FOREWORD

This service manual contains service, diagnostic, trouble shooting and maintenance instructions for the 1974 Arctic Cat El Tigre', 1975 El Tigre' and 1975 Z model El Tigre'. The manual is structured to aid service personnel in practical application and may also be used as a textbook for service training in the classroom.

The manual is divided into sections. Each section pertains to a specific component or operational system. Emphasis is placed on testing, diagnosing malfunctions and trouble shooting. Testing helps to isolate the problem, diagnosing determines what the problem is and trouble shooting tells what the problem is and the cause(s) of the problem. Using this procedure, the problem can be corrected rather than merely replacing components, resulting in the reoccurence of a similar situation.

Other important pieces of service material are the El Tigre' Parts Manuals contained in Section IX. The manuals contain illustrations and parts lists for all serviceable components. The parts manuals should always be referred to when a replacement part is necessary to ensure replacement part accuracy.

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

Just as good service work demands a well-equipped shop, the necessary tools and cleanliness, so also should this Service Manual be associated. Keep this manual in the shop area and use it as a ready reference tool; keep the manual clean.

Form No. 0153-037

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Millimeter/Decimal/Inch Conversion Table

MM	Decimal Equiv.	Inches	+ or −	MM	Decimal Equiv.	Inches	+ or −
1	0.0394	1/32	+	53	2.0866	2 3/32	−
2	0.0787	3/32	−	54	2.1260	2 1/8	+
3	0.1181	1/8	−	55	2.1654	2 5/32	+
4	0.1575	5/32	+	56	2.2047	2 7/32	−
5	0.1969	3/16	+	57	2.2441	2 1/4	−
6	0.2362	1/4	−	58	2.2835	2 9/32	+
7	0.2756	9/32	−	59	2.3228	2 5/16	+
8	0.3150	5/16	+	60	2.3622	2 3/8	−
9	0.3543	11/32	+	61	2.4016	2 13/32	−
10	0.3937	13/32	−	62	2.4409	2 7/16	+
11	0.4331	7/16	−	63	2.4803	2 15/32	+
12	0.4724	15/32	+	64	2.5197	2 17/32	−
13	0.5118	1/2	+	65	2.5591	2 9/16	−
14	0.5512	9/16	−	66	2.5984	2 19/32	+
15	0.5906	19/32	−	67	2.6378	2 5/8	+
16	0.6299	5/8	+	68	2.6772	2 11/16	−
17	0.6693	21/32	+	69	2.7165	2 23/32	−
18	0.7087	23/32	−	70	2.7559	2 3/4	+
19	0.7480	3/4	−	71	2.7953	2 25/32	+
20	0.7874	25/32	+	72	2.8346	2 27/32	−
21	0.8268	13/16	+	73	2.8740	2 7/8	−
22	0.8661	7/8	−	74	2.9134	2 29/32	+
23	0.9055	29/32	−	75	2.9528	2 15/16	+
24	0.9449	15/16	+	76	2.9921	3.0	−
25	0.9843	31/32	+	77	3.0315	3 1/32	+
26	1.0236	1 1/32	−	78	3.0709	3 1/16	+
27	1.0630	1 1/16	+	79	3.1102	3 1/8	−
28	1.1024	1 3/32	+	80	3.1496	3 5/32	−
29	1.1417	1 5/32	−	81	3.1890	3 3/16	+
30	1.1811	1 3/16	−	82	3.2283	3 7/32	+
31	1.2205	1 7/32	+	83	3.2677	3 9/32	−
32	1.2598	1 1/4	+	84	3.3071	3 5/16	−
33	1.2992	1 5/16	−	85	3.3465	3 11/32	+
34	1.3386	1 11/32	−	86	3.3858	3 3/8	+
35	1.3780	1 3/8	+	87	3.4252	3 7/16	−
36	1.4173	1 13/32	+	88	3.4646	3 15/32	−
37	1.4567	1 15/32	−	89	3.5039	3 1/2	+
38	1.4961	1 1/2	−	90	3.5433	3 17/32	+
39	1.5354	1 17/32	+	91	3.5827	3 19/32	−
40	1.5748	1 9/16	+	92	3.6220	3 5/8	−
41	1.6142	1 5/8	−	93	3.6614	3 21/32	+
42	1.6535	1 21/32	−	94	3.7008	3 11/16	+
43	1.6929	1 11/16	+	95	3.7402	3 3/4	−
44	1.7323	1 23/32	+	96	3.7795	3 25/32	−
45	1.7717	1 25/32	−	97	3.8189	3 13/16	+
46	1.8110	1 13/16	−	98	3.8583	3 27/32	+
47	1.8504	1 27/32	+	99	3.8976	3 29/32	−
48	1.8898	1 7/8	+	100	3.9370	3 15/16	−
49	1.9291	1 15/16	−	101	3.9764	3 31/32	+
50	1.9685	1 31/32	−	102	4.0157	4 1/32	−
51	2.0079	2.0	+	103	4.0551	4 1/16	−
52	2.0472	2 1/16	−	104	4.0945	4 3/32	+

+ = Decimal equivalent is greater than the fraction.
− = Decimal equivalent is less than the fraction.

Millimeter/Decimal/Inch Conversion Table

MM	Decimal Equiv.	Inches	+ or −	MM	Decimal Equiv.	Inches	+ or −
105	4.1339	4 1/8	+	157	6.1811	6 3/16	−
106	4.1732	4 3/16	−	158	6.2205	6 7/32	+
107	4.2126	4 7/32	−	159	6.2598	6 1/4	+
108	4.2520	4 1/4	+	160	6.2992	6 5/16	−
109	4.2913	4 9/32	+	161	6.3386	6 11/32	−
110	4.3307	4 11/32	−	162	6.3779	6 3/8	+
111	4.3701	4 3/8	−	163	6.4173	6 13/32	+
112	4.4094	4 13/32	+	164	6.4567	6 15/32	−
113	4.4488	4 7/16	+	165	6.4961	6 1/2	−
114	4.4882	4 1/2	−	166	6.5354	6 17/32	+
115	4.5276	4 17/32	−	167	6.5748	6 9/16	+
116	4.5669	4 9/16	+	168	6.6142	6 5/8	−
117	4.6063	4 19/32	+	169	6.6535	6 21/32	−
118	4.6457	4 21/32	−	170	6.6929	6 11/16	+
119	4.6850	4 11/16	−	171	6.7323	6 23/32	+
120	4.7244	4 23/32	+	172	6.7716	6 25/32	−
121	4.7638	4 3/4	+	173	6.8110	6 13/16	−
122	4.8031	4 13/16	−	174	6.8504	6 27/32	+
123	4.8425	4 27/32	−	175	6.8898	6 7/8	+
124	4.8819	4 7/8	+	176	6.9291	6 15/16	−
125	4.9213	4 29/32	+	177	6.9685	6 31/32	−
126	4.9606	4 31/32	−	178	7.0079	7.0	+
127	5.0000	5.0		179	7.0472	7 1/16	−
128	5.0394	5 1/32	+	180	7.0866	7 3/32	−
129	5.0787	5 3/32	−	181	7.1260	7 1/8	+
130	5.1181	5 1/8	−	182	7.1653	7 5/32	+
131	5.1575	5 5/32	+	183	7.2047	7 7/32	−
132	5.1968	5 3/16	+	184	7.2441	7 1/4	−
133	5.2362	5 1/4	−	185	7.2835	7 9/32	+
134	5.2756	5 9/32	−	186	7.3228	7 5/16	+
135	5.3150	5 5/16	+	187	7.3622	7 3/8	−
136	5.3543	5 11/32	+	188	7.4016	7 13/32	−
137	5.3937	5 13/32	−	189	7.4409	7 7/16	+
138	5.4331	5 7/16	−	190	7.4803	7 15/32	+
139	5.4724	5 15/32	+	191	7.5197	7 17/32	−
140	5.5118	5 1/2	+	192	7.5590	7 9/16	−
141	5.5512	5 9/16	−	193	7.5984	7 19/32	+
142	5.5905	5 19/32	−	194	7.6378	7 5/8	+
143	5.6299	5 5/8	+	195	7.6772	7 11/16	−
144	5.6693	5 21/32	+	196	7.7165	7 23/32	−
145	5.7087	5 23/32	−	197	7.7559	7 3/4	+
146	5.7480	5 3/4	−	198	7.7953	7 25/32	+
147	5.7874	5 25/32	+	199	7.8346	7 27/32	−
148	5.8268	5 13/16	+	200	7.8740	7 7/8	−
149	5.8661	5 7/8	−	201	7.9134	7 29/32	+
150	5.9055	5 29/32	−	202	7.9527	7 15/16	+
151	5.9449	5 15/16	+	203	7.9921	8.0	−
152	5.9842	5 31/32	+	204	8.0315	8 1/32	+
153	6.0236	6 1/32	−	205	8.0709	8 1/16	+
154	6.0630	6 1/16	+	206	8.1102	8 1/8	−
155	6.1024	6 3/32	+	207	8.1496	8 5/32	−
156	6.1417	6 5/32	−	208	8.1890	8 3/16	+

+ = Decimal equivalent is greater than the fraction.
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Millimeter/Decimal/Inch Conversion Table

MM	Decimal Equiv.	Inches	+ or –	MM	Decimal Equiv.	Inches	+ or –
209	8.2283	8 7/32	+	255	10.0393	10 1/32	+
210	8.2677	8 9/32	–	256	10.0787	10 3/32	–
211	8.3071	8 5/16	–	257	10.1181	10 1/8	–
212	8.3464	8 11/32	+	258	10.1575	10 5/32	+
213	8.3858	8 3/8	+	259	10.1968	10 3/16	+
214	8.4252	8 7/16	–	260	10.2362	10 1/4	–
215	8.4646	8 15/32	–	261	10.2756	10 9/32	–
216	8.5039	8 1/2	+	262	10.3149	10 5/16	+
217	8.5433	8 17/32	+	263	10.3543	10 11/32	+
218	8.5827	8 19/32	–	264	10.3937	10 13/32	–
219	8.6220	8 5/8	–	265	10.4330	10 7/16	–
220	8.6614	8 21/32	+	266	10.4724	10 15/32	+
221	8.7008	8 11/16	+	267	10.5118	10 1/2	+
222	8.7401	8 3/4	–	268	10.5512	10 9/16	–
223	8.7795	8 25/32	–	269	10.5905	10 19/32	–
224	8.8189	8 13/16	+	270	10.6299	10 5/8	+
225	8.8583	8 27/32	+	271	10.6693	10 21/32	+
226	8.8976	8 29/32	–	272	10.7086	10 23/32	–
227	8.9370	8 15/16	–	273	10.7480	10 3/4	–
228	8.9764	8 31/32	+	274	10.7874	10 25/32	+
229	9.0157	9 1/32	–	275	10.8268	10 13/16	+
230	9.0551	9 1/16	–	276	10.8661	10 7/8	–
231	9.0945	9 3/32	+	277	10.9055	10 29/32	–
232	9.1338	9 1/8	+	278	10.9449	10 15/16	+
233	9.1732	9 3/16	–	279	10.9842	10 31/32	+
234	9.2126	9 7/32	–	280	11.0236	11 1/32	–
235	9.2520	9 1/4	+	281	11.0630	11 1/16	+
236	9.2913	9 9/32	+	282	11.1023	11 3/32	+
237	9.3307	9 11/32	–	283	11.1417	11 5/32	–
238	9.3701	9 3/8	–	284	11.1811	11 3/16	–
239	9.4094	9 13/32	+	285	11.2204	11 7/32	+
240	9.4488	9 7/16	+	286	11.2598	11 1/4	+
241	9.4882	9 1/2	–	287	11.2992	11 5/16	–
242	9.5275	9 17/32	–	288	11.3386	11 11/32	–
243	9.5669	9 9/16	+	289	11.3779	11 3/8	+
244	9.6063	9 19/32	+	290	11.4173	11 13/32	+
245	9.6457	9 21/32	–	291	11.4567	11 15/32	–
246	9.6850	9 11/16	–	292	11.4960	11 1/2	–
247	9.7244	9 23/32	+	293	11.5354	11 17/32	+
248	9.7638	9 3/4	+	294	11.5748	11 9/16	+
249	9.8031	9 13/16	–	295	11.6142	11 5/8	–
250	9.8425	9 27/32	–	296	11.6535	11 21/32	–
251	9.8819	9 7/8	+	297	11.6929	11 11/16	+
252	9.9212	9 29/32	+	298	11.7323	11 23/32	+
253	9.9606	9 31/32	–	299	11.7716	11 25/32	–
254	10.0000	10.0		300	11.8110	11 13/16	–

+ = Decimal equivalent is greater than the fraction.
– = Decimal equivalent is less than the fraction.

Conversions

Number of Cubic Centimeters x 0.061 = Cubic Inches
Number of Cubic Inches x 16.387 = Cubic Centimeters
Number of Foot Pounds x 0.1383 = Kilograms in Meters
Number of Kilogram Meters x 7.235 = Foot Pounds

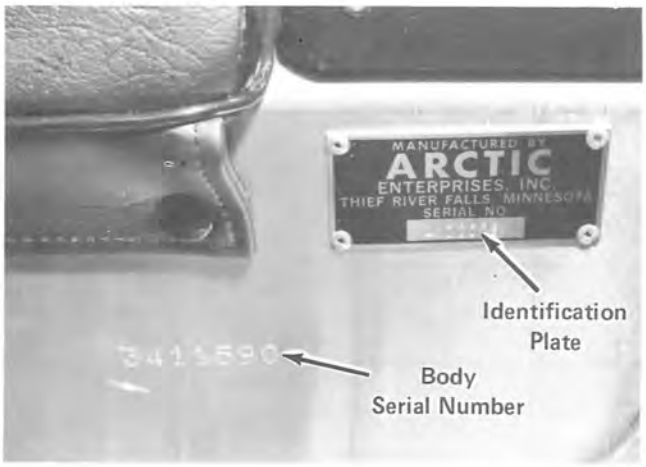
IDENTIFICATION

The 1974 Arctic Cat El Tigre' has 3 identifying numbers; chassis model and serial number, a body serial number and an engine model and serial number.

Chassis Model and Serial Number — The identification plate, Fig. I-1, is located on the right front side of the body tunnel. All internal records are maintained by the chassis serial number.

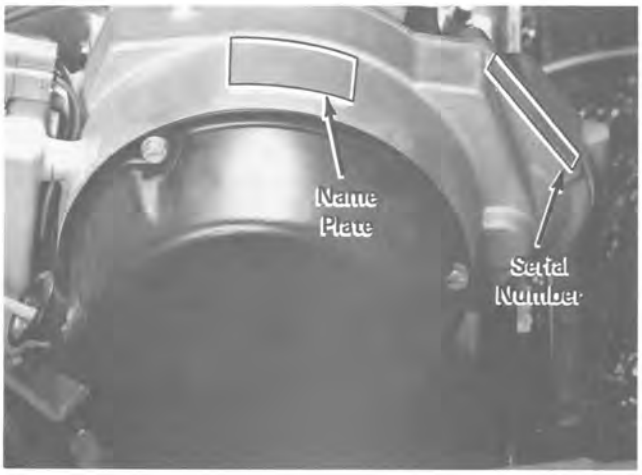
Body Serial Number — The number is stamped into the body tunnel, Fig. I-1, near the chassis serial number plate. This number is of great importance because it can be used to trace and identify a stolen snowmobile.

Fig. I-1



Engine Model and Serial Number — The engine model number is stamped into the engine name plate, Fig. I-2, which is located above the recoil starter. The engine serial number, Fig. I-2, is stamped into the top of the axial fan housing.

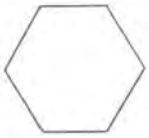
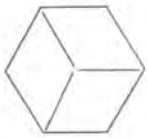
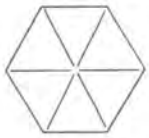
Fig. I-2



The chassis, body and engine numbers are required to properly complete warranty claims and to make sure that correct replacement parts are obtained. Under no circumstances is warranty to be allowed if the chassis model and serial number plate has been tampered with or removed. When a new engine is installed, notify the distributor and the factory of the new engine model and serial number.

Fig. I-3

BOLT TORQUE CHART

Bolt Grade		SAE-2	SAE-5	SAE-8	Socket or Wrench	
Minimum Tensile Strength		64,000 PSI	105,000 PSI	150,000 PSI		
Grade Marking on Bolt						
U.S. Standard						
Bolt Diameter	U.S. Dec. Equiv.	Ft./Lbs. Torque ± 10%			Bolt Head	Nut
1/4	0.250	6	10	14	7/16	7/16
5/16	0.3125	13	20	30	1/2	1/2
3/8	0.375	23	35	50	9/16	9/16
7/16	0.4375	35	55	80	5/8	11/16
1/2	0.500	55	85	120	3/4	3/4
9/16	0.5625	75	130	175	13/16	7/8
5/8	0.625	105	170	240	15/16	15/16
3/4	0.750	185	300	425	1-1/8	1-1/8
7/8	0.875	160	445	685	1-5/16	1-5/16
1	1.000	250	670	1030	1-1/2	1-1/2

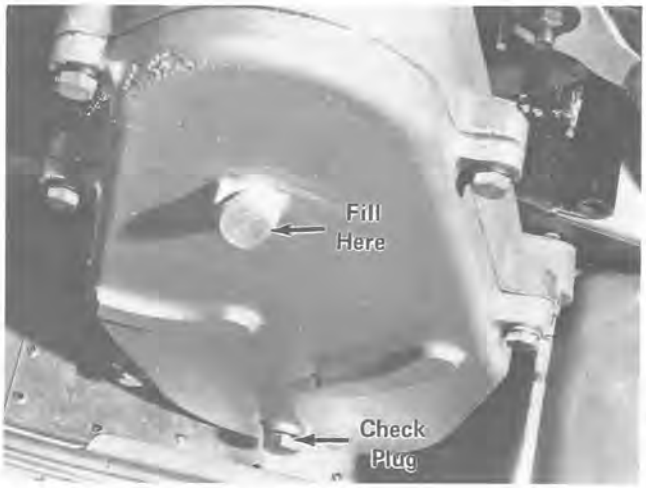
Note: Multiply foot pound value by 12 to obtain inch pound torque value.

CHAINCASE LUBRICANT

The lubricant used in the chaincase is to be Arctic Chainlube. Lubricant level must be at the point of overflowing in the check plug hole, Fig. I-4. Capacity of the chaincase is 8 ounces.

To drain the lubricant from the chaincase, place rags in the belly pan, remove chaincase cover and allow lubricant to drain into the rags. Lubricant is to be changed at the end of every snow season or after 100 hours of operation.

Fig. I-4

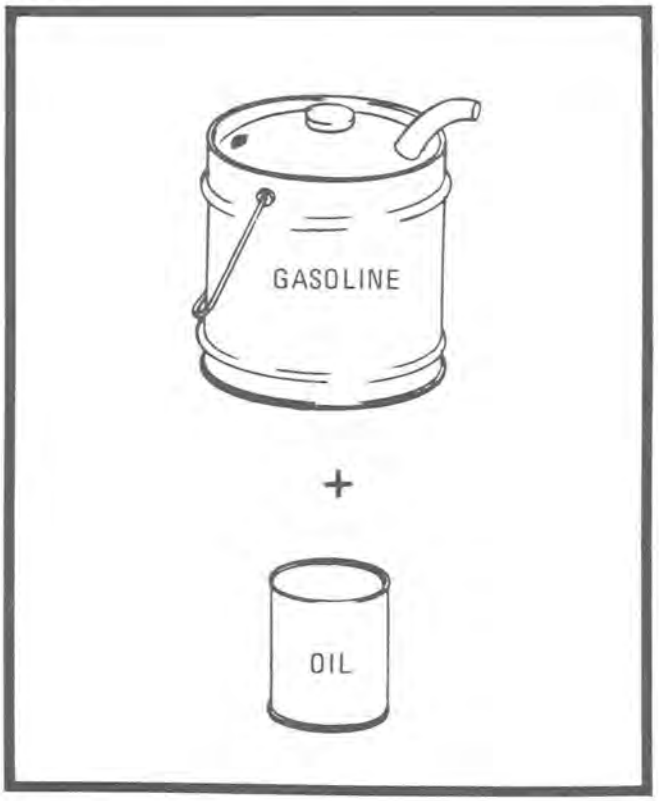


FUEL MIXING

Equipment Necessary: Gas Can, Arctic Cat Purple Powerlube or Chemilube (for Racing) Snowmobile Oil and Gasoline (90 Octane Minimum)

The correct fuel mixture ratio is 5 U.S. gallons of regular gasoline (90 octane minimum) plus 1 U.S. quart of Arctic Cat Purple Powerlube or Chemilube Snowmobile Oil, Fig. I-5. This mixture is equivalent to a 20:1 ratio.

Fig. I-5



▲ WARNING ▲

When mixing gas/oil or when the snowmobile fuel tank is filled, do so outdoors. Do not smoke; keep away from camp fires if fueling in a camping or rest area. The engine must not be running when fueling to prevent the possibility of a fire or an explosion, Fig. I-6.

Instruct the customer that a two-cycle engine requires the lubricating oil to be mixed with gasoline for lubrication and internal engine cooling. Do not use outboard motor oil in the Arctic Cat engine.

Fig. I-6

Note: Gasoline and oil must be premixed in a clean container. Impress upon the customer that no attempt should be made to mix gasoline and oil in the snowmobile fuel tank. Gasoline and oil will not mix well in extremely cold temperatures. Therefore, it is recommended that the oil be at room temperature (+70°F.) when mixing.

1. Fill a clean container (gas can) with 2-1/2 U.S. gallons of gasoline (90 octane minimum). Add the recommended amount of oil (1 U.S. quart of Arctic Cat Purple Powerlube or Chemilube Snowmobile Oil) and shake the mixture vigorously.

2. Add the remainder of gasoline (2-1/2 U.S. gallons), and again, shake the mixture vigorously.

3. Using a funnel with a fine mesh screen to prevent the entry of dirt or other foreign particles, fill the snowmobile fuel tank. Wipe up any fuel that may have spilled. DO NOT fill when the engine is hot.

Note: When using a gasoline/oil mixture that has been setting for some time (settling of oil may have occurred), the mixture is to be shaken vigorously before the snowmobile fuel tank is filled.

KNOW THE CONTROLS

Prior to starting the engine, the operation and function of every control, Fig. I-7, must be understood. Even if you have driven and serviced an Arctic Cat Snowmobile before, read this material to familiarize yourself with the location of controls and operational characteristics so that you can better explain them to the customer. KNOW THE CONTROLS.

1. Headlight Dimmer Switch – Move headlight dimmer switch to the desired low or high beam position. When point of switch is down, headlight is on low beam. When point of switch is up, headlight is on high beam.

2. Brake Control – When brake control is compressed, braking action will retard or stop snowmobile movement.

3. Choke – To start a cold engine, close choke by pulling fully outward. A warm engine will require little or no choking.

4. Light Switch – Move switch to ON position to activate headlight and taillights. Lights work only while engine is running.

5. Speedometer – Indicates how fast (MPH) the snowmobile is moving and number of miles traveled.

6. Fuel Tank Gauge Cap – Indicates fuel level. Keep vent hole in the top of the cap unobstructed.

7. Tachometer – Indicates engine RPM.

8. Recoil Starter Handle – After ignition key is rotated to the ON position, pull recoil starter handle to start the engine.

9. Ignition Switch – Three positions (OFF, ON and START). OFF position used to shut engine off. Rotate key to ON position to start recoil equipped engine. START position is not used.

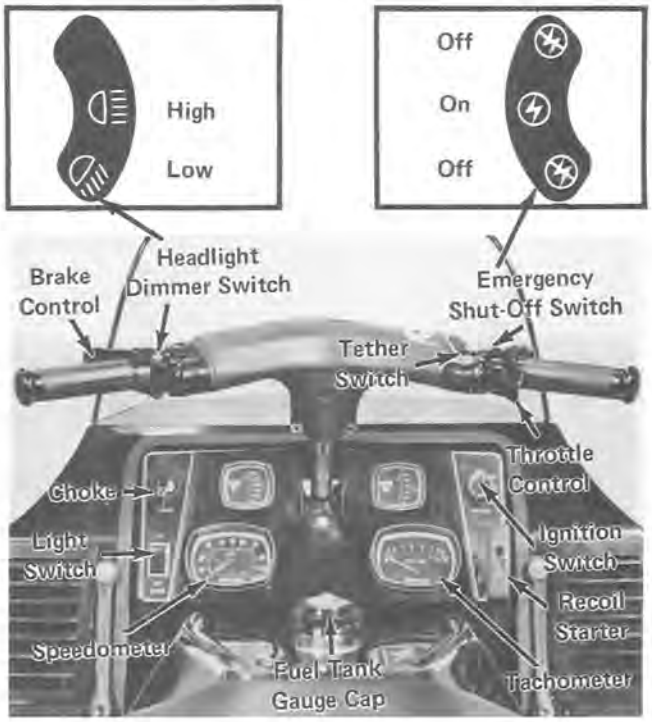
Note: Ignition key must be in the OFF position before it can be rotated to the ON or START position. Key will not rotate from ON to START.

10. Throttle Control – Used to operate engine at various speeds. Speed is directly proportionate to throttle lever movement. When throttle is released, it automatically returns carburetor throttle arm to idle position. If carburetor throttle or throttle linkage freezes or jams in an open position, throttle safety switch will automatically shut engine off when handle-mounted throttle control is released. DO NOT COMPRESS THROTTLE CONTROL WHEN STARTING A COLD ENGINE.

11. Tether Switch – Pin must be inserted into switch before engine can be started. Slip end of cord around wrist when operating snowmobile. If pin is pulled out of switch, engine will shut off.

12. Emergency Shut-Off Switch – To be used if an emergency occurs and the engine must be shut off quickly. Depress the emergency shut-off switch to obtain the ON or OFF position. When the switch is in a depressed position, the engine will shut off and will not start. When the switch is in a released position, the engine can be started. The emergency shut-off switch works independently of the ignition switch.

Fig. I-7



Note: Heat gauges are optional equipment for the 1974 El Tigre'. Additional accessories are listed in the 1974 Arctic Cat Snowmobile Accessory Brochure.

SAFETY CHECKS

Before the snowmobile is test driven and returned to the customer after service work is completed, the following critical items are to be checked so that the operating systems are working properly.

1. Check the cooling system. Finned parts of the engine must not be obstructed.

2. Make sure the carburetor and exhaust systems are fastened securely.

3. Check the operation of the throttle control. The throttle control is to compress without excessive effort and return freely to the idle position.

4. Check the brake control. Brake is to fully engage when brake control is compressed approximately 3/4-inch and disengage freely when released. If more than 3/4-inch brake control travel is necessary to fully engage the brake, an adjustment of the brake is necessary.

5. Check the steering; skis must turn freely. If difficulty is encountered, repair before operating. Check the ski alignment; skis must be parallel.

6. Make sure the headlight, brakelight and taillights are working properly.

7. Check the operation of the throttle safety switch. Prop the back end of the snowmobile up on a Quik Jack and start the engine. Check the operation of the throttle safety switch by opening the carburetor slides approximately 1/8-inch. DO NOT compress throttle control on the steering handle. When engine starts to cut out, release the carburetor throttle. Engine cutout indicates throttle safety switch is operating properly. If cutout does not occur, an adjustment is necessary.

STARTING/STOPPING INSTRUCTIONS

WARNING

Never allow anyone to stand in front of the snowmobile at any time, especially when starting.

1. Perform all Safety Checks.

2. Move the emergency shut-off switch to the ON position. This position allows the engine to be started.

3. Insert the tether pin into the switch.

4. Move the choke fully upward. DO NOT HOLD THE THROTTLE CONTROL WHEN STARTING A COLD ENGINE.

Note: If the engine is warm, choking is not normally necessary.

5. Rotate the ignition key to the ON position.

6. Pull recoil starter handle until pawls engage; then give a short quick pull.

CAUTION

DO NOT pull the recoil rope to its limit or drop the rope from an extended recoil position. Failure to comply may result in damage to the recoil starter.

7. When a cold engine is started, the choke will allow the engine to "fast idle" until the engine is warm. Allow a cold engine to idle for approximately 30 seconds before operating.

8. Stopping — To stop (shut off) the engine under normal conditions, rotate the ignition key to the OFF position after coming to a complete stop.

9. Emergency Stopping — If the engine must shut off quickly because of an emergency, pull out the tether pin or move the emergency shut-off switch to the OFF position. Engine will shut off.

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SETTING UP INSTRUCTIONS

Install Skid Frame (All Except Z Models)

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

1. Remove all mounting hardware holding the snowmobile to the pallet, using a 1/2-inch wrench and socket. Lift the snowmobile off the pallet and set on the floor.

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

3. Move the front mounting arm of the skid frame into position with the front mounting holes in the tunnel. Slide lock washer onto bolt and secure skid frame to tunnel, Fig. IA-1, using a 9/16-inch socket. DO NOT TIGHTEN BOLT – THREAD IN ONLY HALFWAY.

Fig. IA-1

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

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

5. Secure the front mounting arm, following the directions given in step 3.

6. Move the rear mounting arm of the skid frame into position with the rear mounting holes in the tunnel. Slide lock washer onto bolt and secure skid frame to tunnel, Fig. IA-2, using a 9/16-inch socket. DO NOT TIGHTEN BOLT – THREAD IN ONLY HALFWAY.

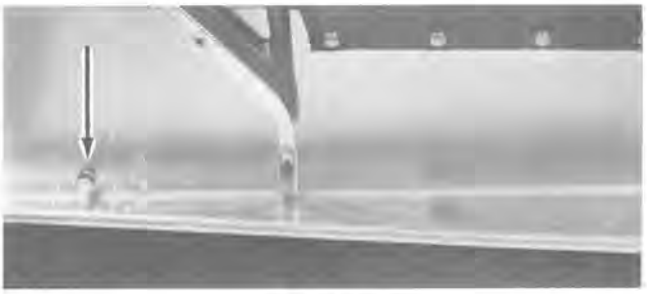

Fig. IA-2

Note: The rear mounting arm of the skid frame may not line up with the holes in the tunnel. To obtain mounting arm and mounting hole alignment, drive the mounting arm, using a rubber hammer, in the proper direction until it is aligned with hole in tunnel.

7. Tip snowmobile over on opposite side, using cardboard to protect against scratching.

8. Secure the rear mounting arm to the tunnel with a bolt and a lock washer, using a 9/16-inch socket. Tip snowmobile upright.

9. Tighten all skid frame mounting bolts to 35 ft-lb, using a torque wrench and a 9/16-inch socket.

Install Skid Frame (Z Models)

Equipment Necessary: Cardboard, Torque Wrench, 1/2-Inch Socket, and 9/16-Inch Socket

1. Remove all mounting hardware holding the snowmobile to the pallet, using a 1/2-inch wrench and socket. Lift the snowmobile off the pallet and set on the floor.

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

3. Relax spring tension on both rear arm assemblies of skid frame by loosening nuts on eye bolts.

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

SETTING UP INSTRUCTIONS

4. Move the front mounting arm of the skid frame into position with the front mounting holes in side of tunnel. Slide lock washer onto bolt and secure skid frame to tunnel, Fig. IA-3. DO NOT TIGHTEN BOLT.

Fig. IA-3

Note: The Model Z has three holes in each side of the tunnel for mounting the front arm of the skid frame. The skid frame is correctly installed when the front mounting arm is aligned with and secured through the rear of these three holes.

5. Push skid frame and track into tunnel and tip snowmobile over onto opposite side, using cardboard to protect against scratching.

6. Secure front mounting arm as in step 4. DO NOT TIGHTEN BOLT.

7. Install metal bushing into outside end of each of the two rear mounting arms. While holding bottom bushing in place, push rear of skid frame up into tunnel.

8. Move rear mounting arm into position so that hole in bushing aligns with rear mounting hole in tunnel.

Note: The Model Z has two holes in each side of the tunnel for mounting the rear arms of the skid frame. The skid frame is correctly aligned when the rear mounting arms are aligned with and secured through the rear of these two holes.

9. Install another metal bushing into inside end of rear mounting arm. Hold bushing in place while inserting cap screw with large flat washer, from inside of tunnel, through both bushings, Fig. IA-4, and out through rear mounting hole in tunnel. Secure with small flat washer and self-locking nut. DO NOT TIGHTEN.

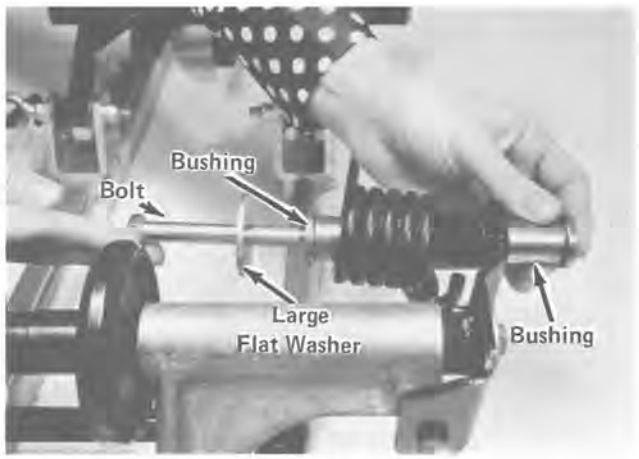

Fig. IA-4

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

11. Install metal bushing into inside end of rear mounting arm and secure as in step 9. DO NOT TIGHTEN NUT.

12. Tip snowmobile upright.

13. Tighten all skid frame mounting bolts to 35 ft-lb, using a torque wrench and a 9/16-inch socket.

Install Skis

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

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

Note: The 1975 El Tigre skis and shocks come assembled as a unit. For 1975 ski installation, proceed to step 6. For 1974 models, begin with step 2.

SETTING UP INSTRUCTIONS

2. Slide a long sleeve through the stationary end of the shock absorber and place a plastic bushing on each end of the long sleeve, Fig. IA-5.

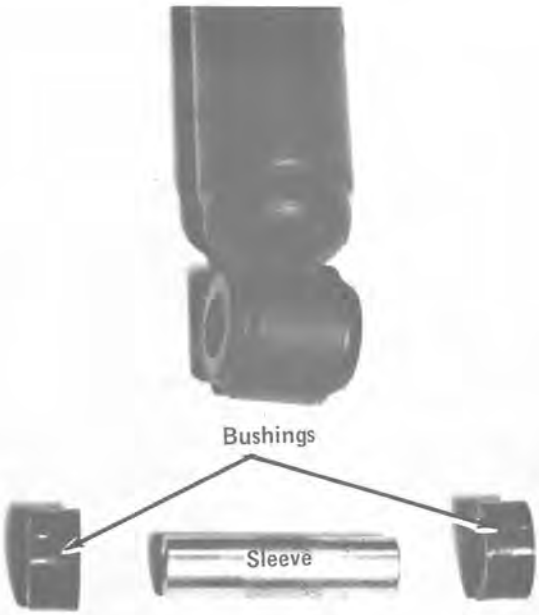

Fig. IA-5

Note: Flat end surface of the plastic bushing must contact shock absorber and radiused end surface must contact the shock mounting bracket.

3. Place shock assembly into position between the shock mounting bracket and secure in place with bolt and lock nut, Fig. IA-6. Bolt is to be started from the outside. Tighten the bolt to 50 ft-lb, using a 5/8-inch wrench, 5/8-inch socket, and torque wrench.

Fig. IA-6

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

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

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

6. Place ski assembly into position on spindle and secure in place with a bolt (rubber damper, Fig. IA-7, is to be placed between spindle and saddle on 1975 model skis). Threaded hole in the ski saddle is to be on the inside, and therefore, the bolt must be started from the outside. Tighten the bolt to 30 ft-lb, using a 9/16-inch socket and torque wrench. (Rubber dampers may obstruct passage of bolts. Therefore, to facilitate ski installation, tip snowmobile upright before placing skis on spindles. Then, by lifting snowmobile front end off floor, skis can be installed on spindles and weight of snowmobile can be used to compress rubber damper.) Thread lock nut onto bolt and tighten to 30 ft-lb, using a 9/16-inch socket and torque wrench.

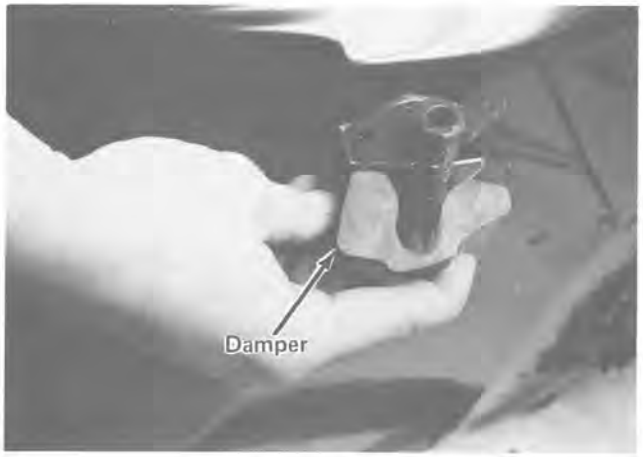

Fig. IA-7

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

7. Slide a short sleeve through the moveable end of the shock absorber and position the end between the spindle mounting bracket. Secure in place with bolt and lock nut, making sure the bolt is started from the outside. Tighten

the bolt to 50 ft-lb, using a 5/8-inch socket and torque wrench.

Note: Apply low-temperature grease (Texaco 2346 EP or equivalent) to the non-threaded portion of the bolt to prevent binding or corrosion. Step 7 applies only to 1974 models.

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

9. Position the snowmobile upright.

Align Skis

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

1. Remove the cap screw and lock nut holding the tie rod end to the spindle arm, using a 9/16-inch socket and wrench. Separate tie rod end from the spindle arm. Perform this step on the opposite tie rod end.

2. Position the skis straight forward and establish a parallel relationship.

3. Measure the distance to the outside edge of both skis, Fig. IA-8, using a tape measure. Make sure measurement is taken behind the front spring mounting bracket and ahead of the rear spring mounting bracket. Skis are to be parallel (same measurement at front and rear) or have a maximum of 1/4-inch "toe-in" (front measurement 1/4 inch less than rear).

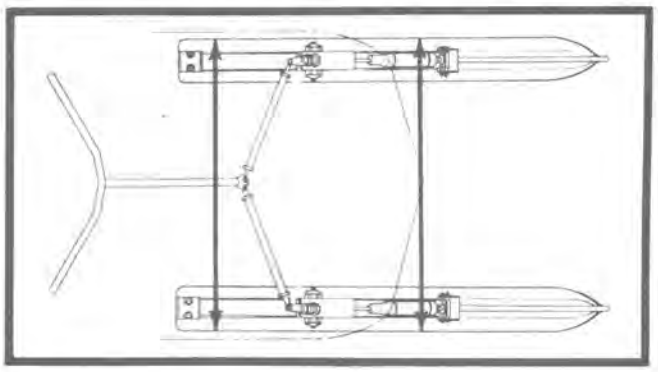

Fig. IA-8

4. Position handlebar straight forward in relation to the skis.

5. Rotate tie rod until the tie rod end mounting hole lines up with hole in the spindle arm. Secure tie rod end to spindle with a cap screw and lock nut, using a 9/16-inch socket and open end wrench. Tighten cap screw to 35 ft-lb, using a 9/16-inch socket and torque wrench.

Note: On 1975 models, loosen the two jam nuts, Fig. IA-9, securing adjusting stud in position; then rotate adjusting stud until tie rod end mounting hole lines up with the hole in the spindle arm and secure in place.

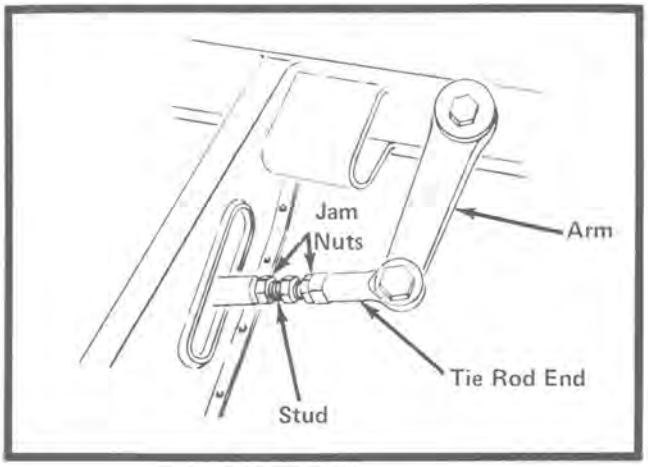

Fig. IA-9

6. Bottom the jam nut against the tie rod, using a 9/16-inch open end wrench.

Note: On 1975 models, bottom one jam nut against tie rod; then bottom other jam nut against tie rod.

7. Perform steps 5 and 6 on remaining tie rod end.

⚠ WARNING ⚠

To ensure the utmost safety for the operator, all cap screws, lock nuts, jam nuts, tie rods, and tie rod ends must be tightened properly and be without noticeable damage. Tie rod end must be threaded halfway into tie rod to assure maximum steering linkage strength. If any of these are neglected, damaged, or not assembled correctly, serious injury to the operator or passenger may result.

SETTING UP INSTRUCTIONS

Install Windshield

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

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

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

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

4. Position the windshield and trim in place and retain with 2 phillips screws on each side of center. Thread the screws 3/4 of the way in, using a phillips screwdriver. DO NOT TIGHTEN SCREWS.

5. Work from side to side and install the remaining phillips screws, which will position the windshield and trim on the hood. DO NOT TIGHTEN SCREWS.

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

Adjust Suspension and Track

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

1. Lubricate rear suspension arms, Fig. IA-10, with low-temperature grease (Texaco 2346 EP or equivalent).

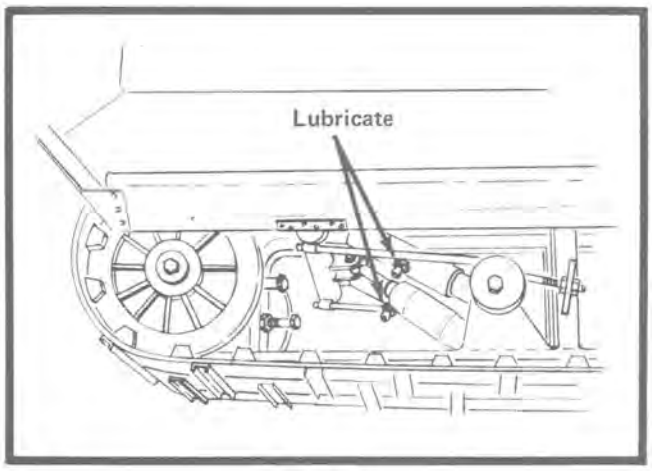

Fig. IA-10

Note: Because of grease fitting position, a flexible hose grease gun must be used.

2. Adjust the suspension (See: Section VI – Suspension, Suspension Adjustment).

3. Adjust the track tension (See: Section VI – Suspension, Track Tension).

4. Adjust the track alignment (See: Section VI – Suspension, Track Alignment).

Remove Exhaust System

Equipment Necessary: Small Vise-Grip, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Socket, and 6-Inch Extension

Note: Use steps 1 - 2 for 1974 models, steps 3 - 5 for standard 1975 models, and steps 6 - 9 for 1975 Z models.

1. Remove the two springs securing pulse charger to exhaust manifold, using a small vise-grip. Remove the rear tension spring securing pulse charger to the right footrest, using a small vise-grip.

2. Remove the lock nut and flat washer securing pulse charger and bracket to right front motor mount, using a 9/16-inch socket and 6-inch extension. Remove pulse charger.

3. Remove the two springs securing pulse charger to exhaust manifold, using a small vise-grip.

4. Remove the large spring holding muffler in mounting bracket, using a vise-grip, Fig. IA-11.

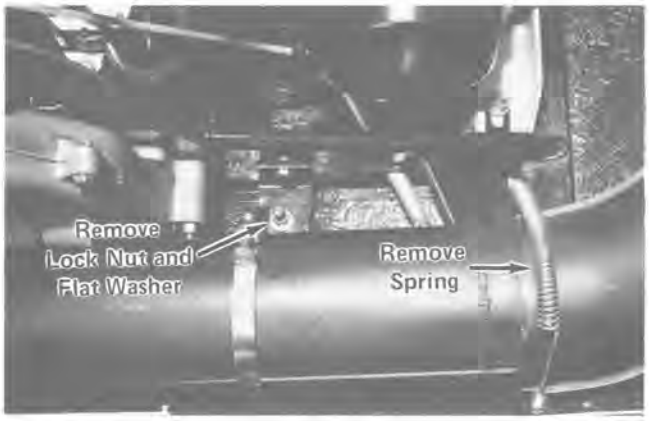

Fig. IA-11

SETTING UP INSTRUCTIONS

5. Remove the lock nut and flat washer, Fig. IA-11, from the rear pulse charger mount, using a 9/16-inch socket and 6-inch extension. Remove pulse charger.

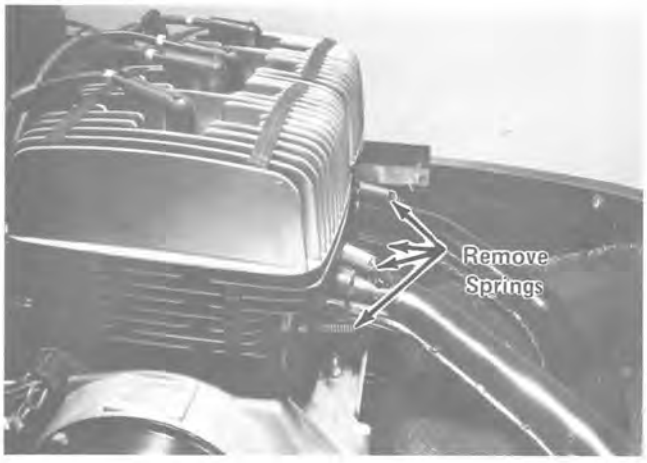

Fig. IA-12

6. Remove the four springs securing expansion chambers to exhaust pipe flanges, Fig. IA-12, using a small vise-grip.

7. Loosen the four nuts on the exhaust clamps, Fig. IA-13, using a 1/2-inch wrench. Remove the expansion chambers.

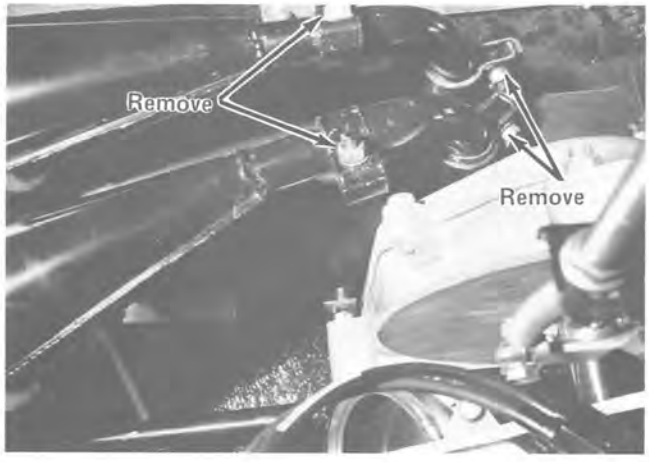

Fig. IA-13

8. Remove the bolt, washer, and nut securing rear of muffler to footrest, using a 7/16-inch socket and 7/16-inch wrench.

9. Remove the lock nut and flat washer securing muffler to chain case housing, using a 1/2-inch wrench.

● CAUTION ●

Make sure the chain case cover and gasket are sealing properly against chain case. Chain lube will leak if an improper seal exists, and damage to drive system components will result.

Check Chain Alignment and Lubricate

Equipment Necessary: Arctic Chain Lube, Small Vise-Grip, Straight Edge, 1/2-Inch Socket, 9/16-Inch Socket, 3/4-Inch Wrench, and a 3-Inch Extension

1. Remove the exhaust system (See: Remove Exhaust System, page IA-6).

2. Remove the four cap screws and star washers, Fig. IA-14, holding chain case cover in place. Remove the chain case cover and gasket.

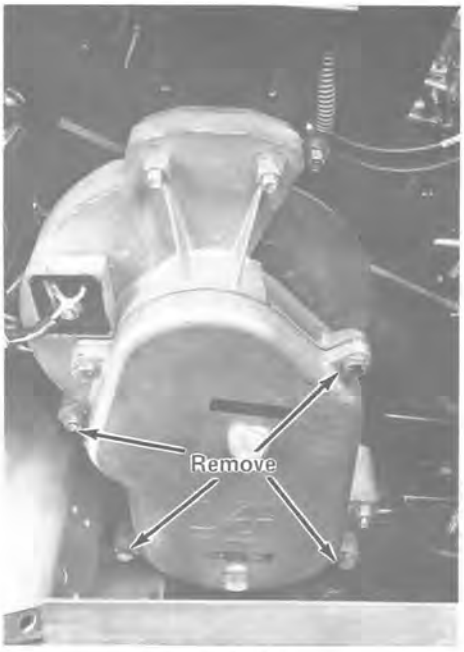

Fig. IA-14

Note: Exercise care when removing the chain case cover so as not to damage the gasket.

SETTING UP INSTRUCTIONS

3. Check chain alignment in relation to sprockets by placing a 12-inch straight edge against the bottom and top sprocket, Fig. IA-15. No visible gap is to exist between the surface of the straight edge and the face of the sprockets. If alignment is correct, proceed to step 4. If alignment is not correct, adjust sprockets (See: Section V — Drive System, Align Sprockets).

Fig. IA-15

4. Remove oil filler plug and oil check plug, using a 3/4-inch wrench.

5. Place chain case gasket in position on chain case. Install chain case cover with the four cap screws and star washers. Tighten to 20 ft-lb, using a torque wrench and a 1/2-inch socket.

6. Using a funnel, fill the chain case with 8 ounces of Arctic Chain Lube, which is located in the hood compartment. Lubricant level is to be at the point of overflowing in the check plug hole. If not at the point of overflowing, carefully top off with Arctic Chain Lube. Wipe any spilled chain lube off parts.

7. Install both the oil check plug and oil filler plug and tighten, using a 3/4-inch wrench.

8. Install exhaust system components (See: Install Exhaust System, page IA-8).

Install Exhaust System

Equipment Necessary: Small Vise-Grip, 7/16-Inch Socket, 7/16-Inch Wrench, 1/2-Inch Wrench, 9/16-Inch Socket, and 6-Inch Extension

Note: Use steps 1 - 2 for 1974 models, steps 3 - 4 for standard 1975 models, and steps 5 - 8 for 1975 Z models.

1. Place pulse charger w/bracket into position in chassis. Secure pulse charger to manifold with the two springs. Fasten rear of pulse charger to footrest with a spring, using a small vise-grip.

2. Secure bracket to MAG side front motor mount, using a 9/16-inch socket and 6-inch extension.

3. Place pulse charger in position in chassis. Secure pulse charger to manifold with two springs and connect the large spring which holds pulse charger in bracket, using a small vise-grip.

4. Install the lock nut and flat washer which secures the rear pulse charger mount, using a 9/16-inch socket and 6-inch extension.

5. Place muffler in position. Secure rear of muffler to footrest with a bolt, washer, and nut, using a 7/16-inch socket and wrench.

Note: To prevent exhaust fumes from escaping into the front cowling, a small amount of RTV sealant may be used to seal exhaust joints and flanges.

6. Install the lock nut and flat washer which secures the muffler to the chain case housing, using a 1/2-inch wrench.

7. Place the two expansion chambers in position and secure to the exhaust pipe flanges with four springs, using a small vise-grip.

8. Tighten the four nuts on the exhaust clamps, using a 1/2-inch wrench.

Adjust Choke

Equipment Necessary: 7mm Wrench, 3/8-Inch Wrench, and 7/16-Inch Wrench

1. Adjust choke cable so the greatest amount of slack is present.

   A. 1974 Models — Loosen the jam nuts on cable slack adjusters, Fig. IA-16, using a 7mm wrench. Turn adjusters toward engine to get slack in cables.

SETTING UP INSTRUCTIONS

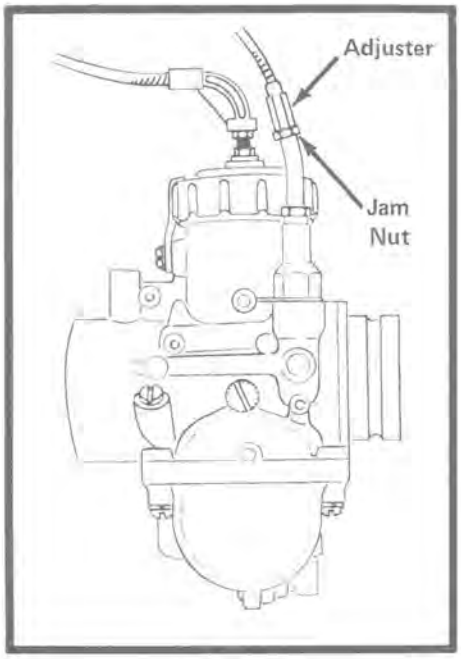

Fig. IA-16

B. 1975 Models — Loosen the jam nut on cable adjusters, using a 7/16-inch wrench. Turn adjusters into carburetor to obtain slack in cable, using a 3/8-inch wrench if needed.

2. Remove excessive slack from cable. Cable should have 1/16-inch free play.

   A. 1974 Models — Check free play at either adjuster end or junction box of cable by dash mount.

   B. 1975 Models — Check free play only at inlet of 90° cable guide.

Note: DO NOT remove all slack. If no free play is evident, starter plunger may not fully seat and a rich condition will result.

3. Tighten starter cable adjusters.

   A. 1974 Models — Tighten the jam nut against the cable adjusters, using a 7mm wrench, Fig. IA-16.

   B. 1975 Models — Tighten the jam nut on the cable adjusters against the starter cable cap of carburetor.

Note: The 1975 models have a two-positio choke. To start a cold engine, lift the choke lever fully upward. When the engine starts, move the choke to the middle position until fully warmed.

Adjust Brake and Throttle Controls

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, 3/8-Inch Wrench, 7/16-Inch Wrench, and 1/2-Inch Wrench

1. Squeeze the brake lever. When brake is fully engaged, there is to be from 1/4 - 1/2 inch between the front of the brake lever and the brake lever stop, Fig. IA-17. If specification (1/4 - 1/2 inch) is not obtained, remove cotter key from brake adjusting stud and rotate brake adjusting nut clockwise or counter-clockwise, using a 1/2-inch wrench, until the specified adjustment is obtained.

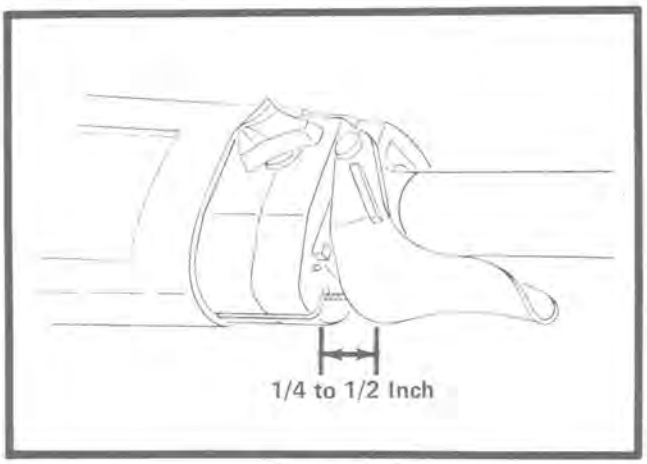

Fig. IA-17

2. Adjust carburetor throttle controls (See: Section III — Fuel System, Carburetor, Throttle and Synchronization Adjustment).

SETTING UP INSTRUCTIONS

Time the Engine (Ignition)

Equipment Necessary: Feeler Gauge, Torque Wrench, Screwdriver Having a 1/4-Inch Blade, 10mm Socket, 13/16-Inch Spark Plug Socket, and 3-Inch Extension

It is recommended that the ignition timing be checked at time of "Setup" and each time the engine is serviced. Incorrect ignition timing will have a negative effect on engine performance.

1. Disconnect the high tension wires from the spark plugs, Fig. IA-18. Remove the spark plugs and washers, using a 13/16-inch spark plug socket, and check for proper type and heat range (NGK BR9EVA). Set the air gap at 0.016 of an inch, using a feeler gauge.

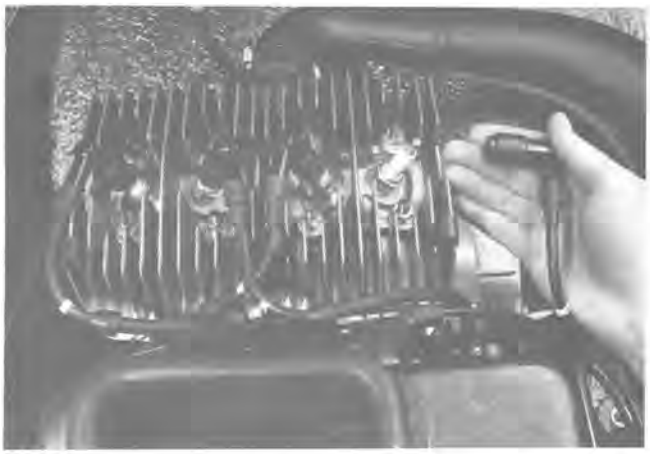

Fig. IA-18

2. Install the spark plugs and washers. Tighten to 20 ft-lb, using a torque wrench and a 13/16-inch spark plug socket. Connect the high tension wires to the spark plugs.

3. Remove the three bolts and lock washers securing recoil cover to flywheel housing. Remove recoil.

4. Rotate flywheel until one of the holes in flywheel is toward front of snowmobile. Shine a light through the hole in flywheel to see that the timing mark is aligned with the boss of engine cases. The long mark on base plate is for engine requiring 17° ignition timing. The short mark is for engines requiring 14° ignition timing. Timing for the various engines is shown in Fig. IA-19.

IGNITION TIMING

Engine Model	Timing (Degrees)
T1C295RS	25
T1C340RS	25
T7B400RS	17
T7B440RS	17
T7C340FR1	14
T7C440FR1	17
T7C250FR2	14
T7C340FR2	14
T7C440FR2	17

Fig. IA-19

Note: On T1C series engines, the only timing mark on the stator plate is for the required 25° timing. Align the mark with the boss on the engine cases.

5. If adjustment is necessary, loosen the two base plate screws, using a screwdriver having a 1/4-inch blade. Align marks. Tighten base plate screws.

6. Check fine timing of engine with timing light (See: Section II — Engine Servicing, Timing).

7. When timing is correct, secure recoil assembly to flywheel housing with the three bolts and lock washers. Tighten bolts to 5 ft-lb, using a torque wrench and a 10mm socket.

SETTING UP INSTRUCTIONS

Check Switch Operation

Equipment Necessary: No Special Tools Required

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

Adjust Headlight

Equipment Necessary: See Section IV – Electrical System, Headlight Adjustment

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

BREAK-IN

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

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

Note: During break-in or after the engine is overhauled, only a 20:1 fuel mixture ratio is to be recommended to the customer.

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

Arctic recommends that specific items be checked at the ten hour checkup. The specific items are critical adjustments, operating characteristics, and safety features (See: Ten Hour Checkup, page IA-12).

TEN HOUR CHECKUP

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

The following items are to be checked:

1. Ask the customer if he is generally satisfied with the performance and operating characteristics of the snowmobile.
2. Check the operation of the ignition switch, headlight and taillight switch, brakelight switch, and the emergency shut-off switch. Make sure both the high and low beams of the headlight work.
3. Test drive the snowmobile so that you can be certain all systems are working properly. Test the brake for proper braking characteristics.
4. Remove the spark plug and examine the center electrode and air gap. Determine the engine operating temperature by examining the color of the center electrode.
5. Check the fuel line, the in-line fuel filter, and the fuel tank filter.
6. Check the carburetors for proper adjustments.
7. Check the choke and throttle cables. Cables must not be bent, frayed, or kinked.
8. Check skags and ski alignment.
9. Check condition of drive belt.
10. Check drive clutch; rollers must be free to rotate.
11. Check center-to-center distance between drive clutch and driven pulley.
12. Check drive clutch/driven pulley offset measurement.
13. Check chain case lubricant level.
14. Check track tension and alignment.
15. Lubricate rear suspension arms.
16. Check ignition timing.
17. Tighten all nuts and bolts.
18. Tighten intake, exhaust, and recoil hardware to the proper torque value.
19. Make sure all safety decals are in place.
20. Test drive snowmobile to ensure proper operation.
21. Clean snowmobile prior to customer pickup or delivery.

NOTES

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'74 EL TIGRE ENGINE SPECIFICATIONS

Description	295	340	400	440
Engine Model	T1C 295 RS1A	T1C 340 RS1A	T7B 400 RS1A	T7B 440 RS1A
No. of Cylinders	2	2	2	2
Displacement	295	339	398	436
Bore	56mm/2.205 in.	60mm/2.362 in.	65mm/2.559 in.	68mm/2.677 in.
Stroke	60mm/2.362 in.	60mm/2.362 in.	60mm/2.362 in.	60mm/2.362 in.
Effec. Comp. Ratio	7.1:1	6.8:1	6.8:1	6.8:1
Allowable Cylinder Head Distortion	None	None	None	None
Cylinder Diameter	2.20472 - 2.20547	2.36377 - 2.36452	2.56062 - 2.56137	2.67716 - 2.67771
Piston Pin Bore Diameter	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.
Piston Pin Diameter	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.
Piston Ring Side Play Top	0.002 - 0.005 in.	0.002 - 0.005 in.	0.002 - 0.005 in.	0.002 - 0.005 in.
Bottom	0.002 - 0.004 in.	0.002 - 0.004 in.	0.002 - 0.004 in.	0.002 - 0.004 in.
Piston Ring End Gap	0.006 - 0.014 in.	0.006 - 0.014 in.	0.008 - 0.016 in.	0.008 - 0.016 in.
Piston Skirt Clearance	0.0028 - 0.0042 in.	0.0028 - 0.0042 in.	0.0033 - 0.0048 in.	0.0033 - 0.0048 in.
Connecting Rod Radial Play	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.
Connecting Rod Small End Diameter	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.
Crankshaft End Play	0.030 in.	0.030 in.	0.030 in.	0.030 in.
Crankshaft Run Out	0.0012 in. (max.)	0.0012 in. (max.)	0.0012 in. (max.)	0.0012 in. (max.)
Ignition Type	Standard CDI	Standard CDI	Dual CDI	Dual CDI
Dynamic Ignition Timing	25° @ 6000 rpm	25° @ 6000 rpm	17° @ 6000 rpm	17° @ 6000 rpm
Static Ignition Timing	Align Timing Marks	Align Timing Marks	Align Timing Marks	Align Timing Marks
Lighting System Output	12V/100W	12V/100W	12V/100W	12V/100W
Lighting Coil	0.18 ohm	0.18 ohm	0.18 ohm	0.18 ohm
Pulser Coil	22.5 ohms	22.5 ohms	22.5 ohms	22.5 ohms
Exciter Coil	295 ohms	295 ohms	295 ohms	295 ohms
Ignition Coil Primary	0.365 ohm	0.365 ohm	0.365 ohm	0.365 ohm
Ignition Coil Secondary	10,200 ohms	10,200 ohms	10,200 ohms	10,200 ohms
Spark Plug Type	NGK BR-9EVA	NGK BR-9EVA	NGK BR-9EVA	NGK BR-9EVA
Spark Plug Gap	0.016 in.	0.016 in.	0.016 in.	0.016 in.
Engine Torque Specifications				
Cylinder Head Nuts	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb
Crankcase Nuts	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb
Flywheel Nut	60 ft-lb	60 ft-lb	60 ft-lb	60 ft-lb
Recoil Bolt	5 ft-lb	5 ft-lb	5 ft-lb	5 ft-lb
Intake Flange Bolts	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb
Exhaust Manifold Nuts	10 ft-lb	10 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb
Engine Mounting Bolts	45 ft-lb	45 ft-lb	45 ft-lb	45 ft-lb
Motor Mount Lock Nuts	30 - 35 ft-lb	30 - 35 ft-lb	30 - 35 ft-lb	30 - 35 ft-lb
Drive Clutch Bolt	55 - 60 ft-lb	55 - 60 ft-lb	55 - 60 ft-lb	55 - 60 ft-lb
Spark Plug	20 ft-lb	20 ft-lb	20 ft-lb	20 ft-lb

'75 EL TIGRE ENGINE SPECIFICATIONS

Description	340	440	250	340	440
Engine Model	T7C 340 FR1	T7C 440 FR1	T7C 250 FR2	T7C 340 FR2	T7C 440 FR2
No. of Cylinders	2	2	2	2	2
Displacement	339cc	436cc	245cc	339cc	436cc
Bore	60mm/2.362 in.	68mm/2.677 in.	51mm/2.009 in.	60mm/2.362 in.	68mm/2.677 in.
Stroke	60mm/2.362 in.	60mm/2.363 in.	60mm/2.362 in.	60mm/2.362 in.	60mm/2.362 in.
Effec. Comp. Ratio	7.9:1	7.3:1	8.8:1	8.4:1	7.1:1
Allowable Cylinder Head Distortion	None	None	None	None	None
Cylinder Diameter	60.045 - 60.065mm	68.005 - 68.025mm	51.045 - 51.065mm	60.045 - 60.065mm	68.035 - 68.055mm
Piston Pin Bore Diameter	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.	0.6298 - 0.6301 in.	
Piston Pin Diameter	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.	0.6297 - 0.6299 in.
Piston Ring Side Play Top	0.002 - 0.005 in.	0.002 - 0.005 in.	0.002 - 0.005 in.	0.002 - 0.005 in.	0.002 - 0.005 in.
Bottom	0.002 - 0.004 in.	0.002 - 0.004 in.	0.002 - 0.004 in.	0.002 - 0.004 in.	0.002 - 0.005 in.
Piston Ring End Gap	0.006 - 0.014 in.	0.008 - 0.016 in.	0.006 - 0.014 in.	0.006 - 0.014 in.	0.012 - 0.019 in.
Piston Skirt Clearance	0.0030 - 0.0045 in.	0.0022 - 0.0037 in.	0.0026 - 0.0041 in.	0.0030 - 0.0045 in.	0.0033 - 0.0049 in.
Connecting Rod Radial Play	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.	0.0008 - 0.0012 in.
Connecting Rod Small End Diameter	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.	0.7875 - 0.7880 in.
Crankshaft End Play	0.030 in.	0.030 in.	0.030 in.	0.030 in.	0.030 in.
nkshaft Run Out	0.0012 in. (max.)	0.0012 in. (max.)	0.0012 in. (max.)	0.0012 in. (max.)	0.0012 in. (max.)
Ignition Type	Dual CDI	Dual CDI	Dual CDI	Dual CDI	Dual CDI
Dynamic Ignition Timing	14° @ 6000 rpm	17° @ 6000 rpm	14° @ 6000 rpm	14° @ 6000 rpm	17° @ 6000 rpm
Static Ignition Timing	Align Timing Marks	Align Timing Marks	Align Timing Marks	Align Timing Marks	Align Timing Marks
Lighting System Output	12V/100W	12V/100W	12V/100W	12V/100W	12V/100W
Lighting Coil	0.18 ohm	0.18 ohm	0.18 ohm	0.18 ohm	0.18 ohm
Pulser Coil	22.5 ohms	22.5 ohms	22.5 ohms	22.5 ohms	22.5 ohms
Exciter Coil	295 ohms	295 ohms	295 ohms	295 ohms	295 ohms
Ignition Coil Primary	0.365 ohm	0.365 ohm	0.365 ohm	0.365 ohm	0.365 ohm
Ignition Coil Secondary	10,200 ohms	10,200 ohms	10,200 ohms	10,200 ohms	10,200 ohms
Spark Plug Type	NGK BR-9EVA	NGK BR-9EVA	NGK B-9EVA	NGK B-9EVA	NGK B-9EVA
Spark Plug Gap	0.016 in.	0.016 in.	0.016 in.	0.016 in.	0.016 in.
Engine Torque Specifications					
Cylinder Head Nuts	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb
Crankcase Nuts	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb	16 ft-lb
Flywheel Nut	60 ft-lb	60 ft-lb	60 ft-lb	60 ft-lb	60 ft-lb
Recoil Bolts	5 ft-lb	5 ft-lb	5 ft-lb	5 ft-lb	5 ft-lb
Intake Flange Bolts	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb
Exhaust Flange Nuts	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb	5 - 7 ft-lb
Engine Mounting Bolts	45 ft-lb	45 ft-lb	45 ft-lb	45 ft-lb	45 ft-lb
Motor Mount Lock Nuts	30 - 35 ft-lb	30 - 35 ft-lb	30 - 35 ft-lb	30 - 35 ft-lb	30 - 35 ft-lb
Drive Clutch Bolt	55 - 60 ft-lb	55 - 60 ft-lb	55 - 60 ft-lb	55 - 60 ft-lb	55 - 60 ft-lb
Spark Plug	20 ft-lb	20 ft-lb	20 ft-lb	20 ft-lb	20 ft-lb

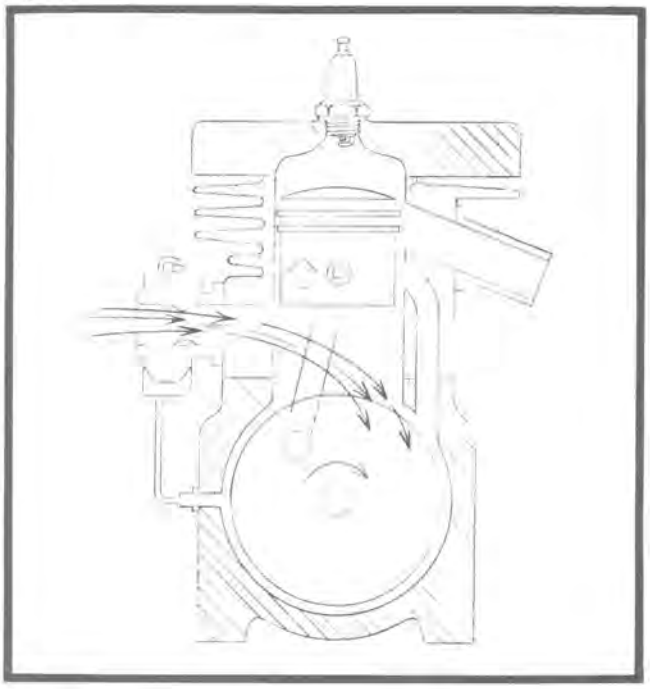
THEORY OF OPERATION

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

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

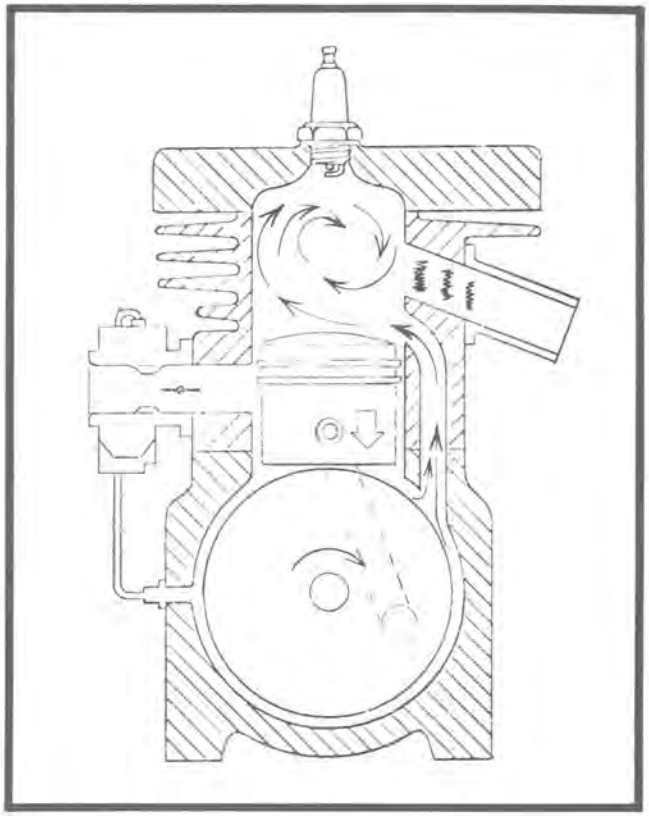
The first step of the engine's work cycle is the INTAKE of fuel and air from the carburetor, Fig. II-1. As the piston moves upward in the cylinder and opens the intake port, a crankcase vacuum is generated and, as a result, fuel/air rushes into the lower portion of the cylinder and down into the low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

Fig. II-1



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

Fig. II-2



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

THEORY OF OPERATION

Fig. II-3

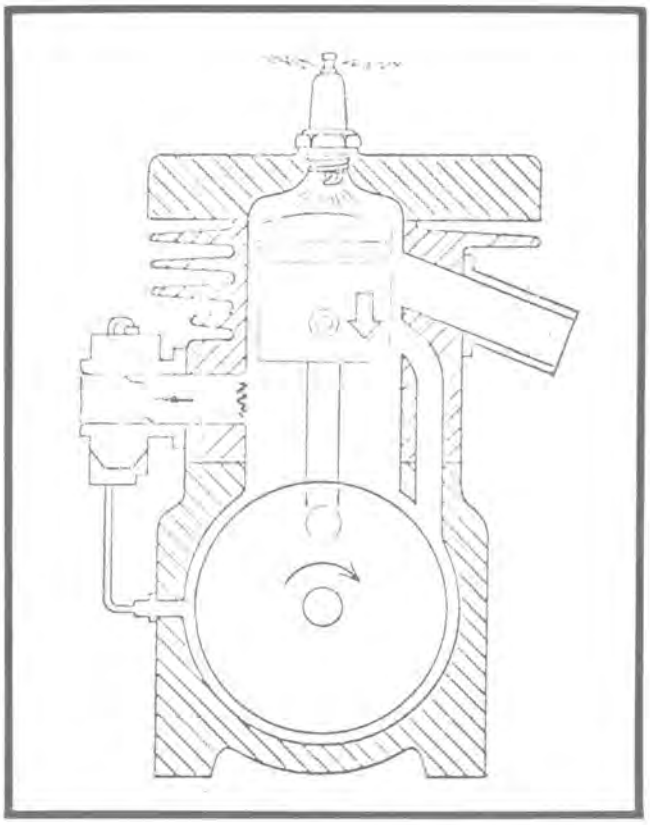
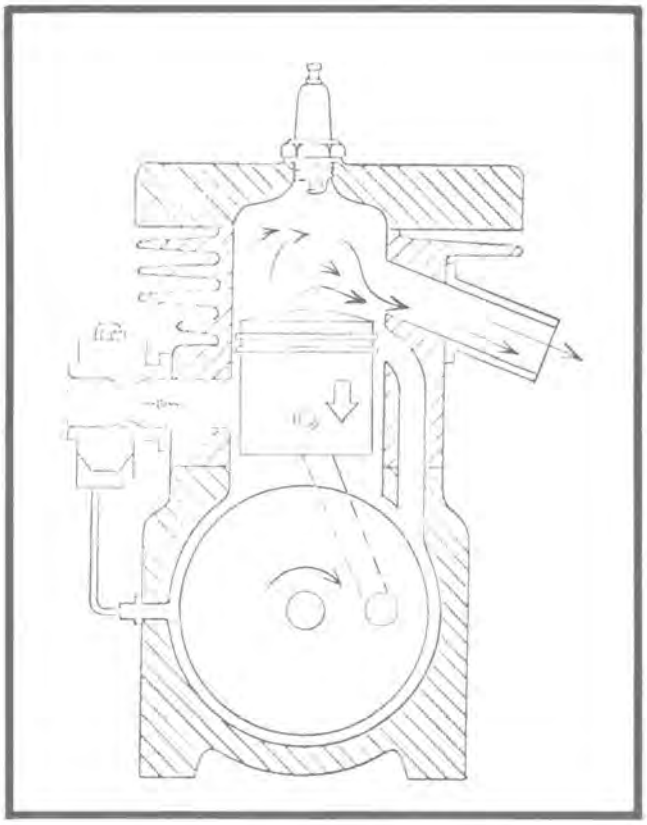


Fig. II-4



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

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

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

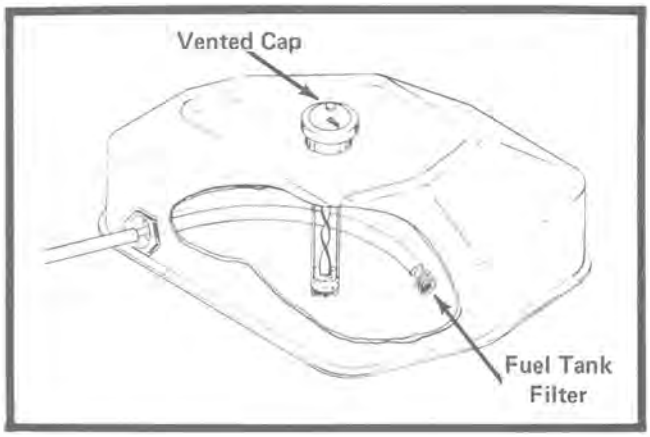
BEFORE TROUBLE SHOOTING

Check Fuel Tank Filter

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

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

Fig. II-5



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

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

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

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

5. Install filter and fuel level gauge cap.

CAUTION

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

Check In-Line Fuel Filter

Equipment Necessary: Gasoline

The fuel line has an in-line filter, just before the carburetor fuel inlet fitting, Fig. II-6. The filter must be clean to allow the fuel line to carry the maximum volume of fuel to the carburetor. If the in-line fuel filter is obstructed, fuel flow through the fuel line will be restricted; therefore, the filter must be cleaned.

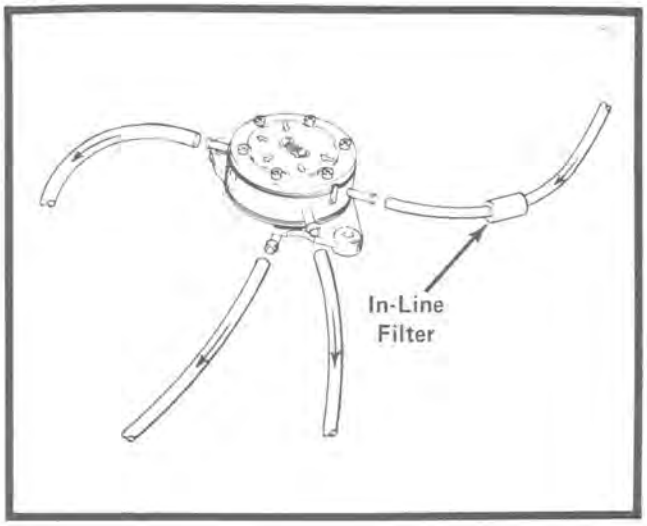
1. Remove the in-line fuel filter from the fuel line. After filter is removed, plug the fuel line to prevent fuel drainage from the fuel tank.

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

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

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

Fig. II-6



BEFORE TROUBLE SHOOTING

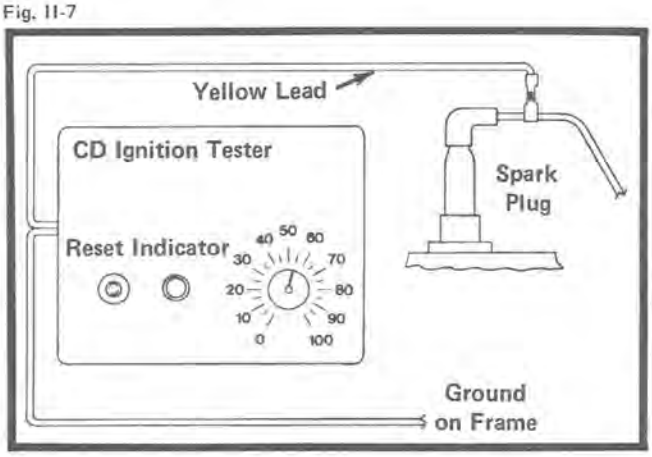
Check High Voltage Output

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

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

2. Connect the yellow lead of the CDI tester to the MM-1 secondary output adaptor. Next, connect the MM-1 adaptor to the no. 2 high tension wire, Fig. II-7. Also, connect the red tester lead to a good ground on the snowmobile frame, Fig. II-7. Finally, set tester dial at 55, Fig. II-7.

Fig. II-7



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

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

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

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

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

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

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

Check Crankshaft Runout

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

Note: Maximum crankshaft runout is 0.0012 of an inch.

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

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

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

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

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

6. Slowly rotate the flywheel while someone watches the dial indicator. Maximum runout must not exceed 0.0012 of an inch. If crankshaft runout exceeds 0.0012 of an inch, the crankshaft is defective and must be replaced. If runout is within 0.0012 of an inch, install the drive clutch, spark plugs, and recoil housing.

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

TROUBLE SHOOTING

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

TROUBLE SHOOTING

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

TROUBLE SHOOTING

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

TROUBLE SHOOTING

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

TROUBLE SHOOTING

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

ENGINE REMOVAL

General

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

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

Remove Engine from Snowmobile

Equipment Necessary: Cardboard, Small Vise-Grip, Phillips Screwdriver Having a No. 2 Blade, 9/16-Inch Socket, Two 9/16-Inch Wrenches, and an 8-Inch Extension

Note: When the engine is being removed from the snowmobile, all mounting hardware is to be kept with its respective assembly.

1. Tip the snowmobile on its side, using cardboard to prevent scratching.

2. Remove the two lock nuts securing motor mounts to the front end, Fig. II-8, using a 9/16-inch socket and an 8-inch extension. Tip the snowmobile upright.

Fig. II-8

3. Open the hood.

4. Remove the exhaust system (See: Section IA – Setting Up, Remove Exhaust System, page IA-6).

5. Loosen the carburetor flange clamps, using a phillips screwdriver having a no. 2 blade. Pull carburetors out of flanges.

Note: On 1975 models, the carburetors must be pulled back into rubber air silencer boots.

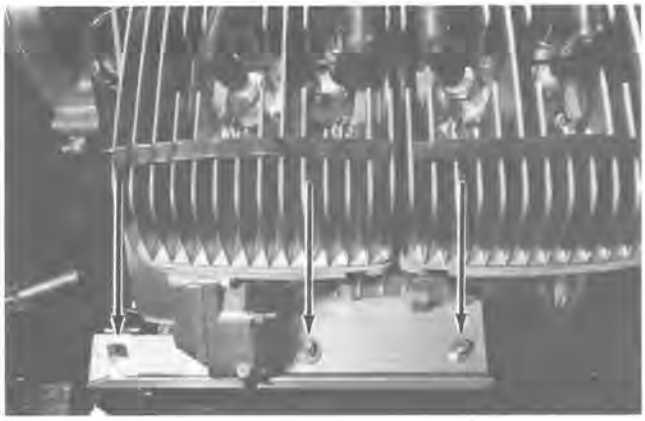
6. Remove impulse line from fitting on crankcase.

Note: On 1975 Z models, remove both impulse lines.

7. Disconnect electrical harness from connector on flywheel housing.

8. Remove the three lock nuts and flat washers from the three motor mounts studs, Fig. II-9, holding front motor plate support on, using a 9/16-inch socket and 8-inch extension.

Fig. II-9



Note: On 1975 models, remove the two outside lock nuts.

9. Remove the drive belt.

10. Grasp engine firmly and tilt it back until front motor plate support clears motor mount studs; then pull engine ahead until rear motor mounts are free of front end. Remove engine from chassis; set engine on clean workbench.

11. Account for any shims that may have fallen when engine was removed.

12. Before disassembling engine, thoroughly clean the exterior of the engine. Make note of any excessive fluid leakage around gasket areas.

ENGINE SERVICING (DISASSEMBLY)

Remove External Components

Equipment Necessary: Air Impact Tool, 10mm Socket, 10mm Wrench, 3/4-Inch Socket, and 3-Inch Extension

1. Pull the drive clutch off the engine crankshaft (See: Section V – Drive System, Drive Clutch Removal).

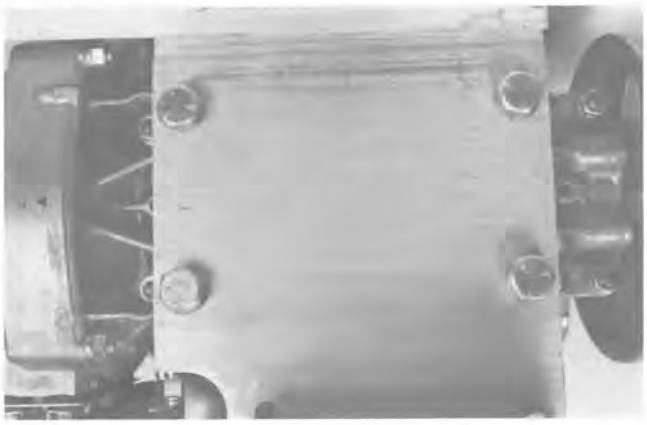
2. T7 Series Engines – Remove the eight brass nuts and lock washers, Fig. II-10, holding exhaust manifold to the cylinders, using a 10mm socket and a 10mm wrench.

   T1C Series Engines – Remove the four brass nuts and lock washers holding exhaust manifold to the cylinders, using a 13mm socket and a 13mm wrench.

Fig. II-10

3. Remove the engine motor plate mounting bolts and lock washers, Fig. II-11, using an air impact tool and a 3/4-inch socket.

Fig. II-11



Remove Cylinder Heads, Cylinders, and Pistons

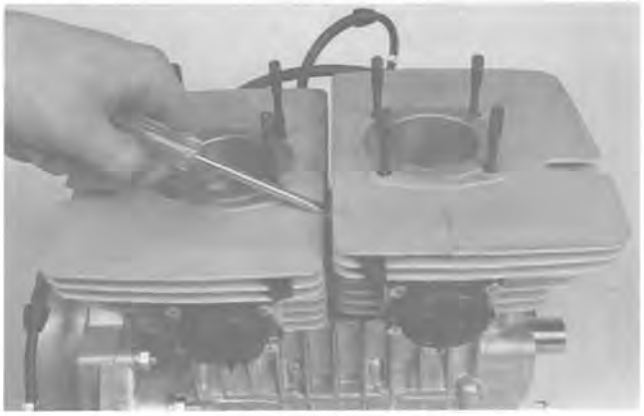
Equipment Necessary: Needle-Nose Pliers, Piston Pin Puller, Rubber Mallet, 12mm Socket, 13mm Socket, and 3-Inch Extension

1. Remove the eight nuts, lock washers, and flat washers holding cylinder heads on, using a 13mm socket and 3-inch extension. Lift cylinder heads off studs.

2. Remove cylinder head gaskets.

3. Carefully lift cylinders off crankcase. Use a hammer and tap lightly on cylinder to free it from crankcase, or carefully pry on cylinder fins with a screwdriver to guide cylinder, Fig. II-12.

Fig. II-12



4. If a cylinder is to be replaced, remove the two cap screws securing carburetor mounting flange and insulator, using a 12mm socket. The cylinder is completely disassembled, Fig. II-13.

Fig. II-13

ENGINE SERVICING (DISASSEMBLY)

5. Remove the PTO side piston by first taking out the piston pin snap ring on the PTO side. Using a piston pin puller, insert puller from PTO side of engine and pull piston pin.

Note: Piston pin and piston pin bearing are a matched set and must be retained together as a set.

6. Remove the MAG piston by first taking out the piston pin snap ring from MAG side of piston, Fig. II-14, using a needle-nose pliers. Insert piston pin puller from MAG side of engine and pull piston pin.

Fig. II-14

Note: When disassembling upper end, place matching items (cylinders, pistons, heads, etc.) together to prevent engine damage.

Remove Magneto Cover and Flywheel (T7 Series Engines Only)

Equipment Necessary: Flywheel Puller Kit (Part No. 0144-064), Side Cutter, Hammer, Screwdriver Having a 5/16-Inch Blade, 13mm Socket, 13mm Wrench, 15/16-Inch Wrench, 1-Inch Wrench, and 1-Inch Socket

1. Remove the four nuts, lock washers, and flat washers securing magneto cover to crankcase, using a 13mm socket and a 13mm wrench.

2. Remove the one bolt holding magneto housing to crankcase, using a 13mm socket and 13mm wrench.

3. Loosen the two screws holding wire connector to magneto housing, Fig. II-15, using a screwdriver having a 1/4-inch blade. Slide connector free of screws.

Fig. II-15

4. Remove the four screws and lock washers holding CDI unit on magneto housing, Fig. II-16, using a screwdriver having a 5/16-inch blade. DO NOT disconnect wiring.

Fig. II-16

ENGINE SERVICING (DISASSEMBLY)

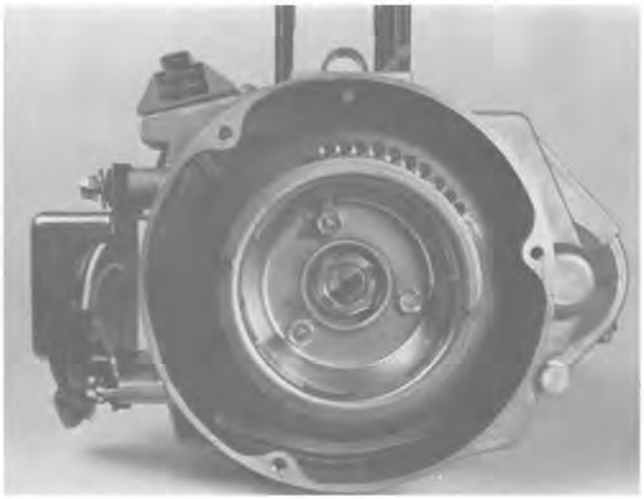
Note: 1975 models use cap screws.

5. Remove magneto housing from crankcase.

6. Remove the three bolts holding auxiliary starting pulley and retainer on flywheel, Fig. II-17. Remove the pulley and retainer.

7. Remove the large hex nut, Fig. II-17, holding flywheel on crankshaft, using a 15/16-inch wrench. Remove locking washer.

Fig. II-17



8. Place flywheel puller against flywheel. Install the three 6 x 18 hex head bolts through the puller and into the flywheel. Tighten slightly.

9. Thread puller bolt against crankshaft. Hold puller with a 15/16-inch wrench or use auxiliary pulley spanner wrench to hold auxiliary starting pulley, Fig. II-18, while tightening puller bolt, using a 1-inch socket. When bolt is tight, sharply tap end of the puller bolt, using a hammer, until the flywheel releases from the crankshaft taper.

Fig. II-18

10. Pull the flywheel from the crankshaft.

CAUTION

Position the flywheel on a clean, dry area with the magnets up, Fig. II-19. Damage may result if dirt and other foreign matter come in contact with the magnets.

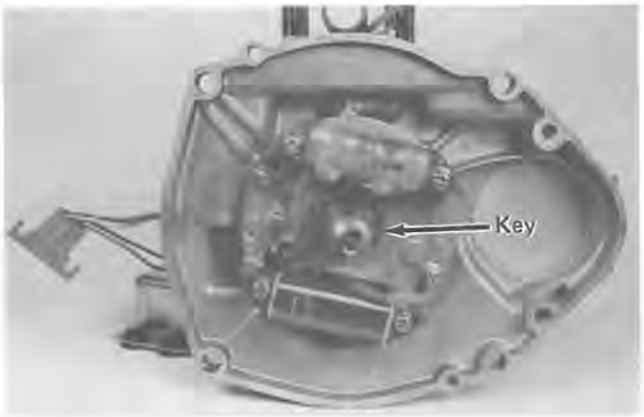
Fig. II-19

11. Remove the key from the crankshaft, Fig. II-20, using a side cutter.

12. To loosen the magneto base plate, remove the two screws and lock washers holding magneto base plate to crankcase, Fig. II-20, using a screwdriver having a 5/16-inch blade.

ENGINE SERVICING (DISASSEMBLY)

Fig. II-20



Remove Magneto Cover and Flywheel (T1 Series Engines Only)

Equipment Necessary: Flywheel Puller Kit (Part No. 0144-064), Hammer, Side Cutter, Screwdriver Having a 5/16-Inch Blade, 13mm Socket, 13mm Wrench, 15/16-Inch Wrench, 1-Inch Socket, and 1-Inch Wrench

1. Remove the four nuts, lock washers, and flat washers securing magneto cover to crankcase, using a 13mm socket and a 13mm wrench.

2. Remove the one bolt holding magneto housing to crankcase, using a 13mm socket and a 13mm wrench.

3. Loosen the two screws holding wire connector to magneto housing, using a screwdriver having a 1/4-inch blade. Slide connector free of screws.

4. Remove magneto housing from crankcase.

5. Remove the three bolts holding auxiliary starting pulley and retainer on flywheel. Remove the pulley and retainer.

6. Remove the large hex nut holding flywheel on crankshaft, using a 15/16-inch wrench. Remove special locking washer.

7. Place flywheel puller against flywheel. Install the three 6 x 18 hex head bolts through the puller and into the flywheel. Tighten slightly.

8. Thread puller bolt against crankshaft. Hold puller with a 15/16-inch wrench while tightening puller bolt, using a 1-inch socket. When bolt is tight, sharply tap end of the puller bolt, using a hammer, until the flywheel releases from the crankshaft taper.

9. Pull the flywheel from the crankshaft.

10. Remove the key from the crankshaft, using a side cutter.

> **● CAUTION ●**
> **Position the flywheel on a clean, dry bench with the magnets up. Damage may result if dirt and other foreign particles come in contact with surfaces, especially the magnets.**

11. To loosen the magneto, remove the two screws and lock washers holding magnets to crankcase, using a screwdriver having a 5/16-inch blade.

Remove External Coils (T7B and T7C Series Engines Only)

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

1. Remove the four bolts, lock washers, and flat washers holding ignition coil box to crankcase, using a 10mm socket. DO NOT disconnect wiring.

2. Account for the high tension cord clamps and collars.

Remove External Coil (T1C Series Engines Only)

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

1. Remove the two screws holding coil cover to the coil bracket, using a screwdriver having a 5/16-inch blade.

2. Spray a small amount of silicone spray on high tension cables. Carefully slide wires through coil cover while pulling on cover until coils are exposed.

3. Remove the CDI unit from the coil bracket, using a screwdriver having a 5/16-inch blade.

4. Remove the two bolts holding coil bracket to engine crankcase, using a 10mm socket.

5. Remove coil bracket and insulator bracket.

ENGINE SERVICING (DISASSEMBLY)

Split Crankcase and Remove Crankshaft

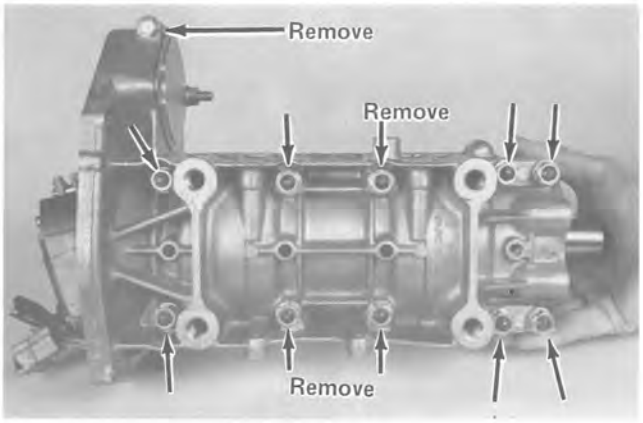
Equipment Necessary: Air-Powered Ratchet, 10mm Socket, 13mm Socket, and 3-Inch Extension

1. Set the crankcase assembly on the cylinder studs.

2. Remove the one crankcase bolt and lock washer holding crankcase halves together, Fig. II-21.

3. Remove the ten crankcase stud nuts, lock washers, and flat washers holding crankcase together, Fig. II-21, using an air-powered ratchet, 13mm socket, and 3-inch extension.

Fig. II-21



4. Hit the short center crankcase studs until crankcase begins to split, using a rubber mallet.

5. Remove rubber wiring grommet and slip wires free of crankcase, Fig. II-22. Set magneto and ignition coil boxes aside in a clean place, Fig. II-23.

Fig. II-22

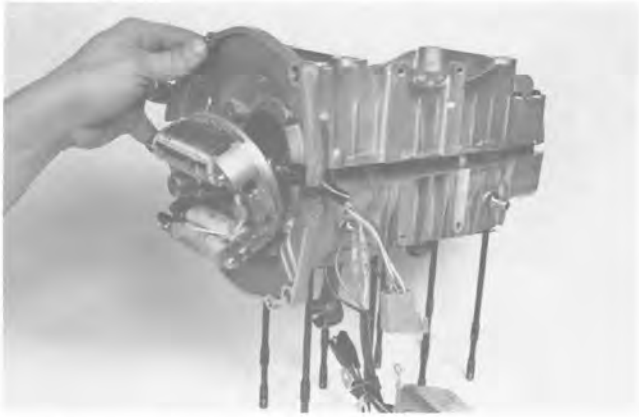


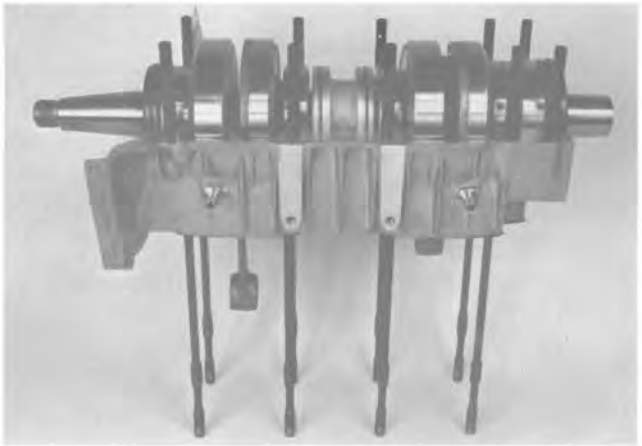
Fig. II-23

6. Completely split crankcase.

Note: DO NOT use screwdrivers or similar tools to split crankcase. Using them will ruin sealing surfaces of crankcase.

7. When bottom half of case is removed, remove crankshaft from case, Fig. II-24.

Fig. II-24



TOP AND BOTTOM END FAILURES

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

Piston Seizure

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

Piston Dome Burn-Out

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

Piston Ring Damage (Breakage)

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

CLEANING AND INSPECTING COMPONENTS

Clean and Inspect Cylinder Head

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

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

1. Using a nonferrous carbon scraper, carefully remove any carbon buildup which has collected in the combustion chamber.

> **CAUTION**
> Be careful not to gouge sealing surface of head. Poor performance and poor combustion will result.

2. Clean head, using cleaning solvent.
3. Inspect head for aluminum deposits and other noticeable damage.
4. Lay cylinder head on a surfacing block. No distortion is to be evident — no clearance is to be visible.

Clean and Inspect Cylinder

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

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

1. Remove carbon buildup from the exhaust port, using a nonferrous carbon scraper or file.

> **CAUTION**
> DO NOT accidentally gouge cylinder or damage edge of exhaust port.

2. Wash cylinder, using cleaning solvent. Dry, using compressed air.
3. Inspect cylinder for pitting, scoring, corrosion, and scuffing. Replace cylinder if damaged.
4. Lay top surface of cylinder on a surfacing block. No distortion is to be evident — no clearance is to be seen.

Clean and Inspect Piston

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

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

1. Examine dome of piston for any area that may be "washed" free of carbon. Any "washed" area on piston dome may indicate either badly-worn rings or an out-of-round cylinder.
2. Remove carbon buildup from piston dome, using a nonferrous carbon scraper.
3. Clean ring grooves, using a piston ring groove cleaner or a piece of an old ring.

> **CAUTION**
> When cleaning piston dome and ring grooves, be careful not to damage any surfaces because damage will result.

4. Wash piston with cleaning solvent. When the piston is clean, dry it, using compressed air.
5. Inspect the piston for corrosion, pitting, and scoring. If damage is evident, replace piston.

Clean and Inspect Crankcase Halves

Equipment Necessary: Cleaning Solvent

Note: Whenever the crankcase halves are worn excessively, cracked, defective, or damaged in any way, replacement is necessary.

1. Thoroughly wash crankcase halves, using cleaning solvent.
2. Inspect crankcase halves for scoring, pitting, scuffing, or imperfections in crankcase castings.

CLEANING AND INSPECTING COMPONENTS

Note: Be careful not to damage sealing surfaces of crankcase. A perfect mating surface is required. An improper crankcase seal will cause severe engine damage.

Clean and Inspect Crankshaft

Equipment Necessary: Cleaning Solvent, Compressed Air

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

1. Thoroughly wash crankshaft w/bearings, using cleaning solvent. When crankshaft is clean, dry it with compressed air.

2. Inspect outer edges of bearings for external wear, scoring, scuffing, and free rotation. If replacement is necessary, replace (See: Servicing Crankshaft Main Bearings, page II - 27).

Note: Only outer crankcase bearings are replaceable. If the two center bearings are damaged, crankshaft must be replaced.

3. Make sure all bearings rotate freely without binding.

4. Inspect threaded MAG end of crankshaft for stripped, worn, or damaged threads. If damage cannot be repaired, crankshaft replacement is necessary. Inspect keyway for rough edges.

5. Inspect tapers of crankshaft for scratches, wear, or scoring. Also, examine the internal threads in the PTO end for damage.

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

7. Inspect the oil seals for rubber deterioration, cuts, wear, cracks, or damaged springs. Also, check washers for damage.

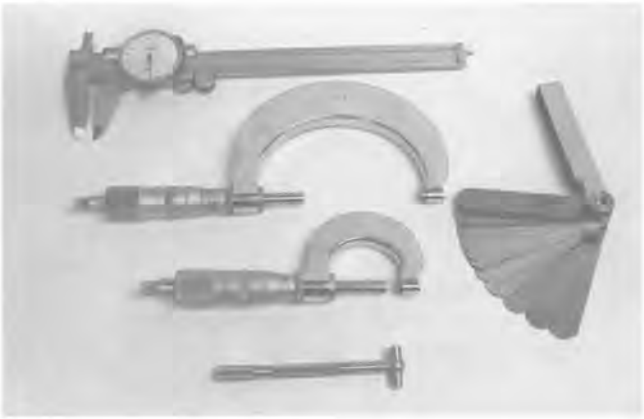
8. Inspect the needle bearing of the connecting rod small end for scoring, wear, and for free bearing rotation. If the condition of the bearing is doubtful, a complete piston pin set is to be used. The piston pin set includes both the needle bearing and the piston pin.

MEASURING CRITICAL PARTS

General

Special measuring instruments are needed for this section. Care must be taken to ensure accuracy of these instruments. The tools shown in Fig. II-25 will be used in this section.

Fig. II-25



Check Cylinder Wear

Equipment Necessary: Inside Micrometer

1. Insert an inside micrometer approximately 3/8 inch below the top of the cylinder bore and take two measurements: the first, front to back; the second, side to side, Fig. II-26. Record measurements. If the two measurements vary more than 0.0020 of an inch, or if the cylinder is not within the specified tolerance range, the cylinder must be replaced.

Fig. II-26

2. Take two measurements just above the intake port (front to back, side to side), using an inside micrometer, Fig. II-27. Record measurements. If the two measurements vary more than 0.0020 of an inch, or if the cylinder is not within the specified tolerance range, the cylinder must be replaced.

Fig. II-27

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

ACCEPTABLE CYLINDER DIAMETERS	
Engine No.	Diameter (In.)
T1C 295 RS1A	2.2047 - 2.2106
T1C 340 RS1A	2.3638 - 2.3697
T7B 400 RS1A	2.5606 - 2.5665
T7B 440 RS1A	2.6772 - 2.6831
T7C 340 FR1	2.3640 - 2.3699
T7C 440 FR1	2.6785 - 2.6844
T7C 250 FR2	2.0096 - 2.0155
T7C 340 FR2	2.3640 - 2.3699
T7C 440 FR2	2.6785 - 2.6844

Check Piston/Skirt Clearance

Equipment Necessary: Inside Micrometer and 3-Inch Outside Micrometer

1. Insert an inside micrometer approximately 1/4 inch into the bottom of the cylinder bore. Take measurement from front to back at bottom of cylinder, Fig. II-28. Record this measurement.

MEASURING CRITICAL PARTS

Fig. II-28

Note: If the cylinder bore exceeds the specified tolerance, the cylinder must be replaced.

2. Measure the piston 1/4 inch above the bottom of the piston skirt, Fig. II-29, using a 3-inch outside micrometer. Record this measurement.

Fig. II-29

3. Subtract the piston skirt measurement (step 2) from the cylinder bore measurement (step 1). The difference between the two measurements must fall between the clearances listed in the chart. If piston skirt/cylinder exceeds the values listed, there is excessive clearance. The problem must be corrected before the engine is asembled.

Note: If the cylinder bore is within the specified tolerance range, and the piston skirt/cylinder clearance exceeds the maximum value for that engine, the piston must be replaced. When replacing a piston, a new piston pin and needle bearing must be installed.

PISTON SKIRT/CYLINDER CLEARANCE	
Engine No.	Clearance (In.)
T1C 295 RS1A	0.0028 - 0.0042
T1C 340 RS1A	0.0028 - 0.0042
T7B 400 RS1A	0.0033 - 0.0048
T7B 440 RS1A	0.0033 - 0.0048
T7C 340 FR1	0.0030 - 0.0045
T7C 440 FR1	0.0022 - 0.0037
T7C 250 FR2	0.0026 - 0.0041
T7C 340 FR2	0.0030 - 0.0045
T7C 440 FR2	0.0033 - 0.0049

Check Piston Ring Groove and Ring Side Clearance

Equipment Necessary: Dial Calipers, Straight Edge, and Feeler Gauge

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

2. Measure the thickness of the ends and center arc of the top and bottom rings, using dial calipers. Thickness of top and bottom ring must be within the tolerances for that particular engine listed (see Fig. II-30). If the thickness of the ring is not within tolerance, a new ring set must be installed.

3. Measure the width of the top and bottom piston rings at the ends and center arc, using dial calipers. Width of the rings must be within tolerances listed in Fig. II-30. If the width of the rings is not as specified, the rings are not within tolerance, and a new ring set must be installed.

MEASURING CRITICAL PARTS

Fig. II-30

PISTON RING SPECIFICATIONS		
Engine	Thickness* (In.)	Width* (In.)
T1C 295 RS1A	0.0716 - 0.0704 0.0586 - 0.0574	0.0990 - 0.0910 0.0950 - 0.0870
T1C 340 RS1A	0.0776 - 0.0764 0.0586 - 0.0574	0.1005 - 0.0925 0.1005 - 0.0925
T7B 400 RS1A	0.0770 - 0.0758 0.0580 - 0.0568	0.1060 - 0.0980 0.1075 - 0.0995
T7B 440 RS1A	0.0770 - 0.0758 0.0580 - 0.0568	0.1192 - 0.1112 0.1148 - 0.1068
T7C 340 FR1	0.0776 - 0.0764 0.0586 - 0.0574	0.1005 - 0.0925 0.1005 - 0.0925
T7C 440 FR1	0.0770 - 0.0758 0.0580 - 0.0568	0.1192 - 0.1112 0.1148 - 0.1068
T7C 250 FR2	0.0776 - 0.0764 0.0586 - 0.0574	0.0930 - 0.0810 0.0930 - 0.0810
T7C 340 FR2	0.0776 - 0.0764 0.0586 - 0.0574	0.1005 - 0.0925 0.1005 - 0.0925
T7C 440 FR2	0.0776 - 0.0764 0.0576 - 0.0564	0.1210 - 0.1130 0.1190 - 0.1110

*Measurements taken at the ends and center arc of the ring.

4. Install a new ring set that is within the specified limits (see steps 2 and 3) into the piston ring grooves.

Note: There is a difference between the top (no. 1) ring and the bottom (no. 2) ring.

5. Lay a straight edge along the side of the piston pushing the ring into the piston ring groove. Slide a feeler gauge between the top of the ring and the ring groove (side clearance for bottom ring), Fig. II-31. The bottom ring side clearance must be 0.002-0.004 of an inch for all El Tigre snowmobile engines. The top ring side clearance must be 0.002-0.005 of an inch for all engines.

Note: If the bottom ring side play clearance exceeds 0.004 of an inch, or if the top ring side play exceeds 0.005 of an inch, the piston ring groove is worn beyond the service limit and must be replaced. Since the piston, piston pin, and needle bearing have definite wear characteristics, the parts must be replaced as a set. Therefore, if the piston is replaced, the piston pin and needle bearing must also be replaced.

Fig. II-31

Check Piston Ring End Gap and Ring Wear

Equipment Necessary: Feeler Gauge and Dial Caliper

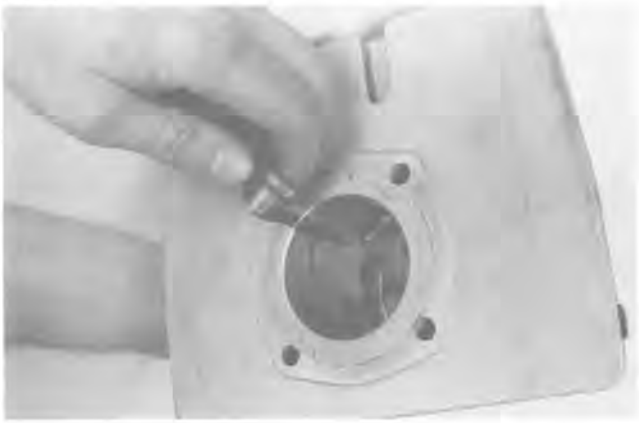
1. Remove carbon deposits from the piston rings. DO NOT accidentally damage the ring.

2. Insert the piston ring approximately 3/8 inch into the top of the cylinder bore. Make sure the ring is horizontal in relation to the cylinder bore by pressing against the ring with the top of the piston.

MEASURING CRITICAL PARTS

3. Slide a feeler gauge between the ends of the ring, Fig. II-32. Ring end gap must be within the tolerances shown for that engine, Fig. II-33. If ring end gap is not as specified, the ring is not within tolerance. Therefore, check the ring for wear (proceed to step 4) or check the cylinder for wear (See: Check Cylinder Wear, page II - 22).

Fig. II-32



4. Since the amount of wear at the ends and at the arc of the piston ring influences ring end gap, piston ring dimensions must be held to close tolerances. Therefore, check the thickness and width of the top and bottom ring, using a dial caliper (proceed to step 5).

5. Measure the thickness at the ends and center arc of the top and bottom rings, using a dial caliper. Thickness of top and bottom rings must be within the tolerances for the particular engine listed (see Fig. II-30). If the ring thickness is not within tolerance, a new ring set must be installed.

Note: The width of the top and bottom ring must also be checked. Proceed to step 6.

6. Measure the width of the top and bottom piston rings at the ends and center arc, using a dial caliper. Width of the rings must be within tolerances listed, Fig. II-30. If the width of the rings is not as specified, the rings are not within tolerance and a new ring set must be installed.

Fig. II-33

PISTON RING END GAP	
Engine No.	End Gap (In.)
T1C 295 RS1A	0.006 - 0.014
T1C 340 RS1A	0.006 - 0.014
T7B 400 RS1A	0.008 - 0.016
T7B 440 RS1A	0.008 - 0.016
T7C 340 FR1	0.012 - 0.019
T7C 250 FR2	0.012 - 0.019
T7C 340 FR2	0.012 - 0.019
T7C 440 FR2	0.012 - 0.019

Check Piston Pin and Piston Pin Bore

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

1. Make sure piston pin is clean, Fig. II-34.

Fig. II-34

2. Measure the piston pin approximately 1/4 inch from both ends, using a 1-inch outside micrometer, Fig. II-35. Piston pin diameter for all models must be 0.6297-0.6299 of an inch. If measurement is not as specified, then replace the piston pin and needle bearing as a set.

Fig. II-35

MEASURING CRITICAL PARTS

3. Insert an inside snap gauge about 1/4 inch from the outside of the piston pin bore of the piston, Fig. II-36. Remove the snap gauge and measure it with a 1-inch outside micrometer. Piston pin bore diameter for all models must be 0.6298-0.6301 of an inch. If measurement is not as specified, replace the piston, piston pin, and needle bearing.

Fig. II-36

Check Connecting Rod Small End Diameter and Big End Side Play

Equipment Necessary: Feeler Gauge, Inside Snap Gauge (3/4 to 1-1/4 Inch), and Outside Micrometer (0 to 1 Inch)

1. Insert an inside snap gauge (3/4 to 1-1/4 inch) into the bore of the connecting rod small end, Fig. II-37. Lock the snap gauge in position when it is positioned properly.

Fig. II-37

2. Carefully slide the snap gauge out of connecting rod small end. Measure the snap gauge, using an outside micrometer, Fig. II-38. The measurement should be 0.7875-0.7880 inch. This is the connecting rod small end diameter. If the connecting rod small end diameter is not as specified, the connecting rod is defective. Measure the remaining rod.

Fig. II-38

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

3. Move the bottom end of the connecting rod to one side. Slide a feeler gauge between the connecting rod big end and the spacer washer, Fig. II-39. This measurement between the spacer washer and the connecting rod big end is known as "side play". Side play must be 0.016-0.020 of an inch. If the side play is not as specified, there is excessive wear and crankshaft must be replaced.

Fig. II-39

SERVICING CRANKSHAFT MAIN BEARINGS

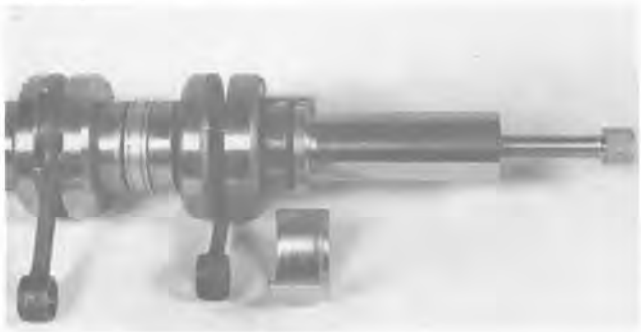
Remove Main Bearings

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

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

1. Using a bearing puller w/appropriate shells (part no. 0144-080), place shells over the bearing. Slide appropriate retaining ring over the half shells. Hold all components in place.

Fig. II-40



2. Tighten the bearing puller bolt, Fig. II-40, until the bearing releases from the crankshaft taper, using a 7/8-inch socket.

3. Separate the two PTO end main bearings approximately 1/8 inch, using a bearing splitter (or a chisel) and a hammer, Fig. II-41.

Fig. II-41

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

5. Install the bearing puller and two half shells around the bearings. Slide the appropriate retaining ring over the half shells. Hold all components in place.

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

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

Make Crankshaft Dummy Bearings

Equipment Necessary: Brake Cylinder Hone, Cleaning Solvent, Compressed Air, Vise, and 1/4-Inch Drill

1. If old bearings are to be replaced with new bearings, "dummy bearings" can be made from the old bearings.

2. Place the bearing in a vise.

3. Using a small brake hone and a 1/4-inch drill, hone out the inner race of the bearing, Fig. II-42, until the bearing will slide freely onto the crankshaft.

Fig. II-42

4. Thoroughly wash the "dummy bearing", using cleaning solvent. Dry bearing, using compressed air.

5. Mark the bearing so it will not be confused with a new bearing.

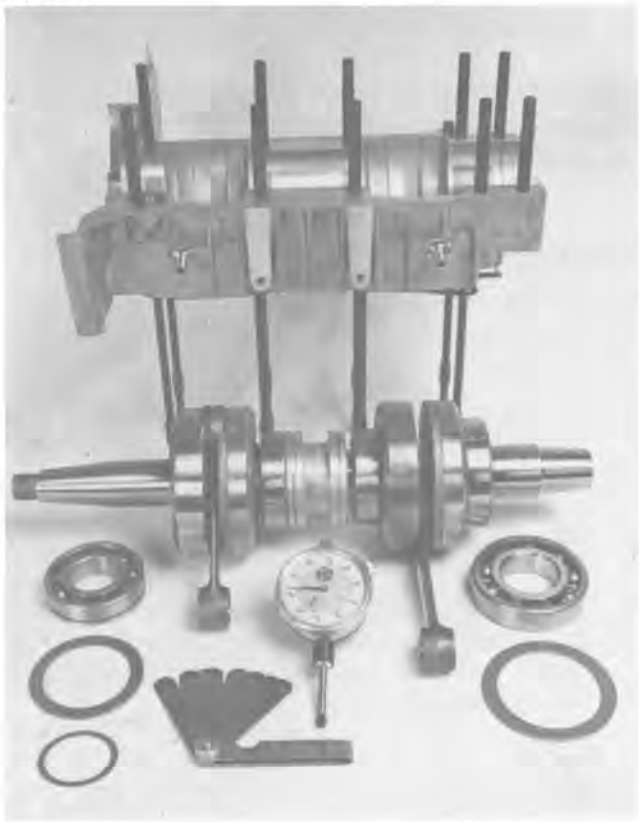
SERVICING CRANKSHAFT MAIN BEARINGS

Center Crankshaft in Crankcase and Install MAG End Bearing

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

1. Clean the crankshaft and crankcase thoroughly. When installing new bearings or a new crankcase, it is necessary to both center and set end play on the crankshaft, Fig. II-43.

Fig. II-43



2. Set top half of crankcase on cylinder studs.

3. Install the crankshaft (less bearings) in the top half of the crankcase. Make sure crankshaft is seated properly in the crankcase.

4. T1C Engines — Slide a no. 3 shim (part no. 3000-160), which is 0.012 of an inch thick, onto the MAG end of the crankshaft.

   T7 Engines — Slide a no. 2 shim (part no. 3001-110), which is 0.012 of an inch thick, onto the MAG end of the crankshaft.

Note: The shims are used only as a starting point for centering the crankshaft in the crankcase. Measure the shim to make sure it is correct thickness, using a 1-inch outside micrometer.

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

Note: Make sure the shim is not "cocked" on the crankshaft. If the shim is "cocked", an inaccurate crankshaft centering will result.

6. Slide the large retaining washer onto the MAG end and PTO end of the crankshaft; then seat washers in appropriate crankcase groove.

7. Using a screwdriver having a 7/16-inch blade, carefully pry or push the PTO end of the crankshaft toward the MAG side of the crankcase, until all free-play is eliminated. To determine if the free-play is eliminated from between the crankshaft and crankcase, try to rotate the MAG end retaining washer while exerting slight pressure against the PTO end of the crankshaft, Fig. II-44. If the retaining washer does not rotate, free-play is eliminated. However, if the retaining washer rotates, there is still free-play; then drive the PTO end of the crankshaft toward the MAG side of the crankcase.

Fig. II-44

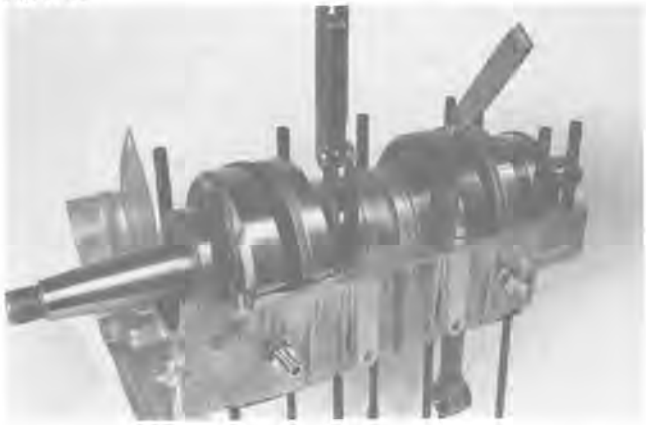
SERVICING CRANKSHAFT MAIN BEARINGS

8. Install feeler gauge blades between the most outboard or inboard MAG side flyweight and the crankcase to determine the amount of clearance, Fig. II-45. Record the dimension.

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

9. Install feeler gauge blades between the most outboard or inboard PTO side flyweight and the crankcase to determine the amount of clearance, Fig. II-45. Record the dimension.

Fig. II-45



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

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

11. When measuring between most outboard flyweights and case – if the measurement obtained in step 8 is less than the measurement obtained in step 9, remove the retaining washer and "dummy bearing" from the MAG end of the crankshaft and install a thicker shim in place of the original shim. However, if the measurement obtained in step 8 is greater than the measurement taken in step 9, install a thinner shim in place of the original shim. To determine the proper shim, subtract measurements obtained in step 8 and step 9; then divide by 2 and refer to the shim charts, Table II-46 and Table II-47. After the shim is installed, repeat steps 5-10.

    When measuring between most inboard flyweights and case – if the measurement obtained in step 8 is less than the measurement obtained in step 9, remove the retaining washer and "dummy bearing" from the MAG end of the crankshaft and install a thinner shim in place of the original shim. However, if the measurement obtained in step 8 is greater than the measurement taken in step 9, install a thicker shim.

Note: Complete lists of shims available are shown in the following tables. The tables include the shim number, Kawasaki part number, Arctic part number, thickness of the shim, and the inside diameter of the shim. Always measure the shim to make sure of its thickness. Use Fig. II-46 for T1 series only. Use Fig. II-47 for T7 series engines.

SERVICING CRANKSHAFT MAIN BEARINGS

Fig. II-46

T1C SERIES CRANKSHAFT SHIMS (MAG SIDE)				
Shim No.	Kawasaki Part No.	Arctic Part No.	Shim Thickness (In.)	Inside Dia. of Shim (In.)
1	319331-3231-00	3001-109	0.008	1.375
2	319331-3232-00	3001-110	0.012	1.375
3	319331-3233-00	3001-111	0.020	1.380
4	319331-3234-00	3001-112	0.028	1.380
		3001-046	0.040	1.380

Fig. II-47

T7 SERIES CRANKSHAFT SHIMS (MAG SIDE)				
Shim No.	Kawasaki Part No.	Arctic Part No.	Shim Thickness (In.)	Inside Dia. of Shim (In.)
1	319331-3231-00	3001-109	0.008	1.375
2	319331-3232-00	3001-110	0.012	1.375
3	319331-3233-00	3001-111	0.020	1.380
4	319331-3234-00	3001-112	0.028	1.380
5	319331-3235-00	3001-113	0.040	1.380

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

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

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

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

⚠ WARNING ⚠

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

16. Set end play and install PTO end main bearings (See: Set End Play and Install PTO End Main Bearings, page II-30).

Set Crankshaft End Play and Install PTO End Main Bearings

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

1. Install the crankshaft in a vise, making sure the PTO end is pointing upward. Wrap a rag around the crankshaft to guard against possible damage from the vise jaws, Fig. II-48.

SERVICING CRANKSHAFT MAIN BEARINGS

Fig. II-48

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

3. When the bearing is heated thoroughly, slide it onto the PTO end of the crankshaft until it seats against the PTO side flyweight, using a pliers to slide the bearing onto the crankshaft, Fig. II-49.

Fig. II-49

⚠ WARNING ⚠

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

4. Set top half of crankcase on cylinder studs.

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

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

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

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

9. Secure a dial indicator on the crankcase and slide the indicator's moveable stem against the end of the crankshaft until significant indicator needle movement is noticed. Rotate the dial indicator bezel until the O mark lines up with the indicator needle.

10. Carefully push the MAG end of the crankshaft toward the PTO side of the crankcase until the retaining washer cannot be rotated, Fig. II-50. If retaining washer rotates, crankshaft is not pushed far enough.

Note: A screwdriver may be used to pry crankshaft toward PTO. Be very careful not to damage sealing surface of crankcase.

SERVICING CRANKSHAFT MAIN BEARINGS

11. Observe the reading on the dial indicator, Fig. II-50. If the reading exceeds 0.008 of an inch, a shim must be installed between the two bearings. Select the appropriate shim from the charts below. Use steps 12 and 13 for shim installation. However, if the end play reading is 0.008 of an inch, proceed to step 14.

Fig. II-50

Fig. II-51

T1 SERIES CRANKSHAFT SHIMS (PTO SIDE)				
Shim No.	Kawasaki Part No.	Arctic Part No.	Shim Thickness (In.)	Inside Dia. of Shim (In.)
1	318801-3231-00	3000-158	0.004	1.260
2	318801-3232-00	3000-159	0.008	1.260
3	318801-3233-00	3000-160	0.012	1.260
4	318801-3234-00	3000-161	0.016	1.260
5	318801-3235-00	3000-162	0.020	1.260
6	318801-3236-00	3000-163	0.024	1.260

Fig. II-52

T7 SERIES CRANKSHAFT SHIMS (PTO SIDE)				
Shim No.	Kawasaki Part No.	Arctic Part No.	Shim Thickness (In.)	Inside Dia. of Shim (In.)
11	319331-3361-00	3001-115	0.008	1.575
12	319331-3362-00	3001-116	0.012	1.575
13	319331-3363-00	3001-117	0.020	1.575
14	319331-3364-00	3001-118	0.028	1.575
15	319331-3365-00	3001-119	0.040	1.575
		3001-120	0.032	1.397

SERVICING CRANKSHAFT MAIN BEARINGS

Note: A sample reading that might be obtained in step 11 is a dial indicator reading of 0.024 of an inch. Even though the reading, which is the end play, is within the acceptable tolerance range (0.000-0.030 of an inch), a service specification of 0.008 of an inch is suggested. Therefore, if the end play is 0.024 of an inch on a T1 series crankshaft, a no. 4 shim (0.016 of an inch) is required to obtain the correct end play (0.008 of an inch). Always measure the shim to make sure of its thickness.

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

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

13. Slide the "dummy bearing" onto the PTO end of the crankshaft, Fig. II-53. Repeat steps 6-11 to verify the end play specification.

Fig. II-53

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

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

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

17. When the bearing is heated thoroughly, slide it onto the PTO end of the crankshaft until it pushes against the inside bearing and shim, Fig. II-54. If a shim(s) is not required, there must be bearing to bearing contact. Use a pliers to slide the bearing onto the crankshaft.

Fig. II-54

⚠ WARNING ⚠

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

ENGINE ASSEMBLY

Install Crankshaft in Crankcase

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

Note: Bottom crankcase half sealing surface can be checked by sliding a fine mill file on the surface, Fig. II-55.

Fig. II-55

1. Make sure all parts have been cleaned and inspected.

2. Coat mating surfaces of crankcase halves with crankcase sealer (part no. 3000-211), Fig. II-56.

Fig. II-56

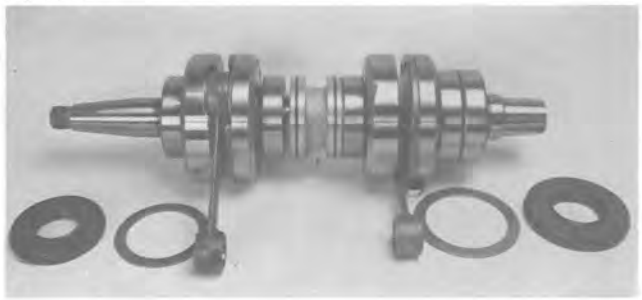
3. Place top half of crankcase on cylinder studs.

> **CAUTION**
> **DO NOT scratch or damage any surface area that must be sealed. An improper seal will cause engine damage.**

4. Inspect the crankshaft end seals and replace if necessary to ensure a good seal. Pack the oil seal lips with bearing grease, Fig. II-57. Install the seals and retaining washers on the crankshaft, Fig. II-58.

Fig. II-57

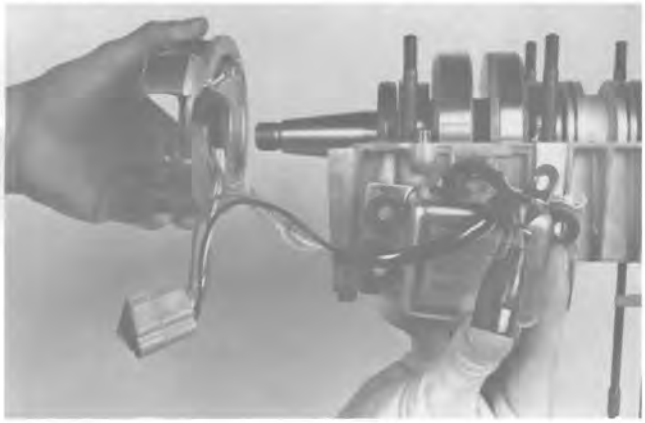
Fig. II-58



5. Place the assembled crankshaft assembly w/ seals in top half of crankcase. Make sure center seal dowel pin is inserted into alignment hole. Make sure retaining washers and crankshaft end seals are in their correct grooves and correctly seated.

6. Place magneto in position on MAG end of crankshaft. Install magneto wires and rubber grommet in position in top crankcase half, Fig. II-59.

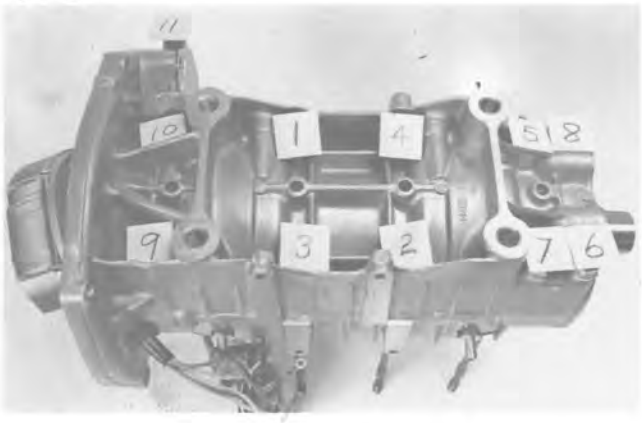
Fig. II-59



7. Install the lower crankcase half onto top half. Make sure retaining washers and seals are correctly seated.

8. Install the ten flat washers, lock washers, and nuts on the crankcase studs. Tighten the nuts to 16 ft-lb, using a torque wrench, 13mm socket, and a 3-inch extension, in the sequence shown, Fig. II-60.

Fig. II-60



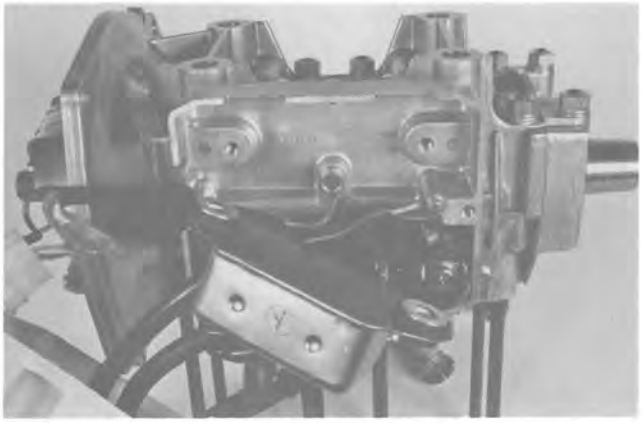
9. Install the one crankcase bolt at electric start mounting boss. Tighten to 5 ft-lb, using a torque wrench and 10mm socket.

Install External Coil (T1 Series Engine Only)

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

1. Place coil bracket and insulator bracket on crankcase, Fig. II-61. Secure in place with the two bolts; tighten to 5 ft-lb, using a torque wrench and a 10mm socket.

Fig. II-61

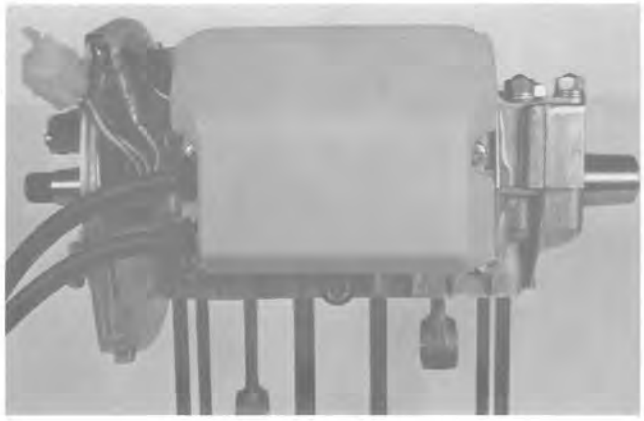


2. Fasten the CDI unit to the coil bracket with the two screws and washers, Fig. II-62; tighten, using a screwdriver having a 5/16-inch blade.

Fig. II-62

3. Carefully slide the coil cover in position on coil bracket. Make sure the high tension wire grommets are in position in coil cover. Install the two screws and washers to secure coil cover in place, Fig. II-63.

Fig. II-63



Install External Coils (T7B Series Engines Only)

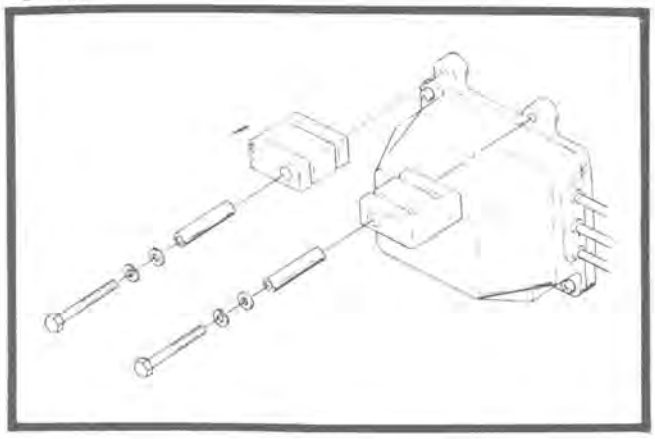
Equipment Necessary: Torque Wrench and 10mm Socket

1. Position ignition coil box on the crankcase.

2. Install the two short lower mounting bolts through coil box and into crankcase, Fig. II-64.

3. Install the two longer bolts through the high tension cord clamps and into crankcase, Fig. II-64.

Fig. II-64



4. Tighten the four bolts to 5 ft-lb, using a torque wrench and a 10mm socket.

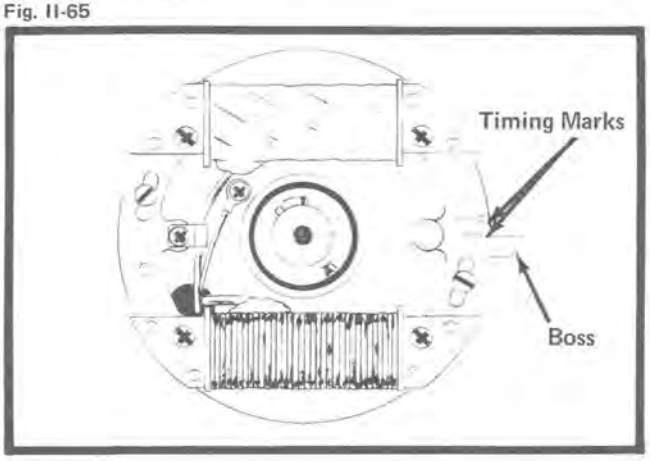
Install Flywheel and Magneto Cover

Equipment Necessary: Rubber Mallet, Torque Wrench, Flywheel Holding Tool (Arctic Part No. 0144-007), Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 5/16-Inch Blade, 10mm Socket, 13mm Socket, and 13mm Wrench

1. Install the two screws and lock washers which will hold magneto to crankcase, using a screwdriver having a 5/16-inch blade. DO NOT TIGHTEN.

2. Align appropriate timing marks on magneto base plate with timing mark on crankcase, Fig. II-65. To verify accuracy of timing marks, check timing (See: Timing, page II-42).

Fig. II-65



Note: On the T7 series magneto base plate, the long mark is 17° or 0.066 of an inch BTDC. The short mark on the base plate is 14° or 0.044 of an inch BTDC. On T1C series engines, the only mark is 25° or 0.139 of an inch BTDC.

Fig. II-66

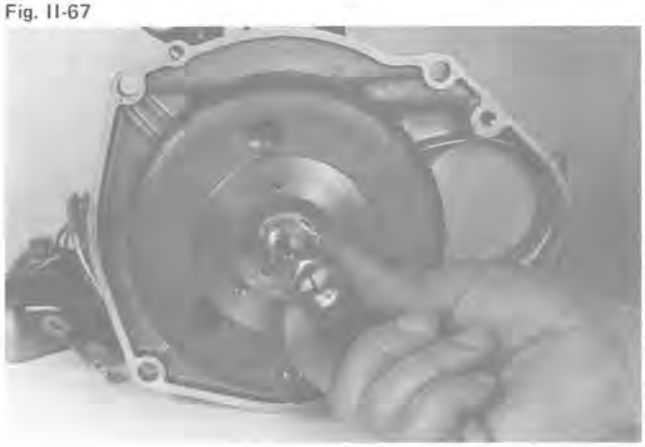
ENGINE TIMING CHART		
Engine	Dynamic (BTDC)	Piston Location (BTDC)
T1C 295 RS1A	25° @ 6000 rpm	0.139 in.
T1C 340 RS1A	25° @ 6000 rpm	0.139 in.
T7B 400 RS1A	17° @ 6000 rpm	0.066 in.
T7B 440 RS1A	17° @ 6000 rpm	0.066 in.
T7C 340 FR1	14° @ 6000 rpm	0.044 in.
T7C 440 FR1	17° @ 6000 rpm	0.066 in.
T7C 250 FR2	17° @ 6000 rpm	0.066 in.
T7C 340 FR2	14° @ 6000 rpm	0.044 in.
T7C 440 FR2	17° @ 6000 rpm	0.066 in.

3. When proper timing marks are aligned, tighten the magneto base screws, using a screwdriver having a 5/16-inch blade.

4. Install flywheel key in slot in crankshaft. Lightly tap in place, using a rubber mallet.

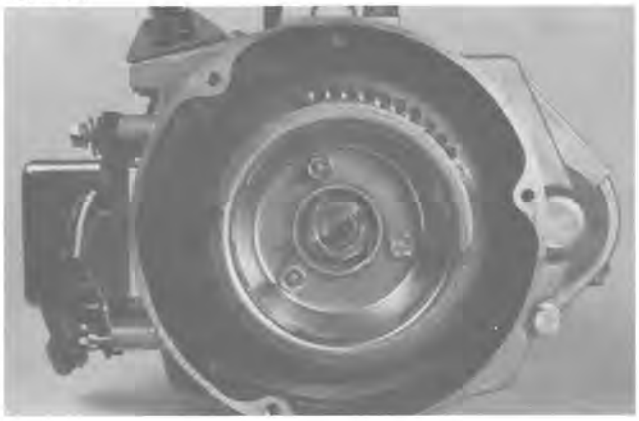
5. Make sure flywheel w/magnets is free of dirt and other foreign matter. Align keyway in flywheel with key in crankshaft MAG end. Slide flywheel in position. Install retaining washer and flywheel nut, Fig. II-67. DO NOT TIGHTEN.

Fig. II-67



6. Temporarily install the retainer pulley and recoil pulley on the flywheel with three bolts, Fig. II-68. Slightly tighten the bolts.

Fig. II-68



7. Now tighten the large flywheel nut to 60 ft-lb, using a flywheel holding tool (Arctic Part No. 0144-007) to hold flywheel, a torque wrench, and a 22mm socket.

8. Remove auxiliary recoil pulley and retainer. Bend the lock washer locking tab toward the flywheel nut to properly lock in place.

9. Install the retainer pulley and auxiliary recoil pulley on the flywheel with the three bolts, Fig. II-68. Tighten bolts to 5 ft-lb, using a torque wrench and 10mm socket.

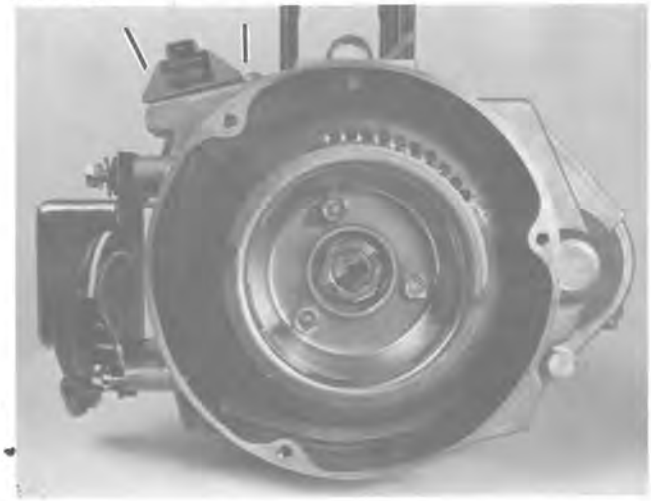
10. Position magneto housing in place on crankcase. Install the four nuts, lock washers, and flat washers on magneto studs. Install the magneto housing bolt, lock washer, and nut. Tighten the five nuts to 16 ft-lb, using a torque wrench, 13mm socket, and 13mm wrench.

11. T7 Series Only — With the four screws (T7B) or four bolts (T7C) and lock washers, install the CDI unit on the magneto housing, Fig. II-69. Tighten to 5 ft-lb, using a screwdriver having a 5/16-inch blade or a torque wrench and a 10mm socket.

Fig. II-69

12. Slide engine wire harness connector into place on magneto housing, Fig. II-70. Tighten the two screws, using a screwdriver having a 1/4-inch blade.

Fig. II-70



Install Cylinder Heads, Cylinders, and Pistons

Equipment Necessary: Arctic Cat Purple Power-lube, Wooden or Soft Metal Block, Piston Ring Compressor (Arctic Part No. 0144-001), Torque Wrench, 12mm Socket, and 13mm Socket

Note: Make sure matched parts are assembled together.

1. Make sure all parts have been cleaned and inspected.

2. Ensure the gasket areas of the crankcase and the bottom of the cylinder is clean. Install new cylinder base gasket, Fig. II-71.

Fig. II-71

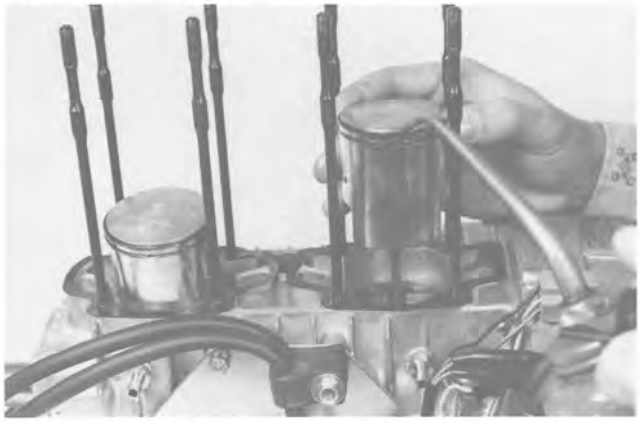
3. Install piston ring set on piston. Make sure the open ends of rings are situated over piston ring groove pins. Install piston pin circlip on the centermost side of piston (for ease of installation).

Note: If a new piston is installed, a new piston ring set must be used.

4. Install the piston pin needle bearing in the upper end of the connecting rod, Fig. II-72.

Fig. II-72

Fig. II-74



Note: When replacing the piston pin or needle bearing, the pin and bearing must be replaced as a set.

5. Place piston over the connecting rod, Fig. II-73, with the arrow on top of piston pointing toward the exhaust side of engine; secure with a piston pin. Retain piston pin in place with circlip. Be sure circlip is positioned in the piston pin grooves.

Fig. II-73

6. Lubricate the upper and lower rod bearings, side of pistons, ring, and cylinder walls with Arctic Cat Purple Powerlube, Fig. II-74.

7. Using a wooden or soft metal block for support, rotate the crankshaft until skirt of piston rests on the support block, Fig. II-75.

Fig. II-75

Note: DO NOT DAMAGE THE CYLINDER BASE GASKET.

8. Using a piston ring compressor (Arctic Part No. 0144-001), compress the piston rings and slide the cylinder on the crankcase studs and over the piston and rings, Fig. II-76.

Fig. II-76

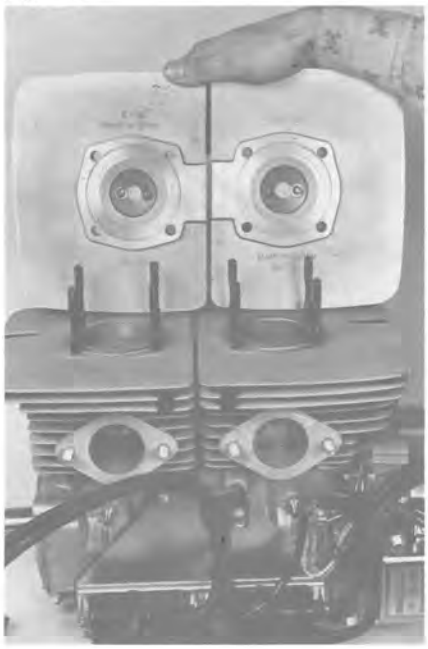
9. After cylinder is positioned over piston rings and covers piston pin hole, remove the block from under piston. Slide cylinder completely down onto crankcase.

10. Install head gasket on cylinder studs.

Note: Usually no gasket sealer is needed; however, a minimal amount of RTV sealer or bathtub caulk may be used if desired.

11. Position the cylinder head on the cylinder, Fig. II-77.

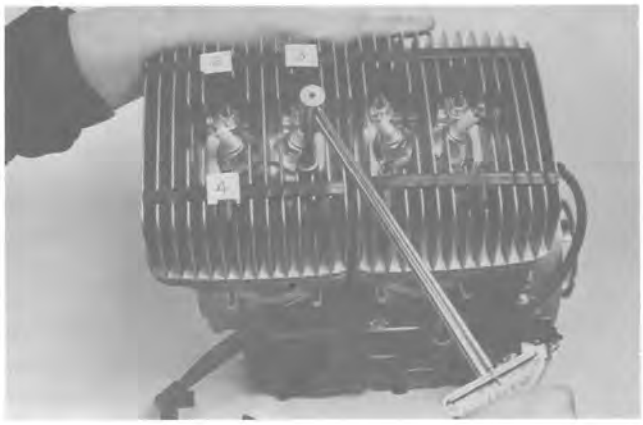
Fig. II-77



Note: Large boss on bottom of cylinder head must be facing adjacent cylinder.

12. Install the flat washers, lock washers, and cylinder head nuts. Tighten to 16 ft-lb, using a torque wrench and 13mm socket, in the sequence shown in Fig. II-78.

Fig. II-78



13. If a cylinder is replaced, install the carburetor mounting flange, insulator, and gasket with the two bolts, using a 12mm socket. Tighten bolts to 5-7 ft-lb, using a torque wrench and 12mm socket.

Note: Before installing carburetor insulator, check insulator for trueness, using a surface plate. Briskly rub insulator face against plate, Fig. II-79, and examine for imperfections.

Fig. II-79

14. Repeat steps 1-13 on opposite cylinder, if required.

ENGINE ASSEMBLY

Install External Components

Equipment Necessary: Torque Wrench, 10mm Socket, 10mm Wrench, 13mm Socket, 13mm Wrench, 3/4-Inch Socket, and 3-Inch Extension

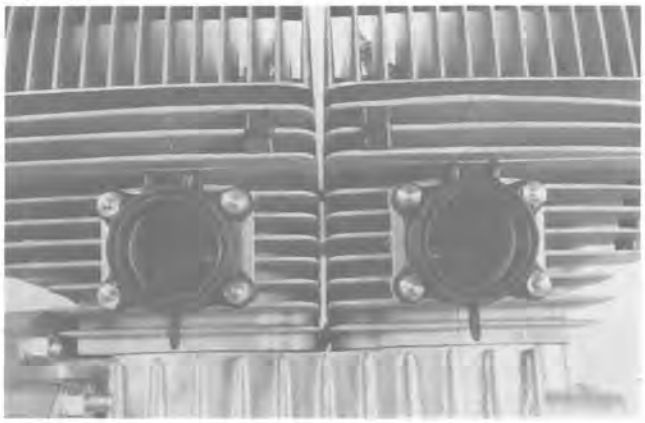
1. Place the exhaust manifold on the cylinder exhaust studs.

Note: On Z models, install the two exhaust flanges.

2. T7 Series Engines — Install the eight brass nuts and lock washers on cylinder exhaust studs, Fig. II-80. Tighten nuts to 5-7 ft-lb, using a torque wrench and 10mm socket.

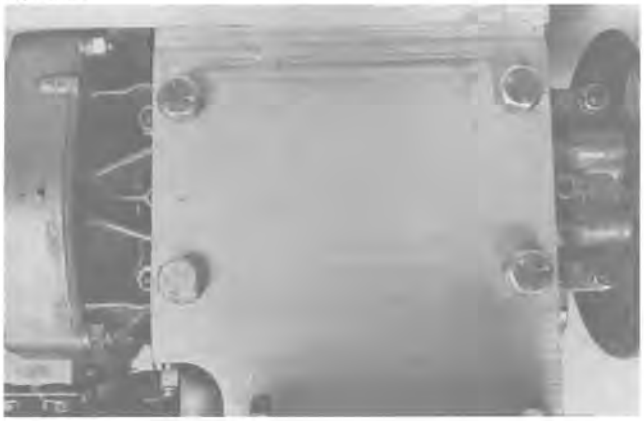
   T1C Series Engines — Install the four brass nuts and lock washers on cylinder exhaust studs. Tighten brass nuts to 10 ft-lb, using a torque wrench, 13mm socket, and 13mm wrench.

Fig. II-80



3. Place the engine motor plate in position on bottom of engine. Secure in place with four mounting bolts and lock washers, Fig. II-81. Tighten to 45 ft-lb, using a torque wrench and a 3/4-inch socket.

Fig. II-81



4. Install the drive clutch on the engine crankshaft (See: Section V — Drive System, Drive Clutch Installation).

ENGINE INSTALLATION

Install Engine in Snowmobile

Equipment Necessary: Cardboard, Small Vise-Grip, Torque Wrench, Phillips Screwdriver Having a No. 2 Blade, 10mm Socket, 9/16-Inch Socket, Two 9/16-Inch Wrenches, 3-Inch Extension, and 8-Inch Extension

1. Lift engine into the engine compartment of the snowmobile.
2. Account for any shims which were removed during disassembly.
3. Grasp engine firmly. Align rear motor mounts and motor mounting holes in front end. Slide rear motor mount studs into mounting holes.
4. Align holes in front of engine plate and front motor plate support with the front motor mount studs. Slide engine plate and plate support onto front motor mounts.
5. Install the impulse line on the crankcase fitting.
6. Connect the electrical connector to the plug on flywheel housing.
7. Install the carburetors in the carburetor mounting flanges. Make sure carburetors are level. Tighten mounting flange clamp, using a screwdriver having a no. 2 blade.
8. Install the exhaust system (See: Section IA – Setting-Up, Install Exhaust System, page IA-8).
9. Install the three lock nuts and flat washers on the front motor mount studs. Tighten to 30-35 ft-lb, using a torque wrench, 9/16-inch socket, and 8-inch extension.
10. Tip the snowmobile on its side and use a piece of cardboard to protect against scratching.
11. Install the two lock nuts on the rear two motor mount studs. Tighten to 30-35 ft-lb, using a torque wrench, 9/16-inch socket, and 8-inch extension.
12. Tip the snowmobile upright.
13. Install the drive belt.
14. Secure recoil in place with 3 bolts. Tighten to 5 ft-lb, using a torque wrench, 10mm socket, and 3-inch extension.

Timing

Equipment Necessary: Dial Indicator w/Adapters, Auxiliary Starting Rope, Quik Jack, Torque Wrench, Felt-Tip Marker, Sun Electric Timing Light (Model RTL-55-2), and Screwdriver Having a 5/16-Inch Blade

Note: For this procedure, one cylinder head of the T7 series engines must be removed to allow use of dial indicator w/adapters.

1. Using a dial indicator w/adapters, find top dead center (TDC) on either cylinder. Make reference mark on a stationary part of engine and a corresponding mark on engine flywheel, using a felt-tip marker.
2. Looking at MAG side of engine, rotate engine counterclockwise to proper timing position for the particular engine, Fig. II-82.
3. Make a timing mark on flywheel exactly opposite the first reference mark. Use this mark for checking timing.
4. Remove dial indicator and install spark plug and plug wires.

Note: On the T7 series engines, cylinder head will have to be installed.

ENGINE INSTALLATION

Fig. II-82

ENGINE TIMING CHART		
Engine	Dynamic (BTDC)	Piston Location (BTDC)
T1C 295 RS1A	25° @ 6000 rpm	0.139 in.
T1C 340 RS1A	25° @ 6000 rpm	0.139 in.
T7B 400 RS1A	17° @ 6000 rpm	0.066 in.
T7B 440 RS1A	17° @ 6000 rpm	0.066 in.
T7C 340 FR1	14° @ 6000 rpm	0.044 in.
T7C 440 FR1	17° @ 6000 rpm	0.066 in.
T7C 250 FR2	17° @ 6000 rpm	0.066 in.
T7C 340 FR2	14° @ 6000 rpm	0.044 in.
T7C 440 FR2	17° @ 6000 rpm	0.066 in.

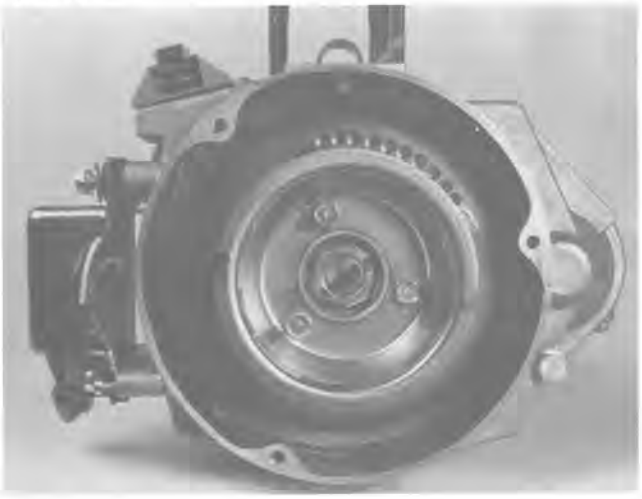
5. Using a Quik Jack, raise the rear of the snowmobile off the floor. Make sure the track is free to rotate.

6. Using an auxiliary starting rope, start the engine.

7. Using a Sun Electric Timing Light (Model RTL-55-2), gradually accelerate engine to 6000 rpm. At this time, the timing mark made in step 3 should align with the stationary reference mark. If marks do not align, proceed to steps 8-12.

8. If timing is off (timing marks do not align), remove the three bolts securing auxiliary starting pulley and retainer to expose holes in flywheel, Fig. II-83, using a 10mm socket.

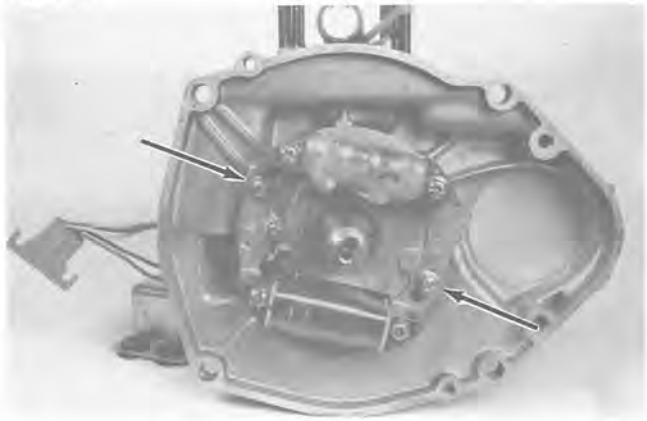
Fig. II-83



9. Rotate flywheel until magneto base mounting screws are visible. Loosen the two screws, using a screwdriver having a 5/16-inch blade.

Note: Fig. II-84 shows the screws to loosen (flywheel removed for clarity only).

Fig. II-84



10. Rotate the base plate clockwise or counterclockwise to compensate for timing mark variance.

11. Tighten the two base plate mounting screws, using a screwdriver having a 5/16-inch blade.

12. Install the auxiliary starting pulley and retainer on flywheel. Secure in place with the three bolts and tighten to 5 ft-lb, using a torque wrench and a 10mm socket. Repeat steps 6 and 7.

Remove Recoil Starter

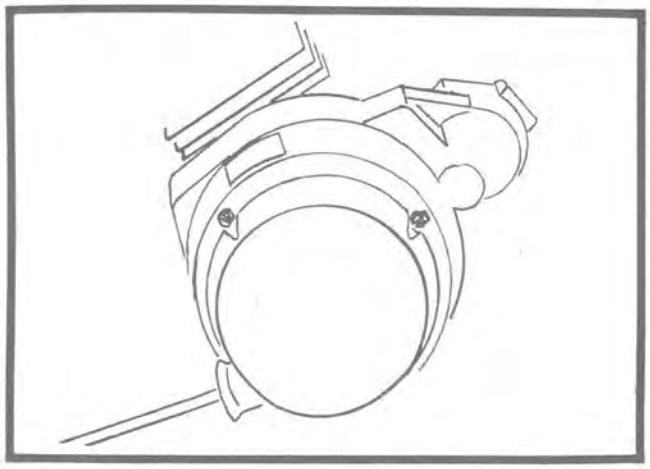
Equipment Necessary: 10mm Socket and 3-Inch Extension

1. Turn ignition switch to OFF position.

2. Open hood.

3. Remove the 3 bolts securing recoil assembly to the magneto housing, Fig. II-85, using a 10mm socket and 3-inch extension.

Fig. II-85



CAUTION

Before removing last bolt, grasp the recoil to prevent a sudden retraction of the recoil to the instrument panel.

4. Tie a slip knot in the recoil rope and slowly allow the rope to retract against recoil housing.

5. Remove the knot in the recoil handle. Slide handle off rope.

6. Pull recoil rope free of instrument panel.

Disassemble Recoil Starter

Equipment Necessary: Piece of Stiff Wire and 13mm Socket

1. Clamp the recoil in a vise.

2. While exerting downward pressure on the retainer cover, remove the 13mm nut, lock washer, and flat washer, Fig. II-86, using a 13mm socket.

Fig. II-86

3. Slowly release the retainer cover. Lift cover free of spiral spring, Fig. II-87.

Fig. II-87

4. Remove spiral and compression springs.

5. Remove the 3 pawl springs; then remove the 3 starter pawls.

Note: Further recoil disassembly is not required, unless there is a problem with the main spring or the recoil rope.

6. Rotate the recoil reel counterclockwise until the notch of the reel is near the recoil rope bushing. Using a piece of stiff wire, guide the rope into the notch and slowly allow the reel to retract until all main spring tension is released.

7. Carefully lift the recoil reel free of case, making sure that the recoil spring does not accidentally disengage from the recoil housing, Fig. II-88.

Fig. II-88

8. Remove the recoil spring from the recoil housing 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 recoil housing, Fig. II-89.

Fig. II-89

Inspect Recoil Parts

Equipment Necessary: No Special Tools Required

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

1. Inspect all springs, shims, washers, pawls, and retaining cover for excessive wear or damage.

2. Inspect the recoil reel and housing for excessive cracks, or damage. Also check the center hub for cracks and excessive wear.

3. Check the recoil rope for breaks and fraying.

4. Inspect the main spring for cracks, crystallization, and abnormal bends.

5. Inspect the starter handle and end piece for damage, cracks, or deterioration.

Assemble Recoil Starter

Equipment Necessary: Torque Wrench and 13mm Socket

1. Hook the one end of the recoil spring around the mounting lug in the recoil housing.

2. Continue to insert the recoil spring, winding in a counterclockwise direction, Fig. II-90. Insert windings one at a time until the complete recoil spring is installed.

Fig. II-90

Note: Recoil spring must seat evenly on the recoil housing to ensure correct installation.

3. If a recoil rope is to be installed, secure a knot in one end of the rope and insert the rope through the hole in the recoil pulley; then wrap rope counterclockwise around pulley leaving about two feet of rope free of pulley.

4. Align the hook in the end of the recoil spring with the notch in the recoil pulley.

Note: At this time a light oil may be used to lubricate both the spring and pulley hub, and also to prevent corrosion.

5. Carefully slide the recoil pulley over hub and hook spring to the pulley, Fig. II-91.

Fig. II-91

6. When the recoil is seated correctly in the recoil case, place washer "A" against the recoil pulley.

7. Install the pressure spring and return spring in the recoil; then place the three recoil pawls in position.

8. Slide end of recoil rope through rope guide of recoil; then tie a slip knot in the end of the rope.

9. Install the three pawl springs in the recoil pawls, Fig. II-92.

Fig. II-92

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

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

11. Secure cover in place with flat washer "B", lock washer, and nut, Fig. II-93. Tighten nut to 16 ft-lb, using a torque wrench and a 13mm socket.

Fig. II-93

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

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

Install Recoil Starter

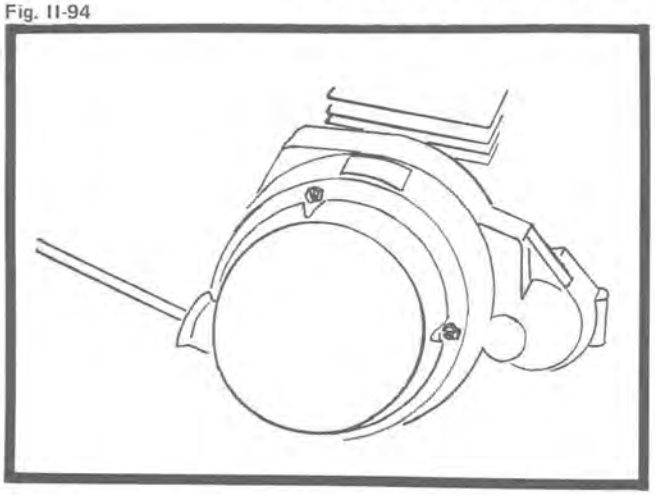
Equipment Necessary: Torque Wrench, 10mm Socket, and 3-Inch Extension

1. Place recoil assembly in position against magneto housing.

2. Secure recoil, Fig. II-94, in place with three recoil bolts. Tighten bolts to 5 ft-lb, using a torque wrench, 10mm socket, and 3-inch extension.

ENGINE INSTALLATION

Fig. II-94



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

3. Thread recoil rope through rope guide bushing in instrument panel, recoil handle, and end piece; then tie a knot in the end of rope to prevent it from pulling through handle.

4. Release the slip knot in the rope by the recoil housing.

NOTES

NOTES

TABLE OF CONTENTS

FUEL SYSTEM SPECIFICATIONS

1974 MODELS

	295	340	400, 440
Fuel Tank Capacity	6.25 gal.	6.25 gal.	6.25 gal.
Carburetor Part No.	0107-046	0170-044	0170-043
Carburetor Type	VM30-53	VM34-23	VM34-24
Jet Needle	5DP7	6DH4	6DH4
Needle Jet	P-O (169)	P-O (166)	P-O (166)
Standard Main Jet	180	270	360
Slide Cutaway	2.0	2.0	2.0
Pilot Jet	30	25	25
Air Screw (Turns from Seated Position)	1.0	1.0	1.0
Inlet Seat	1.5	1.5	1.5
Float Level (mm)	16.2	22	22
*Fuel Level (mm)	31.0 ± 1	35.5 ± 1	35.5 ± 1
Pump Part No.	0109-600	0109-600	0109-600

*** The dimension shows distance between bore center and fuel level.**

1975 STANDARD MODELS

	340	440
Fuel Tank Capacity	6.25 gal.	6.25 gal.
Carburetor Part No.	0170-073	0170-072
Carburetor Type	VM32	VM34
Jet Needle	6DH4-3	6DH4-3
Needle Jet	P-O	P-O
Standard Main Jet	300	460
Slide Cutaway	2.0	2.0
Pilot Jet	30	25
Air Screw (Turns from Seated Position)	1.0	1.0
Inlet Seat	1.5	1.5
Float Level (mm)	22-24	22-24
*Fuel Level (mm)	35.5 ± 1	35.5 ± 1
Pump Part No.	0109-638	0109-638

*** The dimension shows distance between bore center and fuel level.**

FUEL SYSTEM SPECIFICATIONS

1975 "Z" MODELS

	250	340	440
Fuel Tank Capacity	3 gal.	3 gal.	3 gal.
Carburetor Part No.	0170-076	0170-075	0170-074
Carburetor Type	VM28	VM36	VM38
Jet Needle	5DP7-3	6DH4-3	6DH4-3
Needle Jet	0-8 (182)	P-O (159)	Q-O (166)
Standard Main Jet	230	400	530
Slide Cutaway	2.0	2.0	1.5
Pilot Jet	35	35	30
Air Screw (Turns from Seated Position)	1.0	1.0	1.0
Inlet Seat	1.5	1.5	1.5
Float Level (mm)	15-17	17-19	17-19
*Fuel Level (mm)			
Pump Part No.	0109-638	0109-638	0109-638

*** The dimension shows distance between bore center and fuel level.**

FUEL SYSTEM

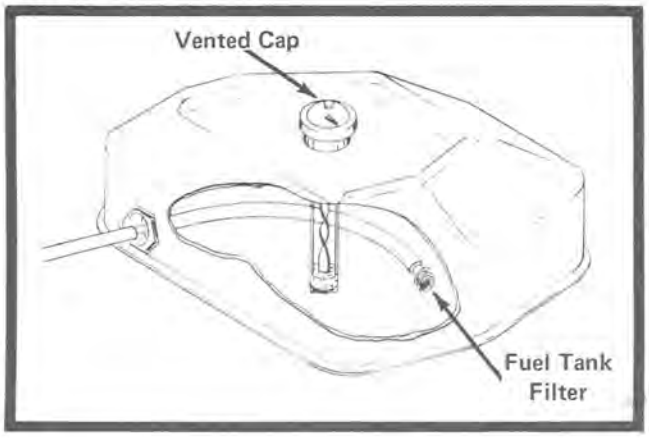
General

The fuel system utilized in the Arctic Cat El Tigre snowmobile consists of a fuel tank, fuel line, chassis-mounted external fuel pump, and carburetors. The fuel pump is mounted on the curved section of the front end and is actuated by pressure impulses from the engine crankcase.

The only source of lubrication for the El Tigre engine is the fuel mixture that is used for combustion. Therefore, correct fuel mixing is important. The correct ratio of gasoline to oil is 20:1. If the mixture contains too much oil, the spark plug will eventually foul, and the piston dome will become excessively carboned because of incomplete combustion. If the mixture does not contain enough oil, the engine will possibly overheat and engine damage may result.

The fuel tank on all models, except the 1975 Z models, is made of cold-rolled steel and has an approximate capacity of 6.25 U.S. gallons. The outside of the fuel tank is specially cleaned and coated with a gasoline/oil resistant paint. The tank is equipped with a vented fuel level gauge cap, Fig. III-1, that allows fuel vapors to be released into the atmosphere. The vented cap also aids the flow of fuel to the fuel pump and carburetor. If a vent hole was not provided in the fuel level gauge cap or if the vent hole becomes obstructed, fuel will not flow to the fuel pump and carburetor.

Fig. III-1



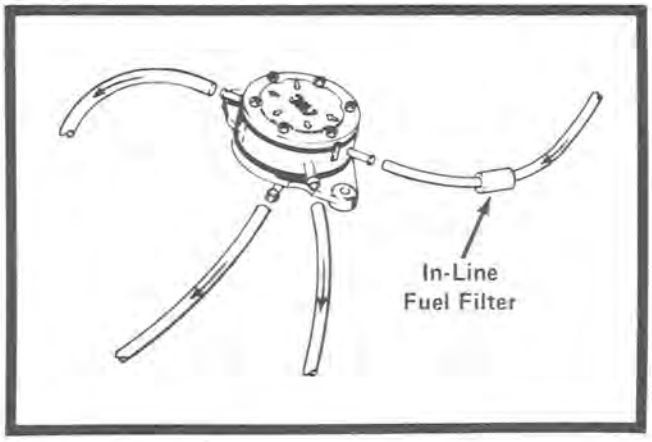
The Z model fuel tank is a molded plastic tank rather than steel, and has an approximate capacity of 3 U.S. gallons. The Z model fuel tank has a vented fuel cap.

Both fuel tanks are also equipped with a fitting to accommodate the fuel line. The section of fuel line extending into the tank has a screened filter, Fig. III-1, that removes impurities from the fuel mixture. The fuel tank filter also encases a check valve

that prevents back flow of fuel when engine is off. As an added precaution, there is an in-line fuel filter just before the fuel pump, Fig. III-2.

To transmit fuel from the fuel tank to the carburetor, an externally-mounted fuel pump, Fig. III-2, is mounted on the curved portion of the front end. The fuel pump is operated by crankcase impulses which pass through the impulse line that is connected to the fuel pump and engine crankcase.

Fig. III-2



The carburetors used on the El Tigre snowmobiles are Mikuni VM series. The carburetors are float type with both a low speed (pilot system) and a high speed (main system). This will provide efficient operation from idle to wide open throttle. The primary function of the carburetor is to meter a precise volume of fuel, and, at a specific time, change liquid fuel to a vapor that is mixed with air, resulting in a volatile gas that can be ignited by the spark plug.

1975 Bowl Vent System

The purpose of the bowl vent is to equalize the pressure in the carburetor bowl with the pressure in the intake area of the carburetor and air silencer.

The addition of the silencer box creates a pressure differential between the intake area of the carburetor and the float bowl.

Consequently, the high atmospheric pressure exerted in the float bowl through the normal external bowl vents causes excessive fuel to flow into the engine during acceleration and partial throttle operation. To equalize this pressure, the bowl is vented to the intake and silencer areas.

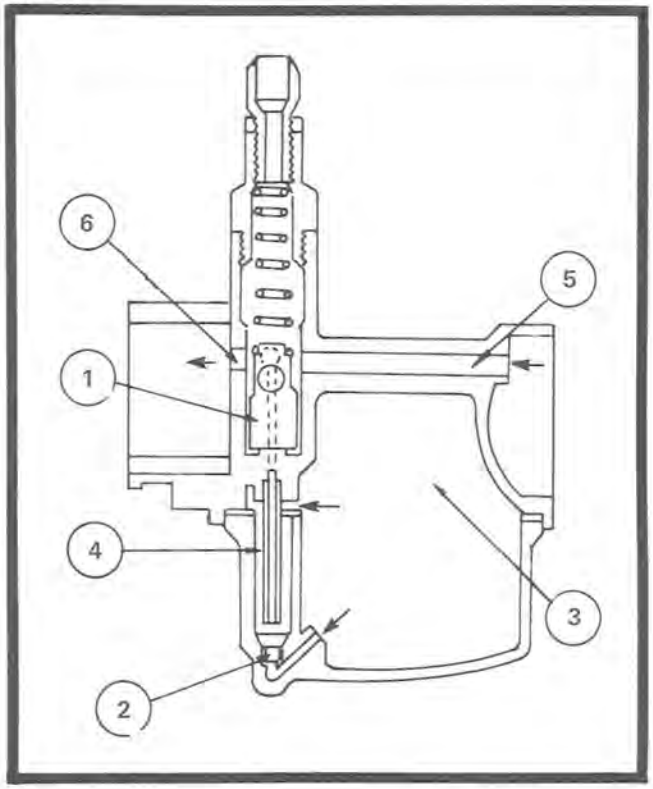
In the event that this new bowl vent system incurs a leak, no engine damage should result — only poor acceleration and part throttle operation. However, if the air silencer box is removed or damaged, a lean fuel condition will occur, allowing for possible engine damage.

THEORY OF OPERATION

Starter System

In place of a choke, a starter system is used on the Mikuni carburetors, Fig. III-3. This system is used to enable easy starting when the engine is cold, and replaces the choke system usually found on four-cycle or old style two-cycle engines.

Fig. III-3



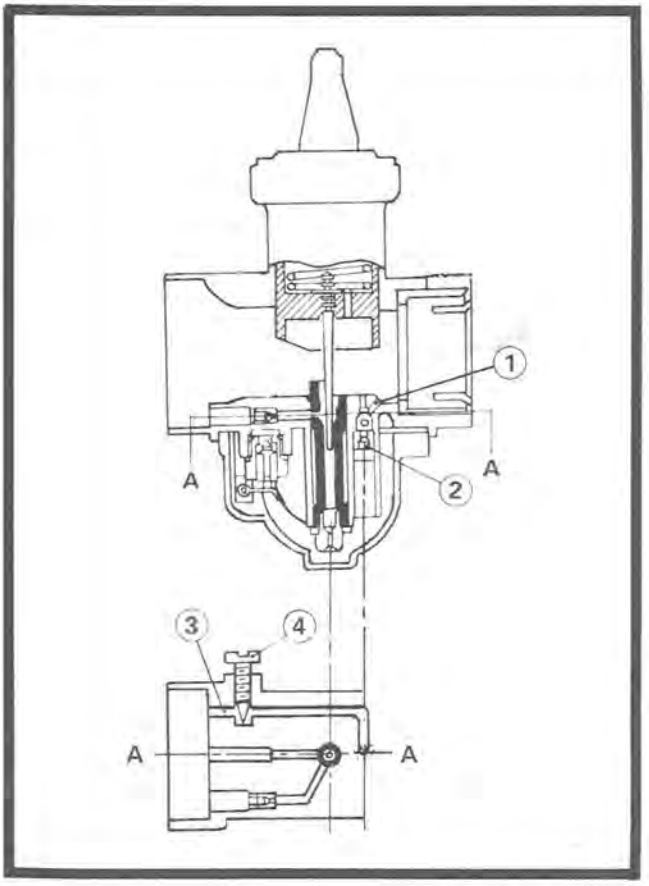
To start a cold engine, lift the choke (starter) lever up. When the lever is lifted, the starter plunger (1) is pulled up. Fuel is then drawn up through the starter jet (2) by a negative intake pressure. The fuel is then mixed with air from the float chamber (3) via the air bleed opening (4). The fuel is then also mixed with air from the starter primary air passage (5). This mixture is released into the main carburetor bore through the starter outlet hole (6) behind the throttle valve. This mixture, along with the fuel mixture supplied by the pilot system, is then drawn into the engine.

Because the starter system of this carburetor is constructed to utilize the negative pressure of the intake port, it is important that the throttle valve be closed when starting the engine. The starter system should not be used if the engine is warm.

Idle Operation

Since the throttle valve is almost closed at idle or in the low speed range, the air flow through the needle jet is low velocity. Because of this, the negative pressure created is not enough to draw fuel from the needle jet into the main fuel system.

Fig. III-4



The fuel supply at this low speed operation, Fig. III-4, is controlled by the pilot outlet and bypass (1) located behind the throttle valve and close to the engine. When the throttle valve is in the idle position, fuel is metered through the pilot jet (2), mixed with air (3) adjusted in the proper amount by the air screw (4), and atomized. This mixture is drawn into the pilot outlet and then into the intake port. As the throttle valve is raised for low speed operation, more mixture is needed. Since the pilot outlet cannot supply enough mixture, the shortage has to be made up with fuel injected through the bypass. The adjustment of the ratio for the low speed or idle system is made with the pilot jet and the air screw.

THEORY OF OPERATION

Part Throttle Operation

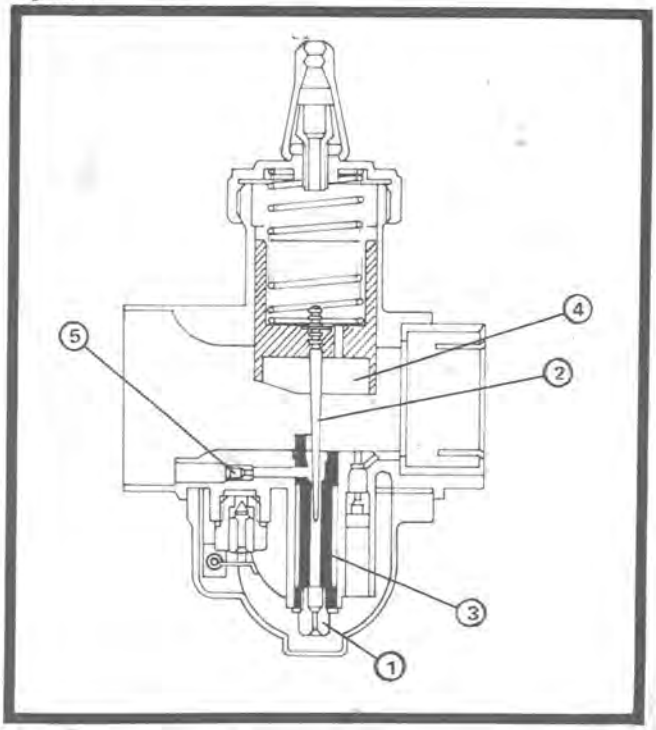
During operation from 1/4 to 3/4 throttle, the velocity of air flowing through the needle jet increases. The resulting negative pressure will increase to the point where fuel will be drawn up through the main jet. The air, metered by the air jet, is mixed with the fuel to cause atomization. This mixture is drawn into the carburetor bore and mixed with the incoming air in the throttle bore. The mixture then enters the engine. The cutaway of the throttle valve controls the negative pressure of the needle jet, and thus, regulates the amount of fuel drawn into the engine.

Full Throttle Operation

When the throttle valve is over three-quarters open for high speed operation, fuel is metered by the main jet. The air flowing through the needle jet causes a negative pressure which makes the fuel flow from the main jet and up through the needle jet; however, the needle jet is not metering the fuel flow.

Both part throttle and full throttle are usually combined when referring to the main system. In Fig. III-5, the main system consists of the following: main jet (1), jet needle (2), needle jet (3), throttle valve (4), and the air jet (5).

Fig. III-5

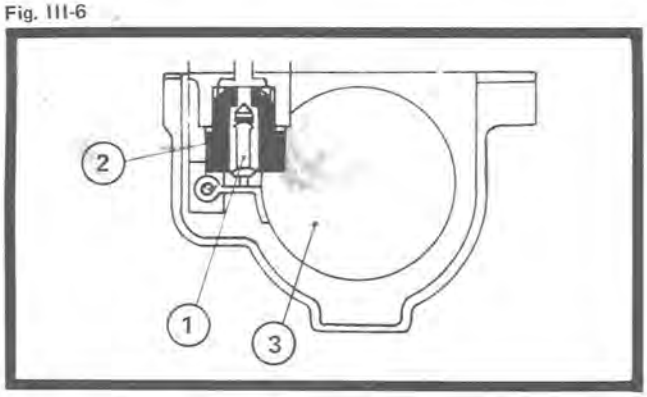


Any time the throttle valve is more than one-fourth open, air is taken in mainly through the carburetor bore and flows beneath the throttle valve. This air flow causes a low pressure area around the jet needle, thus drawing fuel up through the main jet through the opening between the needle jet and jet needle and finally into the main carburetor bore. Air coming in via the air jet mixes with the fuel inside the needle jet. This mixing helps to speed up the atomization process. When this mixture reaches the main bore of the carburetor, it is further atomized by and combined with the main stream of air; then drawn into the engine.

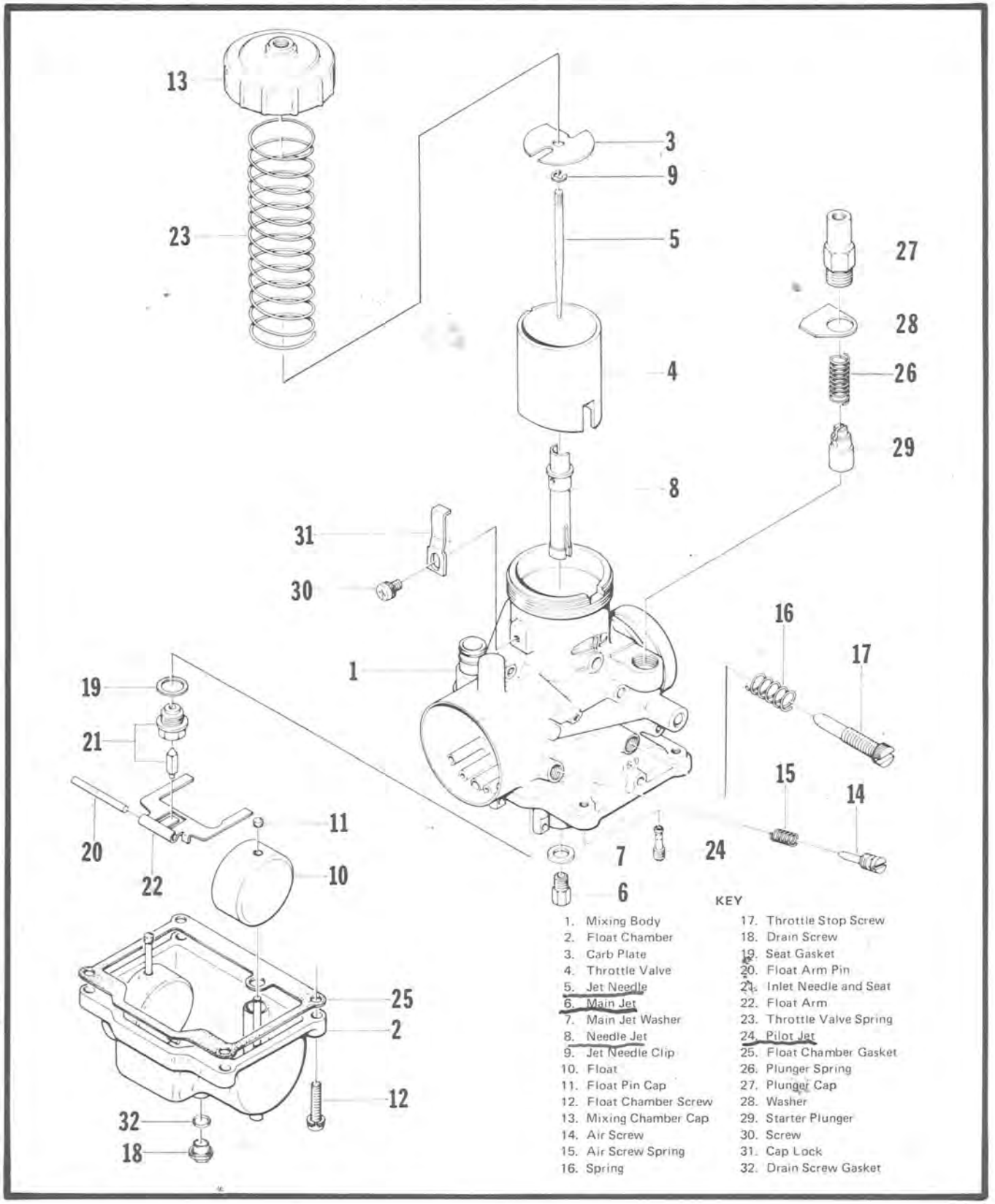
Float System

The float system of the Mikuni carburetor, Fig. III-6, is used to maintain the proper fuel level in the float bowl. Fuel entering the carburetor passes between the inlet needle (1) and the inlet needle seat (2). As the fuel level rises, the floats (3) rise. When the floats reach the specified float level, the inlet needle valve moves into the valve seat and eventually closes. Therefore, the floats control the fuel level in the float bowl. If the fuel level is too high, excess fuel will overflow through the needle jet, causing a rich mixture. By contrast, a low fuel level will not allow enough fuel to flow through the needle jet, causing a lean mixture.

Fig. III-6



MIKUNI VM SERIES CARBURETOR



Note: Because various engines use different carburetors, the above is used to give an idea of the parts breakdown. See the parts books for correct carburetor parts breakdown for each model.

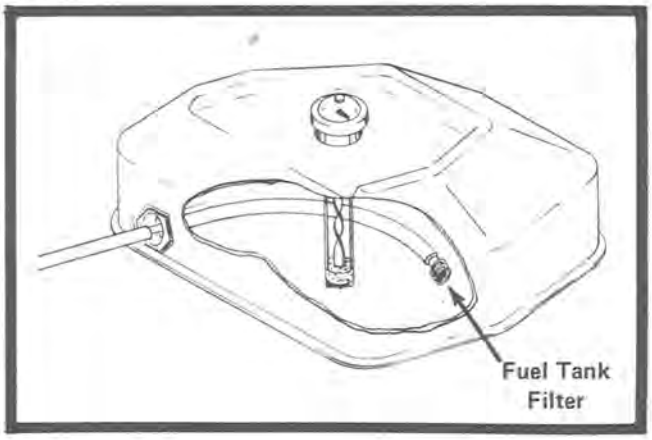
BEFORE TROUBLE SHOOTING THE CARBURETOR

Check Fuel Tank Filter

Equipment Necessary: 12-Inch Stiff Wire, Gasoline

Inside the fuel tank on the end of the fuel line is a brass screen filter, Fig. III-7. The filter must be clean to allow the fuel line to transmit the maximum amount of fuel. If the fuel filter or the vent hole in the fuel level gauge cap is obstructed, fuel flow will be restricted.

Fig. III-7



1. If the vent hole in the fuel level gauge cap is plugged, remove the obstruction by washing the cap in gasoline and drying it with compressed air.

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

3. Remove the fuel line from within the tank, using the stiff wire.

Note: The fuel line can be pulled up through the filler hole far enough for examination.

4. Examine the condition of the fuel filter. If filter is obstructed, wash it in a container of clean gasoline. If brass screen or spring is damaged, filter is to be replaced.

5. When the fuel filter is clean, install it in the end of the fuel line. Insert the fuel line and filter into the fuel tank. Make sure the filter is on the bottom of the fuel tank.

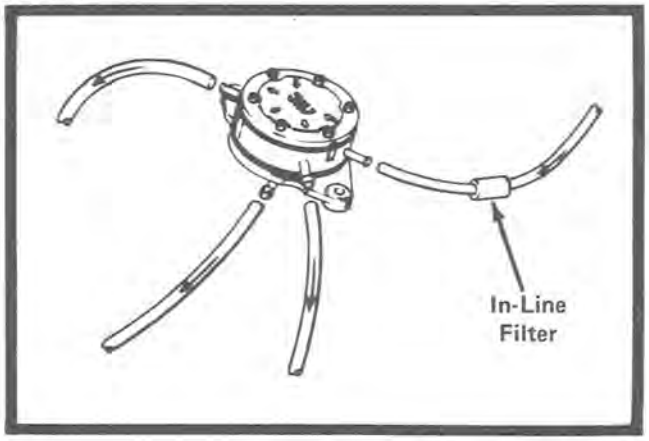
6. Install the fuel level gauge cap.

Check In-Line Fuel Filter

Equipment Necessary: Gasoline

An in-line fuel filter is located just before the fuel pump, Fig. III-8. The filter must be clean to allow the fuel line to transmit the maximum amount of fuel. If fuel filter is obstructed, fuel flow will be restricted.

Fig. III-8



1. Remove the fuel filter from the fuel line. To prevent fuel drainage, plug the fuel line, using a 1/4-inch bolt.

2. The in-line fuel filter does not have a replaceable filtering element. Therefore, the only cleaning possible is a back-flush of the filter, using gasoline.

3. When the fuel filter is clean, install it in the fuel line.

4. Check fuel line for proper connection at the fittings. If lines are cracked or have deteriorated, replace them.

Starting a Flooded Engine

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

1. Turn the ignition key to the OFF position.

2. Disconnect the high tension wire from the spark plugs. Remove the spark plugs, using a 13/16-inch spark plug socket. Dry the spark plugs. Install the plugs in the plug wires.

3. Pull recoil rope 5-10 times.

BEFORE TROUBLE SHOOTING THE CARBURETOR

4. Install the spark plugs and tighten to 20 ft-lb, using a torque wrench and 13/16-inch spark plug socket. Connect the high tension wires to the spark plugs.

5. Start the engine (See: Section I — General, Starting/Stopping Instructions, page I-9).

Note: If the engine continues to flood, trouble shoot the carburetor (See: Trouble Shooting, page III-10).

Check High Voltage Output

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

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

1. Connect the CD ignition tester's secondary output lead to the yellow lead on the CD ignition tester; then install the opposite end of the secondary output lead on the MAG side high tension wire, Fig. III-9.

2. Connect the remaining CD ignition tester to ground, Fig. III-9. Set tester dial on 55.

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

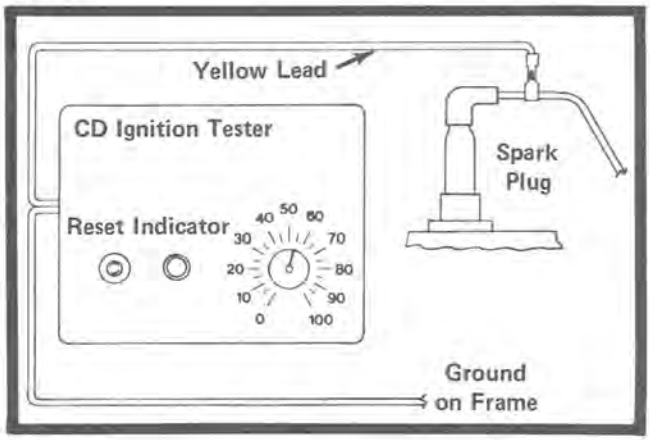
4. If the red light on the CD ignition tester illuminates when both high tension wires are checked, the spark plug and high voltage output is satisfactory and, therefore, a carburetor problem exists. If red light did not illuminate, proceed to step 5.

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

5. Remove the customer's old spark plugs and install new spark plugs, using a torque wrench and a 15/16-inch spark plug socket. Tighten spark plugs to 20 ft-lb and connect the high tension wires to the spark plugs.

6. Connect the secondary output lead to the high tension wire and the other lead to ground, Fig. III-9. Set tester dial on 55.

Fig. III-9



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

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

CARBURETOR TROUBLE SHOOTING

0 - 1/4 THROTTLE OPENING

Problem	Condition	Remedy
Too Rich	1. Too large pilot jet. 2. Clogged pilot air intake, pilot jet air passage, or air bleed opening. 3. Pilot jet mounting loose. 4. Starter plunger not seated.	1. Replace with smaller pilot jet. 2. Thoroughly disassemble and clean carburetor. 3. Tighten pilot jet. 4. Readjust starter cable linkage.
Too Lean	1. Pilot jet or jet outlet obstructed. 2. Throttle valve has worn and developed play. 3. Carburetor mounting loose, causing an air leak.	1. Thoroughly disassemble and clean carburetor. 2. Replace throttle valve. 3. Check mounting for tightness and correct sealing.

1/4 - 3/4 THROTTLE OPENING

Problem	Condition	Remedy
Too Rich	1. Problem in low-speed circuit. 2. Blocked air passage, air jet, or the air bleed opening of the needle jet. 3. Larger needle jet/jet needle clearance due to needle jet wear.	1. See: Trouble Shooting. 2. Thoroughly disassemble and clean carburetor. 3. Replace needle jet.
Too Lean	1. Problem in low-speed circuit. 2. Dirt collecting in the main jet or needle jet.	1. See: Trouble Shooting. 2. Thoroughly disassemble and clean carburetor.

3/4 - FULL THROTTLE OPENING

Problem	Condition	Remedy
Too Rich	1. Too large main jet.	1. Replace with a smaller main jet.
Too Lean	1. Too small main jet.	2. Replace with a larger main jet.

CARBURETOR TROUBLE SHOOTING

GENERAL

Problem	Condition	Remedy
Engine cuts out at high rpm.	1. Fuel pump does not pump adequate fuel. 2. Float level too low. 3. Fuel line filters plugged. 4. Moisture in fuel lines.	1. Repair or replace. 2. Readjust flow level setting. 3. Clean or replace. 4. Add gas line de-icer and clean carburetors.
Engine runs leaner on one side.	1. Carburetor flange leaking. 2. Air silencer out of alignment.	1. Reseal or replace. 2. Realign.

CARBURETOR REMOVAL

Remove Carburetor

Equipment Necessary: Large Pliers, Phillips Screwdriver Having a No. 2 Blade, 11mm Wrench, and 12mm Wrench

1. Open the hood.

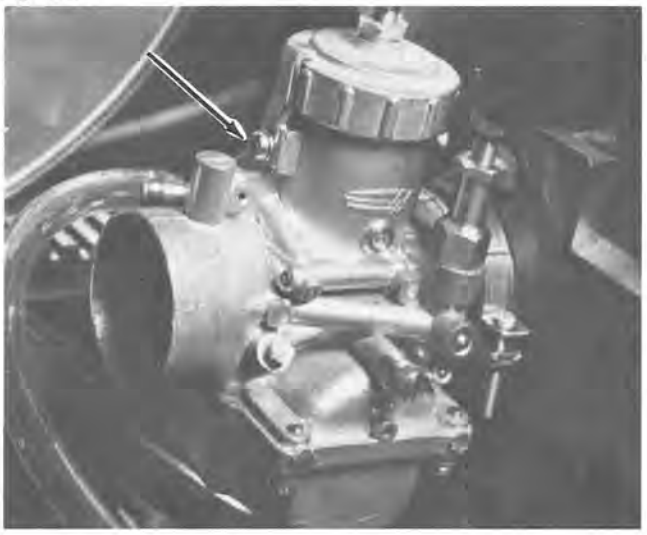
2. Remove the fuel line from the fitting on the carburetor, Fig. III-10. Plug the fuel line, using a 1/4-inch bolt.

Fig. III-10

3. Loosen the screw holding mixing chamber top plate, Fig. III-11, using a phillips screwdriver having a no. 2 blade.

Note: Mikuni 36mm and 38mm carburetors do not have mixing chamber top plates.

Fig. III-11



4. Remove mixing chamber top. Lift off throttle cable and chamber top.

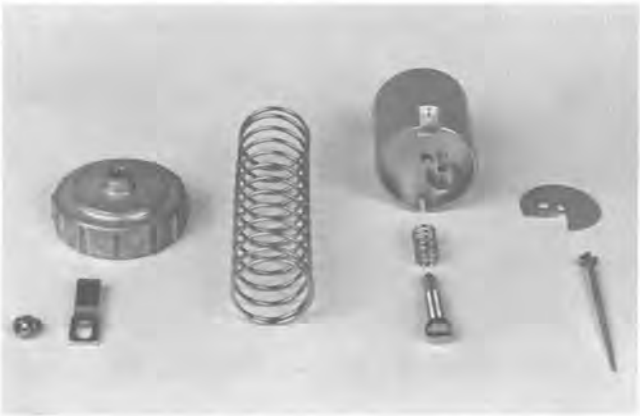
5. Compress spring toward chamber top. When compressed, push jet needle into throttle valve. Tilt so spring base plate will fall out; push jet needle through. Looking at bottom of throttle valve, move valve until cable end is free to slide through valve.

6. Remove throttle cable from chamber top, using an 11mm wrench.

CARBURETOR REMOVAL

Note: Keep all throttle valve parts together, Fig. III-12.

Fig. III-12



7. Remove starter cable from carburetor, using a 12mm wrench.

8. Remove plunger cap from carburetor, using a 12mm wrench. Pull starter plunger out of carburetor.

9. Remove end of choke cable from starter plunger by sliding starter plunger to the side.

Note: Keep all starter parts together, Fig. III-13.

Fig. III-13

10. Loosen the carburetor flange clamp screw, using a phillips screwdriver having a no. 2 blade.

11. Pull carburetors out of rubber carburetor flanges.

Note: On 1975 models, pull carburetor towards rear of snowmobile and into air silencer box; then remove carburetor from silencer box.

CARBURETOR SERVICING (DISASSEMBLY)

Disassemble Carburetor

Equipment Necessary: Small Vise-Grip, Needle-Nose Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade, Screwdriver Having a 3/16-Inch Blade, 8mm Wrench, 10mm Wrench, 12mm Wrench, and 14mm Wrench

Prior to disassembling and servicing the carburetor, carefully clean the exterior of the carburetor, using carburetor cleaner.

> **CAUTION**
>
> **DO NOT use compressed air to clean or blow out an assembled carburetor. Damage may result.**

Note: Because of differences in the various carburetors, some steps may not be totally correct for all models.

1. Remove the replaceable main jet banjo bolt, Fig. III-14, using a 14mm wrench.

Fig. III-14

CARBUETOR SERVICING (DISASSEMBLY)

2. Remove the main jet from the banjo bolt, Fig. III-15, using a small vise-grip.

Fig. III-15

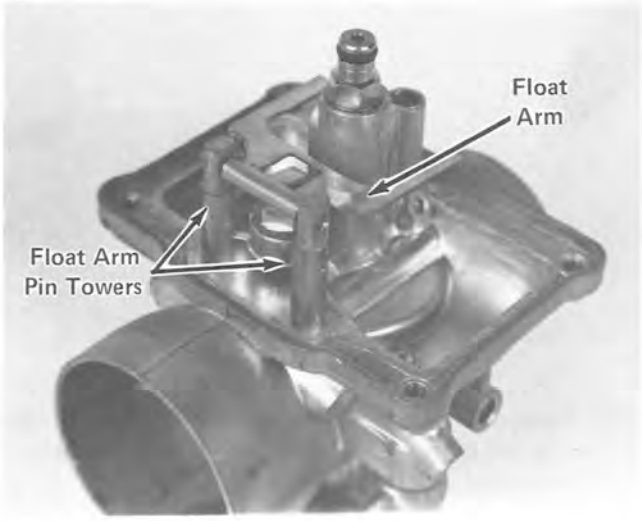
3. Remove the four screws holding float bowl chamber to carburetor body, using a phillips screwdriver having a no. 2 blade. Remove float bowl, Fig. III-16.

4. Remove the float pin caps, Fig. III-16. Pull floats off pins.

Fig. III-16

5. Remove float arm by pushing float pin through the float arm pin towers, Fig. III-17.

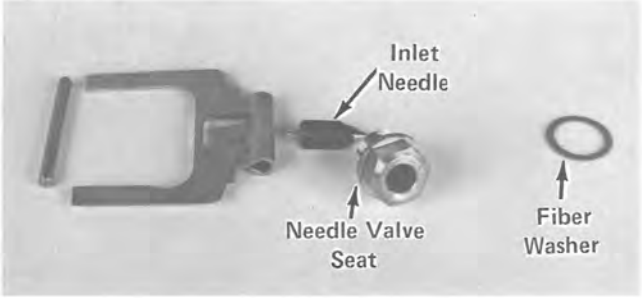
Fig. III-17



6. Remove inlet needle valve, using a needle-nose pliers.

7. Remove needle valve seat and fiber washer, Fig. III-18, using a 10mm wrench.

Fig. III-18



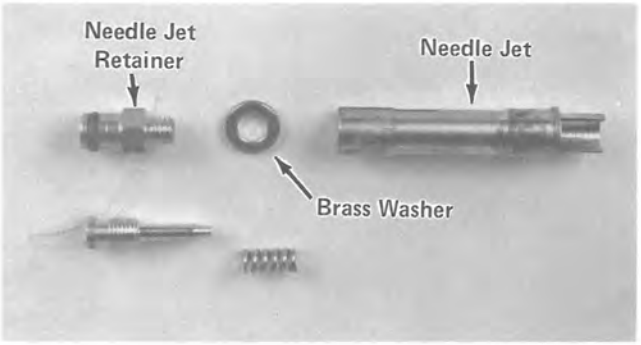
8. Remove needle jet retainer and brass washer from bottom of carburetor, using an 8mm wrench, Fig. III-19.

Note: On some models, the main jet acts as a needle jet retainer.

9. Tip top of carburetor into cupped hand. Needle jet, Fig. III-19, should slide into hand.

CARBURETOR SERVICING (DISASSEMBLY)

Fig. III-19

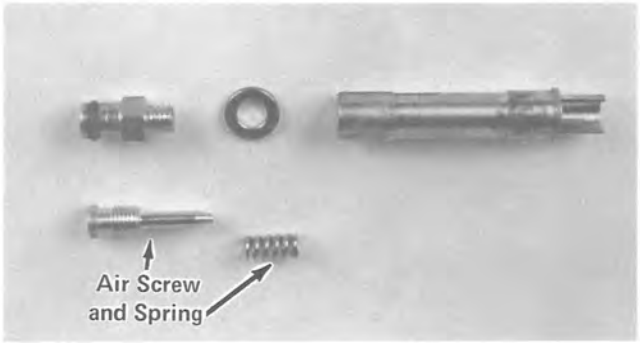


10. Remove throttle stop screw and spring from side of carburetor, Fig. III-20, using a screwdriver having a 1/4-inch blade.

Fig. III-20

11. Remove the air screw and spring, Fig. III-21, using a screwdriver having a 1/4-inch blade.

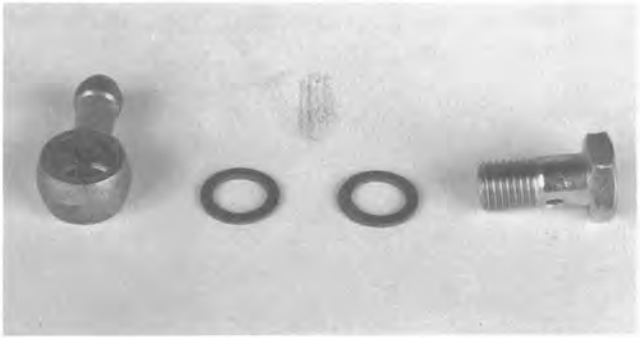
Fig. III-21



12. Remove the mixing chamber locking plate and screw, using a phillips screwdriver having a no. 2 blade.

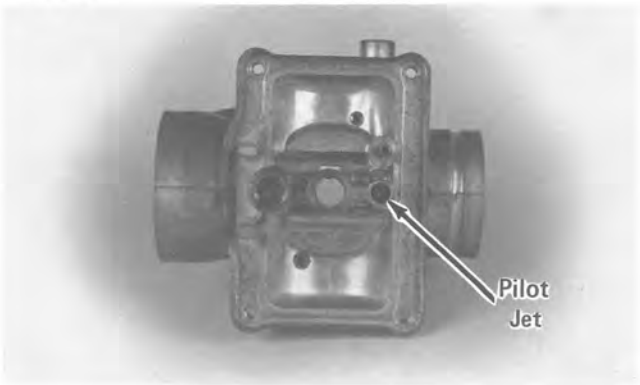
13. Remove the inlet banjo bolt, connector, and washers, Fig. III-22, using a 12mm wrench.

Fig. III-22



14. Remove the pilot jet from the mixing bowl chamber, Fig. III-23, using a screwdriver having a 3/16-inch blade.

Fig. III-23



15. Carburetor is completely disassembled at this time.

CLEANING INDIVIDUAL COMPONENTS

Cleaning

Equipment Necessary: Carburetor Cleaner, Basket (for Soaking Parts), and Compressed Air

> **● 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. The carburetor must be cleaned with carburetor cleaner only.**

1. Carefully wash all metallic carburetor parts with a good quality carburetor cleaner. DO NOT place any of the nonferrous parts in the carburetor cleaner because damage or deterioration will result.
2. After carburetor parts have been washed, place the parts in a wire basket. Submerse the parts in carburetor cleaner.
3. Allow the parts to remain in the carburetor cleaner solution for approximately 1/2 hour. Then remove parts and rinse with fresh carburetor cleaner.
4. Dry the components with compressed air, making sure all holes, orifices, and channels are unobstructed.

> **● CAUTION ●**
>
> **DO NOT use rags or paper towels to dry carburetor parts. If lint or coarse paper particles plug orifices, holes, channels, or jet openings, poor performance will result.**

INSPECTING INDIVIDUAL COMPONENTS

Inspecting Components

Equipment Necessary: No Special Tools Required

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

1. Examine the carburetor body, float bowl, and mixing chamber cap for cracks, nicks, stripped threads, and any other imperfections in the casting.
2. Examine the throttle valve for imperfections in casting or "score" marks on slide faces.
3. Check condition of the throttle return spring.
4. Inspect carburetor floats for holes or damage.
5. Inspect gaskets and O-ring for distortion, tears, or noticeable damage.
6. Inspect jet needle and air screw for damaged tips.
7. Inspect tip of inlet needle valve.
8. Inspect starter plunger and seat for wear or damage.

> **● CAUTION ●**
>
> **Check carburetor insulator block for distortion by placing it on a surface plate. If insulator block is only slightly distorted, sand it down accordingly. If insulator block is excessively warped, replace it. If carburetor mounting flange is warped, replace it. An air leak between the carburetor and engine will cause severe engine damage.**

CARBURETOR SERVICING (ASSEMBLY)

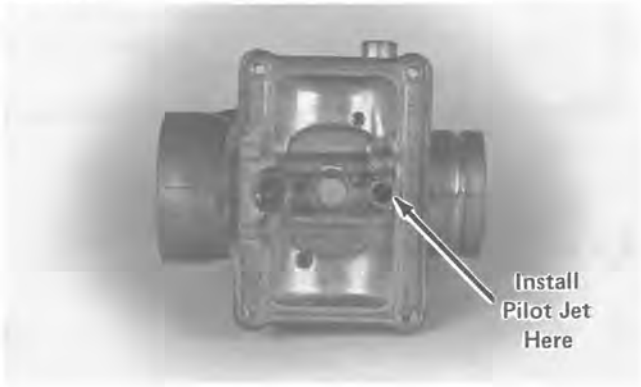
Assemble Carburetor

Equipment Necessary: Needle-Nose Pliers, Small Vise-Grip, Hammer, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 3/16-Inch Blade, Screwdriver Having a 1/4-Inch Blade, 8mm Wrench, 10mm Wrench, 12mm Wrench, and 14mm Wrench

1. Make sure all parts have been cleaned and inspected.

2. Install the pilot jet in the pilot jet tube, Fig. III-24, using a screwdriver having a 3/16-inch blade.

Fig. III-24



3. Install the needle jet in position by inserting it through mixing chamber.

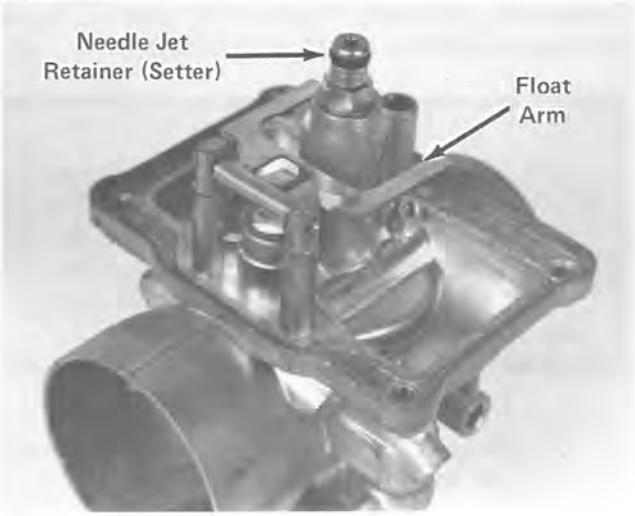
4. Fasten needle jet in position by installing needle jet setter with O-ring and washer, Fig. III-25. Tighten setter, using a 8mm wrench.

Note: On some models the main jet secures the needle jet in position.

5. Install inlet needle valve seat in casting. Tighten, using a 10mm wrench. Install inlet needle valve into seat.

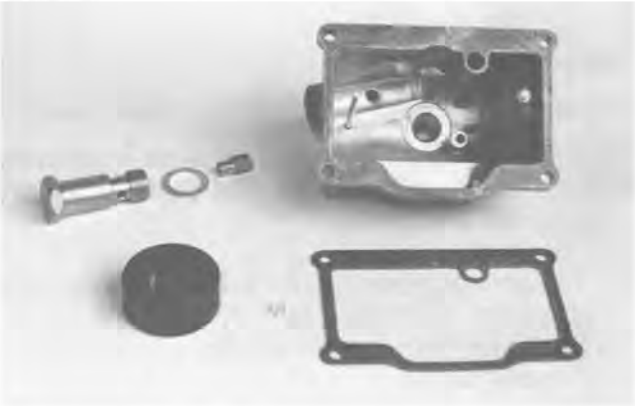
6. Place float arm in position. Secure arm to carburetor with float arm pin, Fig. III-25. Tap pin into position, using a hammer.

Fig. III-25



7. Slide floats over pins in float bowl. Push pin caps onto pins to prevent floats from sliding off during assembly, Fig. III-26.

Fig. III-26

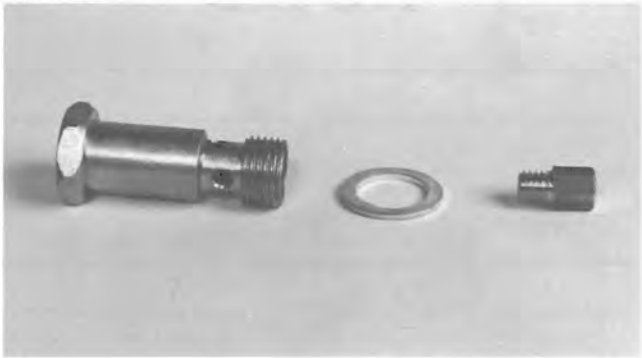


Note: When installing floats in float bowl, note "up" markings on floats. Position on pins properly.

8. Install main jet in main jet banjo slot, Fig. III-27, using a 14mm wrench and a small vise-grip.

CARBURETOR SERVICING (ASSEMBLY)

Fig. III-27



9. Place float bowl basket in position on carburetor. Assemble float bowl assembly on carburetor body with four screws. Tighten screws, using a phillips screwdriver having a no. 2 blade.

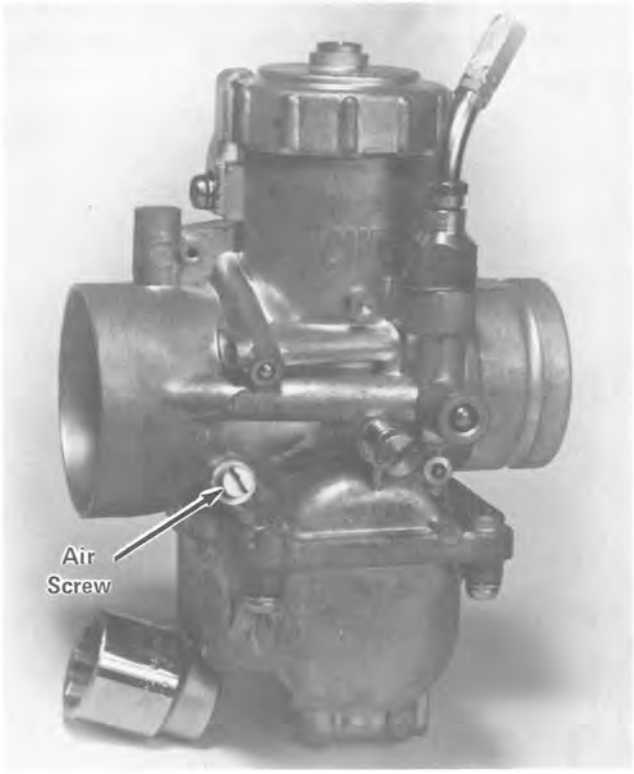
Note: Make sure float bowl gasket holes line up with the holes in the castings.

10. Install the main jet banjo bolt assembly in float bowl, Fig. III-28, and tighten, using a 14mm wrench.

Fig. III-28

11. Install air screw and spring, Fig. III-29. Turn screw in until slightly seated, then back out approximately one turn for an initial adjustment.

Fig. III-29



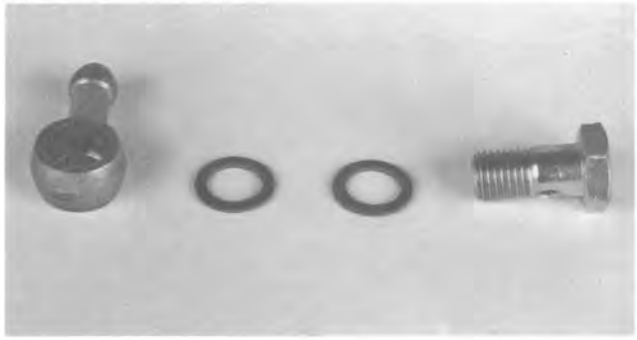
CAUTION

Close the air screw finger tight only – forcing will cause damage to the air screw and seat.

12. Install throttle stop screw and spring, Fig. III-29. Tighten until spring is compressed, then back out four turns.

13. Install inlet banjo bolt, connector, and washers, Fig. III-30. Tighten banjo bolt securely, using a 12mm wrench.

Fig. III-30



CARBURETOR SERVICING (ASSEMBLY)

14. Install mixing chamber locking plate and screw, Fig. III-31, using a phillips screwdriver having a no. 2 blade. DO NOT tighten screw.

Fig. III-31

NOTES

CARBURETOR INSTALLATION / ADJUSTMENTS

Install Carburetor on Engine

Equipment Necessary: Large Pliers, Phillips Screwdriver Having a No. 2 Blade, 8mm Wrench, 9mm Wrench, and a 12mm Wrench

1. Insert choke cable into the starter system guide assembly. Place plunger spring over cable. Compress spring enough to allow starter plunger to slide over cable end. Release tension on spring. Starter system guide assembly parts are shown in Fig. III-32.

Fig. III-32

2. Thread starter system guide assembly with starter cable into carburetor casting. Tighten, using a 12mm wrench.

Note: The choke and throttle cables on some El Tigres may be routed in such a way that they may contact the fins of the cylinder or cylinder head. Upon contact, the inner lining of the cable will begin to melt and can cause sticking of the throttle cable. Therefore, all El Tigre models must be checked during pre-delivery and cable ties installed if necessary.

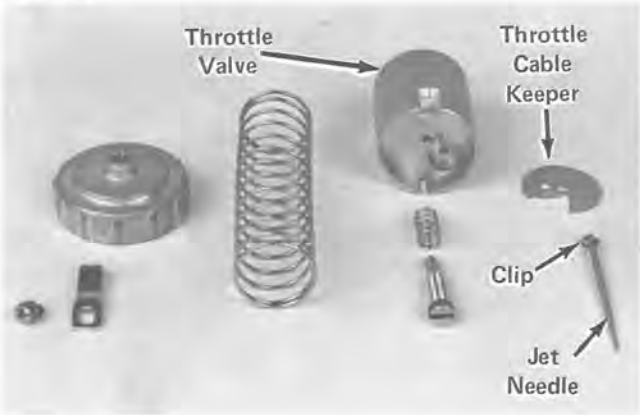
3. Install mixing chamber top, Fig. III-33, on throttle cable end.

4. Insert jet needle with clip, Fig. III-33, installed into throttle valve.

5. Insert spring, Fig. III-33, and compress spring into throttle valve, Fig. III-33. Guide throttle cable end through spring and hole in throttle valve.

6. Gather spring into mixing chamber top. Slip throttle cable keeper, Fig. III-33, into position in bottom of throttle valve. Be sure it is seated properly. Release spring slowly.

Fig. III-33



7. Guide throttle valve and throttle cable into mixing chamber bore. Align full-length groove in throttle valve with alignment pin in side of mixing chamber bore. Slide assembly into carburetor.

Note: To be sure throttle valve is installed and seated properly, look into engine side of the carburetor bore. There must be about 1/16 inch between the throttle valve and the bottom of carburetor bore.

8. Screw mixing chamber top onto carburetor. Tighten the screw slightly, using a large pliers.

9. Place locking plate of mixing chamber over cap. Tighten the screw, using a phillips screwdriver having a no. 2 blade.

10. Slide carburetor into mounting flange. Carburetor should be level. Tighten mounting flange clamp screw, using a phillips screwdriver having a no. 2 blade.

Note: The choke and throttle cables on some El Tigres may be routed in such a way that they may contact the fins of the cylinder or cylinder head. Upon contact, the inner lining of the cable will begin to melt and can cause sticking of the throttle cable. Therefore, all El Tigre models must be checked during pre-delivery and cable ties installed if necessary.

11. Connect the fuel line to the inlet fitting on the carburetor, Fig. III-34.

Fig. III-34

12. Adjust the throttle control (See: Throttle and Synchronization Adjustment, page III-19).

13. Close the hood.

⚠ WARNING ⚠

Frequently observe the condition of the throttle cable, wire, and housing. Any cable that is kinked, stretched, frayed, or does not operate smoothly is to be replaced. A defective throttle cable or housing may cause personal injury or damage to the snowmobile.

Carburetor, Throttle, and Synchronization Adjustment

Equipment Necessary: Screwdriver Having a 1/4-Inch Blade, 11mm Wrench, 3/8-Inch Wrench, and 7/16-Inch Wrench

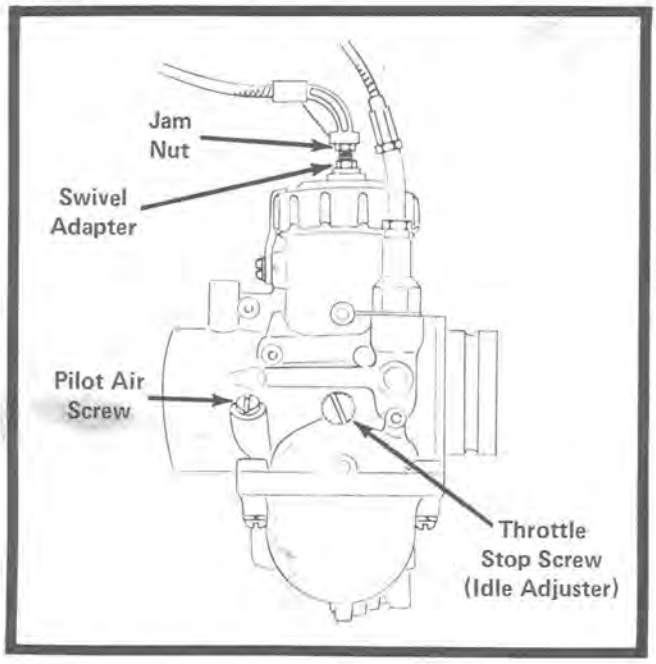
The engine in the El Tigre snowmobiles uses Mikuni carburetors for precise fuel/air mixture metering. Since the Mikuni carburetor is built with a fixed main jet, no external adjustment can be made for high speed operation.

1. Open the hood.

2. Rotate the idle screws on both carburetors, Fig. III-35, counterclockwise until the tip of each is flush with the side of the carburetor bore.

3. Loosen the jam nuts on both throttle cables and rotate the swivel adapter, Fig. III-35, until the throttle slide fully seats in the recess of the carburetor bore.

Fig. III-35



4. Rotate both idle adjusting screws, Fig. III-35, clockwise until the screws contact the throttle slide, and, at that instant, the throttle slide will begin to rise.

5. Rotate the idle adjusting screws an additional two turns clockwise.

6. Loosen the jam nuts on both throttle cables and rotate the swivel adapter counterclockwise until all slack has been removed from the throttle cable. Lock the jam nuts and swivel adapter in position.

7. Look into the throat of the carburetors and slowly compress the handlebar-mounted throttle lever. The throttle slides must begin to rise at precisely the same instant. If throttle slide movement does not occur as specified, repeat steps 2-6.

8. Carefully rotate both pilot air screws clockwise, Fig. III-35, until a slight seating resistance is felt.

9. Rotate both pilot air screws one revolution counterclockwise.

10. The idle speed may not be suitable for normal operation, even though the carburetors are synchronized. To check the engine for proper idle, proceed as follows:

    A. Run the engine until operating temperature is normal.

    B. If the engine will not idle or if a higher idle rpm is desired, rotate the idle adjusting screws clockwise to get the desired idle.

Note: Set both idle adjusting screws equally. If the idle adjusting screws are not adjusted equally, it will be necessary to repeat steps 2-8.

11. Close the hood.

Carburetion (Fine Tuning) — General

In the Mikuni VM-type carburetors, different components function depending on the degree of throttle valve opening. Before fine tuning, carburetors must be free of any dirt or foreign matter. The following components affect carburetor operation, depending on how wide the throttle opening is:

1. Air Screw — From closed to 1/8 throttle opening
2. Throttle Valve Cutaway — 1/8 to 1/4 throttle opening
3. Jet Needle — 1/4 to 3/4 throttle opening
4. Main Jet — 3/4 to full throttle opening

Each of the systems overlap the other, so great care must be taken when changing a component in any system. With its original components and normal conditions, the carburetor will perform satisfactorily. However, altitude and temperature changes may require adjustments to various systems of the carburetor.

1. CHECK FLOAT LEVEL — The fuel level in the float chamber is controlled by the projection of the two float arms. If there is dirt between the needle valve and seat, causing the valve to stay open, fuel will overflow. Also, wear or damage in the needle valve area, or a

punctured float, will cause fuel overflow. By contrast, if the needle valve sticks in the seat, a very limited amount of fuel will flow into the float chamber.

A. Remove the float chamber body and gasket from the main body of the carburetor and invert the carburetor.

B. Measure the distance (E) from the gasket mating surface to the top edge of the float arm, Fig. III-36. See Fig. III-37 for proper distance. When an adjustment of the float arm is necessary, bend only the float arm actuating tab.

Fig. III-36

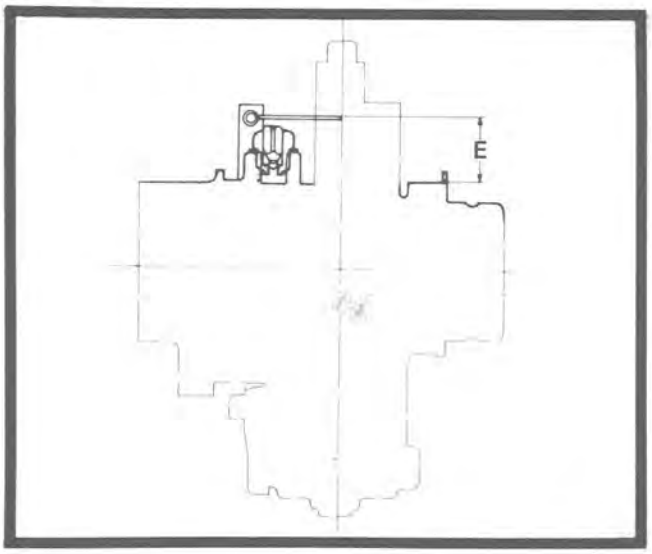


Fig. III-37

Model	VM 28	VM 30	VM 32	VM 34	VM 36	VM 38
Height						
(Inch)	.59 - .66	.86 - .94	.86 - .94	.86 - .94	.66 - .74	.66 - .74
(mm)	15 - 17	22 - 24	22 - 24	22 - 24	17 - 19	17 - 19

2. SELECT MAIN JET – Main jets for the El Tigre, Fig. III-38, will have a graduated range in systematic steps of ten: 260, 270, and 280. The larger the number, the greater diameter of the jet orifice and, as a result, a richer fuel/air mixture. See Fig. III-38 for a complete list of main jets available for Mikuni carburetors.

Fig. III-38

MIKUNI MAIN JETS AVAILABLE FROM ARCTIC			
Jet No.	Arctic Part No.	Jet No.	Arctic Part No.
150	6505-168	350	6505-071
160	6505-064	360	6505-038
170	6505-065	370	6505-072
180	6505-056	380	6505-077
190	6505-066	390	6505-078
200	6505-144	400	6505-124
210	6505-145	—	—
220	6505-137	420	6505-125
230	6505-067	430	6505-146
240	6505-079	440	6505-126
250	6505-068	450	6505-147
260	6505-017	460	6505-127
270	6505-069	470	6505-148
280	6505-080	480	6505-149
290	6505-123	490	6505-150
300	6505-128	500	6505-151
310	6505-136	530	6505-170
320	6505-074	560	6505-172
330	6505-070	590	6505-173
340	6505-076	620	6505-174
		680	6505-169

A. Run the machine on a flat hard-packed area at full throttle. If the engine drags, or labors at full throttle, the main jet orifice is too large. To remedy this, install the next smaller size jet and repeat full throttle on a flat hard-packed area. Continue changing jets until the engine runs efficiently at full throttle as explained previously. Check the condition of the spark plug to determine how engine is running.

B. If the engine runs efficiently at full throttle to begin with, the jet should still be checked for proper size; the jet may be contributing to a lean condition. If a lean condition does exist, install a main jet which is two sizes larger. Run the machine on a flat hard-packed area; when the engine drags, use the next lower sized main jet. Check the condition of the spark plug to determine how the engine is running.

Note: Examine the center electrode and insulator for plug readings. A correct mixture should result in a light tan or brown color.

3. ADJUST PILOT AIR SCREW — Throttle slide must be resting on the idle speed adjusting screw before any adjustment is made. Observe this condition by looking into the bore of the carburetor.

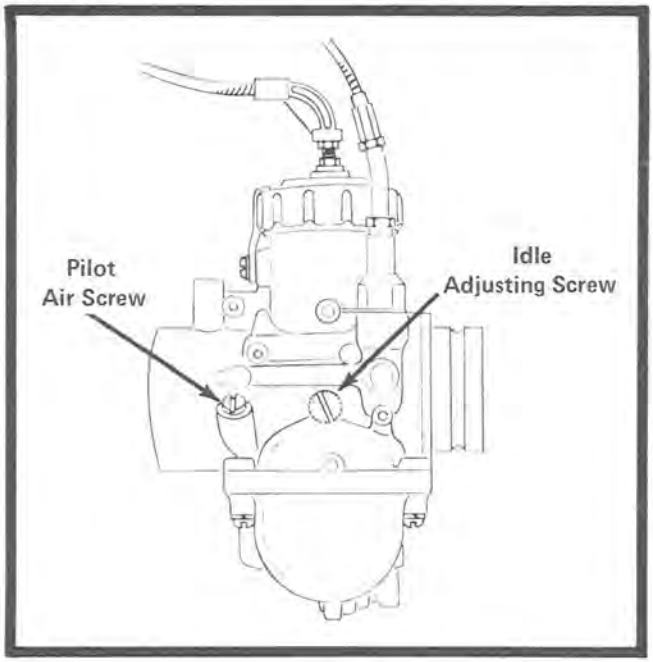
   A. Raise the back end of snowmobile, using a Quik-Jak. Start the engine and allow it to warm up.

   B. Slowly rotate the idle speed adjusting screw, Fig. III-39, clockwise until engine begins to idle faster.

   C. Slowly back the idle speed adjusting screw counterclockwise until the engine begins to die out.

   D. Rotate the pilot air screw, Fig. III-39, clockwise until the engine runs smoothly.

Fig. III-39



Note: Rotating the pilot air screw clockwise will richen the fuel/air mixture and rotating it counterclockwise will lean out the fuel/air mixture.

E. Perform steps B, C, and D until the proper engine idle speed is attained.

F. Shut the engine off.

G. When the desired idle speed has been attained, cautiously rotate the pilot air screw clockwise, and, at the same time, count the number of turns required to seat the screw.

CAUTION

DO NOT force the pilot air screw; doing so may cause damage to the screw or seat.

H. The pilot air screw adjustment should range from 1 to 2-1/2 turns out from the fully seated position.

I. If it takes one turn or less, the pilot jet is too small and must be replaced by a larger pilot jet. If it takes 2-1/2 turns or more, the pilot jet is too large and must be replaced by a smaller pilot jet. See Fig. III-40 for a list of pilot jets and their correct part number.

Fig. III-40

MIKUNI PILOT JETS AVAILABLE FROM ARCTIC	
Jet Size	Arctic Part No.
20	6505-138
25	6505-075
30	6505-073
35	6505-029
40	6505-047

Note: Pilot jets have an approximate graduated range in systematic steps of five. The larger the number, the greater diameter of the jet orifice, and, as a result, a richer fuel/air mixture.

J. The engine may idle smoothly without the pilot air screw in the 1 to 2-1/2 turn range, but it will not accelerate smoothly during mid-range operation.

4. THROTTLE SLIDE CUTAWAY — The amount of throttle slide cutaway, Fig. III-41, affects the fuel/air mixture from 0-1/4 throttle slide movement. Throttle slides are stamped with a number (1.5, 2.0, 2.5, 3.0, 3.5, etc.); these numbers reflect the degree of cutaway. The larger the number, the greater portion of throttle slide cutaway, which results in a leaner initial fuel/air mixture. Fig. III-42 shows the slides available for Mikuni carburetors.

Fig. III-41

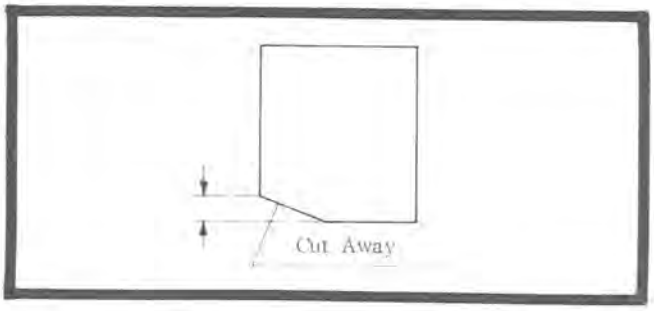


Fig. III-42

MIKUNI SLIDES AVAILABLE FROM ARCTIC		
Slide No.	Carb Size (mm)	Arctic Part No.
2.0	28 - 30	6505-048
3.0	28 - 30	6505-161
1.5	32 - 34*	6505-130
2.0	32 - 34	6505-002
2.0	36*	6505-154
2.0	36**	6505-177
2.5	36*	6505-115
1.5	38**	6505-178
1.0	40 - 44*	6505-092
2.0	40 - 44**	6505-179
2.0	32 - 34**	6505-183

* Slides cannot be used with carbs on Arctic Cat snowmobiles using automatic ignition kill switch built into throttle handle.

** Slides can be used only with 1975 model carbs because of diameter of slide guide pin.

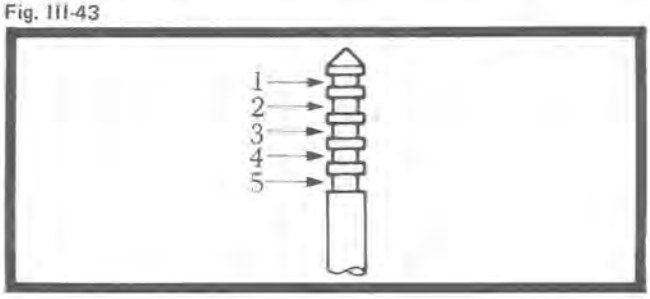
A. Start the engine. From an idle, accelerate to 1/4 throttle. If the engine hesitates or if "spit back" occurs, a lean condition exists (throttle slide cutaway too large).

B. Conversely, if the engine drags or four-cycles while accelerating to 1/4 throttle, a rich condition exists (throttle slide cutaway too small). When this condition exists, rotate the pilot air screw one turn (maximum) counterclockwise. If this adjustment does not correct the condition, the next larger throttle slide should be installed.

5. NEEDLE SELECTION — The needle can be set in one of five different positions by moving the needle clip to a different groove, Fig. III-43. For fine tuning purposes, number the grooves from 1-5, starting from the top groove down. The number 5 groove gives the richest setting.

The needle is stamped with a number and letter series for a certain specific measurement such as 4GL3.

Fig. III-43



A. FIRST NUMBER — Designates the total length of the needle. The larger the number, the longer the needle. The four stands for 40mm long but does not exceed 50mm.

B. LETTERS — The degree of taper is indicated by the two letters. The needle is tapered in graduated steps. The first letter indicates the upper taper angle and the second letter indicates the lower taper angle. As an example, the letter "A" equals $0^{\circ}15'$; each successive letter is a greater angle by 15'. "G" = $1^{\circ}45'$ and "L" = $3^{\circ}00'$.

A "G" needle will have more taper than an "F" needle, and therefore provides a richer mixture through mid-range operation.

C. SECOND NUMBER — Indicates the manufacturer lot number and will vary with different needles.

Fig. III-44

MIKUNI JET NEEDLES AVAILABLE FROM ARCTIC	
Needle No.	Arctic Part No.
5DP7	6505-050
6DH4	6505-003
6DH7	6505-215
7DH2	6505-097

CARBURETOR INSTALLATION / ADJUSTMENTS

6. NEEDLE JET — The needle jet comes in various sizes and works in direct relation with the needle. The needle jet orifice diameter remains constant through the entire length of the jet, and, therefore, changing the needle jet will have a greater effect on mid-range operation than a groove change on the needle. The needle jets have a stamped letter followed by a number, such as N3 or O2. Each letter is graduated in increments of ten digits, i.e., N0, N1, N2, N3, N4, N5, N6, N7, N8, N9, O0, O1, O2, O3, and O4, etc.

   A. LETTER — Designates the orifice size. An "O" needle jet provides a richer fuel/air mixture than an "N" needle jet.

   B. NUMBER — Related the specific diameter of the needle jet. For example, an N2 needle jet has a larger diameter than an N1 needle jet. The various needle jets available are listed in Fig. III-45.

Fig. III-45

MIKUNI NEEDLE JETS AVAILABLE FROM ARCTIC		
Jet No.	Carb Size (mm)	Arctic Part No.
0.8 (182)	28	6505-181
P-0 (169)	30	6505-051
P-4 (169)	30	6505-164
P-0 (159)	32	6505-155
P-0 (166)	34	6505-007
Q-5 (166)	36	6505-119
AA-5 (224)	40 - 44	6505-099
BB-0 (224)	40 - 44	6505-182
BB-5 (224)	40 - 44	6505-180
Q-0 (166)	34	6505-190
Q-4 (166)	36 - 38	6505-215

7. MID-RANGE TUNING — Fine tuning and mid-range is similar to tuning the main jet. For example, use a rich needle position and a rich needle jet until four-cycling is evident. When the engine four-cycles, install the next leaner needle or needle jet to get the proper fuel/air mixture.

Note: All the adjustments mentioned previously will overlap to provide smooth acceleration. A main jet change will affect the mid-range operation by approximately 10%. If one groove needle change is made, it will affect the main jet by approximately 10%.

AIR SILENCER SERVICING

Air Silencer (1975 Models Only)

Used in conjunction with the carburetor is an air intake silencer. The function of the air intake silencer is to quiet the intake of fresh air used in carburetion and to catch fuel that spits back out of the carburetor.

● CAUTION ●

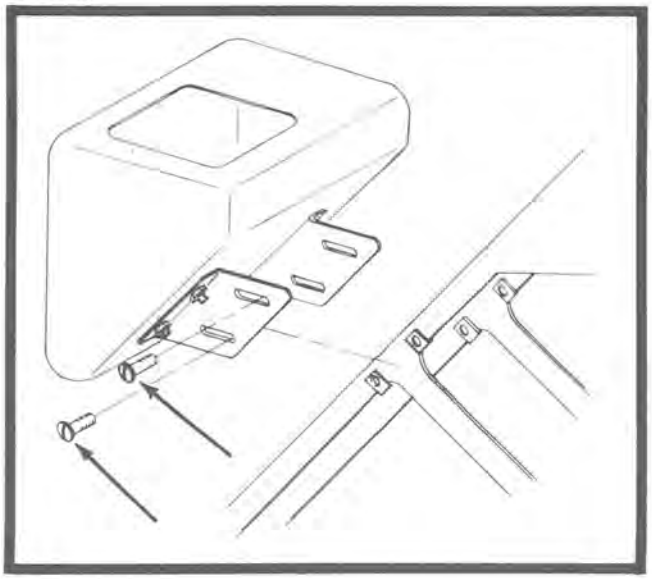
The air silencer is to be secured to the carburetor when operating the engine and when adjusting the carburetor. DO NOT run engine if the air silencer is removed because possible engine damage may occur. Make sure the silencer is clean and free of obstructions.

Remove Air Silencer

Equipment Necessary: Screwdriver Having a 7/16-Inch Blade

1. Remove the four screws holding air silencer to steering post tower, Fig. III-46, using a screwdriver having a 7/16-inch blade. DO NOT lose the clip nuts on the steering tower.

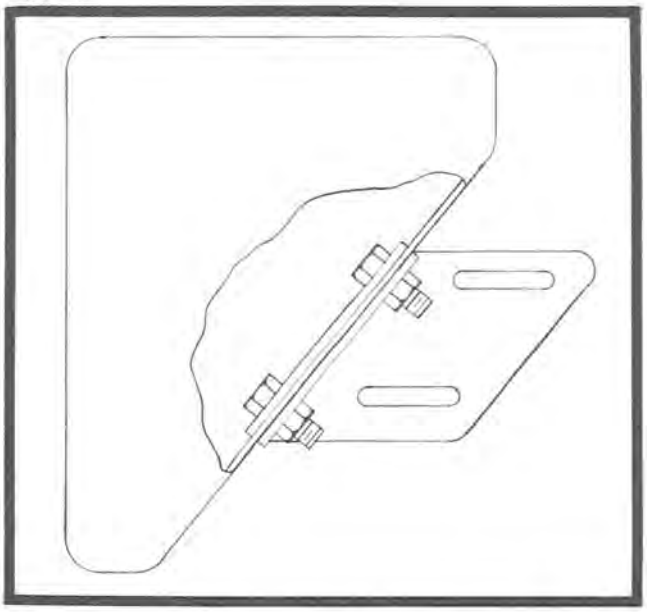
Fig. III-46



2. Slide air silencer toward rear of snowmobile until rubber boots are free of carburetor.

Note: Silencer bracket holes are slotted to allow movement both forward and backward, Fig. III-47.

Fig. III-47



Install Air Silencer

Equipment Necessary: Screwdriver Having a 7/16-Inch Blade

1. Slide air silencer over steering post tower. Push silencer toward engine and carburetors, making sure that rubber boots fit over carburetors and do not obstruct air flow.

2. Install the four screws which will secure silencer in the steering post tower, Fig. III-46. DO NOT TIGHTEN.

3. Adjust air silencer (See: Adjust Air Silencer, page III-26).

Adjust Air Silencer

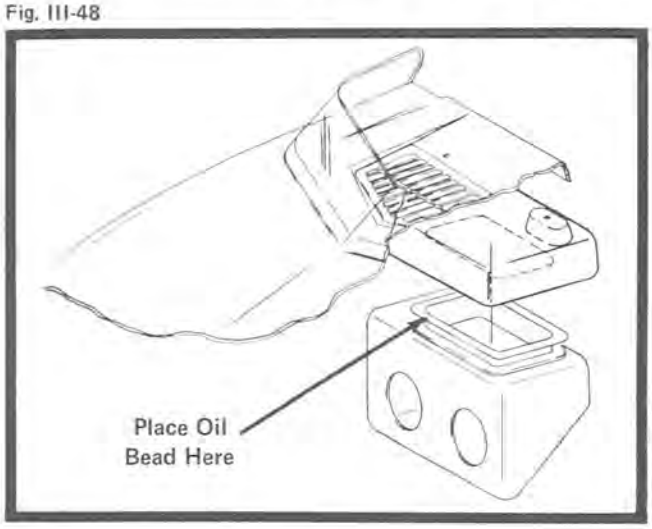
Equipment Necessary: Screwdriver Having a 7/16-Inch Blade and Small Quantity of Oil

1. Open hood.

2. Place a small bead of oil on the edge of air intake seal of the air silencer, Fig. III-48.

AIR SILENCER SERVICING

Fig. III-48



3. Close hood tight. This will leave an oil bead on the bottom of the air intake duct.

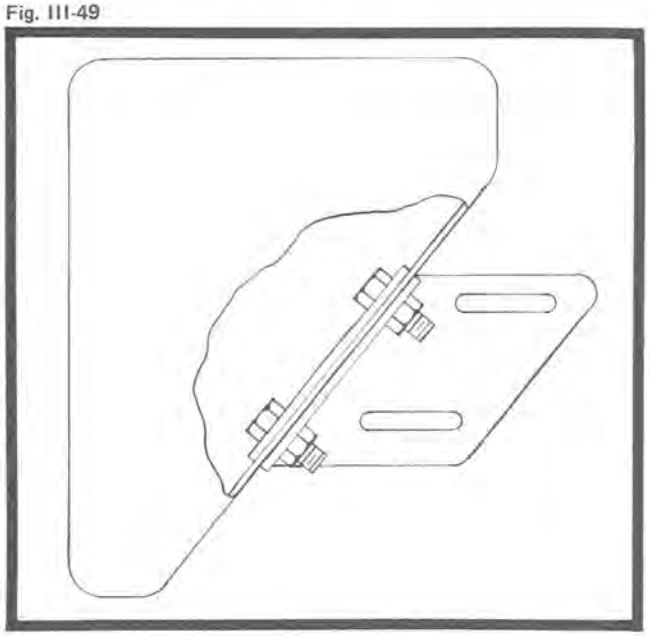
4. Open hood. Observe oil bead on air intake duct.

5. Slide silencer forward or backward to center air intake duct and air silencer.

6. Repeat steps 1 to 5 until openings are aligned.

7. For vertical movement, loosen the lock nuts securing air silencer to the air silencer mount, Fig. III-49. Slide silencer up or down. Recheck alignment.

Fig. III-49



Note: Only a small vertical adjustment can be made. A vertical adjustment may require a horizontal adjustment since the silencer moves vertically and at an angle.

8. Tighten the four screws, using a screwdriver having a 7/16-inch blade.

9. Close hood.

FUEL TANK SERVICING

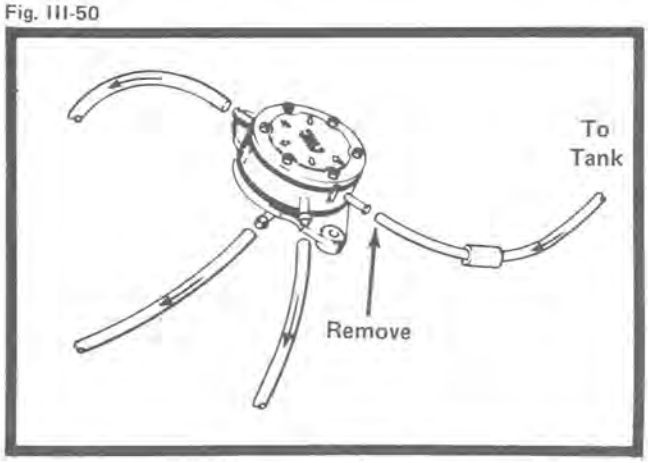
Remove Fuel Tank

Equipment Necessary: 1/4-Inch Bolt, Screwdriver Having a 5/16-Inch Blade

1. Remove seat cushion from tunnel.

2. Remove the fuel line from the inlet fitting on the fuel pump, Fig. III-50. Plug end of fuel line, using a 1/4-inch bolt.

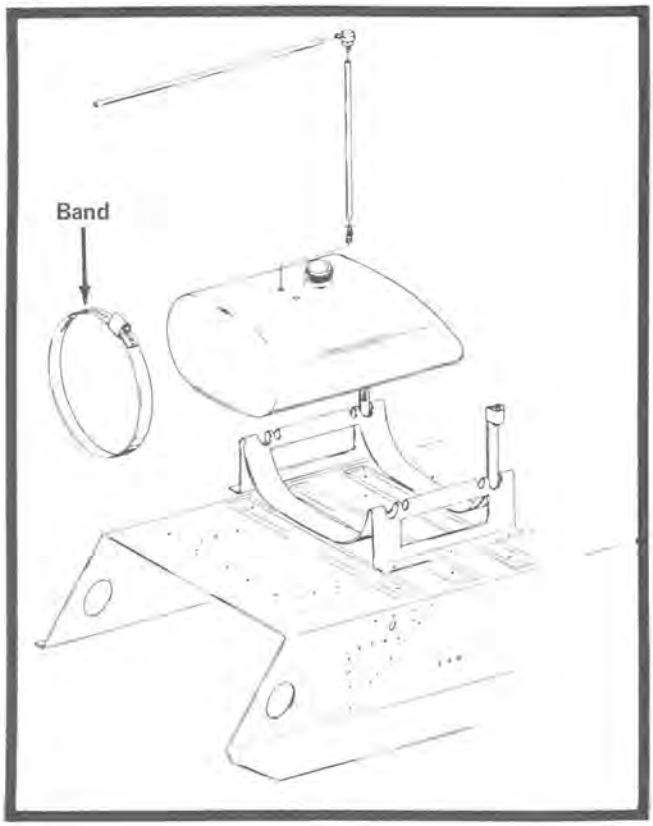
Fig. III-50



FUEL TANK SERVICING

3. Slide fuel tank to rear of machine until it is free of mounting brackets on standard models. On the 1975 Z model, loosen the mounting bands, Fig. III-51, using a screwdriver having a 5/16-inch blade; then lift tank out of bracket.

Fig. III-51



Cleaning

Equipment Necessary: Soap, Water, Cleaning Solvent, and Fuel Mixture (20:1)

Note: On the 1975 Z models, clean the fuel tank with soap and water ONLY.

1. Wash the outside of the fuel tank with cleaning solvent until tank is thoroughly clean.

2. Pour out solvent; then pour 1 U.S. pint of gasoline and fuel/oil mixture (20:1) into the fuel tank and install the fuel level gauge cap. Plug the fuel line hole in the tank. Shake the fuel mixture vigorously. Pour the mixture out when inside of the tank is coated with fuel mixture.

Inspection

Equipment Necessary: No Special Tools Required

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

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

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

Note: Does not apply to Z model gas tanks.

3. Inspect the fuel line fittings. If deterioration is evident or condition is doubtful, replace the fittings.

4. Examine the fuel filter at the end of the fuel line, Fig. III-51. If the filter is obstructed, wash it in clean gasoline. Blow gasoline out of fuel filter, using compressed air. If the brass screen is damaged or if the ball check valve does not restrict backward flow of fuel to the fuel tank, replace fuel filter.

Note: On Z models, the hose inside the fuel tank should be only 10 inches long. A hose longer than 10 inches may curl up above the gas level, thus starving the engine of fuel.

Install Fuel Tank

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade

Note: Use step 1 for Z models and step 2 for standard models.

1. Place tank in bracket and secure with two bracket clamps. Tighten the clamps, using a screwdriver having a 5/16-inch blade.

CAUTION

Make sure the taillight wires do not bind or get pinched between the fuel tank and body of tunnel. If a wire gets pinched, a short circuit may develop and cause lighting problems.

FUEL TANK SERVICING

2. Move fuel tank to edge of mounting bracket. Place taillight/brakelight harness between MAG side mounting bracket and the tunnel.

Note: The fuel tank on the El Tigre Z models are secured to their mounting brackets by 2 large clamps. It is possible that these clamps were overtightened during production, causing the tank to rupture. Therefore, remove the seat and inspect the clamps to determine if they are too tight. Clamps should be tightened only enough to hold the tank in position.

3. Slide fuel tank forward until front edge of tank contacts front end.

4. Remove 1/4-inch bolt from fuel line and connect fuel line to fuel inlet fitting on fuel pump.

5. Install the seat on the tunnel.

FUEL PUMP SERVICING

Remove Fuel Pump

Equipment Necessary: 1/4-Inch Bolt, 7/16-Inch Socket, and 3-Inch Extension

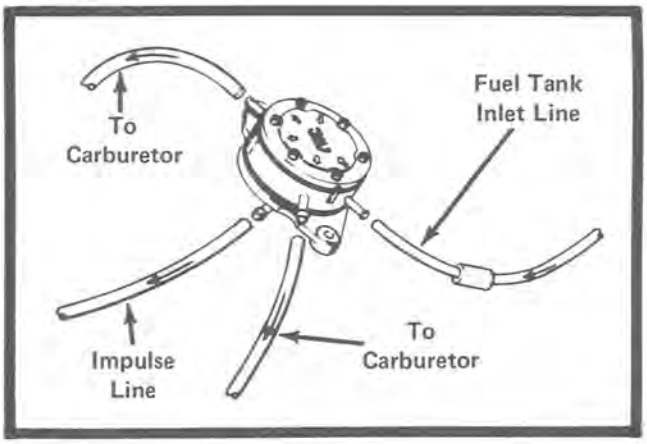
1. Remove fuel line from the fuel pump inlet fitting, Fig. III-52. Plug fuel line, using a 1/4-inch bolt.

2. Remove the fuel lines leading to the carburetors, Fig. III-52.

3. Remove the two cap screws holding fuel pump to front end, using a 7/16-inch socket and 3-inch extension.

4. Remove the impulse line from the fitting on the bottom of carburetor.

Fig. III-52



FUEL PUMP SERVICING

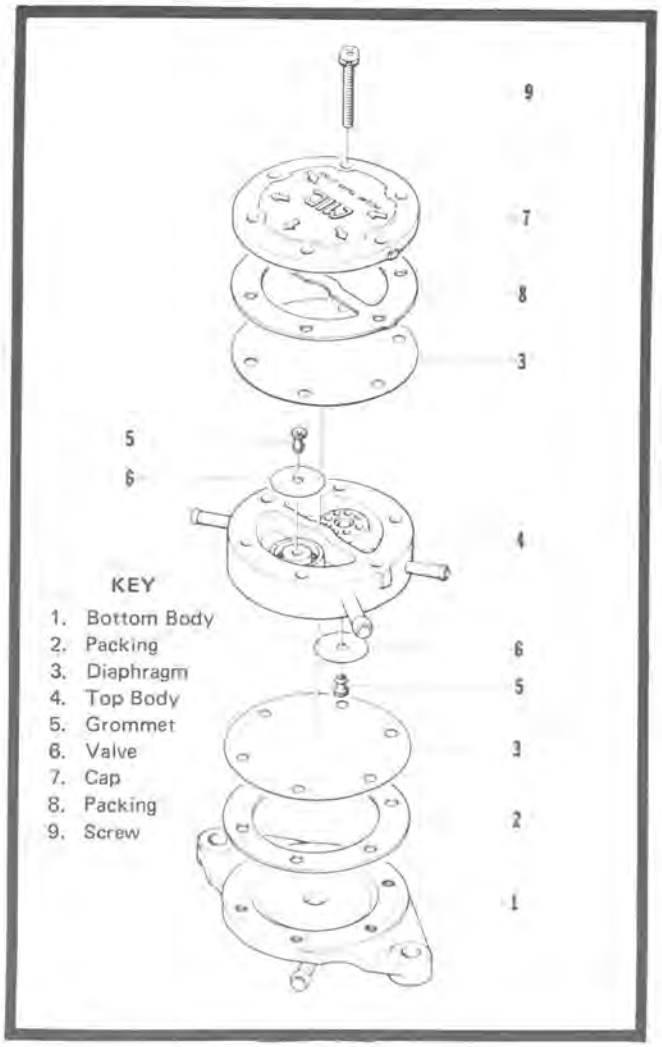
Disassemble Fuel Pump

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade

1. Remove the six screws holding the fuel pump together, using a phillips screwdriver having a no. 2 blade.
2. Lift cover plate off fuel pump. Remove gasket and diaphragm.
3. Lift fuel pump plate off base plate. Remove diaphragm and gasket.
4. Remove valves from fuel pump plate by pushing rubber grommets through from the side opposite valve. Valves can then be slipped off grommets.

Note: Fig. III-53 shows the complete parts breakdown of the fuel pump.

Fig. III-53



Cleaning and Inspecting

Equipment Necessary: Cleaning Solvent

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

1. Clean all parts, using a good cleaning solvent.
2. Inspect fuel pump diaphragms for holes or cracks.
3. Inspect fuel pump valves for cracks or distortion.
4. Make sure fuel and impulse line fittings are tight.

Note: If a fitting is found to be loose, it can be corrected by removing the fitting and swaging the hole in the aluminum body of the fuel pump. Place a rounded object such as the ball end of a small ballpeen hammer against the oversize hole and tap lightly with another hammer.

Assemble Fuel Pump

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade

Note: Use Fig. III-53 as a guide when reassembling the fuel pump.

1. Place base plate on a clean surface.
2. In sequence, place gasket and impulse diaphragm on the base plate.
3. Push fuel pump valves onto grommets.
4. Push valves w/grommets into fuel pump plate.

Note: Valves w/grommets must be installed so they seat against machined surface of fuel pump plate.

5. Place fuel pump plate on the base plate. Divided portion of fuel pump must face upward.
6. In sequence, place fuel pump diaphragm and gasket on fuel pump plate.

Note: Be sure extruded edge of gasket is aligned with alignment mark on fuel pump plate. If gasket is installed improperly, extruded edge will not align with marks.

FUEL PUMP SERVICING

7. Place cover plate on fuel pump plate. Align marks on castings with top gasket.

8. Secure the fuel pump together with six screws and lock washers, using a phillips screwdriver having a no. 2 blade.

Install Fuel Pump

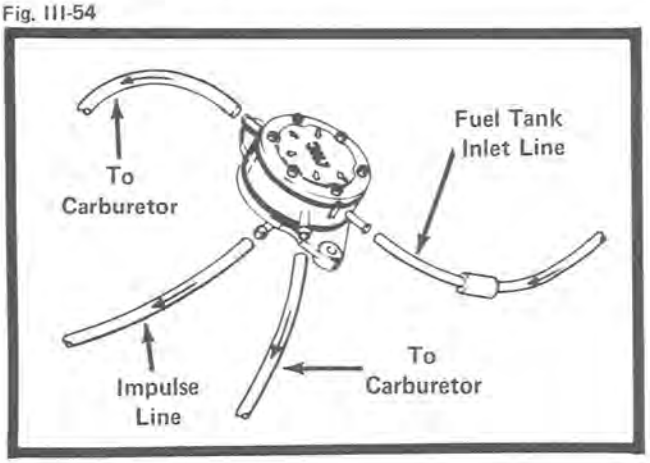
Equipment Necessary: Torque Wrench, 7/16-Inch Socket, and 3-Inch Extension

1. Install impulse line on bottom fitting of fuel pump, Fig. III-54.

2. Place fuel pump in position on chassis. Secure in place with two cap screws and tighten to 10 ft-lb, using a torque wrench, a 7/16-inch socket, and 3-inch extension.

3. Install the fuel lines from the carburetor to the fittings indicated by arrows pointing away from center of fuel pump, Fig. III-54.

Fig. III-54



4. Remove the 1/4-inch bolt from the fuel tank inlet line. Install fuel line on fuel inlet fitting of fuel pump (arrow points to center of fuel pump), Fig. III-54.

CHECK FUEL PUMP PRESSURE

Fuel Pump Pumping Pressure

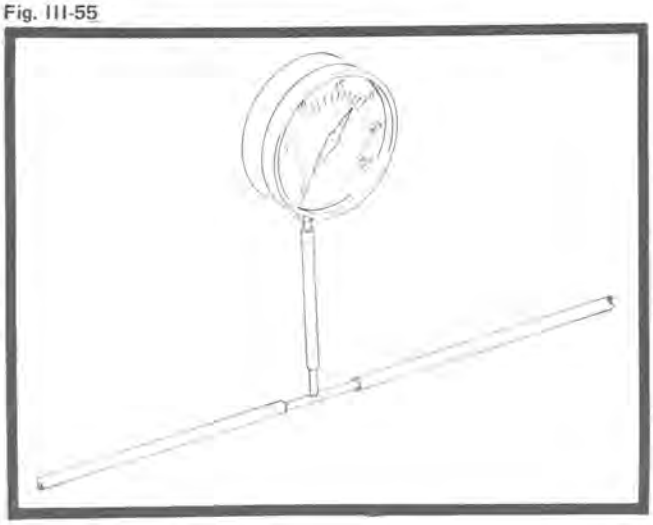
Equipment Necessary: Plastic "T" Fitting, Pressure Gauge, Short Piece of Fuel Line, and Quik-Jak

1. Remove the fuel line from one of the carburetors.

2. Install short piece of fuel line to carburetor. Install other end of fuel line to plastic "T" fitting, Fig. III-55.

3. Place fuel line removed from carburetor in step 1 on other end of plastic "T" fitting, Fig. III-55.

Fig. III-55



4. Connect pressure gauge to remaining fitting on plastic "T", Fig. III-55.

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

6. Start the engine and run it from 3500-8000 rpm. Note pressure readings at intervals of 500 rpm. Check pumping pressures with those in table below, Fig. III-56. If pressure is less than 4.75 lb at 3500 rpm or greater than 8.0 lb at 7500 rpm, the fuel pump is defective and must be replaced.

Fig. III-56

PSI TO BE MAINTAINED AT RPM			
PSI	RPM	PSI	RPM
4.75	3500	6.5	6000
5.5	4000	7.0	6500
6.0	4500	7.5	7000
6.0	5000	8.0	7500
6.0	5500	7.5	8000

NOTES

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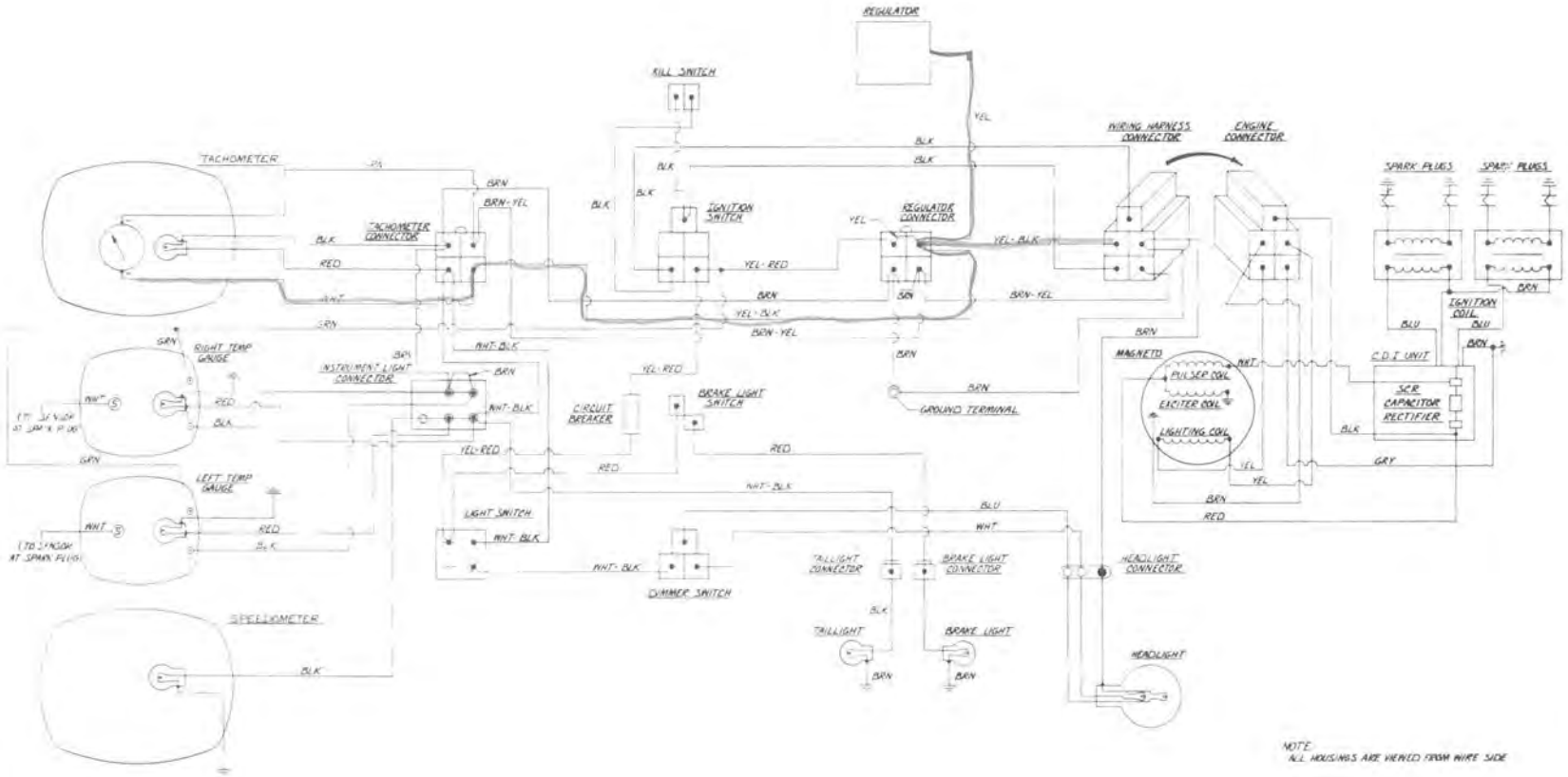
1974 WIRING DIAGRAM

Fig. IV-1



1975 WIRING DIAGRAM

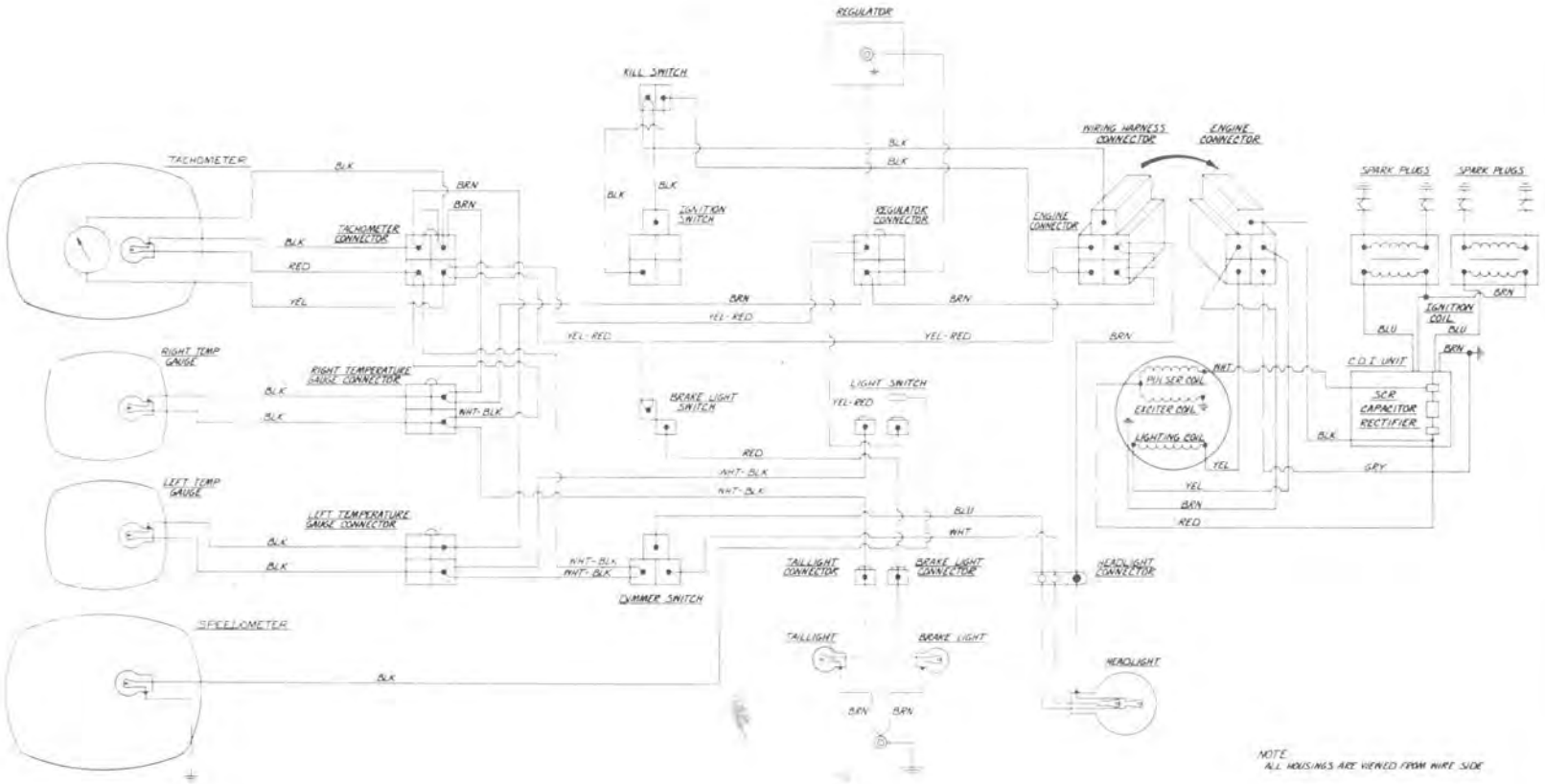


Fig. IV-2

SWITCHES AND CONNECTORS

Fig. IV-3

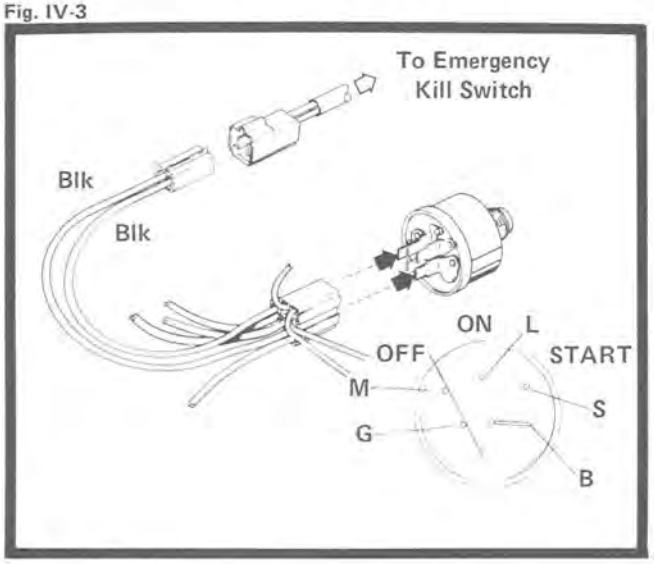


Fig. IV-6

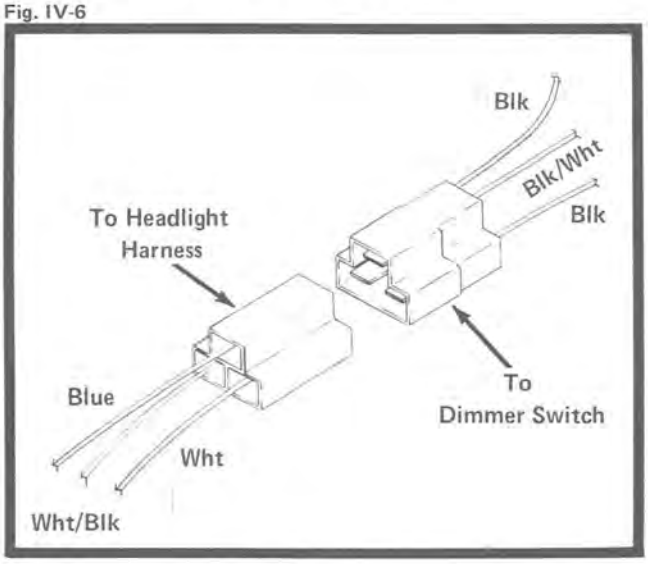


Fig. IV-4

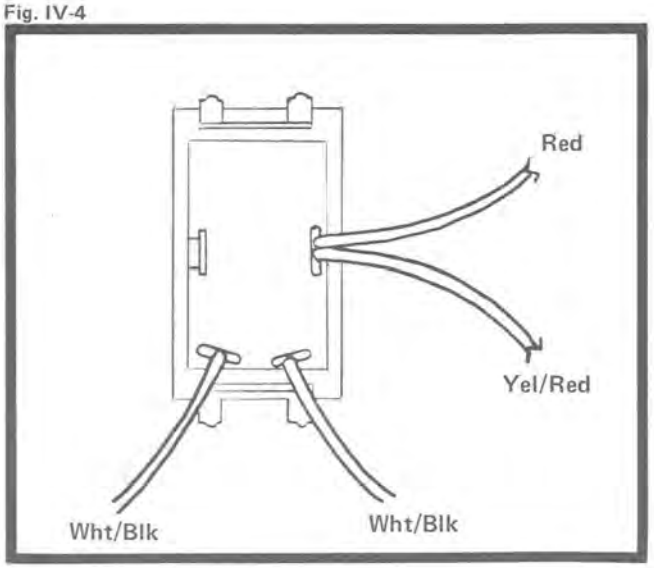


Fig. IV-7

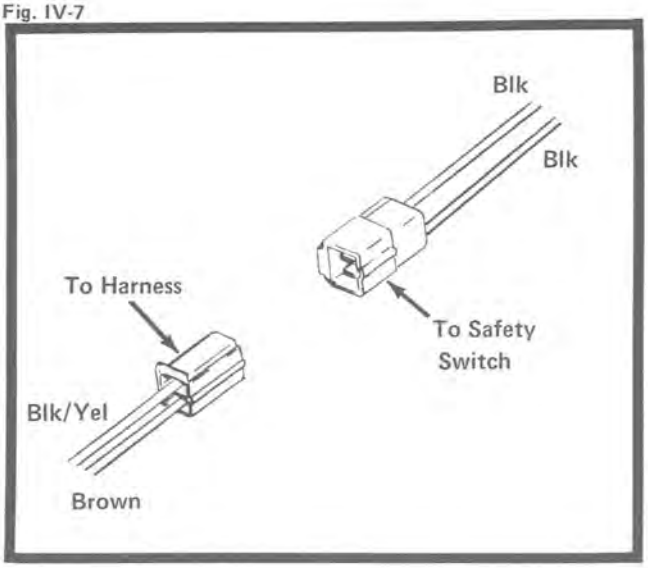


Fig. IV-5

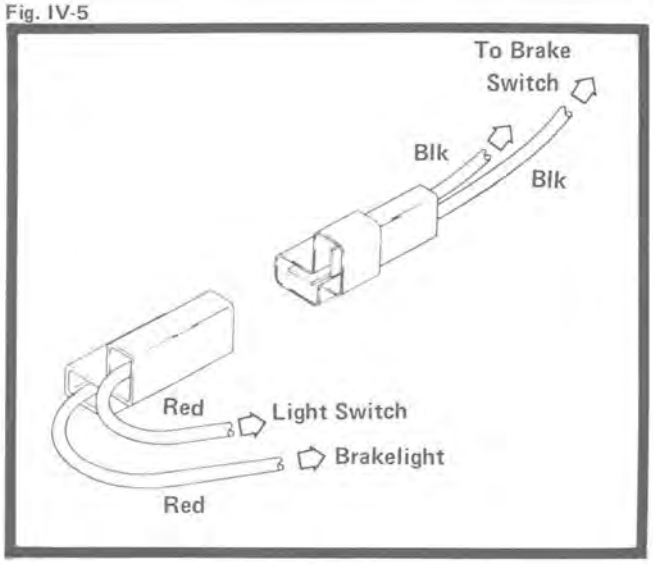
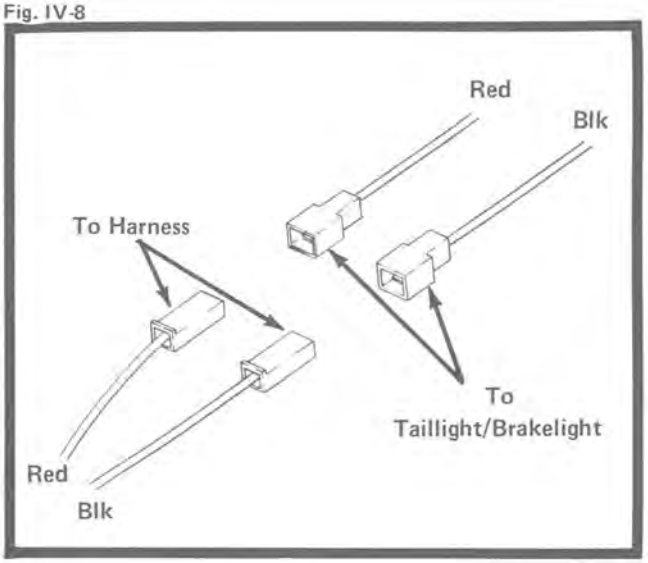


Fig. IV-8



ELECTRICAL SPECS. - 1974 T1C

Description	Arctic P/N	Test Value	Tester Connections	
		Ohm Meter Test		
Spark Plug Cap	3001-469	975 Ohms	Leads to opposite ends on spark plug cap	
Ignition Coil	3001-067			
Primary		0.365 Ohms	+To Blue	–To Brown
Secondary		10,200 Ohms	+To #1 H.T. Lead	–To #2 H.T. Lead
Excitor Coil	3001-053	195 Ohms	+To Red	–To Ground
Pulser Coil	3001-054	23.5 Ohms	+To Red	–To White
Lighting Coil	3001-055	0.18 Ohms	+To Yellow	–To Remaining Yellow
		Output Test With Electro Specialties CDI Tester Model #1		
Ignition Coil	3001-067	55	+To Ground	–To #2 High Tension
Exciter Coil	3001-053	40	+To Ground	–To Red Fr. Stator
Pulser Coil	3001-054	40	+To Ground	–To White Fr. Stator
CDI Unit	3001-068	40	+To Brown	–To Blue, Leave Other Blue Open
		Voltmeter Test		
Lighting Coil	3001-055	12-15 Volts	+To Yellow Red At Light Switch	–To Ground

● CAUTION ●

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

		Replacement Components		Mfg. No.
Spark Plug	0217-032	0.016 Gap	Feeler Gauge	BR-9EVA
Head Light	0109-179			4454
Taillight	0109-460			1035
Brakelight	0109-460			1035
Speedometer Bulb	0109-453			53
Tachometer Bulb				1893
Temp. Gauge Bulb	0109-453			53

Note: All tolerances of test values are plus or minus 10% unless otherwise specified.

ELECTRICAL SPECS. - 1974 T7B

Description	Arctic P/N	Test Value	Tester Connections	
		Ohmmeter Test		
Spark Plug Cap	3001-469	975 Ohms	Leads to opposite Ends of Spark Plug Cap	
No. 1	3001-136			
No. 2	3001-137			
Ignition Coil				
Primary		0.365 Ohms	+To Blue	–To Ground
Secondary		10,200 Ohms	+To High Tension Lead	–To Other High Tension Lead
Excitor Coil	3001-129	295 Ohms	+To Red	–To Ground
Pulser Coil	3001-130	23.5 Ohms	+To Red	–To White
Lighting Coil	3001-055	0.18 Ohms	+To Yellow	–To Remaining Yellow
		Output Test With Electro Specialties CDI Tester Model #1		
Ignition Coil (Both)	3001-136, 3001-137	55		
Excitor Coil	3001-129	50	+To Ground	–To Red from Stator
Pulser Coil	3001-130	50	+To Ground	–To White from Stator
CDI Unit	3001-479	70	+To Brown	–To Blue, Ground other Blue; then reverse Blues
		Voltmeter Test		
Lighting Coil	3001-055	12-15 Volts	+To Yellow Red at Light Switch	–To Ground

CAUTION

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

		Replacement Components		Mfg. No.
Spark Plug	0217-032	0.016 Gap	Feeler Gauge	BR-9EVA
Headlight	0109-179			4454
Taillight Bulb	0109-460			1035
Brakelight Bulb	0109-460			1035
Speedometer Bulb	0109-453			53
Tachometer Bulb				1893
Temperature Gauge Bulb	0109-453			53

Note: All tolerances of test values are plus or minus 10% unless otherwise specified.

ELECTRICAL SPECS. - 1975

Description	Arctic P/N	Test Value	Tester Connections	
		Ohmmeter Test		
Spark Plug Cap	3001-469	975 Ohms	Lead to opposite ends of spark plug cap	
Ignition Coil	3001-594			
Primary		0.365 Ohms	+To Blue	–To Brown
Secondary		10,200 Ohms	+To High Tension Lead	–To Other High Tension Lead
Excitor Coil	3001-129	295 Ohms	+To Red	–To Ground
Pulser Coil	3001-130	23.5 Ohms	+To Red	–To White
Lighting Coil	3001-589	0.18 Ohms	+To Yellow	–To Yellow
		Output Test With Electro Specialties CDI Tester Model #1		
Ignition Coil	3001-594	55		
Exciter Coil	3001-129	50	+To Ground	–To Red Fr. Stator
Pulser Coil	3001-130	50	+To Ground	–To White Fr. Stator
CDI Unit	3001-597	70	+To Brown	–To Blue, Ground Other Blue; then reverse Blues
		Voltmeter Test		
Lighting Coil	3001-589	12-15 Volts	+To Yellow Red At Light Switch	–To Ground

CAUTION

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

		Replacement Components		
Spark Plug	0217-032	0.016 Gap	Feeler Gauge	BR-9EVA
Headlight	0109-558			
Taillight	0109-460			1035
Brakelight	0109-460			1035
Speedometer Bulb	0109-453			53
Tachometer Bulb				1893
Temp. Gauge Bulb	0109-453			53

Note: All tolerances of test values are plus or minus 10% unlesss otherwise specified.

GLOSSARY

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

GLOSSARY

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

GLOSSARY

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

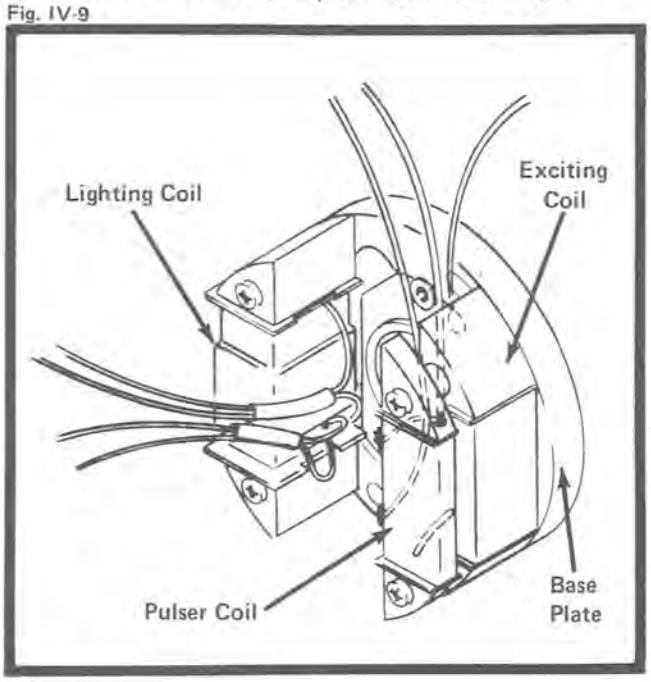
THEORY OF OPERATION

General

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

The flywheel magneto generator assembly, Fig. IV-9, consists of the components listed below:

Fig. IV-9



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

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

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

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

Ignition System

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

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

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

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

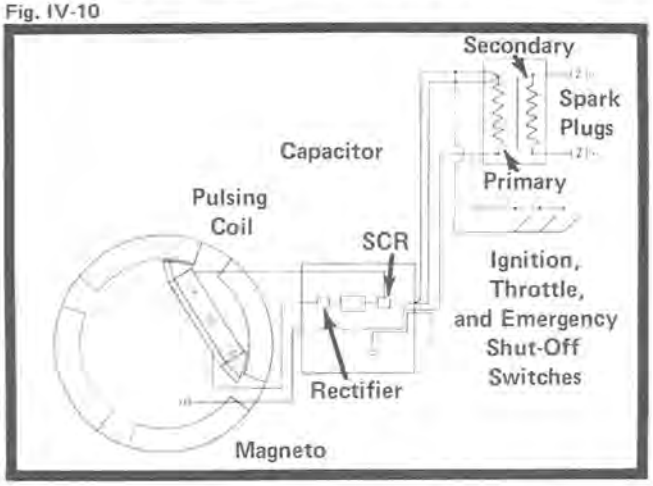
3. PULSER COIL – Mounted on the base plate just above the exciting coil is the pulser. One lead of the pulser coil is attached to the same red lead as the exciter coil. The other (white) lead is connected to the CDI unit.

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

5. IGNITION COILS – The ignition coils are mounted on the coil bracket with a high tension lead going to each spark plug. On dual CDI models, each coil will have a lead going to both the PTO side(1) and the MAG side(2) cyclinders.

High voltage current is required to jump the spark plug air gap, which will result in ignition of the fuel/air mixture in the combustion chamber. Current is induced in the exciting coil by the rotation of the four magnets, Fig. IV-10. Since the magnets are alternately mounted, and also, alternately pass the exciting coil, the magnetic forces change direction of travel. Because the magnetic forces travel from north to south (positive to negative), the direction of flow changes every 90 degrees of flywheel rotation. Therefore, the electricity induced in the exciting coil winding will also alternate in direction of flow. The term for this type of flow is "alternating current".

Fig. IV-10



The CD ignition system cannot utilize alternating current, so the current from the exciter coil is routed through a rectifier to eliminate the negative flow, Fig. IV-10. The positive flow passes through the rectifier and is stored in the capacitor in the CDI unit, Fig. IV-10. The capacitor is connected to the primary winding of the ignition coil through an SCR. The SCR, Fig. IV-10, acts as a switch for the exciter current. With the SCR (switch) open, the exciter current builds up a charge in the capacitor. To fire the spark plug, the SCR (switch) is closed or triggered by a pulse from the pulser coil. The position of this pulser coil, in relation to the magnets and the piston, triggers the SCR at the precise moment to ensure the most efficient combustion. When the SCR (switch) closes, a circuit is completed from the capacitor to the ignition coil primary. As a result, current flows through the external ignition coil primary, Fig. IV-10.

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

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

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

Other components that function in the ignition system, but not mounted on the engine, are: the ignition switch, the throttle safety switch and the

emergency shut-off switch. The switches are all connected in parallel with the external ignition coil primary and the engine frame, which is also a common ground. If any one of the switches is closed (OFF), the induced exciting coil current is routed to ground, rather than allowing the current to flow to the external ignition coil and spark plug. Therefore, a closed ignition switch, emergency shut-off switch, or throttle safety switch will not allow the engine to start because there is no ignition spark.

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

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

Magneto Alternator System

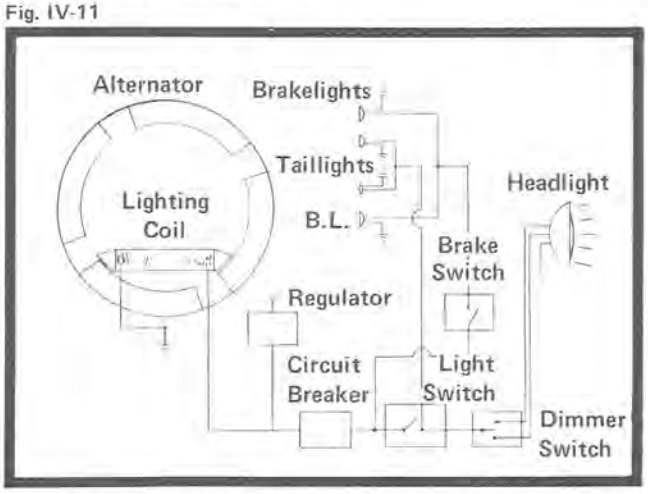
The function of the magneto alternator system is to produce electrical current required by the headlight, taillight, and brakelight. For their operation, accessories such as a speedometer, tachometer, and heat gauges also draw upon the output of the magneto alternator. To produce and control the current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

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

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

As stated in the first paragraph, current is required to operate the headlight, taillight, brakelight and accessories that require output from the lighting coils. To accomplish this, current is induced in the lighting coil by the rotation of the four magnets, Fig. IV-11. Since the magnets are alternately mounted, and also, alternately pass the lighting coil, the magnetic forces change direction of travel. Because the magnetic forces travel from north to south (maximum positive to maximum negative), the direction of flow changes every 90 degrees of flywheel rotation. The lighting system uses every positive and negative current impulse to supply electricity to the lighting system. For every crankshaft rotation, four electrical impulses take place. When the engine is at idle (approximately 3000 rpm), the output of the lighting coil is 12,000 electrical impulses per minute. Therefore, the electrical impulses occur so fast that blinking lights, or the decrease in output, which occurs just after maximum positive and just before maximum negative, cannot be detected.

Fig. IV-11



After current is induced in the lighting coil, the current flows to the lights and other accessories by way of wiring harnesses and switches. Current will flow to the headlight, taillight, and brakelight only when the light switch is ON (closed circuit), Fig. IV-11. By contrast, the induced current in the lighting coil is routed through the voltage regulator and to ground when the light switch is OFF (open circuit), Fig. IV-11. Therefore, the voltage regulator directs any unwanted or excess voltage that is not used by the lighting system to ground.

Current flowing to the headlight must first flow to the headlight dimmer switch, Fig. IV-11. By moving the switch to high beam, the high beam circuit is closed; thus, current is routed to the

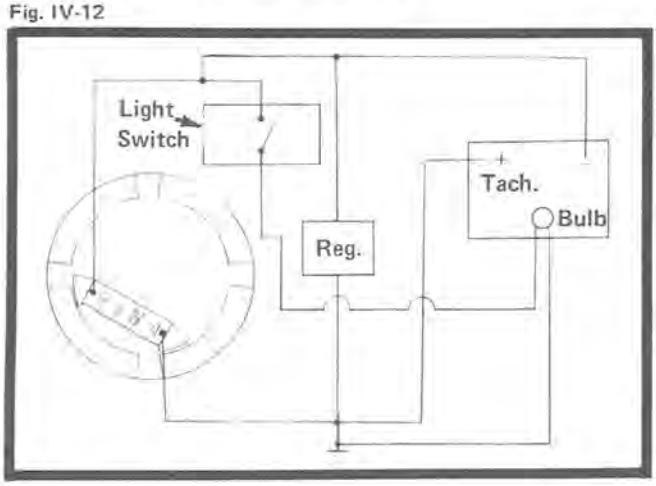
headlight high beam filament. By contrast, when the dimmer switch is on low beam, the low beam circuit is closed; thus, current is routed to the headlight low beam filament.

Tachometer

The function of the tachometer is to register the rpm of the crankshaft. To accomplish this, the positive (+) and negative (–) terminals on the back of the tachometer are connected in parallel with the lighting coil, which sends positive pulses to the tachometer. These positive pulses flow through a coil in the tachometer and create an electromagnetic force, resulting in tachometer needle movement against pressure of a spring. Therefore, as the pulse rate of the magneto generator increases, so does the tachometer needle movement. By contrast, as the pulse rate decreases, the electromagnetic force decreases, allowing the force of the spring on the indicator needle to become dominant; a decrease in rpm reading results.

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

Fig. IV-12

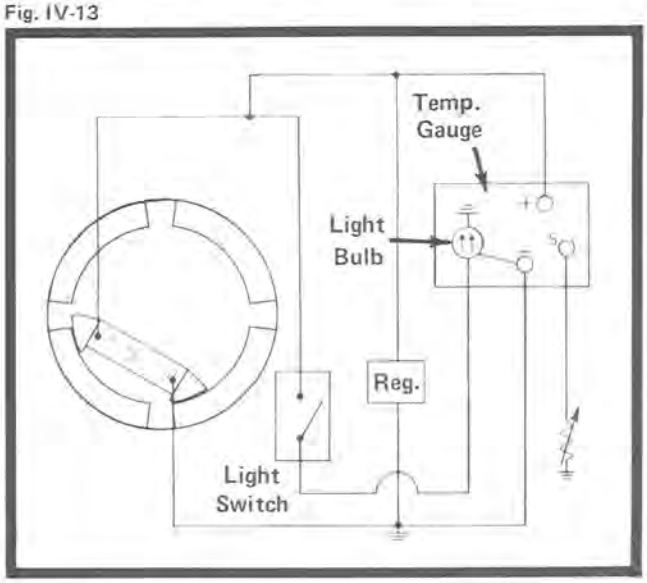


Electronic Temperature Gauge (0134-866)

The function of the gauge is to indicate cylinder head temperature. To accomplish this, the gauge is connected in parallel with the magneto alternator, which is the power source for the gauge, Fig. IV-13. A heat sensor is also connected to the gauge and mounted between the spark plug and cylinder head. When the engine is running, output from the magneto alternator moves the indicator needle to the lowest temperature reading. At the same time, another circuit within the gauge is completed by the heat sensor. As the cylinder head temperature increases, the resistance in the heat sensor decreases and allows more current to flow to the gauge. Because of the increased current flow to the gauge, the indicator needle will register a higher cylinder head temperature reading. The opposite happens when the cylinder head temperature decreases. Resistance in the heat sensor increases and allows less current to flow to the gauge. Because of the decreased current flow to the gauge, the indicator needle will register a lower cylinder head temperature.

Mounted in the gauge, and connected in parallel with the lighting circuit, is the temperature gauge light bulb, Fig. IV-13. The only function of the bulb is to illuminate the gauge dial and it does not affect any mechanical function.

Fig. IV-13



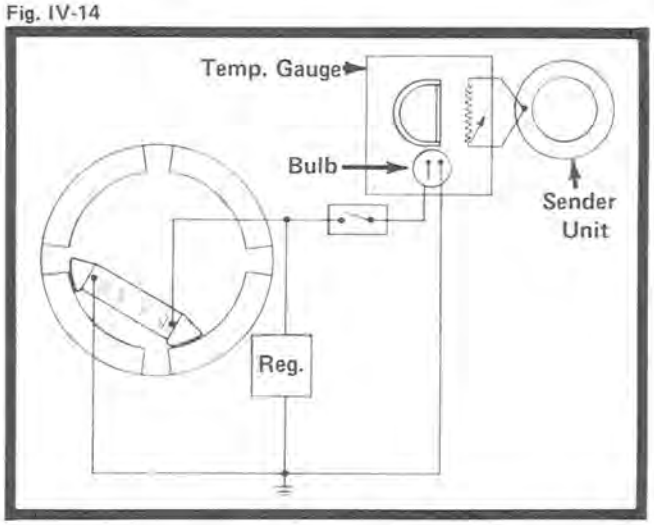
Thermocouple Temperature Gauge (0134-915)

The function of the gauge is to indicate cylinder head temperature. This gauge does not use an external power source except to provide current to illuminate the temperature gauge bulb, Fig. IV-14; thus, the gauge will indicate cylinder head temperature at all times. A heat sensor (thermocouple) is connected to the gauge and mounted between the spark plug and cylinder head. The thermocouple contains two unlike conductors, which, when exposed to temperature variations, cause a current to flow. The rate of change of current flow will cause the indicator needle to change positions.

THEORY OF OPERATION

Mounted in the gauge, and connected in parallel with the lighting circuit, is the temperature gauge light bulb, Fig. IV-14. The only function of the bulb is to illuminate the gauge dial and it does not affect any other function of the gauge.

Fig. IV-14



BEFORE TROUBLE SHOOTING IGN. SYSTEM

Check Fuel Delivery to Engine

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

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

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

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

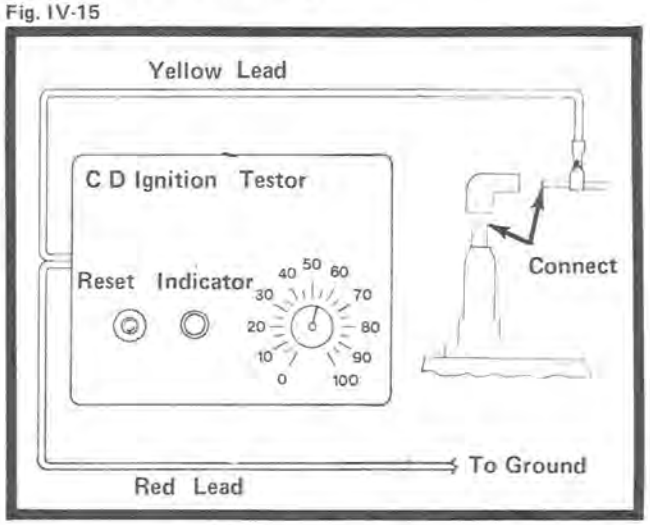
Check High Voltage Output

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

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

2. Connect the yellow lead of the CDI tester to the MM-1 secondary output adaptor. Next, connect the MM-1 adaptor to the no. 2 high tension wire, Fig. IV-15. Also, connect the red tester lead to a good ground on the snowmobile frame, Fig. IV-15. Finally, set tester dial at 55, Fig. IV-15.

Fig. IV-15



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

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

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

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

BEFORE TROUBLE SHOOTING IGN. SYSTEM

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

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

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

IGNITION SYSTEM TESTING

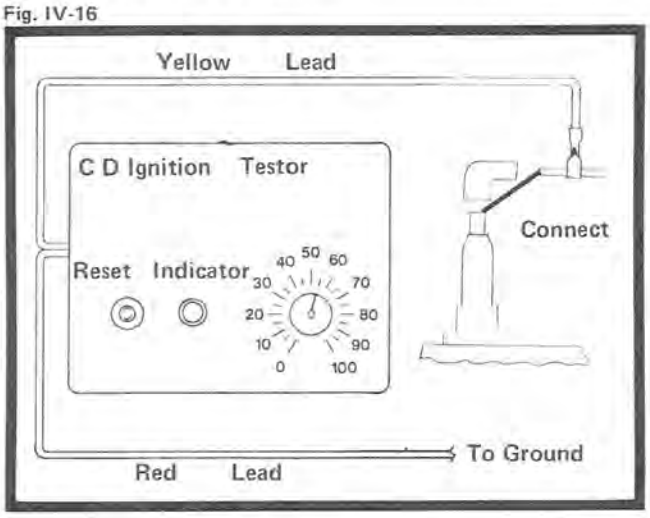
Ignition System and Main Wiring Harness Check

Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1

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

2. Remove the spark plug cap from the no. 2 high tension wire; then connect the high tension wire directly to the spark plug. Connect the positive (RED) lead of the tester to ground and the negative (yellow) tester lead to the no. 2 high tension wire, Fig. IV-16. Use the MM-1 secondary output adaptor. Set the dial at 55.

Fig. IV-16



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

4. If red light illuminates, high voltage output is satisfactory and indicates there is a problem in the main wiring harness or related switches. Check all the switches to find the problem area (See: Check Main Wiring Harness and Related Switches, page IV-15,16). If red light did not illuminate, high voltage is not satisfactory and indicates there is a problem in the ignition system, not in the main harness or switches. Check ignition system components to find the problem area (See: Check Ignition-Related Components, page IV-16,17).

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

Check Main Wiring Harness and Related Switches

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

Note: Before checking harness and switches, make sure carburetors are correctly synchronized. This will ensure correct setting of the throttle safety switch.

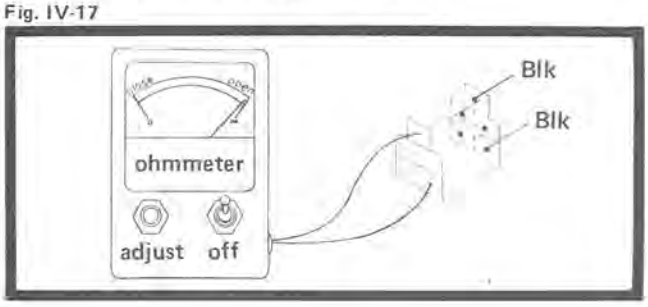
1. Make sure the main wiring harness is disconnected from the engine connector plug.

2. Rotate the ignition switch to the ON position.

Note: Make sure all safety switches are in the ON position.

3. Connect one lead of the ohmmeter to a black wire in the wiring harness connector plug and the other lead to the remaining black wire in the connector plug, Fig. IV-17.

Fig. IV-17

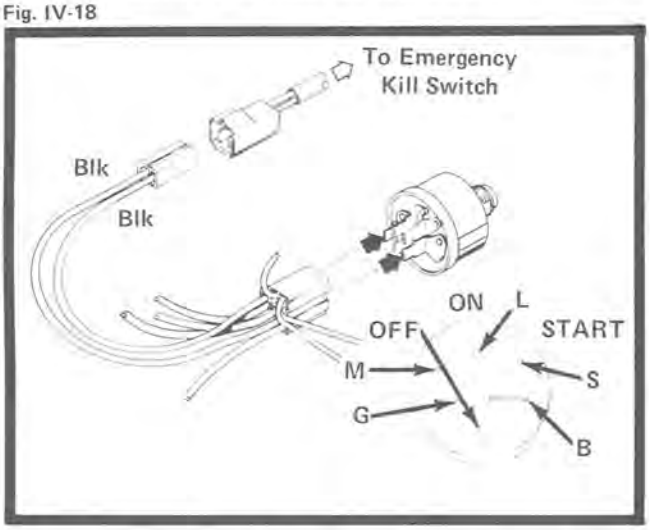


4. If the ohmmeter reads infinity, an OPEN circuit exists, and the switches are satisfactory. If the ohmmeter reads 0 or very low resistance, a short circuit exists, and a switch may not be operating properly. To determine if a switch or the wiring harness is defective, proceed to step 5 and 6.

5. Disconnect the main wiring harness connector plug from the ignition switch, Fig. IV-18. Also, disconnect emergency shut-off switch plug from the plug having two black wires running to the ignition switch connector, Fig. IV-18.

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

Fig. IV-18



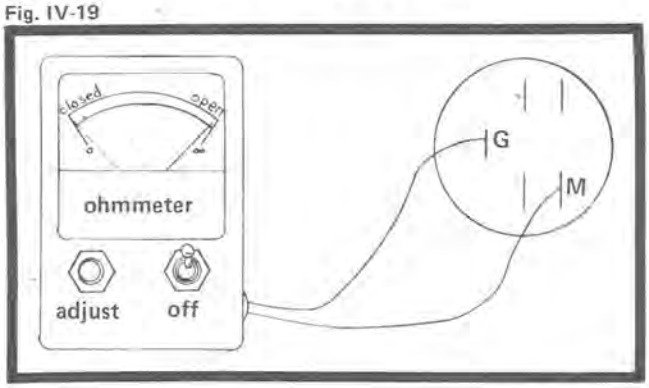
Ignition Switch and Throttle Safety/Stop Switch Check

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

1. Rotate ignition switch to the ON position.

2. Connect one lead of the ohmmeter to the G terminal on ignition switch and the other lead to the M terminal, Fig. IV-19.

Fig. IV-19



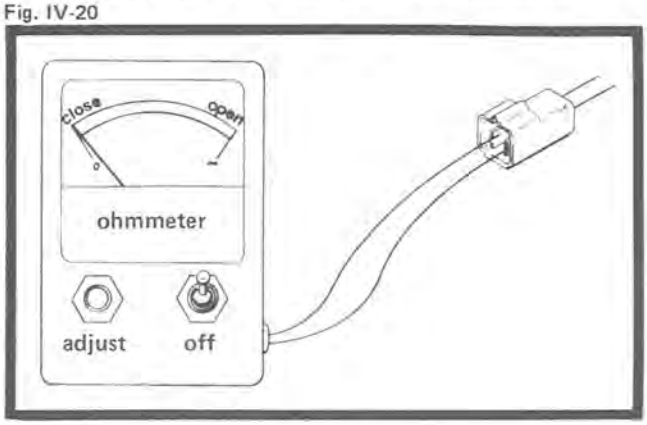
3. If ohmmeter registers infinity (OPEN), the ignition switch is satisfactory; proceed to step 4. If the ohmmeter registers 0 (CLOSED), the ignition switch is defective and is to be replaced.

4. Connect one lead of the ohmmeter to the brown wire running to the throttle safety/stop switch and the other lead to the black wire having a yellow tracer, Fig. IV-20. This wire also runs to the throttle safety/stop switch.

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

6. If ohmmeter registers 0 (CLOSED), the throttle safety/stop switch is defective and must be replaced, Fig. IV-20. If ohmmeter registers infinity (OPEN), the switch is satisfactory.

Fig. IV-20



Check Ignition-Related Components

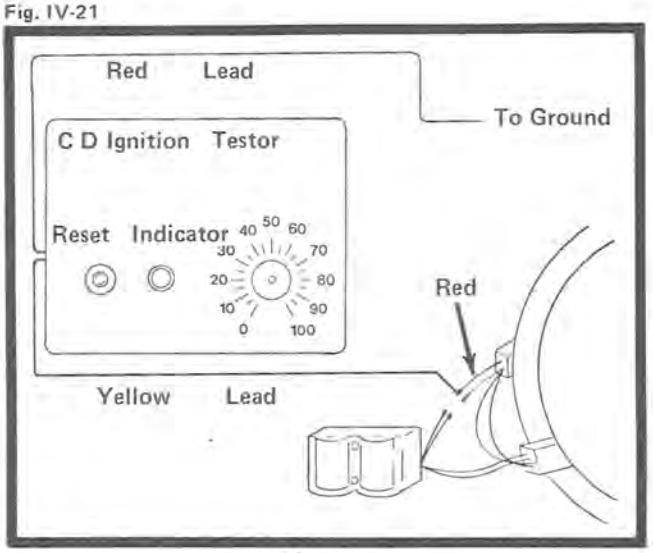
Equipment Necessary: Electro-Specialties CD Ignition Tester Model 1

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

IGNITION SYSTEM TESTING

1. Exciter Coil Test: 50 Disconnect the red and white wires from the exciter coil and the CDI unit, Fig. IV-21. Connect the positive (red) tester lead to the engine frame. Connect the negative (yellow) tester lead to the red wire from the exciter coil, Fig. IV-21. Set the tester dial at the specified setting (See: Electrical Specification), then crank the engine over quickly. If the red light on the tester illuminates, the output of the exciter coil is satisfactory. If the red light on the tester does not illuminate, the exciter coil must be replaced. Repeat test three times for conclusive results.

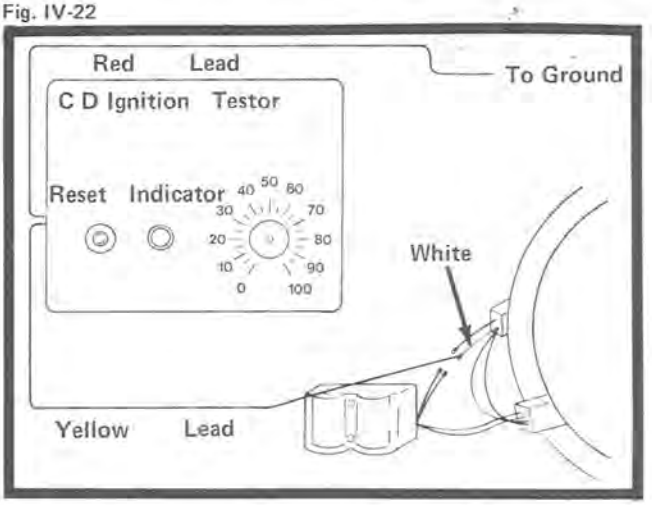
Fig. IV-21



2. Pulser Coil Test: 50 Make sure the white lead of the pulser coil is disconnected from the white wire of the CDI unit. Next, connect the positive (red) tester lead to the engine frame and the negative (yellow) tester lead to the white lead from the pulser coil, Fig. IV-22. Set the tester dial at the specified setting (See: Electrical Specifications), then crank the engine over quickly. If the red light on the tester illuminates, the pulser coil output is satisfactory. If the red light on the tester does not illuminate, the pulser coil must be replaced. Repeat test three times for conclusive results.

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

Fig. IV-22



Check CDI Unit, External Ignition Coil, and RFI Suppressors

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

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

CDI Unit 70

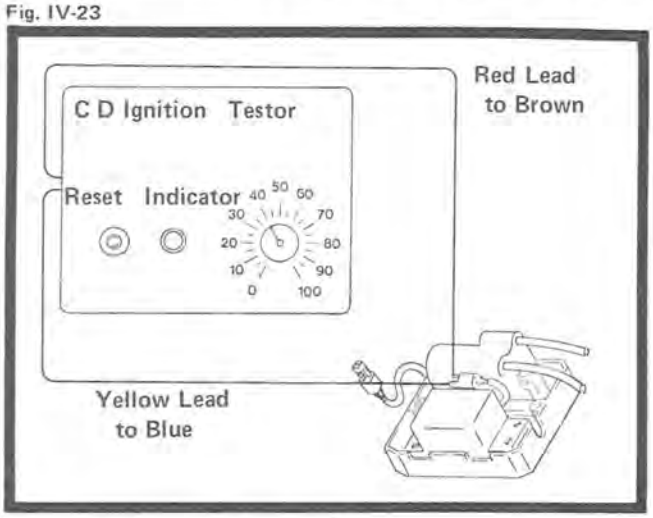
1. Remove the ignition coil and CDI unit bracket from the engine, using a screwdriver having a 5/16-inch blade. Make certain the red wire and the white wire from the exciter and pulser coils are connected to the matching wires on the CDI unit.

2. Disconnect the triple wire plugs connecting the CDI unit to the external ignition coil.

3. Connect the positive (red) tester lead to the brown wire terminal on the CDI part of the triple plug and the negative (yellow) tester lead to one of the blue wires on the CDI plug, Fig. IV-23. Leave the remaining blue wire open. Set the tester dial on the specified setting (See: Electrical Specifications), then crank the engine over quickly. If the red light on the tester illuminates, the CDI unit is satisfactory. If the red light on the tester does not illuminate, the CDI unit must be replaced. Repeat the test three times for conclusive results.

IGNITION SYSTEM TESTING

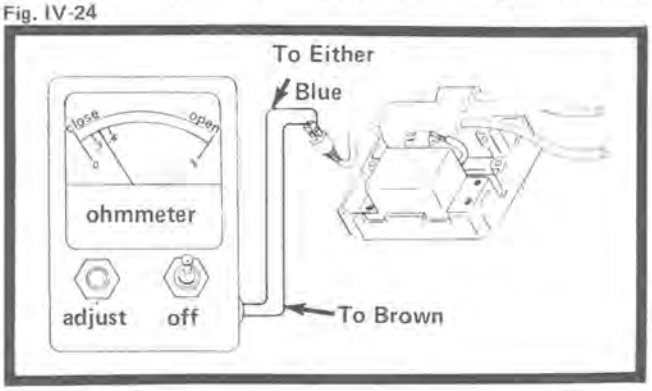
Fig. IV-23



External Ignition Coil

1. Connect one lead of the PC2 ohmmeter to either of the blue wires on the ignition coil end of the triple plug and the other ohmmeter lead to the brown wire on the triple plug, Fig. IV-24. The ohmmeter reading should be 0.365 ohms. However, a range of 0.328-0.401 ohms is acceptable. If the reading is within specifications, the ignition coil is satisfactory (proceed to step 2). If the reading is not within specifications, replace the ignition coil.

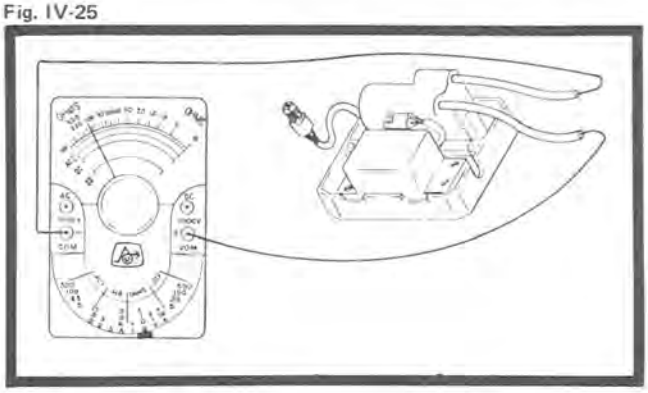
Fig. IV-24



2. After setting the multitester selector at 100X, connect one tester lead to each high tension wire, Fig. IV-25. The reading should be 10,200 ohms. However, a range of 9,180-11,220 ohms is acceptable. If the reading is not in this range, replace the ignition coil.

Note: When checking the external ignition coils on dual CDI models, be sure to connect tester leads to the high tension wires of the same coil. If checking the wrong wires, no reading will be given.

Fig. IV-25

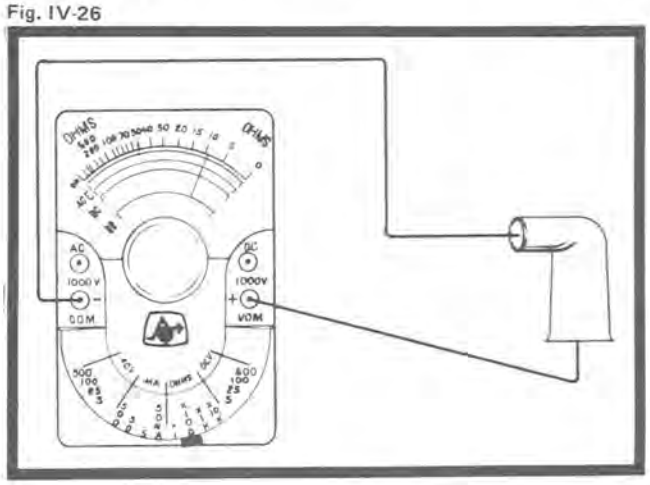


RFI Suppressor Caps

1. With the multitester selector set on 100X, connect one tester lead to each end of the RFI cap, Fig. IV-26. The reading should be 975 ohms. However, a range of 900-1100 is acceptable. If the reading is not in this range, replace the RFI suppressor caps.

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

Fig. IV-26



BEFORE TROUBLE SHOOTING LIGHT SYST.

Check Headlight, Taillight and Brakelight

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

1. Check taillight and brakelight bulb (See: Check Taillight and Brakelight, page IV-19).

2. Check headlight bulb (See: Check Headlight, page IV-20).

LIGHTING SYSTEM TESTING

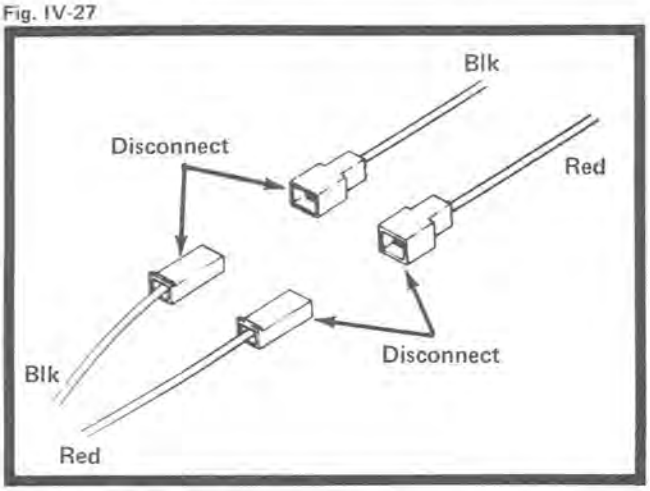
Check Taillight and Brakelight

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Remove the seat from the tunnel.

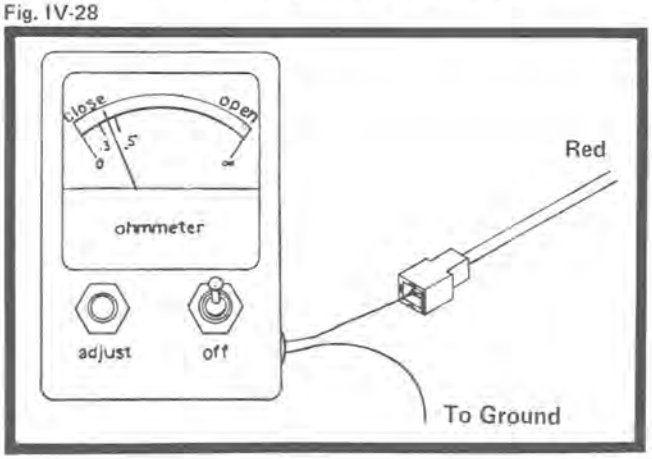
2. Disconnect the taillight/brakelight connector, Fig. IV-27.

Fig. IV-27



3. Connect one lead of the ohmmeter to the red wire running to the brakelight, and the other lead to a suitable ground, Fig. IV-28.

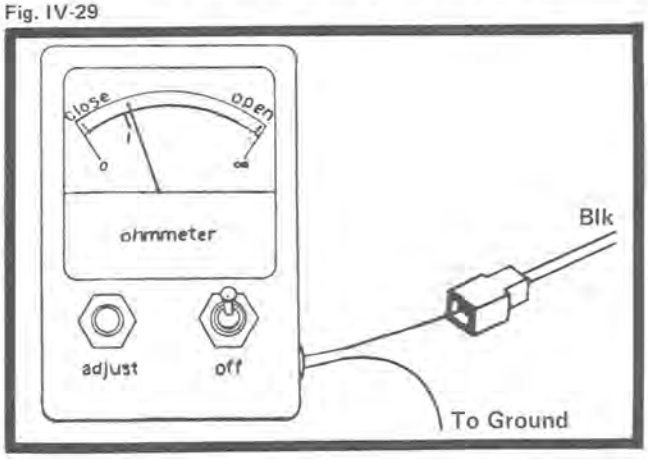
Fig. IV-28



4. If the ohmmeter registers low resistance (approximately 0.3-0.5), the brakelight is acceptable. If the ohmmeter registers infinity (OPEN), there is a bad ground, broken red wire or the brakelight bulb is burned out.

5. Connect one lead of the ohmmeter to the black wire running to the taillight, and the other lead to a suitable ground, Fig. IV-29.

Fig. IV-29



6. If the ohmmeter registers low resistance (approximately 1 ohm), the taillight is acceptable. If the ohmmeter registers infinity (OPEN), there is a bad ground, broken black wire or the taillight bulb is burned out.

Note: The taillight, brakelight, and wires have now been checked. If all the components checked out to be acceptable, and a malfunction still exists in the brakelights and taillights, the problem area must be isolated (See: Isolate Problem to Magneto Alternator or Wiring Circuit, page IV-20).

LIGHTING SYSTEM TESTING

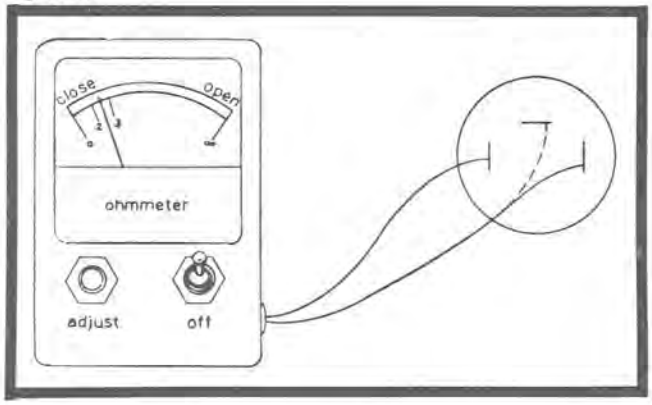
Check Headlight

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Disconnect the headlight connector from the headlight terminals.

2. Connect one lead of the ohmmeter to ground terminal on headlight (where brown wire connects) and the other lead to the high beam headlight terminal (where blue wire connects), Fig. IV-30.

Fig. IV-30



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

4. Connect one lead of the ohmmeter to ground terminal on headlight (where brown wire connects) and the other lead to the low beam headlight terminal (where the white wire connects), Fig. IV-30.

5. If the ohmmeter registers low resistance (1.0-1.4), the low beam filament is acceptable. If the ohmmeter registers high resistance or infinity (OPEN), the low beam filament is burned out and, therefore, the headlight must be replaced.

Note: The headlight has not been checked. If it checked out to be acceptable and a malfunction still exists in the headlight, the problem area must be isolated. (See: Isolate Problem to Magneto Alternator or Wiring Circuit, page IV-20).

Isolate Problem to Magneto Alternator or Wiring Circuit

Equipment Necessary: Multitester, Quik-Jak

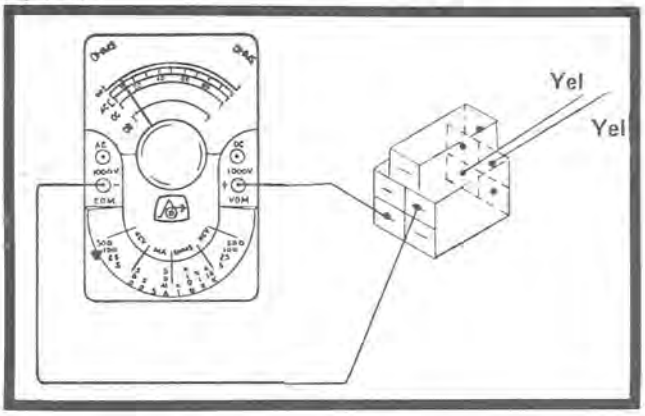
Note: Use either a voltmeter or ohmmeter to isolate the lighting problem to the magneto alternator or wiring harness. If a voltmeter is used, proceed by following steps 1-5. If ohmmeter is used, check resistance of lighting coils (See: Step 6 only).

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

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

3. Set the multitester selector at 100 AC volts. In the engine connector plug, connect one lead of the voltmeter to one yellow wire terminal and the other tester lead to the remaining yellow wire terminal, Fig. IV-31.

Fig. IV-31



4. Start the engine and allow it to idle. The voltmeter must register some degree of AC voltage (approximately 10-15 AC volts), Fig. IV-31. Grasp the throttle and accelerate slightly. As the engine rpm increases, the voltmeter must register 20-30 AC volts.

CAUTION

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

LIGHTING SYSTEM TESTING

5. If output is 10-15 AC volts at idle, and also, raises to 20-30 AC volts when slight acceleration takes place, the magneto alternator (lighting coil) is satisfactory and indicates a wiring circuit problem. If the output is not satisfactory, the magneto alternator is malfunctioning and must be checked further (See: Check Magneto Alternator, page IV-25). Shut engine off and remove the Quik-Jak.

6. An alternate method of testing the magneto alternator (lighting coils) is with an ohmmeter (See: Check Resistance of Lighting Coils, page IV-21).

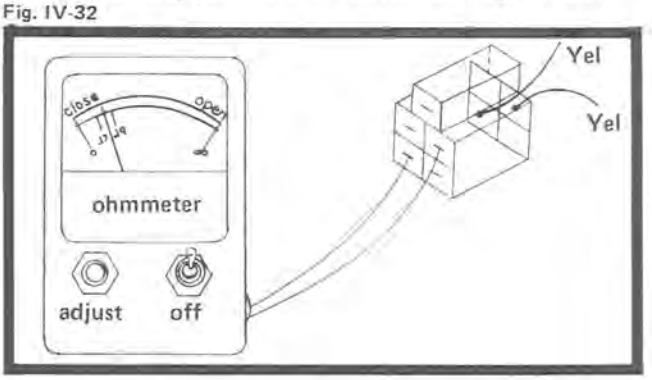
Check Resistance of Lighting Coil

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

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

2. In the engine connector plug, connect one lead of the ohmmeter to one yellow wire terminal, and the other tester lead to the remaining yellow wire terminal, Fig. IV-32.

Fig. IV-32



3. The ohmmeter must register 0.17-0.19 ohms.

4. If the ohmmeter registers 0.17-0.19 ohms, the lighting coil is satisfactory and indicates a wiring circuit problem (See: Check Voltage Regulator, page IV-21). If the ohmmeter does not register 0.17-0.19 ohms, the lighting coil is defective and must be replaced.

MAIN WIRING CIRCUIT TESTING

Check Voltage Regulator — '74 Models

Equipment Necessary: Multitester, Quik-Jak

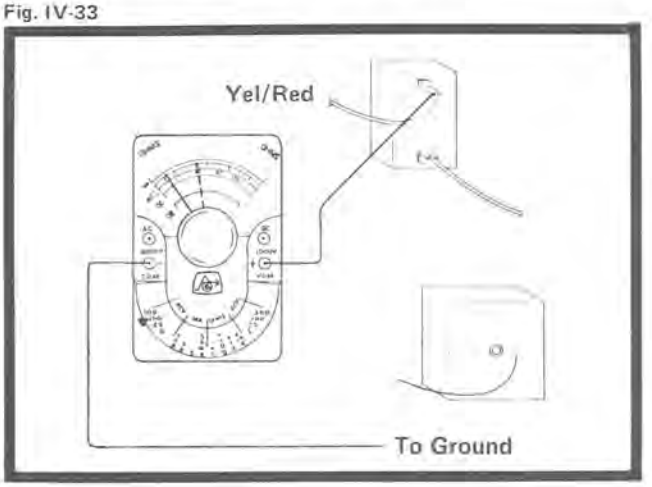
1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure the track is free to rotate.

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

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

4. Set multitester selector at 100 AC volts. Connect one lead of the AC voltmeter to the yellow w/red wire on the circuit breaker and the other tester lead to GROUND on the steering column, Fig. IV-33.

Fig. IV-33



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

MAIN WIRING CIRCUIT TESTING

● CAUTION ●

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

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

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

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

9. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other lead to a circuit breaker terminal, Fig. IV-33. Voltmeter must register 12-15 AC volts. If voltmeter registers 12-15 AC volts, check the opposite circuit breaker terminal; it also must have 12-15 AC volts. If either circuit breaker terminal does not have 12-15 AC volts, the circuit breaker is defective and must be replaced.

Check Voltage Regulator — '75 Models

Equipment Necessary: Multitester and Quik-Jak

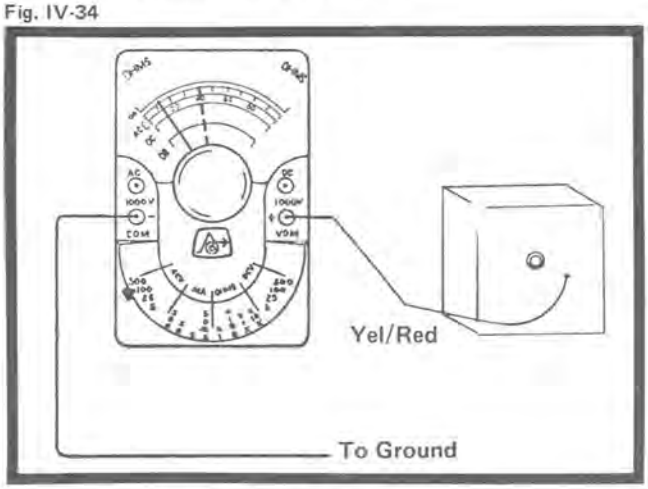
1. Raise the rear of the snowmobile off the shop floor, using a Quik-Jak. Make sure track is free to rotate.

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

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

4. Set multitester selector at 100AC volts. Connect one lead of the AC voltmeter to the yellow w/red wire on the voltage regulator and the other tester lead to GROUND on the steering column, Fig. IV-34.

Fig. IV-34



5. Turn the light switch to the OFF position.

6. Start the engine and allow it to idle rapidly. The voltmeter must register approximately 12-15 AC volts. Grasp the throttle and accelerate slightly. As the engine rpm increases, the voltmeter must register 15 to 25 AC volts.

● CAUTION ●

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

7. If the voltmeter registers 12-15 AC volts at engine idle, and 15-25 AC volts when engine is accelerated slightly, adequate power is getting to the system. Proceed to step 8. By contrast, if the voltmeter does not register as mentioned, there is either a problem in the magneto alternator wiring circuit between the

engine connector and the regulator ground on the steering column, or between the engine connector and the lighting coil.

8. With the engine at idle, and the AC voltmeter as in step 4, connect the voltage regulator to the steering column. Voltmeter must register 12-15 AC volts at idle and when the engine is accelerated.

9. If the voltmeter registers 12-15 AC volts, the voltage regulator is operating correctly. If voltmeter does not register 12-15 AC volts, the voltage regulator is defective and must be replaced.

Check Light Switch for Voltage – 1974

Equipment Necessary: Multitester, Quik-Jak

1. Move light switch to the OFF position.

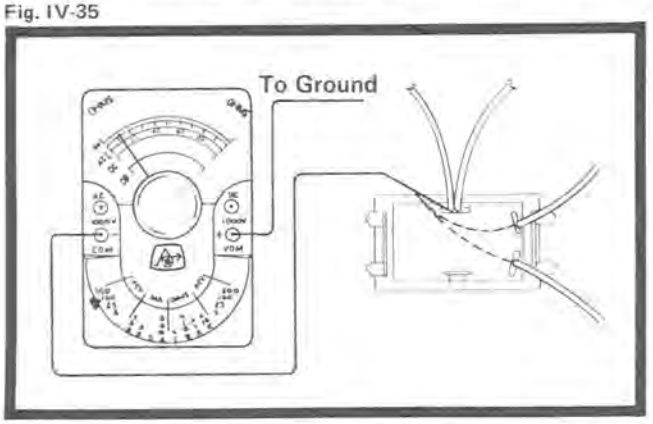
2. Connect the main wiring harness connector to the engine connector plug.

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

4. Start the engine and allow it to idle.

5. Set the multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other lead to the vertically-oriented terminal holding a yellow w/red wire, Fig. IV-35. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

Fig. IV-35



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

7. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other tester lead to a horizontally-oriented light switch terminal, Fig. IV-35. Move light switch to the ON position. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

8. If the voltmeter registers 12-15 AC volts, the light switch is acceptable and indicates a problem in the brake switch, dimmer switch, or related wires (See: Check Brake Switch and Dimmer Switch, page IV-24). If the voltmeter does not register 12-15 AC volts, the light switch is defective and must be replaced. To positively verify a defective switch, check it with an ohmmeter (See: Check Light Switch Resistance, page IV-24).

Check Light Switch for Voltage – 1975

Equipment Necessary: Multitester and Quik-Jak

1. Move light switch to the OFF position.

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

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

4. Start the engine and allow it to idle.

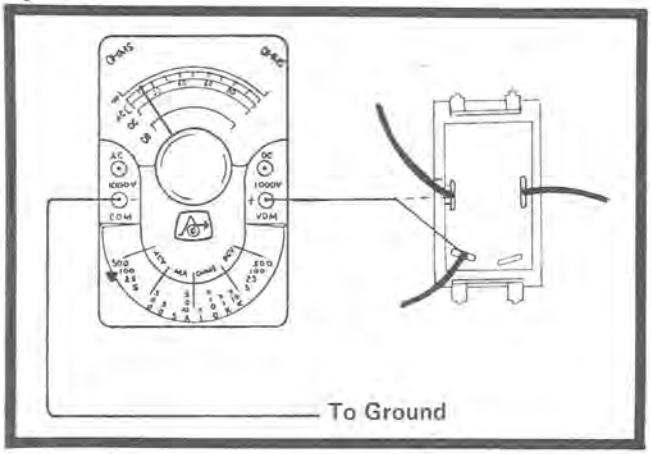
5. Set the multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other lead to the horizontally-oriented terminal holding a yellow w/red wire, Fig. IV-36. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

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

WIRING CIRCUIT TESTING

7. Set the multitester selector at 100 AC volts. Connect one lead of the voltmeter to GROUND on the steering column and the other tester lead to a vertically-oriented light switch terminal, Fig. IV-36. Move light switch to the ON position. Voltmeter must register 12-15 AC volts. DO NOT REMOVE WIRES FROM SWITCH.

Fig. IV-36



8. If the voltmeter registers 12-15 AC volts, the light switch is acceptable and indicates a possible problem in the brake switch, dimmer switch, or related wires (See: Check Brake Switch and Dimmer Switch, page IV-24). If the voltmeter does not register 12-15 AC volts, the light switch is defective and must be replaced. To positively verify a defective switch, check it with an ohmmeter (See: Check Light Switch Resistance).

Check Light Switch Resistance

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

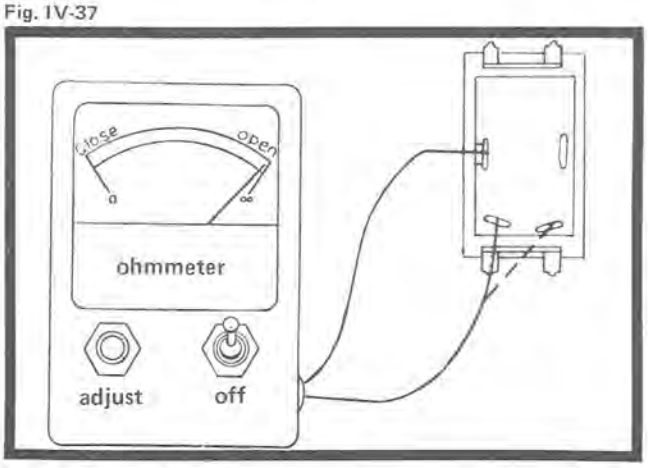
1. Shut the engine off.

2. Remove the wires from the light switch terminals.

3. Move the light switch to the OFF position.

4. Connect one lead of the ohmmeter to a horizontally-oriented terminal on the light switch and the other lead to a vertically-oriented terminal, Fig. IV-37. Ohmmeter must register OPEN. Check remaining horizontally-oriented terminal in the same manner, Fig. IV-37.

Fig. IV-37



5. If ohmmeter does not register OPEN, the light switch is defective and must be replaced. If the ohmmeter registers OPEN, proceed to step 6.

6. Move the light switch to the ON position. Ohmmeter must register CLOSED.

7. If ohmmeter registered CLOSED, the light switch is acceptable. If the ohmmeter does not register CLOSED, the light switch is defective and must be replaced.

8. Check the brake switch and dimmer switch (See: Check Brake Switch and Dimmer Switch, page IV-24).

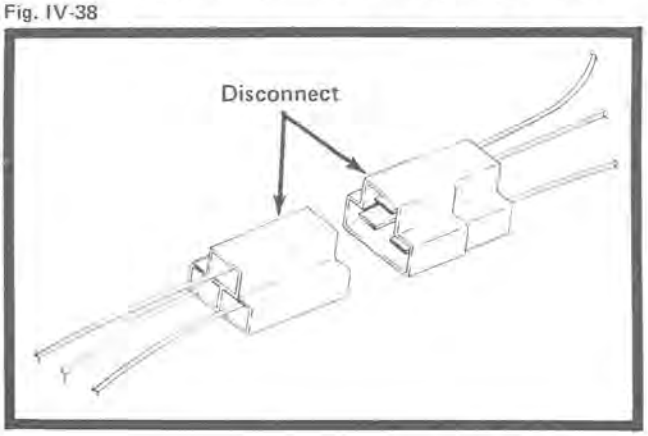
Check Brake Switch and Dimmer Switch

Equipment Necessary: Electro-Specialties Ohmmeter Model PC2

1. Shut engine off.

2. Disconnect the connectors holding three wires running to the dimmer switch, Fig. IV-38.

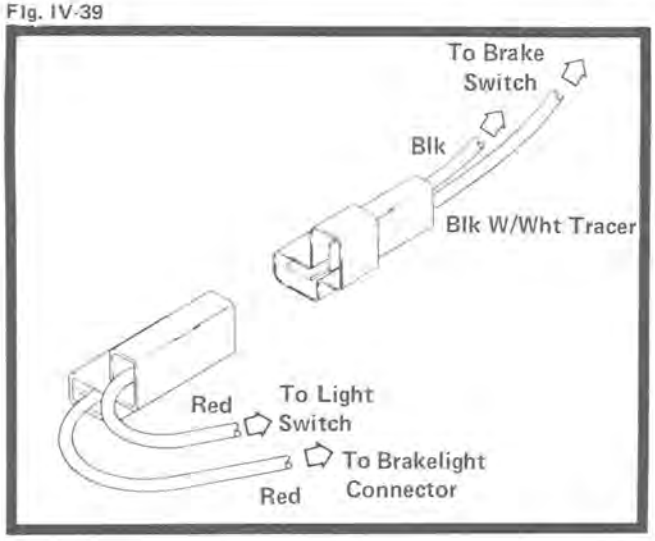
Fig. IV-38



WIRING CIRCUIT TESTING

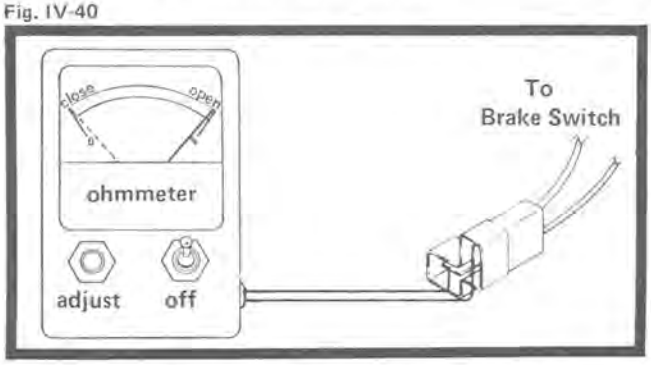
3. Disconnect the Z-shaped connectors holding two wires running to the brake switch, Fig. IV-39.

Fig. IV-39



4. Connect one lead of the ohmmeter to the terminal in the Z-shaped connector and the other lead to the remaining terminal in the Z-shaped connector holding the two wires running to the brake switch, Fig. IV-40. Ohmmeter must register OPEN.

Fig. IV-40



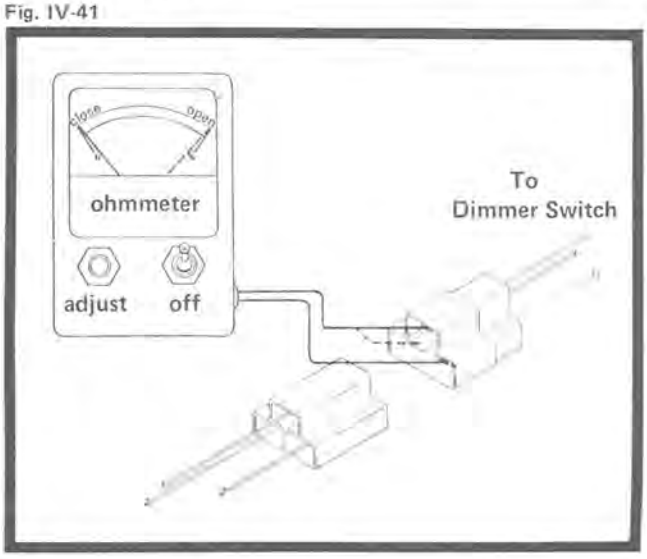
5. If the ohmmeter does not register OPEN, the switch is defective and must be replaced. If the ohmmeter registers OPEN, proceed to step 6.

6. Squeeze the brake lever. Ohmmeter must register CLOSED, Fig. IV-40.

7. If ohmmeter registers CLOSED, the brake switch is acceptable and indicates a possible dimmer switch problem (See: Step 8). If the ohmmeter registers OPEN, the brake switch is defective and must be replaced.

8. Connect one ohmmeter lead to the single black wire in the three terminal connector running to the dimmer switch, and the other lead to the high beam terminal in the three terminal connector of the dimmer switch, Fig. IV-41. The terminal can be identified by noting that it mates with the blue wire in the wiring harness half of the plug. The ohmmeter must show CLOSED when the dimmer switch is in the high beam position, Fig. IV-41. The ohmmeter must register OPEN with the dimmer switch in the low beam position, Fig. IV-41. Change the ohmmeter lead from the high beam terminal to the low beam terminal, Fig. IV-41. The terminal can be identified by noting that it mates with the white wire in the wiring harness half of the plug, Fig. IV-41. With the dimmer switch in the low beam position, the ohmmeter must register CLOSED. With the switch in the high beam position, the ohmmeter must register OPEN, Fig. IV-41.

Fig. IV-41



Check Magneto Alternator

Equipment Necessary: Electro-Specialties Ohmmeter PC2

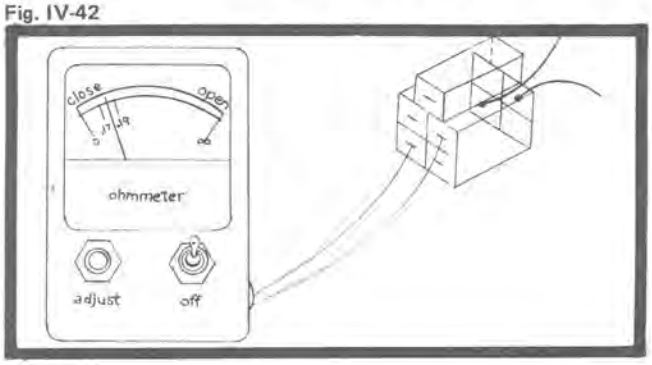
1. Shut the engine off.

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

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

WIRING CIRCUIT TESTING

Fig. IV-42



4. The ohmmeter must register 0.17-0.19 ohms. If the ohmmeter registers 0.17-0.19 ohms, the lighting coil is acceptable. If the ohmmeter does not register 0.17-0.19 ohms, the lighting coil is defective and must be replaced.

5. The lighting coil has now been checked for proper resistance.

Note: If voltage output of the magneto alternator does not improve after all the preceding tests are performed, the flywheel magnets may be weak. Compare the magnetic attraction of the old flywheel against the attraction of a new flywheel. Install a new flywheel if the old flywheel magnets do not seem to be strong enough.

TACHOMETER TESTING

Check Tachometer

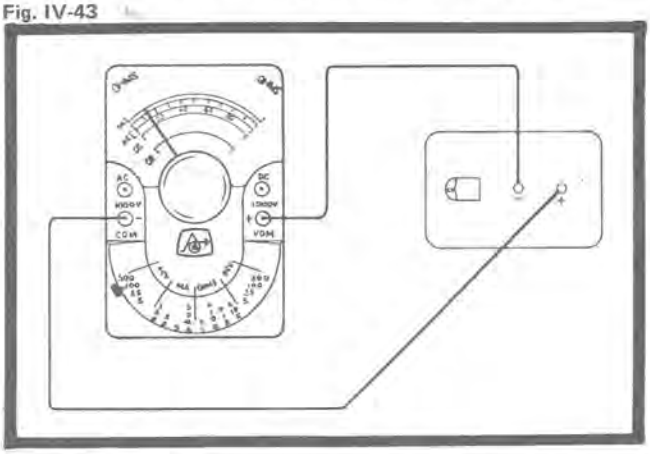
Equipment Necessary: Quik-Jak, Multitester

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

2. Start the engine and allow it to idle.

3. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to the positive (+) terminal (white lead) on the tachometer and the other tester lead to the negative (—) terminal (green lead), Fig. IV-43. Voltmeter must register 12-15 AC volts.

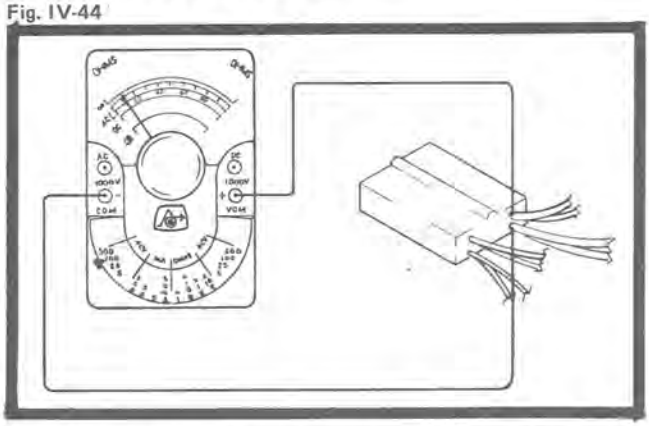
Fig. IV-43



Note: On 1975 models, the yellow is positive (+) and the black is negative(—).

4. If the voltmeter registers 12-15 AC volts, but the tachometer does not operate, the tachometer must be replaced because it is defective. If the voltmeter does not register 12-15 AC volts, there is a problem in another area (proceed to step 5).

Fig. IV-44



5. Set multitester selector at 100 AC volts. Connect one lead of the voltmeter to the brown/yellow wire at the tachometer connector and the other tester lead to the yellow and black wire at the tachometer connector, Fig. IV-44. Voltmeter must register 12-15 AC volts.

Note: On 1975 models, connect one lead to the yellow in the connector, and the other to a black (ground).

6. If voltmeter registers 12-15 AC volts and the tachometer does not operate, the wires running from the tachometer to the tachometer connector are defective, or the tachometer is defective. If voltmeter does not register 12-15 AC volts, the magneto alternator may be defective (See: Check Magneto Alternator, page IV-25), or the wires from the regulator connector to the tachometer connector may be defective.

TEMPERATURE GAUGE TESTING

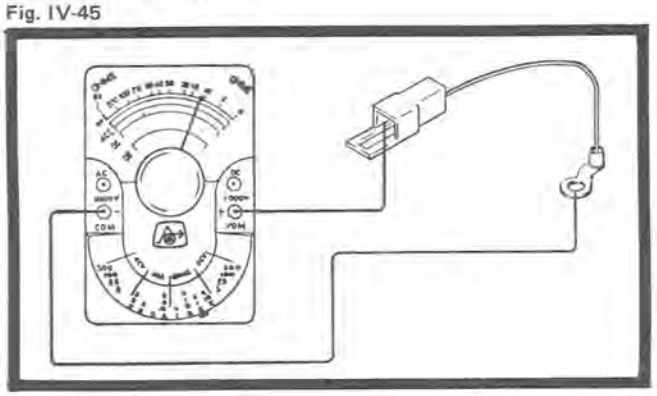
Check AC Voltage at Temperature Gauge

Equipment Necessary: 13/16-Inch Spark Plug Socket, Ohmmeter, Quik-Jak and Multitester

1. Remove the spark plug and temperature gauge sensor from the cylinder head, using a 13/16-inch spark plug socket. Make sure top of cylinder head near spark plug hole is clean to ensure a good ground for the sensor. Disconnect sensor from temperature gauge.

2. Set multitester selector at 1K ohms. Connect one lead of the ohmmeter to the sensor wire terminal and the other tester lead to the sensor, Fig. IV-60. Ohmmeter must register 10,000-11,000 ohms when sensor is at room temperature, Fig. IV-45. If ohmmeter registers 10,000-11,000 ohms, sensor is acceptable (proceed to step 3). If ohmmeter does not register 10,000-11,000 ohms, replace the sensor. After sensor replacement is made, proceed to step 3.

Fig. IV-45



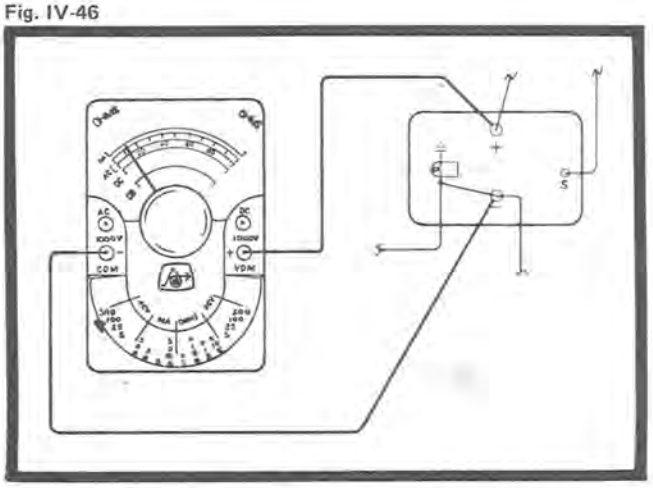
3. Install the temperature gauge sensor and a new spark plug in cylinder head, using a 13/16-inch spark plug socket. DO NOT USE SPARK PLUG WASHER IF TEMPERATURE GAUGE SENSOR IS USED. Connect sensor to temperature gauge.

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

5. Start the engine and allow it to idle.

6. Set multitester selector at 100 AC volts. Connect one lead of the AC voltmeter to the positive (+) terminal (green wire) on the temperature gauge and the other tester lead to negative (–) terminal (black wire) on the temperature gauge, Fig. IV-46. Voltmeter must register 12-15 AC volts, Fig. IV-46, and temperature gauge needle must point to COLD.

Fig. IV-46



7. As a final check of the gauge when the engine is idling, attach a jumper wire from the sensor to engine ground. Temperature gauge needle must move to HOT if gauge is working properly. If needle does not point to HOT, the gauge is defective and must be replaced.

TROUBLE SHOOTING TEMP. GAUGE

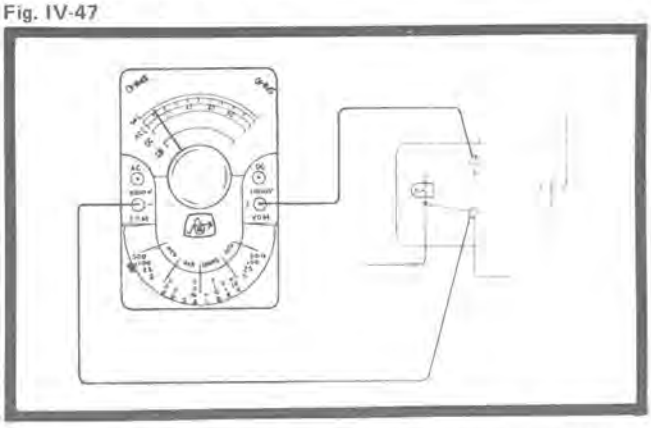
Check Temperature Gauge

Equipment Necessary: Quik-Jak, Multitester

Note: The gauge is calibrated to read from 250°F to 475°F. Some engines operating at light loads and in cold temperatures may not reach the operating range of the instrument. Thus, someone may mistakenly think the gauge is defective. However, if the tests show the gauge to be acceptable, the gauge will record when temperature rises above 250°F.

1. Install the Quik-Jak to raise the snowmobile off the floor. Set the multitester selector at 100 AC volts. Connect one tester lead to the positive terminal (green wire) on the gauge and the other tester lead to the negative terminal (black wire) on the gauge, Fig. IV-47. With the engine running, the AC voltmeter must register 12-15 AC volts, and the gauge must show a COLD reading; then proceed to step 2. However, if the voltmeter registers 12-15 AC volts, but the gauge reading remains at 475°F, the gauge is defective and must be replaced. If the voltmeter reading is not 12-15 AC volts, proceed to magneto alternator check (See: Check Magneto Alternator, page IV-25).

Fig. IV-47

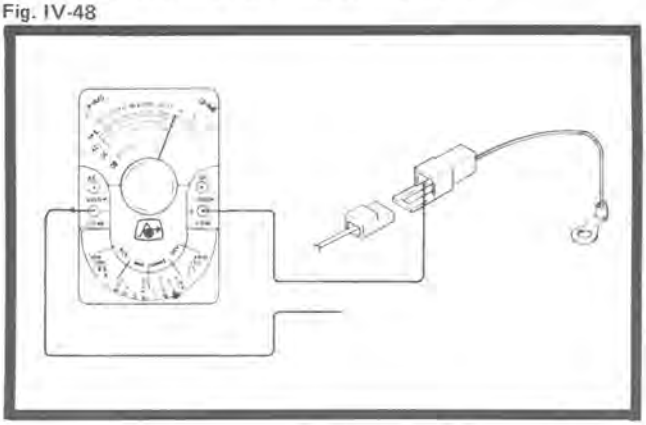


2. With the engine running and the gauge showing a cold reading, disconnect the sensor wire at the connector. Touch the sensor wire from the gauge to ground. The temperature gauge needle must move to approximately 475°F. If the gauge moves to approximately 475°F, the gauge is operating correctly. If the gauge does not move to a hot reading when the sensor wire is grounded, the gauge is defective and must be replaced.

Note: Before replacing the gauge, check the sensor lead attached to the S terminal on the temperature gauge for continuity (See: Step 3).

3. Shut the engine off. Set the multitester selector to 100X ohms. Attach one lead of the ohmmeter to the sensor connector and the other lead to GROUND, Fig. IV-48. A reading of approximately 11,000 ohms should be registered with the sensor at 60-70 degrees. As the temperature of the sensor rises, the ohms reading will decrease. If the ohmmeter readings do not follow this pattern, the sensor is defective and must be replaced.

Fig. IV-48



Note: The sensor units are affected by the cooling air passing across the cylinder heads. To shield the sensor unit from this air passage, the sensor unit must be positioned behind the spark plug in relation to the air flow. Thus, on a free-air engine, the sensor must be directly behind the spark plug.

4. To check for proper gauge calibration, a resistor of known value should be attached between the sensor lead and GROUND.

   243 ohms should produce a 250°F reading.

   174 ohms should produce a 275°F reading.

   121 ohms should produce a 305°F reading.

   60.4 ohms should produce a 353°F reading.

   304 ohms should produce a 405°F reading.

   16.2 ohms should produce a 255°F reading.

   Tolerances of ±10°F are acceptable.

Note: Needles are dampened. A small amount of vibration may be necessary for accurate readings.

5. Proper calibration of the sensor can also be made by heating the sensor to a temperature given in step 4; then check the resistance of the sensor, using an ohmmeter.

ELECTRICAL ADJUSTMENTS

Checking Ignition Timing

If the magneto base plate was removed, the only adjustment required is to align the mark on the base plate with the "boss" of the crankcase. On the base plate are two marks. The long mark is for engines requiring 17° ignition timing. The short mark is for engines requiring 14° ignition timing.

Note: On T1 Series engines, the long mark is for a 25° timing setting.

1. Set the static timing of the engine (See: Section IA — Setting Up Instructions, Time the Engine, Steps 1-5, page IA-10).

2. Check the dynamic (running) timing of the engine (See: Section II — Engine Servicing, Timing, page II — 42).

Headlight Aiming Adjustment

Equipment Necessary: Tape Measure, Phillips Screwdriver Having a No. 1 Blade.

The headlight can be adjusted for vertical and horizontal aim of the high and low beam. The geometric center of the high beam light zone must be used for vertical and horizontal service aiming.

1. Make sure suspension is adjusted correctly.

2. Position the snowmobile on a level floor so the headlight is approximately 25 feet away from a wall or similar aiming surface.

3. Measure the distance from the floor to midpoint of headlight, using a tape measure. REMEMBER THIS DISTANCE.

4. Using distance obtained in step 3, place an appropriate mark on the wall or similar headlight aiming surface.

5. Activate the headlight and move the dimmer switch to high beam position. DO NOT USE LOW BEAM — IMPROPER HEADLIGHT AIM WILL RESULT.

6. Observe the aim of the headlight beam. Correct aim is when the most intense beam is focused and centered 2 inches below the mark made on the wall or similar aiming surface. If headlight aim is not as specified, an adjustment is required (See: Step 7).

7. To adjust the vertical or horizontal aim of the headlight beam, adjust the four screws located at the corners of the headlight, using a screwdriver having a no. 1 blade.

SPARK PLUG INFORMATION

SPARK PLUG TABLE

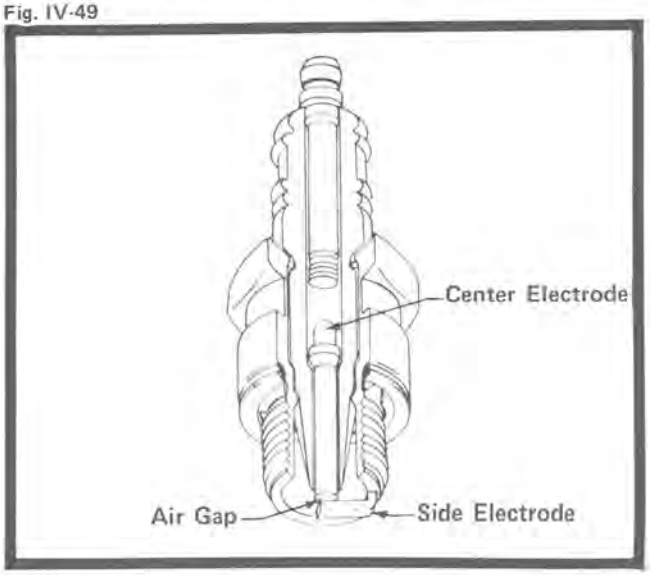
Hot Spark Plug	NGKB8EVA
Factory-Supplied Spark Plug	*NGKBR9EVA
Colder Spark Plug	NGKB10EVA

*Alternate Spark Plugs: Champion N2 or AC-S41XL

Spark Plug Structure

The NGK spark plug used in the Arctic Cat Snowmobile engine is made of two electrodes separated by an air gap. Completely insulated in the glass cover of the spark plug is the center electrode, Fig. IV-49. The side electrode is connected to the base of the spark plug, Fig. IV-49. When high voltage current is released from the "secondary" of the external ignition coil, the current flows through the center electrode and jumps the air gap to the side electrode. The spark generated between the two electrodes ignites the fuel mixture in the combustion chamber.

Fig. IV-49



SPARK PLUG INFORMATION

Heat Range — Heat range is the ability of the spark plug to dissipate heat away from the center electrode and insulating material. The rate of heat dissipation is controlled by the design of the spark plug insulator and shell structure. When heat is being dissipated, the path followed is:

1. Spark Plug Shell
2. Metal Washer
3. Threads in Cylinder Head
4. Cool Air from Fan

A spark plug having a hot heat range has a long center electrode extension and, as a result, dissipates heat slowly. By contrast, a spark plug having a cold heat range has a short center electrode extension and, as a result, dissipates heat rapidly.

Heat dissipation is also affected by the metal washer positioned between the spark plug and top of the cylinder head. To make sure the seal between the base of the spark plug and top of the cylinder head is adequate, the spark plug must be tightened to 18-20 ft-lb. If the spark plug is tightened more than 20 ft-lb, the metal washer is flattened completely and, as a result, the spark plug burns colder than normal because heat is dissipated too rapidly. By contrast, if the spark plug is tightened less than 18 ft-lb, the metal washer is not flattened enough and, as a result, the spark plug burns hotter than normal because heat is dissipated slowly. When heat is dissipated too slowly, the cylinders, pistons, cylinder heads and crankcase may be damaged.

Recommended Spark Plug

The recommended spark plug to use is an NGKBR9EVA. The correct air gap is 0.016-0.018 of an inch. For the majority of snowmobile drivers, the factory supplied NGKBR9EVA spark plug provides optimum engine performance. However, varying terrain, temperature and operating usage may require a different heat range spark plug. As an example, sustained cross-country riding usually requires a colder heat range spark plug (NGKB10EVA). By contrast, trail riding or other continued slow speed driving usually requires a hotter heat range spark plug (NGKB8EVA). To determine if the spark plug is burning properly, examine the center electrode insulator (See: Reading Spark Plug).

Reading Spark Plug

A good method of checking the operating temperature of the engine is to examine the center electrode insulator of the spark plug. Perform the examination after the snowmobile is operated like it usually will be driven.

1. Pull the spark plug caps off the spark plugs. Next, remove the spark plugs from the cylinder heads, using a 13/16-inch spark plug socket.
2. Examine the center electrode insulator of each spark plug.
   A. TAN or LIGHT BROWN insulator indicates correct spark plug heat range.
   B. LIGHT GRAY or WHITE insulator indicates overheating of the engine. This condition is caused by a loose spark plug, lean condition, overloading or incorrect spark plug heat range (too hot).

Note: If the gasoline and oil mixture ratio is correct (20:1), the carburetor is adjusted correctly and the spark plug is tightened to 18-20 ft-lb, replace the spark plug with one having a colder heat range.

   C. BLACK insulator indicates fuel in the combustion chamber is not burning completely. This condition is caused by too much oil in the fuel mixture, a rich condition or incorrect spark plug heat range (too cold).

Note: If the gaoline and oil mixture ratio is correct (20:1) and the carburetor is adjusted correctly, replace the spark plug with one having a hotter heat range.

3. First, apply a light film of graphite grease on the threads of the spark plug. Next, install the spark plug in the cylinder head; then tighten spark plug to 18-20 ft-lb, using a torque wrench and 13/16-inch spark plug socket. Finally, install the spark plug cap on top of the spark plug.

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1974 DRIVE CLUTCH SPECIFICATIONS

Description	Specifications	
	Low Altitude	High Altitude
Arctic Drive Clutch Models		
295	0225-047	0225-047
340	0225-042	0225-042
400	0225-041	0225-041
440	0225-043	0225-043
Clutch Engagement Speed - Approx.	3800	3800
Maximum Drive Clutch rpm	8500	8500
Spring Part Number	0146-068	0146-068
*Spring Length - New w/No Load	(See Spring Chart)	(See Spring Chart)
Spring Wire Diameter (in.)	0.192	0.192
Spring Pressure at 1.25 in. Compression (lb)	192-212 lb	192-212 lb
Weight Part Number		
295	0146-135	0146-159
340	0146-106	0146-159
400	0146-123	0146-175
440	0146-105	0146-175
Weight Color	(See Weight Chart)	(See Weight Chart)
Weight Outside Diameter	(See Weight Chart)	(See Weight Chart)
Weight Thickness	(See Weight Chart)	(See Weight Chart)
Weight - Gram Weight	(See Weight Chart)	(See Weight Chart)
Ramp Part Number	0146-143	0146-143
Clutch/Pulley "Center to Center Distance" (in.)	11.375 (11-3/8)	11.375 (11-3/8)
Clutch/Pulley "Offset" (in.)	0.380	0.380
Moveable Sheave "Travel Distance on Shaft" (in.)	1.125 (1-1/8)	1.125 (1-1/8)

Note: After approximately 50 miles, the spring will take a "set" and lose 0.25 (1/4) of an inch of its total length. However, no significant loss of spring compression will occur because of the decreased spring length.

1975 DRIVE CLUTCH SPECIFICATIONS

Description	Specifications	
	Low Altitude	High Altitude
Arctic Drive Clutch Models		
340	0225-041	0225-041
440	0225-043	0225-043
250Z	0225-065	0225-065
340Z	0225-066	0225-066
440Z	0225-064	0225-064
Clutch Engagement Speed - Approx.	3800	3800
Maximum Drive Clutch rpm:		
Std. Model	8500	8500
Z Model	9500	9500
Spring Part Number - All	0146-068	0146-068
*Spring Length - New w/No Load (in.)	4.35 ± 0.156	4.35 ± 0.156
Spring Wire Diameter (in.)	0.192	0.192
Spring Pressure at 1.25 in. Compression (lb)	192-212 lb	192-212 lb
Weight Part Number		
340	0146-123	0146-123
440	0146-105	0146-105
250Z	0146-135	0146-135
340Z	0146-107	0146-107
440Z	0146-278	0146-278
Weight Color	(See Weight Chart)	(See Weight Chart)
Weight Outside Diameter	(See Weight Chart)	(See Weight Chart)
Weight Thickness	(See Weight Chart)	(See Weight Chart)
Weight - Gram Weight	(See Weight Chart)	(See Weight Chart)
Ramp Part Number		
340	0146-143	0146-143
440	0146-143	0146-143
250Z	0146-273	0146-273
340Z	0146-271	0146-271
440Z	0146-273	0146-273
Clutch/Pulley "Center to Center Distance" (in.)	12.0	12.0
Clutch/Pulley "Offset" (in.)	0.454	0.454
Moveable Sheave "Travel Distance on Shaft" (in.)	1.125 (1-1/8)	1.125 (1-1/8)

Note: After approximately 50 miles, the spring will take a "set" and lose 0.25 (1/4) of an inch of its total length. However, no significant loss of spring compression will occur because of the decreased spring length.

1974 & 1975 DRIVEN PULLEY SPECIFICATIONS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Model	1975 Model	1974 Model	1975 Model
Arctic Driven Pulley Model	0226-008	0226-010	0226-008	0226-010
Driven Pulley Diameter (in.)	10.625 or 10-5/8	10.625 or 10-5/8	10.625 or 10-5/8	10.625 or 10-5/8
Cam Angle	30°	30°	30°	30°
Spring Part Number	0148-070	0148-070	0148-070	0148-070
Spring Color	Black	Black	Black	Black
Spring Length - New w/No Load (in.)	4.60	4.60	4.60	4.60
Spring Diameter (in.)	2.880	2.880	2.880	2.880
Spring Wire Diameter (in.)	0.156	0.156	0.156	0.156
Spring Preload - Counterclockwise	2nd. Hole 120°	2nd. Hole 120°	2nd. Hole 120°	2nd. Hole 120°
Clutch/Pulley "Center to Center Distance" (in.)	11.375 or 11-3/8	12.0	11.375 or 11-3/8	12.0
Clutch/Pulley "Offset" (in.)	0.380	0.454	0.380	0.454
Stationary/Moveable Sheave Distance - Closed (in.)	1.250	1.250	1.250	1.250
Stationary/Moveable Sheave Distance - Fully Open (in.)	2.810	2.810	2.810	2.810
Moveable Sheave "Travel Distance on Shaft" (in.)	1.56	1.56	1.56	1.56

1974 & 1975 DRIVE BELT SPECIFICATIONS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Model	1975 Model	1974 Model	1975 Model
Drive Belt Part Number	0227-014	0227-009	0227-014	0227-009
Outside Circumference (in.)	45-1/2 ± 3/16	46-11/16 ± 3/16	45-1/2 ± 3/16	46-11/16 ± 3/16
Diameter - Top Surface (in.)	1-1/4 ± 1/32	1-1/4 ± 1/32	1-1/4 ± 1/32	1-1/4 ± 1/32
Thickness - Top of Belt to Bottom of Lug (in.)	17/32 ± 1/32	17/32 ± 1/32	17/32 ± 1/32	17/32 ± 1/32
Belt Taper Angle	28°	28°	28°	28°

1974-1975 SPROCKET & CHAIN SPECS.

Description		Specifications			
		Low Altitude		High Altitude	
		1974 Model	1975 Model	1974 Model	1975 Model
Sprocket Ratio					
	295	19/39	—	15/35	—
	340	20/39	20/39	18/39	19/39
	400	22/39	—	20/39	—
	440	22/39	20/35	20/39	20/39
	250Z	—	15/39	—	—
	340Z	—	19/39	—	—
	440Z	—	19/39	—	—
Chain Pitch					
	295	70	—	66	—
	340	70	70	70	70
	400	72	—	70	—
	440	72	68	70	70
	250Z	—	68	—	—
	340Z	—	70	—	—
	440Z	—	68	—	—
Chain Type	All	Silent Chain			

1974 & 1975 TRACK SPECIFICATIONS

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Track	1975 Track	1974 Track	1975 Track
Track Part Number				
295	0110-527	—	0110-527	—
340	0110-787	0110-924	0110-787	0110-924
400	0110-787	—	0110-787	—
440	0110-787	0110-924	0110-787	0110-924
250Z	—	0110-917	—	0110-917
340Z	—	0110-917	—	0110-917
440Z	—	0110-917	—	0110-917
Track Style				
1974 Model 295	Molded Track w/Full Width Cleat			
1974 Model 340, 400, 440	Molded Logo Track w/2/3 Cleat			
1975 Model 340, 440	Riveted Logo Track w/2/3 Cleat			
1975 Model 250Z, 340Z, 440Z	Riveted Track w/Full Width Cleat			
Cleat Fastening Method				
1974 Model 295	Bonded On			
1974 Model 340, 400, 440	Bonded On			
1975 Model 340, 440	Solid Rivets			
1975 Model 250Z, 340Z, 440Z	Solid Rivets			
Track Width All (in.)	15	15	15	15
Track Length on Ground (in.)	—	—	—	—
1974 All	33	—	33	—
1975 Model 340, 440	—	35.5	—	35.5
1975 Model 250Z, 340Z, 440Z	—	33.5	—	33.5

1974 & 1975 TRACK SPECIFICATION (CONT.)

Description	Specifications			
	Low Altitude		High Altitude	
	1974 Track	1975 Track	1974 Track	1975 Track
Type of Drive				
1974 Model 295	External Cleat Drive			
1974 Model 340, 400, 440	Internal Drive Lug			
1975 All	Internal Drive Lug			
Cleat Part Number				
295	0102-034	–	0102-034	–
340	0102-093	0102-093	0102-093	0102-093
400	0102-093	–	0102-093	–
440	0102-093	0102-093	–	0102-093
250Z	–	0102-168	–	0102-168
340Z	–	0102-168	–	0102-168
440Z	–	0102-168	–	0102-168
Track Inside Circumference (in.)				
295	117.9	–	117.9	–
340	115.9	115.9	115.9	115.9
400	115.9	–	115.9	–
440	115.9	115.9	115.9	115.9
250Z	–	111.9	–	111.9
340Z	–	111.9	–	111.9
440Z	–	111.9	–	111.9

SPRING CHART

	Part No.	Spr. Rate Lbs./Inch	Spr. Comp. @ 1.25 Inches	*Spring Length No. Load	No. Coils	Color Code
Light	0146-065	22.5 - 27.5	67.5 - 87.5 lb	*4.35 in. ±0.25	5.1	White
↕	0146-066	39 - 45	120 - 140 lb	*4.35 in. ±0.234	5.15	Red
	0146-067	45 - 53	145 - 165 lb	*4.35 in. ±0.187	5.35	Yellow
Heavy	0146-068	60 - 66	192 - 212 lb	*4.35 in. ±0.156	5.0	Green

WEIGHT CHART

	Part No.	Gram Weight	Outside Diameter	Inside Diameter	Thickness	Color Code
Light	0146-227	1.0 Alum.	0.400	0.205	0.250	N/A
↑	0146-225	1.5 Alum.	0.463	0.205	0.250	N/A
	0146-226	2.0 Alum.	6.521	0.205	0.250	N/A
	0146-159	2.500	0.377	0.205	0.250	White
	0146-108	3.058	0.406	0.205	0.250	Yellow
	0146-175	3.725	0.437	0.205	0.250	Red
	0146-135	4.479	0.471	0.205	0.250	Black
	0146-176	4.675	0.500	0.205	0.228	Green
Z	0146-107	4.958	0.491	0.205	0.250	White
	0146-279	5.457	0.511	0.205	0.250	Black
	0146-106	5.958	0.530	0.205	0.250	Red
	0146-278	6.475	0.549	0.205	0.250	Black
	0146-123	6.992	0.568	0.205	0.250	Yellow
	0146-105	7.858	0.598	0.205	0.250	Black
	0146-136	9.279	0.644	0.205	0.250	Green
	0146-104	9.750	0.665	0.205	0.250	White
Heavy	0146-166	—	0.684	0.205	0.250	Red

THEORY OF OPERATION

General

The Drive System consists of the drive clutch, drive belt, driven pulley, sprockets, chain, track drive, and track. Operating as a complete system, the components deliver optimum power to the track under varying snow conditions and load factors (resistance on the track).

The Arctic Cat Snowmobile uses a torque sensing, sheave-type, variable ratio (3.79:1) drive clutch and driven pulley. This method of transmitting power from the drive clutch, by means of a belt, to the driven pulley is used to multiply engine torque needed by the track to pull the snowmobile through varying snow depths, up and down steep hills and mountains, and across open hard-packed areas. The Arctic drive clutch and driven pulley automatically determine the proper ratio that will allow the snowmobile to move without hesitation from drive clutch engagement speed to high speed operation, no matter what the snow conditions are (resistance).

Resistance (load on the track) has an effect on the ratio that the drive clutch and driven pulley automatically "seeks out". As resistance increases and more torque is needed, the belt will "down shift" to a larger radius on the driven pulley. If track resistance decreases, the belt will "up shift" to a 1:1 ratio between the drive clutch and driven pulley. Engine rpm change slightly during the "down shift" and "up shift" pattern.

Snowmobile speed is controlled by the "ratio" the belt "seeks" between the drive clutch and driven pulley. If the ratio of the drive clutch and driven pulley is 3.79:1 and engine rpm are 6,000, the snowmobile should move at the slowest designed speed possible. However, when the ratio changes to 1:1 and engine rpm are 6,000, the snowmobile should move at the fastest designed speed possible. The reason for this is: at a 3.79:1 ratio, the drive clutch must turn 3.79 revolutions before the driven pulley can turn 1 revolution. In contrast, when there is a 1:1 ratio, the drive clutch turns one revolution as does the driven pulley.

Note: Minimum and maximum mph are affected by the sprocket ratio being used (See: 1974 and 1975 Sprocket/Chain Specifications, Sprocket Ratio, page V-5).

In the paragraphs that follow, elements of the drive clutch and driven pulley will be explained. Knowing what effect the various elements have on the drive clutch and driven pulley will help you to understand the operating characteristics of the "Arctic Drive System".

Spring (Drive Clutch)

The drive clutch spring is made of straight, high-quality spring steel wire that has excellent spring rate retention qualities. The wire is wound to a definite number of coils and to a predetermined length that will provide the desired spring rate. Once the spring rate is established, the spring is color coded for identification (See: 1974 or 1975 Drive Clutch Specifications, Spring Color Code, page V-2 or V-3).

Note: In comparing spring rates, four factors will affect the rate characteristic:

1. **Wire Diameter**
2. **Spring Diameter**
3. **Number of Coils**
4. **Spring Length**

Spring Comparison — When comparing two different springs, a strong spring will have larger diameter wire and fewer coils in relation to a spring of the same length. In contrast, a weak spring will have smaller diameter wire, more coils, have a larger diameter and be longer than the spring being compared to.

The primary function of the spring is to control initial moveable sheave engagement with the side of the drive belt and stationary sheave. When the engine is idling, the moveable sheave does not push against the side of the belt because the spring keeps the moveable and stationary sheave apart. Since the distance between the sheaves is more than the width of the drive belt, power is not transmitted from the drive clutch to the driven pulley. However, as engine rpm increase to the specified clutch engagement speed (See: 1974 or 1975 Drive Clutch Specifications, Clutch Engagement Speed, page V-2 or V-3), rollers and centrifugal weights move outward on three ramps with enough force to overcome the pressure of the spring. Now, because the moveable sheave pushes against the side of the drive belt and squeezes it between the sheaves, drive clutch engagement takes place. Therefore, drive clutch engagement speed is increased or decreased by using springs having different spring

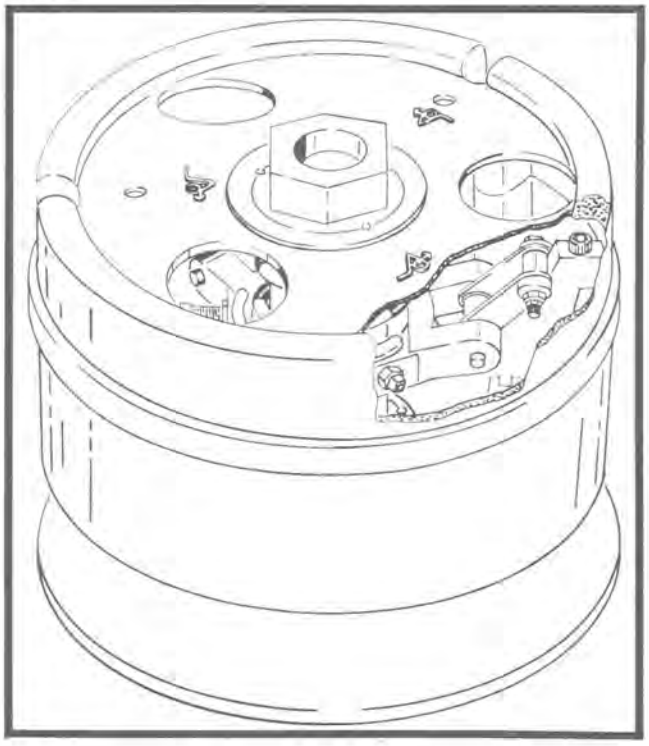
rates. A spring having a spring rate of 50 lb/in. will cause the drive clutch to engage at a higher rpm than a spring rated at 40 lb/in.

Note: The desired drive clutch engagement speed is when the engine puts out enough horsepower rpm to move the snowmobile from a stop without hesitation or a "flat spot".

Weights, Rollers and Ramps

The weights and rollers are bolted to arms that are pinned to the spider, Fig. V-1. The spider has three arms: each arm has two weights and a roller with bushing that is retained to the arm by a small bolt and lock nut, Fig. V-1. The complete spider assembly (arms, weights, and rollers) is fastened to the stationary sheave shaft by the three set screws and a split ring.

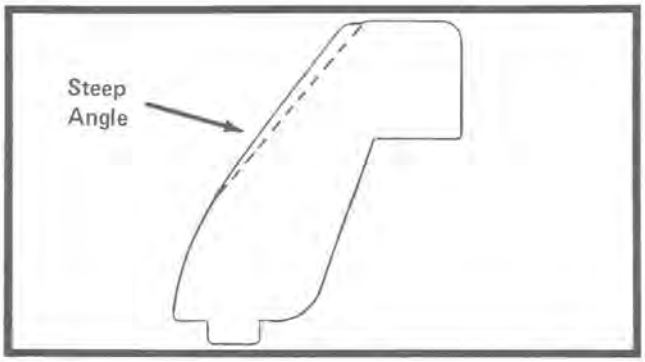
Fig. V-1



The function of the weights is to provide an outward force against the spring while the rollers roll on the three ramps. The three ramps are designed so clutch engagement is smooth, and the total shift pattern is responsive to various loads. When the engine is idling (less than clutch engagement rpm), the force against the ramp by the rollers and weights is not enough to overcome the outward pressure of the spring. However, as engine rpm increase and predetermined clutch engagement speed takes place, the weights are thrown outward by centrifugal force caused by increased engine rpm. Since the outward movement of the weights overcomes the pressure of the spring, the moveable sheave pushes the drive belt against the stationary sheave. Power is then transmitted from the drive clutch through the remainder of the drive system.

As engine speed increases to peak horsepower rpm, centrifugal force throws the weights with rollers progressively outward along the angle of the three ramps, Fig. V-1. A ramp that has a steep angle, Fig. V-2, will take more engine rpm and longer to shift from engagement speed through the complete shift pattern. By contrast, if the ramp angle is decreased, Fig. V-2, it will take less time and engine rpm to shift from engagement speed through the complete shift pattern. And if the track has only a light load when maximum engine rpm are achieved, the drive belt is pushed to the maximum radius between the drive clutch sheaves. When the belt is at maximum radius, there is a 1:1 ratio between the drive clutch and driven pulley and, provided all other parts of the drive system are working correctly, the snowmobile will move at the fastest designed speed possible.

Fig. V-2



Note: A light weight increases drive clutch engagement rpm, and therefore, the drive clutch takes longer to completely "shift up". By contrast, a heavy weight decreases drive clutch engagement rpm and takes less time to completely "shift up".

CUSTOMIZING DRIVE CLUTCH

As produced, the Arctic Cat Snowmobile is "clutched" for average customer usage. However, three parts (variables) can be changed to produce different clutching characteristics. The three drive clutch variables are:

1. Spring
2. Weights
3. Ramps

By understanding these clutching variables the Arctic Drive Clutch can be customized to suit almost any condition or owner request.

One variable affecting the drive clutch operation is the spring. The spring's primary function is to control initial moveable sheave engagement with the side of the drive belt and stationary sheave (engagement). In addition, the spring also affects engine rpm maintained throughout the drive clutch shift pattern. A light (weak) spring decreases drive clutch engagement speed and maximum engine rpm — the result is a slow shift pattern. By contrast, a heavy (strong) spring increases drive clutch engagement speed and maximum engine rpm — the result is a quick shift pattern.

Another drive clutch variable affecting engine rpm is the weight. A light weight slightly increases drive clutch engagement speed and produces higher engine rpm throughout the shift pattern. By contrast, a heavy weight slightly decreases drive clutch engagement speed and produces lower engine rpm throughout the shift pattern.

The only other variable affecting "up shift" and "down shift" is the ramp. The ramp is designed so the shift pattern is within the peak torque curve (rpm) of the engine. A ramp that is **cut back at the top**, Fig. V-3, will cause the engine to run at lower rpm. However, a ramp that is **not cut back** as far as the standard ramp, Fig. V-4, will cause the engine to run at higher rpm. A ramp that is **cut back at the bottom**, Fig. V-5, will increase drive clutch engagement speed. By contrast, a ramp that is **not cut back** as far as the standard ramp, Fig. V-6, will decrease drive clutch engagement speed.

Fig. V-3

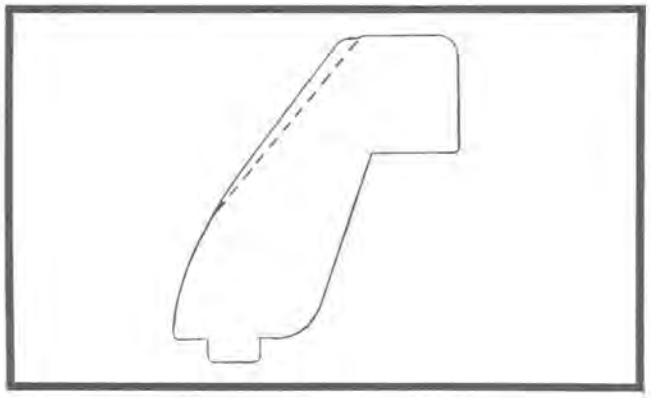


Fig. V-4

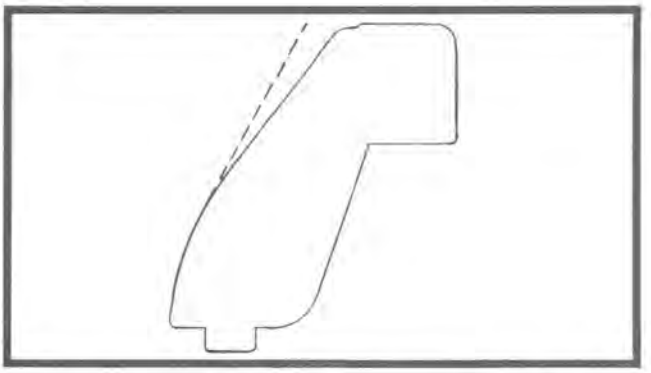


Fig. V-5

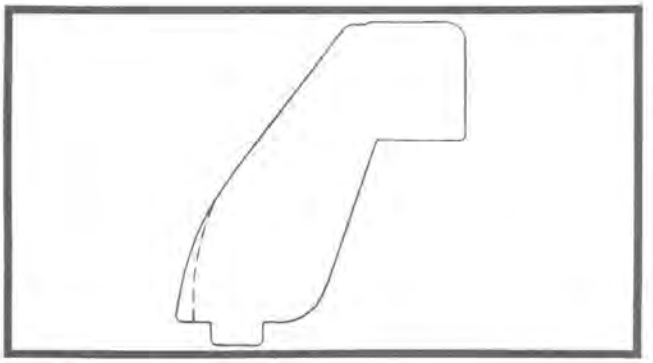
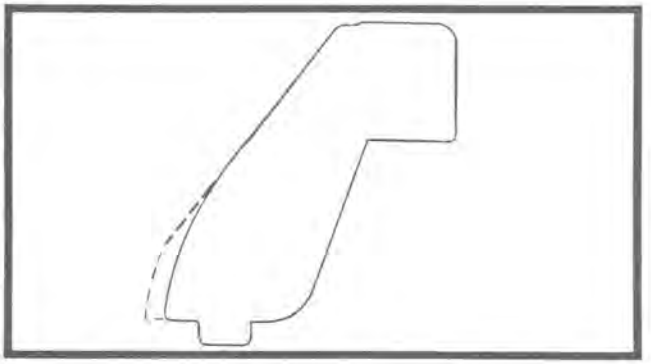


Fig. V-6



In conclusion, the spring, weights and ramps have a combined effect on drive clutch operation. The weight chart and spring chart is to be used as a guide to satisfy clutching requests that a customer may make (See: Weight Chart, page V-6, and Spring Chart, page V-5).

DRIVE CLUTCH TROUBLE SHOOTING

Problem	Condition	Remedy
Drive clutch engages before specified rpm.	1. Wrong spring. 2. Weak spring. 3. Wrong weights.	1. Check specifications for correct spring. 2. Check spring pressure. 3. Check specifications for correct weights.
Drive clutch engages after specified rpm.	1. Wrong spring. 2. Wrong weights. 3. Dirty clutch. 4. Worn (flat spots) rollers and ramps. 5. Bushing in cover housing and moveable sheave worn excessively on inside diameter.	1. Check specifications for correct spring. 2. Check specifications for correct weights. 3. Clean clutch. 4. Replace rollers and ramps. 5. Replace appropriate parts – see Parts Manual.
Maximum drive clutch rpm too high.	1. Weights too light. 2. Wrong ramps (ramp angle too steep at top).	1. Check specifications for correct weights. 2. Check specifications for correct ramps.
Maximum drive clutch rpm too low.	1. Weights too heavy. 2. Wrong ramps (ramp angle too flat at top).	1. Check specifications for correct weights. 2. Check specifications for correct ramps.
Shift up through midrange takes place too quickly.	1. Weights too heavy. 2. Wrong ramps (ramp angle too steep). 3. Drive clutch spring too weak. 4. Drive pulley spring preload too loose. 5. Driven pulley spring too weak.	1. Check specifications for correct weights. 2. Check specifications for correct ramps. 3. Check spring pressure. 4. Increase driven pulley spring preload. 5. Replace driven pulley spring.
Shift up through midrange takes place too slowly.	1. Weights too light. 2. Wrong ramps (ramp angle too flat). 3. Drive clutch spring too strong. 4. Driven pulley spring preload too tight. 5. Driven pulley spring too strong.	1. Check specifications for correct weights. 2. Check specifications for correct ramps. 3. Check spring pressure. 4. Decrease driven pulley spring preload. 5. Replace driven pulley spring.

DRIVE CLUTCH TROUBLE SHOOTING

Problem	Condition	Remedy
Belt deposits on drive clutch face or hex shaft.	1. Wrong "offset".	1. Remove belt deposits and establish correct "offset" — see specifications.
	2. Belt worn because of hourly usage.	2. Install new belt and check "center to center distance" and "offset" — see specifications.
Drive clutch does not disengage at idle — engine starts hard and has tendency to stall because of belt drag.	1. Moveable sheave Duralon bearing set screws backed out.	1. Stake moveable sheave Duralon bearing set screws.
	2. Drive belt outside circumference below specifications.	2. Check drive belt specifications (outside circumference).
	3. Thickness of belt on inside diameter exceeds specifications.	3. Check drive belt specifications (belt thickness on inside diameter).

BELT TROUBLE SHOOTING

Problem	Condition	Remedy
1. Normal belt side wear.	1. Normal and minimal side pressure applied to belt.	1. Install new belt – wear is normal.
2. Belt will not shift to top of drive clutch (1:1 ratio).	2. Belt worn across top surface (less than 1-1/16") after many hours of use.	2. Install new belt – wear is normal.
3. Cracks between belt lugs when flexed.	3. Occurs after many hours of use.	3. Install new belt – wear is normal.
Belt is glazed or baked on its side – not normal and is caused by heat buildup.	1. Wrong belt – excessive slippage.	1. Install correct drive belt – see Parts Manual.
	2. Driver applied too much throttle under heavy load – excessive slippage.	2. Tell driver to decrease throttle under heavy load condition; install new belt.
	3. Weak drive clutch spring.	3. Perform spring pressure test; install new spring if spring is weak.
	4. Drive clutch engagement rpm too low.	4. Adjust engagement rpm – see specifications.
	5. Improper drive clutch operation (sticking, etc.).	5. Remove and service drive clutch; install new belt if one is needed.
	6. Drive clutch and driven pulley "offset/parallelism" is incorrect.	6. Check and adjust "offset/parallelism"; install new belt if one is needed.
	7. Grease on drive clutch or driven pulley sheave surface.	7. Clean sheaves; install new belt if one is needed.
Lugs torn off inside of belt.	Drive clutch engages suddenly (engagement speed too high).	Remove and service drive clutch; install new belt, if one is needed.
Belt worn in one spot.	1. Track frozen to skid frame or front drive.	1. Free the track and install new belt.
	2. Track tension too tight.	2. Adjust track tension and install new belt.
	3. Idle speed too high.	3. Reduce idle rpm and install new belt.
	4. Improper operation of drive clutch.	4. Repair or replace drive clutch and install new belt.
Cracks at base of belt lug.	Continuous over revving when snowmobile is operated.	Decrease rpm and install new belt.

BELT TROUBLE SHOOTING

Problem	Condition	Remedy
1. Belt disintegrates.	1. Drive clutch and driven pulley "offset/parallelism" is incorrect.	1. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
2. Frayed or broken cord on side of belt.	2. Drive clutch and driven pulley "offset/parallelism" is incorrect.	2. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
3. Belt turns over at high speeds.	3. Drive clutch and driven pulley "offset/parallelism" is incorrect.	3. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.
4. Belt side wear usually occurs after belt is glazed or baked because of slippage.	4. Drive clutch and driven pulley "offset/parallelism" is incorrect.	4. Check and adjust "offset/parallelism"; install new belt after correct adjustment is made.

DRIVEN PULLEY TROUBLE SHOOTING

Problem	Condition	Remedy
Engine rpm low and belt shifted completely through driven pulley.	1. Weak spring. 2. Broken spring.	1. Move end of spring clockwise on driven pulley to increase spring tension. 2. Install new spring.
Engine rpm high and belt takes too long to shift through driven pulley.	1. Wrong spring — too heavy. 2. Sliding shoes worn excessively. 3. Dirty driven pulley hub. 4. Worn driven pulley sheave.	1. Install correct spring. 2. Install new sliding shoes. 3. Clean driven pulley. 4. Install new sheave.

CHAIN/SPROCKET TROUBLE SHOOTING

Problem	Condition	Remedy
Chain rattle in chain case.	1. Chain tension too loose. 2. Chain stretched beyond adjustable limit.	1. Adjust chain tension. 2. Install new chain and sprockets.
Chain slips on sprockets.	1. Chain tension too loose. 2. Chain stretched beyond adjustable limit. 3. Sprocket teeth worn.	1. Adjust chain tension. 2. Install new chain and sprockets. 3. Install new sprockets and chain.
Chain slips off sprockets.	1. Chain tension too loose. 2. Sprocket teeth worn. 3. Sprockets misaligned.	1. Adjust chain tension. 2. Install new sprockets and chain. 3. Align top sprocket with bottom sprocket.

TRACK TROUBLE SHOOTING

Problem	Condition	Remedy
Edge of track is frayed.	1. Track is misaligned. 2. Outer belts worn out because of hourly usage. 3. Track hits rivets in tunnel, even though track alignment is correct.	1. Set track tension and alignment. 2. Install new outer belt(s). 3. Remove rivets that are too long and install correct rivet.
Track is grooved (worn) or burnt on inside surface of outer belt(s).	1. Track tension is too tight. 2. Rear idler wheels do not turn or are otherwise damaged.	1. Set track tension and alignment. 2. Install new rear idler wheels, and set track tension and alignment.
Track is grooved or gouged on center belt.	Center brace(s) of skid frame hanging down and contacting inside surface of center belt.	Repair skid frame center brace and install new center belt if it is damaged.
Internal drive lugs worn on inside surface.	Track is misaligned.	Set track tension and alignment. If lugs are worn excessively, install new outer belt(s).
Track ratchets or hits on body tunnel (top).	1. Track tension is too loose. 2. Track drive sprockets not timed in relation to drive lugs. 3. Track drive sprockets turn on shaft. 4. Internal drive lugs worn because of hourly usage.	1. Set track tension and alignment. 2. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 3. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 4. Install new outer belt(s).
Accelerated hi-fax wear.	1. Slide rail(s) is bent. 2. Worn cleat on surface that contacts hi-fax. 3. Track is misaligned.	1. Straighten slide rail(s) or install new skid frame. 2. Install new hi-fax or cleats. 3. Set track tension and alignment.

DRIVE CLUTCH BEARING TOLERANCE

Inspect and Measure Bearing for Wear

The maximum allowable bearing wear or clearance between the hex shaft and bearing is critical for correct drive clutch operation. The flats on the drive clutch are directly associated with the large bearing area. This bearing area, added to the high bearing load capacity and low coefficient of friction, result in improved life expectancy of the clutch.

For assembly purposes, radial clearance between the hex shaft and bearing is necessary, and a slightly greater clearance does not adversely affect clutch operation. However, the maximum allowable bearing wear tolerance is limited by the clearance between the ramp and inside surface of the roller arm.

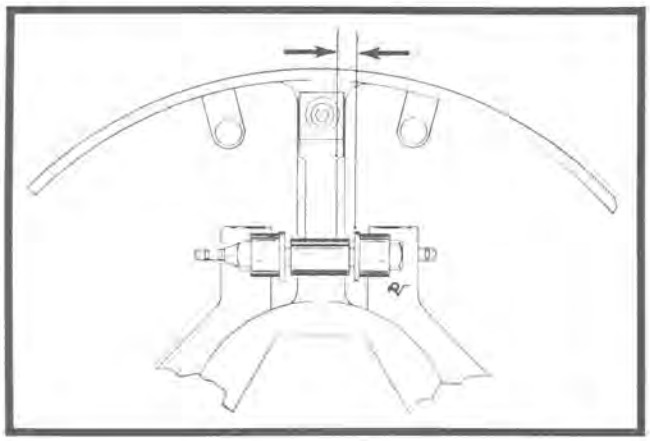
If the bearing is considered to be worn, roller arm and ramp clearance can be visually inspected by looking into the clutch, or the clutch can be removed from the crankshaft and measured. The visual inspection method and measurement method are explained below.

Visual Inspection Method

Equipment Necessary: Flashlight

1. Look into the clutch and rotate it clockwise and counterclockwise; a flashlight may be necessary to see the inside of the clutch. Look at the inside surface of the roller arm; there must not be any contact between the roller arm and ramp, Fig. V-7.

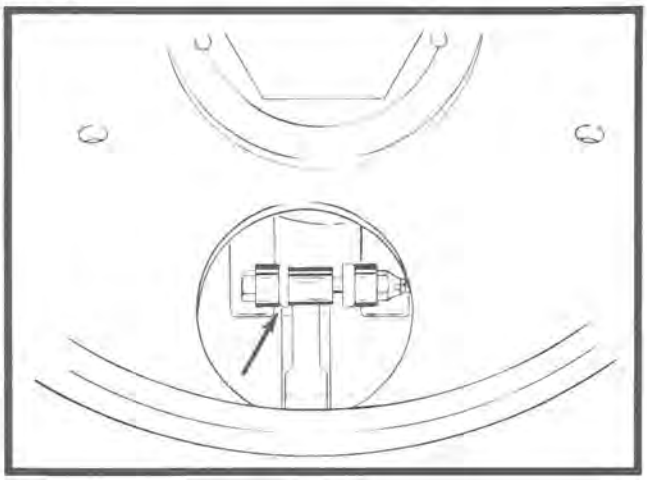
Fig. V-7



2. If there is no contact between the roller arm and ramp, Fig. V-7, the maximum allowable drive clutch bearing wear is within tolerance. Drive clutch is acceptable.

3. If there is contact between the roller arm and ramp, Fig. V-8, the maximum allowable drive clutch bearing wear is not within tolerance. Drive clutch moveable sheave and cover housing must be replaced.

Fig. V-8



Measurement Method

Equipment Necessary: 1/4-Inch Hex Key Wrench, Tri-Square, Scribe, and Calipers or Scale

1. Remove the drive clutch from the crankshaft (See: Remove Drive Clutch, page V-18).

2. Remove cover housing and spring (See: Disassemble Drive Clutch, steps 1-3, page V-18).

3. Install cover housing with three socket head cap screws, using a 1/4-inch wrench.

4. Keeping the stationary sheave fixed, rotate the moveable sheave counterclockwise until all clearance is taken up, Fig. V-9. Scribe a line on the moveable sheave, using a tri-square and scribe, Fig. V-9.

DRIVE CLUTCH BEARING TOLERANCE

Fig. V-9

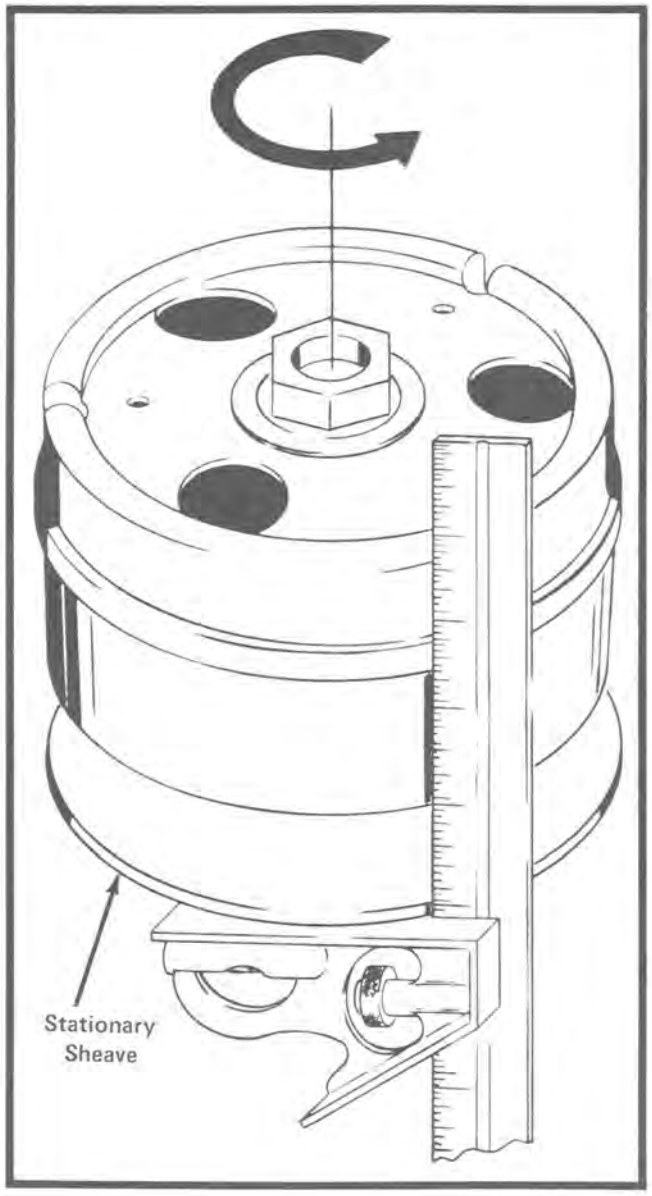
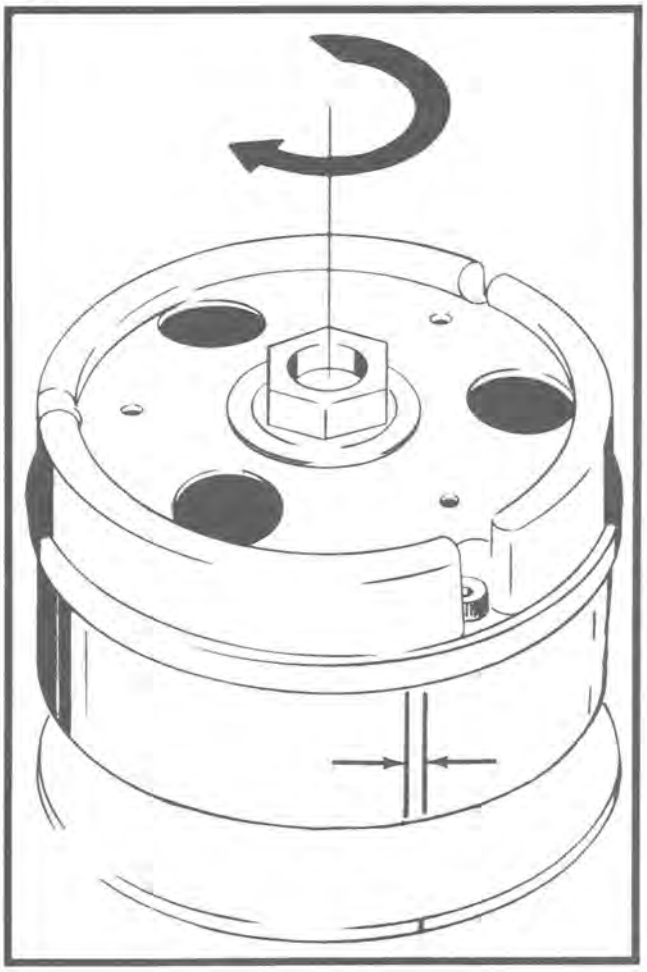


Fig. V-10



5. Keeping the stationary sheave fixed, rotate the moveable sheave clockwise until all clearance is taken up, Fig. V-10. Scribe another line on the moveable sheave, using a tri-square and scribe, Fig. V-10.

6. Measure distance between the two scribe marks, Fig. V-10, using a caliper or scale.

7. If distance between the two scribed lines is less than 5/32 inch (0.156"), the maximum allowable drive clutch bearing wear is within tolerance. Drive clutch is acceptable.

8. If distance between the two scribed lines is more than 5/32 inch (0.156"), the maximum allowable drive clutch bearing wear is not within tolerance. Drive clutch moveable sheave and cover housing must be replaced.

DRIVE CLUTCH REMOVAL

Remove Drive Clutch

Equipment Necessary: 3/4-Inch Socket, Air Impact Tool, and Clutch Puller

1. After opening the hood, remove drive belt.

2. Remove the cap screw and lock washer holding the drive clutch on the crankshaft, using an air impact tool and 3/4-inch socket.

3. Slide the clutch puller bolt (See: Section VIII Tools, page VIII-15) into the center hub of the drive clutch; thread puller bolt into crankshaft. Back puller bolt out 1/2 turn after it "bottoms out" in the crankshaft.

4. Pull the drive clutch off the crankshaft, using an air impact tool and 3/4-inch socket.

DRIVE CLUTCH DISASSEMBLY

Disassemble Drive Clutch

Equipment Necessary: 1/4-Inch Hex Key Wrench, 1/4-Inch Wrench, 3/16-Inch Wrench, 3/8-Inch Wrench, and 9/64-Inch Hex Key Wrench

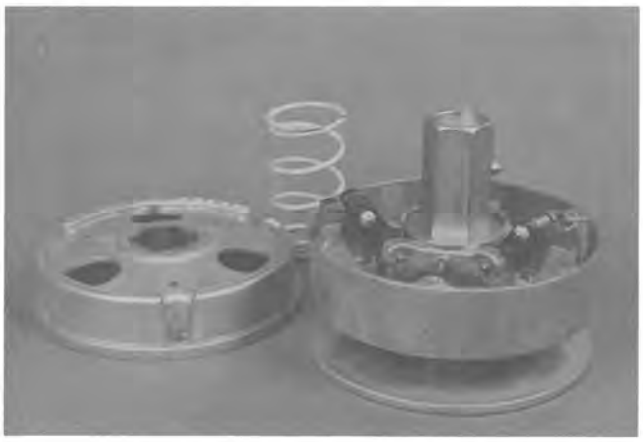
1. Place a large flat washer on puller bolt, then thread puller bolt into the center of the hex shaft, starting on the cover housing side. Continue to thread puller bolt in until washer and head of bolt contact cover housing.

2. Remove the three socket head cap screws, Fig. V-11, holding the cover housing against the moveable sheave, using a 1/4-inch hex key wrench. After socket head cap screws are removed, remove the puller bolt from the center of the hex shaft.

Fig. V-11

3. Remove cover housing and slide spring off stationary sheave center hub, Fig. V-12.

Fig. V-12



4. Loosen the three jam nuts, using a 1/4-inch wrench, Fig. V-13. Also, loosen the three set screws, Fig. V-13, until the spider is loose on the hex shaft, using a 3/16-inch wrench.

Fig. V-13

DRIVE CLUTCH DISASSEMBLY

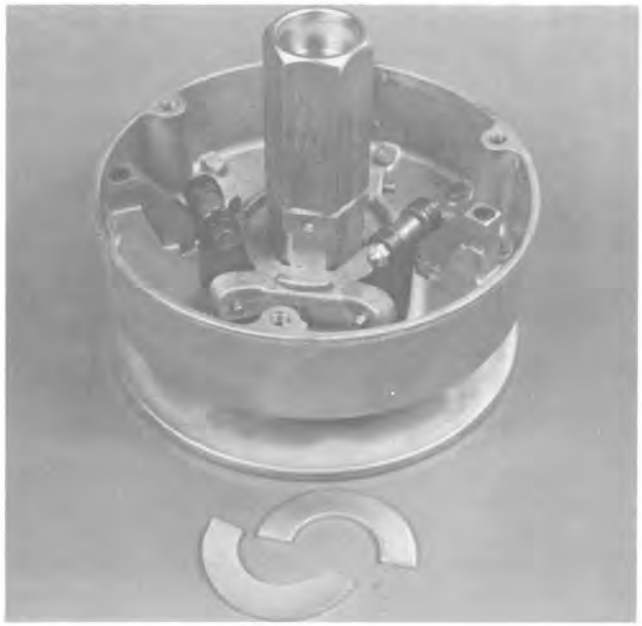
5. Push the spider assembly down against the moveable sheave, Fig. V-14.

Note: The spider assembly may stick on the hex shaft even after the set screws are loosened and downward pressure is exerted. If this happens, the spider assembly is to be forced down on the hex shaft.

Fig. V-14

6. Slide the split ring halves out of the groove in the hex shaft, Fig. V-15.

Fig. V-15



7. Mark the spider assembly in relation to the hex shaft so that it can be reinstalled in the same position; then slide spider assembly off hex shaft, Fig. V-16.

Fig. V-16

8. Slide moveable sheave off hex shaft, Fig. V-17.

Fig. V-17

9. If the spider, rollers or weights are to be serviced, use the following instructions.

   A. Remove lock nut and cap screw holding weights, rollers, and bushing to the roller arm, using a 3/8-inch wrench, Fig. V-18.

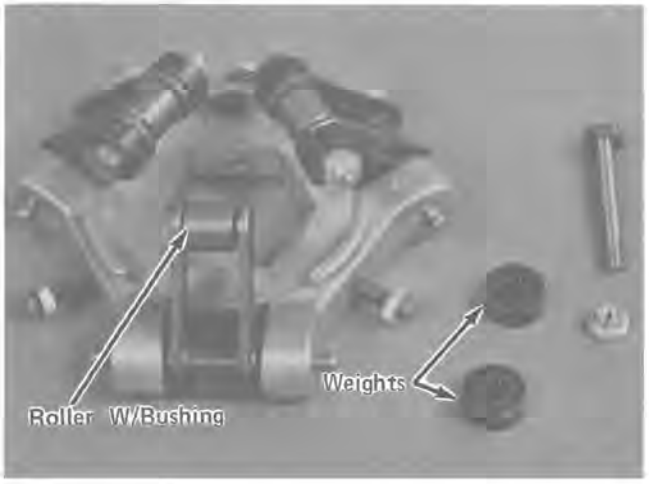
   B. Slide roller with bushing from between roller arm, Fig. V-18.

Note: There are two small "ears" protruding on the inside of the roller arm. Make sure ears "seat" in slots of roller bushing.

   C. Perform steps A and B on remaining roller arms.

DRIVE CLUTCH DISASSEMBLY

Fig. V-18



Note: A complete roller kit with bushing is to be installed, even if only 1 roller with bushing is worn or damaged. New rollers with bushings will have a definite "wear-in" pattern. If rollers with bushings are to be replaced, new ramps are to be installed (See: Step 10).

10. Remove the cap screws retaining the ramps to the moveable sheave, using a 9/64-inch hex key wrench. Slide ramp out of "ramp setting" in moveable sheave.

Note: A complete ramp kit is to be installed, even if only 1 ramp is worn or damaged. If ramps are to be replaced, new rollers with bushings are to be installed.

CLEANING INDIVIDUAL COMPONENTS

Cleaning

Equipment Necessary: Cleaning Solvent and Compressed Air

1. Wash grease, dirt, and foreign matter off all parts, using cleaning solvent. Dry the parts with compressed air.

2. If drive belt accumulations are on the stationary sheave, moveable sheave, or the moveable sheave Duralon bushing, the accumulations are to be removed, using cleaning solvent ONLY. Dry the parts with compressed air.

CAUTION

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

INSPECTING INDIVIDUAL COMPONENTS

Inspecting

Equipment Necessary: Cleaning Solvent and Compressed Air

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

1. Inspect the stationary sheave, moveable sheave, and cover housing for cracks and imperfections in the casting.

2. Inspect the spider for cracks and imperfections in the casting. Arms, weights, and rollers with bushings are to be without damage or wear.

3. Inspect the ramp "settings" on the inside of the moveable sheave for wear and cracks.

4. Inspect the spring for proper compression qualities (See: Spring Compression Test, page V-21). If spring compression is not as specified or damage is evident, replacement is necessary.

5. Inspect the ramps for wear pattern that may develop after usage.

6. Inspect all threaded components for stripped or otherwise damaged threads.

7. Inspect the hex shaft; no burrs or rough edges are to be evident. Use a fine file to remove

INSPECTING INDIVIDUAL PARTS

burrs and rough edges. If filing was necessary, the stationary sheave and hex shaft is to be washed in cleaning solvent to remove metal filings. Dry the shaft with compressed air.

8. Inspect the set screws retaining the Duralon bearing in the moveable sheave. Set screws are to be 1/16 inch below the casting on the inside surface of the moveable sheave. Set screws are to be staked on inside of moveable sheave. If set screws are not staked, do so (See: Stake Moveable Sheave Duralon Bearing Set Screws, page V-21).

SPRING COMPRESSION SPECIFICATION

Spring Compression Test

Equipment Necessary: Spring Pressure Tester

The spring is to be a specific length and have definite pressure characteristics to ensure proper drive clutch engagement (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). Spring pressure reading must be as specified when checked with a spring pressure tester (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). If the spring pressure is within tolerance and an engagement problem is still experienced, another part in the drive clutch is affecting engagement rpm.

1. Place spring between compression pad and scale contact surface, Fig. V-19.

2. Push compression arm down 1-1/4 inches; then read the number of pounds registered on the indicator, Fig. V-19. Indicator reading is to be as specified (See: 1974 or 1975 Drive Clutch Specifications, page V-2 or V-3). If indicator reading is less than specified spring pressure, install a new spring.

Fig. V-19

MOVEABLE SHEAVE SET SCREW STAKING

Stake Moveable Sheave Duralon Bearing Set Screws

Equipment Necessary: 3/32-Inch Hex Key Wrench, 1/8-Inch Diameter, Pin Punch, and Hammer

The three set screws holding the Duralon bearing in the moveable sheave have a tendency to back out. When this happens the drive clutch will not disengage at idle speed and will have a tendency to creep. Hard starting may be evident and the snowmobile may "lurch" forward when the recoil rope is pulled. To correct the problem, the set screws are to be staked.

1. Examine the set screws holding the Duralon bearing in the moveable sheave. The head of the set screws is to be 1/16 inch below the surface of the casting as viewed from the inside of the moveable sheave.

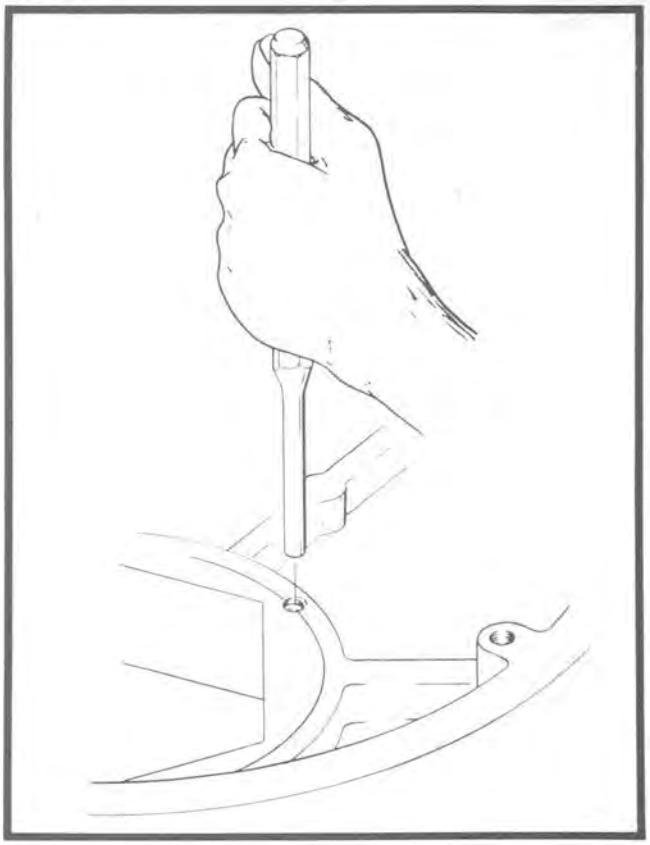
MOVEABLE SHEAVE SET SCREW STAKING

2. If set screws are not 1/16-inch below casting surface, tighten set screws until proper measurement is evident, using a 3/32-inch hex key wrench.

3. After set screws are tightened, the casting is to be staked on the outside edge of each set screw, using a 1/8-inch pin punch, and a hammer, Fig. V-20.

Note: When staking is performed, strike the punch with the hammer, using sufficient force to deform the threads, but not so hard as to break off a part of the casting. This procedure will keep the set screws in place and prevent them from backing out.

Fig. V-20



DRIVE CLUTCH ASSEMBLY

Assemble Drive Clutch

Equipment Necessary: 9/64-Inch Hex Key Wrench, Torque Wrench, 3/8-Inch Socket, 3/8-Inch Wrench, 3/16-Inch Socket, and 1/4-Inch Hex Key Wrench

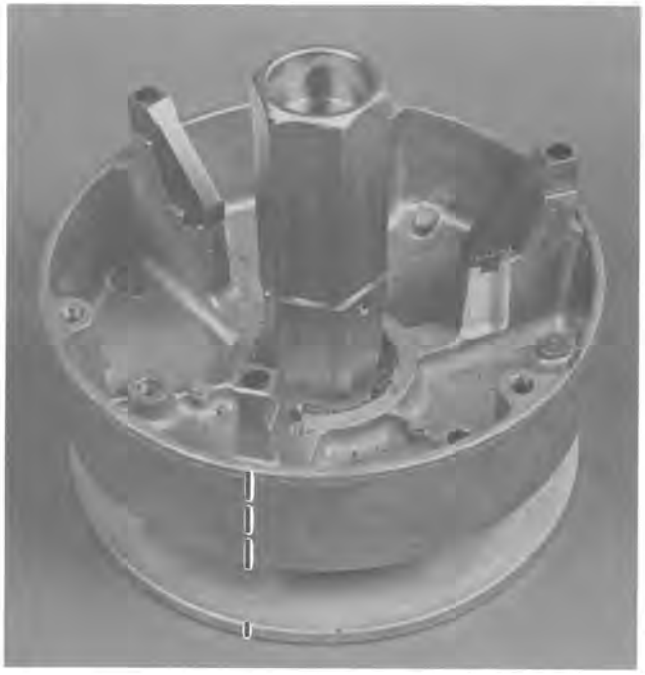
1. Make sure all drive clutch parts have been cleaned, repaired or replaced.

2. Install ramp in moveable sheave and secure in place with socket-head cap screw, using a 9/64-inch hex key wrench. Tighten socket-head cap screw to 2-2.5 ft-lb, using a torque wrench. Install remaining ramps.

Note: A complete ramp kit must be installed, not an individual ramp. If new ramps are being installed, a new roller kit with bushings must be installed.

3. Slide the moveable sheave onto the stationary sheave hex shaft, Fig. V-21. The alignment marks on both sheaves MUST line up to keep the clutch balanced.

Fig. V-21



DRIVE CLUTCH ASSEMBLY

4. If the spider, rollers, or weights were serviced, use the following procedure:

Note: A complete roller kit must be installed, not an individual roller. If new rollers are being installed, a new ramp kit should have been installed already (See: Step 2).

A. Slide bushing into roller and install both parts between the roller arm, Fig. V-22. Make sure the bushing "cut outs" slide over the two small "ears" on the inside surface of the roller arm.

B. Slide a weight onto the cap screw; then push cap screw through roller arm, roller, and bushing.

Note: Head of cap screw must be positioned on side of roller arm having the two small "ears".

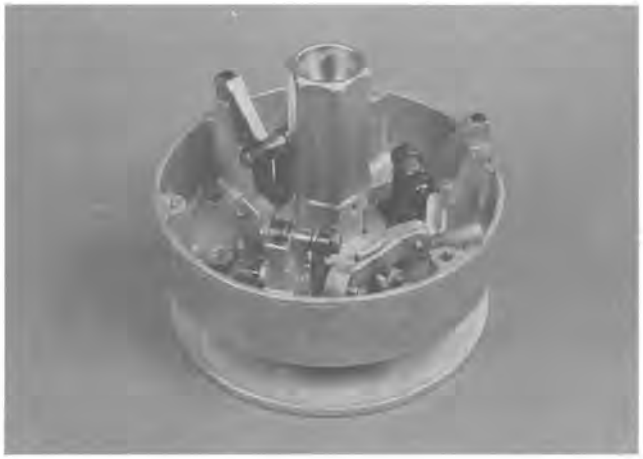
C. Slide another weight onto opposite end of cap screw and secure it in place with the lock nut. Tighten lock nut to 3-4 ft-lb, using a 3/8-inch socket, 3/8-inch wrench, and a torque wrench.

D. Perform steps A, B, and C on remaining rollers, bushings, and weights, Fig. V-21.

E. Install the three set screws with lock nuts in the spider. End of set screws must not extend into center of spider.

5. Slide the spider assembly onto the hex shaft in the same position occupied before disassembly, Fig. V-22. Side of spider with stamped part number must face up.

Fig. V-22



Note: During disassembly the spider should have been marked in relation to the hex shaft. Without this marking, the spider may be installed incorrectly and result in accelerated wear of the rollers and ramps.

6. Install the split ring halves in the hex shaft groove, Fig. V-23.

Fig. V-23

Note: The three types of washers that are installed in the "Z" drive clutches are as follows:

1. **Cup Washer — A cup washer, 0.045" thick, is installed in all "Z" drive clutches. It is used to eliminate any side movement of the spring.**
2. **Spring Spacer Flat Washer — Each "Z" drive clutch will have one of these washers installed. It is located between the cup washer and the split washer. This flat washer is fabricated from 16 gauge material and will have mill thickness tolerance.**

DRIVE CLUTCH ASSEMBLY

3. **Drive Clutch Tolerance Washer — This washer, having a thickness of from 0.010" to 0.014", is positioned between the split washer and the spider. Depending on tolerance, this washer may or may not be present in a clutch.**

7. Pull the spider assembly up against the split ring halves. Tighten set screws to 3-4 ft-lb, using a torque wrench and 3/16-inch socket. Bottom the lock nuts against the spider, Fig. V-24, to lock the set screws in place, using a 3/8-inch wrench.

Fig. V-24

Note: End of set screws must slide into the recess in the hex shaft to ensure proper spider retention.

8. Slide the spring onto the hex shaft, Fig. V-25.

9. Place the cover housing on the spring and line up the alignment mark with those in the moveable and stationary sheave, Fig. V-25.

10. Push down on the cover housing and lift up on the moveable sheave until both parts contact, using the clutch puller bolt and large flat washer. Secure the cover housing to the moveable sheave, Fig. V-25, with three socket head cap screws, using a 1/4-inch hex key wrench. Tighten cap screws to 15-17 ft-lb, using a torque wrench and 1/4-inch hex key wrench.

Fig. V-25

DRIVE CLUTCH INSTALLATION

Install Drive Clutch

Equipment Necessary: 3/4-Inch Socket, Air Impact Tool, and Torque Wrench

1. Place the drive belt on the driven pulley.

2. Move the drive clutch into position near the crankshaft and loop drive belt onto the clutch.

3. Retain drive clutch on crankshaft with cap screw and lock washer, using an air impact tool and 3/4-inch socket. Tighten the cap screw to 55-60 ft-lb, using a torque wrench and 3/4-inch socket.

4. Check alignment between drive clutch and driven pulley (See: Drive Clutch/Driven Pulley Alignment, page V-25).

CAUTION

If service is performed on the drive clutch or a new drive clutch is installed, alignment of drive clutch and driven pulley must be checked. When alignment is not as specified, accelerated belt wear, poor performance and component failure may result.

ALIGNMENT INSTRUCTIONS

Drive Clutch/Driven Pulley Alignment

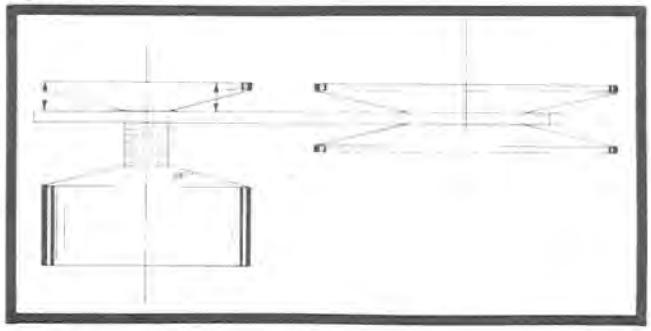
Equipment Necessary: Clutch Alignment Bar - 0.380 Inch Thick (Arctic No. 0144-099), 1/4-Inch Block

Note: Two dimensions that must be checked when aligning the drive clutch and driven pulley are PARALLELISM and OFFSET. The first dimension to check and adjust, if required, is parallelism, then offset.

1. Unlatch belt guard and remove the drive belt from the drive clutch and driven pulley.

2. Install the clutch alignment bar between the sheaves of the driven pulley, making sure the bar is as far down between sheaves as possible. Allow sheaves to release and hold alignment bar in position, Fig. V-26.

Fig. V-26



Note: Alignment bar must extend beyond the front edge of the drive clutch.

3. Place a 1/4-inch block on the drive clutch hex shaft and allow alignment bar to contact the block. All measurements must be taken with the alignment bar on the block.

4. Measure dimension X and Y, Fig. V-26, at front and rear edge of the drive clutch, using a scale or calipers. Write the two dimensions on a piece of paper for reference. Compare dimension X and Y against Rule A and B.

   Rule A – Dimension Y must be more than dimension X.

   Rule B – Dimension Y must never exceed dimension X by more than 1/16-inch (0.0625).

Note: Manufacturing tolerances for both dimensions (X and Y) are ± 1/16-inch (0.0625). For service recommendations, conform to Rule A and B as stated above.

5. If dimension Y is less than dimension X, parallelism between engine crankshaft and driven pulley shaft is not correct. Therefore, parallelism must be adjusted (See: Clutch/Pulley Parallelism Adjustment, page V-26). If dimension Y is more than dimension X (See: Rules A and B), the offset can be adjusted (See: Offset Check, steps 6-8, page V-25).

6. Offset Check – Install clutch alignment bar between the sheaves of the driven pulley, making sure the bar is as far down between sheaves as possible. Allow sheaves to release and hold alignment bar in position.

Note: Alignment bar must extend beyond the front edge of the drive clutch.

7. Place a 1/4-inch block on the drive clutch hex shaft and allow alignment bar to contact the block. All measurements must be taken with the alignment bar on the block.

8. Measure dimension X and Y, Fig. V-26, at the front and rear edge of the drive clutch, using a scale or calipers. Both dimensions must be between 7/8 (0.875)" and 15/16 (0.945)" for 1974 models. Using the same alignment bar on 1975 models, the dimension must be between 0.954 of an inch and 1.024 inches.

9. Offset Correction

   A. Remove cap screw and washers holding driven pulley on driven shaft, using a 1/2-inch socket, Fig. V-27.

Fig. V-27

ALIGNMENT INSTRUCTIONS

B. To change offset, remove driven clutch; then either install or remove washers until correct offset is obtained. When offset is within specifications, place driven pulley on driven shaft. Align keyway in drive clutch with keyway in driven shaft and install key. Next, install cap screw and washers to hold driven pulley on driven shaft, Fig. V-27, using a 1/2-inch socket. Proceed to step 10.

10. Install the drive belt and, finally, the clutch guard.

CLUTCH / PULLEY PARALLELISM ADJ.

Adjust Parallelism

Equipment Necessary: 9/16-Inch Socket, 9/16-Inch Wrench, and 8-Inch Extension

1. Loosen the lock nuts holding front of motor to the motor strap, using a 9/16-inch socket and wrench.

2. Loosen the lock nuts on the rear motor mounts, using a 9/16-inch socket and 8-inch extension.

3. Insert a shim between the bottom of the left rear motor mount (PTO side) and the curved section of the front end assembly.

4. Tighten all lock nuts; then check parallelism and offset (See: Drive Clutch/Driven Pulley Alignment, page V-27).

Note: Continue to add or remove shims between motor mount and front end until parallelism is obtained.

DRIVEN PULLEY REMOVAL

Remove Driven Pulley

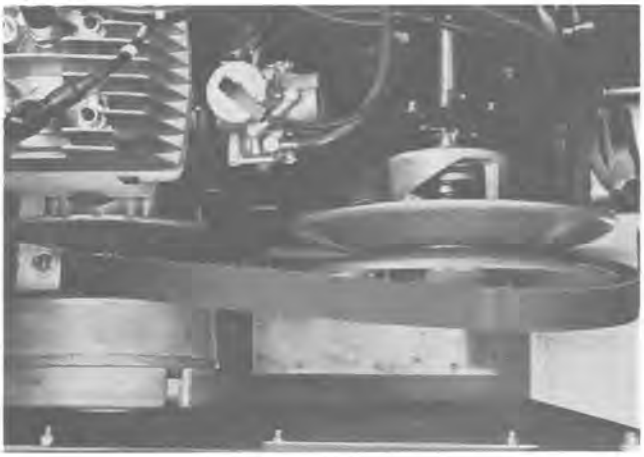
Equipment Necessary: 1/2-Inch Socket

1. Open hood. Unlatch clutch and belt shield and raise to upright position.

Note: On 1975 models, remove the retaining pin and lift shield upright.

2. Remove drive belt, Fig. V-28.

Fig. V-28



3. Remove cap screw and washers holding driven pulley on driven shaft, using a 1/2-inch socket, Fig. V-29. DO NOT lose shims.

Fig. V-29

4. Slide driven pulley off driven shaft.

Note: Slight pressure may have to be exerted against inside of belly pan to allow adequate clearance to remove pulley.

5. Remove driven shaft key from keyway.

DRIVEN PULLEY DISASSEMBLY

Disassemble Driven Pulley

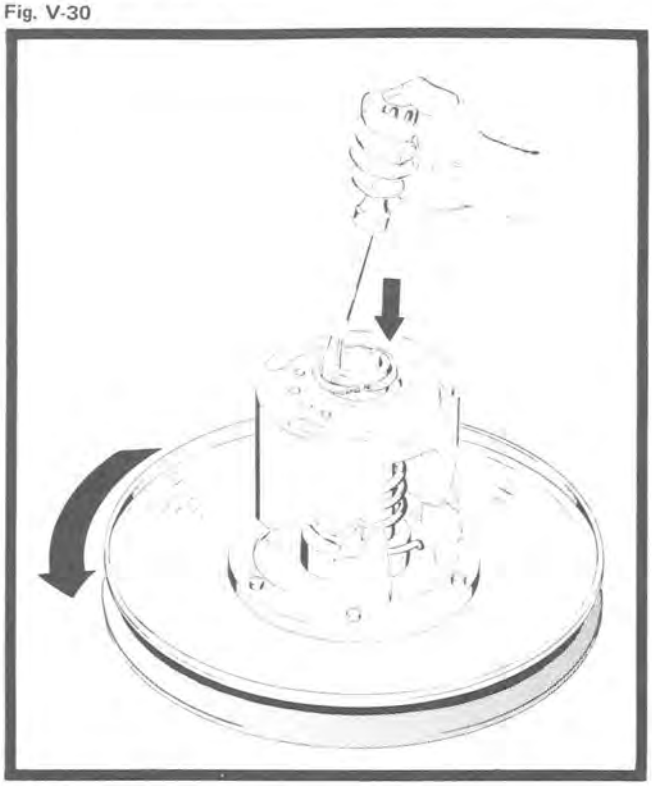
Equipment Necessary: Rubber Mallet, Pliers, Side Cutter, Large Snap Ring Pliers, and Screwdriver with 1/4-Inch Blade

1. Hold stationary sheave of driven pulley and turn moveable sheave counterclockwise so that shoe ramps are not contacting cam of torque bracket.

2. Force torque bracket down on shaft until it bottoms on bearing.

3. Pry the two-piece snap ring off the fixed face shaft, using a screwdriver with a 1/4-inch blade, Fig. V-30.

Fig. V-30



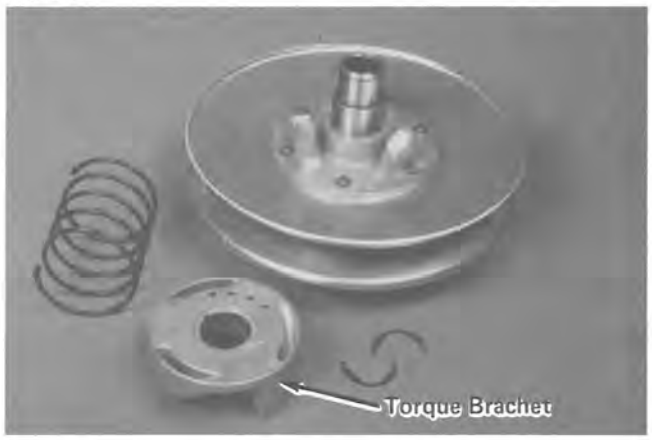
Note: On 1975 models, remove the one-piece snap ring with a large snap ring pliers.

⚠ WARNING ⚠

Keep slight downward pressure on the torque bracket to prevent a sudden upward release of the spring.

4. Slide torque bracket and spring off stationary sheave hub, Fig. V-31. Remove cam bracket sliding shoes, if servicing is required, using a pliers.

Fig. V-31



Note: If cam bracket is difficult to remove, a three-prong puller can be used to pull cam bracket off hub.

5. Remove moveable face from stationary hub, Fig. V-32.

Fig. V-32

Note: Woodruff key does not have to be removed to pull moveable face.

6. Remove woodruff key from stationary hub, using a side cutter or pliers.

7. Slide bearing off stationary hub.

8. Clean and inspect driven pulley (See: Cleaning and Inspecting, page V-30).

CLEANING AND INSPECTING

Cleaning

Equipment Necessary: Cleaning Solvent, Compressed Air

1. Wash grease and foreign matter off all parts, using cleaning solvent. Dry parts with compressed air.

2. If drive belt accumulations are on stationary sheave, stationary sheave hub, or moveable sheave, remove the accumulations, using cleaning solvent ONLY. Dry with compressed air.

● CAUTION ●

DO NOT use steel wool or wire brush to clean driven pulley parts. A wire brush or steel wool will cause the sheaves to be gouged, and the drive belt may not slide properly between sheaves. Decreased performance and possible accelerated belt wear will result.

Inspecting

Equipment Necessary: Fine Emery Cloth

Note: After inspection of parts, replace any parts that are damaged, worn, or broken.

1. Inspect sliding shoes for wear and damage.

2. Inspect the fixed and moveable face for any broken or loose rivets which hold sheaves in position.

3. Check torque bracket for cracks, wear, and other noticeable damage.

4. Inspect stationary and moveable sheave for rough surfaces, grooves, and scratches. Use fine emery cloth to repair minor damage.

5. Inspect spring for distortion, crystallization, or breaks.

DRIVEN PULLEY ASSEMBLY

Assemble Driven Pulley

Equipment Necessary: Rubber Mallet, Slip-Joint Pliers

1. Be sure all components are clean and have been inspected for possible defects.

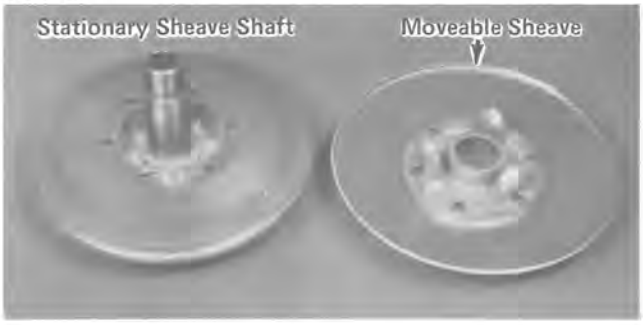
2. Place cam bracket sliding shoes into position; then seat into casting, using a rubber mallet.

3. Slide stationary sheave bearing onto sheave hub.

4. Install woodruff key in stationary face hub; tap into place, using a rubber mallet.

5. Place moveable sheave on stationary sheave shaft, Fig. V-33.

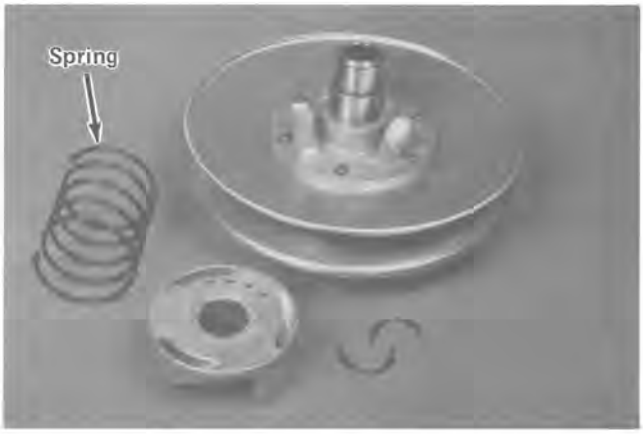
Fig. V-33



6. Place the spring over the fixed face shaft, Fig. V-34, and hook the turned down end into the hole in the casting on the moveable face.

7. Position the torque bracket over the spring, Fig. V-34, and hook the turned up end into the second hole (standard spring tension) of the torque bracket.

Fig. V-34



8. Line up the keyway in the torque bracket with the key in the shaft.

9. Push the torque bracket onto the shaft just far enough to contact the key holding the torque bracket in place on the shaft.

DRIVEN PULLEY ASSEMBLY

10. Turn the moveable face counterclockwise until there is slight spring pressure. From this point, turn the moveable face 120°.

⚠ WARNING ⚠
Keep slight downward pressure on the torque bracket to prevent a sudden upward release of the spring.

11. Push the torque bracket down on the shaft until the bracket bottoms on the bearing.

12. Place the two-piece snap ring in place. Using a slip-joint pliers, squeeze the rings into place.

13. Slowly release the torque bracket against the snap ring.

14. If no further drive system disassembly is needed, install the driven pulley (See: Install Driven Pulley, page V-31).

DRIVEN PULLEY INSTALLATION

Install Driven Pulley

Equipment Necessary: Hammer and 1/2-Inch Socket

1. Be sure all components have been cleaned and inspected.

2. Place the correct numbers of shims in position.

Note: To ensure alignment, refer to clutch alignment section (See: Alignment Instructions, page V-27).

3. Place driven pulley on driven shaft.

Note: Slight pressure may have to be exerted against inside of belly pan to allow adequate clearance to install pulley.

4. Rotate driven pulley until keyway in clutch lines up with keyway in driven shaft. Tap driven shaft key gently into place.

5. Thread cap screw, large washer, and shims into end of driven shaft, Fig. V-35, using a 1/2-inch socket. Tighten cap screw to 17 ft-lb, using a torque wrench and 1/2-inch socket.

Fig. V-35

6. Secure belt/clutch guard in place.

7. Close hood.

DRIVEN SHAFT REMOVAL

Remove Chain Case Cover, Gasket, and Top Sprocket

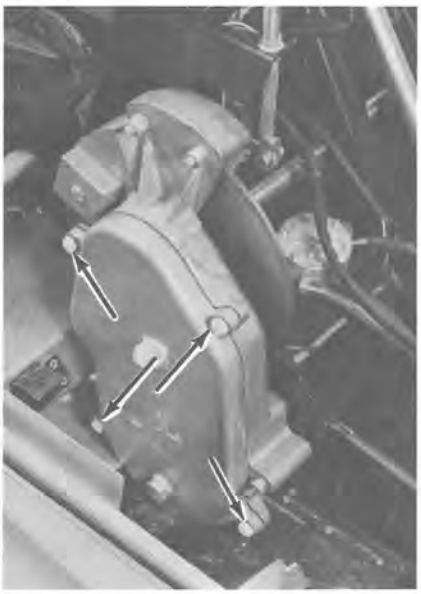
Equipment Necessary: Rags, Two-Prong Puller, Needle-Nose Pliers, Small Vise-Grip, 9/16-Inch Deep Socket, and 1/2-Inch Socket

1. Remove exhaust system (See: Section IA, Set-Up, Remove Exhaust System).

2. Place rags under chain case cover to absorb chain lube that will flow when chain case cover is removed.

3. Remove the four cap screws and star washers holding chain case cover to chain case, Fig. V-36, using a 1/2-inch socket. Pull chain case cover and gasket away from backing plate; chain lube will flow onto rags.

Fig. V-36



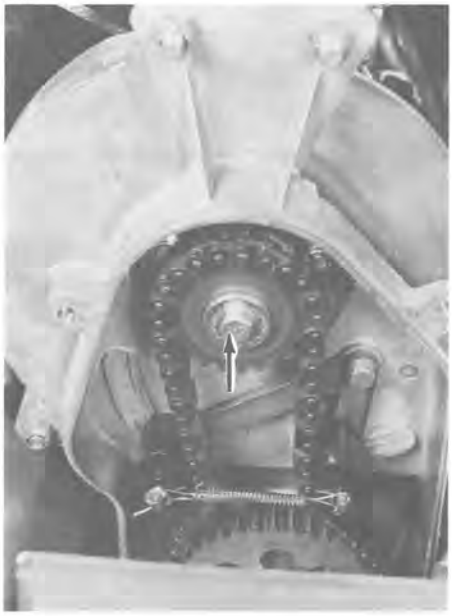
Note: If chain lube spills into belly pan or onto other components, wipe clean, using a dry rag.

4. Remove cotter keys and washers holding chain tension spring, Fig. V-37, using a needle-nose pliers. This will release tension on the chain.

Fig. V-37

5. Remove cap screw and flat washer, holding small sprocket and chain on driven shaft, Fig. V-38, using a 1/2-inch socket.

Fig. V-38



6. Now thread cap screw back into driven shaft approximately halfway. Cap screw is used for bottoming puller bolt when sprocket is to be pulled off driven shaft.

7. Pull upper sprocket and chain off driven shaft, using a two-prong puller. After sprocket is pulled, remove cap screw from driven shaft.

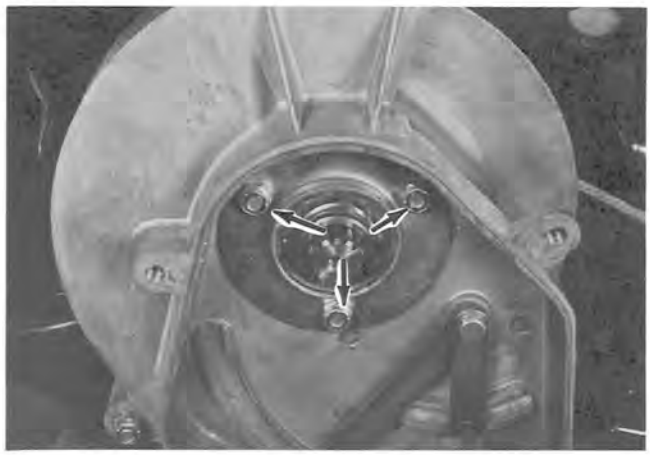
DRIVEN SHAFT REMOVAL

Remove Driven Shaft

Equipment Necessary: Rubber Mallet, Pliers, Side Cutter, Small File, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 1/2-Inch Socket, and 3-Inch Extension

1. Remove the three lock nuts holding the right-hand driven shaft bearing, Fig. V-39, using a 1/2-inch socket and 3-inch extension.

Fig. V-39



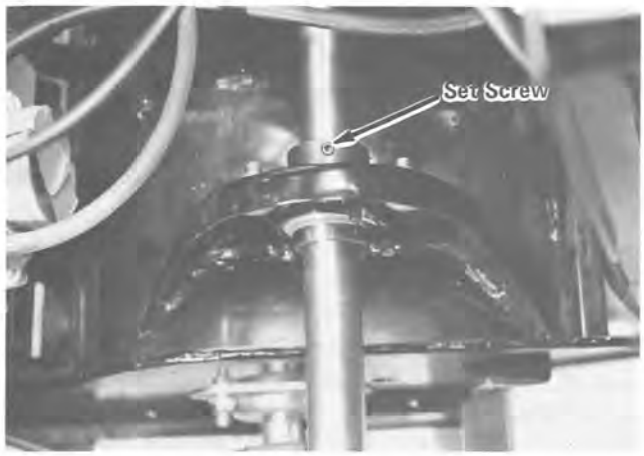
2. Remove flange, O-ring, and bearing, Fig. V-40.

Fig. V-40

3. Loosen the set screw on the clutch side driven shaft bearing, Fig. V-41, using a 1/8-inch hex key wrench.

Note: If only left-hand driven shaft bearing is to be removed, bearing may be taken off by removing the three lock nuts and carriage bolts, then sliding flange, O-ring, and bearing off driven shaft towards clutch side.

Fig. V-41



4. Drive the bearing lock collar opposite the direction of rotation, using a punch and hammer, till it turns freely.

Note: A small file may be needed to remove any burrs left on shaft by lock collar.

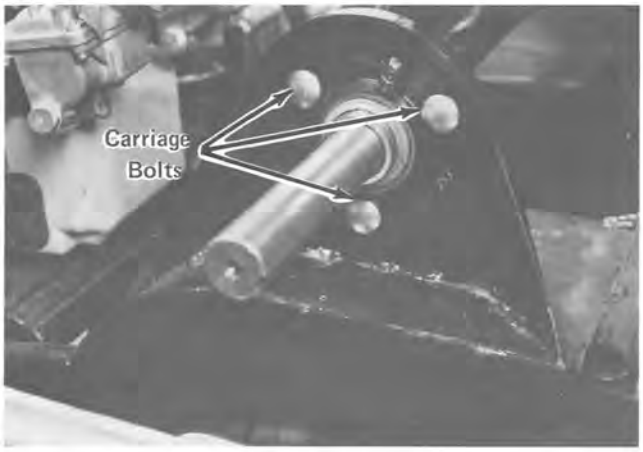
5. Force the driven shaft towards the clutch side, using a rubber mallet, until the shaft contacts left-hand hood channel.

Note: Turn shaft while driving to prevent brake disc from binding on shaft.

6. Remove the woodruff key from brake disc keyway on splined end, using a pliers or side cutter.

7. Loosen the three lock nuts from the carriage bolts on the left-hand driven shaft bearing holder, Fig. V-42, using a 1/2-inch socket.

Fig. V-42



Note: Bearings have radial outers which allow bearing to swivel and provide clearance for removal.

DRIVEN SHAFT REMOVAL

8. Tilt driven shaft up until it can be removed from left side.

9. Remove driven shaft from machine.

Note: If further disassembly is not necessary, install driven shaft (See: Driven Shaft Installation, page V-37).

CHAIN CASE REMOVAL

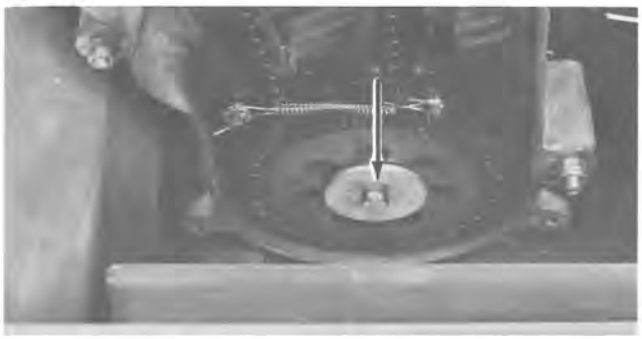
Remove Chain Case

Equipment Necessary: Rubber Mallet, Pliers, Side Cutter, Needle-Nose Pliers, Two-Prong Puller, Cardboard, Hammer, 3-Inch Extension, 1/8-Inch Hex Key Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Wrench, and 9/16-Inch Socket

1. Remove chain case, cover, and top sprocket (See: Remove Chain Case Cover, Gasket, and Top Sprocket, page V-32).

2. Remove the cap screw and flat washer, holding the lower chain sprocket on track drive shaft, Fig. V-43, using a 1/2-inch socket.

Fig. V-43



3. Thread cap screw approximately halfway into track drive shaft. Cap screw is used for bottoming puller bolt when sprocket is to be pulled off track drive shaft.

4. Pull lower sprocket off track drive shaft, using a two-prong puller. After sprocket is pulled, remove cap screw from drive shaft.

5. Remove the two rear skid frame mounting bolts, using a 9/16-inch socket and 3-inch extension. Swing out skid frame.

6. Tip snowmobile onto clutch side and use cardboard to protect against scratching.

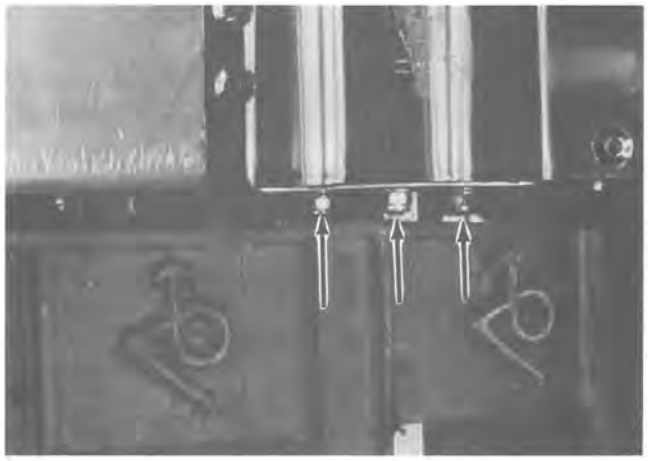
7. Remove the two lock nuts securing chain case to front end, Fig. V-44, using a 1/2-inch socket.

Fig. V-44

Note: Carriage bolts are used. It may be necessary to hold heads of bolts in place to keep them from spinning.

8. Remove from within the tunnel the three lock nuts and flat washers holding the chain case to the front end, Fig. V-45, using a 1/2-inch wrench.

Fig. V-45

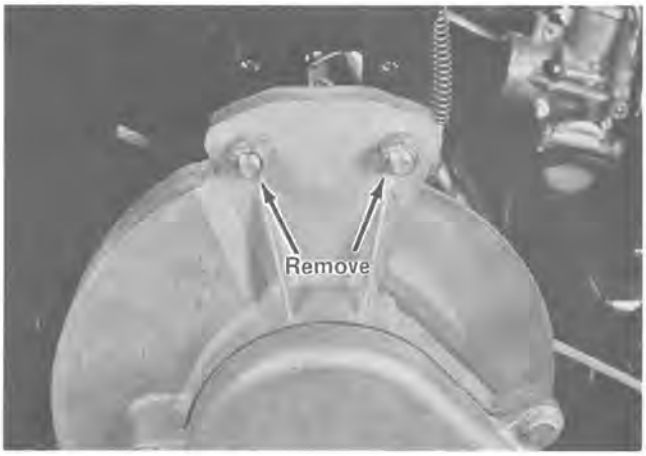


CHAIN CASE REMOVAL

Note: The bearing flange, bearing, and O-ring can be left in housing for removal.

9. Remove brake cable bracket and brake unit from chain case, Fig. V-46, using a 9/16-inch socket and open-end wrench.

Fig. V-46



10. At this point, remove chain case from front end assembly.

Note: If chain case is to be replaced, proceed to step 11. If replacement isn't necessary, use next set of instructions (See: Install Chain Case, step 6, page V-36).

11. Remove the six lock nuts securing bearing flanges, using a 1/2-inch socket with a 3-inch extension.

12. Remove flanges, O-rings, and bearings. Set aside in a clean place.

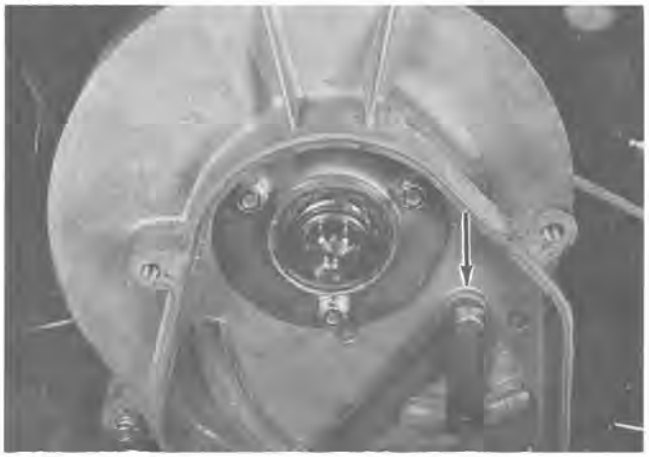
13. Remove the lock nut on chain tensioner bolt, using a 7/16-inch wrench.

Note: On some models, two short chain tensioner arms are used. Remove both chain tension arms.

14. Remove the chain tensioner bolt, Fig. V-47, using a 7/16-inch wrench.

15. Remove short tensioner link, long tensioner link, and the bushing, Fig. V-47.

Fig. V-47



16. Remove cotter pin and flat washer from fastened end of tension spring, using a needle-nose pliers.

17. Slide tension pads off link pins.

18. To remove flange studs, thread lock nut part way onto the studs. Then, using a hammer, tap nuts with light sharp blows until the studs can be removed easily.

Note: Lower studs may be removed only by driving studs from tunnel side of case.

CLEANING AND INSPECTING

Cleaning and Inspecting

Equipment Necessary: Cleaning Solvent, Compressed Air

1. Wash dirt, grease, and foreign matter off parts, using cleaning solvent. Dry parts with compressed air.

Note: Any damaged, faulty, or worn parts should be replaced.

2. Inspect chain case for cracks in casting.

3. Inspect chain tightener pads for excessive wear or cracked blocks.

4. Inspect link arms and bushing for cracks or wear.

INSTALL CHAIN CASE

Install Chain Case

Equipment Necessary: Rubber Mallet, Needle-Nose Pliers, Cardboard, Hammer, Torque Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 7/16-Inch Socket, 7/16-Inch Wrench, 9/16-Inch Socket, and 3-Inch Extension

Note: If chain case is to be replaced, proceed with this set of instructions. If chain case was removed only, then begin at step 6.

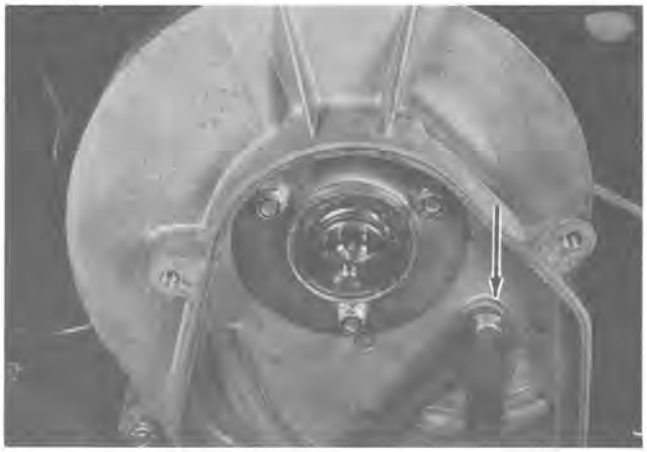
1. Drive top chain case ribbed bolt into place, using a hammer.

2. Install lower chain case bolts by placing a short piece of 5/16-inch I.D. pipe over stud against stud flange; then drive stud into place, using a hammer.

Note: Lower studs must be driven in from recessed bearing side.

3. Install chain tensioner by placing cap screw with flat washer through bushing, short link, and long link, Fig. V-48. Thread into housing and tighten to 7 ft-lb, using a torque wrench and 7/16-inch socket. Place lock nut on back side and tighten to 7 ft-lb, using a torque wrench.

Fig. V-48



4. Slide tensioner pads into place (recessed hole in pad) and secure by placing tension spring, flat washer, and cotter pin over pivot pin. Fasten only one pad.

Note: For 1974 400 or 440 El Tigres that experience ratcheting problems, a heavier chain tensioner spring (part no. 0110-718) and thicker chain tensioner pads (part no. 0107-411) must be installed.

5. Place drive shaft and driven shaft bearings (sealed side toward tunnel) in bearing recesses. Place O-rings over bearings. Place bearing flanges over bearings and O-rings, Fig. V-49. Secure with six lock nuts. DO NOT tighten.

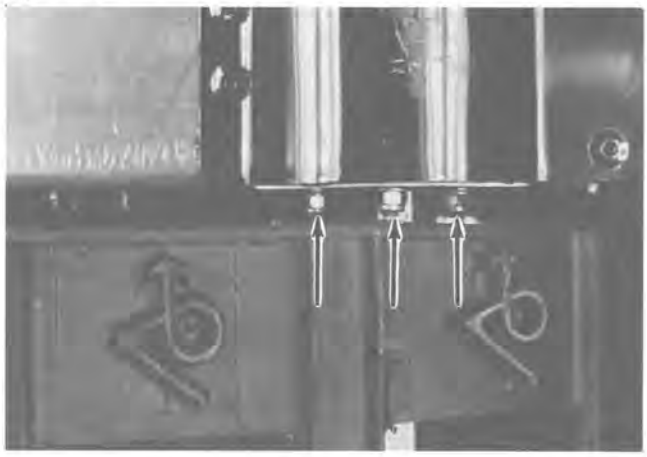
Fig. V-49

6. Place chain case in position over drive shaft and driven shaft, sliding bearings over splines.

7. Place the two carriage bolts through front end and chain case. Install the two lock nuts on bolts. DO NOT tighten.

8. Place three lock nuts and flat washers onto chain case lower mounting studs on inside of tunnel, Fig. V-50. Tighten nuts with an open-end 1/2-inch socket.

Fig. V-50



9. Tighten carriage bolt lock nuts to 12 ft-lb, using a 1/2-inch socket and torque wrench.

10. Now tighten bearing flange nuts to 12 ft-lb, using a torque wrench and 1/2-inch socket.

INSTALL CHAIN CASE

11. Place lower chain sprocket onto shaft. Install cap screw and large flat washer, Fig. V-51. Tighten cap screw to 17 ft-lb, using a torque wrench and 1/2-inch socket.

    Note: When cap screw is tightened, sprocket will draw onto splined shaft properly.

12. Install brake caliper assembly and brake cable bracket, using the two cap screws and lock nuts, Fig. V-51. Tighten to 24 ft-lb, using a torque wrench and 9/16-inch socket.

Fig. V-51

DRIVEN SHAFT INSTALLATION

Install Driven Shaft

Equipment Necessary: Small Vise-Grip, Hammer, 3-Inch Extension, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, 1/2-Inch Socket, and 9/16-Inch Deep Socket

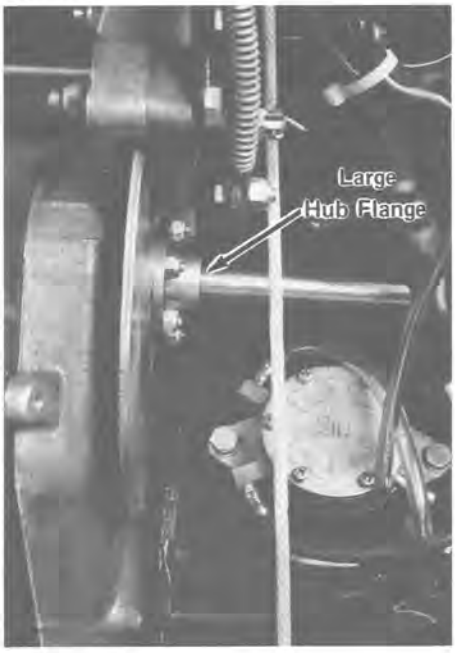
1. Be sure all parts are clean and have been inspected for defects.

2. Coat driven shaft very lightly with oil to aid assembly and prevent corrosion. Insert driven shaft (splined end first) through left driven shaft bearing from clutch side. When shaft splines begin to clear bearing, place lock collar on shaft (large I.D. on bearing side).

3. Continue to push shaft through bearing. Swing shaft to a horizontal position as clearance allows.

4. Install woodruff key in shaft. Place brake disc and hub into position (large brake hub flange on clutch side), Fig. V-52. Align key in shaft with keyway in brake disc hub. Push shaft through brake disc hub.

Fig. V-52



⚠ WARNING ⚠

Be sure that brake disc woodruff key does not accidentally fall out. Personal injury could result if key is not in place when machine is running.

DRIVEN SHAFT INSTALLATION

5. Place right-hand driven shaft bearing in position in chain case. Install O-ring and bearing flange, Fig. V-53.

Fig. V-53

6. Install lock nuts on chain case studs. DO NOT tighten.

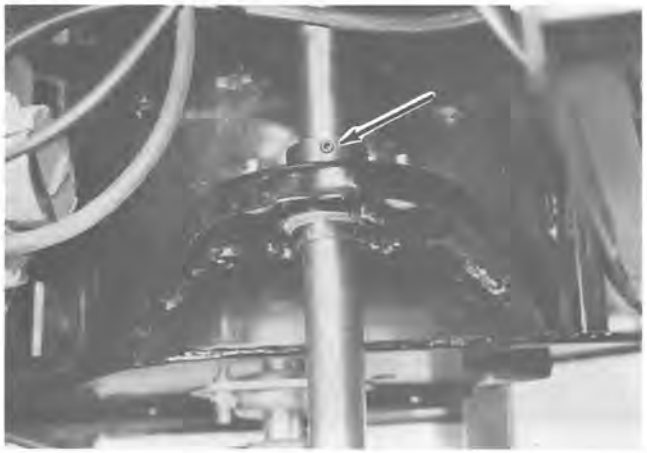
7. Continue to push driven shaft through right-hand driven shaft bearing until the shaft "bottoms" on the bearing.

8. Now tighten right-hand bearing flange lock nuts to 12 ft-lb, using a 1/2-inch socket and torque wrench.

9. Slide bearing lock collar against bearing. Rotate lock collar in the direction of shaft rotation until it begins to lock on bearing. Using a 5/16 x 1/8-inch flat end punch, drive lock collar in direction of rotation. Lock collar and bearing are locked when bearing begins to turn with lock collar.

10. Tighten lock collar set screw, Fig. V-54, using a 1/8-inch hex key wrench.

Fig. V-54



Install Chain Case Cover, Gasket, and Top Sprocket

Equipment Necessary: Small Vise-Grip, Arctic Chain Lube, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Deep Socket, and 3/4-Inch Socket

1. Place drive chain onto top sprocket and start sprocket on splines.

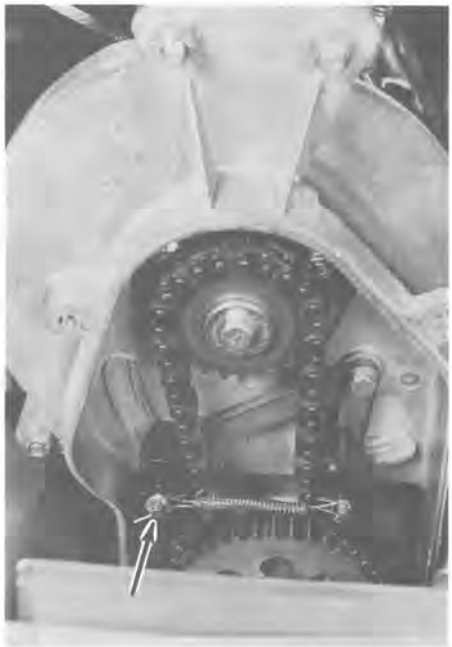
Note: On some El Tigre model 440 Z machines, the chain tension may not be proper. To correct this, replace the 19-tooth upper sprocket (part no. 0107-219) with a 20-tooth sprocket (part no. 0107-409). This change has been tested and found to have no adverse effects on acceleration.

2. Install cap screw and flat washer, Fig. V-55. Tighten cap screw to 17 ft-lb, using a 1/2-inch socket and torque wrench.

Note: When cap screw is tightened, sprocket will draw onto splined shaft properly.

3. Fasten remaining end of chain tension spring to link pin, Fig. V-55. Secure in place with a flat washer and cotter pin.

Fig. V-55



Note: Be sure to check sprocket alignment at this time (See: Align Sprockets, page V-39). Also, on 1974 400 or 440 El Tigres that experience ratcheting problems, a heavier chain tensioner spring (part no. 0110-718) and thicker chain tensioner pads (part no. 0107-411) must be installed.

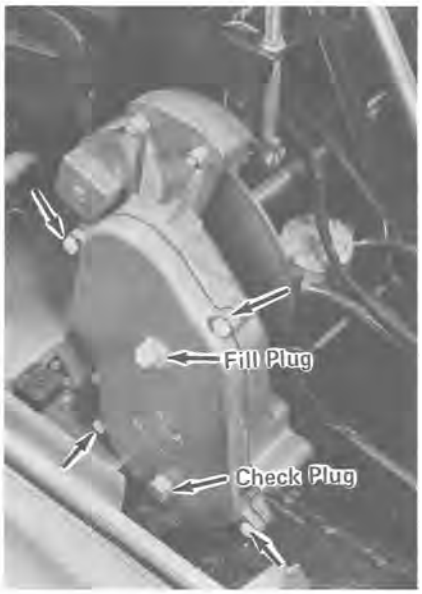
DRIVEN SHAFT INSTALLATION

4. Place chain case gasket in position on chain case.

5. Install chain case cover with four cap screws and star washers, Fig. V-56. Tighten to 12 ft-lb, using a 1/2-inch socket and torque wrench.

6. Remove oil fill plug and oil check plug, Fig. V-56, using a 3/4-inch socket.

Fig. V-56



7. Fill chain case with 8 ounces of Arctic Chain Lube. Chain lube is to be at the point of overflowing in the check plug hole. Install filler plug and check plug.

● CAUTION ●

After filling chain case with chain lube, be sure chain case cover and gasket are installed evenly and a good seal exists between chain case cover and chain case. If a poor seal exists and a leak results, mechanical damage will likely occur.

8. Install exhaust system (See: Section IA, Set-Up, Install Exhaust System).

Note: On 1975 El Tigre Z models prior to serial number 5019829, it is possible for the front support leg of the muffler to wear a hole through the belly pan. Therefore, on these models a wear plate (part no. 0116-764) should be installed between the muffler support leg and the belly pan. Wear plates were installed by the factory on models after serial number 5019829.

SPROCKET ALIGNMENT

Align Sprockets

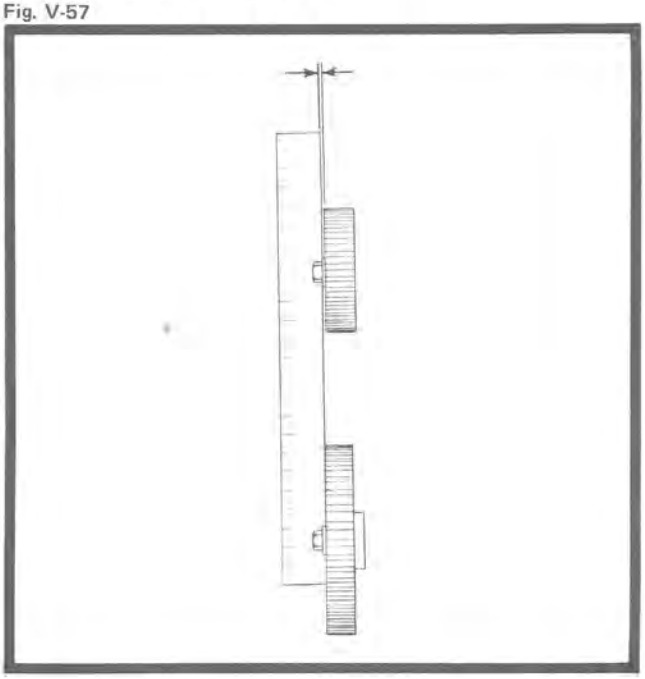
Equipment Necessary: 12-Inch Straight Edge, 1/2-Inch Socket, and Rags

Note: To check sprocket alignment, lay a 12-inch straight edge against faces of top and bottom sprockets. No visible gap is to be evident between straight edge contact surface and sprocket faces.

1. Remove chain case cover and gasket (See: Remove Chain Case Cover, Gasket, and Top Sprocket, steps 1-7, page V-32).

2. Lay straight edge against sprocket faces, Fig. V-57.

Fig. V-57



SPROCKET ALIGNMENT

3. If top sprocket is to the inside of alignment, install a shim behind the top sprocket.

4. If bottom sprocket is to the inside of alignment, install a shim behind the bottom sprocket.

5. When sprockets are aligned, replace chain case cover and gasket (See: Install Chain Case Cover, Gasket, and Top Sprocket, steps 3-9, page V-38).

Note: On some El Tigre model 440 Z machines, the chain tension may not be proper. To correct this, replace the 19-tooth upper sprocket (part no. 0107-219) with a 20-tooth sprocket (part no. 0107-409). This change has been tested and found to have no adverse effects on acceleration.

TRACK DRIVE REMOVAL

Remove Chain Case Cover and Bottom Sprocket

Equipment Necessary: Small Vise-Grip, 3-Inch Extension, Rags, Two-Prong Puller, Needle-Nose Pliers, 1/2-Inch Socket, and 9/16-Inch Socket

1. Remove chain case cover and gasket (See: Remove Chain Case Cover, Gasket, and Top Sprocket, steps 1-7, page V-32).

2. Remove the cap screw and flat washer holding lower chain sprocket and chain on track drive shaft, Fig. V-58, using a 1/2-inch socket.

Fig. V-58

3. Thread cap screw into track drive shaft approximately halfway. Cap screw is used for bottoming puller bolt when sprocket is to be pulled off track drive shaft.

4. Pull lower sprocket and chain off track drive shaft, using a two-prong puller. After sprocket is pulled, remove cap screw from track drive shaft.

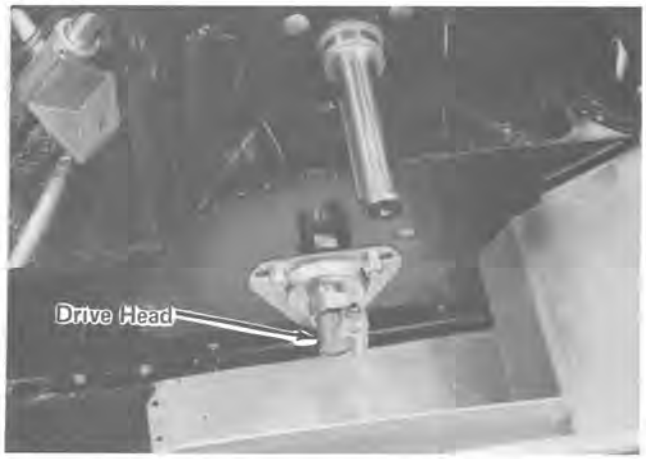
Remove Skid Frame and Track Drive Shaft

Equipment Necessary: Cardboard, Hammer, 1/8-Inch Hex Key Wrench, Screwdriver Having 1/4-Inch Blade, 5/16 x 1/8-Inch Flat End Punch, 1/2-Inch Wrench, and 3/4-Inch Open-End Wrench

1. Remove skid frame from tunnel (See: Section VI, Skid Frame Removal, page VI-3 or VIA-3).

2. Remove speedometer drive head and disconnect cable coupling from track drive shaft, Fig. V-59, using a screwdriver and 3/4-inch open-end wrench.

Fig. V-59

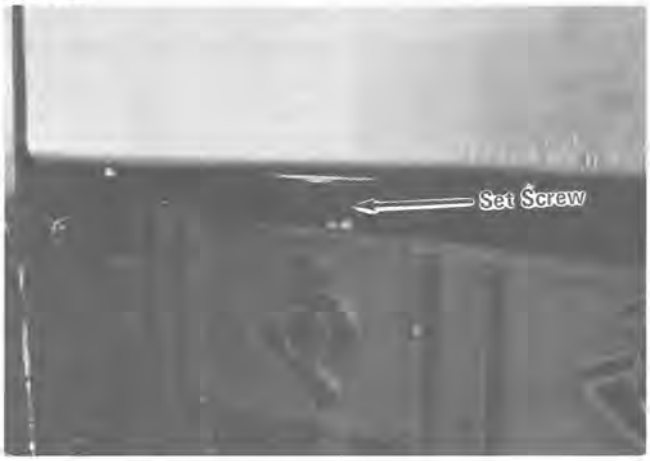


3. Tip snowmobile onto recoil side using cardboard to protect against scratching.

TRACK DRIVE REMOVAL

4. Loosen set screw holding bearing lock collar onto PTO end of track drive shaft, Fig. V-60, using a 1/8-inch hex key wrench.

Fig. V-60



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

6. Remove the three lock nuts holding right-hand track drive bearing flange, using a 1/2-inch socket. Remove flange, bearing, and O-ring.

7. Remove three lock nuts and carriage bolts holding bearing retainer plates to clutch side of front end, using a 1/2-inch socket. Set lock nuts and carriage bolts aside.

8. Slide track drive shaft toward chain case side until clutch end is out of the mounting hole in front end assembly; then remove opposite end of shaft. Account for the retainer plates and bearing on clutch end of track drive shaft.

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

9. Track drive shaft is now removed and completely disassembled.

AUXILIARY DRIVE INSTALLATION

Auxiliary Cleat Drive Sprocket Installation (1974 El Tigre 340, 400, and 440 Models)

For those machines that experience ratcheting of the track after checking for correct track tension, an auxiliary cleat drive sprocket kit (part no. 0110-895) is available. These auxiliary sprockets are to be installed on the existing drive shaft. When installing the auxiliary cleat drive sprocket kit on either the 400 or 440 models, a new tensioner spring (part no. 0110-718) and thicker chain tensioner pads (part no. 0107-411) must be installed.

Equipment Necessary: Pin Punch, Hammer, and Screwdriver Having a 7/16-Inch Blade

1. Remove chain case cover, chain, and lower sprocket (See: Remove Chain Case Cover and Bottom Sprocket, page V-32).

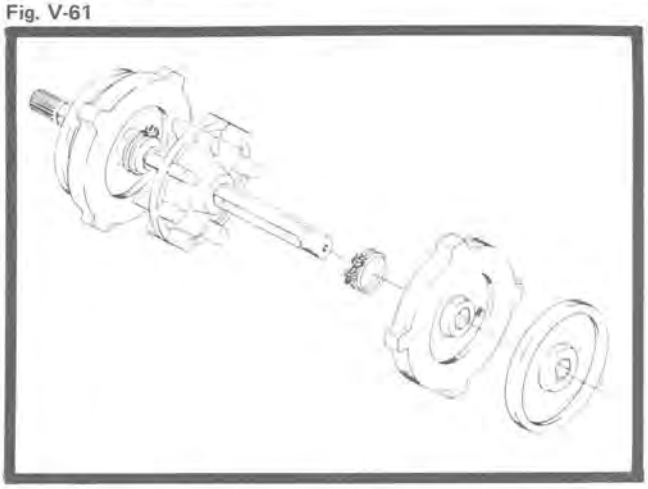
2. Remove the skid frame and drive shaft assemblies (See: Remove Skid Frame and Track Drive Shaft, page V-40).

3. Scribe a location mark on idler wheels and shaft to aid reassembly. Each idler wheel must be installed on the same side from which it was removed.

4. Drive out the roll pins with a pin punch and remove the idler wheels.

5. Install the auxiliary cleat drive sprockets with the slotted hub side toward the center drive sprocket, Fig. V-61.

Fig. V-61



Note: Make sure the wire clamps are in place before installing the cleat drive sprockets. The Arctic Logo on the cleat drive sprockets must be in line with the logo on the center drive sprocket. DO NOT tighten wire clamps.

AUXILIARY DRIVE INSTALLATION

6. Replace idler wheels in their original position and drive the roll pins in place.

7. Move the cleat drive sprockets outward until they contact the hub of the idler wheels. This is the proper location for the cleat drive sprockets.

8. Tighten the wire clamps securely.

9. Reinstall the drive shaft (See: Install Track Drive Shaft and Skid Frame, page V-42). See Note.

Note: Before installing skid frame, check the orientation of the track on the drive sprockets. When the center drive sprocket contacts the internal drive lugs on the track, the cleat drive sprocket should be approximately 0.1 of an inch from engagement with the cleat on the lower part of the sprocket. If the orientation is not correct, rotating shaft one lug forward or backward will bring the sprockets into correct position.

10. Install lower sprocket, chain, and chain case cover (See: Install Sprocket and Chain Case Cover, page V-38). See Note.

Note: On 400 and 440 models only, it will be necessary to install a new chain tightener spring assembly and new tightener pads.

TRACK DRIVE INSTALLATION

Install Track Drive Shaft and Skid Frame

Equipment Necessary: Torque Wrench, Steel Tape Measure, Hammer, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, Screwdriver Having a 1/4-Inch Blade, 1/2-Inch Socket, and 3/4-Inch Open-End Wrench

1. Position track drive shaft between track so that splined end is on recoil side, Fig. V-62.

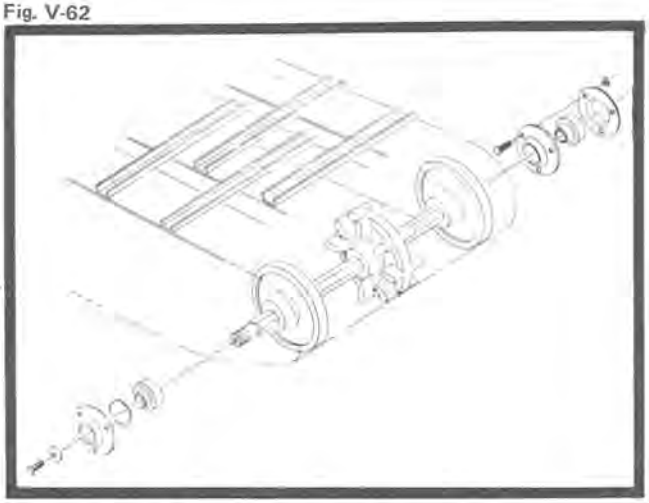
2. In sequence, slide lock collar (large I.D. toward end of shaft), retainer plate (flange toward lock collar), bearing (race toward lock collar), and retainer plate (flange toward end of shaft) on the nonsplined end of track drive shaft, Fig. V-62.

3. Lift track drive shaft and track into position between front end assembly. Then push splined end of track drive shaft through hole in chain case and front end. Allow track drive shaft to hang loosely in position.

4. Slide lock collar (large I.D. toward splines) onto shaft.

5. Place bearing, O-ring, and bearing flange over splined end of drive shaft. Install flange lock nuts, Fig. V-62. DO NOT tighten.

Fig. V-62



6. Align holes in retainer plates with holes in tunnel and front end assembly on clutch side. Place speedometer drive unit flange in position. Secure all components with three carriage bolts and lock nuts, using a 1/2-inch socket. Tighten lock nuts to 20 ft-lb, using a torque wrench and 1/2-inch socket.

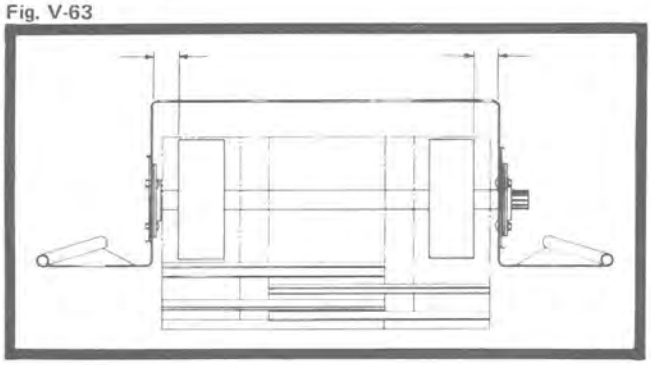
Note: Heads of carriage bolts are to be inside of tunnel.

7. Tighten lock nuts on bearing flange in chain case to 20 ft-lb, using a torque wrench and 1/2-inch socket.

TRACK DRIVE INSTALLATION

8. Line up track drive shaft sprockets so that sprocket edges are equidistant from inside edge of tunnel, Fig. V-63, using a steel tape measure.

Fig. V-63



9. Tip snowmobile onto clutch side using cardboard to protect against scratching.

10. When correct alignment is established, slide lock collar against bearing. Drive lock collar in direction of normal shaft rotation, using a 5/16 x 1/8-inch flat end punch and hammer. Lock collar and bearing are locked when bearing begins to turn with lock collar.

11. Tighten lock collar set screw, Fig. V-64, using a 1/8-inch hex key wrench.

Fig. V-64

12. Install the speedometer drive head and connect cable coupling from track drive shaft, using a screwdriver and 3/4-inch open-end wrench, Fig. V-65.

Fig. V-65

13. Install the skid frame (See: Section VI, Skid Frame Installation, page VI-14 or VIA-12).

Install Bottom Sprocket and Chain Case Cover

Equipment Necessary: Torque Wrench, 12-Inch Straight Edge, Arctic Chain Lube (8 Ounces), Funnel, and 1/2-Inch Socket

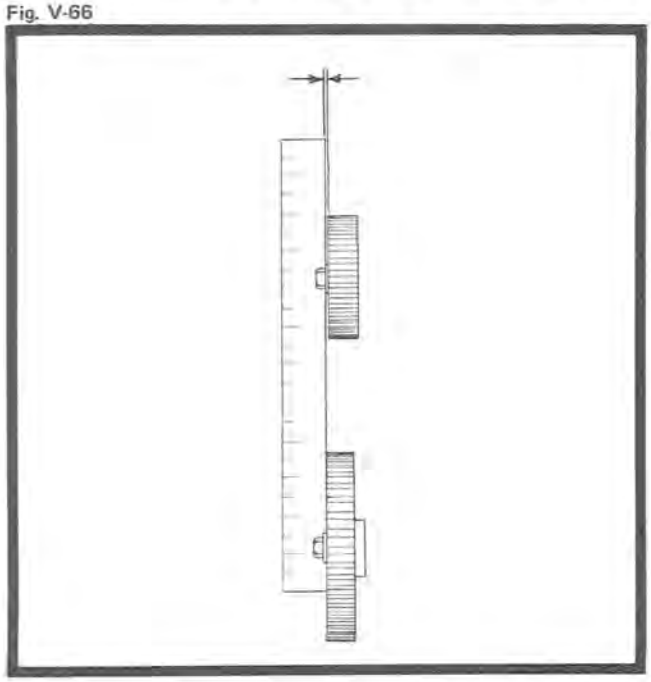
1. Place drive chain onto top sprocket and large bottom sprocket; then start large sprocket on track drive shaft splines. Pull sprocket onto track drive shaft with cap screw and flat washer, using a 1/2-inch socket. Tighten cap screw to 17 ft-lb, using a torque wrench and 1/2-inch socket.

Note: When cap screw is tightened, sprocket will draw onto track drive shaft splines properly.

2. Check Sprocket Alignment: Lay a 12-inch straight edge against faces of top and bottom sprockets, Fig. V-66. No visible gap is to be evident between straight edge and sprocket faces. If alignment is correct, proceed to step 3. If there is a gap between straight edge contact surface and sprocket faces, an adjustment is necessary (See: Sprocket Alignment, page V-39).

TRACK DRIVE INSTALLATION

Fig. V-66



3. Install chain case cover and gasket (See: Install Chain Case Cover, Gasket, and Top Sprocket, steps 3-9, page V-38).

TRACK SERVICING

General

The track is composed of three bolts, held together by three-quarter or full length cleats which are riveted to the track belts. Both outer belts have molded internal drive lugs on their inside surfaces. These drive lugs engage the track drive shaft sprockets to provide efficient, smooth power transfer. The track not only drives the snowmobile but also acts as a cushion to absorb minor impacts. And, working in conjunction with the brake, the track exerts a drag on the snow surface to aid in slowing or stopping the snowmobile.

Note: When the molded internal drive lugs become worn on one side, the track can be reversed to get maximum track life.

Note: Some rivets may be improperly set on some El Tigre model Z tracks. Tracks should be regularly inspected and any rivets which are bent should be replaced with bolts and nuts from the bolt kit (part no. 0134-815). Also, ice stud rivets must be replaced with nuts and bolts.

TRACK REMOVAL

Remove Track

Equipment Necessary: Cardboard, 1/8-Inch Hex Key Wrench, 5/16 x 1/8-Inch Flat End Punch, Hammer, 1/2-Inch Socket, Screwdriver Having a 1/4-Inch Blade, and 3/4-Inch Open-End Wrench

1. Remove the chain case cover and bottom sprocket (See: Remove Chain Case Cover and Bottom Sprocket, page V-32).
2. Remove skid frame and track drive shaft (See: Remove Skid Frame and Track Drive Shaft, page V-40).

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

TRACK INSTALLATION

Install Track

Equipment Necessary: 1/2-Inch Socket, Torque Wrench, 5/16 x 1/8-Inch Flat End Punch, Hammer, 1/8-Inch Hex Key Wrench, and 3/4-Inch Open-End Wrench

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

2. Install sprocket and chain case cover (See: Install Bottom Sprocket and Chain Case Cover, page V-43).

OPTIONAL GEARING

General

Since the El Tigre snowmobile is used for various riding conditions, the operator may decide to change the gear ratio for his type of riding. Because of the silent chain and the automatic chain tensioner, care must be taken during sprocket changes to ensure correct chain length and tension. The various sprockets, chains, and tensioner combinations are shown in Fig. V-67.

Fig. V-67

PARTS AVAILABLE FROM ARCTIC ENTERPRISES

Sprockets	Part Number	Chain Pitch	Part Number
15 Tooth	0107-217	66	0107-358
16 Tooth	0107-340	68	0107-215
17 Tooth	0107-218	70	0107-216
18 Tooth	0107-341	72	0107-372
19 Tooth	0107-219		
20 Tooth	0107-286	For Tightener Combinations:	
21 Tooth	0107-408	Common Spring	0107-229
22 Tooth	0107-301	Long Wire Form	0107-236
33 Tooth	0107-321	Short Wire Form	0107-235
35 Tooth	0107-325	Thicker Pad	0107-411
39 Tooth	0107-220	Regular Pad	0107-228


0107-236


0107-235


0107-229


0107-228


0107-411

OPTIONAL GEARING

When changing gear ratios with sprocket changes, care must be taken to keep the chain as tight as possible. Guidelines for the various ratios and sprocket sizes are listed in the Recommended Tensioner Chart,

RECOMMENDED TENSIONER BY SPROCKET COMBINATION

Sprocket	Chain	Clip 1	Clip 2	Spring	Pad 1	Pad 2
15-35	66	0107-236	0107-235	0107-229	0107-411	0107-411
15-39	68	0107-236	0107-236	0107-229	0107-411	0107-411
16-35	66	0107-236	0107-236	0107-229	0107-228	0107-228
16-39	70	0107-236	0107-235	0107-229	0107-411	0107-411
**17-35	68	0107-236	0107-236	0107-229	0107-411	0107-411
17-39	70	0107-236	0107-235	0107-229	0107-411	0107-411
18-35	68	0107-236	0107-235	0107-229	0107-411	0107-411
18-39	70	0107-236	0107-235	0107-229	0107-411	0107-411
19-35	68	0107-236	0107-235	0107-229	0107-411	0107-411
19-39	70	0107-236	0107-236	0107-229	0107-411	0107-411
20-35	68	0107-236	0107-235	0107-229	0107-411	0107-228
20-39	70	0107-236	0107-236	0107-229	0107-228	0107-228
21-35	70	Not Recommended				
***21-39	72	Not Recommended				
22-35	70	0107-236	0107-235	0107-229		0107-411
22-39	72	0107-236	0107-235	0107-229		0107-228

** Same as 19-39
*** Same as 19-35

NOTES

NOTES

TABLE OF CONTENTS

TROUBLE SHOOTING

Problem	Condition	Remedy
Edge of track is frayed.	1. Track is misaligned. 2. Outer belts worn out because of hourly usage. 3. Track strikes rivets in tunnel, even though alignment is correct.	1. Set track tension and alignment. 2. Install new outer belt(s). 3. Remove affected rivets that are too long and install correct type rivet.
Track is grooved (worn) or burnt on inside surface of outer belt(s).	1. Track tension is too tight. 2. Rear idler wheels do not turn or otherwise damaged.	1. Set track tension and alignment. 2. Install new rear idler wheels and set track tension and alignment.
Track is grooved or gouged on center belt.	1. Center brace(s) of skid frame hanging down and contacting inside surface of center belt.	1. Repair skid frame center brace and install new center belt if damage is excessive.
Internal drive lugs worn on inside surface.	1. Track is misaligned.	1. Set track tension and alignment. If lugs are worn excessively, install new outer belt(s).
Track ratchets or hits on body tunnel (top).	1. Track tension is too loose. 2. Track drive sprockets not timed in relation to drive lugs. 3. Track drive sprockets turn on shaft. 4. Internal drive lugs worn because of hourly usage.	1. Set track tension and alignment. 2. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 3. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 4. Install new outer belt(s).
Accelerated Hi-Fax Wear	1. Slide rail(s) is bent. 2. Badly worn cleat on surface that contacts hi-fax. 3. Track is misaligned.	1. Straighten slide rail(s) or install new skid frame. 2. Install new hi-fax and/or cleats. 3. Set track tension and alignment.

SKID FRAME REMOVAL

General

The specially-designed slide rail and torsion spring suspension system allows the Arctic Cat Snowmobile to maneuver and negotiate in most snow conditions. The slide rail operating principle is to create maximum track pressure on the snow surface. Proper adjustment, lubrication and overhaul will ensure proper operation, thereby contributing to total snowmobile performance.

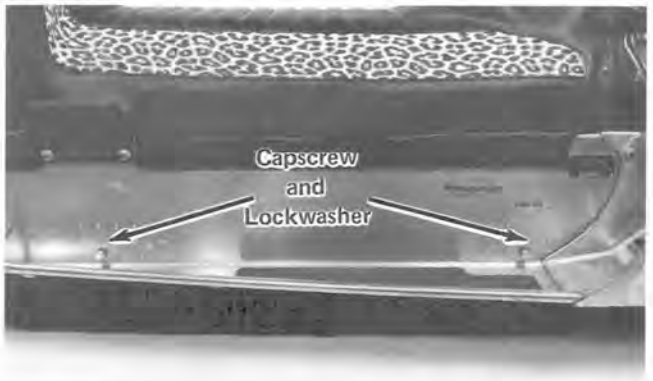
Skid Frame

Equipment Necessary: 9/16-Inch Socket, 3-Inch Extension and Quik Jack (Hoist)

1. Position the snowmobile in its normal upright position.

2. Remove 4 capscrews and lockwashers, Fig. VI-1, that secure front and rear skid frame mounting axles to the body tunnel, using a 9/16-inch socket and 3-inch extension.

Fig. VI-1

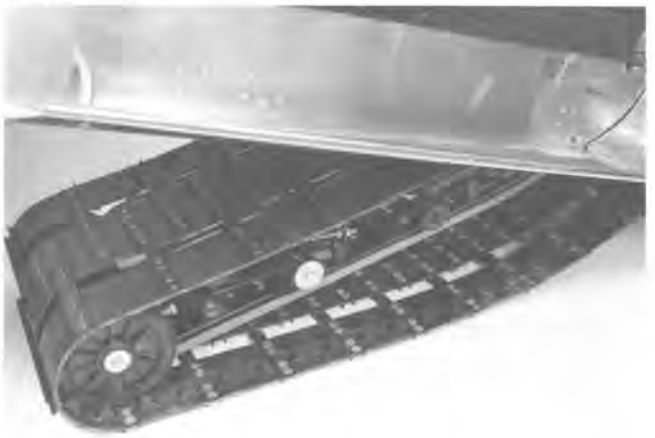


3. Raise rear of snowmobile off the floor approximately 2 feet, using a Quik Jack or similar type hoist.

Note: As rear is being raised, track and skid frame is to remain on floor.

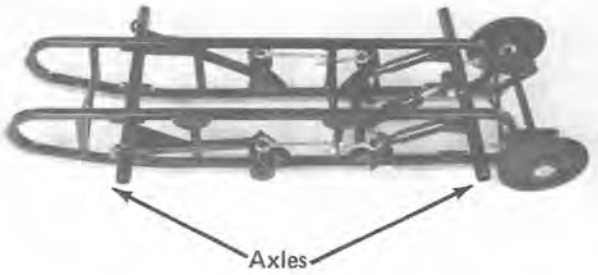
4. Grasp skid frame and pull from within track sections, Fig. VI-2.

Fig. VI-2



5. Slide the axles out of front and rear arms, Fig. VI-3.

Fig. VI-3



SKID FRAME DISASSEMBLY

Remove Hi-Fax Slides

Equipment Necessary: 1/2-Inch Chisel, Hammer and 5/16 x 1/8-Inch Punch

Note: Examine hi-fax slides for wear, cracks and deterioration. If conditions dictate, replace the hi-fax slides. A good indication of excessive hi-fax wear is when rivet heads are flush with top surface of hi-fax slide. If hi-fax slides will not be serviced, remove the front arm (see Remove Front Arm, page VI-4).

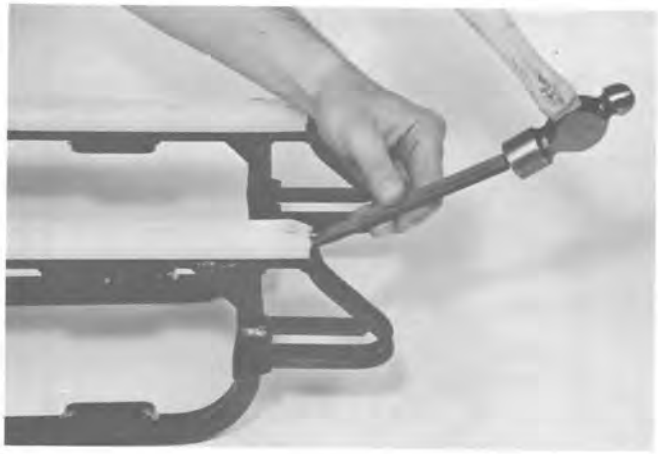
1. Set skid frame on a clean working surface; hi-fax slides to face upward.

2. Remove rivets that secure hi-fax slides to skid frame rail, using an air tool with 1/2-inch chisel. As an alternative, use hammer and a 1/2-inch chisel, Fig. VI-4.

Note: When removing rivets that secure hi-fax slides to skid frame, start at back of skid frame and work forward.

SKID FRAME DISASSEMBLY

Fig. VI-4



3. Remove all rivet ends from skid frame, using a 5/16 x 1/8-inch punch. DO NOT ELONGATE HOLES IN SKID FRAME.

Remove Front Arm

Equipment Necessary: 9/16-Inch Deep-Well Socket and 9/16-Inch Combination Wrench

1. Set the skid frame on a clean working surface; hi-fax side to contact working surface.

> **CAUTION**
> **Do not accidentally damage hi-fax slides when servicing skid frame. Accidental damage that is undetected will cause accelerated hi-fax wear and possible track deterioration.**

2. Loosen and remove nuts, Fig. VI-5, that secure eye bolt to skid frame mounting flange, using a 9/16-inch open end wrench. Repeat this step on opposite side eye bolt.

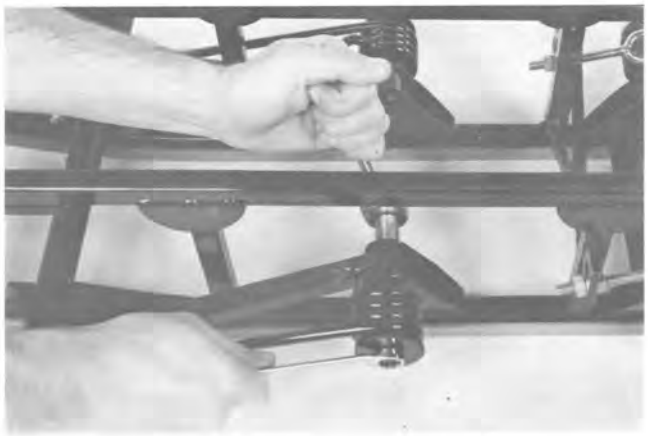
Fig. VI-5

3. Remove eye bolts from front springs, Fig. VI-6.

Fig. VI-6

4. Remove capscrew, large flat washer and locknut that secures front arm and springs to skid frame pivot mount, using a 9/16-inch socket and wrench, Fig. VI-7. Repeat this step on opposite side.

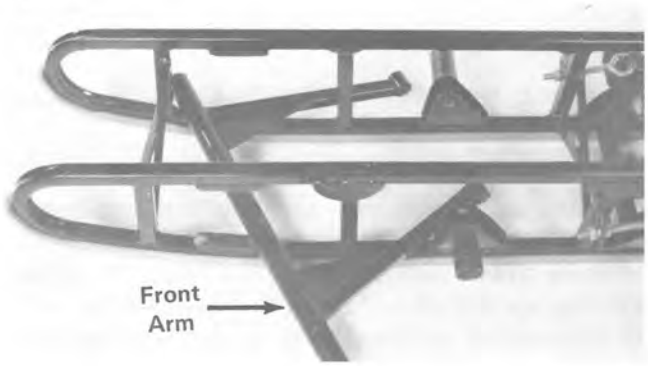
Fig. VI-7



5. Slide springs off front arm and skid frame pivot mounts.

6. Rotate front arm to the side and remove from within inside of skid frame, Fig. VI-8.

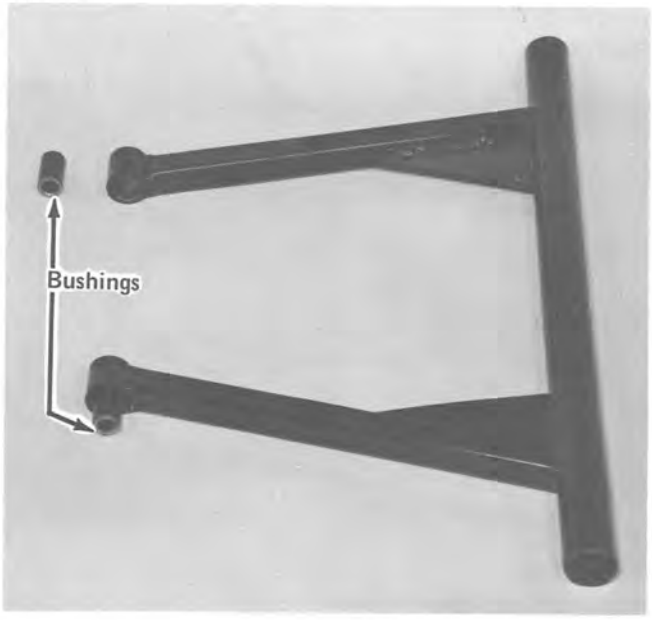
Fig. VI-8



SKID FRAME DISASSEMBLY

Note: Account for 2 bushings located in front arm pivot points, Fig. VI-9.

Fig. VI-9

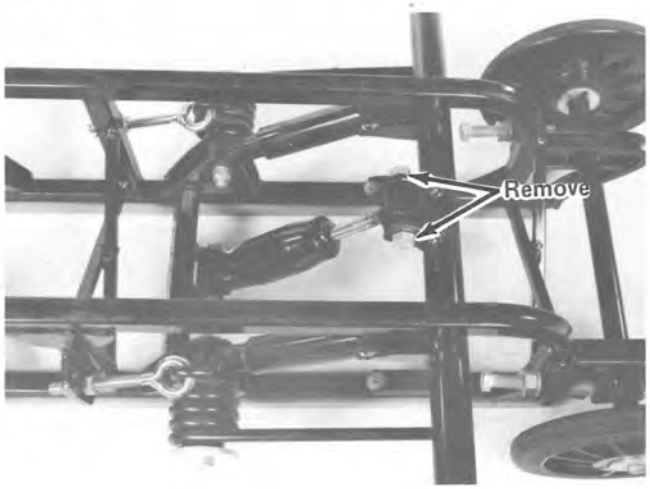


Remove Rear Arm

Equipment Necessary: 5/8-Inch Short Socket, 5/8-Inch Wrench, 9/16-Inch Deep-Well Socket and 9/16-Inch Combination Wrench

1. Remove locknut and capscrew, Fig. VI-10, that secures shock absorber to rear arm, using a 5/8-inch short socket and wrench.

Fig. VI-10

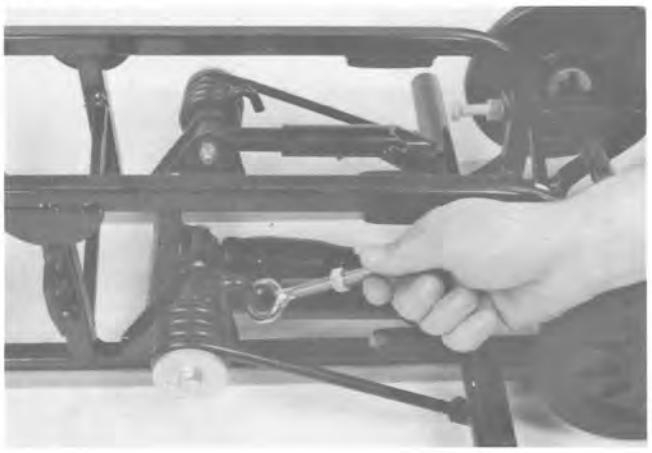


2. Loosen and remove nuts, Fig. VI-11, that secure eye bolt to eye bolt mounting flange, using a 9/16-inch deep-well socket and open end wrench. Repeat this step on opposite side eye bolt.

Fig. VI-11

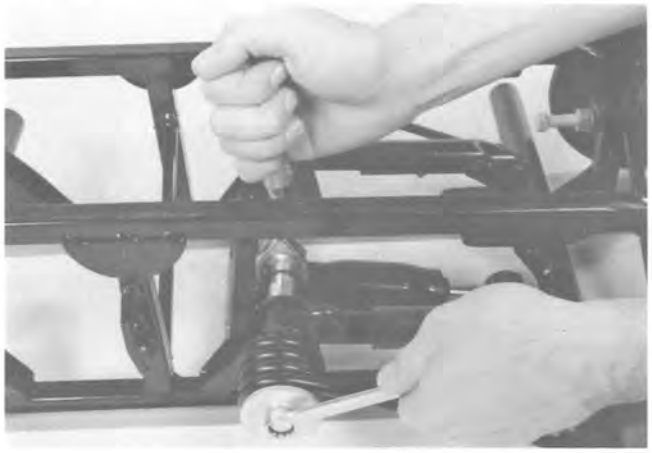
3. Remove eye bolts from rear springs, Fig. VI-12.

Fig. VI-12



4. Remove capscrew, large flat washer and locknut that secures rear arm and springs to rear arm mount, using a 9/16-inch socket and wrench, Fig. VI-13.

Fig. VI-13



SKID FRAME DISASSEMBLY

5. Pull rear arm backward until spring ends slide out of mounting holes, Fig. VI-14; then slide springs off spring pivot mounts.

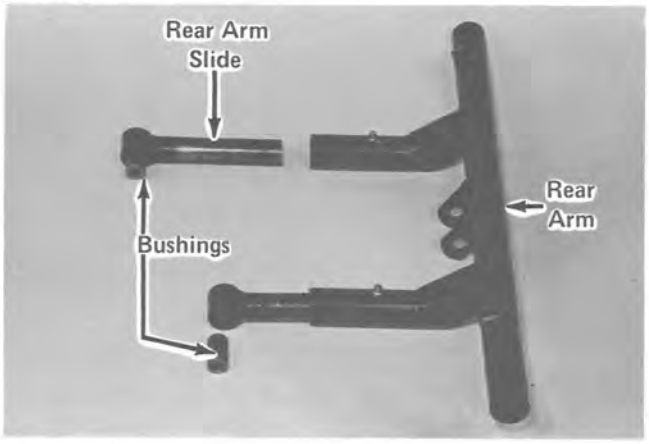
Fig. VI-14

6. Slide rear arm from within inside of skid frame, Fig. VI-15.

Fig. VI-15

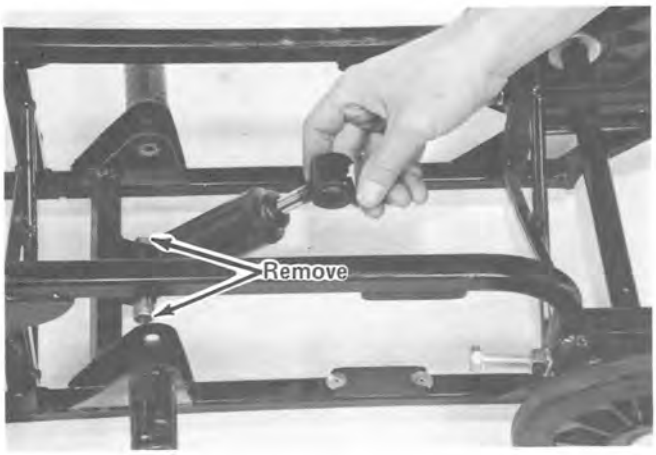
Note: Account for 2 bushings located in rear arm pivot points and separate rear arm slides from rear arm, Fig. VI-16.

Fig. VI-16



7. Remove locknut and capscrew, Fig. VI-17, that secures shock absorber to skid frame cross member mount, using a 5/8-inch short socket and wrench.

Fig. VI-17



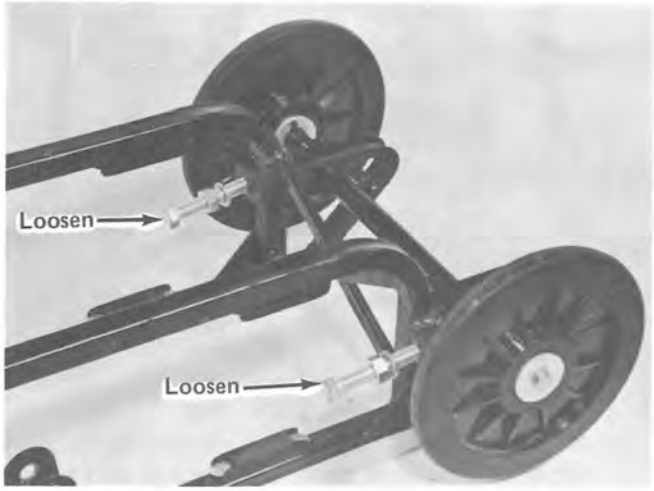
Remove Rear Idler Wheels

Equipment Necessary: 5/8-Inch Socket, 11/16-Inch Open End Wrench, 1/2-Inch Socket, Hammer, 5/16 x 1/8-Inch Punch, 3/16-Inch Allen Wrench and 1/2-Inch Nonferous Dowel

Note: If rear idler wheel is damaged and must be replaced, install 2 new rear idler wheels. A worn and a new rear idler wheel may cause track drive problems.

1. Loosen idler wheel adjusting bolts, Fig. VI-18, using a 5/8-inch socket on the bolt and 11/16-inch open end wrench on the nut.

Fig. VI-18



SKID FRAME DISASSEMBLY

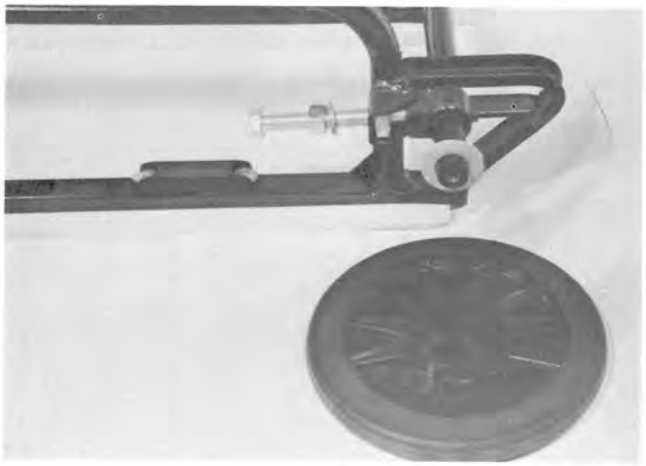
Note: If skid frame is damaged and replacement is necessary, remove the 2 idler wheel adjusting bolts, hex nuts, lockwashers and square nuts.

2. Remove capscrew and flat washer, Fig. VI-19, that secures idler wheel to idler wheel axle, using a 1/2-inch socket. Repeat this step on opposite side.

Fig. VI-19

3. Slide rear idler wheel and large flat washer off axle, Fig. VI-20.

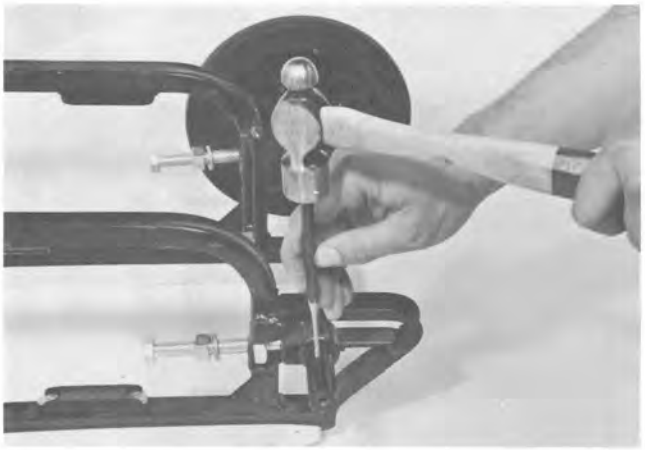
Fig. VI-20



Note: It may be necessary to tap lightly near center hub before rear idler wheel will slide off axle.

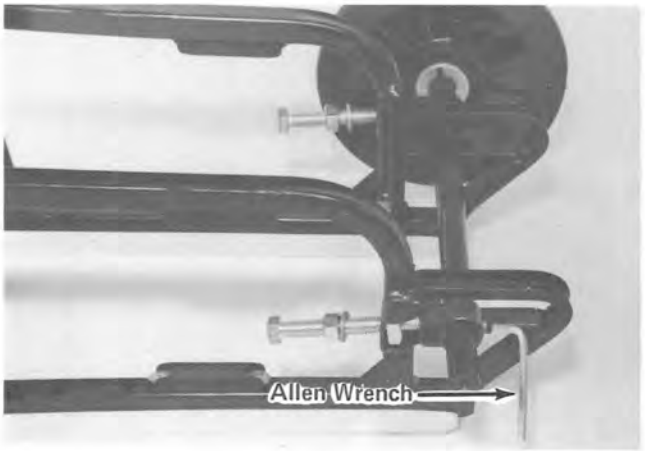
4. Remove drive pin from axle, using a hammer and 5/16 x 1/8-inch punch, Fig. VI-21.

Fig. VI-21



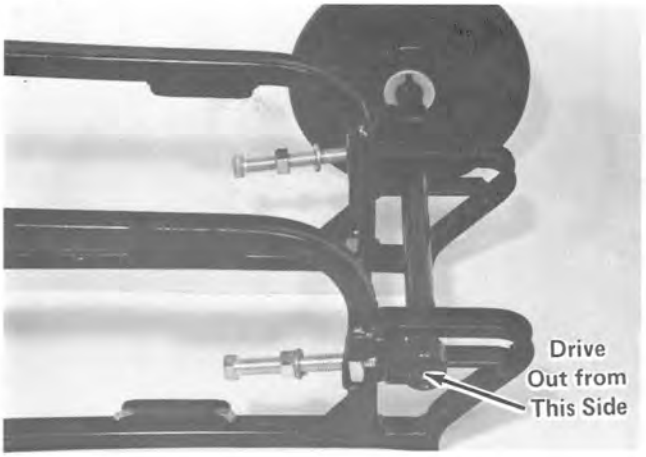
5. Remove set screw from spacer, using a 3/16-inch Allen wrench, Fig. VI-22. Remove set screw from opposite side spacer.

Fig. VI-22



6. Drive out rear axle, using a 1/2-inch nonferous dowel and hammer, Fig. VI-23.

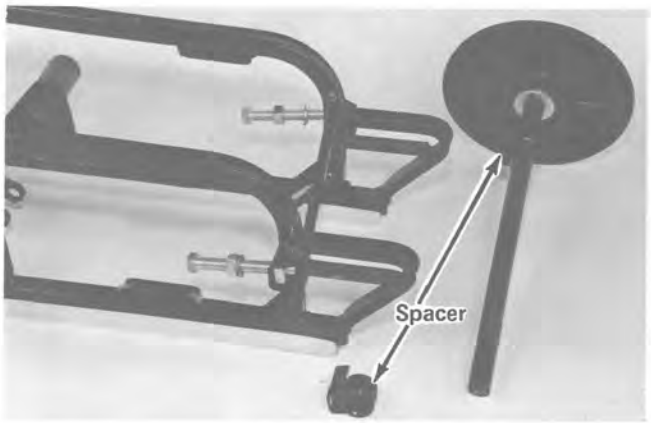
Fig. VI-23



SKID FRAME DISASSEMBLY

7. When axle is removed from within the skid frame, account for the 2 spacers, Fig. VI-24.

Fig. VI-24



8. Remove rear idler wheel and related components from opposite end of axle.

CLEANING

Cleaning

Equipment Necessary: Soap, Water, Clean Rag, Degreaser Solution, Compressed Air and Kerosene

1. Wash entire skid frame with soap and water; dry thoroughly with clean rag.

2. Touch up all rusted and chipped paint surfaces; sand affected skid frame area lightly before painting.

3. Remove bushings from front arm; clean arm and bushings with degreaser. Dry components thoroughly with compressed air.

4. Remove bushings from rear arm and separate rear arm from its sliding ends. Clean arm, sliding ends and bushings with degreaser. Also check rear arm spring bushings for wear and deterioration. Dry components thoroughly with compressed air.

5. Wash the rear idler wheels with soap and water; dry thoroughly with clean rag.

6. Wash remaining components in kerosene; dry thoroughly with compressed air.

INSPECTING COMPONENTS

Inspecting

Equipment Necessary: No Special Tools Required

1. Inspect all threaded components for stripped threads. Replace component(s) if damaged.

2. Inspect all bushings and corresponding pivot areas for damage, cracks and excessive wear. Replace component(s) if conditions dictate.

3. Inspect rear idler wheels for cracks, center hub wear and rubber deterioration. Replace both rear idler wheels if damage or wear is evident. Bearing must rotate freely.

Note: Rear idler wheels are to be replaced as a set, not as individual components.

4. Make sure that axles are not bent. Replace axle(s) if conditions dictate.

5. Inspect all springs for abnormal bends and cracks. Replace spring(s) if conditions dictate.

6. Inspect the eye bolts for separation of eye and abnormal bend. Replace component(s) if conditions dictate.

7. Inspect front and rear arm pivot points on skid frame. Repair any damage that exists.

8. Inspect eye bolt mounting flanges at center of skid frame. Repair any damage that exists.

9. Inspect the entire skid frame. No unusual bend is to be evident in the skid frame. Replace skid frame if conditions dictate.

SKID FRAME ASSEMBLY

Install Hi-Fax Slides

Equipment Necessary: Pop Rivets, Rivet Tool and Propane Torch

Note: Make sure skid frame and related components are clean (see Cleaning, page VI-9) and have been inspected for wear, defects and damage (see Inspecting, page VI-9).

1. Before attempting to install hi-fax slides on skid frame rail, make sure hi-fax is at room temperature (+70°F.).

2. Install a new hi-fax slide in first hole at curved end of skid frame rail, using a pop rivet and rivet tool.

3. With front of hi-fax slide secured to curved end of skid frame, carefully heat the hi-fax, using a propane torch. Immediately bend hi-fax slide into position on skid frame rail and continue to secure hi-fax slide, using rivets and rivet tool.

Note: Hi-fax slide is to be heated so as to conform with curved end of skid frame rail. If hi-fax slide is not heated, breakage may occur when riveting to curved section of skid frame rail.

4. Continue to secure hi-fax slide to remainder of skid frame rail.

5. Repeat steps 2 - 4 on opposite side skid frame rail.

Install Rear Idler Wheels

Equipment Necessary: Tape Measure, 3/16-Inch Allen Wrench, Hammer, 1/2-Inch Socket and Torque Wrench

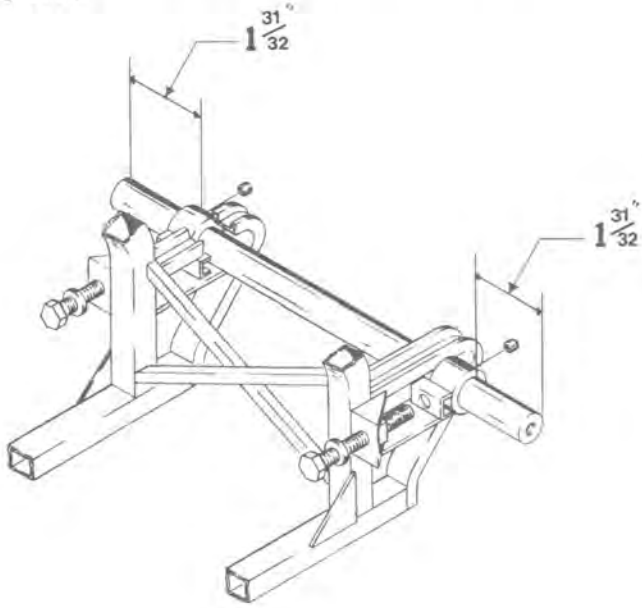
Note: Make sure skid frame and related components are clean (see Cleaning, page VI-9) and have been inspected for wear, defects and damage (see Inspecting, page VI-9).

1. If removed during disassembly, install idler wheel adjusting bolts, hex nuts, lockwashers and square nuts to the skid frame mounting flange.

Note: Adjusting bolts are to extend through square nuts only 1/4-inch.

2. Slide idler wheel axle between skid frame axle slide, Fig. VI-25.

Fig. VI-25

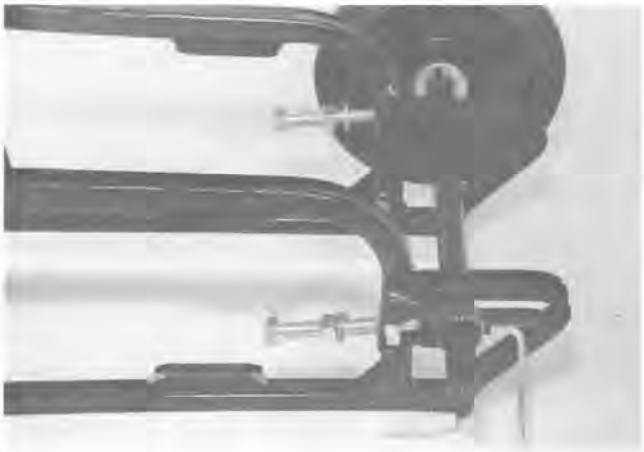


3. Slide spacers onto idler wheel axle, making sure that spacer extension is positioned to the inside (between skid frame axle slide).

4. Seat the spacers against the axle slides. Measure distance from outside edge of spacers to end of idler wheel axle, using a tape measure, Fig. VI-25. Correct measurement is when spacers are equidistant from axle ends.

5. When correct measurement is obtained, tighten both spacer set screws, using a 3/16-inch Allen wrench, Fig. VI-26. Tighten set screws securely.

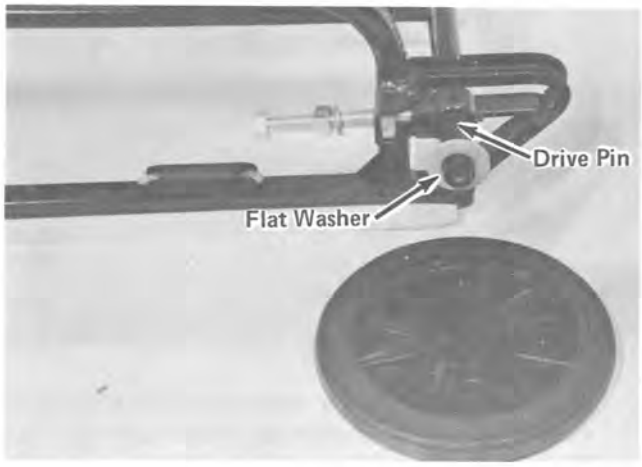
Fig. VI-26



SKID FRAME ASSEMBLY

6. Install drive pin, Fig. VI-27, in each end of idler wheel axle, using a hammer. Drive pin is to extend equally on both sides of axle.

Fig. VI-27



7. Place a large flat washer on the idler wheel axle, Fig. VI-27.

8. Hold rear idler wheel in position and secure to axle with capscrew and flat washer, Fig. VI-28, using a 1/2-inch socket. Tighten capscrew to 14 - 19 ft. lbs. torque, using a torque wrench.

Fig. VI-28

Note: Largest diameter recess at center of idler wheel is to fit against the large flat washer that contacts the drive pin, Fig. VI-27.

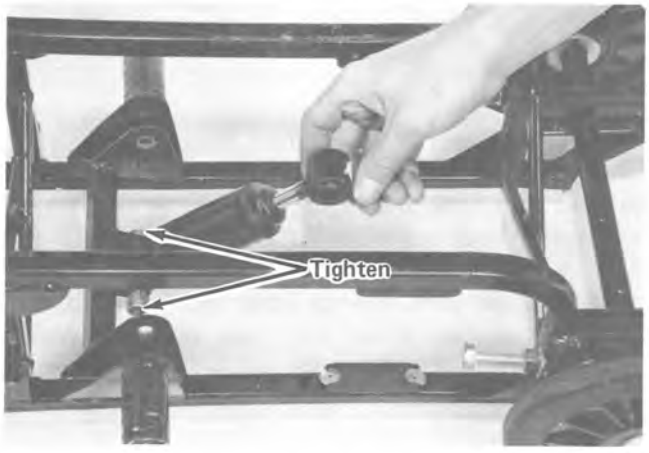
9. Repeat steps 7 and 8 on opposite side of idler wheel axle.

Install Rear Arm

Equipment Necessary: 5/8-Inch Short Socket, 5/8-Inch Wrench, 9/16-Inch Deep-Well Socket, 9/16-Inch Open End Wrench, Torque Wrench, Grease Gun and Low-Temperature Grease (Texaco 2346EP or Equivalent)

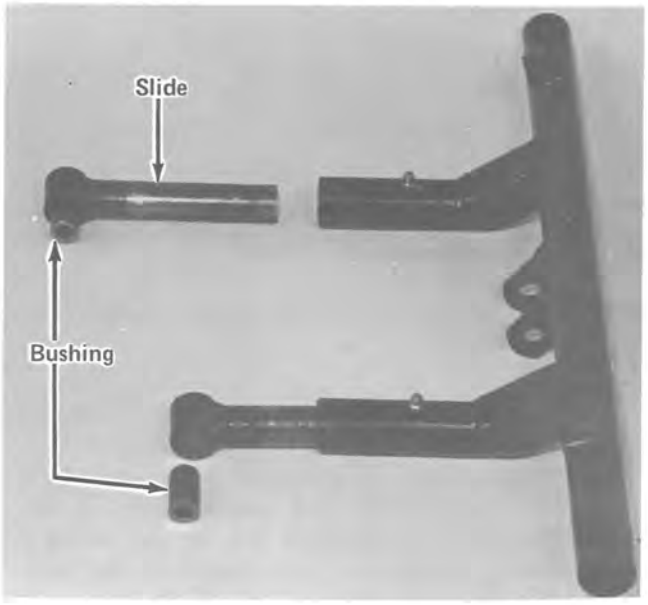
1. Install stationary end of shock absorber between the skid frame cross member mount and secure in place with capscrew and locknut, Fig. VI-29, using a 5/8-inch short socket and wrench. Tighten locknut to 45 - 55 ft. lbs. torque, using a 5/8-inch short socket and torque wrench.

Fig. VI-29



2. Install rear arm slides into rear arm and insert bushing into both rear arm slide pivot points, Fig. VI-30.

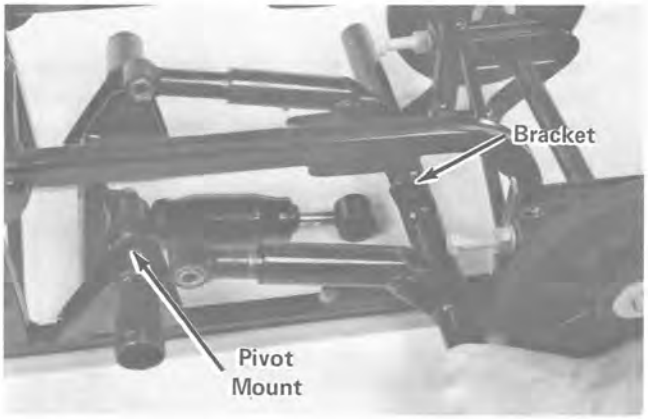
Fig. VI-30



SKID FRAME ASSEMBLY

3. Position rear arm assembly on inside of skid frame and allow rear arm pivot points to slide between rear arm pivot mounts on the skid frame, Fig. VI-31.

Fig. VI-31



Note: Ensure rear arm shock mounting bracket faces upward, Fig. VI-31. Upward position of shock mounting bracket is necessary for correct shock absorber installation.

4. Slide rear arm springs onto the spring pivot mounts, Fig. VI-32. Pull rear arm backward until spring ends can be slid into the rear arm mounting holes, Fig. VI-32. Push rear arm forward.

Fig. VI-32

Note: Hooked end of spring for eye bolt is to face inward.

5. Slide large flat washer onto capscrew. Secure the spring and rear arm to the skid frame with capscrew, large flat washer and locknut, using a 9/16-inch socket and wrench, Fig. VI-33. Tighten locknut to 35 ft. lbs. torque, using a 9/16-inch socket and torque wrench. Perform this step on opposite side of skid frame.

Fig. VI-33

6. Thread a nut halfway onto eye bolt and slide eye bolt onto hooked end of rear spring, Fig. VI-34. Perform this step on remaining eye bolt.

Fig. VI-34

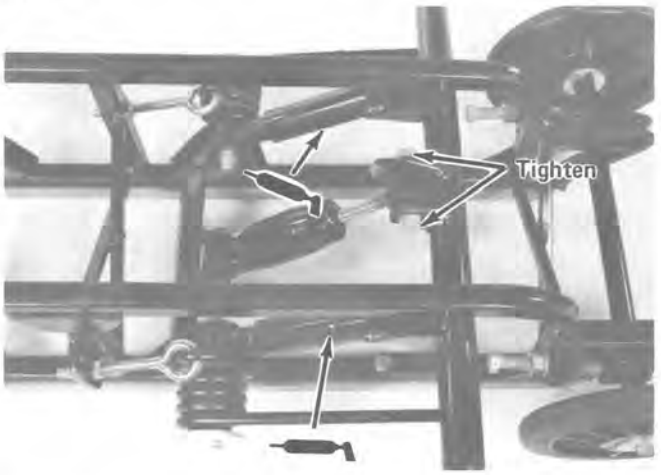
7. Slide both eye bolt ends through the respective eye bolt mounting flanges on the skid frame. Hold components in place and install nuts on both eye bolts, Fig. VI-35.

Fig. VI-35

SKID FRAME ASSEMBLY

8. Secure shock absorber to rear arm with a capscrew and locknut, Fig. VI-36, using a 5/8-inch short socket and wrench. Tighten locknut to 45 - 55 ft. lbs. torque, using a 5/8-inch short socket and torque wrench.

Fig. VI-36



9. Tighten eye bolt adjusting nut so approximately 5/8-inch of eye bolt extends through the nut, Fig. VI-36, using a 9/16-inch deep-well socket. Lock adjustment in place by "bottoming" jam nut against eye bolt mounting flange, Fig. VI-36, using a 9/16-inch open end wrench. Perform this step on opposite side eye bolt.

Note: Make sure both eye bolts are adjusted equally.

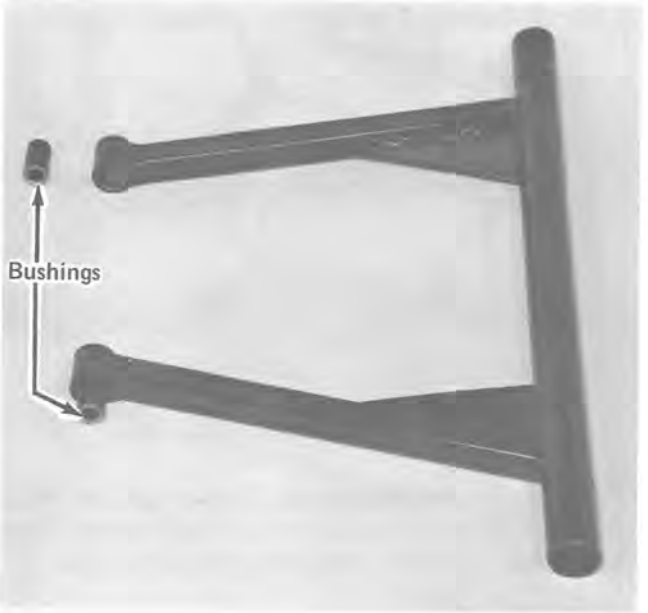
10. Lubricate the rear arms with low-temperature grease (Texaco 2346EP or equivalent), Fig. VI-36, using a hand grease gun. Two or three pumps on the grease gun handle will provide enough grease for proper lubrication.

Install Front Arm

Equipment Necessary: 9/16-Inch Deep-Well Socket, 9/16-Inch Open End Wrench and Torque Wrench

1. Insert bushing into front arm pivot points, Fig. VI-37.

Fig. VI-37



2. Position front arm on inside of skid frame, Fig. VI-38, and allow front arm pivot points to slide between front arm pivot mounts on the skid frame.

Fig. VI-38

3. Slide front arm springs onto front arms and spring pivot mount on the skid frame.

Note: Hooked end of spring for eye bolt is to face inward.

4. Slide large flat washer onto capscrew. Secure spring and front arm to the skid frame with capscrew, large flat washer and locknut, using a 9/16-inch socket and wrench, Fig. VI-39. Tighten locknut to 45 - 55 ft. lbs. torque, using a 9/16-inch socket and torque wrench. Perform this step on opposite side of skid frame.

SKID FRAME ASSEMBLY

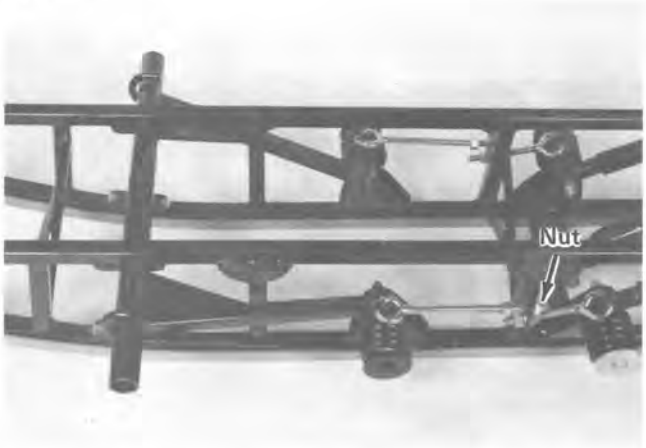
Fig. VI-39

5. Thread a nut halfway onto eye bolt and slide eye bolt onto hooked end of front spring, Fig. VI-40. Perform this step on remaining eye bolt.

Fig. VI-40

6. Slide both eye bolt ends through the respective eye bolt mounting flanges on the skid frame. Hold components in place and install nuts on both eye bolts, Fig. VI-41.

Fig. VI-41



7. Tighten eye bolt adjusting nut so that approximately 1/2-inch of eye bolt extends through the nut, using a 9/16-inch open end wrench. Lock adjustment in place by "bottoming" jam nut against eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side eye bolt.

Note: Make sure both eye bolts are adjusted equally.

SKID FRAME INSTALLATION

Install Skid Frame

Equipment Necessary: Low-Temperature Grease (Texaco 2346EP or Equivalent), Cardboard, 9/16-Inch Socket, 3-Inch Extension and Torque Wrench

1. Spread a light film of low-temperature grease (Texaco 2346EP or equivalent) on the front and rear skid frame mounting axles.

2. Tip snowmobile onto its side and use a piece of cardboard to protect against scratching.

3. Pull track away from body tunnel and install skid frame within the confines of the track. Slide axles through front and rear arms of the skid frame.

4. Move front arm of skid frame into position with front mounting hole in the body tunnel. Slide lockwasher onto capscrew and secure front arm to tunnel, using a 9/16-inch socket. DO NOT TIGHTEN CAPSCREW – THREAD IN ONLY HALFWAY, Fig. VI-42.

Fig. VI-42

SKID FRAME INSTALLATION

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

5. Push skid frame and track up into the tunnel. Tip snowmobile onto its opposite side and use a piece of cardboard to protect against scratching.

6. Secure front arm to tunnel following directions given in step 4.

7. Move rear arm of skid frame into position with rear mounting holes in body tunnel. Slide lockwasher onto capscrew and secure rear arm to tunnel, using a 9/16-inch socket and 3-inch extension. DO NOT TIGHTEN CAPSCREW – THREAD IN ONLY HALFWAY, Fig. VI-43.

Fig. VI-43

Note: Rear arm of skid frame may not line up with mounting holes in tunnel. To obtain proper alignment of rear arm and mounting holes, drive rear arm in proper direction until alignment is obtained; a rubber hammer is to be used.

8. Tip snowmobile on opposite side and use a piece of cardboard to protect against scratching.

9. Slide lockwasher onto capscrew and secure rear arm to tunnel, using a 9/16-inch socket and 3-inch extension. Tip snowmobile upright.

10. Tighten front and rear arm mounting capscrews, Fig. VI-44, to 35 ft. lbs. torque, using a torque wrench.

Fig. VI-44

ADJUSTMENTS

Track Tension

Equipment Necessary: Quik Jack, 11/16-Inch Open End Wrench, 5/8-Inch Socket and Tape Measure

WARNING

Shut engine off and make sure ignition switch is in the OFF position. Personal injury may result if this warning is not complied with.

1. Make sure both rear idler wheels are positioned between the internal drive lugs, if the track is so equipped.

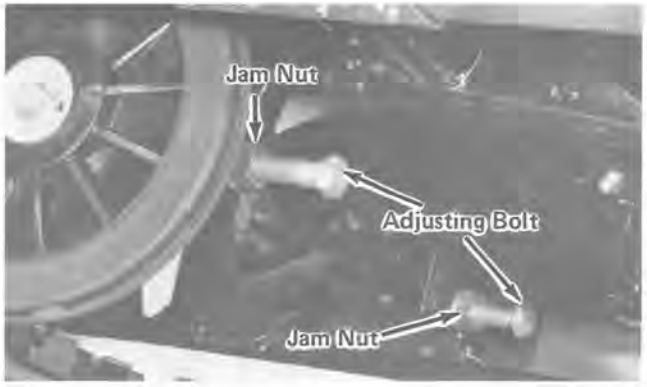
2. Using a Quik Jack, raise rear of snowmobile until track is completely off the shop floor.

3. Press down on track at midspan and measure distance between bottom of hi-fax slides and inside surface of track, using a tape measure. Desired distance is to be 1-1/4 - 1-1/2 inches.

4. If measurement is not 1-1/4 - 1-1/2 inches, loosen idler wheel adjusting bolt jam nut, Fig. VI-45, using an 11/16-inch open end wrench. Back jam nut off until it is approximately 1/2-inch away from the adjusting bolt head. Perform this step on opposite side idler wheel adjusting bolt jam nut.

5. If measurement obtained in step 3 is more than 1-1/2 inches, tighten adjusting bolts, Fig. VI-45. If measurement obtained in step 3 is less than 1-1/4 inches, loosen adjusting bolts, Fig. VI-45. When specified measurement (1-1/4 - 1-1/2 inches) is obtained, lock adjustment in place by bottoming jam nuts against skid frame, using an 11/16-inch open end wrench.

Fig. VI-45



Note: An excellent check at this time would be to slide your hand along the inside of the tunnel and vigorously push underside of track up and down. Track must not hit top of tunnel or slap on the skid frame.

6. After correct track tension is obtained, check track alignment (see Track Alignment, page VI-16).

Note: Track tension and track alignment are both interrelated; always perform both adjustments, even if only one particular adjustment seems necessary.

Track Alignment

Equipment Necessary: Quik Jack, 5/8-Inch Socket and 11/16-Inch Open End Wrench

Proper track alignment is obtained when rear idler wheels are equidistant from inside edges of internal drive lugs, and in the case of a cleat drive track, when track is equidistant from inside edge of tunnel, lift up snowflap to check alignment.

WARNING

Shut engine off and make sure ignition switch is in the OFF position. DO NOT allow anyone to stand in front or to the rear of the snowmobile when checking track alignment. Personal injury or bystander injury may result if this warning is not complied with.

1. Make sure both rear idler wheels are positioned between the internal drive lugs, if track is so equipped.

2. Using a Quik Jack, raise rear of snowmobile until track is completely off the shop floor and free to rotate. Skis are to be placed against a wall or another stationary object.

3. Start engine, accelerate slightly to turn the track several revolutions and SHUT ENGINE OFF (ignition switch in OFF position). Note to which side the track has run.

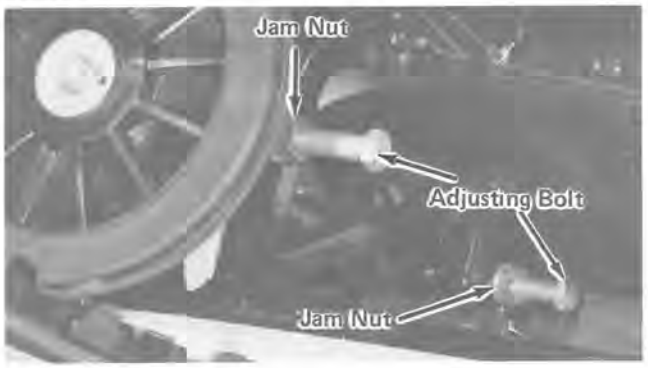
Note: Allow track to coast to a stop when checking track alignment. DO NOT apply brake as this may produce an inaccurate alignment condition.

4. If cleat drive track ran to the left or right or if idler wheels rub against inside surface of internal drive lugs, loosen idler wheel adjusting bolt jam nut, Fig. VI-46, using an 11/16-inch open end wrench. Back jam nut off until it is approximately 1/2-inch away from the adjusting bolt head. Perform this step on opposite side idler wheel adjusting bolt jam nut.

5. Rotate adjusting bolts, Fig. VI-46, clockwise or counterclockwise until proper alignment is established, using a 5/8-inch socket. Bottom jam nuts against skid frame, using an 11/16-inch open end wrench.

Note: After the jam nuts are bottomed against the skid frame, an equal length of bolt is to extend back from the jam nut to the bolt head. This relationship in itself will ensure proper track alignment.

Fig. VI-46



6. When adjustment is completed, lower rear of snowmobile, start engine and test run the track under actual operating conditions.

7. After test run is completed, recheck track alignment and adjust if necessary.

Note: Make sure correct track tension is maintained when alignment is adjusted.

Suspension Adjustment

Equipment Necessary: 9/16-Inch Open End Wrench

The suspension is to be set up for either the operator only or the operator and passenger combined. Total operator and passenger weight have a direct influence on the rear adjustment. The front adjustment is to be made for snow conditions.

Hard Packed Snow — Front spring, Fig. VI-46, adjustment is to be increased (tighten adjusting nuts) to allow track to remain on top of the snow.

Trail Riding — If constant trail riding is anticipated, front spring, Fig. VI-47, adjustment is to be increased (tighten adjusting nuts), which will allow skis to be turned easier than when adjustment is loose. Tightening front adjusting nuts increases spring tension and as a result, decreases downward pressure on the skis; decreased pressure on skis accounts for easier turning effort characteristics. Loosening front adjusting nuts decreases spring tension and as a result, increases downward pressure on the skis; increased pressure on skis makes turning more difficult for the operator but the compensation is more positive turning characteristics.

To obtain the best ride, the suspension (front and rear springs) must be tensioned properly. The tension can be changed by adjusting the eye bolt pull against the springs.

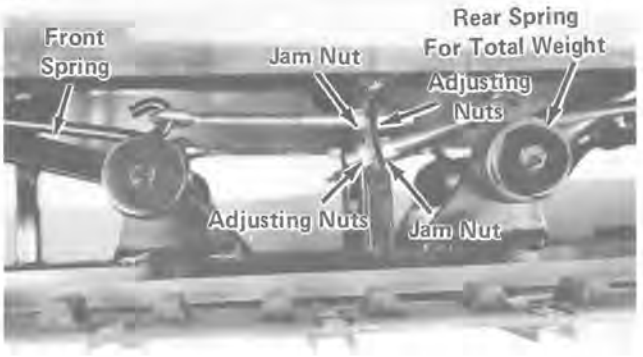
1. Back jam nut, Fig. VI-47, away from front or rear eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side.

2. Tighten or loosen adjusting nut, Fig. VI-47, to obtain desired suspension adjustment, using a 9/16-inch open end wrench. Perform this step on opposite side.

3. When desired tension is obtained, lock adjustment in place by bottoming jam nut, Fig. VI-47, against eye bolt mounting flange, using a 9/16-inch open end wrench. Perform this step on opposite side.

Note: Maintain equal suspension adjustment on both sides of the skid frame.

Fig. VI-47



NOTES

NOTES

NOTES

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TROUBLE SHOOTING

Problem	Condition	Remedy
Edge of track is frayed.	1. Track is misaligned. 2. Outer belts worn out because of hourly usage. 3. Track strikes rivets in tunnel, even though alignment is correct.	1. Set track tension and alignment. 2. Install new outer belt(s). 3. Remove affected rivets that are too long and install correct type rivet.
Track is grooved (worn) or burnt on inside surface of outer belt(s).	1. Track tension is too tight. 2. Rear idler wheels do not turn or otherwise damaged.	1. Set track tension and alignment. 2. Install new rear idler wheels and set track tension and alignment.
Track is grooved or gouged on center belt.	1. Center brace(s) of skid frame hanging down and contacting inside surface of center belt.	1. Repair skid frame center brace and install new center belt if damage is excessive.
Internal drive lugs worn on inside surface.	1. Track is misaligned.	1. Set track tension and alignment. If lugs are worn excessively, install new outer belt(s).
Track ratchets or hits on body tunnel (top).	1. Track tension is too loose. 2. Track drive sprockets not timed in relation to drive lugs. 3. Track drive sprockets turn on shaft. 4. Internal drive lugs worn because of hourly usage.	1. Set track tension and alignment. 2. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 3. Install new track drive and replace outer belt(s) if drive lugs are worn excessively. 4. Install new outer belt(s).
Accelerated Hi-Fax Wear	1. Slide rail(s) is bent. 2. Badly worn cleat on surface that contacts hi-fax. 3. Track is misaligned.	1. Straighten slide rail(s) or install new slide rail. 2. Install new hi-fax and/or cleats. 3. Set track tension and alignment.

SKID FRAME REMOVAL

General

The El Tigre model Z suspension system features a lightweight, torsion spring, slide rail skid frame designed specifically for racetrack competition. Its responsiveness to driver weight shifts allows for quick, positive acceleration and excellent power-on maneuverability. When properly adjusted and maintained, the model Z suspension system will ensure optimum snowmobile performance under most snow conditions.

Skid Frame

Equipment Necessary: Quik-Jak, 3-Inch Extension, 9/16-Inch Socket, and 9/16-Inch Combination Wrench

1. Position the snowmobile upright.

2. Remove 2 cap screws and lock washers that secure front arm of skid frame to the body tunnel, using a 9/16-inch socket and 3-inch extension.

3. Remove 2 lock nuts and flat washers holding rear arms of skid frame to the body tunnel, using a 9/16-inch socket with 3-inch extension and 9/16-inch combination wrench. Remove cap screws and large flat washers from within tunnel.

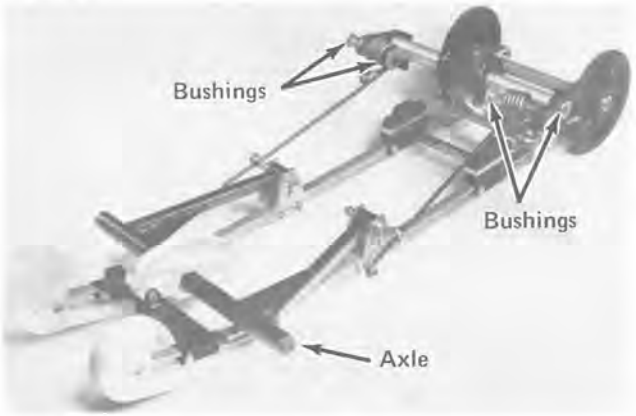
4. Raise rear of snowmobile off the floor approximately 2 feet, using a Quik-Jak or other suitable hoist.

Note: As rear is being raised, track and skid frame are to remain on floor.

5. Grasp skid frame and pull from within track.

6. Slide axle out of front arm and remove bushings from rear arms, Fig. VIA-1.

Fig. VIA-1



SKID FRAME DISASSEMBLY

Remove Hi-Fax Slides

Equipment Necessary: Hammer and 5/16 x 1/8-Inch Punch

Note: Examine hi-fax slides for wear, cracks, and deterioration. The hi-fax is 3/4-inch thick when new. As a general rule, the slide(s) should be replaced when hi-fax is no more than 7/16-inch thick as measured at midpoint of the slide rail. If hi-fax slides need not be serviced, remove front arm and front arm stop (See: Remove Front Arm and Front Arm Stop, page VIA-4).

1. Set skid frame on a clean working surface; hi-fax slides to face upward.

2. Remove spring pins that secure hi-fax to skid frame rail, Fig. VIA-2, using a hammer and a 5/16-inch punch.

Fig. VIA-2

3. Remove worn hi-fax, using an air-tool with a 1/2-inch chisel. As an alternative, use a hammer and a 1/2-inch chisel.

Note: When removing hi-fax slides, start at rear of skid frame and work forward.

SKID FRAME DISASSEMBLY

Remove Front Arm and Front Arm Stop

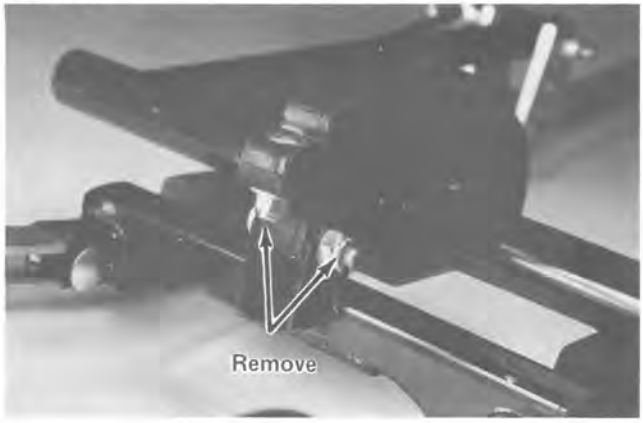
Equipment Necessary: 1/2-Inch Socket, 1/2-Inch Combination Wrench, 9/16-Inch Deep-Well Socket, and 9/16-Inch Combination Wrench

1. Place the skid frame on a clean working surface; hi-fax side to contact working surface.

> **● CAUTION ●**
> **Do not accidentally damage hi-fax slides when servicing skid frame. Damage that goes undetected will cause accelerated hi-fax wear and possible track deterioration.**

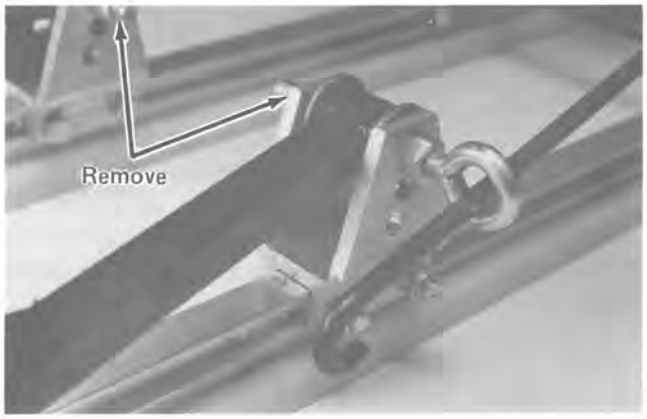
2. Remove cap screw and lock nut securing front arm stop to front rail brace, Fig. VIA-3, using a 1/2-inch socket and wrench.

Fig. VIA-3



3. Remove nuts that secure eyebolts and front arm pivots to front arm pivot brackets, Fig. VIA-4, using a 9/16-inch deep-well socket and open-end wrench.

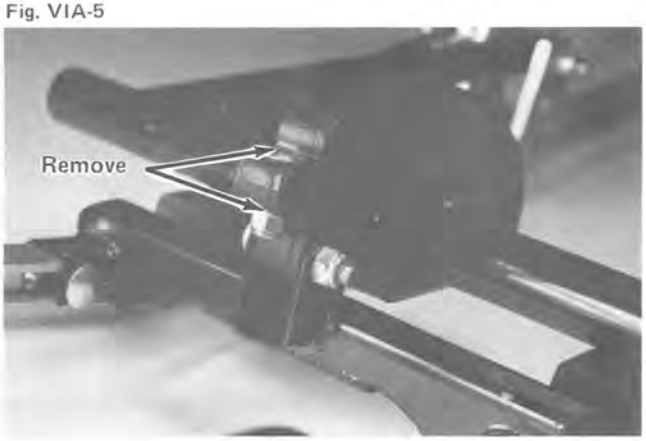
Fig. VIA-4



4. Remove eyebolts from springs. Front arm and front arm stop are now free of skid frame.

5. Take front arm stop off front arm by removing lock nut, flat washer, and machine screw holding one end of front arm stop together, using 7/16-inch combination wrench and a screwdriver having a 7/16-inch blade, Fig. VIA-5. Then pry stop apart and remove from arm.

Fig. VIA-5



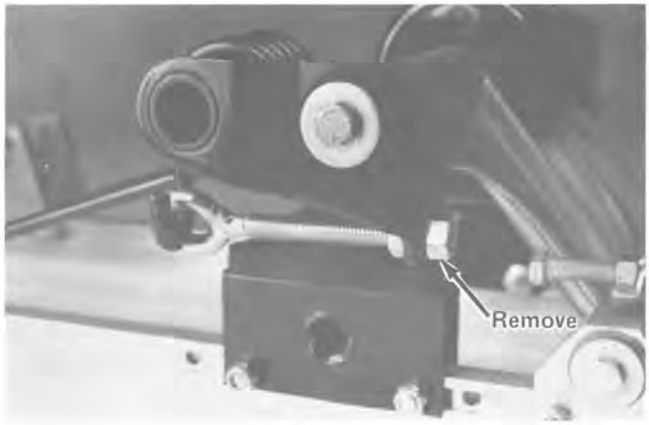
Remove Rear Arm

Equipment Necessary: Hammer, 5/16 x 1/8-Inch Punch, 1/2-Inch Socket, 1/2-Inch Combination Wrench, 9/16-Inch Socket, and 9/16-Inch Combination Wrench

1. Remove lock nut that secures eyebolt to flange of rear mounting bracket, Fig. VIA-6, using a 9/16-inch socket and open-end wrench. Repeat this step on opposite side eyebolt.

SKID FRAME DISASSEMBLY

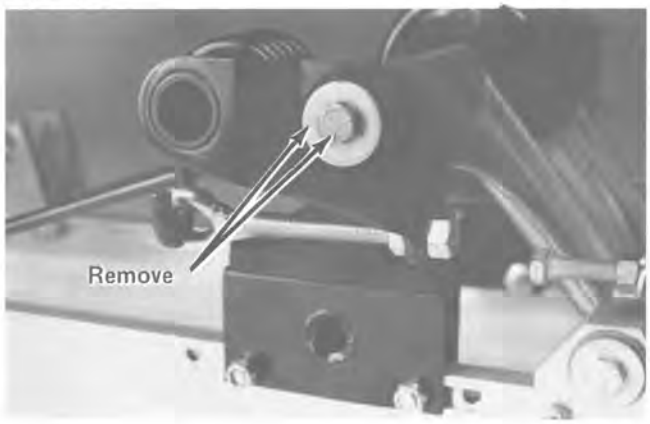
Fig. VIA-6



2. Slide springs off the pivot arms of both rear mounting brackets.

3. Remove cap screw and flat washer holding rear mounting bracket to rear arm assembly, Fig. VIA-7, using a 1/2-inch socket. Repeat this step on opposite mounting bracket.

Fig. VIA-7

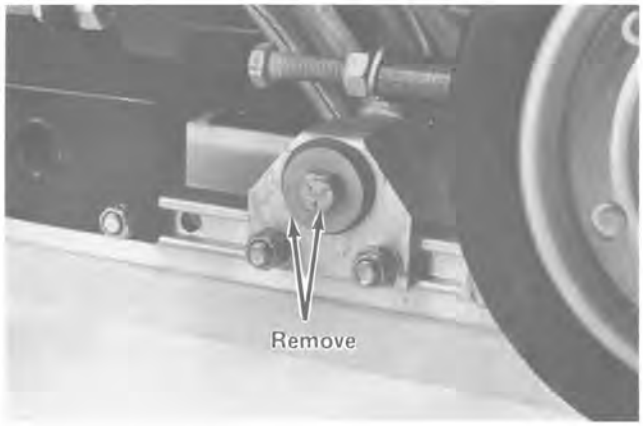


4. Remove rear mounting brackets from splined ends of rear arm shaft by tapping lightly on inside of brackets with a hammer.

5. Drive out rear arm shaft. This also frees track guide idlers.

6. Remove cap screw and flat washer holding lower rear shaft and rear arm sections in rear arm pivot bracket, Fig. VIA-8, using a 1/2-inch socket and combination wrench. Repeat this step on opposite end of lower rear shaft.

Fig. VIA-8



7. Remove spring pins holding lower rear shaft in rear arm sections, using a hammer and a 5/16 x 1/8-inch punch, Fig. VIA-9.

Fig. VIA-9

8. Drive out lower rear shaft. This also frees rear arm sections.

Note: To ease shaft removal, first loosen cap screws and lock nuts holding rear arm pivot brackets to slide rails, using a 1/2-inch socket and combination wrench.

Remove Rear Idler Wheels

Equipment Necessary: Hammer and 1/2-Inch Socket

1. Remove cap screw and flat washer holding idler wheel to idler wheel axle, Fig. VIA-10, using a 1/2-inch socket. Repeat this step on opposite side idler wheel.

SKID FRAME DISASSEMBLY

Fig. VIA-10

2. Slide rear idler wheel, spacer sleeve, and flat washer off axle.

Note: It may be necessary to tap lightly near wheel hub with a hammer before wheel will slide off axle.

3. Repeat step 2 on opposite idler wheel.

4. Remove idler wheel axle from skid frame.

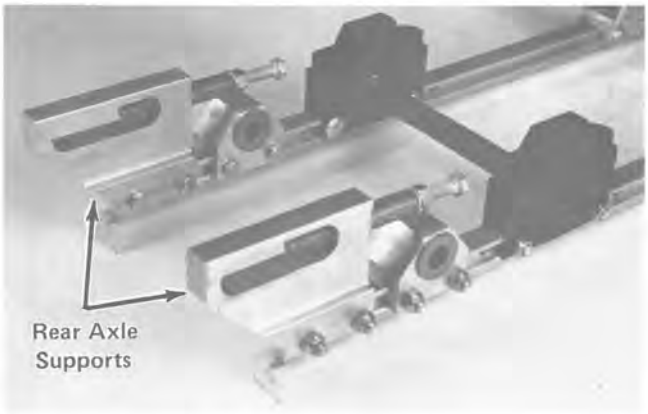
Remove Rear Axle Support

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

Note: To ensure correct reinstallation of pivot brackets, rail braces and clamps, and shock pads, scribe location marks on the rails before removal.

1. Remove cap screws and lock nuts holding rear axle support to slide rail, Fig. VIA-11, using a 1/2-inch socket and combination wrench.

Fig. VIA-11



2. Slide rear axle support off slide rail.

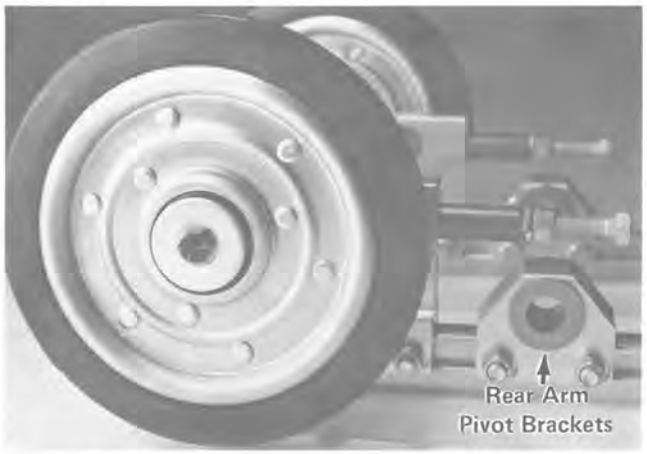
3. Repeat steps 1 and 2 on opposite side rear axle support.

Remove Rear Arm Pivot Bracket

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

1. Remove cap screws and lock nuts holding rear arm pivot bracket to slide rail, Fig. VIA-12, using a 1/2-inch socket and combination wrench.

Fig. VIA-12



2. Slide rear arm pivot bracket off slide rail.

3. Repeat steps 1 and 2 on opposite side rear arm pivot bracket.

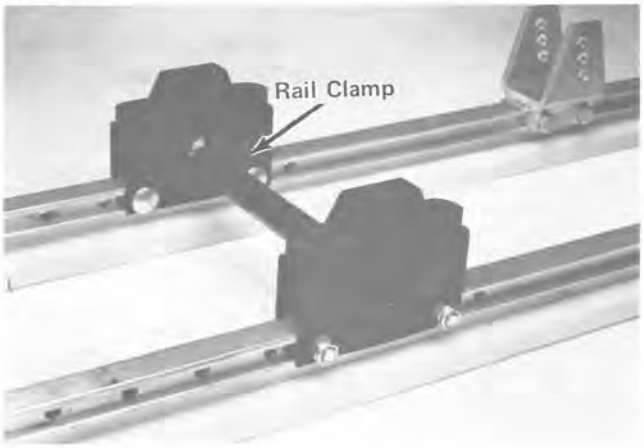
Remove Rail Clamp

Equipment Necessary: 1/2-Inch Socket

1. Remove carriage bolts and lock nuts holding clamp to slide rails, Fig. VIA-13, using a 1/2-inch socket.

SKID FRAME DISASSEMBLY

Fig. VIA-13



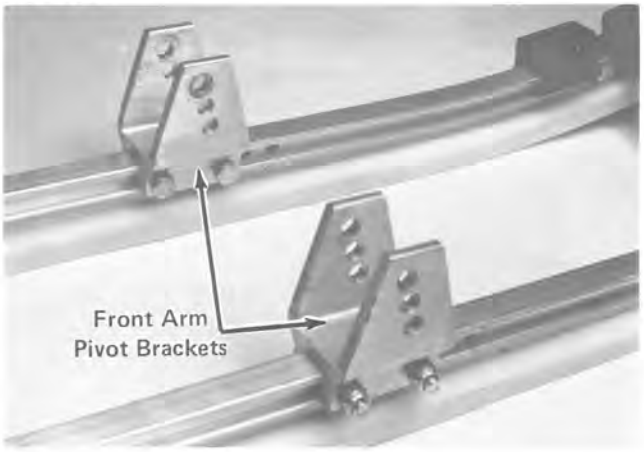
2. Slide or lift clamp off slide rails.

Remove Front Arm Pivot Bracket

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

1. Remove cap screws and lock nuts holding bracket to slide rail, Fig. VIA-14, using a 1/2-inch socket and combination wrench.

Fig. VIA-14



2. Slide pivot bracket off slide rail.

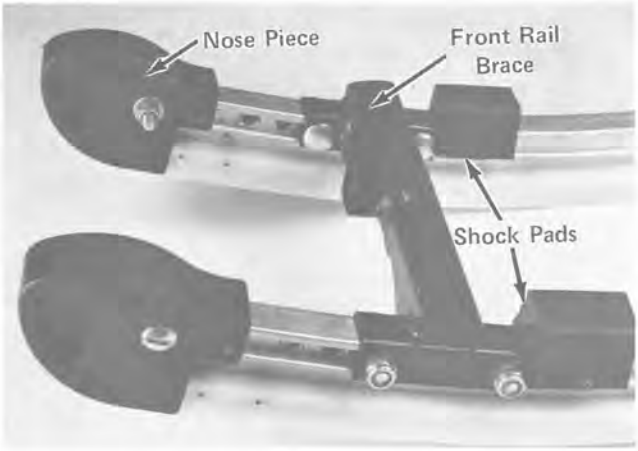
3. Repeat steps 1 and 2 on opposite side front arm pivot bracket.

Remove Nose Piece

Equipment Necessary: Hammer, 5/16 x 1/8-Inch Punch, Screwdriver Having a 7/16-Inch Blade, and 7/16-Inch Combination Wrench

1. Remove spring pin, using a hammer and a 5/16 x 1/8-inch punch, Fig. VIA-15.

Fig. VIA-15



2. Remove machine screw and lock nut, using a 7/16-inch combination wrench and a screwdriver having a 7/16-inch blade.

3. Slide nose piece off slide rail.

4. Repeat steps 1 thru 3 on opposite side nose piece.

Remove Front Rail Brace

Equipment Necessary: 1/2-Inch Socket

1. Remove carriage bolts and lock nuts holding brace to slide rails, Fig. VIA-15, using a 1/2-inch socket.

2. Slide or lift rail brace off slide rails.

Remove Rubber Shock Pad

Equipment Necessary: Hammer and 5/16 x 1/8-Inch Punch

1. Remove spring pin holding rubber pad to slide rail, Fig. VIA-15, using a hammer and a 5/16 x 1/8-inch punch.

2. Slide or pry rubber pad off slide rail.

3. Repeat steps 1 and 2 on opposite rail.

CLEANING AND INSPECTING

Cleaning

Equipment Necessary: Soap, Water, Clean Rag, Degreaser Solution, Compressed Air, and Kerosene

1. Touch up any rusted or chipped paint surfaces; sand affected areas lightly before painting.

2. Remove bushings from front arm; clean arm and bushings with degreaser. Dry components thoroughly with compressed air.

3. Clean rear arm sections, mounting rear arm shaft, lower rear shaft, brackets, and bushings with degreaser. Dry components thoroughly with compressed air.

4. Wash rear idler wheels and rear axle with soap and water; dry thoroughly with clean rag.

5. Wash all remaining parts in kerosene and dry thoroughly with compressed air.

Inspecting

Equipment Necessary: No Special Tools Required

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

1. Inspect all threaded parts for stripped threads.

2. Inspect all bushings and corresponding pivot areas for damage, cracks, and excessive wear.

3. Inspect rear idler wheels for cracks, center hub wear, and rubber deterioration. Bearing must rotate freely.

Note: Rear idler wheels are to be replaced as a set.

4. Inspect track guide idlers to be sure they are not cracked or broken.

5. Make sure that all shafts and axles are not bent.

6. Inspect all springs for abnormal bends and cracks.

7. Inspect eyebolts for separation of eye and abnormal bend.

8. Inspect slide rails. No unusual bends are to be evident.

SKID FRAME ASSEMBLY

Install Hi-Fax Slides

Equipment Necessary: Hammer and 5/16 x 1/8-Inch Punch

Note: Make sure slide rails and all related skid frame parts are clean (See: Cleaning, page VIA-8) and have been inspected for wear, defects, and damage (See: Inspecting Components, page VIA-8) before reassembling skid frame.

1. Before installing hi-fax slides on skid frame rail, make sure hi-fax is at room temperature (70°F).

2. Fit front end of hi-fax slide (the end with spring pin holes) onto rear of slide rail.

3. Using a hammer, carefully drive the hi-fax slide onto the rail to the point where spring pin holes in hi-fax align with spring pin holes in slide rail.

4. Install spring pins, using a hammer, Fig. VIA-16.

Fig. VIA-16

5. Repeat steps 2 thru 4 on opposite rail.

SKID FRAME ASSEMBLY

Install Rubber Shock Pad

Equipment Necessary: Hammer

1. Position rubber shock pad over rail with holes in pad aligning with hole in rail.

2. Install spring pin to hold rubber shock pad securely on slide rail.

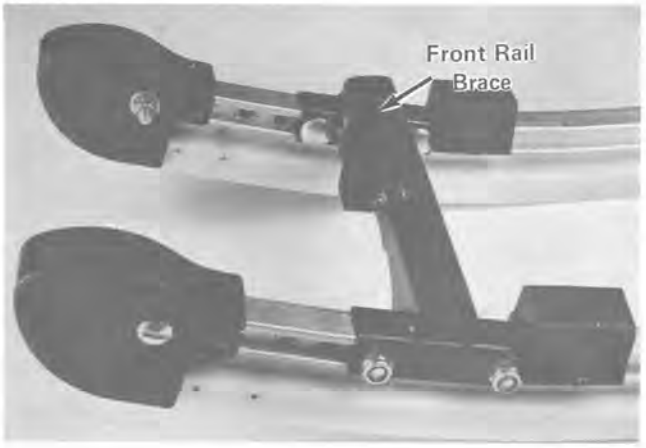
3. Repeat steps 1 and 2 on opposite rail.

Install Front Rail Brace

Equipment Necessary: 1/2-Inch Socket

1. Fit mounting bracket of brace over both rails so that mounting holes in brace align with holes in rail, Fig. VIA-17. Make sure front arm stop mounting bracket is toward front of skid frame.

Fig. VIA-17



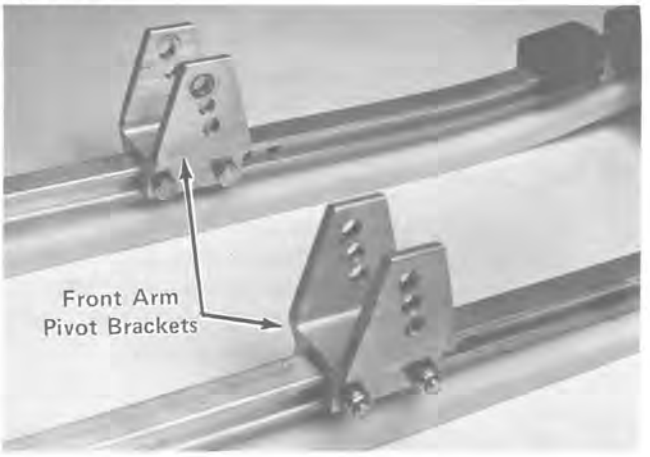
2. Secure rail brace to rails with carriage bolts and lock nuts, using a 1/2-inch socket. Carriage bolt heads are to be to inside of skid frame. DO NOT TIGHTEN NUTS.

Install Front Arm Pivot Bracket

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

1. Fit pivot bracket onto rear of slide rail. Move bracket forward until mounting holes in bracket align with holes in rail, Fig. VIA-18. Make sure bracket is reinstalled in same position as before disassembly.

Fig. VIA-18



2. Secure pivot bracket to rail with cap screws and lock nuts, using 1/2-inch socket and combination wrench. Cap screw heads are to be to inside of skid frame.

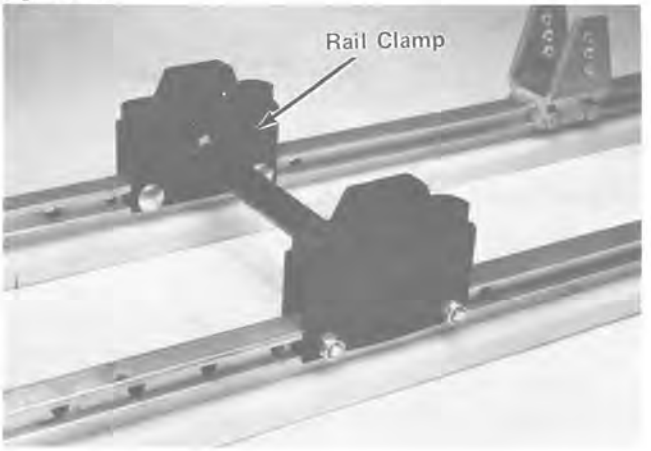
3. Repeat steps 1 and 2 on opposite rail.

Install Rail Clamp

Equipment Necessary: 1/2-Inch Socket

1. Fit mounting brackets of clamp over both rails so that mounting holes in clamp align with holes in rail, Fig. VIA-19. Make sure clamp is reinstalled in same position as before disassembly.

Fig. VIA-19



2. Secure clamp to rails with carriage bolts and lock nuts, using a 1/2-inch socket. Carriage bolt heads are to be to inside of skid frame.

SKID FRAME ASSEMBLY

3. Tighten nuts on both front rail brace and rail clamp.

Install Rear Axle Support

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

1. Fit pivot bracket onto rear of slide rail. Move bracket forward until rail mounting holes in bracket align with holes in rail, Fig. VIA-20. Make sure bracket is reinstalled in same position on rail as before disassembly.

Fig. VIA-20

2. Secure pivot bracket to rail with cap screws and lock nuts, using 1/2-inch socket and combination wrench. Cap screw heads are to be to inside of skid frame. DO NOT TIGHTEN NUTS.

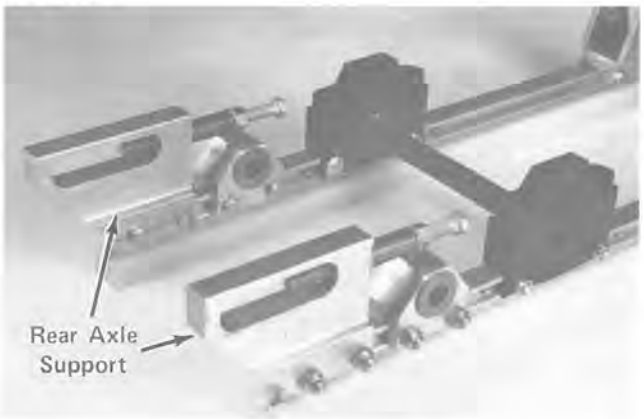
3. Repeat steps 1 and 2 on opposite rail. DO NOT TIGHTEN NUTS.

Install Rear Axle Support

Equipment Necessary: 1/2-Inch Socket and 1/2-Inch Combination Wrench

1. Fit rear axle support onto rear of slide rail. Move support forward until mounting holes in axle support align with holes in rail, Fig. VIA-21. Make sure axle support is reinstalled in same position as before disassembly.

Fig. VIA-21



2. Secure rear axle support to rail with cap screws and lock nuts, using 1/2-inch socket and combination wrench. Cap screw heads are to be to inside of skid frame.

3. Repeat steps 1 and 2 on opposite rail.

Install Rear Idler Wheel

Equipment Necessary: 1/2-Inch Socket and Torque Wrench

1. Slide idler wheel axle through axle mounting holes in rear axle brackets.

2. Slide flat washer and spacer sleeve onto end of idler wheel axle.

3. Place idler wheel onto axle and secure with cap screw and flat washer, using a 1/2-inch socket. Tighten cap screw to 14-19 ft-lb, using a torque wrench.

4. Repeat steps 2 and 3 on opposite end of idler wheel axle.

Install Rear Arm

Equipment Necessary: Low-Temperature Grease (Texaco 2346 EP or Equivalent), Hammer, Torque Wrench, 1/2-Inch Socket, 9/16-Inch Socket, and 9/16-Inch Combination Wrench

1. Apply a light coating of low-temperature grease to lower rear shaft, Fig. VIA-22.

2. Install lower rear shaft through one rear arm pivot bracket, through both rear arm sections, and through opposite rear arm pivot bracket.

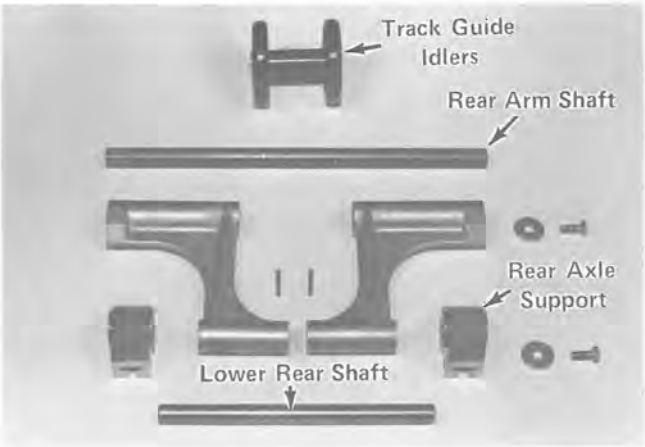
SKID FRAME ASSEMBLY

3. Secure lower rear shaft to rear arm pivot bracket with flat washer and cap screw, using a 1/2-inch socket. Repeat this step on opposite end of lower rear shaft. Tighten cap screws to 14-19 ft-lb, using a torque wrench.

4. Tighten cap screws and lock nuts on left and right rear arm pivot brackets, using a 1/2-inch socket and combination wrench.

5. Apply a light coating of low-temperature grease to rear arm shaft, Fig. VIA-22.

Fig. VIA-22



6. Install rear arm shaft through rear arm sections and track guide idlers. Fig. VIA-23 shows final assembly.

Fig. VIA-23

7. Install rear mounting bracket onto splined end of rear arm shaft. Repeat on opposite end of rear arm shaft. Using a hammer, tap mounting brackets lightly until shaft ends are flush with outside edges of both rear mounting brackets. Make sure both rear mounting brackets are installed as mirror images of each other.

Note: Both rear mounting brackets must be mounted identically on shaft splines to ensure correct skid frame operation.

8. Secure rear mounting bracket to shaft with cap screw and flat washer, using a 1/2-inch socket. Repeat on opposite end of shaft. Tighten cap screws to 14-19 ft-lb, using a torque wrench.

9. Place springs onto arms of rear mounting brackets, making sure that hooks for eyebolts are to outside of skid frame.

10. Place eyebolts over hooks of springs. Slide both eyebolt ends through holes in their respective rear mounting flanges and secure with nuts, using a 9/16-inch socket and combination wrench. Fig. VIA-24 shows final assembly.

Fig. VIA-24

Install Front Arm and Front Arm Stop

Equipment Necessary: Screwdriver Having a 7/16-Inch Blade, 7/16-Inch Socket, 1/2-Inch Socket, 1/2-Inch Combination Wrench, 9/16-Inch Deep-Well Socket, and 9/16-Inch Combination Wrench

1. Install front arm stop on front arm by prying stop halves apart and placing stop over the cross piece of the front arm. Install machine screw, flat washer, and lock nut in front arm stop, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket.

SKID FRAME ASSEMBLY

2. Apply a light coating of low-temperature grease (Texaco 2346 EP or equivalent) to front arm pivot bushings. Insert bushings into front arm pivot points and position pivots in front arm pivot brackets, Fig. VIA-25.

Fig. VIA-25

3. Hook end of spring through eyebolt and install end of eyebolt through front arm pivot bracket and front arm pivot.

4. Secure eyebolt with self-locking nut, using a 9/16-inch deep-well socket and combination wrench.

5. Repeat steps 2 and 3 with opposite side eyebolt.

6. Secure front arm stop to front rail brace with cap screw and lock nut, using a 1/2-inch socket and combination wrench.

Install Nose Piece

Equipment Necessary: Screwdriver Having a 7/16-Inch Blade, Hammer, and 7/16-Inch Combination Wrench

1. Slide nose piece onto front of slide rail so that mounting holes in nose piece for machine screw and spring pin align with holes in slide rail.

2. Install machine screw and lock nut, using a 7/16-inch combination wrench and a screwdriver having a 7/16-inch blade.

3. Install spring pin, using a hammer.

4. Repeat steps 1 thru 3 on opposite side nose piece.

SKID FRAME INSTALLATION

Install Skid Frame

Equipment Necessary: Torque Wrench, Cardboard, 9/16-Inch Socket, and 9/16-Inch Combination Wrench

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

2. Relax spring tension on both rear arm assemblies of skid frame by loosening nuts on eyebolts.

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

3. Move the front mounting arm of the skid frame into position with front mounting holes in side of tunnel. Secure front arm to tunnel with cap screw and lock washer, using a 9/16-inch socket. DO NOT TIGHTEN CAP SCREW; THREAD IN ONLY HALFWAY.

Note: The El Tigre model Z has three holes in each side of the tunnel for mounting the front arm of the skid frame. The skid frame is correctly installed when the front mounting arm is aligned with and secured through the rear of these three holes.

4. Push skid frame and track into tunnel and tip snowmobile over onto opposite side, using cardboard to protect against scratching.

5. Secure front mounting arm to tunnel as in step 3. DO NOT TIGHTEN CAP SCREW; THREAD IN ONLY HALFWAY.

6. Install metal bushing into outside end of each of the two rear mounting arms. While holding the bushings in place, push rear of skid frame up into tunnel.

7. Move rear mounting arm into position so that hole in bushing aligns with rear mounting hole in tunnel.

SKID FRAME INSTALLATION

Note: The El Tigre model Z has two holes in each side of the tunnel for mounting the rear arms of the skid frame. The skid frame is correctly installed when the rear mounting arms are aligned with and secured through the rear of these two holes.

8. Install another metal bushing into inside end of rear mounting arm. Hold bushing in place while inserting cap screw with large flat washer, from inside of tunnel, through both bushings in rear arm and out through rear mounting hole in tunnel. Secure with small flat washer and self-locking nut, using a 9/16-inch socket and combination wrench. DO NOT TIGHTEN.

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

10. Install metal bushing into inside end of rear mounting arm and secure arm as in step 8. DO NOT TIGHTEN.

11. Tip snowmobile upright.

12. Tighten all skid frame mounting bolts to 35 ft-lb, using a torque wrench and a 9/16-inch socket.

ADJUSTMENTS

General

All the different components of the model Z suspension system function together as interrelated parts of the overall system. Therefore, for best performance results, it is very important to know what each suspension component does and how each adjustment affects performance under all types of conditions. The correct suspension set-up for the individual driver can only be determined through careful trial and error experimentation and testing by the driver himself.

⚠ WARNING ⚠

Shut engine off and make sure ignition switch is in the OFF position before checking track tension. Personal injury may result if this warning is ignored.

Track Tension

Equipment Necessary: Quik-Jak, Tape Measure, 9/16-Inch Socket, and 9/16-Inch Open End Wrench

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

2. Make sure both rear idler wheels are positioned between the internal drive lugs.

3. Grasp the track at midpoint along the slide rails and pull down. Correct tension exists when the track can be pulled away from the hi-fax a distance of 3/4 to 1 inch.

4. If an adjustment is required, loosen jam nuts on idler wheel adjusting bolts, Fig. VIA-26, using a 9/16-inch open-end wrench. Loosen the jam nuts until they are approximately 1/2 inch away from bolt heads.

5. To obtain proper track tension, turn track tension adjusting bolts (clockwise to increase tension, counterclockwise to decrease tension), using a 9/16-inch socket. Rotate bolts until the proper track tension is obtained. Then lock adjustment in place by bottoming jam nuts, using a 9/16-inch open-end wrench.

Note: Both adjusting bolts must be adjusted equally.

6. When correct track tension is obtained, check track alignment (See: Track Alignment, page VIA-14).

Note: Track tension and track alignment are interrelated; always perform both adjustments, even if only one particular adjustment seems necessary. Always establish correct track tension before checking and/or adjusting alignment.

ADJUSTMENTS

Track Alignment

Equipment Necessary: Tape Measure, Quik-Jak, 9/16-Inch Socket, and 9/16-Inch Open-End Wrench

1. Make sure ignition switch is in the OFF position.

2. Using a Quik-Jak or other suitable hoist, raise rear of snowmobile until track is completely off the shop floor and free to rotate. Skis should be against a wall or other stationary object.

⚠ WARNING ⚠

DO NOT allow anyone to stand in front or to the rear of the snowmobile when checking track alignment. Personal injury may result if this warning is ignored.

3. Start engine, accelerate slightly to turn the track several revolutions and SHUT ENGINE OFF (ignition switch in OFF position), and allow track to coast to a stop.

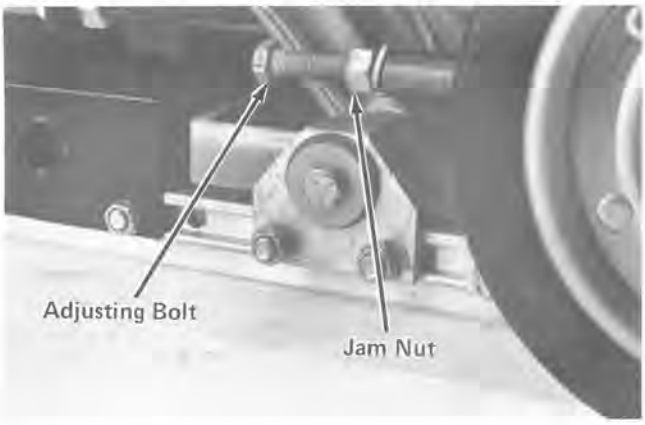
Note: Do not apply brake when performing this procedure as it may produce incorrect alignment indication.

4. Correct track alignment exists when rear idler wheels are equidistant from the edges of the internal drive lugs. If the track runs off center, correct by adjusting track tension adjusting bolts.

5. Loosen both adjusting bolt jam nuts, Fig. VIA-26, using a 9/16-inch open-end wrench. Back jam nuts off until they are approximately 1/2 inch away from adjusting bolt heads.

6. Turn adjusting bolts until proper alignment is established (tighten bolt on side track runs to or loosen opposite bolt), using a 9/16-inch socket. When correct alignment is established, bottom jam nuts, using a 9/16-inch open-end wrench.

Fig. VIA-26



7. When adjustment is completed, lower rear of snowmobile, start engine, and field test the track.

8. After test run, recheck track alignment and readjust if necessary.

Note: Make sure correct track tension is maintained when alignment adjustment is completed.

Suspension Adjustments

Note: Do not try to adjust the El Tigre model Z suspension system for trail riding or cross-country use. Instead, it is recommended that the standard El Tigre skid frame, track, and drive shaft be installed for this purpose.

Load Tension — Torsion Spring Preload

General

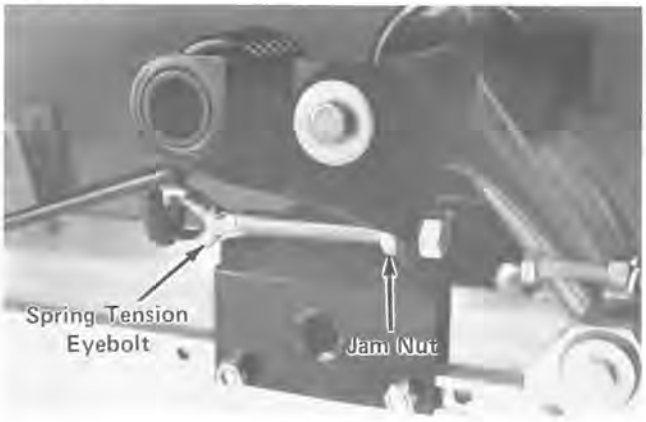
Spring preload is to be set by and for the individual driver only. Test for proper tension by attempting to bottom the skid frame or touch the chassis to the snow. If either the skid frame bottoms or the chassis touches the snow, an adjustment to the spring tension is necessary.

ADJUSTMENTS

Equipment Necessary: 9/16-Inch Socket and 9/16-Inch Open-End Wrench

1. Loosen jam nuts on spring tension eyebolts, Fig. VIA-27, using a 9/16-inch open-end wrench. Back jam nuts off until they are approximately 1/2 inch from flanges of rear mounting brackets.

Fig. VIA-27



2. Adjust spring tension eyebolts equally on each side until they are just tight enough to prevent suspension bottoming, using a 9/16-inch socket.

3. When proper load tension is established, tighten jam nuts, using a 9/16-inch open-end wrench.

Rear Arm Assembly

General

The combination of rear arm assembly location, spring tension, and driver position will have to be tested by trial and error to arrive at the best performance set-up. As installed by the factory, the rear arm assembly is located in the rear-most position on the skid frame where it provides optimum suspension performance for most riders. In this position, when the rider weight is shifted to the rear of the machine, the suspension should collapse slightly providing maximum traction and reduced ski drag. When rider weight is shifted forward, the tension spring should raise the rear of the machine, putting additional pressure on the skis and allowing the driver to hold tight through turns with power on.

The location of the rear arm assembly can be changed to alter chassis sensitivity according to different rider weights. Moving the rear arm assembly forward increases weight transfer sensitivity for lighter weight riders; moving it back will reduce sensitivity for heavier riders. Relocation holes are provided in the slide rails for making this adjustment.

Equipment Necessary: 1/2-Inch Socket and Combination Wrench

1. Remove 4 cap screws and lock nuts holding the rear arm pivot brackets to the slide rails, using a 1/2-inch socket and combination wrench.

2. Remove 4 carriage bolts and lock nuts holding the rail clamp to the slide rail, using a 1/2-inch socket.

3. Move the pivot brackets and the rail clamp forward or backward to the position desired.

Note: When relocating rear arm assembly, both rear arm pivot brackets and the rail clamp must be moved together as they function together as interrelated parts of the rear arm assembly.

4. Secure rear arm pivot brackets to the slide rail with cap screws and lock nuts, using a 1/2-inch socket and combination wrench. Cap screw heads are to be to inside of skid frame.

5. Secure the rail clamp to the slide rails with carriage bolts and lock nuts, using a 1/2-inch socket. Carriage bolt heads are to be to inside of skid frame.

Note: Be sure not to move the rear pivot brackets too far forward. The rider should be able to get his weight ahead of the pivot brackets to better control ski pressure in turns.

Front Arm Assembly

General

The weight transfer characteristics of the El Tigre model Z suspension system are also affected by either the mounting location of the front arm in the chassis, the position of the front pivot brackets on the slide rails, or a combination of both. Moving

the front arm forward in its mounting position in the chassis increases weight transfer sensitivity as does moving the front arm pivot brackets and front rail brace forward. Holes are provided in the slide rails for moving the front arm assembly forward or back.

Note: Moving the front arm too far ahead without making adjustments to the front arm stop can cause turning problems.

Equipment Necessary: Hammer, 5/16 x 1/8-Inch Punch, 1/2-Inch Socket, and 1/2-Inch Combination Wrench

1. Remove 4 cap screws and lock nuts holding front arm pivot brackets to slide rails, using a 1/2-inch socket and combination wrench.

2. Remove 4 carriage bolts and lock nuts holding front rail brace to slide rails, using a 1/2-inch socket.

3. Remove the spring pins holding the rubber front arm stop pads to the slide rails, using a 5/16 x 1/8-inch punch and a hammer.

4. Move pivot brackets, rubber stop pads, and rail brace forward or backward to the position desired.

Note: When relocating front arm assembly, the front arm pivot brackets, the front rail brace, and the rubber front arm stop pads must be moved together as they function together as interrelated parts of the front arm assembly.

5. Secure front arm pivot brackets to slide rails with cap screws and lock nuts, using a 1/2-inch socket and combination wrench. Cap screw heads are to be to inside of skid frame.

6. Secure front rail brace to slide rails with carriage bolts and lock nuts, using a 1/2-inch socket. Carriage bolt heads are to be to inside of skid frame.

7. Install rubber stop pads behind front rail brace, using a hammer to drive spring pins in place.

Front Arm Stop

General

The simplest way to change the weight transfer characteristics of the suspension system is by adjusting the front arm stop. Increasing the effective length of the front arm stop increases weight transfer sensitivity; shortening it will reduce weight transfer sensitivity.

The front arm stop is provided with two holes for mounting to the bracket on the front rail brace. Mounting through the upper hole effectively increases ski pressure; mounting through the lower hole effectively reduces ski pressure.

Equipment Necessary: 1/2-Inch Socket and Combination Wrench

1. Remove cap screw and lock nut holding front arm stop to mounting bracket on front rail brace, using a 1/2-inch socket and combination wrench.

2. Move front arm stop to align desired mounting hole with holes in mounting bracket.

3. Install cap screw and secure with lock nut, using a 1/2-inch socket and combination wrench.

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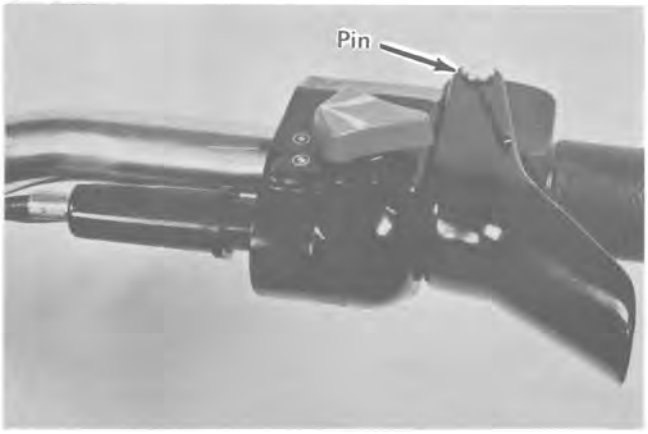
Remove Throttle Control Handle

Equipment Necessary: Hammer, Screwdriver Having a 1/4-Inch Blade, Phillips Screwdriver Having a No. 2 Blade, and 5/16 x 1/8-Inch Flat End Punch

1. Remove the protective pad from the handlebar.

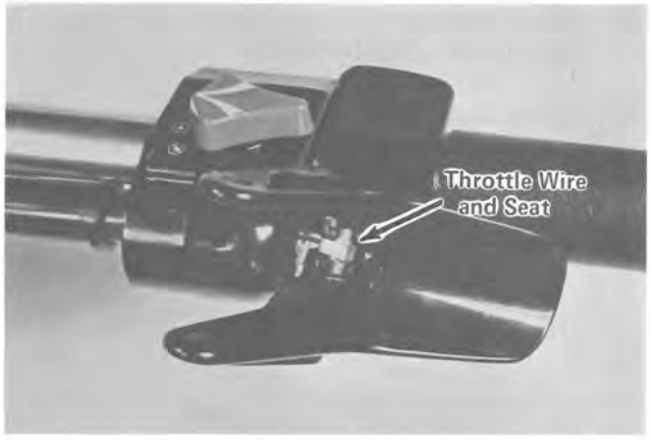
2. Remove the retaining ring from the pin holding throttle lever to throttle handle, Fig. VII-1, using a screwdriver having a 1/4-inch blade.

Fig. V11-1



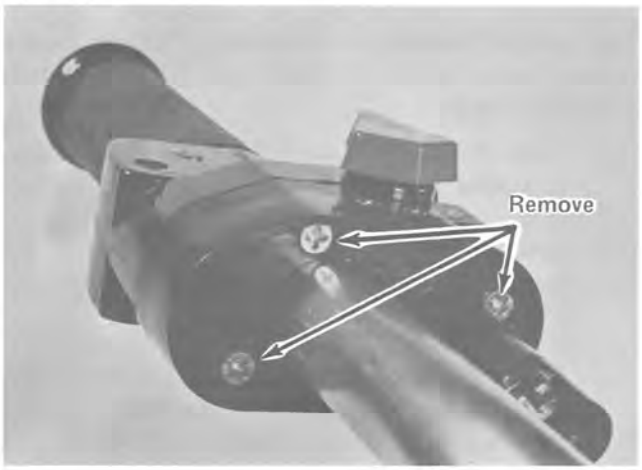
3. Remove the pin that holds throttle lever to throttle handle; then disconnect end of throttle cable from "seat" in throttle lever, Fig. VII-2.

Fig. V11-2



4. Remove the three machine screws holding throttle handle cap to throttle handle, using a phillips screwdriver having a no. 2 blade, Fig. VII-3.

Fig. V11-3



5. Slide throttle handle cap toward center of handlebar; then pull throttle safety/tether switch assembly out of handle.

6. Remove the spring pin holding throttle handle on handlebar, Fig. VII-4, using a hammer and 5/16 x 1/8-inch flat end punch.

Fig. V11-4

7. Remove throttle handle from handlebar.

STEERING SERVICING

Install Throttle Control Handle

Equipment Necessary: Hammer, Phillips Screwdriver Having a No. 2 Blade, and 5/16 x 1/8-Inch Flat End Punch.

1. Slide throttle handle onto handlebar, making sure that the socket for emergency kill switch is toward rear of snowmobile. Move handle until drive pin holes in both handle and handlebar are aligned. Install spring pin, using a hammer.

2. Move throttle safety switch and throttle cable into position in throttle handle. Make sure kill switch and tether are positioned correctly.

3. Slide throttle handle cap against throttle handle. Make sure all parts fit together properly.

4. Slide throttle cable through safety switch cover. Place end of throttle cable in switch block.

5. Push throttle safety switch cover onto switch. Make sure all components remain seated and in place.

6. Install the three machine screws that secure throttle handle cap to throttle handle. Tighten the screws using a phillips screwdriver.

7. Hook end of throttle cable into throttle lever seat.

8. Install throttle lever and "seated" throttle cable on throttle handle with pin and retaining ring.

Note: Compress throttle handle a few times to be sure of free movement. If throttle handle sticks, correct the problem before machine is operated.

9. If throttle works freely, install protective pad on handlebar.

Remove Brake Control Handle

Equipment Necessary: Hammer, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade, and 5/16 x 1/8-Inch Flat End Punch.

1. Remove protective pad from handlebar.

2. Remove the three machine screws from brake handle cap, Fig. VII-5, using a phillips screwdriver having a no. 2 blade.

Fig. V11-5

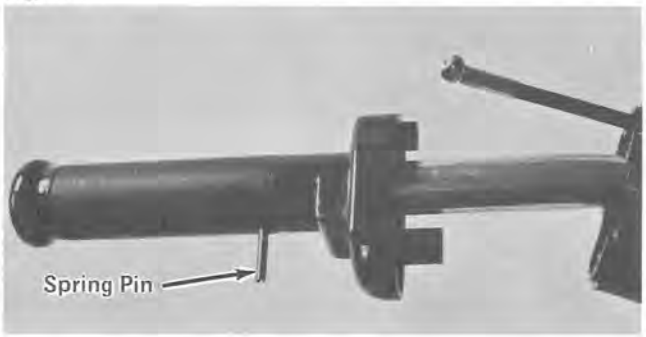
3. Slide brake handle cap toward center of handlebar, Fig. VII-6.

Fig. V11-6

4. Slide headlight dimmer switch and brakelight switch out of brake handle.

5. Drive out spring pin holding brake handle onto handlebar, Fig. VII-7, using a hammer and 5/16 x 1/8-inch flat end punch.

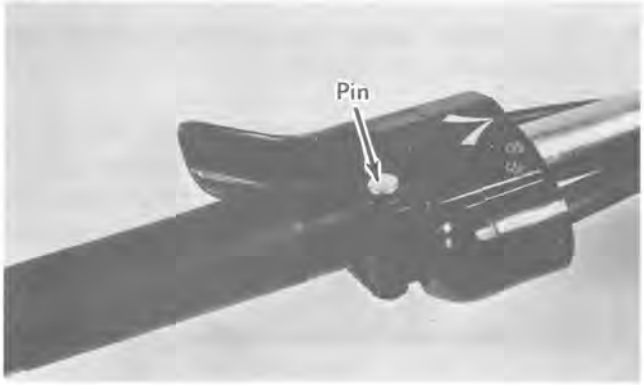
Fig. V11-7



6. Remove the retaining ring from the pin holding brake lever to brake handle, Fig. VII-8, using a screwdriver having a 1/4-inch

blade. Remove the pin holding brake lever on brake handle; then disconnect end of brake cable from "seat" in brake lever. Pull brake cable out of brake handle.

Fig. V11-8



7. Pull brake handle off handlebar.

Install Brake Control Handle

Equipment Necessary: Hammer, Phillips Screwdriver Having a No. 2 Blade, and 5/16 x 1/8-Inch Flat End Punch.

1. Slide brake handle onto handlebar, making sure that socket for dimmer switch is toward rear of snowmobile. Align spring pin hole in brake handle with hole in the handlebar. Drive spring pin into place, using a hammer.

2. Slide brake cable into position in brake handle and hook end of brake cable into brake lever.

3. Fasten brake lever and seated brake cable to brake handle with pin and retaining ring.

4. Slide brakelight switch into brake handle.

5. Move dimmer switch into position in socket of brake handle.

6. Secure brakelight switch and dimmer switch by sliding brake handle cap into position. Install the three machine screws into brake handle and tighten, using a phillips screwdriver having a no. 2 blade.

7. Install protective pad on handlebar.

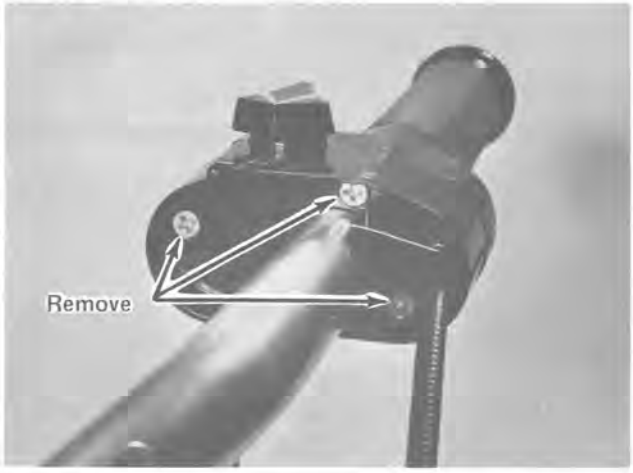
Remove Brake/Dimmer Switch

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade, and 5/16 x 1/8-Inch Flat End Punch.

1. Remove protective pad from handlebar.

2. Remove the three machine screws from brake handle cap, Fig. VII-9, using a phillips screwdriver having a no. 2 blade.

Fig. V11-9



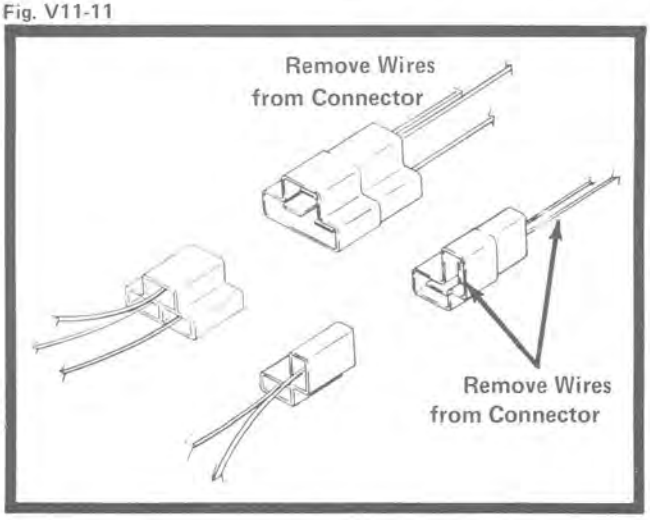
3. Slide brake handle cap toward center of handlebar, Fig. VII-10. This will expose both the brakelight switch and the dimmer switch.

Fig. V11-10

4. Slide brakelight and dimmer switches out of brake handle.

5. Pull brakelight and dimmer switch connectors apart, Fig. VII-11.

Fig. V11-11

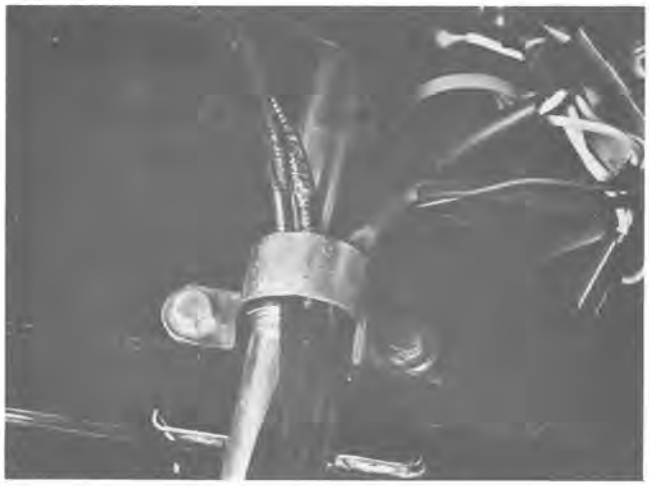


6. Disconnect wire terminals from brakelight and dimmer switch connectors, using a screwdriver having a 3/16-inch blade.

Note: Remove connectors from brake and dimmer switch wires, so that complete harness can be pulled through upper steering post clamp and bracket. If connectors are allowed to remain on harness, the harness cannot be pulled through the upper steering post clamp and bracket.

7. Pull brake/dimmer switch harness through upper steering post clamp and bracket, Fig. VII-12.

Fig. V11-12



Install Brake/Dimmer Switch

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade.

1. Slide end of brake/dimmer switch harness through upper steering post clamp and bracket.

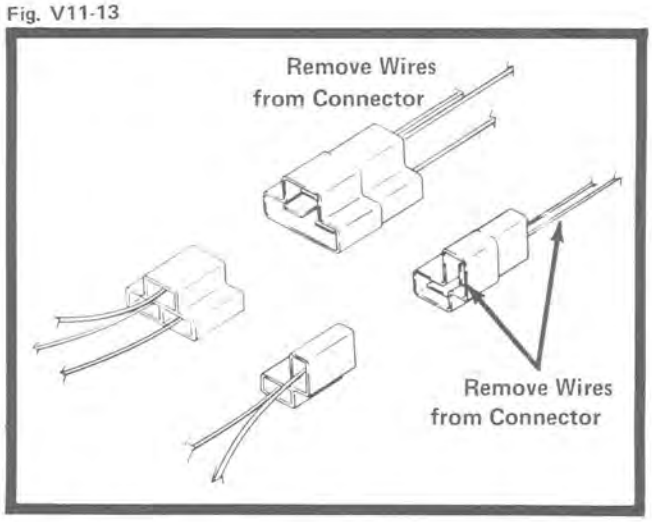
2. Install the two wires from brakelight switch into the L-shaped connector, Fig. VII-13.

3. Connect the three wires from dimmer switch to the three-prong plug, see Fig. VII-13.

4. Slide brake switch and dimmer switch into position in brake handle.

5. Secure brake switch and dimmer switch in position by sliding brake handle cap against brake handle. Install the three machine screws into brake handle and tighten, using a phillips screwdriver having a no. 2 blade.

Fig. V11-13



6. Place protective pad on handlebar.

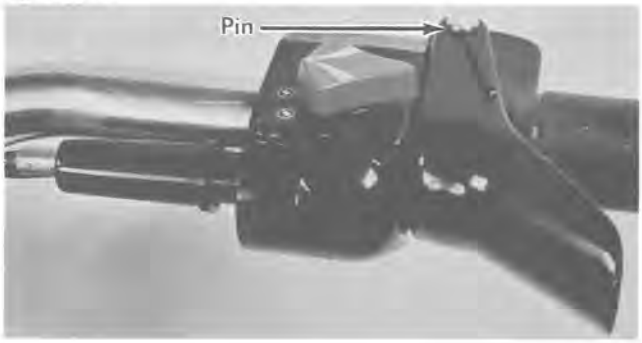
Remove Throttle Safety Switch

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade and Screwdriver Having a 1/4-Inch Blade.

1. Remove protective pad from handlebar.

2. Remove retaining ring from pin that holds throttle lever to throttle handle, Fig. VII-14, using a screwdriver having a 1/4-inch blade.

Fig. V11-14

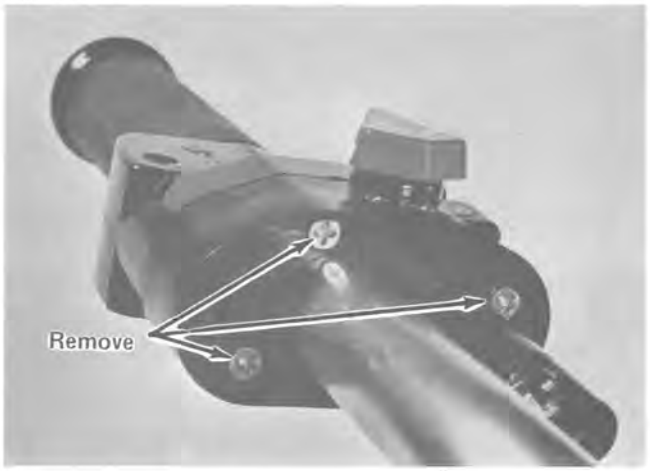


3. Pull out pin holding throttle lever to throttle handle; then disconnect end of throttle cable from "seat" in throttle lever, Fig. VII-15.

Fig. V11-15

4. Remove the three machine screws holding throttle handle cap to throttle handle, Fig. VII-16, using a phillips screwdriver having a no. 2 blade.

Fig. V11-16



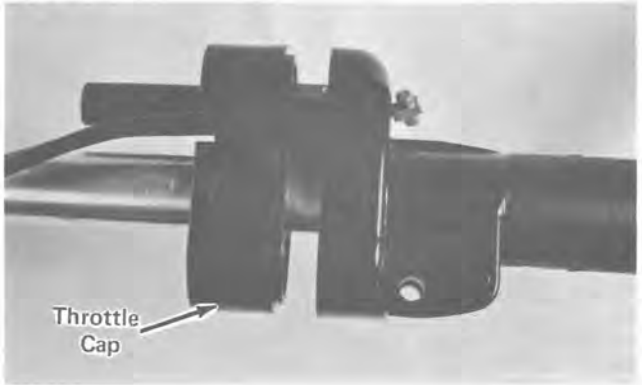
5. Slide throttle safety switch cover off switch holder.

6. Disengage end of throttle cable from throttle cable switch block, Fig. VII-17. Pull throttle cable out of throttle safety switch cover.

Fig. V11-17

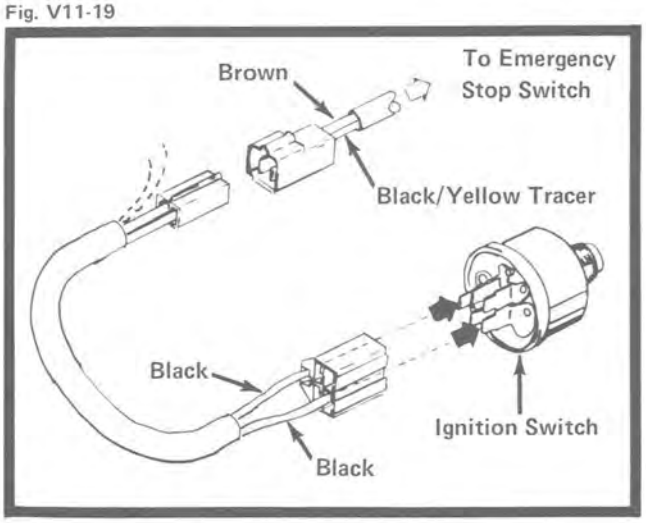
7. Slide throttle handle cap toward center of handlebar, Fig. VII-18. Pull throttle safety switch out of throttle handle.

Fig. V11-18



8. Disconnect the square throttle safety connector switch holding the black and brown wires, Fig. VII-19.

Fig. V11-19



9. Remove throttle safety switch wires from connector, using a screwdriver having a 1/4-inch blade.

Note: With connector now removed from end of safety switch harness, complete harness can be pulled through upper steering post clamp and bracket. If connector is allowed to remain on harness, the harness cannot be pulled through upper steering post clamp and bracket.

10. Pull throttle safety switch harness through upper steering post clamp and bracket, Fig. VII-20.

Fig. V11-20

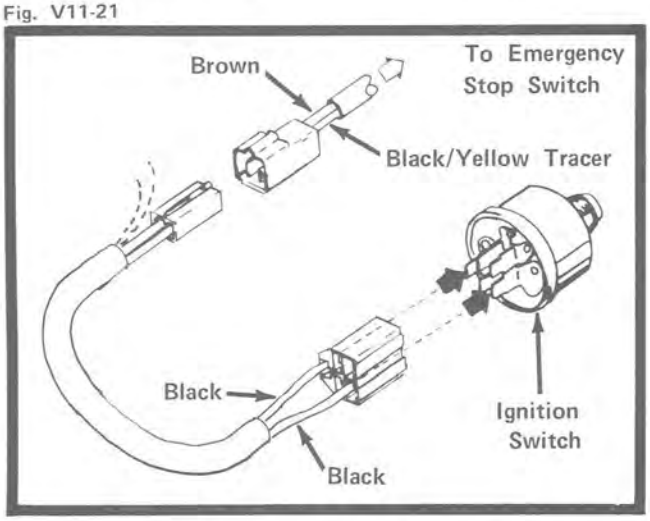
Install Throttle Safety Switch

Equipment Necessary: Phillips Screwdriver Having a No. 2 Blade.

1. Slide end of safety switch harness through upper steering post clamp and bracket.

2. Install safety switch wires in the square connector, Fig. VII-21. Push together the safety switch wire connector and connector holding the two black wires running to the ignition switch.

Fig. V11-21



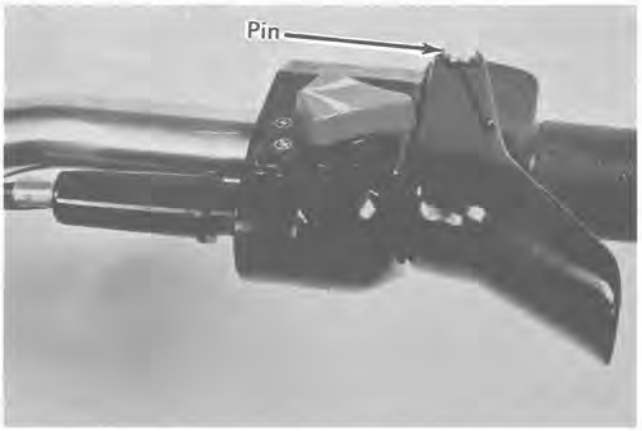
3. Install the three machine screws that secure throttle handle cap to throttle handle. Tighten, using a phillips screwdriver having a no. 2 blade.

4. Hook end of throttle cable into throttle lever seat, Fig. VII-22.

Fig. V11-22

5. Fasten throttle lever and "seated" throttle cable onto the throttle handle with pin and retaining ring, Fig. VII-23.

Fig. V11-23



Note: Compress throttle handle a few times to be sure of free movement. If throttle handle sticks, correct the problem before machine is operated.

6. If throttle works freely, install protective pad on handlebar.

Remove Steering Post and Tie Rod Ends

Equipment Necessary: 12–Inch Extension, Cardboard, Screwdriver Having a 5/16-Inch Blade, 5/16 x 1/8-Inch Flat End Punch, 7/16-Inch Wrench, 7/16-Inch Wrench, 7/16-Inch Socket, 9/16-Inch Socket, and 9/16-Inch Wrench.

1. Remove outside tie rod ends and tie rods (See: Remove Outside Tie Rod Ends and Tie Rods, Page VII-9).

STEERING SERVICING

2. Remove the three screws holding instrument panel to steering post mount. Tilt instrument panel toward rear of machine, being careful not to disconnect any wires.

3. Tip snowmobile on recoil side, using cardboard to protect against scratching.

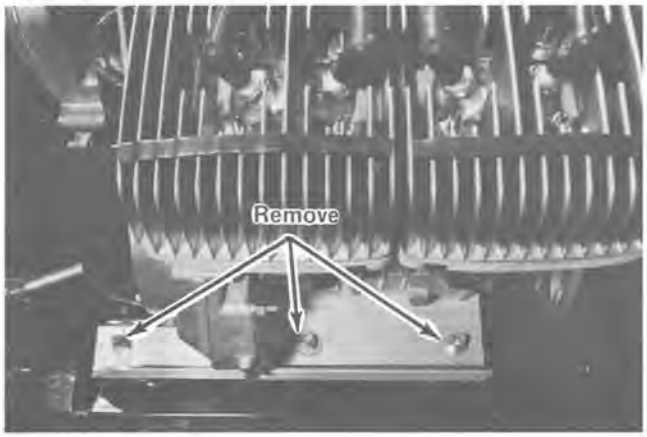
4. Remove the two lock nuts from the two rear motor mounts, using a 9/16-inch socket and 12-inch extension.

5. Remove the remaining bolt from the lower steering post bracket, using a 9/16-inch socket, extension, and a 9/16-inch wrench.

6. Tip machine upright.

7. Remove the three lock nuts and flat washers from the front left, center, and right motor mounts, Fig. VII-24, using a 9/16-inch socket and a 12-inch extension.

Fig. V11-24



8. Remove protective pad from handlebar.

9. Remove the two cap screws and lock nuts holding steering post clamp and bracket to the steering tower, Fig. VII-25, using a 7/16-inch socket and wrench. Set steering post clamp aside.

Fig. V11-25

10. Remove drive belt from driven pulley and drive clutch.

11. Lift engine off front motor mounts. Slide engine ahead so rear engine mounts clear front end. Account for shims that may be needed on the mounts.

12. If only the tie rod ends are to be replaced, proceed to step 13. If the complete steering post is to be replaced, proceed to step 14.

13. Remove the cap screw and lock nut holding tie rod end to the bottom of the steering post, Fig. VII-26, using a 9/16-inch socket and wrench.

14. Drive spring pin holding brake handle to handlebar out of handle, using a 5/16 x 1/8-inch flat end punch. Pull brake handle off handlebar.

15. Drive spring pin holding throttle handle to handlebar out of handle, using a 5/16 x 1/8-inch flat end punch. Pull throttle handle off handlebar.

16. Slide steering post up and away from the steering tower.

STEERING SERVICING

Fig. V11-26

Install Steering Post and Tie Rod Ends

Equipment Necessary: Hammer, Torque Wrench, Cardboard, Screwdriver Having a 5/16-Inch Blade, 7/16-Inch Wrench, 9/16-Inch Socket, 9/16-Inch Wrench, and 12-Inch Extension.

1. Install tie rod ends on bottom of steering post with two cap screws and lock nuts, see Fig. VII-26, using a 9/16-inch socket and wrench. Tighten lock nuts to 35 ft-lb, using a 9/16-inch torque wrench and socket.

Note: Bronze tie rod ends are left hand thread and must be installed only on the steering post.

2. Slide the steering post into position.

● CAUTION ●

Make sure that control cables and electrical wires are not pinched when the steering post is installed.

3. Slide throttle handle on right side of handlebar. Align holes in control handle and handlebar; then secure in place with spring pin, using a hammer.

4. Slide brake handle onto left side of handlebar. Align hole in control handle and handlebar; then secure in place with spring pin, using a hammer.

5. Install lower steering post bracket to curved section of front end with cap screw and lock nut. DO NOT tighten.

6. Lift engine and guide rear mounts through mount holes in curved section of front end.

Note: Be sure to replace any shims that were taken out during disassembly.

7. Place engine and front motor plate support onto front motor mounts. Install flat washers and lock nuts on motor mounts. DO NOT tighten lock nuts.

8. Tip snowmobile on recoil side, using cardboard to protect against scratching.

9. Install lock nuts on rear motor mounts. Tighten to 35 ft-lb, using a torque wrench, a 9/16-inch socket, and 12-inch extension.

10. Tip snowmobile upright.

11. Now tighten right hand bottom post bracket to 35 ft-lb, using a 9/16-inch socket, 12-inch extension, and torque wrench.

12. Now tighten the three lock nuts that will hold front motor plate support on the motor mounts to 35 ft-lb, using a torque wrench, 9/16-inch socket, and 12-inch extension.

13. Slide the upper steering post clamp and bracket into position on the steering support tower, Fig. VII-27. Place the throttle cable, brake cable, throttle safety switch harness and dimmer switch harness between the upper steering post clamp and bracket. Secure upper steering post clamp and bracket to the steering support tower with two cap screws and lock nuts, using a 7/16-inch socket and wrench. Tighten cap screw to 10 ft-lb, using a torque wrench and 7/16-inch socket.

Fig. V11-27

⚠ WARNING ⚠

Make sure that control cables and electrical wiring harnesses are not pinched between the upper steering post bracket and clamp. If a cable or harness is pinched, mechanical or electrical failure may occur, resulting in possible injury to the operator or damage to the snowmobile.

12. Install the instrument panel on the steering tower with the three mounting screws, using a screwdriver with a 5/16-inch blade.

Note: Make sure all wire connections are secure. Also, make sure no wires are pinched between console and steering post tower.

13. Install protective pad on handlebar.

14. Install tie rods (See: Install Tie Rod and Outside Tie Rod Ends, Page VII-11).

Remove Outside Tie Rod End and Tie Rod

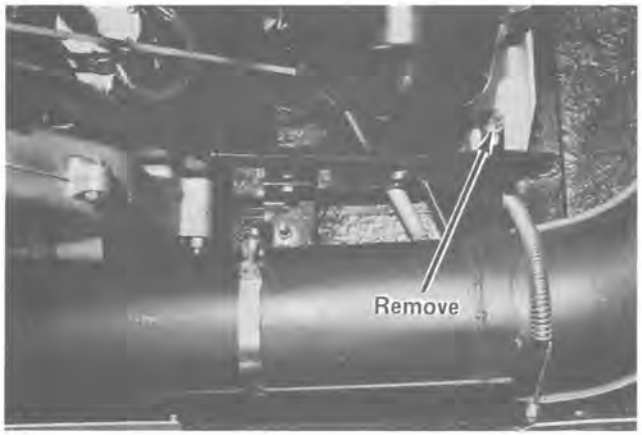
Equipment Necessary: Small Vise-grip, 9/16-Inch Open End Wrench and 9/16-Inch Socket

Note: If only right tie rod is to be removed, begin with step 1. If left tie rod is to be removed, begin at step 3.

1. Remove the two exhaust manifold/pulse charger tension springs, using a small vise-grip. Remove the rear tension spring that holds pulse charger to footrest, using a small vise-grip.

2. Remove lock nut and flat washer holding the pulse charger mounting bracket to the right front motor mount bolt, Fig. VII-28, using a 9/16-inch socket.

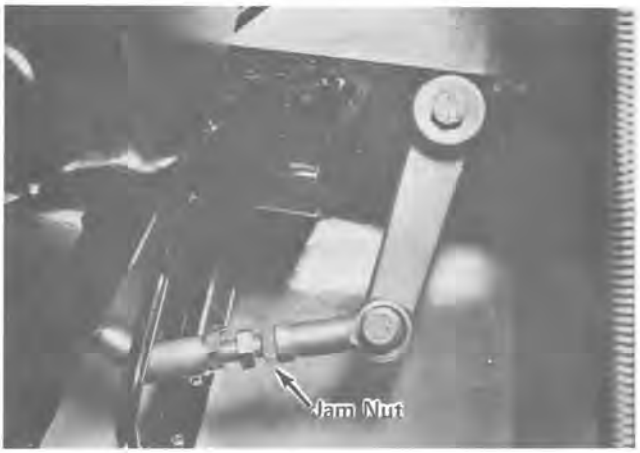
Fig. V11-28



Note: On 1975 Z models, remove the exhaust chambers.

3. Loosen the jam nut holding tie rod end in place, Fig. VII-29, using a 9/16-inch open and wrench.

Fig. V11-29



4. Remove the cap screw and lock nut holding tie rod end to spindle arm, Fig. VII-30, using a 9/16 inch socket and open end wrench.

Fig. V11-30

5. Unscrew tie rod end from tie rod.

6. Rotate tie rod clockwise until it is free of steering post tie rod end, using a 9/16-inch open end wrench.

Note: On the 1975 models, the tie rod is permanently fastened to the steering post tie rod end.

7. If tie rod end on steering post is to be replaced, proceed to (See: Remove Steering Post and Tie Rod Ends, step 13, page VII-7).

Remove Ski Spindle

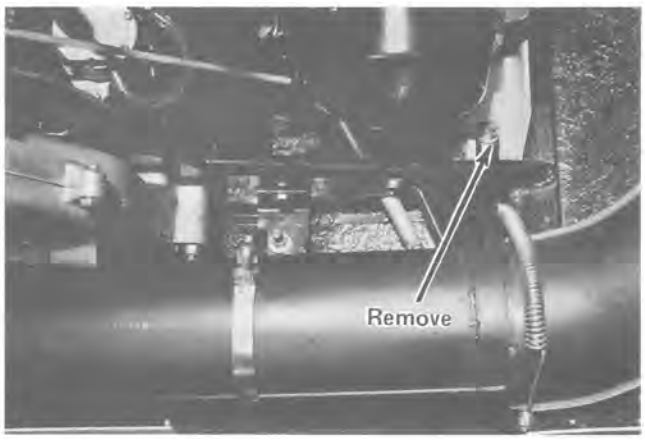
Equipment Necessary: Hammer, 1/2-Inch Socket, 1/2-Inch Diameter Brass Punch, 5/8-Inch Socket, and 5/8-Inch Wrench.

Note: To replace MAG side ski, the pulse charger must first be removed. To replace MAG side ski spindle, begin at step 1. To replace the PTO side ski spindle, begin at step 2.

1. Remove the two exhaust manifold/pulse charger tension springs, using a small vise-grip. Remove the rear tension spring holding pulse charger to right footrest, using a small vise-grip.

2. Remove the lock nut and flat washer holding the pulse charger mounting bracket to the right front motor mount stud, Fig. VII-31, using a 9/16-inch socket. Remove pulse charger.

Fig. V11-31



Note: For 1975 models, remove exhaust system (See: Section 1A — Setting Up Instructions, Remove Exhaust System).

3. Remove the cap screw and flat washer holding spindle arm to spindle, using a 1/2-inch wrench or socket. Pull spindle arm off spindle shaft.

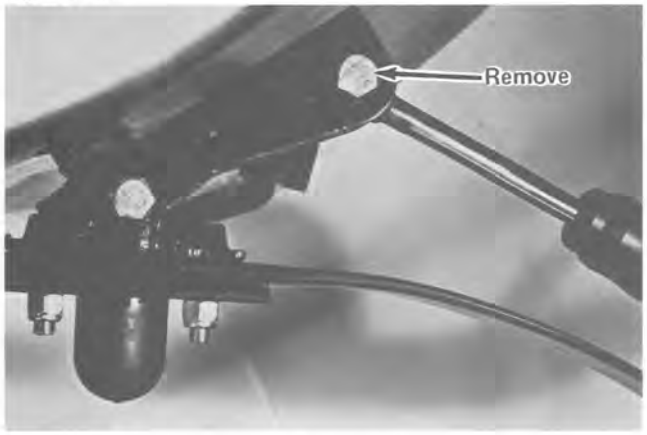
4. Slide U-bend washers and flat washer off spindle shaft.

5. Block the front end up until the entire ski (spindle shaft) can be removed from the spindle mount.

Note: The spindle shaft may stick in the spindle mount. If this happens, use a 1/2-inch diameter brass punch and drive spindle shaft out of spindle mount. However, if the PTO side ski spindle sticks in the spindle mount, it may be necessary to remove the drive clutch.

6. Remove the cap screw and lock nut holding top of shock absorber (moveable end) to the spindle, Fig. VII-32, using a 5/8-inch socket and wrench. Account for the short sleeve located inside of shock absorber moveable end.

Fig. V11-32



7. Remove lock nut and cap screw holding spindle to ski saddle, Fig. VII-33, using a 9/16-inch socket.

Fig. V11-33

Note: The cap screw is threaded through the ski saddle. Therefore, the lock nut must be removed from the cap screw before the cap screw can be removed.

Install Tie Rod and Outside Tie Rod End

Equipment Necessary: Small Vise-grip, 9/16-Inch Open End Wrench, and 9/16-Inch Socket

1. Check jam nut on steering post tie rod end. Jam nut must be threaded approximately half way onto tie rod end.

2. Thread tie rod (counterclockwise) onto steering post tie rod end until it solidly bottoms against the tie rod end jam nut, using a 9/16-inch open end wrench. It may be necessary to turn steering post tie rod end toward the side that tie rod will be installed.

3. Thread outside tie rod end approximately half way into tie rod.

4. Align the skis (See: Ski Alignment, page VII-15).

5. Install pulse charger.

6. Connect the two exhaust manifold/pulse charger tension springs, using a small vise-grip. Connect the rear tension spring (front footrest), using a small vise-grip.

7. Install the flat washer and lock nut on the right front motor mount stud, Fig. VII-34. Tighten to 35 ft-lb, using a torque wrench and a 9/16-inch socket.

Fig. V11-34

STEERING SERVICING

Install Ski Spindle

Equipment Necessary: Small Vise-grip, Torque Wrench, 1/2-Inch Socket, 5/8-Inch Socket, 5/8-Inch Wrench, and 9/16-Inch Socket.

1. Apply low-temperature grease (Texaco 2346 EP or equivalent) to the unthreaded portion of the cap screw that holds spindle to ski saddle.

2. Position the spindle on the ski saddle and secure in place with a cap screw, Fig. VII-35, using a 9/16-inch socket. Tighten cap screw to 30 ft-lb, using a 9/16-inch socket and torque wrench.

Fig. V11-35

Note: Head of cap screw is to be on opposite side of threaded hole in ski saddle. Threaded hole is to be on the inward side of the ski.

3. Thread lock nut onto cap screw and tighten to 30 ft-lb, using a 9/16-inch socket and torque wrench.

4. Slide the short sleeve through moveable end of shock absorber.

Note: Steps 4-6 do not apply to 1975 models.

5. Apply low-temperature grease (Texaco 2346 EP or equivalent) to unthreaded portion of cap screw holding moveable end of shock absorber to spindle.

6. Position moveable end of shock absorber in spindle bracket and secure with cap screw and lock nut, Fig. VII-36, using a 5/8-inch socket and wrench. Tighten lock nut to 50 ft-lb, using a 5/8 inch socket and torque wrench.

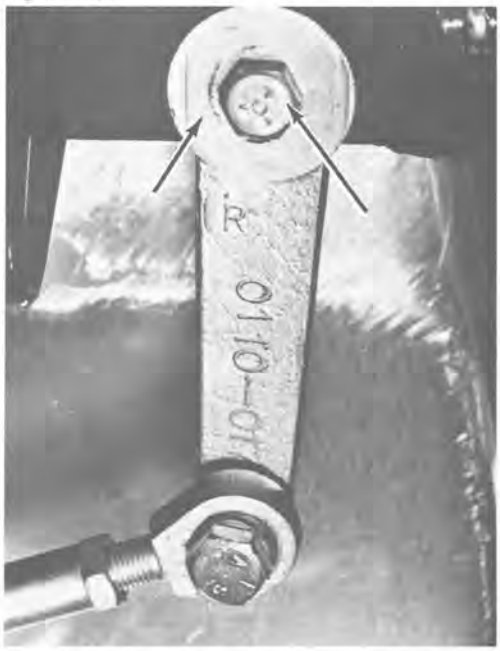
Fig. V11-36

7. Slide shaft through the spindle mount.

8. Place flat washer and U-bend washer on spindle shaft.

9. Align the skis (See: Ski Alignment, page VII-15). When correct alignment is obtained, secure spindle arm to spindle with cap screw and flat washer, Fig. VII-37, using a 1/2-inch socket. Tighten cap screw to 20 ft-lb, using a 1/2-inch socket and torque wrench.

Fig. V11-37



STEERING SERVICING

Note: If drive clutch was removed to aid removal of PTO side ski spindle, install drive clutch at this time. If MAG side ski spindle was removed, proceed to steps 10-11.

10. Install exhaust system (See: Section 1A — Setting Up Instructions, Install Exhaust System).

11. Place flat washer and lock nut on the MAG side, front motor mount stud. Tighten lock nut to 35 ft-lb, using a torque wrench and 9/16-inch socket.

Remove Ski Spring

Equipment Necessary: Vise, 5/8-Inch Socket, 5/8-Inch Wrench, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Socket, and a 9/16-Inch Wrench.

1. Remove lock nut and cap screw holding bottom end of shock absorber (stationary end) to mount bracket, Fig. VII-38, using a 5/8-inch socket and wrench. Account for the long sleeve and two plastic bushings, Fig. VII-39.

Fig. V11-38

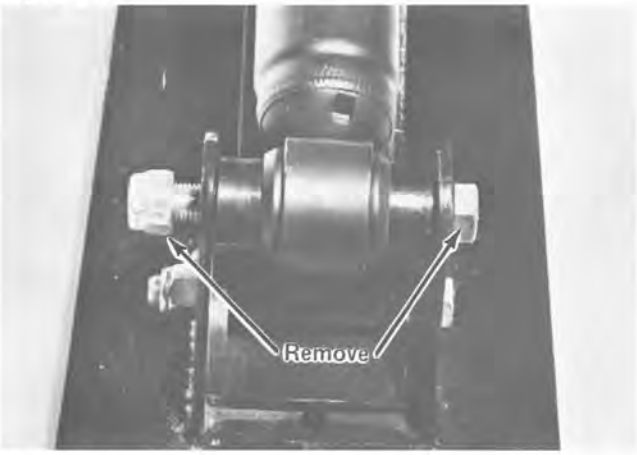
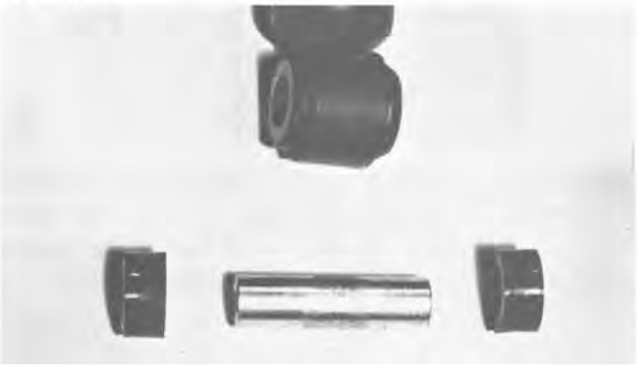


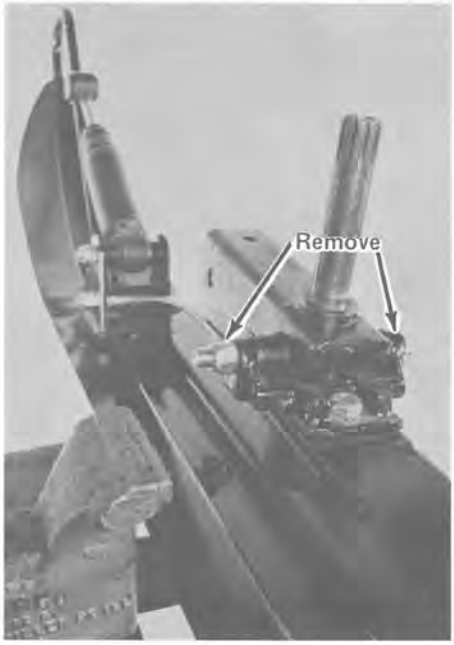
Fig. V11-39



Note: On 1975 models, remove the lock nut and cap screw holding top end of shock absorber to spring shock mount, using a 9/16-inch socket and wrench. Account for the two plastic bushings.

2. Remove the lock nut from the cap screw that holds ski saddle to spindle, Fig. VII-40, using a 9/16-inch socket; then remove cap screw.

Fig. V11-40



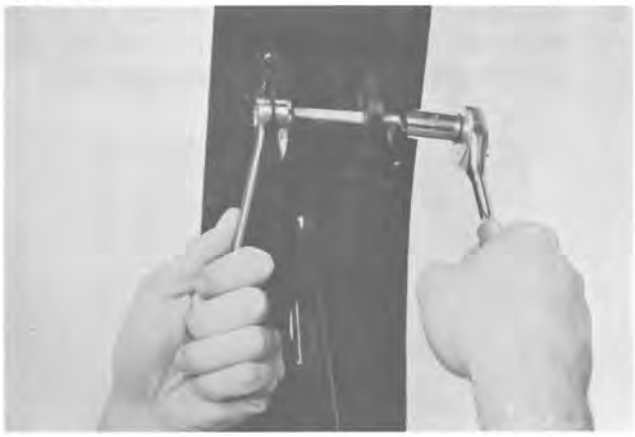
Note: The cap screw is threaded through the ski saddle. Therefore, the lock nut must be removed from the cap screw before the cap screw can be removed.

3. Place ski in a vise and compress spring approximately one inch, Fig. VII-41.

Fig. V11-41

4. Remove cap screw and lock nut holding front of spring and spring slide saddle between the mount bracket, Fig. VII-42, using a 9/16-inch socket and wrench. After parts are disassembled, slowly release the vise pressure.

Fig. V11-42



5. Remove cap screw and lock nut holding spring to mount bracket at rear of ski, Fig. VII-43, using a 1/2-inch socket and wrench. Ski spring can now be replaced.

Fig. V11-43

Install Ski Spring

Equipment Necessary: Torque Wrench, Vise, 1/2-Inch Socket, 1/2-Inch Wrench, 9/16-Inch Socket, 9/16-Inch Wrench, 5/8-Inch Socket, and 5/8-Inch Wrench.

1. Install end of spring in mount bracket at rear of ski, see Fig. VII-43. Secure spring with cap screw and lock nut, using a 1/2-inch socket and wrench. Tighten lock nut to 20 ft-lb, using a torque wrench and 1/2-inch socket.

Note: Lock nut is to be positioned on the inside of the ski.

2. Place spring slide saddle and spring in the front mount bracket, Fig. VII-44.

Fig. V11-44

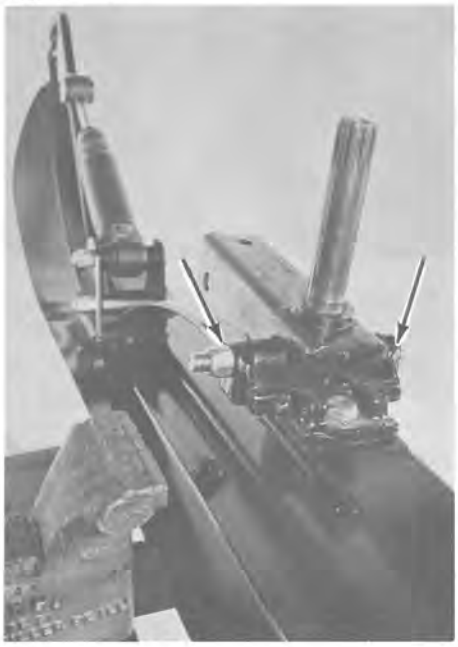
3. Place ski in a vise and compress spring until cap screw and lock nut can be installed, Fig. VII-45. Tighten lock nut to 35 ft-lb, using a 9/16-inch torque wrench and socket. After parts are assembled, slowly release the vise pressure on the spring.

Fig. V11-45

Note: Be careful not to over-tighten. On some early-production El Tigre models, the bolts holding the spring in the front mounting bracket were over-tightened causing the spring to bind.

4. Place ski saddle into position on spindle and secure with cap screw, Fig. VII-46, using a 9/16-inch socket. Tighten cap screw to 30 ft-lb, using a torque wrench and 9/16-inch socket.

Fig. V11-46

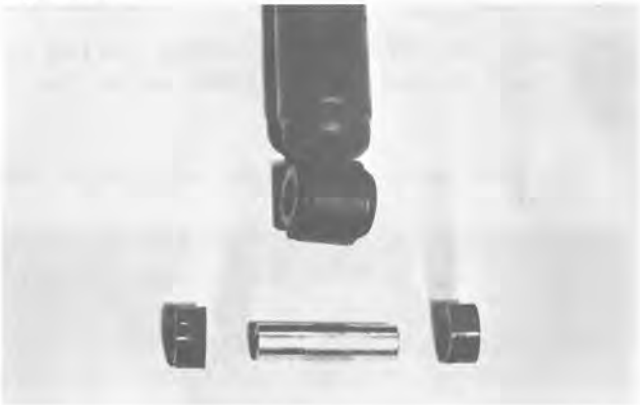


Note: Head of cap screw is to be on opposite side of threaded hole in ski saddle.

5. Thread lock nut onto cap screw and tighten to 30 ft-lb, using a torque wrench and 9/16-inch socket.

6. Slide long sleeve through stationary end of shock absorber; then place a plastic bushing on each end of the long sleeve, Fig. VII-47.

Fig. V11-47

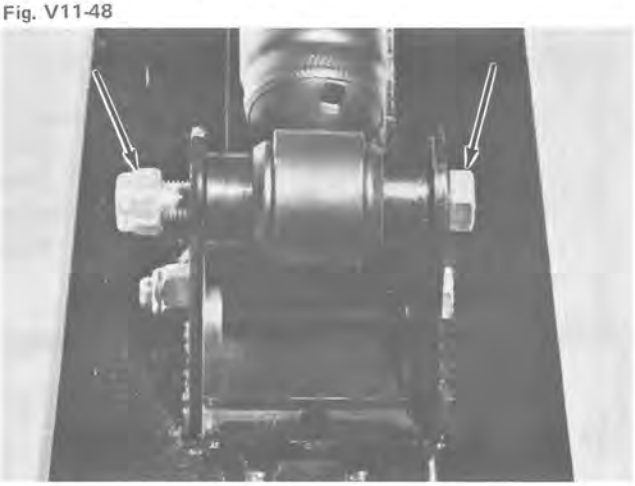


Note: Flat end surface of the plastic bushing is to contact the shock absorber; radiused end surface is to contact mount bracket on ski.

7. Apply low-temperature grease (Texaco 2346 EP or equivalent) to unthreaded portion of cap screw that holds stationary end of shock abosrber to mount bracket.

8. Place stationary end of shock absorber in the mount bracket; then secure with cap screw and lock nut, Fig. VII-48, using a 5/8-inch socket and wrench. Tighten lock nut to 50 ft-lb, using a torque wrench, 5/8-inch socket, and 5/8-inch wrench.

Fig. V11-48



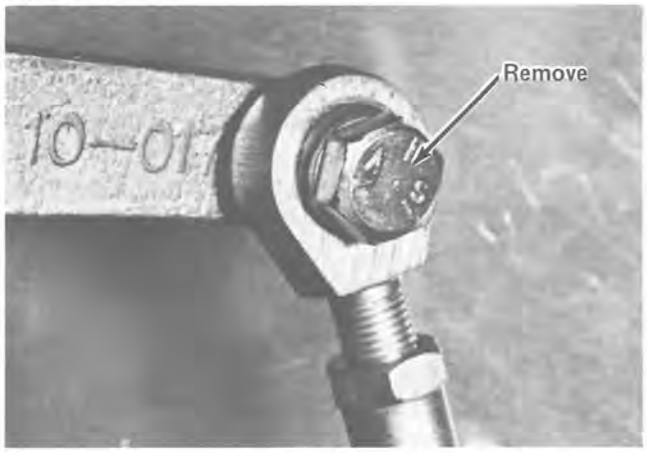
Note: On 1975 models, place the two plastic bushings into the moveable end of the shock absorber; then secure to shock mount with a cap screw and lock nut. Tighten the lock nut to 30 ft-lb, using a torque wrench, 9/16-inch socket, and 9/16-inch wrench.

Ski Alignment

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

1. Remove the cap screw and lock nut holding tie rod end to spindle arm, Fig. VII-49, using a 9/16-inch socket and open end wrench. Separate tie rod end from the spindle arm. Perform this step on opposite tie rod end.

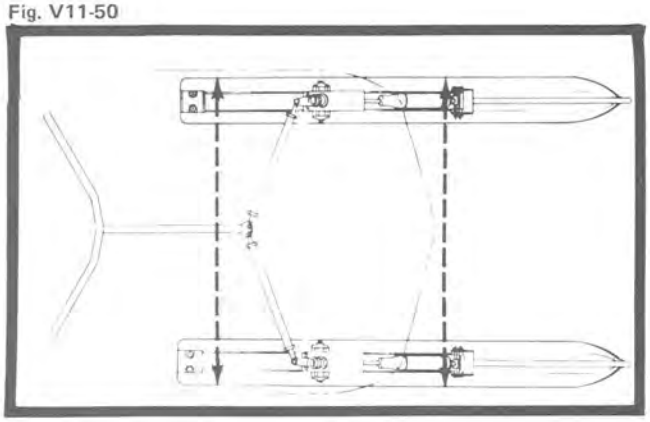
Fig. V11-49



2. Position skis straight forward and establish a parallel relationship.

3. Measure the distance to the outside edge of both skis, Fig. VII-50, using a tape measure. Make sure measurement is taken behind front spring mount bracket and ahead of rear spring mount bracket. Skis are to be parallel (same measurement at front and rear).

Fig. V11-50



4. Position the handlebar straight forward in relation to the skis.

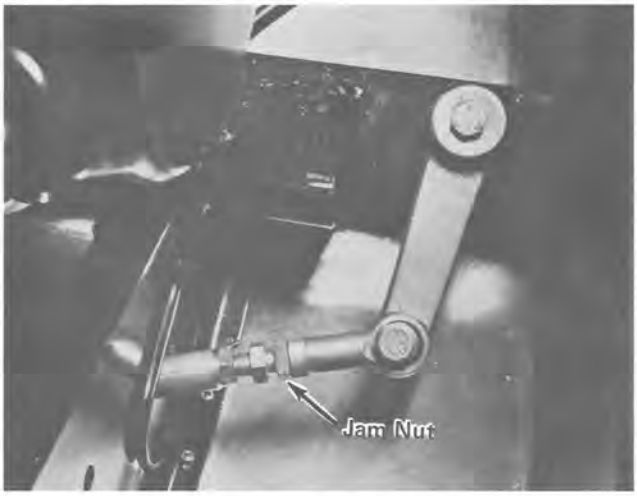
5. Rotate tie rod until the tie rod end mounting hole lines up with the hole in the spindle arm, Fig. VII-51. Secure tie rod end to spindle with cap screw and lock nut, using a 9/16-inch socket and open end wrench. Tighten cap screw to 35 ft-lb, using a 9/16-inch socket and torque wrench.

Fig. V11-51

Note: On 1975 models, rotate the adjusting stud until tie rod end mounting hole and spindle arm hole are aligned; then secure in position with cap screw and lock nut.

6. Bottom the jam nut against the tie rod, Fig. VII-52, using a 9/16-inch open end wrench.

Fig. V11-52



Note: On 1975 models, bottom one jam nut against tie rod and the other against the tie rod end.

7. Perform steps 5 and 6 on remaining tie rod end.

⚠ WARNING ⚠

To ensure the safety of the operator, all cap screws, lock nuts, jam nuts, tie rods and tie rod ends must be tightened properly and be without noticeable damage. Tie rod end or adjusting stud must be threaded halfway into tie rod to assure maximum steering linkage strength. If any of these conditions is neglected or if any parts are incorrectly assembled, serious injury to the operator or passenger may occur.

BODY SERVICING

Remove Instrument Panel

Equipment Necessary: Screwdriver Having a 5/16-Inch Blade, Pliers, 3/8-Inch Wrench and 3/4-Inch Wrench.

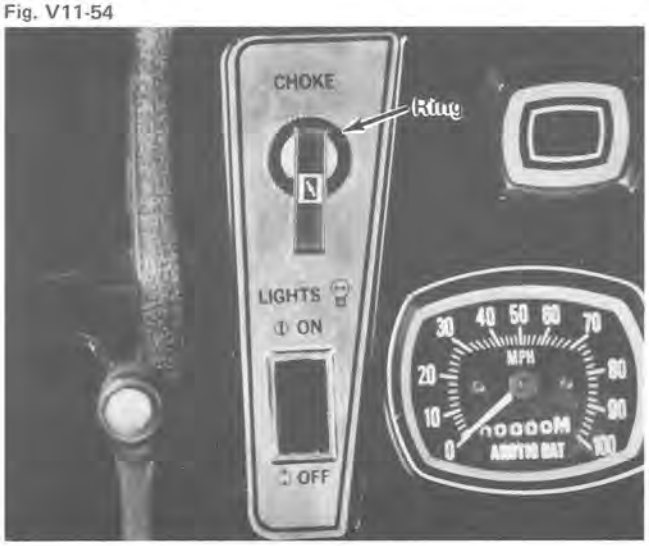
1. Remove the ring nut holding ignition switch in the instrument panel, Fig. VII-53; then slide switch through instrument panel. DO NOT REMOVE WIRE CONNECTOR FROM IGNITION SWITCH.

Fig. V11-53

2. Pull wires off light switch terminals. Compress locking tabs on back of light switch, using thumb and forefinger. Remove switch from instrument panel.

3. Remove the ring nut holding choke cable assembly in the instrument panel, Fig. VII-54. Slide choke cable head through instrument panel.

Fig. V11-54



4. Unplug wire connector from the back of tachometer.

5. Loosen the flange nut securing speedometer cable to speedometer head, using a 3/4-inch wrench. Pull cable out of head.

6. Remove light socket from back of speedometer.

7. Pull recoil rope until fully extended. Take up slack and tie a slip knot near recoil housing to stop rope from retracting.

8. Pry knot in recoil handle free and untie. Slide handle free of rope. Pull rope through recoil bushing in instrumental panel.

9. Remove the three fastening screws (one on steering post mount bracket, one on each lower corner of instrument panel), using a screwdriver having a 5/16-inch blade.

Note: If snowmobile is equipped with temperature gauges or any other gauges, all wires and cables must be disconnected before instrument panel can be removed.

10. Remove instrument panel from chassis.

Note: Instrument panel can be removed with speedometer and tachometer intact. If instrument panel is to be replaced, proceed to steps 11-12.

11. Remove the two nuts and lock washers holding speedometer mount bracket in place. Slide speedometer out of instrument panel.

12. Remove two nuts and lock washers holding tachometer mount bracket in place. Slide tachometer out of instrument panel.

Note: Any other gauges or accessories on instrument panel should be removed at this time.

Install Instrument Panel

Equipment Necessary: Pliers, Screwdriver Having a 5/16-Inch Blade, 3/8-Inch Wrench, and 3/4-Inch Wrench.

Note: If instrument panel was replaced, start at step 1. If panel was only removed and gauges left intact, start at step 3.

1. Slide speedometer and tachometer into holes in instrument panel.

Note: Speedometer must be mounted in left side of panel to allow speedometer cable to reach speedometer head.

2. Secure gauges in place by sliding mount brackets over mounting studs. Install nuts and lock washers on studs. Tighten nuts snugly, using a 3/8-inch wrench.

3. Place instrument panel in position on machine.

4. Connect speedometer cable to head, using a 3/4-inch wrench. Snap speedometer light into place on backside of speedometer.

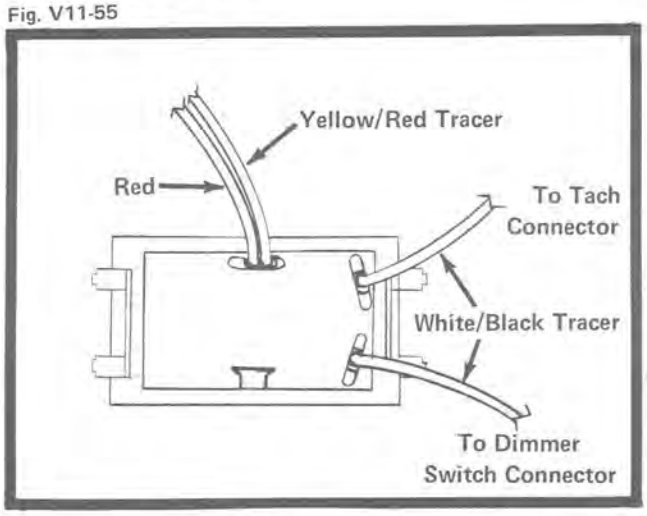
5. Push square tachometer connector into main wiring harness connector.

6. Install light switch in the instrument panel. Make sure the horizontally-oriented terminals are toward the bottom of the instrument panel.

   A. Connect the red and the yellow wires contained in one plug to the vertical terminal closest to the steering post, Fig. VII-60.

   B. Connect either of the white wires having a black tracer to the horizontal terminal closest the steering post, Fig. VII-55; then connect remaining white wire having a black tracer to the other horizontal terminal, Fig. VII-55.

Fig. V11-55



7. Slide choke cable head through hole in instrument panel, Fig. VII-56; then secure cable head in place with the ring nut. DO NOT OVER-TIGHTEN RING NUT, because it can be easily stripped.

Fig. V11-56

8. Slide ignition switch through instrument panel; then secure switch in place with the ring nut, Fig. VII-57. DO NOT OVER-TIGHTEN RING NUT.

Fig. V11-57

Note: Make sure single-prong terminal of ignition switch is toward the brake disc.

9. Thread recoil rope through recoil guide bushing, and then through recoil handle. Tie a knot in the end of rope to keep it from pulling through handle.

10. Install the three screws that secure instrument panel to steering column mounts, using a screwdriver with a 5/16-inch blade.

11. Untie the slip knot used to prevent rope from retracting into the recoil housing.

12. Connect heat gauge wires if snowmobile is so equipped.

Remove Toolbox

Equipment Necessary: Air-powered Drill, Stub Screwdriver with 1/4-Inch Blade, and 5/32-Inch Bit.

1. Remove seat cushion from tunnel.

2. Remove toolbox pad from toolbox.

3. Drill out pop rivets that hold toolbox to tunnel, using an air-powered drill and 5/32-inch bit.

Note: The toolbox pad is to be considered a separate part if the toolbox is being replaced.

4. Using a stub screwdriver with a 1/4-inch blade, remove the two screws securing taillight assembly to toolbox.

Install Toolbox

Equipment Necessary: Pop Rivet Tool and Stub Screwdriver With a 1/4-Inch Blade.

1. Fasten taillight assembly to toolbox, using a small stub screwdriver having a 1/4-inch blade. DO NOT OVER-TIGHTEN.

2. Place toolbox in position on tunnel and fasten with pop rivets, using a rivet tool.

Note: Be sure taillight ground wire gets riveted to tunnel. If not fastened properly, current will not get to taillight and brakelight.

3. Install toolbox pad on toolbox bottom.

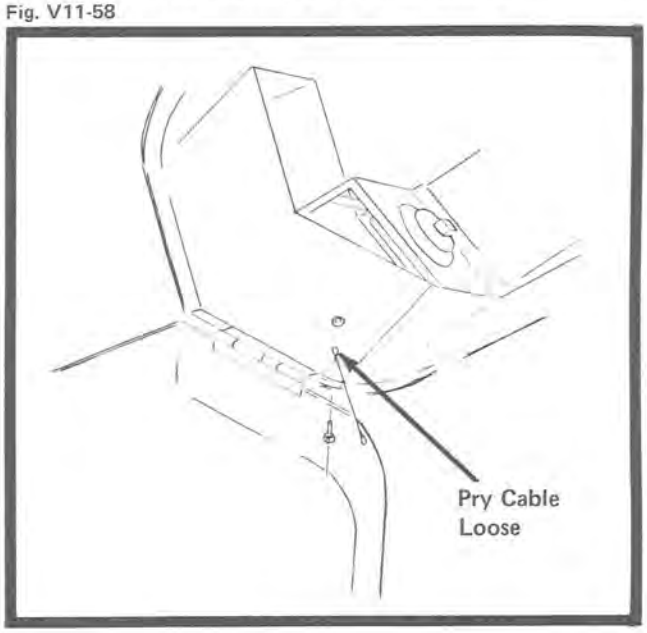
4. Install seat on tunnel.

Remove Hood, Headlight, Hinge Bracket, and Hinge Support

Equipment Necessary: Air Drill, Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade, 5/32-Inch Drill Bit, 7/16-Inch Socket, and 7/16-Inch Wrench.

1. Remove hood cable from hood by prying looped end over rivet, Fig. VII-58, using a screwdriver having a 1/4-inch blade.

Fig. V11-58



2. Disconnect headlight harness from main wiring harness.

3. Remove "E" ring from hood hinge pin, using a pliers.

4. If hood hinge bracket needs to be removed, proceed to step 5. If headlight and/or headlight housing needs to be replaced, proceed to step 6-8. If belly pan mounted hinge support needs to be replaced, proceed to steps 9-12.

5. Remove the four slotted machine screws and lock nuts holding hinge bracket to the hood, using a 7/16-inch socket and screwdriver having a 7/16-inch blade.

Note: On Z models, remove the four rivets securing hinge to the hood.

6. Disconnect headlight harness from headlight; then remove headlight harness from hood.

7. Press ends of headlight retaining wire together until it disengages from the keepers. Remove headlight from housing.

8. Remove the four metal screws holding headlight housing to headlamp mount of the hood, using a phillips screwdriver having a no. 2 blade and a pliers. Account for clips on back side of screws (1974 only). Slide headlight housing out of hood.

9. Remove reflector and reflectorized strip from bumper (See: Remove Reflector and Reflectorized Strip, page VII-22).

Note: For removing hinge support on 295 El Tigre, follow steps 10 and 11. For all other models, follow step 12.

10. Remove front bumper, using a phillips screwdriver with a no. 2 blade and a 7/16-inch wrench or 7/16-inch socket.

11. Using an air drill and a 5/32-inch drill bit, drill out rivets holding hinge support to belly pan. Hinge support should now be free of the belly pan.

12. Remove the three lock nuts holding hinge support to belly pan, using a 7/16-inch socket. Hinge support should now be free of the belly pan.

Note: On 1975 models, remove the four machine screws (three on Z models) and lock nuts holding support to the belly pan.

Install Hood, Headlight, Hinge Bracket, and Hinge Support

Equipment Necessary: Torque Wrench, Pop Rivet Tool, Pliers, Phillips Screwdriver Having a No. 2 Blade, Screwdriver Having a 1/4-Inch Blade, 7/16-Inch Socket, 7/16-Inch Wrench, and a Screwdriver Having a 7/16-Inch Blade.

1. If the belly pan-mounted hinge support was removed, proceed to steps 2-5. If the headlight housing was removed, proceed to steps 6-8. If the hood hinge bracket was removed, proceed to step 9.

Note: When installing pan-mounted hinge support on 295 model, follow steps 2-8. On all other models, follow step 4.

2. Place hinge support in position at front of belly pan. Fasten in place with pop rivets, using a rivet tool.

3. Install front bumper with countersunk screws and lock nuts, using a phillips screwdriver having a no. 2 blade and 7/16-inch socket or wrench. Be sure hood channels are in place. Tighten lock nuts to 10 ft-lb, using a 7/16-inch socket and torque wrench.

4. Install hinge support over studs in belly pan. Secure in place with three lock nuts. Tighten lock nuts to 10 ft-lb, using a 7/16-inch socket and torque wrench.

Note: On 1975 models, secure support in place with 4 machine screws (3 on Z models) and lock nuts.

5. Install reflector and reflectorized strip (See: Install Reflector and Reflectorized Strip, page VII-22).

6. Install headlight housing in hood with the four metal screws and springs using a pliers and phillips screwdriver having a no. 2 blade.

7. Install headlight on back of headlight housing with retaining wire.

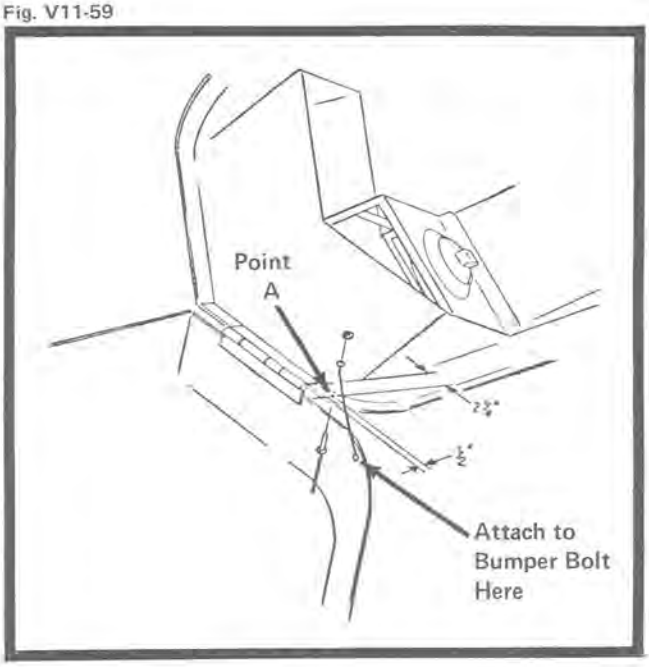
8. Install headlight harness on inside of hood; then push connector over headlight terminals.

Note: On 1975 Z models, the harness must be kept tight to prevent harness from hitting exhaust system. Installation of additional cable clips (part no. 0123-397) is recommended.

9. Place hinge bracket on inside of hood. Secure in position with four slotted machine screws and lock nuts, using a 7/16-inch socket and a screwdriver having a 7/16-inch blade. Tighten lock nuts to 10 ft-lb, using a torque wrench and 7/16-inch socket.

Note: The hood hinge on 1975 El Tigre Z models was designed for quick removal and easy access to all under-hood components. However, if the edge of the hood is not seated properly in the hood channel or if the hood is not latched properly, it is possible for the hood to come off during operation. To prevent this, install a cable (Part No. 0116-740) as shown in Fig. VII-59. Drill a 3/16-inch hole (Point A) through hood per locating measurements in Fig. VII-59. Attach one end of cable to hood with rivet (Part No. 8060-710) and washer (Part No. 8050-157). Attach other end of cable to the bumper bolt at the right of the hood hinge using a second nut (Part No. 8041-366) and washer (Part No. 8050-217). When properly installed, the cable will not interfere with the opening of the hood. However, hood removal will require a removal of the second nut on the bumper bolt.

Fig. V11-59



10. Place hood in position on hinge support. Retain hood in place with E-ring, using a pliers.

11. Install looped end of hood cable over rivet on hood, using a screwdriver having a 1/4-inch blade.

12. Connect headlight harness to main wiring harness.

13. If either headlight or headlight housing was removed, check headlight for proper aim (See: Headlight Aiming, page VII-21).

Headlight Aiming

Equipment Necessary: Tape Measure, Phillips Screwdriver Having a No. 1 Blade, and Phillips Screwdriver Having a No. 2 Blade.

The headlight can be adjusted for vertical and horizontal aim of the high/low beam. The geometric center of the high beam light zone is to be used for vertical and horizontal service aiming.

1. Make sure suspension is adjusted properly.

2. Position snowmobile on a level floor so that headlight is approximatelv 25 feet away from a wall or similar aiming surface.

3. Measure distance from floor to midpoint of headlight, using a tape measure. REMEMBER THIS DISTANCE.

4. Using measurement obtained in step 3, place a mark this distance from the floor on the wall or similar headlight aiming surface.

5. Move light switch to ON position and dimmer switch to high beam. DO NOT USE LOW BEAM — IMPROPER HEADLIGHT AIM WILL RESULT.

6. Observe headlight beam aim. Beam is aimed properly when the most intense light is focused and centered 2 inches below the mark made on the wall or similar headlight aiming surface. If headlight aim is not as specified, proceed to step 7.

7. If an adjustment is necessary, rotate the spring loaded screws until the most intense beam is centered according to step 6.

BODY SERVICING

Note: On all 1975 models, install lock nuts (part no. 8040-276) to the headlight adjustment screws to prevent the screws from loosening and falling out during operation.

Remove Reflector and Reflectorized Strip

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

1. Insert jackknife tip behind end of reflector. Slowly pry reflector away from bumper. Continue to pry using a screwdriver having a 1/4-inch blade.

> **CAUTION**
> DO NOT try to remove reflector when it is cold, because it may break.

2. Peel reflective strip from bumper.

Note: Heating reflective strip very slightly may ease removal.

Install Reflector and Reflectorized Strip

Equipment Necessary: None

1. Remove protective backing and guide new strip in place. Press firmly in place.

2. Trim ends to match contour of bumper ends.

3. Install reflectors on bumper and reflectorized strip. Press into position.

Note: The reflector strip used on 1973, '74 and '75 model El Tigre's may not adhere satisfactorily to the bumper strip. When replacing these reflectors, relocate them on the belly pan just below the original location. Be sure mounting area is free of dirt, oil or wax.

Remove Bumper and Hood Channels

Equipment Necessary: Phillips Screwdriver Having a No. 3 Blade, 7/16-Inch Socket, and 7/16-Inch Wrench.

1. Remove reflector and reflectorized strip (See: Remove Reflector and Reflectorized Strip, page VII-22).

2. Remove the 14 machine screws and lock nuts holding both sides of bumper to belly pan and front end, using a phillips screwdriver having a no. 3 blade, 7/16-inch socket, and 7/16-inch wrench.

Install Bumper and Hood Channels

Equipment Necessary: Phillips Screwdriver Having a No. 3 Blade, 7/16-Inch Socket, and 7/16-Inch Wrench.

1. Secure bumper and hood channels to belly pan and front end with 14 machine screws and lock nuts, using a phillips screwdriver having a no. 3 blade, 7/16-inch socket, and a 7/16-inch wrench.

2. Install reflectorized strip and reflector (See: Install Reflector and Reflectorized Strip, page VII-22).

Remove Footrest

Equipment Necessary: Jackknife, Small Pin Punch, Hammer, Phillips Screwdriver Having a No. 3 Blade, Air-Powered Drill With 5/32-Inch Bit, Cold Chisel With 1/2-Inch Blade, and a 7/16-Inch Wrench.

1. Insert jackknife tip between end of reflector and reflective strip. Pry reflector away from strip and bumper.

> **CAUTION**
> Do not try to remove reflector when it is cold, because it may break.

2. Remove the machine screw and lock nut holding footrest to end of bumper and belly pan, using a phillips screwdriver having a no. 3 blade and a 7/16-inch wrench.

3. Remove rivets holding footrest to tunnel and front end, using a cold chisel with a 1/2-inch blade, and a hammer. Then use a pin punch and hammer to drive rivets through tunnel and front end.

Install Footrest

Equipment Necessary: Pop Rivet Tool, Phillips Screwdriver Having a No. 3 Blade, and 7/16-Inch Wrench.

1. Place footrest in position on chassis.
2. Secure footrest in position with pop rivets, using a pop rivet tool.
3. Install machine screw and lock nut that holds footrest to end of bumper and belly pan, using a 7/16-inch wrench and a phillips screwdriver having a no. 3 blade. Tighten lock nut to 10 ft-lb, using torque wrench and 7/16-inch socket.
4. Install reflector by pressing it firmly in place over bumper reflective strip.

Note: Since reflector covers rear bumper mount screw, it is not necessary to replace reflectorized strip if only rear screw is removed.

Remove Fuel Tank

Equipment Necessary: 1/4-Inch Bolt.

1. Remove fuel tank (See: Section III – Fuel System, Remove Fuel Tank).

Install Fuel Tank

Equipment Necessary: None

1. Install fuel tank (See: Section III – Fuel System, Install Fuel Tank).

Remove Rear Bumper

Equipment Necessary: Air-Powered Drill With 5/32-Inch Bit, Hammer, Screwdriver Having a 7/16-Inch Blade, Stub Screwdriver Having a 7/16-Inch Blade, 7/16-Inch Socket, 7/16-Inch Cold Chisel, and 1/2-Inch Socket.

1. Remove seat cushion from tunnel.
2. Remove the two rivets holding wear plate to bumper, using a 7/16-inch cold chisel and hammer. Repeat this step on opposite side wear plate.
3. Remove the two nylon cap nuts and machine screws holding side of bumper to chassis and wear plate, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket.
4. Remove the four nylon cap nuts and machine screws holding snow flap and backing plate to chassis and bumper, using a stub screwdriver having a 7/16-inch blade and a 7/16-inch socket.
5. Remove the two cap screws on inside of tunnel holding handle portion of bumper to chassis, using a 1/2-inch socket.
6. Raise rear bumper off tunnel.

Install Rear Bumper

Equipment Necessary: Pop Rivet Tool, Torque Wrench, Stub Screwdriver Having a 7/16-Inch Blade, 1/2-Inch Socket, and 7/16-Inch Socket.

1. Place rear bumper over tunnel and into position on chassis.
2. Install the two cap screws holding front portion of bumper, using a 1/2-inch socket. DO NOT TIGHTEN.
3. Install the four machine screws through backing plate and snow flap. Insert through tunnel end plate and then rear bumper. Secure with four nylon cap nuts, using a stub screwdriver having a 7/16-inch blade and a 7/16-inch socket.

Note: Nylon cap nuts are to be positioned on outside of rear bumper.

4. Install two machine screws and lock nuts that secure rear sides of bumper to chassis and wear plates, using a screwdriver having a 7/16-inch blade and a 7/16-inch socket. Tighten securely.

Note: Nylon cap nuts are to be positioned on outside of rear bumper.

5. Install two rivets that secure bumper to wear plate, using a pop rivet tool. Repeat this step on opposite side of bumper.

Note: If a new bumper is to be installed, holes will have to be drilled for rivets, using a 5/32-inch drill bit.

6. Now Tighten the two cap screws holding front portion of bumper, using a 1/2-inch socket.

7. Install seat cushion on tunnel.

NOTES

TABLE OF CONTENTS

SPECIAL TOOLS-ENGINE, SACHS

Description: Flywheel Puller

Part Number: 6000-684

Usage: KM24, KM3, KM914 and RC18.5

How Used: To pull flywheel of mainshaft.

Description: Oil Seal Extractor — Includes hook, part number 0144-091 (3MM).

Part Number: 6000-674

Usage: KM3

Description: Hook, 3mm

Part Number: 0144-091

Usage: KM3

How Used: Remove seal from mag side.

Description: Hook, 4mm

Part Number: 0144-090

Usage: KM3

How Used: Remove seal from PTO side.

Description: Decarbonizing Tool

Part Number: 6000-528

Usage: All Sachs Rotary Engines

How Used: Remove carbon from rotor seal grooves.

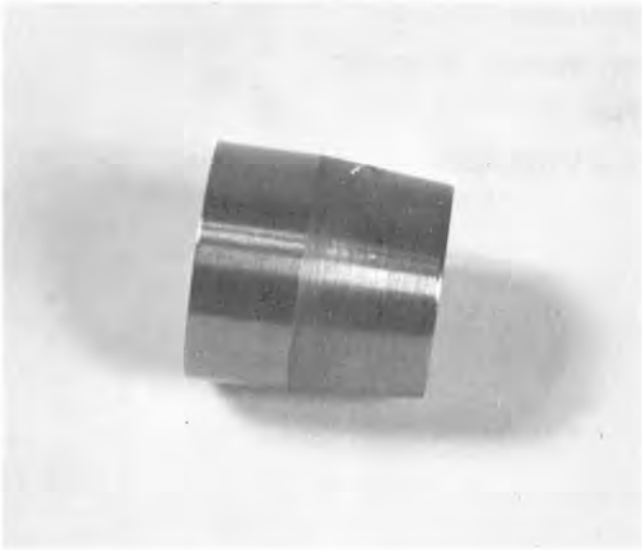
SPECIAL TOOLS-ENGINE, SACHS

Description: Oil Seal Mounting Sleeve

Part Number: 0144-088

Usage: KM3

How Used: Install oil seal in PTO end cover.



Description: Oil Seal Mounting Sleeve

Part Number: 0144-089

Usage: KM3

How Used: Install oil seal in magneto end cover.

Description: Bearing Puller Kit

Part Number: 0144-080

Usage: KM914, RC18.5, SB93, 50AMAX

How Used: Remove bearings from crankshaft.

Note: SB93 puller shells used to pull flywheel off crankshaft.

SPECIAL TOOLS-ENGINE, SACHS

Description: Protective Cap

Part Number: 6000-683

Usage: KM24, KM3, KM914 and RC18.5

How Used: Use with flywheel puller (6000-684) to protect mainshaft.

Part No. 2214-000
Sachs Mini-Bike Tool Kit

Description: Tool Kit

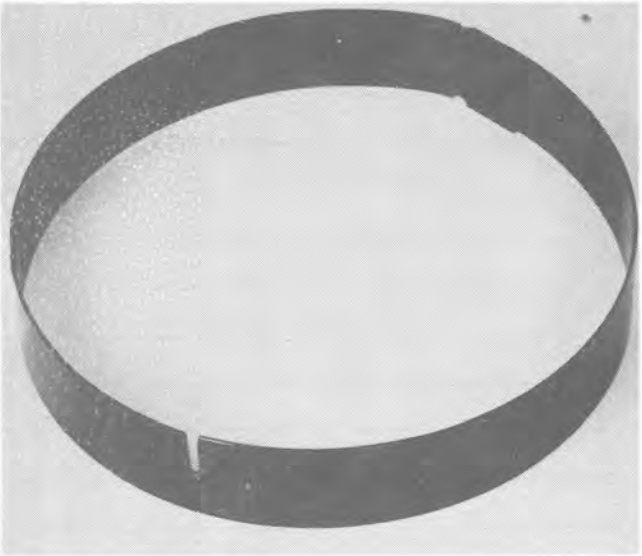
Part Number: 2214-000

Usage: 50AMAX

How Used: Used to pull flywheel, sprockets, piston pin and hold flywheel.

NOTES

SPECIAL TOOLS-ENGINE, ARCTIC CAT

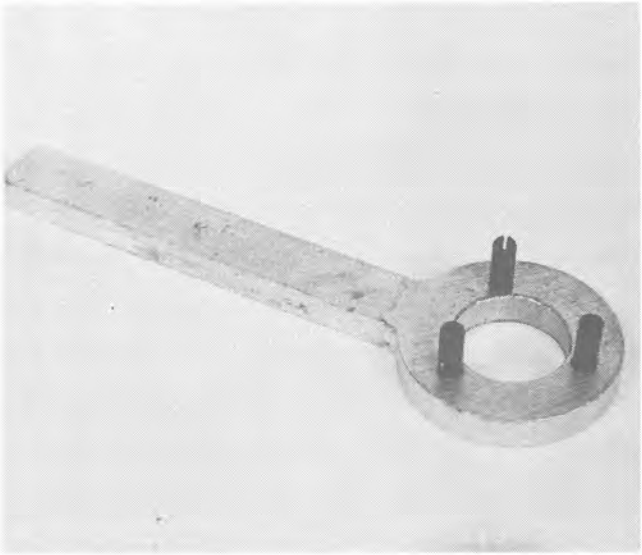


Description: Recoil Spring Retainer

Part Number: 0144-005

Usage: All Arctic Cat Engines Except T6A, T6B, T5A and T5B.

How Used: Used to wind and install recoil spring in recoil case.



Description: Fan Holder

Part Number: 0144-004

Usage: All "T" Series Axial Flow Engines

How Used: Used to hold axial fan pulley.

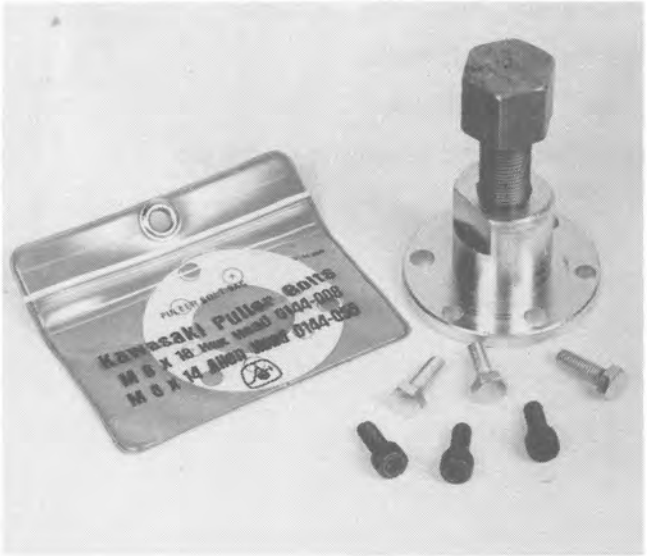
Description: Spanner Wrench, Flywheel

Part Number: 0144-007

Usage: All Arctic Cat Engines

How Used: Used to hold flywheel while removing flywheel nut.

SPECIAL TOOLS-ENGINE, ARCTIC CAT



Description: Flywheel Puller Kit

Part Number: 0144-064

Usage: All Arctic Cat Engines

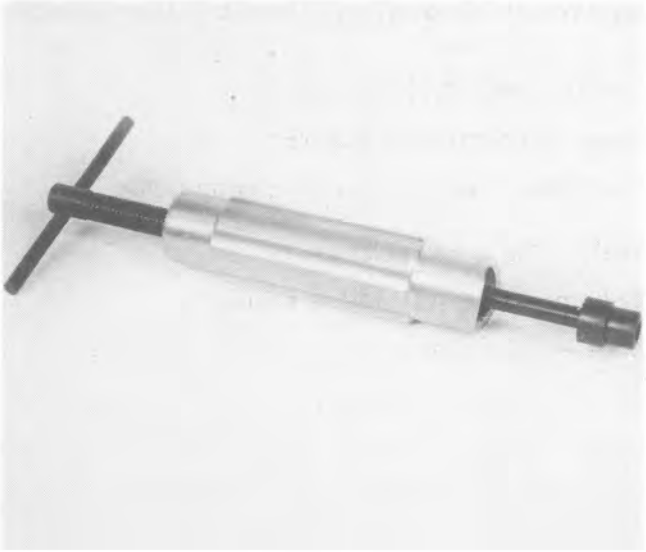
How Used: Used to pull flywheel off crankshaft.

Description: Flywheel Puller Bolt Kit

Part Number: 0144-063

Usage: Use with Flywheel Puller (0144-064)

How Used: For replacement purposes.



Description: Piston Pin Extractor

Part Number: 0144-003

Usage: All Arctic Cat Engines Except T5A and T6A

How Used: Used to remove piston pin.

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Piston Pin Extractor

Part Number: 0144-066

Usage: T5A and T6A

How Used: Used to remove piston pin.

Description: Bearing Puller Kit

Part Number: 0144-080

Usage: All Arctic Cat Engines

How Used: Remove bearings from crankshaft.

Description: Piston Ring Clamp with Compression Bands

Part Number: 0144-001

Usage: All Arctic Cat Engines

How Used: Used to compress piston ring.

Small – 250 & 295 cc engines

Medium – 340, 400, 440 cc engines

Large – 292 single

SPECIAL TOOLS-ENGINE, ARCTIC CAT

Description: Belt Tension Gauge

Part Number: 0144-012

Usage: All Arctic Cat Axial Flow Engines

How Used: Used to tension axial fan belt.

Description: Magneto Gauge

Part Number: 0144-011

Usage: T1A F Series Arctic Cat Engines

How Used: Used to install new excitor, pulser or lighting coil to base plate.

Description: CDI Gauge

Part Number: 0144-056

Usage: T3A and T8A Arctic Cat Engines

How Used: Used to install new excitor, pulser or lighting coil to base plate.

NOTES

SPECIAL TOOLS-ELECTRICAL

Description: Ohm Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

Description: Amp Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

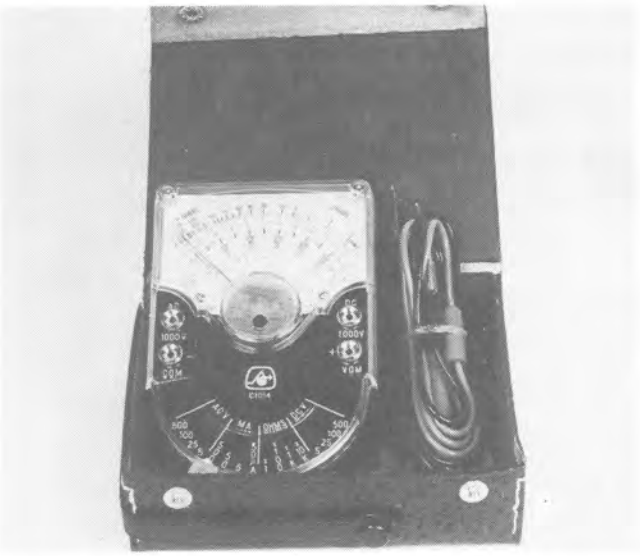
Description: Volt Meter

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

SPECIAL TOOLS-ELECTRICAL

Description: CD Ignition Tester

Note: Order from
Electro Specialties, Inc.
4195 Southport Wash. Ave.
Milwaukee, Wisconsin 53208

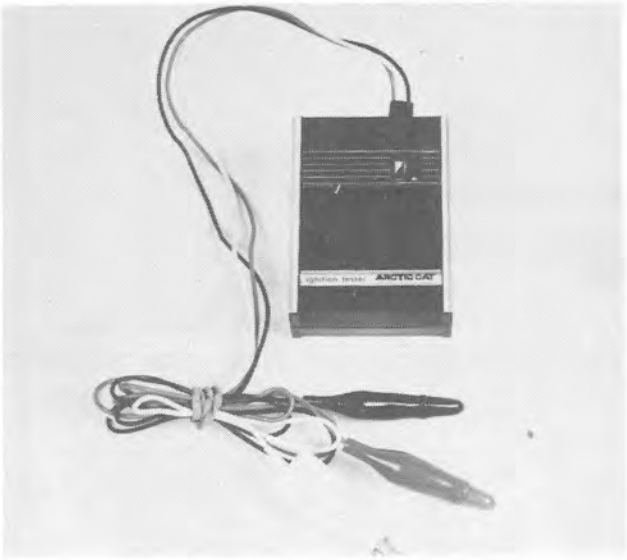


Description: Multitester

Part Number: 0144-053

Usage: All Arctic Cat Snowmobile Electrical Systems

How Used: Ability to read AC volts, DC volts and Ohms



Description: Timing Buzzer

Part Number: 0144-010

Usage: All Arctic Cat Engines

How Used: Used to time engines.

SPECIAL TOOLS-ELECTRICAL

Description: Engine Timing Gauge

Part Number: 0144-009

Usage: All Arctic Cat Engines Except Those Equipped with CDI

How Used: Used to time engines.

Description: Amp Terminal Extractor

Part Number: 0144-100

Usage: All 1974 Arctic Cat Snowmobiles Except Lynx I and Wankel Panther

How Used: Used to remove wire terminal from engine connector block.

NOTES

SPECIAL TOOLS-DRIVE SYSTEM

Description: Arctic Drive Clutch Puller

Part Number: 0144-104

Usage: All 1974 Arctic Cat Snowmobiles Except Wankel Panther Equipped with Arctic Clutch (0225-050 & 0225-010)

How Used: Used to pull drive clutch off crankshaft.

Description: Arctic Drive Clutch Puller

Part Number: 0144-054

Usage: 1974 Wankel Panther Equipped with Arctic Clutch (0225-050 & 0225-014) and 1973 Cheetah/Panther

How Used: Used to pull drive clutch off crankshaft.

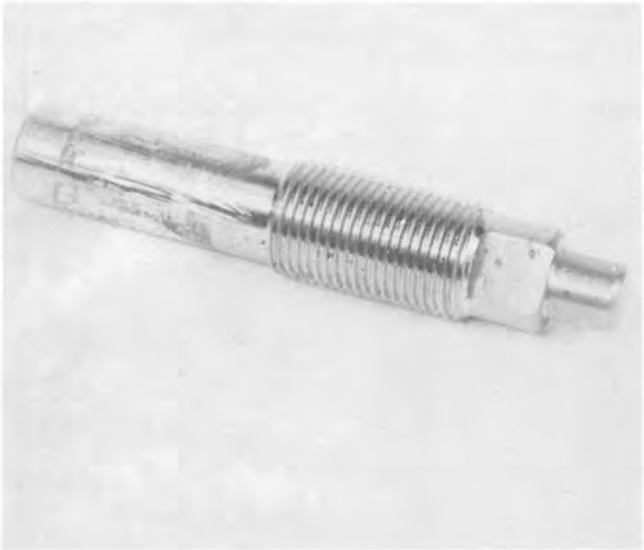
Description: Arctic Drive Clutch Puller

Part Number: 0144-068

Usage: All 1973 Arctic Cat El Tigre's

How Used: Used to pull drive clutch off crankshaft.

SPECIAL TOOLS-DRIVE SYSTEM



Description: Salsbury Drive Clutch Puller

Part Number: 0144-031

Usage: All 700 Series Salsbury Drive Clutches

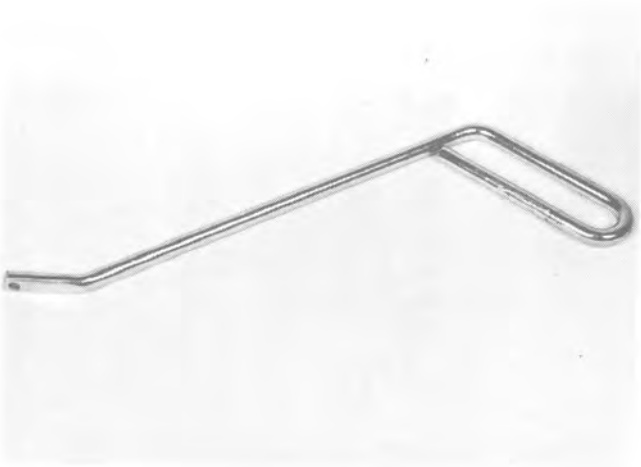
How Used: Used to pull drive clutch off crankshaft.

Description: Salsbury Drive Clutch Puller

Part Number: 0144-029

Usage: All Salsbury 910 Drive Clutches

How Used: Used to pull drive clutch off crankshaft.



Description: Spring Seating Tool

Part Number: 0144-014

Usage: All Salsbury Drive Clutches

How Used: Used to seat spring behind roller arm tab.

SPECIAL TOOLS-DRIVE SYSTEM

Description: St. Lawrence Drive Clutch Puller

Part Number: 0144-052

Usage: All St. Lawrence Clutches

How Used: Used to pull drive clutch off crankshaft.

Description: Salsbury Drive Clutch Puller

Part Number: 0144-026

Usage: Salsbury 9R & 11R Drive Clutch

How Used: Used to pull drive clutch off crankshaft.

Description: Salsbury Drive Clutch Roller

Part Number: 0144-025

Usage: Salsbury 7R

How Used: Used to pull drive clutch off crankshaft.

SPECIAL TOOLS-DRIVE SYSTEM

Description: Solid Rivet Tool

Part Number: 0144-067

Usage: All Tracks Manufactured with Solid Rivets and Internal Drive Lugs

How Used: Used to rivet cleats and ice studs to track – TRACK REBUILDING.

Description: Solid Rivet Tool

Part Number: 0144-062

Usage: All Tracks Manufactured with Solid Rivets and Cleat Drive

How Used: Used to rivet cleats, track guides and ice studs to track – TRACK REBUILDING.

Description: Snowmobile Stand

Part Number: 0144-082

Usage: All Arctic Cat Snowmobiles

How Used: Used to hold snowmobile on its side while using solid rivet tools.

SPECIAL TOOLS-DRIVE SYSTEM

Description: Air Operated Solid Rivet Tool

Part Number: 0144-094

Usage: All Arctic Cat Snowmobile Tracks

How Used: Used to rivet cleats and ice studs to track.

Description: Drive Clutch Spanner Wrench

Part Number: 0144-069

Usage: 1973 El Tigre'

How Used: Used to hold drive clutch for removal purposes.

Description: Clutch Alignment Kit

Part Number: 0144-097 Spacer (.305)
0144-098 Spacer (.365)
0144-099 Bar

Usage: All Arctic Cat Snowmobiles

How Used: Used to establish "parallelism" and "offset" between drive clutch and driven pulley.