1973 EVINRUDE & JOHNSON SNOWMOBILE

SERVICE MANUAL

21 H.P. MODELS
E-1532
J21-153C

SNOWMOBILE DIVISION/ OUTBOARD MARINE CORPORATION
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PART NO. 406133

SECTION 1
INTRODUCTION

SAFETY SYMBOLS

THE PURPOSE OF SAFETY SYMBOLS IS TO ATTRACT YOUR ATTENTION TO POSSIBLE DANGERS. THE SYMBOLS, AND THE EXPLANATIONS WITH THEM, DESERVE YOUR CAREFUL ATTENTION AND UNDERSTANDING. SAFETY WARNINGS DO NOT, BY THEMSELVES, ELIMINATE ANY DANGER. THE INSTRUCTIONS OR WARNINGS THEY GIVE ARE NOT SUBSTITUTES FOR PROPER ACCIDENT PREVENTION MEASURES.

Symbol		Meaning
	SAFETY WARNING	FAILURE TO OBEY A SAFETY WARNING MAY RESULT IN INJURY TO YOU OR TO OTHERS.
	PROHIBITED	WARNS YOU AGAINST AN ACTIVITY WHICH IS, OR MAY BE, ILLEGAL IN YOUR AREA.
	NOTE	ADVISES YOU OF INFORMATION OR INSTRUCTIONS VITAL TO THE OPERATION OR MAINTENANCE OF YOUR EQUIPMENT.

Snowmobile Special Service Tools - 21 H.P.

PART NO.	DESCRIPTION
378103	Flywheel Puller
404032	Wrench - Primary Drive
*	Truarc Pliers
426020	Ring Compressor
383966	Spring Winder
*	Heli-Coil Installers & Inserts
404068	Riveting Tool
375632	Spark Plug Wrench
114146	Splined Wrench
113971	Flywheel Holding Tool
114147	Drive Alignment Gauge
261906	Disassembly Tool (Primary Drive)
261132	Retaining Ring - Bearing Puller
261131	Half Steel - Bearing Puller
261129	Extractor - Crankshaft Bearing

* Refer to the Tool Catalogue

The snow machine has been designed and built for dependable, high performance. It is important to every snow machine owner to be able to receive skilled and thorough service for his vehicle when necessary. It is important to the service dealer to be able to offer the type of skilled service which will maintain the customer's satisfaction.

The service manual, together with the regularly issued service bulletins and Parts Catalogs, provide the serviceman with all the literature necessary to service this snowmobile. An effort has been made to produce a manual that will not only serve as a ready reference book for the experienced serviceman, but will also provide more basic information for the guidance of the less experienced man.

The Parts Catalogs contain complete listings of the parts required for replacement. In addition, the exploded views illustrate the correct sequence of assembly of all parts. This catalog can be of considerable help as a reference during disassembly and reassembly.

The Section Index on page 1-1 enables the reader to locate quickly any desired section. At the beginning of each Section is a Table of Contents which gives the page number on which each topic begins. This arrangement simplifies locating the desired information within this manual. Section 2 lists complete specifications on the snowmobile. All general information, including 2 cycle engine theory, trouble shooting, and tune up procedures, are given in Section 3 through 5 of this manual. Sections 6 through 11 provide fully illustrated, detailed, step-by-step disassembly and reassembly instructions and adjustment procedures. Section 12 provides lubrication and storage information. In this way, the texts treat each topic separately; theory and practice are not intermixed. This makes it unnecessary for the experienced serviceman to reread discussions of theory along with specific service information. Illustrations placed in the margins provide unimpeded reading of explanatory text, and permit close relationship between illustration and text.

Figure 1-1

Read this manual carefully to become thoroughly familiar with the procedures described, then keep it readily available in the service shop for use as a reference. If properly used, it will enable the serviceman to give better service to the snow machine owner, and thereby build and maintain a reputation for reliable service.

This service manual covers all phases of servicing the snowmobile, however, new service situations sometimes arise. If a service question does not appear to be answered in this manual, you are invited to write to the Service Department for additional help. Always be sure to give complete information, including model number and vehicle identification number.

All information, illustrations, and specifications contained in this literature are based on the product information available at the time of publication. The right is reserved to make changes at any time without notice.

1. HAND BRAKE AND PARKING LOCK - To apply brake, squeeze brake lever. NOTE: Do not race engine with brake applied. To apply parking lock, with brake engaged, flip parking lock into position as illustrated in Figure 1-2. To release, squeeze brake lever.

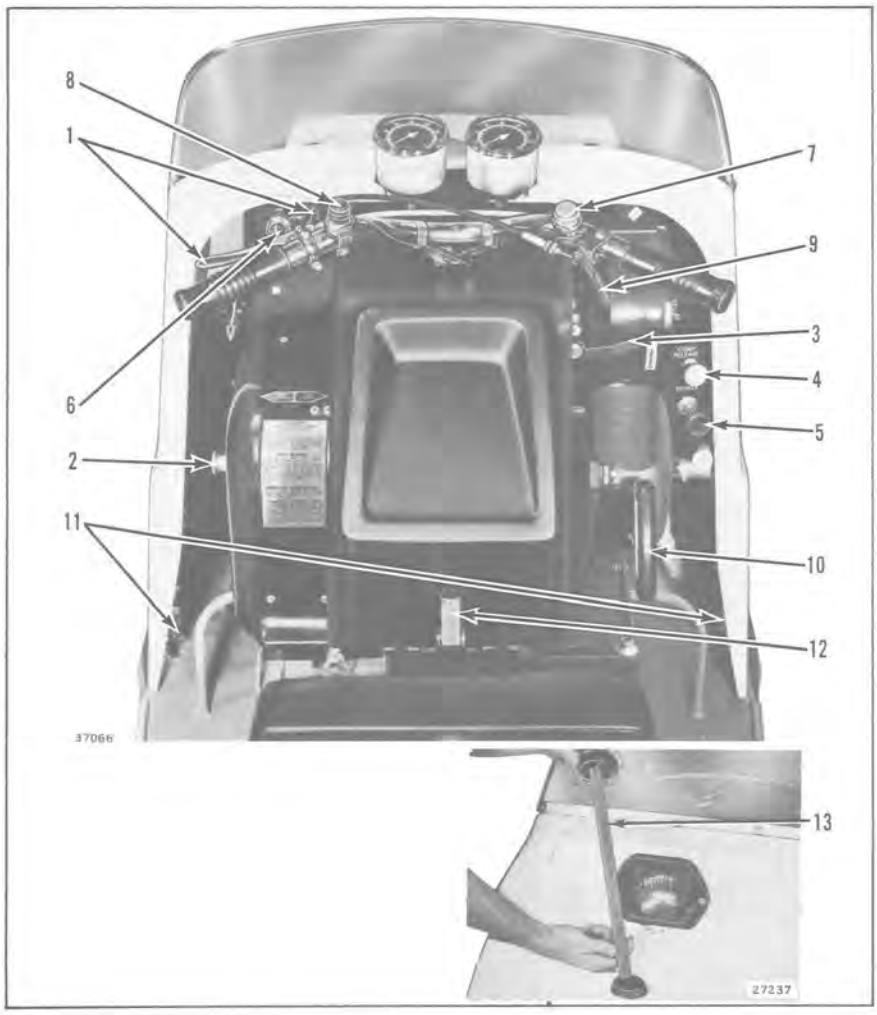

Figure 1-2

2. NEUTRAL CONTROL KNOB - The neutral control locks the transmission in neutral when pulled out. To engage transmission, reduce engine speed to idle and push neutral control knob in.

SAFETY WARNING

Engine RPM must be under 2000 RPM before transmission can be locked in neutral.

3. CHOKE LEVER - The choke lever is used during starting and engine warm-up to enrich the fuel-air mixture to the engine.

4. COMPRESSION RELIEF - Pull compression relief knob out to ease starting. Push knob in after engine starts.

5. PRIMER - Pushing the primer knob manually pumps fuel into the intake manifold. A cold engine should be primed prior to starting.

6. IGNITION/LIGHTS SWITCH - The key operated ignition switch has three positions, 'OFF,' "LIGHTS' (operate with lights), and 'RUN' (operate without lights).

7. SAFETY STOP SWITCH - This switch allows the operator to stop engine power instantly. Depress button to stop engine; depress again and release to allow restarting of engine. The safety stop switch remains slightly down in the "STOP" position.

8. HI-LO BEAM HEADLAMP SWITCH - The headlamp beam switch selects either low beam, or high beam, when ignition switch is in "RUN"/"LIGHTS" position.

9. THROTTLE - The thumb operated throttle lever is located on the right hand steering arm. Squeezing the throttle increases engine speed. When lever is released, engine returns to idle.

10. MANUAL STARTER HANDLE - Snowmobile is started by pulling the manual starter handle.

11. HOOD LOCK LEVERS - The hood lock levers are pulled in and down to release. Remove fuel tank cap. Lift rear of hood up and pull back to release from forward catch.

12. ENGINE COVER LATCH - Pull back and down to release. Lift rear of engine cover and pull back to remove.

13. FUEL LEVEL DIP STICK

SECTION 2 SPECIFICATIONS

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SPECIFICATIONS

PROHIBITED

Snowmobiles are not manufactured for highway use and the manufacturer does not represent that they are equipped with all the devices legally required for such use.

Length	95.5 inches
Width	30.8 inches
Height with windshield	38.8 inches
without windshield	32.4 inches
Engine	OMC 2-cycle opposed twin
Rating	Maximum 21 HP at 6000 RPM
Starter	Manual, rewind
Clutch	Centrifugal operated sheave engages belt
Drive, variable speed	Centrifugal operated sheave engages V-belt -3.33 to 1 overall ratio
Drive, Final	ASA 35 double chain 13 to 33 sprocket ratio
Optional sprockets	15, 16, 18, or 30
Muffler	Single, Tuned muffler for quiet operation
Brake	Disc type, hand operated
Throttle	Thumb operated
Track	Specially designed fully adjustable - cleated
Width:	15-3/8 inches
Skis	Formed steel, equipped with shock-absorbing leaf springs and replaceable wear runners
Seating capacity	Two adults. Vinyl coated twill cover, molded urethane foam cushion
Hood	Molded fiberglass with built-in headlight
Headlamp	Sealed beam GE 4482
Taillamp (black tape in back of bulb)	GE 161
Stoplamp (silver tape in back of bulb)	GE 168
Fuel tank	6 U.S. gallons or 5 Imperial gallons
Fuel	good grade regular leaded
Lubrication	OMC brand 50 to 1 lubricant
Carburetor	OMC Float type
Carburetor Needle Adjustment	
High speed	1-1/2 turns off seat
Low speed	1 to 1-1/4 turns off seat
RPM Ratings	
Idle	1100 - 1200
Transmission Belt Engaging Speed	2400 - 2800
Ignition	
Breaker point gap	.020" (new points .022")
Spark plug	Champion J7J or equivalent
Spark plug gap	.028 - .033 inch
Condenser capacity	.18 - .22 mfd
Magneto drive coil resistance	.8 ohm
Ignition coil primary resistance	1.3 to 1.7
Ignition coil secondary resistance	10,000 ohms
Lighting Coil resistance	.678 to .562 ohm
Engine	
Bore and stroke	2-5/8 x 2-1/4 inches
Piston displacement	24.35 cubic inches (399 cc)
Compression ratio	6.5 to 1
Ring diameter	2-5/8 inches
Ring thickness	1/16 inch
Cylinder Compression	minimum 105 PSI
Clearances	
Piston - wrist pin	Press fit
Piston ring gap	.007 - .017
Piston ring - ring groove	.002 - .004
Cylinder - piston	Top of piston to cylinder .0145 - .0115 Bottom of piston to cylinder .0075 - .0055

Specifications and features may be changed at any time without notice and without obligation towards vehicles previously manufactured.

For your own protection, before proceeding with any repair or adjustments on these snowmobiles, see

SAFETY WARNING

on inside front cover and pages 1-4, 6-7, 7-5, 7-6, 8-2, 9-5, 10-2, 10-3, 11-4 and 12-4.

TORQUE SPECIFICATIONS

PART	APPLICATION	SIZE	TORQUE	
			IN./ LBS.	FT./ LBS.
Screw	Brake Hand Lever	#10-32	13-15	
Screw	Coil Clamp to Main Frame		35-45	
*Screw	Connecting Rod			29-31
*Screw	Crankcase		60-80	6-7
*Nut	Cylinder Base			16-20
*Screw	Engine to Engine Frame Assembly	3/8-16		33-38
*Nut	Flywheel			40-45
*Nut	Engine Frame to Main Frame	3/8-16		18-20
*Nut	Truck Axles	5/8-18		35-45
Bolt and Nut	Rear Axle Pivot	5/16-24		12-15
Setscrew	Rear Sprocket	3/8-16		18-20
Nut	Rear Suspension to Frame	5/16-24		12-15
*Nut	Runner to Ski	5/16-18	90-100	
*Nut	Saddle to Spring	3/8-24		25-30
*	Spark plug			20-25
Nut	Throttle Control Cable		30-40	
*Nut	Tie Rod	3/8-24		14-16
*Screw	Truck to Frame	3/8-16		25-30
*Nut	Steering Arm to Ski Column	3/8-24		18-20
*Bolt	Primary Bolt to End Cap			90-100
Screw		#6	7-10	
Screw		#8	15-22	
Screw		#10	25-35	2-3
Screw		#12	35-40	3-4
Screw		1/4	60-80	5-7
Screw		5/16	120-140	10-12
Screw		3/8	220-240	18-20

*Use Torque Wrench

Specifications and features may be changed at any time without notice and without obligation towards vehicles previously manufactured.

SECTION 3
GENERAL SNOWMOBILE INFORMATION

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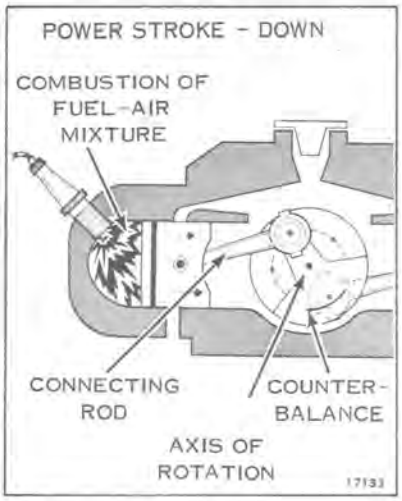

Figure 3-1

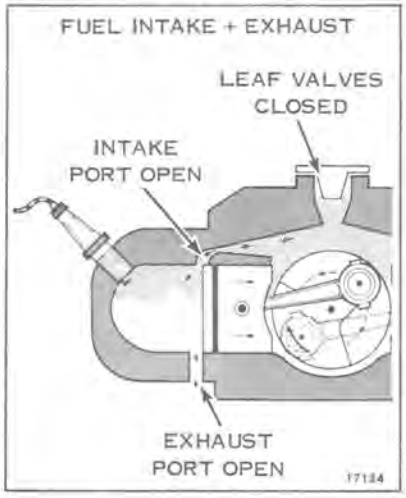

Figure 3-2

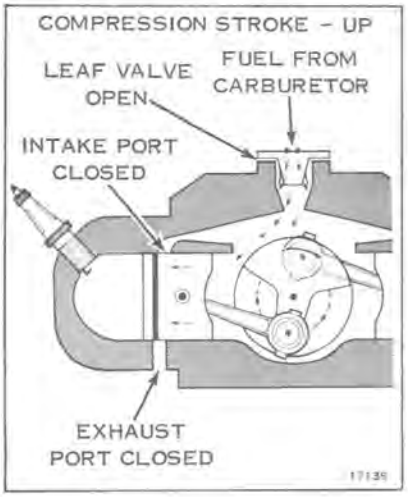

Figure 3-3

TWO CYCLE ENGINE THEORY

An internal combustion engine is one in which fuel is burned inside the engine: a charge of fuel is introduced into a combustion chamber (cylinder) within the engine and ignited. The energy released by the expansion of the burning fuel is converted to torque by the piston, connecting rod, and crankshaft.

Internal combustion engines are classified as either four-cycle or two-cycle engines. The "four" and the "two" refers to the number of piston strokes required to complete a power cycle of intake, compression, power, and exhaust. A piston stroke is piston travel in one direction only; up is one stroke, down is another. In a four-cycle engine, two crankshaft revolutions, or four strokes, are required for each power cycle. In a two-cycle engine only one crankshaft revolution is required per power cycle.

In a two-cycle engine, the ignition of the fuel-air mixture occurs as the piston reaches the top of each stroke. The expansion of gases drives the piston downward (see Figure 3-1). Toward the end of the downward stroke, ports which lead from the cylinder to the exhaust system are uncovered. The expanding exhaust gases flow into these ports, reducing pressure in the cylinder. Immediately after, intake ports are opened. These ports connect the cylinder with the crankcase where a mixture of fuel and air has been developed by carburetion. The downward motion of the piston compresses this mixture and forces it through the intake ports into the cylinder. (See Figure 3-2.)

The inrushing charge of the fuel-air mixture helps to eject (scavenge) the last of the exhaust gases from the cylinder. At this point, the momentum of the flywheel is required to return the piston to the top of the cylinder. As the piston begins its up-stroke, it closes the intake and exhaust ports and begins to compress the fuel-air mixture trapped in the cylinder (see Figure 3-3). The upward motion of the piston also reduces the pressure in the crankcase. The resulting crankcase suction opens leaf valves which admit a fresh charge of air and fuel from the carburetor into the crankcase, thus preparing for the next power cycle. Near the top of the piston stroke, the compressed fuel-air mixture is ignited, the piston is driven downward, and the power cycle is repeated. At full throttle, this cycle may be repeated more than five thousand times every minute.

COMPRESSION

The pistons and piston rings perform two functions. They compress the mixture of fuel and air in the cylinders before ignition, and receive the force of the power after ignition. For maximum compression, the cylinder must be round and the piston and piston rings correctly fitted to it. The rings must be properly seated in the ring grooves and free to expand against the walls of the cylinder. The rings will not retain the pressure of combustion if the pistons and cylinder walls are excessively worn, scored, or otherwise damaged, or if the rings become stuck in grooves because of carbon build up. Escape of compression past the piston rings is referred to as "blow-by" and is indicated by discoloration or carbon formation on the piston skirt.

Cylinder bores normally wear with operation of the engine. The degree of wear will vary with length of operation, efficiency of lubrication, and general condition of the engine. Excessive cylinder wear results in loose fitting pistons and rings, causing blow-by, loss of compression, loss of power and inefficient performance.

Piston rings are formed in such a manner that when installed on the piston, they bear against the cylinder wall with a light, even pressure. Excessive ring pressure against the cylinder wall increases friction,

causing high operating temperature, sluggish performance, and abnormal wear or scoring. Insufficient pressure allows blow-by, which reduces power, and causes overheating and carbon formation on the piston skirt.

Since the ring tends to flex as it follows the cylinder contour during engine operation, clearance or gap must be provided between the ring ends to prevent butting. The ring gap also allows the ring to expand (elongate) as engine temperature rises during operation. Insufficient gap clearance will cause the ring to bend or warp as it flexes and expands; excessive gap clearance will permit loss of compression.

Compression leakage may also occur at the spark plugs. A cracked spark plug insulator will cause similar trouble. Although compression is primarily dependent on the piston, rings, and cylinder, these other sources of leakage should be investigated when compression loss is noted.

Compression may also be affected by the fuel induction and exhaust systems. Since the fuel vapor is first compressed in the crankcase, leakage here will affect engine performance. Possible trouble spots include leaf valve assemblies, seals between crankcase halves, and crankshaft bearing seals. Exhaust ports which have become clogged because of excessive deposits of carbon will hinder the efficient transfer of exhaust gases.

Excessive carbon build-up on piston heads or elsewhere in the cylinder walls can result in a loss of power.

Following the trouble check chart provided at the end of this section and the recommended tune-up procedures given in Section will assure that all areas affecting fuel induction, compression, and exhaust will be considered as part of every trouble shooting procedure. An engine with low or uneven compression cannot be successfully tuned for peak performance. It is essential that improper compression be corrected before proceeding with an engine tune-up.

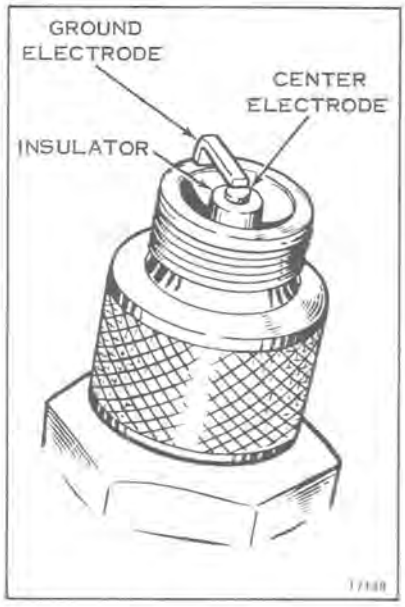

Figure 3-4

SPARK PLUGS

The spark plug provides a gap inside the combustion chamber across which the high voltage from the ignition coil can be discharged. The resulting spark ignites the compressed mixture of fuel vapor and air in the cylinder. See Figure 3-4.

Spark plugs are made in a number of heat ranges to satisfy a variety of operating conditions. The heat range of a spark plug refers to its ability to dissipate heat from its firing end to the cylinder head. The heat range established for any spark plug is determined in design by the length of the path which the heat from the tip must travel to the thread and seat area where it is transferred to the cylinder. Spark plugs having a short gap between the firing end of the center electrode and the thread and seat area are used for hot running engines (see Figure 3-5). Snowmobiles used in heavy load conditions (ie. deep snow or sled towing) will run the engine temperature higher, and in this case, a colder plug might be recommended. Spark plugs operating under these conditions must remain cool enough to avoid preignition and excessive gap erosion. Spark plugs having a long gap transfer heat slower and are used on cooler running engines. See Figure 3-6. Cooler running engines have a relatively low combustion chamber temperature, therefore a high spark plug temperature must be sustained in order to burn off normal combustion deposits and avoid fouling. For most effective sparking through any rpm range and under all conditions of operation, the electrode and insulator tip temperature must be kept high enough to vaporize or burn off particles of fuel mixture which collect on the insulator. Low plug temperatures result in electrode fouling by an accumulation of unburned fuel particles, carbon bits, sludge, etc. Selection of the correct spark plugs for an engine depends on the type of service to which it will be subjected. A cold running engine will require a hot plug and a hot running engine, a cold plug. See Section 7 for additional information on spark plugs.

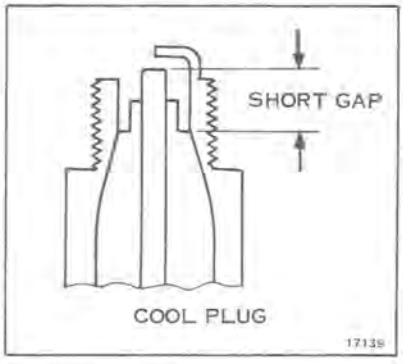

Figure 3-5

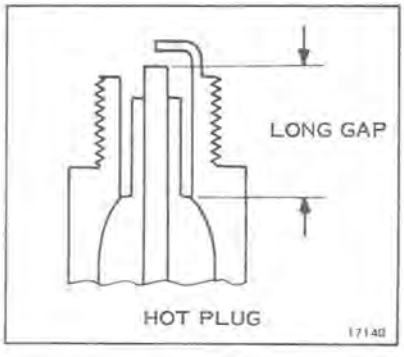

Figure 3-6

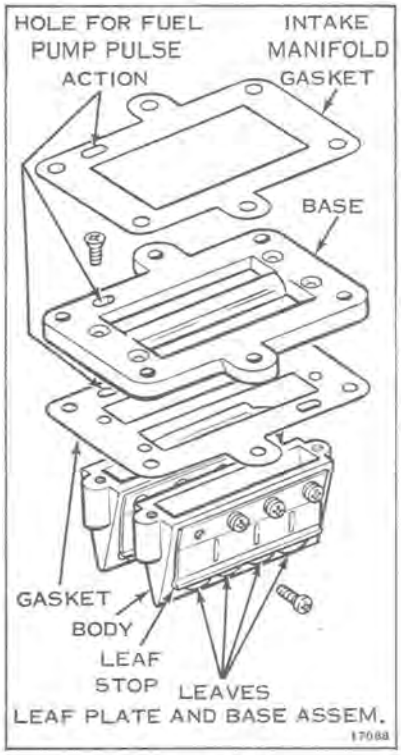

Figure 3-7

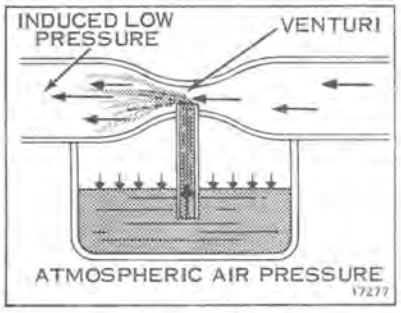

Figure 3-8

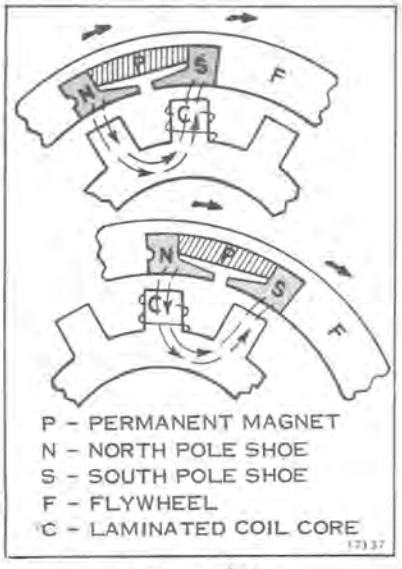

Figure 3-9

CARBURETION

The system which controls the intake of the fuel-air mixture in the two cycle engine consists of a set of leaf valves which serve the same purpose as the intake valves on a four cycle engine. The leaf valves are thin, flexible metal strips mounted between the carburetor intake manifold and crankcase.

When the piston is on the up-stroke, it creates a partial vacuum in the crankcase. Atmospheric pressure forces the leaves away from the body (see Figure 3-7), opening the passage between the carburetor and crankcase. When the piston is on the down-stroke, it compresses the crankcase charge, forcing the leaves against the passage opening, and sealing off the crankcase from the carburetor. Since the opening and closing may occur in excess of five thousand times per minute, the leaves must be thin and flexible. In the snow machine engine, the leaves do not have to seat exactly flush with the body to permit normal operation.

Gasoline, in its liquid state, burns relatively slowly with an even flame. However, when gasoline is combined with air to form a vapor, the mixture becomes highly inflammable and burns with an explosive effect. To obtain best results, the fuel and air must be correctly proportioned and thoroughly mixed. It is the function of the carburetor to accomplish this.

Gasoline vapor will burn when mixed with air in a proportion from 12:1 to 18:1 by weight. Mixtures of different proportions are required for different purposes. Idling requires a relatively rich mixture; a leaner mixture is desirable for maximum economy under normal load conditions; avoid lean mixtures for high speed operation. The carburetor is designed to deliver the correct proportion of fuel and air to the engine for these various conditions.

The carburetor is essentially a simple metering device. Needle valves permit a precise amount of fuel to flow to the carburetor throat. A small chamber holds the fuel. A float valve admits fuel from the fuel tank to replace fuel as it is consumed by the engine. Metering jets in the carburetor throat extend down into the fuel chamber. The upstroke of the piston creates a suction which draws air through the leaf valves and the carburetor throat. At a particular point the throat is restricted by a venturi (see Figure 3-8). The venturi has the effect of reducing air pressure in the air stream, creating a partial vacuum which draws fuel from the jet nozzles. As it is rushed along to the firing chamber, the fuel is swirled about in the air stream and vaporized.

A shutter or butterfly valve in the throat regulates the amount of air drawn through the carburetor. To vary the speed of the engine, the throttle shutter opens or closes, regulating the amount of fuel-air mixture drawn into the engine.

A richer fuel mixture is required for starting a cold engine. A second shutter, called a choke, is placed into the throat forward of the jets, to restrict the flow of air. When the choke shutter is closed, more gasoline and less air is allowed into the air stream resulting in a richer fuel-air mixture. When normal operating temperature is reached, the choke is opened and the standard ratio of gasoline and air is allowed to flow from the carburetor.

IGNITION

The ignition system provides a high voltage electric current which causes a spark to jump the spark plug gap within the cylinder and thus ignite the compressed fuel-air mixture in the cylinder. The ignition system consists of the magneto drive coils, breaker points, and condenser, and the ignition coil assemblies. Permanent magnets built into

the flywheel revolve around the magneto drive coils. As the magnet moves past the coils, the direction of the magnetic flux through the coil is changed from one direction to the other (see Figure 3-6). Self-inductance of the magneto drive coil circuit, completed through the breaker points, prevents the flux in the coil laminations from changing until the breaker points open. When the points open, the flux changes direction very rapidly, inducing a current which flows through the ignition coils' primary windings. The ignition coils transform this current to a very high voltage which is sufficient to discharge across the spark plugs' gap.

The lighting system coils produce alternating current which changes in frequency and voltage in proportion to the engine speed.

POWER FLOW

The transmission assembly transmits power from the engine to the front axle which propels the vehicle along the track. The primary sheave assembly is attached directly to the crankshaft. The secondary sheave assembly is mounted on the chain case and is larger in diameter than the primary assembly. The two are connected by a transmission belt.

PRIMARY DRIVE

The primary sheave is centrifugally operated and engages when the engine speed reaches approximately 2400-2800 RPM. When the engine is rotating at idle speed or below the speed stated above, the transmission belt rides on a idler ball bearing between the halves of the primary sheave assembly (see Figure 3-10). The primary sheave assembly halves are separated by a compression spring in the hub of the movable half of the sheave.

As the engine speed increases, centrifugal effect forces a garter spring in the end cap outward against the contour of the end cap and axially against the movable half of sheave. As the sheaves are brought together the transmission belt is forced outward to ride on a larger diameter of the primary sheave assembly, increasing belt speed (see Figure 3-11). Since the belt length remains constant, the secondary sheave halves spread apart, allowing the belt to ride on a smaller diameter resulting in an increase in speed of the secondary sheave.

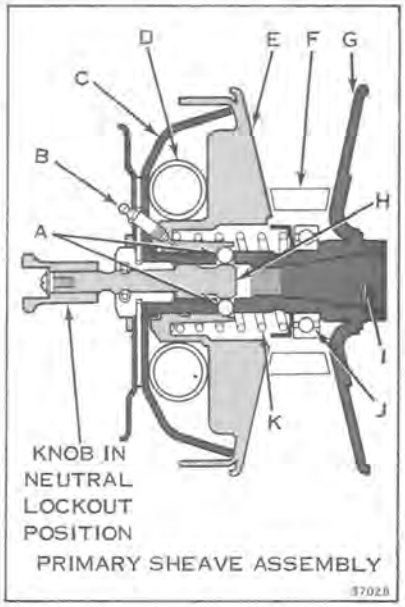

Figure 3-10

A – NEUTRAL LOCKOUT BALLS
B – GREASE FITTING
C – END CAP ASSEM
D – GARTER (ACTIVATING) SPRING
E – MOVABLE HALF OF SHEAVE
F – BELT
G – FIXED HALF OF SHEAVE
H – NEUTRAL LOCKOUT PLUNGER
I – CRANKSHAFT
J – IDLER BALL BEARING
K – COMPRESSION SPRING

NEUTRAL CONTROL

A neutral control mechanism is used to prevent the drive from engaging during starting, warm-up period, and idle. When the neutral lockout plunger is actuated, a cone on the end of the plunger raises two balls through the splines of the primary sheave assembly and into the path of the movable sheave half, preventing it from engaging the belt. The neutral control will operate only when the engine is at idle speed.

SECONDARY DRIVE

The secondary drive mechanism incorporates a torque sensing device that detects the need for more power for steep inclines or deep snow. The mechanism immediately forces the secondary sheaves closer together to lower the transmission ratio and provide a higher torque to the drive chain and track.

The drive ratio varies from 3.3 to 1 in low to .97 to 1 in high which yields an overall drive range of approximately 3.33 to 1. Power is transmitted from the secondary sheave assembly through a drive chain to the front axle.

The ratio between the secondary sheave assembly and the front axle is 13:33. Optional sprockets are available to change these ratios for special applications (see page 2-2).

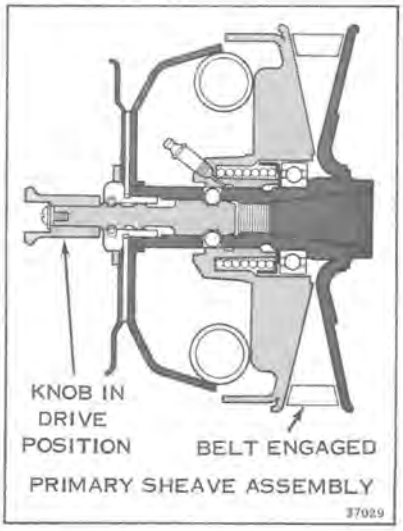

Figure 3-11

SECTION 4
TROUBLE SHOOTING

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DESCRIPTION

This section provides trouble shooting procedures for the snow machine. Steps to be followed in determining causes of unsatisfactory performance are outlined.

Being able to locate the cause of trouble in an improperly operating snow machine is as important as being able to correct the trouble. A systematic approach to trouble shooting is important if the trouble is to be located and identified in minimum time.

Any service operation can be broken down into three steps:

1. Identifying the problem
2. Determining the cause of the problem, and
3. Correcting the problem.

Familiarity with the factors which affect two-cycle engine performance is important in making a correct service diagnosis. Factors which affect engine performance include the quality of the fuel and fuel mixtures, compression, spark and spark plug operation, and proper drive system adjustment. This section discusses compression and spark plugs and their relation to performance. A complete discussion of fuel mixtures is included in Section 12. Familiarity with factors which contribute to abnormal performance of an engine are similarly helpful. The skilled mechanic's experience is a great asset here.

TROUBLE SHOOTING PROCEDURES

Trouble shooting to determine the cause of any operating problem may be broken down into the following steps:

a. Obtaining an accurate description of the trouble.

b. Quick tune-up.

An accurate description of the trouble is essential for trouble shooting. The owner's comments may provide valuable information which will serve as a clue to the cause of the problem. Find out pertinent facts such as:

a. Correct spark plugs

b. Throttle linkage properly adjusted

c. Tank filled with fresh, clean fuel of the proper mixture

d. Spark at each spark plug

e. Carburetor adjusted correctly

f. Turn flywheel by hand or with recoil starter. If compression is present, it can be felt when turning through one complete revolution of the flywheel. If little or no compression exists in both cylinders, engine will spin very easily.

STARTING

1. Hard to start or won't start

   a. Empty gas tank

   b. Incorrect gas-lubricant ratio

   c. Old fuel, or water or dirt in fuel system

   d. Fuel line improperly connected

   e. Fuel line kinked or severely pinched

   f. Clogged fuel line or fuel pick up in tank

   g. Clogged check valve

   h. Carburetor adjustments too lean

   i. High speed needle bent or bowed

   j. Leaf valves not functioning properly

   k. Faulty gaskets

   l. Spark plugs fouled, improperly gapped, dirty or broken

   m. Loose or broken wire or frayed insulation in electrical system

   n. Sheared flywheel key

   o. Faulty coils

   p. Faulty condenser

   q. Binding in engine

   r. Weak or reversed polarity of flywheel magnets

   s. Engine flooded

   t. Engine not primed

2. Engine won't crank over

   a. Cylinder wall corrosion

   b. Broken connecting rod, crankshaft, or drive shaft

   c. Engine improperly assembled after repair

3. Cranks over extremely easily

   a. Spark plug loose

b. Cylinder or pistons scored

c. Hole burned in piston head

d. Rings worn

4. Won't start, but kicks back and backfires

a. Flywheel key sheared

b. Timing out of adjustment

c. Leaf valves broken or not seating

STARTING - MANUAL STARTER

1. Manual starter pulls out, but starter does not engage flywheel

a. Friction spring bent or burred

b. Excess or incorrect grease on pawls or spring

c. Pawls bent or burred

d. Pawls frozen (water) in place

2. Starter rope does not return

a. Recoil spring broken or binding

b. Starter housing bent

c. Loose or missing parts

3. Clattering manual starter

a. Friction spring bent or burred

b. Starter housing bent

c. Excess or incorrect grease on pawls or spring

d. Dry starter spindle

RUNNING - LOW SPEED ONLY

1. Low speed miss

a. Incorrect gas - lubricant ratio

b. Carburetor idle adjustment too lean or too rich

c. Leaf valve standing open or preloaded shut

d. Spark plugs improperly gapped, dirty, or broken

e. Loose or broken ignition wires

f. Spark plug terminal loose

g. Weak coil or condenser

h. Breaker points burned, dirty or improperly gapped

i. Cylinder gasket or leaf plate gasket blown

j. Leaking crankcase seals

k. Coil lead grounded on chassis

RUNNING - HIGH SPEED ONLY

1. High speed miss

a. Water in fuel

b. Spark plug heat range incorrect

c. Spark plugs improperly gapped or dirty, cracked insulator

d. Ignition wires loose or broken or faulty insulation

e. Coil or condenser weak

f. Breaker points burned, dirty, or improperly gapped

g. Engine improperly timed

h. Combustion chambers carboned or fouled

2. Poor acceleration, low top rpm

a. Incorrect gas - lubricant ratio

b. Old fuel

c. Fuel hoses plugged or kinked

d. Fuel pick up restricted

e. Fuel pump faulty

f. Incorrect carburetor mixture adjustments

g. Inlet needle and seat worn or sticky

h. Timing out of adjustment

i. Spark plugs dirty or improperly gapped

j. Loose, broken, or badly insulated high tension leads

k. Coil or condenser weak

l. Breaker points worn or improperly gapped

m. Leaf valves not properly seated, or broken

n. Piston rings stuck or scored

o. Excessive carbon on pistons and cylinder head

p. Carburetor high speed needle set too lean

3. Idles well, but acceleration poor, dies at full throttle

   a. Incorrect gas - lubricant ratio

   b. Fuel lines or passages obstructed

   c. Fuel pick up closed

   d. Faulty fuel pump

   e. High speed nozzle or jet clogged

   f. Dirt or packing behind needles and seats

   g. Choke partly closed

   h. High or low speed needle set too lean

   i. Breaker points burned, dirty, or improperly gapped

   j. Timing out of adjustment

   k. Fuel cap vent clogged

4. Engine runs at high speed only by using hand primer

   a. Fuel lines or passages obstructed

   b. Fuel line leaks or fuel pick up obstructed

   c. Fuel pump not supplying enough fuel

   d. Dirt or packing behind needles or seats

   e. Carburetor adjustments

   f. Fuel cap vent clogged

   g. Leaf block gasket reversed

RUNNING - HIGH AND LOW SPEED

1. Engine overheats

   a. Incorrect gas - lubricant ratio or improperly mixed fuel

   b. Engine not assembled correctly during repair (binding)

   c. Lean mixture (carburetor adjustment)

2. Engine stops suddenly, or freezes up

   a. No lubricant in gas, or no fuel

   b. Fuel connection faulty

   c. Cylinder or crankshaft scored

   d. Bent or broken rod, crankshaft, or stuck piston

   e. Ignition failure

   f. Frozen bearing

3. Engine knocks excessively

   a. Incorrect gas - lubricant ratio

   b. Spark plug - wrong heat range

   c. Flywheel loose

   d. Crankshaft end play excessive

   e. Carbon in combustion chambers and exhaust ports, or on pistons

   f. Worn or loose bearings, pistons, rods, or wrist pins

   g. Loose assemblies, bolts, or screws

   h. Manual starter not centered

4. Excessive fuel consumption

   a. Hole in fuel pump diaphragm

   b. Carburetor casting porous

   c. Deteriorated carburetor gaskets

   d. Hole in metering diaphragm

   e. Carburetor improperly adjusted

   f. Carburetor flooding

5. Vibrates excessively or runs rough and smokes

   a. Too much lubricant mixed with gas

   b. Idle or high speed needles too rich

   c. Air filter obstructed

   d. Faulty ignition

6. No power under heavy load

   a. Faulty carburetion

   b. Faulty ignition

   c. Breaker points improperly gapped or dirty

   d. Ignition timing too far retarded

   e. Carbon build-up on piston head (see Engine Section)

   f. Cylinder scored or rings stuck

   g. High speed adjustment lean

   h. Spark plugs fouled or misfiring

SECTION 5
TUNE-UP PROCEDURE

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DESCRIPTION

The purpose of a tune-up is to restore power and performance which have been lost through wear or deterioration of one or more parts of the snow machine. The successful completion of a tune-up depends on an understanding of principles of two-cycle engine operation, and a familiarity with factors affecting performance. This section gives complete tune-up procedures. Refer to Section 3 for principles of operation, and to Section 4 for trouble shooting procedures. Lubrication procedures and instructions for storage are included in Section 12.

FACTORS AFFECTING PERFORMANCE

In the normal operation of an engine, the operator may not be fully aware of the decrease in performance which takes place slowly over a long period of time. Economical, trouble-free operation can best be assured if a complete tune-up is performed at least once each year, preferably at the start of the season.

It is seldom advisable to attempt to improve performance by correcting one or two items only. Time will be saved and more lasting results obtained by following a definite and thorough procedure of analysis and by correcting all items affecting power and performance.

FUEL SYSTEM

A fresh fuel mixture, with the correct ratio of lubricant and gasoline, is necessary for peak engine performance. The tank should be removed, emptied of old fuel, rinsed out, installed and refilled with a fresh supply at the beginning of the season and at every tune-up. A stale fuel mixture may cause hard starting, stalling, and faulty operation.

IGNITION SYSTEM

Spark plugs having the proper heat range are very important for peak performance of the engine. See sections 4 and 7 for a complete description of spark plugs. A weak spark, which may be the result of faulty ignition system components, will cause hard starting, misfiring, or poor high-speed performance. The spark plugs and ignition system components are frequently checked first in a tune-up because of their importance to the operation of the engine.

COMPRESSION

It is essential that compression be checked before proceeding with an engine tune-up. An engine with low compression cannot be tuned satisfactorily to give peak performance.

An automotive type compression gage may be used as follows: Make certain that choke is open, throttle is wide open, and both spark plugs are removed. Turn the engine over quickly three or four times with the manual starter. Compression should be 105 pounds per square inch minimum. See additional information on compression in Section 4.

NEW VEHICLE DELIVERY

Complete instructions for putting a new snow machine into operation are included in the Owner Manual and Assembly Sheet packed with each snowmobile. Be sure the customer receives this manual and understands the instructions given in it. The following list is a reminder of important things to check when putting a new snow machine into operation.

a. Be sure spark plugs are installed and tightened securely with spark plug gaskets in place.

b. Be sure spark plug wires are securely attached to spark plug terminals.

c. Be sure the correct gasoline and lubricant mixture is used. Pour mixture into tank through a fine mesh strainer.

d. Caution the customer not to operate a new engine at continuous full power until at least one tankful of fuel has been used. During this time, short periods of full power may be used. Instruct the customer to follow the break-in procedure described in the Owner's Manual.

e. Be sure that the customer understands how to operate the engine correctly.

TUNE-UP PROCEDURES

Components which affect engine power and performance can be divided into three groups, namely:

1. items affecting compression,

2. items affecting ignition,

3. items affecting carburetion.

Any tune-up procedure should cover these groups in the order given. Correction of items affecting carburetion should not be attempted until all items affecting compression and ignition have been corrected satisfactorily. Attempts to overcome compression or ignition system deficiencies by altering carburetor settings will result in poor overall performance or increased fuel consumption. This section covers only those parts of a tune-up which involve adjustments, cleaning, and checking for performance. Trouble shooting procedures are covered in Section 4. Repair and replacement of parts, as determined through trouble shooting, is covered in Sections 6 through 11.

a. Test run vehicle, checking particularly the following:

   1. Neutral control

      Can transmission be locked in neutral when machine is at rest and engine at idle speed?

   2. Function of compression release

   3. Function of brake

   4. Engine performance

   5. Ski alignment and handling

   6. After running snowmobile, reduce engine speed to idle and pull neutral control knob out to lock transmission in neutral. Accelerate engine to see if transmission is in neutral. Neutral control cannot be engaged above approximately 2000 rpm.

b. Check compression as described above.

c. If engine knocks or does not come up to speed, check for loose flywheel. Remove manual starter and fan housing (see Section 8). Rock flywheel back and forth, and listen for knocks. Excessive wear in crankshaft journal bearings can be detected by moving flywheel back and forth. Check for end play by pushing and pulling on flywheel. End play tolerance is .019.

   If excessive end play is suspected, remove carburetor and leaf valve assembly. If motion between main bearing outer race and crankcase is detected, engine must be overhauled.

d. If compression and bearing condition checks are not satisfactory, engine overhaul is required (see Section 9).

e. Test for adequate spark at each cylinder, using a spark checker. Inspect and test points, condenser, magneto coils, ignition coils, timing and spark plug high tension leads (see Section 7).

f. Check spark plugs to be sure they are the correct type. Clean spark plugs and regap, or replace as necessary.

g. Check breaker points, and clean or adjust as necessary.

h. Remove and drain fuel tank, flush, and clean thoroughly (see Section 6). Install tank, refill with fresh fuel mixture, and check primer operation.

i. Inspect fuel pump, fuel filter and hoses.

j. Thoroughly lubricate snow machine (see Section 12).

k. Tighten all external bolts, nuts, and screws, and retorque spark plugs to specified value.

l. Check track tension and ski alignment (see Section 11).

m. Start engine and allow to warm up. Check track alignment (see Section 11).

n. Repeat test run on vehicle. Check carburetor needle adjustments. See "Carburetor Adjustments."

o. After engine has run sufficiently to indicate satisfactory condition, stop and restart it several times. Operate it at high and low speeds. Check acceleration from low to high speed.

p. Clean and dry snow machine thoroughly, before returning it to customer. Fog motor for storage, using OMC Accessories Rust Preventative Oil, Part No. 171701.

Figure 5-1

COMPRESSION CHECK

An automotive type compression gage may be used as follows: Make certain that choke is open, throttle is wide open, and both spark plugs are removed. THE COMPRESSION RELEASE KNOB MUST BE COMPLETELY IN. Turn the engine over quickly three or four times with the manual starter. Compression should be 105 pounds per square inch minimum. See Figure 5-1.

IGNITION TIMING ADJUSTMENT

New or Readjusted Points

Remove starter housing, front fan housing and flywheel. See Section 6. Set ignition points at .020" for used points in good condition and .022" for new points.

COMPRESSION RELEASE VALVE ADJUSTMENT

Check for 1/32" to 1/16" clearance when compression release knob is pushed in. See Figure 5-2. Turn out on jam nut and correct clearance with adjustment screw shown in Figure 5-3. Operate compression release knob to check for binding in cable. Lubricate the compression release actuator with OMC grease, Part No. 262233 or Part No. 114154.

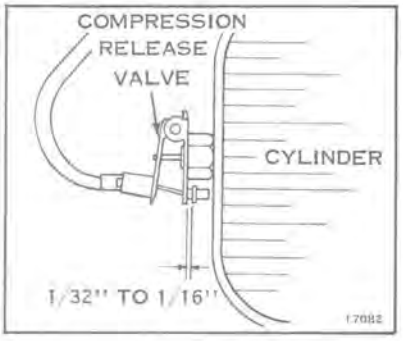

Figure 5-2

CARBURETOR ADJUSTMENTS

HIGH SPEED NEEDLE VALVE

NOTE

TO MAINTAIN ADEQUATE CYLINDER LUBRICATION, THE HIGH SPEED NEEDLE VALVE SHOULD NEVER BE LESS THAN ONE TURN OPEN. "LEANING OUT" OF THE HIGH SPEED NEEDLE VALVE WILL RESULT IN SERIOUS DAMAGE TO THE ENGINE.

For average use, the engine will operate satisfactorily with the carburetor adjusted as it left the factory. If it becomes necessary to readjust due to altitude or climatic conditions follow these instructions carefully.

The correct high speed needle valve setting is obtained as follows:

1. Turn high speed needle valve in until lightly seated. Back out (counterclockwise) one turn. See Figure 5-4.
2. Start engine and allow warm up time of 2-3 minutes. Turn choke lever to "open" position.
3. Drive snowmobile at full throttle to observe engine performance. Observe all safety warnings while driving.
4. Open high speed needle 1/8 turn (counterclockwise).
5. Repeat steps #3 and #4 until engine begins to loose power slightly or 4 cycles ("loads up" and fires on every other revolution).
6. From this setting turn high speed needle in 1/8 turn (clockwise).
7. Drive snowmobile at full throttle to observe engine performance. Observe all safety warnings while driving.
8. Repeat steps #6 and #7 no more than is necessary to obtain smooth performance and maximum power.

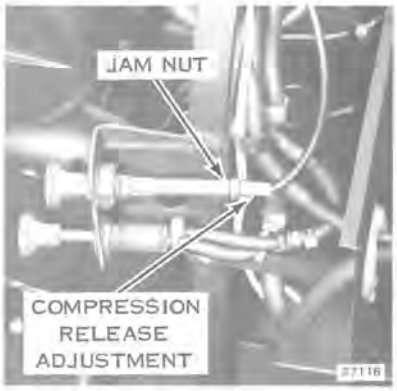

Figure 5-3

NOTE

THE HIGH SPEED NEEDLE VALVE SHOULD NEVER BE SET LEANER THAN ONE TURN OPEN!

Two cycle engines are lubricated by oil that is drawn into the crankcase with the fuel charge. Although they will start and run with a leaner mixture, serious engine damage may result from too lean a setting.

A. TOO LEAN A SETTING if engine misses, backfires, and runs rough. Open high speed needle 1/8 turn more (counterclockwise). Repeat this test procedure until engine begins to 4-cycle (loads up). At this point turn high speed needle 1/8 turn in (clockwise) until smooth engine performance is obtained.

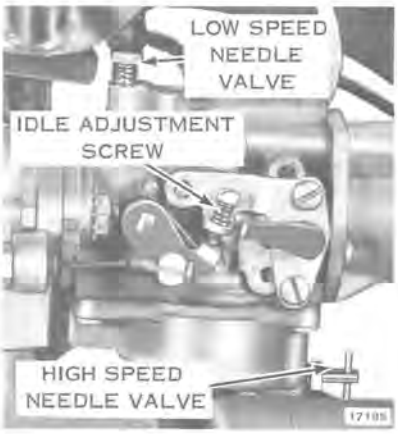

Figure 5-4

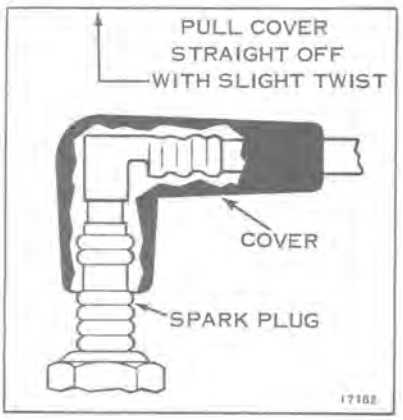

Figure 5-5

B. TOO RICH A SETTING if engine 4-cycles (loads up and fires on every other revolution). Condition noticed also by a loss of power. Turn high speed needle in 1/8 turn (clockwise) until smooth engine performance is obtained.

LOW SPEED AND IDLE ADJUSTMENT SCREW

(See Figure 5-4)

1. Pre-set "low speed needle valve" one turn open.

2. Turn "idle adjustment screw" to the left (counterclockwise) until throttle plate is completely closed and screw is not in contact with throttle lever.

3. Start engine and allow warm up time of 2-3 minutes. If engine will not idle, turn "idle adjustment screw" to right to keep engine running. Turn choke lever to "open" position.

4. Turn "idle adjustment screw" to attain the recommended idle speed of 1100-1200 rpm.

5. Accelerate engine. If a flat spot (hesitation to accelerate) is noted, readjustment of low speed needle is necessary. Turn "low speed needle" counterclockwise 1/8 turn at a time. Reset "idle adjustment screw" to attain 1100-1200 rpm each time low speed needle is adjusted.

6. Accelerate engine then release throttle. Engine should return to idle speed. If engine does not idle immediately, adjustment of the low speed needle may be necessary. Turn low speed needle clockwise to reduce amount of fuel to the engine. Reset "idle adjustment screw" to attain 1100-1200 rpm each time low speed needle is adjusted.

 NOTE

Operating above recommended idle rpm can result in neutral control not operating. If it is necessary to idle at above recommended rpm, check neutral control to insure it can be operated. See page 3-5.

SPARK PLUGS

Using the correct spark plug is most important for efficient operation. See Specifications page 2-2. The proper spark plug gap is .028" - .033".

Remove rubber covered spark plug terminal by pulling straight off, with a slight twist, see Figure 5-5. Remove spark plugs for inspection or replacement as necessary. When reinstalling spark plug, clean the spark plug seat in cylinder head. Be sure spark plug gasket is in place and tighten plug securely. (Recommended torque, 20 to 25 ft. lbs.) See Sections 3 and 7 for additional information on spark plugs.

SECTION 6
FUEL SYSTEM

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DESCRIPTION

The complete fuel system consists of the gas tank assembly and lines, the primer assembly, the fuel pump and filter assembly, the carburetor, and the leaf valve assembly. This section gives complete service procedures on all components of the fuel system, and carburetor adjustments. Principles of carburetion are discussed in Section 3.

FUEL FLOW

Fuel is drawn from the fuel tank by the fuel pump, which is operated by changes in crankcase pressure. These changes in crankcase pressure are transmitted to the fuel pump via the pulse line. Fuel filter screens are located in the fuel tank, at the end of the fuel pick-up tube, at the inlet to the fuel pump and in the carburetor inlet. The filter elements remove water, dirt, or other impurities from the fuel before the fuel passes into the engine. The primer assembly, operated from the control panel, injects raw fuel into the crankcase before starting (see Figure 6-1).

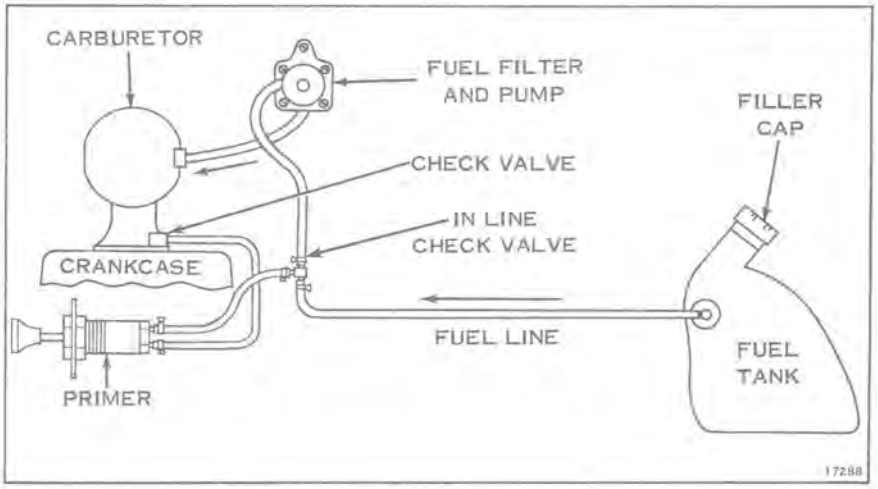


Figure 6-1

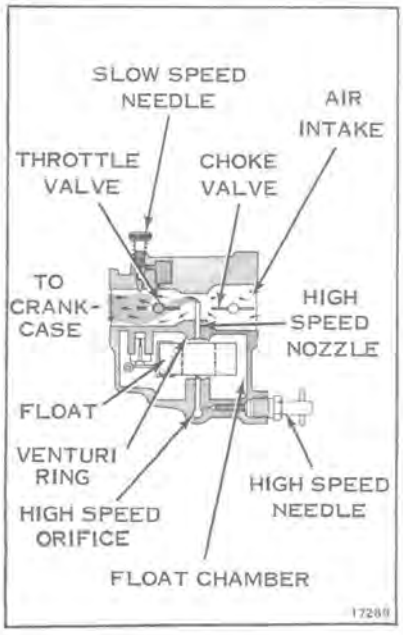


Figure 6-2

CARBURETOR

The carburetor used on this snowmobile is the OMC single barrel, float feed type. See Figure 6-2. The carburetor should be cleaned and inspected at regular intervals, depending on service conditions.

Clean the entire carburetor by flushing with fuel and blow dry with compressed air before disassembly. The carburetor should be inspected for cracks in the casting, bent or broken shaft, loose levers or swivels and stripped threads.

REMOVAL

a. Select a clean work area. Dirt and carelessness are the cause of most carburetor trouble.

b. Remove air filter, fuel line and mounting screws from carburetor.

c. Remove throttle cable using the following procedure: Depress thumb throttle lever. Hold throttle in open position. Slip end of throttle cable through nylon pivot pin. Loosen jam nut on intake manifold and turn cable fitting out of manifold. See Figure 6-3.

NOTE

Some solvents and cleaners have a damaging effect on the synthetic rubber parts used in carburetors. It is best to use a petroleum product for cleaning. Do not use alcohol, lacquer, acetone thinner, benzol or any solvent with a blend of these ingredients unless the rubber parts and gaskets are removed. If you are in doubt about your solvent, test a used part in it and observe the reaction.

DISASSEMBLY

a. Remove low-speed needle valve (1) from carburetor. See Figures 6-3 and 6-4.

b. Remove high-speed needle valve (2) from carburetor.

c. Remove four screws (3) attaching float chamber (4) to carburetor body (5). Remove float chamber and gasket (6). Remove nylon hinge pin (7) to permit removal of float (8) assembly.

d. Remove float valve (9), float valve seat (10), and gasket (11) assembly from carburetor body.

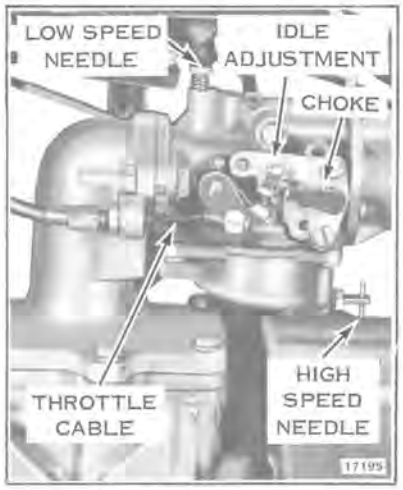
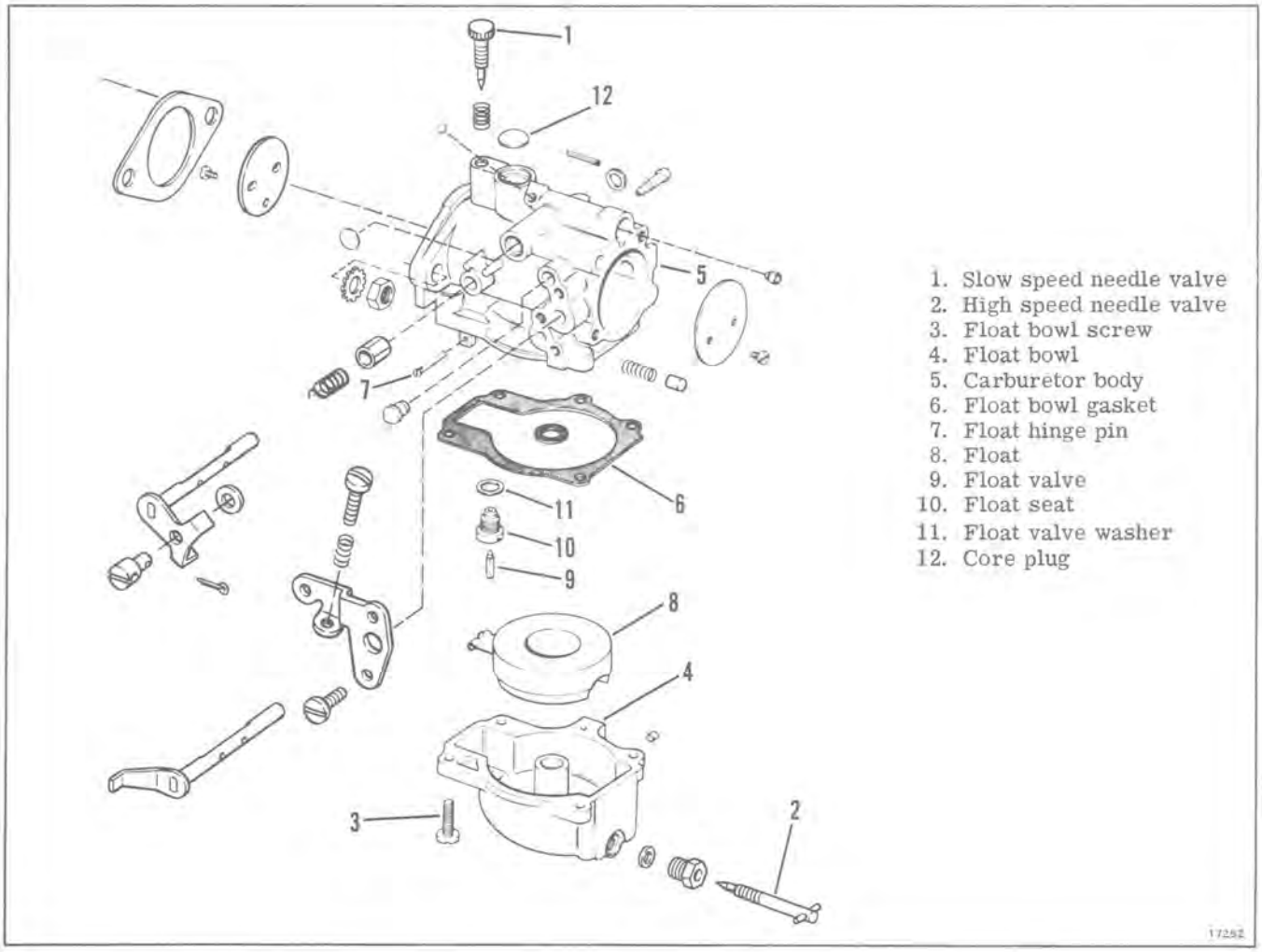


Figure 6-3



1. Slow speed needle valve
2. High speed needle valve
3. Float bowl screw
4. Float bowl
5. Carburetor body
6. Float bowl gasket
7. Float hinge pin
8. Float
9. Float valve
10. Float seat
11. Float valve washer
12. Core plug

Figure 6-4

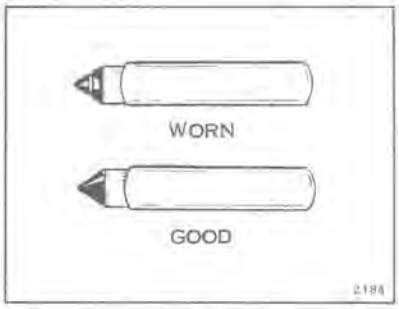


Figure 6-5

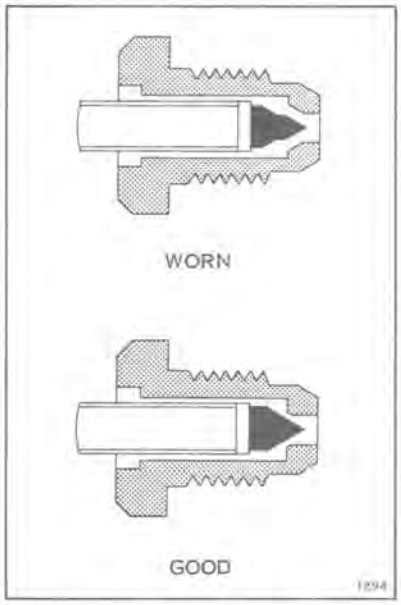


Figure 6-6

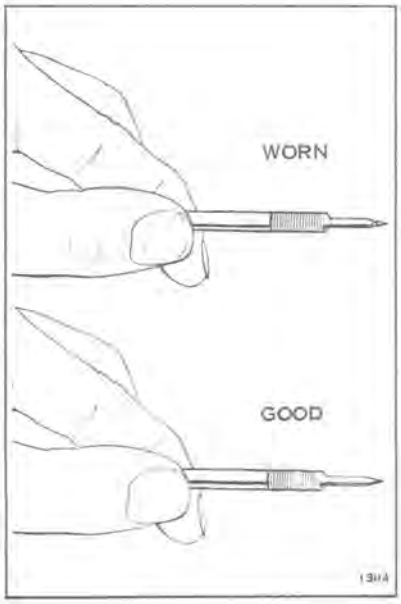


Figure 6-7

CLEANING, INSPECTION AND REPAIR

General Instructions

Clean all parts, except float and float valve, in solvent and blow dry. DO NOT dry parts with a cloth as lint may cause trouble in the reassembled carburetor. Be sure all particles of gaskets are removed from gasket surfaces. Flush all passages in the carburetor body with solvent and remove any gummy deposits with OMC Accessory Engine Cleaner. Certain solvents will not remove this gum which accumulates particularly in the float chamber and on needle valves.

Float and Needle Valve

a. Inspect float and arm for wear or damage. If the float has become oil-soaked, discard it and install a new one. Check float arm wear in the hinge pin and needle valve contact areas. Replace if necessary.

b. Inspect the inlet needle valve for grooves, nicks, or scratches. If any are found, replace float valve assembly. See Figure 6-5. Gum or varnish on the needle valve must be removed with OMC Accessory Engine Cleaner. DO NOT attempt to alter the shape of the needle valve.

c. Check the needle valve seat with a magnifying glass; if seat is nicked, scratched, or worn out-of-round, it will not give satisfactory service. See Figure 6-6. The valve seat and needle are a matched set; if either is worn, both parts must be replaced. Use a new gasket when reinstalling the needle seat.

Needle Valves

a. Inspect the tapered end of the needle valves for grooves, nicks, or scratches; replace if necessary. See Figure 6-7.

b. DO NOT attempt to alter the shape of the high or low-speed needle valve.

Carburetor Body

a. Clean out all the jets and passages, and the venturi, making sure no gum or varnish deposits remain. Dry after cleaning with compressed air. Keep clean for final reassembly.

b. Check all gasket surfaces for nicks, scratches, or distortion. Slight irregularities can be corrected with the use of a surface plate and emery cloth.

c. Check throttle and choke shafts for excessive play. Check operation of choke and throttle valves to be sure they correctly shut off air flow, yet move freely without binding. Replace carburetor body if valves or shafts are excessively worn or damaged.

NOTE

The threaded edges of the choke and throttle valve attaching screws are staked during carburetor assembly to prevent loss during operation. Disassembly of these valves is possible, but replacement of the carburetor body is recommended.

Core Plugs

If necessary, remove core plug (12, Figure 6-4) to clean out slow speed orifice holes.

If leakage occurs at a core plug area, follow these steps:

a. If leakage is slight, a smart tap with a hammer and flat end punch in the center of the core plug will normally correct this condition. See Figure 6-8.

b. If leakage persists, drill a 1/8 inch hole through the center of the core plug to a depth of not more than 1/16 inch below its surface. With a punch carefully pry out the core plug. See Figure 6-9.

c. Inspect and clean casting contact area; if nicks, scratches, or an out-of-round condition exist, the casting will have to be replaced. If the casting opening is normal, apply a bead of Sealer 1000 to the outer edge of a new core plug and place the new core in the casting opening, convex side up. Flatten to a tight fit with a flat end punch and hammer. Check for leakage.

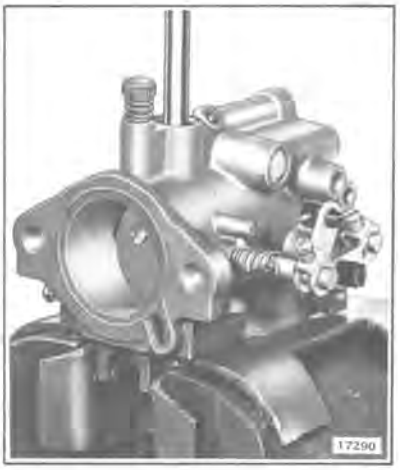


Figure 6-8

REASSEMBLY OF CARBURETOR

General Instructions

Reassemble the carburetor, paying particular attention to the following procedure. Keep all dust, dirt, and lint out of the carburetor during reassembly. Be sure that parts are clean and free from gum, varnish, and corrosion when reassembling them. Replace all gaskets and "O" rings. DO NOT attempt to use original gaskets and "O" rings because leaks may develop after the engine is back in use.

Check the Torque Chart in Section 2 for correct torque recommendations during reassembly.

Figure 6-9

Float and Float Chamber (see Figure 6-4 for callouts)

a. Install new carburetor bowl gasket (6). Replace float valve seat (10) and gasket (11), float valve (9), and float (8), and hinge pin (7).

b. Check for correct positioning of float. Turn carburetor body upside down so weight of float closes needle. Top of float should be parallel and 1/16" above gasket surface. See Figure 6-10.

c. Reassemble float chamber (4) to carburetor body (5).

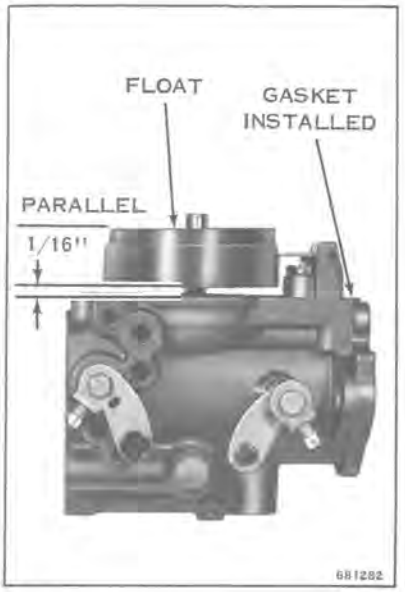


Figure 6-10

Low-Speed Needle

Install the low-speed needle and spring, turning in carefully with finger pressure until it comes lightly against the seat, then back off 5/8 turn. CAUTION should be taken to prevent jamming the needle against the seat. See Section 5 for adjustment procedure.

High-Speed Needle

Install the high speed needle. See Section 5 for adjustment procedure.

Choke

Check the choke for free operation. Choke valve must move freely, without binding.

REASSEMBLY OF CARBURETOR TO ENGINE

a. Using new gaskets, install the carburetor assembly to intake manifold.

b. Install fuel line and air filter to carburetor. See procedure on page 6-8 for installing new fuel line tie straps.

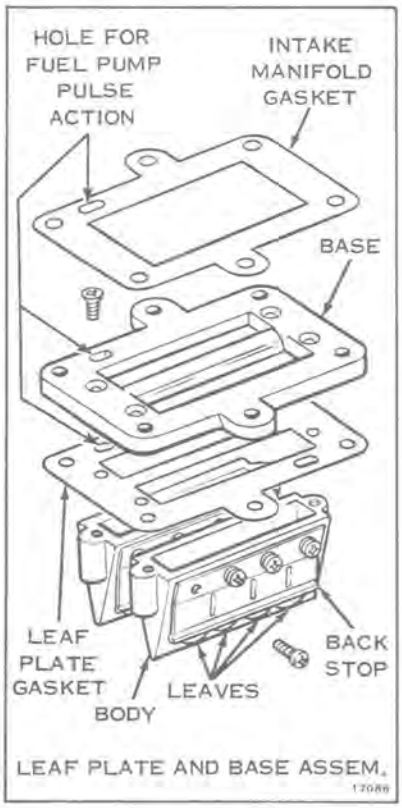


Figure 6-11

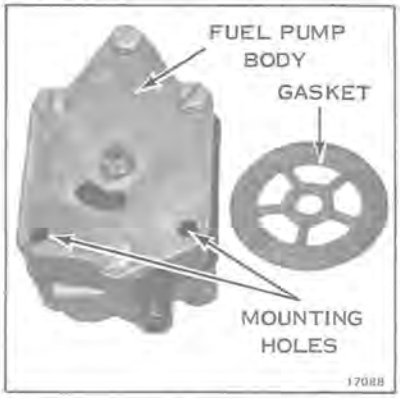


Figure 6-12

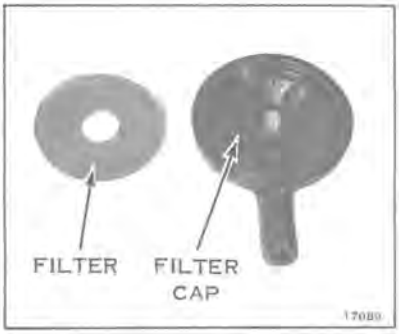


Figure 6-13

c. Assemble throttle cable to carburetor. See page 6-2-C. Adjust throttle cable so that carburetor butterfly valve is full open when thumb throttle lever touches handle grip. When the lever on the carburetor is returned to the idle position, there must be 1/32" minimum over travel in hand lever. Slot in throttle lever must align with slot in cable support bracket. Torque nut on cable adjusting screw to 60-80 inch pounds.

d. A carefully rebuilt carburetor should perform well. The two most likely causes of carburetor failure are dirt and a careless repair job.

LEAF VALVES

a. Separate the intake manifold from the crankcase body, removing the gasket and leaf plate and base assembly.

b. Rinse leaf valves and leaf valve body in cleaning solvent and blow dry with light air pressure to prevent leaf damage.

c. Inspect the leaf valve assembly and disassemble if necessary (see Figure 6-11). Special caution is necessary in disassembling the leaf valve assembly. DO NOT damage or interchange the leaves.

d. The leaves must be flat to maintain a seal with the leaf valve body. DO NOT under any circumstances bend or flex the leaves by hand. Clean, inspect, and immediately reassemble the leaf valve assembly, rather than leave it apart for reassembly later.

e. The leaves are designed to maintain contact with the leaf valve body, and to spring away from the leaf valve body when predetermined pressure is exerted against them. Attach the leaf valves and back stop to the leaf valve body, then examine leaves carefully to make certain that they lie flat against body.

f. Check tightness of leaf valve retaining screws and tighten any that appear loose.

INSTALLATION

a. Secure leaf plate assemblies to base, using a new leaf plate gasket. Align leaf plate and base assembly on crankcase. Install intake manifold on crankcase using a new intake manifold gasket. Be certain that elongated hole in gasket and base plate aligns with passage in intake manifold. Obstruction of this passage will prevent fuel pump operation via the pulse line. Fasten with screws and lockwashers.

b. Attach assembled carburetor to intake manifold with screws, nuts, and lockwashers, using a new carburetor gasket.

FUEL PUMP

REMOVAL

a. Disconnect two hoses from fuel pump and filter assembly (see Figure 6-12.

b. Remove two screws attaching pump and filter assembly to mounting plate (see Figure 6-12), and remove pump and filter assembly. NOTE: Filter assembly may be removed for cleaning and inspection without removing pump assembly by removing filter cap screw (see Figure 6-13).

SAFETY WARNING

Do not allow fuel to drip on hot engine or exhaust manifold because of potential fire hazard.

CLEANING, INSPECTION, AND REPAIR

a. The fuel pump components are not serviced separately. If a malfunction occurs, replace the complete pump.

b. Inspect the filter for accumulation of sediment by removing the filter cap screw and the filter cap (see Figures 6-12 and 6-13). Clean the filter cover and fuel connectors in solvent and blow dry.

c. Check for a clogged filter element. The fuel filter element on an engine that has been in storage may be clogged without appearing to be. During storage, volatile agents as well as anti-gum and anti-varnish agents evaporate from the gasoline that remains in the fuel filter. The result is contamination of the filter element with a clear form of varnish. This varnish is not readily soluble in gasoline or cleaning solvent; therefore, the filter should be replaced at the start of each season. NOTE: Since the purpose of the filter is not only to trap dirt but also to prevent moisture from entering the carburetor, do not attempt to run the engine with the filter element removed.

REASSEMBLY

a. Reassemble the fuel filter. Do not overtighten filter cap to fuel pump body.

b. Attach fuel pump and filter assembly to plate with screws.

c. Reconnect fuel hoses.

FUEL PRIMER

a. The primer is a simple pump which pumps raw fuel from the fuel line, thru check valves, directly into the intake manifold above the leaf valves (see Figure 6-14).

b. To check operation of the primer, disconnect hose from manifold check valve. A spurt of fuel should be evident when the plunger is depressed. If little or no fuel is discharged, check the valves in the fuel line, and fuel line fitting for leakage or sticking (refer Figure 6-1).

c. Check valve above fuel primer "T" fitting must be in vertical position in order to operate.

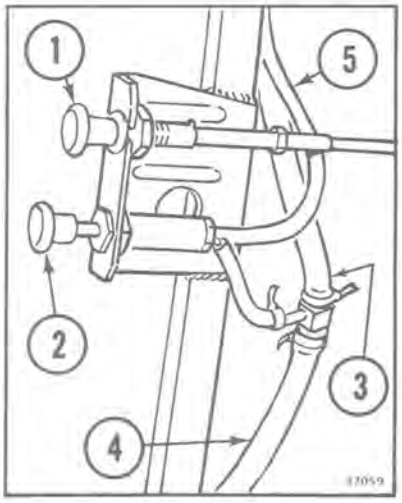


Figure 6-14

1. Compression Release
2. Primer
3. Check Valve in Line
4. Fuel Supply Line
5. Line to Manifold

AIR FILTER

The carburetor is equipped with an automotive type paper air filter element that should be cleaned once during the operating season, and replaced after a year's service. When pores in paper are plugged, engine will receive a rich fuel/air mixture and run rough and get poor fuel economy. To clean filter element, shake to dislodge dirt particles and blow with compressed air from inside, holding nozzle about two inches from filter. DO NOT wash or oil filter element. See Figure 6-15.

Figure 6-15

FUEL TANK

a. For correct fuel and lubricant mixtures and break-in instructions, see Section 12.

b. The importance of using a fresh clean fuel mixture cannot be overstressed. Gum will form in old fuel which will clog filter screens, fuel passages, carburetor orifices, leaf valves and check valves. Remove tank to empty old fuel. Reinstall it and begin with a fresh supply every season.

c. Drain and clean the fuel tank prior to off season storage. Unbuckle strap and turn tank upside down. Remove adapter and fuel pick-up line in tank to check and clean filter screen. On reassembly of adapter to fuel tank, it is not necessary that the adapter seat be tight against the end of the threaded boss on the fuel tank. Apply G.E. RTV-102 on adapter threads and immediately install to fuel tank.

d. Clean the tank with gasoline poured through a filtering funnel. Cover the fuel line opening and agitate the tank. Empty it through the fill opening. Use more gasoline to flush the fuel line opening. Then reinstall the tank and hoses. See following procedure to install new fuel line tie straps.

e. Check to see there are no leaks at fuel hose connections.

FUEL LINE TIE STRAP

a. Fuel line tie strap, part no. 262081 must be replaced with a new strap after its removal.

b. Assemble the new strap around the fuel line with the serrated side toward the inside. See Figure 6-16.

c. Snug up the head on the strap per Figure 6-17.

d. Tighten head on strap with pliers as illustrated in Figure 6-18.

Figure 6-16

Figure 6-17

Figure 6-18

SECTION 7
IGNITION AND ELECTRICAL SYSTEMS

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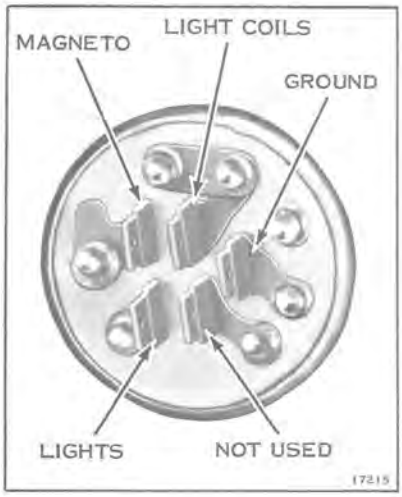

Figure 7-1

DESCRIPTION

The ignition system consists of the magneto drive coils, condenser, breaker point assembly, ignition coils, ignition key switch, spark plugs, and the necessary wiring. Because the engine is a two-cycle, twin opposed cylinder design, a single breaker point assembly and single lobed cam are used, with two ignition coils, to supply spark simultaneously to both cylinders. An automatic spark retard/advance system has been incorporated to provide easier starting.

The electrical system consists of the alternator coils, head and taillights, light and ignition switches and wiring. The alternator coils produce alternating current which changes in frequency and voltage in proportion to engine speed.

This section gives complete service procedures on all components of the ignition and electrical systems, breaker point adjustment. Principles of magneto operation are discussed in Section 3. The wiring diagram is located at the end of the manual.

TEST EQUIPMENT

Figure 7-2

The test procedures outlined in this section require the use of an ohmmeter or multitester (also called a volt-ohm-milliammeter). These instruments can be obtained from local or national electronics supply houses (see Figure 7-2).

To determine accurately the condition of components of the ignition system, an ignition analyzer should be used. Without the use of test equipment, coils, condensers, or breaker point assemblies may be replaced needlessly. A wide variety of ignition analyzers are available from various manufacturers. In addition, some automotive testers having the proper specifications can be used. The use of the Graham, Merc-O-Tronic, or Stevens ignition analyzers are particularly recommended, since these units have provisions for checking all functions of the ignition system (see Figure 7-3).

Detailed instructions for the use of any tester are provided with the unit; therefore, only general information is given here. All components of the ignition system should be checked, even though replacing a single part seems to have corrected the trouble. For example, replacing points may have increased the spark (coil output), but further improvement may be realized if a condenser is found to be weak and is replaced.

Figure 7-3

Figure 7-4

Figure 7-5

The following values are provided for checking the ignition coil:

Graham Tester Model 51

Maximum Secondary	30,000
Maximum Primary	4.0
Coil Index	60
Minimum Coil Test	30
Gap Index	50

Merc-O-Tronic

Operating Amperage	0.9
Primary Resistance	1.3 to 1.7 ohms
Secondary Resistance	60 to 70 (index number)

Old Stevens Tester

Switch B Index Reading 0.8 to 1.0

Stevens Tester Model No. MA75

Switch B Index Reading 22 using MA-12 Adapter

MAGNETO

REMOVAL

a. Remove starter housing (see Figure 7-4 housing guard) and outer fan housing.

b. Remove three screws attaching ratchet and ratchet mount to flywheel (see Figure 7-5). Remove ratchet mount.

c. Remove flywheel nut (see Figure 7-6). Use spark plug wrench handle in hole on rim of flywheel to keep flywheel from turning while removing nut.

d. Remove flywheel from crankshaft (see Figure 7-7), using flywheel puller (Service Tool #378103). Magneto drive coils, condenser, and breaker point assembly are now accessible for servicing (see Figure 7-8).

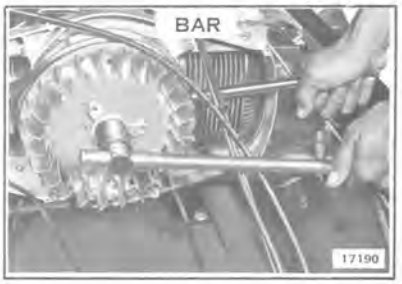

Figure 7-6

Figure 7-7

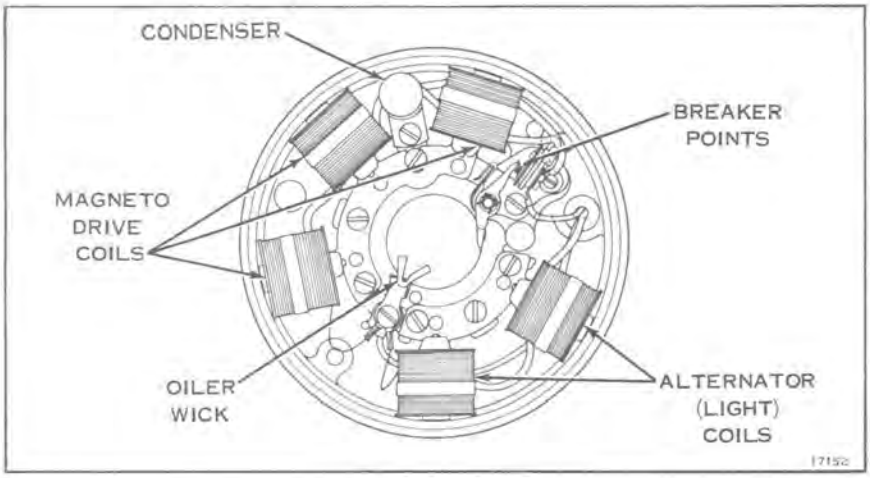

Figure 7-8

e. Disconnect primary leads from terminals on top of ignition coils. Pull high tension leads from ignition coils (see Figure 7-9). Loosen ignition coil clamp screw to remove ignition coils.

TESTING

For conclusive testing, the ignition coils should be removed. The breaker point assembly, condenser, and magneto drive and alternator coils, however, are tested in position and are removed only for replacement.

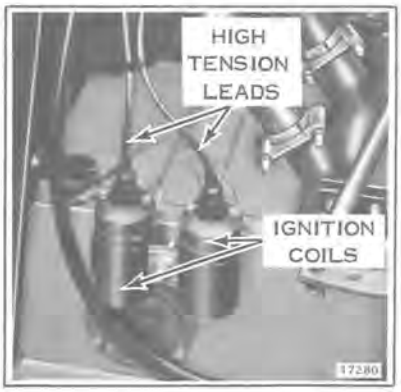

Figure 7-9

FLYWHEEL

Check charge polarity with a compass. Compass arrow should point in direction of arrow on flywheel.

BREAKER POINTS

Breaker points should be inspected at least once each season and replaced whenever necessary. Under normal running conditions, breaker point contacts will appear slightly rough and gray in color. Abnormal points will appear excessively pitted, may have a considerable amount of material transferred from one contact surface to the other, and will generally be blue in color.

Severe pitting, burning, or bluing can usually be traced to such conditions as a faulty condenser, or deposits of foreign material, especially grease or oil, on the contact surfaces. Faulty condensers require replacement. Foreign deposits can be attributed to careless handling of points during installation, use of excessive lubricant on the oiler wick, or a leaky front crankcase seal.

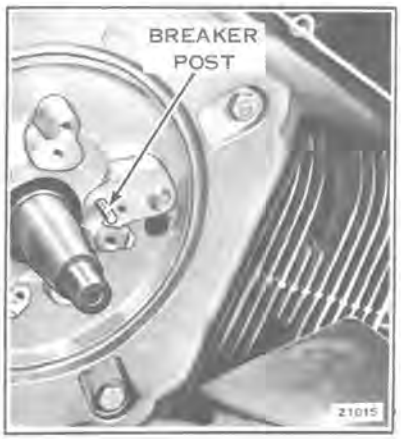

Figure 7-10

Wipe breaker point post clean before installing new breaker points to ensure a clean surface for the breaker point bushing to pivot on (see Figure 7-10). Turn the eccentric adjusting screw into the plate until it bottoms so that there is adequate screw engagement to hold breaker point gap of .020" for used points in good condition, or .022" for new points. Set points on highest point of cam lobe.

Breaker point spring tension is predetermined and does not require adjustment.

Dirt, foreign particles, and oil are detrimental to contact performance. The oils and acids from a person's hand, even though clean, can affect contact resistance. Oil deposits on the points will cause them to

burn after a very short period of operation. If points need cleaning, saturate a piece of bias tape in alcohol or trichlorethylene and work it up and down between the points. Finish with a clean, dry piece of hard finish paper card stock to remove any residue which might cause point burning.

NOTE

If points cannot be cleaned satisfactorily by this method, replace them. DO NOT use an abrasive stone or file to remove residue across new or old breaker contacts. If new breaker points have high resistance across their contact surfaces making use of a continuity meter during breaker point adjustment difficult, snap the contacts open and closed manually several times.

CONDENSER

The following four factors affect condenser performance; each factor must be considered in making a complete condenser test.

1. Breakdown - A failure of the condenser insulation; a direct short between metallic elements in the condenser. This prevents any condenser action.

2. Low insulation resistance (leakage) - Prevents condenser from holding a charge. All condensers are subject to leakage which up to a certain limit is not objectionable.

3. High series resistance - Excessive resistance in the condenser circuit due to loose condenser mounting, broken strands or poor connections inside the condenser, or to defective lead connections. This will prevent normal condenser action, causing rapid breaker point burning or ignition failure.

4. Capacity - Determined by the design and condition of the condenser. For a complete check of the condenser, use a tester (see Figure 7-11) which will test the condenser for correct capacity, series resistance, and leakage resistance. Follow the instructions given by the manufacturer of the test equipment. The condenser should be replaced if it fails to meet any one of the three tests. See specification page for capacity value.

Figure 7-11

SAFETY WARNING

High voltage is applied to the condenser in the leakage test. Handle leads carefully and turn selector switch to "DISCHARGE" before disconnecting leads from condenser.

MAGNETO DRIVE COILS

A good magneto drive coil will not function properly if incorrectly mounted or connected. If the coil heels are not properly aligned with the bosses on the magneto plate, the gap between the flywheel magnet and coil heels may be too great. Connections that are not clean and tight will cause high resistance which will limit current flow. Visually inspect the coil mounting and connections before condemning a coil. Test the coil for correct resistance, using the ignition analyzer. See specification page for resistance value.

NOTE

Magneto drive coils can be tested for correct resistance without removal of starter housing and flywheel. Separate engine connector (Ref. Figure 7-12). Put ohmmeter leads across gray and light blue lead connector half. Set meter on low ohms scale. Reading should be .8 ohms. Points must be open or reading will be zero ohms. Points can be opened by rotating flywheel.

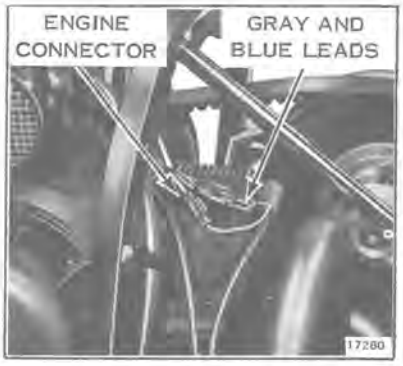

Figure 7-12

Figure 7-13

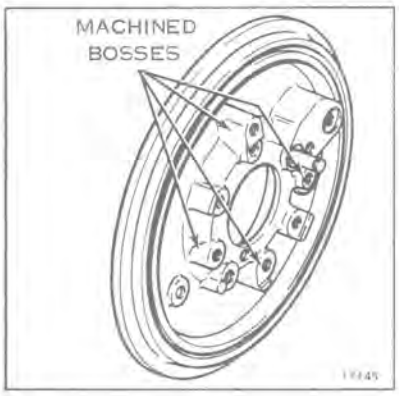

Figure 7-14

1. Crankshaft
2. Cam
3. Feeler Gage
4. Breaker Points
5. Pivot Pin
6. Oiler Clip
7. Wick
8. Woodruff Key

Figure 7-15

IGNITION COILS

Ignition coils (see Figure 7-9) should be tested for correct secondary resistance, correct primary resistance, coil polarity, and coil output. In addition, the coil insulation should be tested for leakage. See specification page and page 7-2 for values.

SAFETY WARNING

Perform all tests on a wooden or insulated bench top to prevent leakage or shock hazards. Follow the equipment manufacturer's instructions. A low reading on the tester indicates a weak coil which must be replaced. No attempt should be made to improve this spark by increasing primary current; a coil is defective if it does not give a good reading on the specified primary current.

Coils should be installed with primary terminals aligned fore and aft to avoid accidentally grounding primary circuit.

HIGH TENSION LEADS

Spark plug high tension leads may be tested for leakage or insulation failures by using the ignition analyzer and an ignition coil (see Figure 7-13). Connect the coil to the ignition analyzer as for the coil test. Connect a separate test lead with suitable clips to the secondary terminal of the coil and to the conductor of the spark plug lead. Probe the entire insulated surface of the spark plug lead with the grounded test probe. Arcing will be apparent wherever the insulation has broken down due to moisture or carbon trails. Check leads for continuity.

REASSEMBLY

a. Install magneto drive coils, making certain that coil laminations are flush with bosses on magneto plate (see Figure 7-14).

b. Install breaker assembly over breaker post.

c. Install condenser. Connect magneto drive coil lead, condenser lead, and lead from electrical panel assembly to breaker point screw terminal.

d. Install cam Woodruff key and cam on crankshaft.

e. Install new oiler clip and wick in position on mounting boss (see Figure 7-8). Apply Delco #U-1901 1948792 distributor lubricant to oiler wick and to point cam follower on side toward cam rotation.

f. Cam must be removed from flywheel. Adjust breaker points, using a feeler gage and with the breaker cam and key installed on the crankshaft (see Figure 7-15). Point gap should be set to .020" for used points in good condition, or .022" for new points. Set points with the breaker arm on the high lobe of the cam (full open).

g. Rotate crankshaft so that crankshaft keyway is 180 degrees opposite breaker point pivot pin. This will bring low point on cam next to fiber block, facilitating assembly.

h. Place Woodruff key in crankshaft keyway. Place cam back in position on flywheel. See Figure 7-16. Carefully place flywheel on crankshaft. When flywheel and cam are properly seated, outer edge will be approximately 1/32 inch above shoulder on crankshaft. DO NOT use force. If it is impossible to position flywheel properly, remove it and repeat above procedure.

i. Place washer and flywheel nut in position. Torque flywheel nut to 40 - 45 foot pounds. See Figure 7-17.

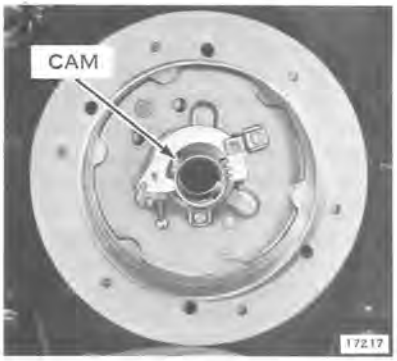

Figure 7-16

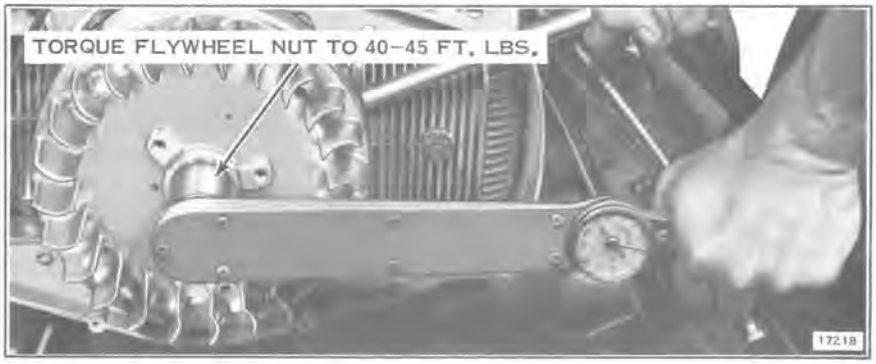

Figure 7-17

j. Replace outer fan housing and manual starter assembly.

k. When this procedure is followed, engine is timed correctly without further adjustment. To recheck, use an automotive timing light, either a 12 volt or 110 volt model. One of the cooling fins on the flywheel out from the keyway has a small raised boss. The fourth fin, counterclockwise after the fin with boss, should be painted yellow (if paint has deteriorated, repaint). See Figure 7-18. With the engine operating at idle speed (1000 to 1200 rpm), this painted mark can be seen in center of timing hole when light is focused there. Timing slot is approximately 7/8 inch long, and is located above the manual starter (at the 12 o'clock position) in the outer fan housing. See Figure 7-19.

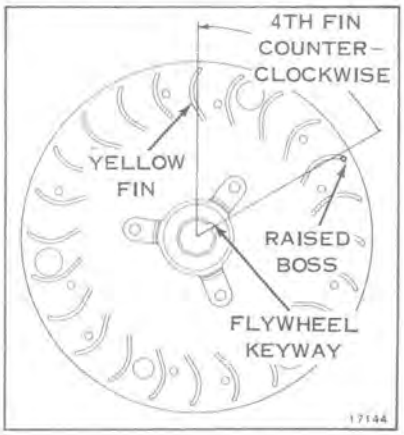

Figure 7-18

SPARK PLUGS

The condition and appearance of spark plugs taken from an engine may be a guide to the type and source of engine trouble. Proper spark plug heat range and normal engine conditions will produce powdery deposits of a rust brown to grayish or tan color on the firing end of the insulator, and a minor degree of electrode wear (see Figure 7-20). Highly leaded fuels may produce white to yellowish powdery deposits on the firing end of the spark plug. These deposits will not interfere with normal spark plug performance if plugs are cleaned at regular service intervals. See page 4-3 for a discussion on spark plug heat range.

Figure 7-19

a. If the insulator tip is an exceptionally light tan or whitish color, or the center electrode burned away, the heat range may be too hot (see Figure 7-21).

b. A dark, black or sootlike coloration, or wet appearance, ordinarily indicates the heat range as being too cold (see Figure 7-22). Black, sooty deposits on the entire firing end of the spark plug result from incomplete combustion due to an overly rich air-fuel mixture, incorrect choke setting, or misfiring caused by faulty ignition components.

c. A definite white coloration may indicate the presence of moisture in the combustion chamber. Similar deposits are caused by preignition.

d. Oil fouling deposits wet, sludgy deposits and is a result of misfiring or of excessive oil in the fuel mixture (see Figure 7-23).

e. Burned or overheated spark plugs may be identified by a white, burned, or blistered insulator nose, and badly eroded electrodes. Excessive deposits in the combustion chamber, a lean fuel mixture or improperly installed spark plugs can cause overheating.

Figure 7-20

Figure 7-21

Figure 7-22

Figure 7-23

The condition of spark plugs may provide an indication of other conditions requiring attention. Inspect each plug and gasket as it is removed. Place the spark plugs in a holder in order of removal, to assist in locating trouble. Inspect each plug for worn electrodes, glazed, broken, or blistered porcelain, and replace plugs where necessary. Plugs that are severely carbon fouled, that have blistered or cracked insulator tips, or plugs that have eroded electrodes must always be replaced. Plugs that are slightly contaminated with deposits, or which have wider than recommended gap settings can be cleaned and regapped for further use. Plugs that appear slightly contaminated can be cleaned by careful scraping, using a small knife or similar instrument. After combustion deposits have been removed, bend the side electrode back slightly so that the center electrode can be filed flat.

DO NOT clean plugs on abrasive blasting machines. This type of cleaning tends to remove the hard, smooth finish from the insulator tip and reduces the tip's resistance to the formation of combustion deposits. Blasting also tends to pack the abrasive between the insulator top and the metal shell of the plug. If the abrasive is not removed before installing the plug, it may pass through the engine, causing piston or cylinder wall scoring.

After the plug has been cleaned, adjust the gap to .028 to .033 inch by bending the side electrode. Adjust only the side electrode, as attempting to bend the center electrode will crack the insulator. Use a round wire feeler gage to measure gap adjustment (see Figure 7-24).

Poor engine performance and premature spark plug failure may result from improper spark plug installation. Before installing the plug, be sure the plug seat in the cylinder head is cleaned and free from obstructions. Inspect and clean spark plug hole threads before installing plugs. See Figure 7-25. Always use new gaskets when installing spark plugs. Screw spark plugs in by hand and tighten to 20 to 25 ft. lbs., using a torque wrench.

Improper installation is one of the greatest single causes of unsatisfactory spark plug performance. Improper installation is the result of one or more of the following:

1. Installation of plugs with insufficient torque to correctly compress the gasket.
2. Installation of plugs using excessive torque can strip the threads in the cylinder head.
3. Installation of plugs on dirty gasket seal.
4. Installation of plugs in corroded spark plug hole threads.

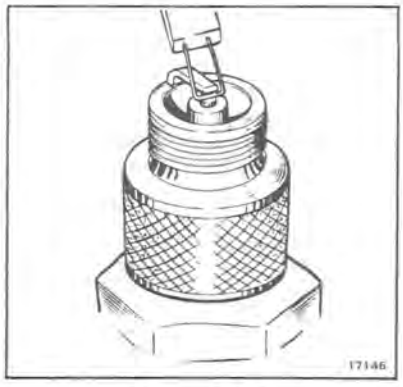

Figure 7-24

Figure 7-25

HEADLAMP ADJUSTMENT (See Figures 7-26 and 7-27)

Headlamp is adjustable for elevation of beam and right or left throw of beam.

For elevation, turn both adjustment screws in or out equally. With high beam on, adjust elevation of beam so that center of high intensity zone is 2 inches below center of lamp at a distance of 25 ft. from headlamp.

For right or left throw of beam, adjust either screw until proper aim is obtained.

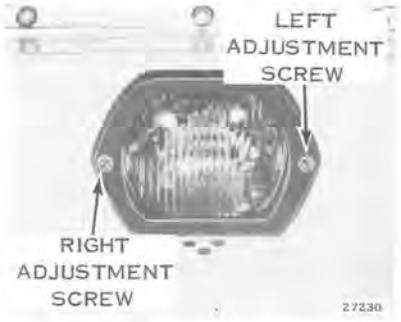

Figure 7-26

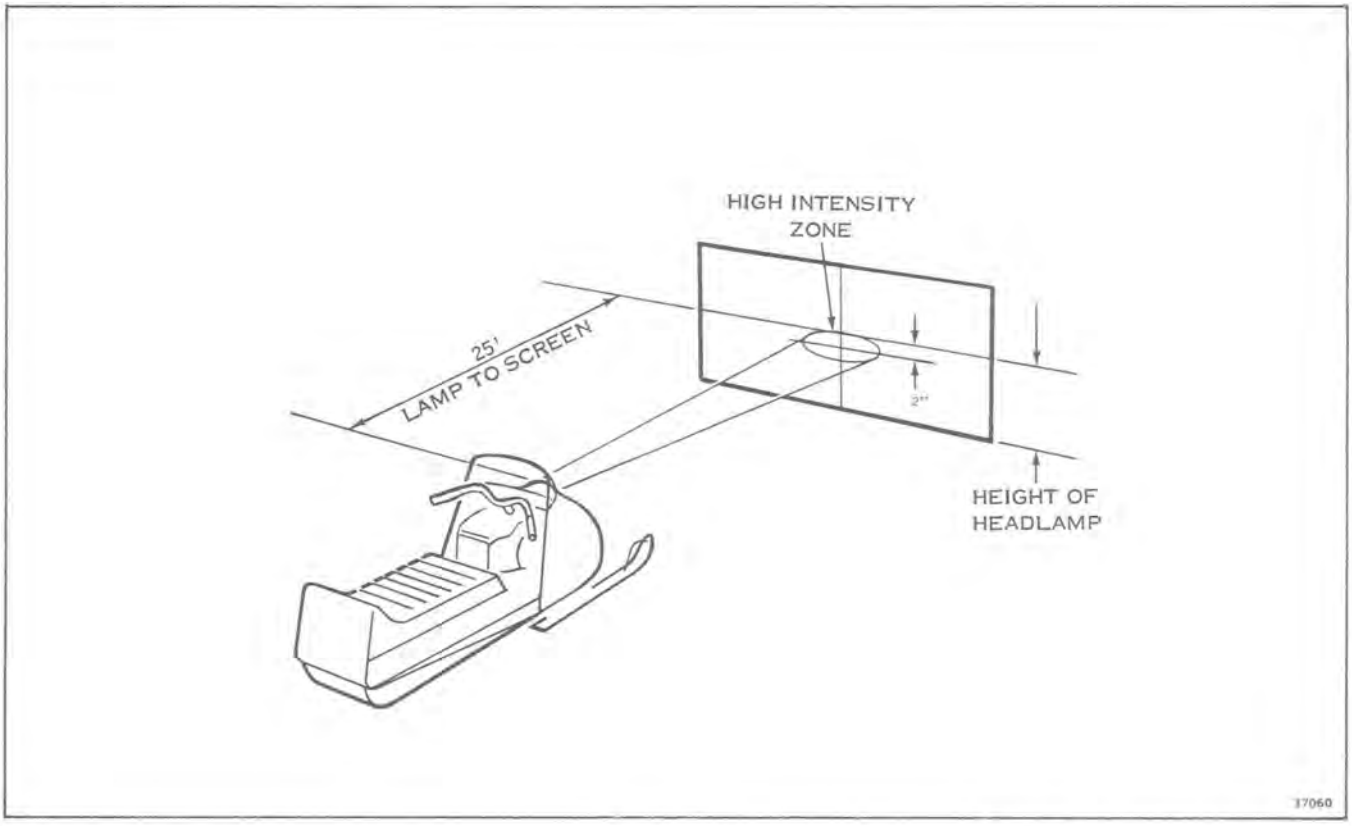

Figure 7-27

VOLTAGE REGULATOR

To check the regulator, first set the voltmeter to the 30 volt DC range and then connect the voltmeter leads across the pink and pink/black leads at the resistor. Connect the red clip lead to the pink wire and the black clip lead to the pink/black wire. See Figure 7-28. Start engine and at an idle with headlight on, the voltmeter should indicate "0" volts. As engine RPM is increased to 1800 to 2000 RPM, the voltmeter should indicate greater than 1 volt DC. As engine RPM is decreased to an idle, the voltmeter should indicate "0" volts.

Figure 7-28

SECTION 8
MANUAL STARTER

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Figure 8-1

DESCRIPTION

The manual starter converts straight line motion to rotary motion necessary to crank the engine. Pawls on the starter pulley engage the flywheel ratchet when the starter rope handle is pulled. When the engine starts, centrifugal force moves the pawls outward, disengaging them from the ratchet. A recoil spring is wound as the rope is pulled and unwinds as the starter handle is returned to the starter housing.

NOTE

Never release handle at end of stroke, allowing rope to snap back. Serious damage will result.

REMOVAL AND DISASSEMBLY

SAFETY WARNING

It is good practice to wear safety glasses while disassembling and reassembling manual starters because of the rewind spring.

a. Remove three screws (see Figure 8-1) attaching manual starter assembly to fan housing. Remove starter assembly from fan housing.

b. Pull starter rope out and untie knot in handle while holding rope.

c. Ease rope back into starter until starter spring is fully unwound.

d. Remove spindle screw, and remove all components of starter pulley spindle assembly (see Figure 8-2).

e. Jar the housing, pulley side down, on bench to dislodge spring washer and pulley from housing.

CLEANING, INSPECTION, AND REPAIR

a. Wash metal components in solvent and blow dry with compressed air.

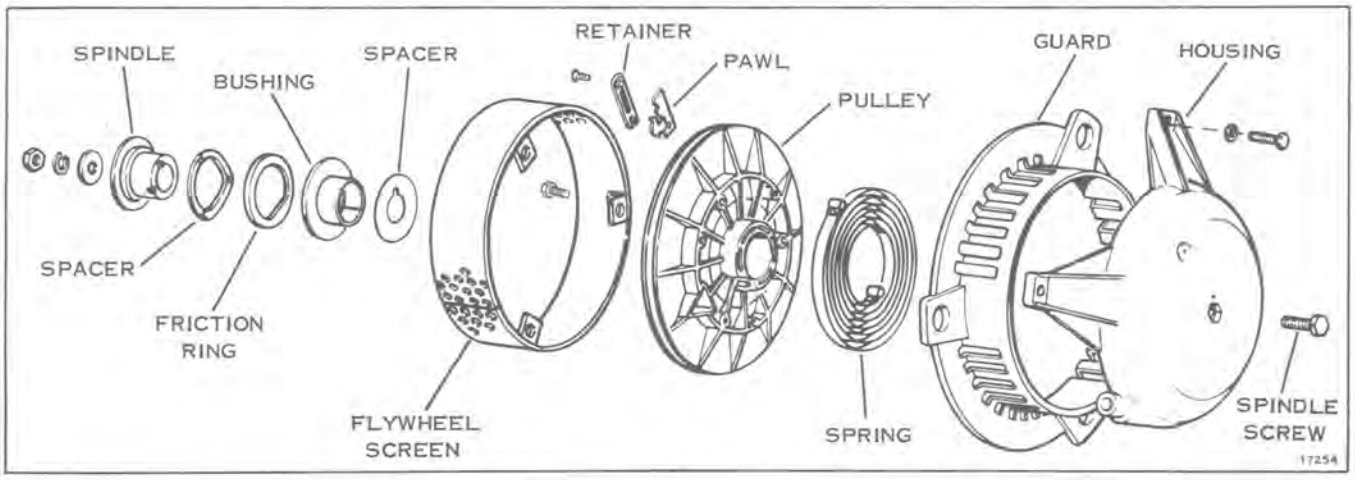

Figure 8-2

b. Inspect spring for broken end loops or insufficient tension.

c. Examine starter pawls and ratchet for excessive wear.

d. Inspect friction ring and spring, spindle bushing, spindle, and retainers.

e. Inspect rope and discard if frayed. Replace with starter rope cut length of 73-3/4 inches.

f. Examine pulley and housing rope eye for sharp edges and rough surfaces that might cause rope fraying. File and polish as necessary.

REASSEMBLY

a. Rewind starter spring manually so it will fit inside starter housing.

b. Place outside spring end loop on starter housing anchor pin.

c. Replace starter pulley and inside spring end loop fitted on starter pulley pin.

d. Grease hub of pulley before installing bushing with OMC grease Part No. 114154.

e. Grease inside of bushing and install spindle, spring washer and friction ring, in bushing. Fasten with screw, washers and nut.

f. Wind pulley counterclockwise until tight.

g. Unwind pulley clockwise until pulley anchor hole lines up (approx.) with starter rope hole in starter housing.

h. Lock starter pulley in position by aligning holes in pulley and housing and inserting a nail or pin through them.

i. Tie a knot in one end of starter rope. If installing a new rope, be sure length measures 73-3/4 inches. Fuse nylon strands over an open flame at each end for about one-half inch. Rope ends must be stiff to hold in pulley.

j. Insert rope through pulley and starter housing. See Figure 8-3. Seat rope knot firmly in pulley. Tie a slip knot in starter rope and allow pulley to rewind.

k. Install pawls, retainers, and screws, if they have been removed.

l. Assemble starter rope to handle and secure with knot.

m. Pull on starter rope to make certain that pawls work properly. When starter rope is pulled, pawls should pivot to engage flywheel ratchet. On releasing rope, pawls should retract to starting positions.

n. Attach manual starter assembly to fan housing with three screws.

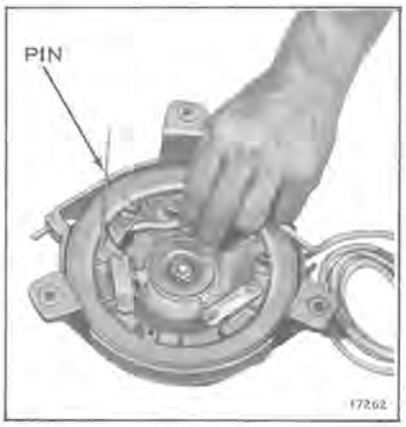

Figure 8-3

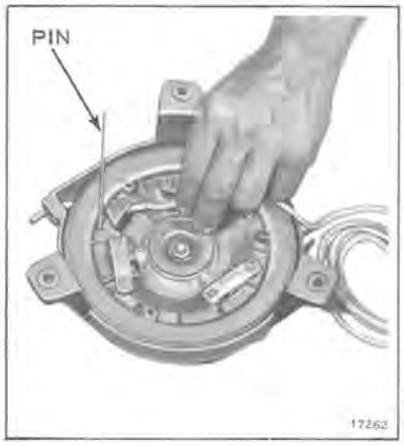

Figure 8-4

STARTER ROPE REPLACEMENT

a. Remove starter assembly from fan housing.

b. Pull starter handle until rope is fully unwound. Lock starter pulley in position by aligning holes in housing and pulley and inserting a nail or pin through them.

c. Remove handle from rope, and remove old rope from pulley.

d. Cut new starter rope to length of 73-1/4 inches. Fuse ends of rope over open flame for about one-half inch. Rope ends must be stiff to hold in pulley. Tie knot in end of rope and thread through pulley and housing. See Figure 8-4.

e. Assemble handle to starter rope and secure with knot.

f. Remove locking pin and allow starter to rewind.

SECTION 9
ENGINE

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Figure 9-1

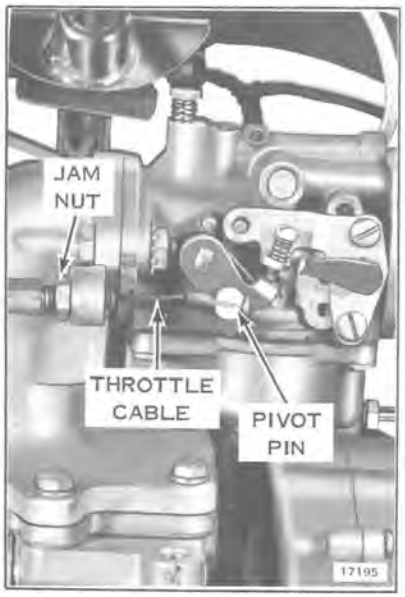

Figure 9-2

DESCRIPTION

The snow machine is driven by a two-cycle, twin-opposed cylinder, air-cooled engine. This section gives instructions for removal and overhaul of the engine. Principles of two-cycle engine operation are discussed in Section 3. Trouble shooting procedures are given in Section 4.

ENGINE REMOVAL

1. Before removing hood:

   a. Disconnect headlight wiring. Separate connectors by squeezing top and bottom tabs of connector and pull. See Figure 9-1.

   b. Remove gas cap and release hood latches.

   c. Lift off hood.

   d. Replace gas cap.

2. Remove belt guard and transmission belt. See Section 10.

3. Remove throttle cable using the following procedure: Depress thumb throttle lever. Hold throttle in open position. Slip end of throttle cable through nylon pivot pin. Remove jam nut on intake manifold and turn cable fitting out of manifold. See Figure 9-2.

4. Remove spark plug leads from spark plugs. See Figure 9-3.

5. Disconnect two engine electrical connectors. See Figure 9-5.

6. Disconnect inlet hose from fuel pump. See Figure 9-4. Disconnect primer line from intake manifold.

7. Remove four nuts securing each muffler mounting bracket. See Figure 9-5.

8. Remove four nuts and washers attaching engine frame to chassis. See Figure 9-5.

9. Engine, exhaust manifold and muffler assembly can now be lifted high enough to remove nuts from exhaust manifold studs.

10. Remove engine assembly from chassis.

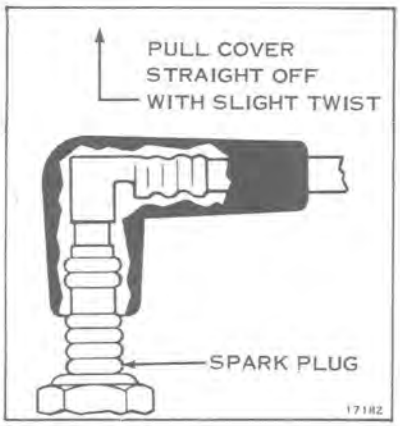

Figure 9-3

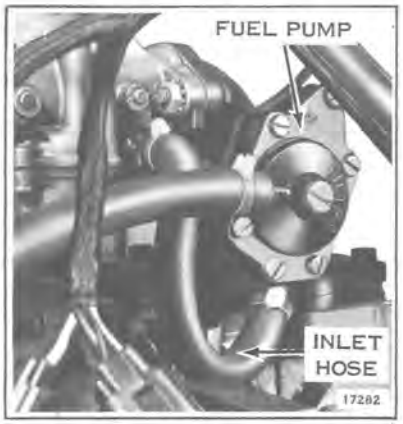

Figure 9-4

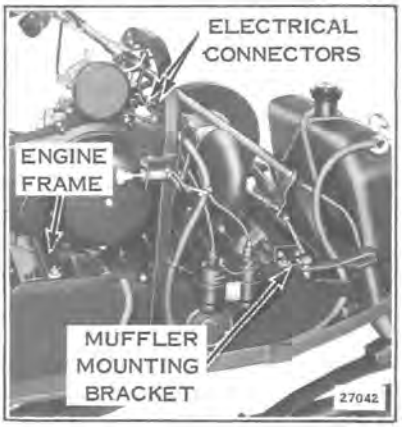

Figure 9-5

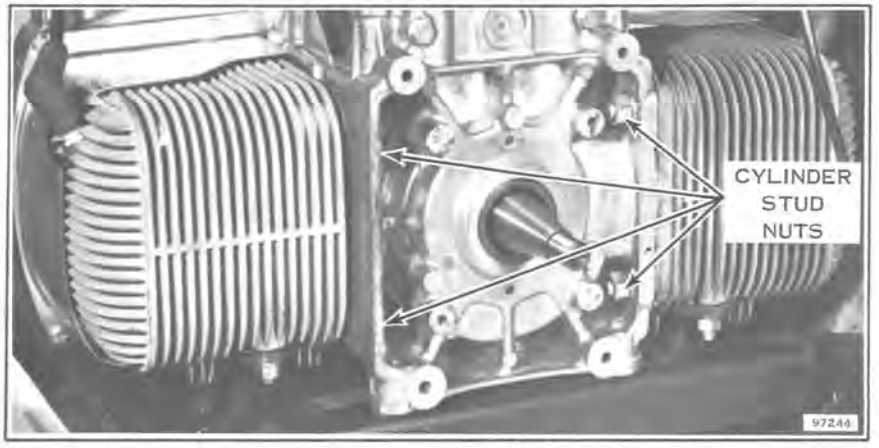

Figure 9-6

Figure 9-7

ENGINE DISASSEMBLY

a. Before disassembly, clean outside of engine to prevent dirt from getting on internal parts of engine.

b. Remove carburetor, intake manifold and leaf valve assembly. For detailed instructions, see Section 6.

c. Remove primary drive assembly. (See Section 10.)

d. Remove manual starter assembly and outer fan housing. Remove manual starter ratchet assembly, flywheel, magneto cam and inner fan housing. (See Sections 7 & 8.)

e. Remove spark plugs.

f. Remove cylinders and crankcase group from engine frame assembly.

NOTE

Before performing next step, take note that cylinders must be replaced on side of crankcase from which they were removed.

g. Remove the eight cylinder stud nuts and lockwashers. The cylinder barrels can now be removed from the crankcase. See Figure 9-6.

NOTE

If it is necessary that only the cylinders and pistons be serviced, this can be accomplished with only the cylinder barrels removed.

h. Remove screws from crankcase halves and drive out two alignment roll pins. Heat up crankcase halves in bearing area to approximately 250°F. (IMPORTANT - when heating crankcase, be careful not to damage seals.) Tap crankcase with rawhide mallet to break seal, and separate crankcase halves. See Figure 9-9.

NOTE

Pistons, connecting rods, and caps are matched parts and seat with the operation of the engine. Because of this, it is essential to maintain their original positions at reassembly. Mark each connecting rod and cap, piston, and bearing component to assure correct mating during reassembly. Also mark the cylinders and crankcase halves from which they are removed.

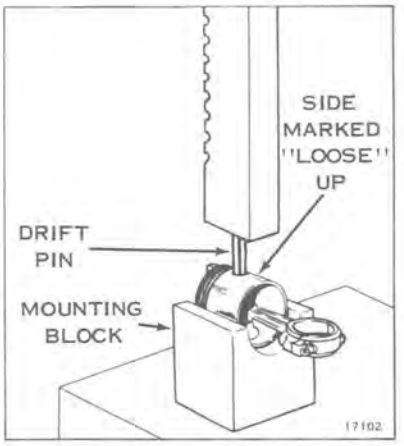

Figure 9-8

i. Remove connecting rod caps.

j. Remove connecting rods from crankshaft.

k. Reinstall matched caps on connecting rods.

l. Remove rings from pistons. DO NOT try to save the rings even when they are not stuck. Install a complete set of new rings on every overhaul.

m. If necessary to remove connecting rods from pistons, remove wrist pin retaining rings, using Truarc No. 1 pliers (Service Tool #303857) (see Figure 9-7). Press out wrist pin to free piston from connecting rod. See Figure 9-8. Piston wrist pin hole marked "Loose" should be up when pressing out wrist pin. This will prevent damage to piston.

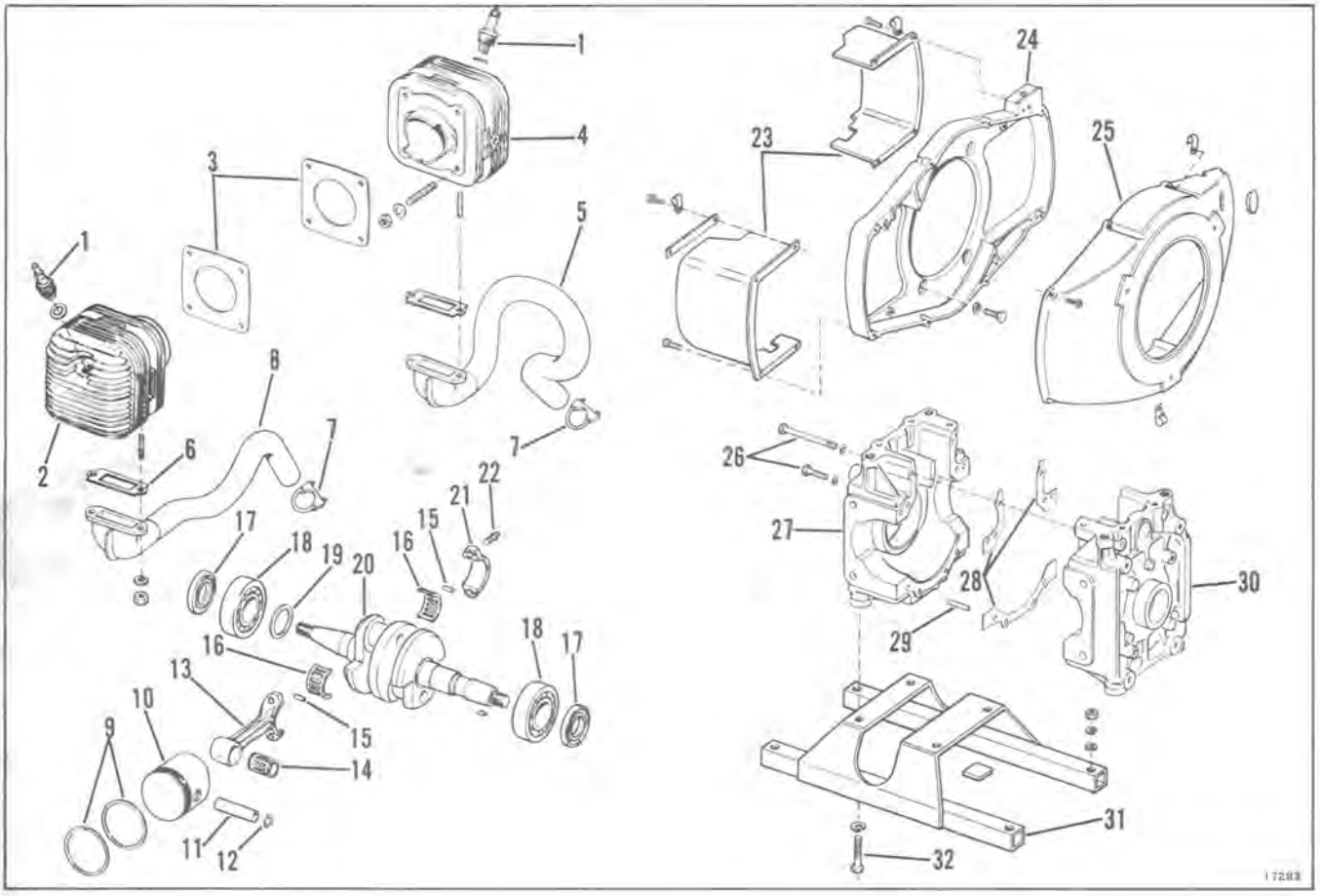

Figure 9-9

1. Spark Plug
2. Rear Cylinder
3. Cylinder Gasket
4. Front Cylinder
5. Front Exhaust Manifold
6. Exhaust Manifold Gasket
7. Muffler Clamp
8. Rear Exhaust Manifold
9. Piston Rings
10. Piston
11. Wrist Pin
12. Retaining Ring
13. Connecting Rod
14. Needle Bearing Assembly
15. Needle Bearing
16. Needle Bearing Retainer
17. Crankshaft Seal
18. Crankshaft Bearings
19. Shim
20. Crankshaft
21. Connecting Rod Cap
22. Connecting Rod Screw
23. Cylinder Shrouds
24. Fan Housing (Inner)
25. Fan Housing (Outer)
26. Crankcase Screws
27. Crankcase Half (Primary Drive Side)
28. Crankcase Gaskets
29. Roll Pin
30. Crankcase Half (Flywheel Side)
31. Engine Frame
32. Engine Mounting Bolt

CLEANING, INSPECTION, AND REPAIR

SAFETY WARNING

When using trichloroethylene as a cleaning agent, use in a well ventilated area at ambient temperatures. Under no circumstances should the solvent be heated. Trichlorethylene vapors are poisonous.

CYLINDERS

a. Remove carbon from exhaust ports and cylinder heads. Carbon accumulation in exhaust ports restricts flow of exhaust gases and has a considerable effect on motor performance. Carefully scrape carbon from cylinder heads and exhaust ports with scraper or other suitable tool. Exhaust ports and all exhaust passages must be free from carbon deposits to insure maximum performance.

NOTE

DO NOT scratch gasket surfaces. Scratches can cause compression losses.

b. Check cylinder walls for excessive wear. Measure cylinder bore for size and straightness by using an inside micrometer or dial bore indicator. If wear is excessive, or cylinder is badly scored, replace. Major portion of wear will be in port area and area covered by ring travel.

GASKETS AND GASKET SURFACES

a. Discard all gaskets, seals, and O-rings. Use new gaskets and seals in reassembly.

b. Remove all traces of dried cement and old gasket material, using trichlorethylene or lacquer thinner.

c. Check gasket faces for flatness. Under certain conditions, gasket faces may warp or spring, particularly where thin sections or flanges are employed and are subject to temperature changes. To check for flatness, lay a sheet of No. 120 emery cloth on a surface plate or piece of plate glass (see Figure 9-10). Place part to be surfaced on emery cloth and move slowly back and forth several times in a figure 8 motion, exerting evenly distributed, light pressure. Lift part from surface plate to observe results. If surface is actually warped or spring, high spots making contact with lapping surface will take on a dull polish, while low areas will retain their original state. To insure flatness over entire surface, continue surfacing until entire gasket surface has been polished to a dull luster. Finish surfacing with No. 180 emery cloth.

PISTONS

a. Carefully remove carbon deposits from piston head. Inspect ring grooves for carbon accumulation, excessive wear, or damage to ring seats. Carefully scrape carbon from ring grooves (see Figure 9-11), making certain that carbon clinging to bottom and side of grooves has been thoroughly removed, without scratching or otherwise damaging the grooves. A suitable tool for cleaning ring grooves can be made by breaking a piston ring, grinding an angle on the edge, and breaking the lower sharp edge to prevent damage to lower ring land (see Figure 9-12).

Figure 9-10

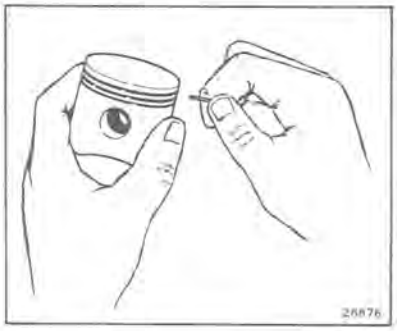

Figure 9-11

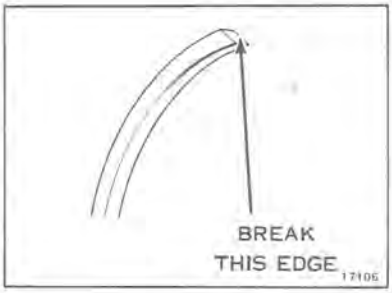

Figure 9-12

Figure 9-13

Figure 9-14

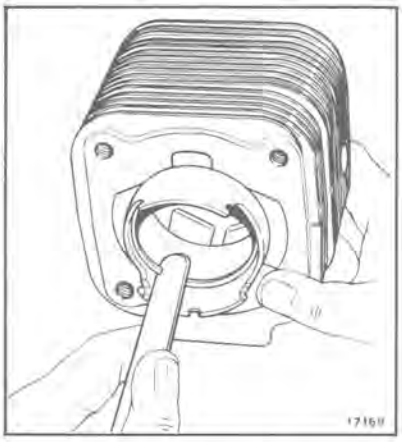

Figure 9-15

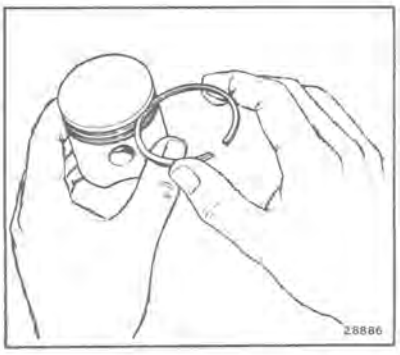

Figure 9-16

b. Check pistons for roundness, taper, excessive skirt wear, and scoring, Piston skirts must be perfectly round and unscratched to prevent entry of exhaust gases into crankcase chamber. Check piston size, taper, and roundness, using a micrometer (see Figure 9-13). Check clearance between piston and cylinder before reinstalling piston (see Figure 9-14). Check tolerances on spec. sheet page 2-2.

c. Before installing new piston rings, check gap between ends of ring by placing ring in its respective cylinder bore (see Figure 9-15). Press ring down in bore slightly with bottom of piston to square it up. Discard and replace with different ring if gap is too large or too small (see Section 2, Specifications).

d. Check each ring in its respective ring groove for tightness or binding by rolling the ring around the piston groove (see Figure 9-16). Check for groove side clearance with feeler gage (see Figure 9-17) (see Section 2, Specifications).

BEARINGS

NOTE

All areas where bearings are to be serviced must be free from oil and dirt. DO NOT spin ball or roller bearings before they are cleaned. Dirt in the races could cause serious damage.

a. Clean bearings while they are still on crankshaft by emersing them in a cleaning solvent and turning outer race of bearing. Flush all dirt from around balls and separators. Tank should be equipped with a screened false bottom to prevent settlings from being stirred up into the bearings. Agitate bearings frequently until all oil, grease, and sludge have been loosened and can be flushed out. Bearings with especially heavy carbon deposits or hardened grease should be soaked in a separate container of solvent.

b. Use a spray gun with air filter and a cleaning solvent to flush each bearing until all dirt and residue have been removed. Blow solvent out of bearings, using dry, filtered air. Do not spin bearings by force of air.

c. Since dry bearings rust rapidly, lubricate them immediately in light, clean oil. Rotate them a few times to spread the oil film and place them in a clean, covered container for inspection later.

d. Discard and replace any bearing that shows any of the following:

1. Rusted balls, rollers, or races.

2. Fractured ring. This may be caused by forcing a cocked bearing off a shaft or by too tight a press fit.

3. Worn, galled, or abraided surfaces. These may be caused by too loose a fit, or a bearing locked by dirt and turning on the shaft or in the housing.

4. Badly discolored balls, rollers, or races. This is usually due to an inadequate supply of lubricant. Moderate discoloration is not a cause for discard.

e. If bearings must be replaced, remove the old bearings using the following procedure: Use special bearing removal tool shown in Figure 9-18. Position lips of half shells behind bearing and over extractor. Slide retaining ring over half shells. Turn extractor

center screw to remove bearing. This tool is a must if main bearing replacement is required. Do not lose shims between bearing and crankshaft throw.

ASSEMBLY OF ENGINE

Refer to Figure 9-9 for correct sequence of assembly. Make no forced assemblies unless press fits are called for. Make no dry assemblies. Lubricate all moving parts with a light film of oil. Be sure all parts are clean and free from dirt and grit. Perfectly good cylinder walls, pistons, and rings can be ruined in a few minutes of operation if grit remains after assembly. Work in clean surroundings and with reasonably clean hands. Coat all bearing surfaces, cylinder walls, etc., with clean oil before assembly.

NOTE

Use new gaskets and seals throughout when reassembling the engine. Apply Perfect Seal #4 to both sides of crankcase gasket before assembly.

PISTONS, WRIST PINS, AND CONNECTING RODS

a. Install wrist pin needle bearing in connecting rod, using an arbor press.

b. Apply a coat of oil to wrist pin, making sure that surface is clean. Place a drop of oil in each pin hole in piston.

c. Oil wrist pin bearing in connecting rod. Heat piston in water, approximately 140°F. Insert wrist pin through hole in one side of piston. Place connecting rod in position in piston, then complete wrist pin installation.

d. Replace retaining rings, lettered side out, making certain they seat securely in the groove provided.

e. Check piston with micrometer to determine whether piston has been distorted during assembly. Maximum permissible distortion is .003 below wrist pin boss only.

PISTON RINGS

a. Install the piston rings on each piston. Spread each ring with a ring expander just enough to slip it over the head of the piston and into place (see Figure 9-19). Be sure that the rings fit freely in the piston ring grooves.

b. Be sure that piston rings are correctly positioned in piston ring grooves. Be sure dowel pins on piston are centered between ring gaps.

CRANKSHAFT

a. Install crankshaft shims and journal bearings on crankshaft, using an arbor press. Be sure to support properly to prevent distortion. Shims must be installed on primary drive side (not magneto side) of crankshaft, between the bearing and the thrust face of crankshaft. Crankshaft end play should not exceed .025" after installation. Total dimension across bearings should be 4.930" ± .001". See Figure 9-20.

b. Remove connecting rod caps from connecting rods. Apply a coat of OMC NEEDLE BEARING GREASE (Part No. 378642) to connecting rod bearing area. Assemble needle bearings (16) and retainer halves, with connecting rod and connecting rod cap, to crankpin.

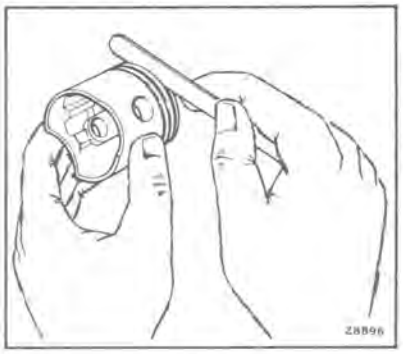

Figure 9-17

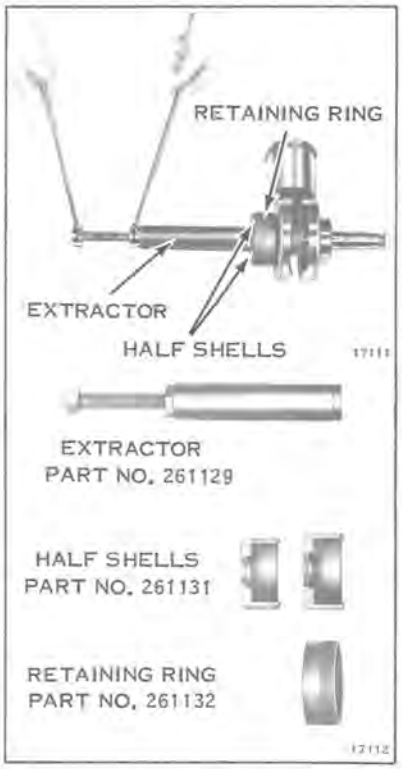

Figure 9-18

Figure 9-19

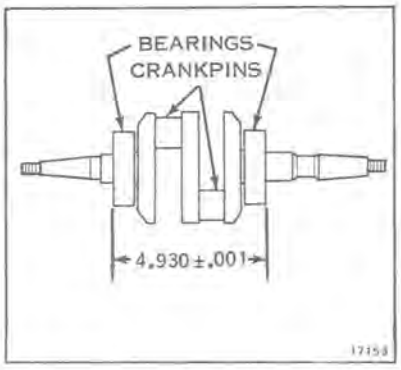

Figure 9-20

Figure 9-21

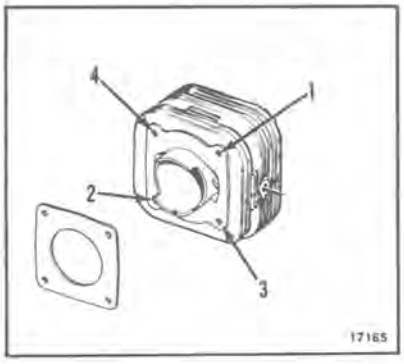

Figure 9-22

NOTE

Bearing retainer halves are matched. DO NOT interchange retainer halves or turn them end for end.

c. Attach connecting rod to caps. Connecting rod caps are not interchangeable, neither may the caps of the same rod be turned end for end. Match marks are provided to assure correct assembly. Draw a pencil over edge surface on both sides of rod to make certain that cap and rod are correctly aligned (see Figure 9-21). If misaligned, offset edge will be felt with pencil point. Tighten connecting rod cap screws together. If alignment is satisfactory, tighten connecting rod cap screws to specified torque. If alignment is necessary, tap into alignment with drift punch. Check for binding. Bearings and retainers must float freely on crankpins.

d. Install crankshaft seals in crankcase halves.

e. Use a new crankcase gasket. Coat gasket with Perfect Seal #4 and place on one crankcase half. If gasket requires trimming, be sure to use a very sharp cutting tool. Uneven edges may result in crankcase leakage.

NOTE

Heat crankcase halves with a heat lamp to approximately 250° for 15 minutes. This allows easier installation of crankshaft.

f. Replace crankcase alignment roll pins, driving in carefully with a hammer. Replace all crankcase screws and tighten to specified torque.

g. Check crankshaft end play. It should not exceed .019".

h. Crankshaft tapered end must be kept clean (free of grease and finger prints) before assembly of primary sheave.

CYLINDERS

a. Install cylinders, using new gaskets. Use a ring compressor (Special tool 426020) to install pistons in cylinders. Tighten nuts in correct sequence to specified torque. See Figure 9-22.

b. Install exhaust manifolds to cylinders. The gasket surfaces on cylinders and manifolds must be clean and smooth, and new gaskets should be used. See torque specifications.

c. Attach cylinder and crankcase group to engine frame.

d. Install inner fan housing with magneto and alternator, flywheel, and outer fan housing. See Figure 9-9.

e. Install manual starter (see Section 8).

f. Install leaf valve assembly, intake manifold, carburetor, and air horn. For detailed instructions, see Section 6.

INSTALLATION OF ENGINE ASSEMBLY TO CHASSIS

1. Install engine and frame to chassis.

2. Install primary sheave assembly. See Section 10.

3. Install transmission belt. See Section 10.

4. Connect throttle cable. Adjust lever with throttle full open.

5. Reconnect electrical connectors.

6. Install spark plugs and connect leads.

7. Reconnect fuel lines. See Section 6.

8. Replace hood and reconnect headlight wiring.

BREAK-IN PROCEDURE

a. Be certain that when an engine is returned to service following an overhaul, the owner is advised to follow break-in procedures as described in the Owner's Manual exactly. This will allow the internal moving parts to seat themselves, thus greatly prolonging engine life.

b. For the first tankful of fuel the vehicle must be operated at reduced speeds.

c. Allow engine to warm up before putting vehicle in gear. Start out slowly; avoid jack-rabbit starts. DO NOT overspeed engine. Operation in extreme cold weather can cause a slow down in the drive and track mechanism. When this occurs, block up rear of snowmobile and place front edge of skis against stationary object and run to free mechanism. DO NOT over-speed or run vehicle for prolonged periods as this can damage drive lugs on track.

d. Observe fuel mixing precautions as described in Section 12.

IMPORTANT

Adjust drive chain tension after the first 10 hours of operation. Refer to Section 10 for drive chain adjustment instructions.

Adjust track tension after the first 10 hours of operation. Refer to Section 11 for track tension and track alignment adjustment instructions.

MUFFLER

REMOVAL

1. Mark exhaust manifold at top of muffler inlet for location on reassembly. See Figure 9-23.

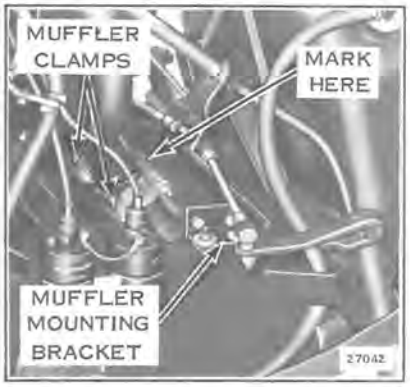

Figure 9-23

2. Remove lock nut from ball joint.

3. Remove 2 screws from upper yoke on steering column. See Figure 9-24.

4. Remove muffler mounting brackets. See Figure 9-23.

5. Loosen Muffler clamps. See Figure 9-23.

6. Remove four nuts securing engine frame to chassis.

7. Block engine frame up approximately two inches off chassis and tap wood block on muffler at exhaust inlet. See Figure 9-24. Alternate sides in order to work muffler off exhaust manifolds.

8. Remove high tension leads from coils. See Figure 9-25.

9. Remove belt guard and transmission belt. See Section 10.

10. Lift engine off mounting studs and work muffler out of well. See Figure 9-25.

Figure 9-24

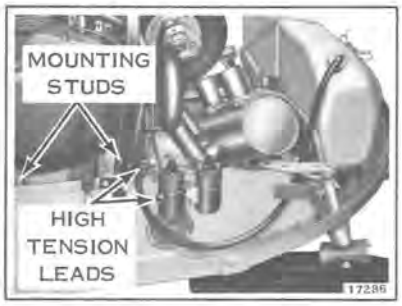

Figure 9-25

Figure 9-26

REASSEMBLY

1. Place muffler in well. Apply muffler cement to muffler inlet.

2. Place engine back on mounting studs and exhaust manifold over muffler inlet.

3. Pry muffler up into place with screw drivers on both sides of muffler and tap both manifolds to vibrate muffler back to original position in exhaust manifolds. See Figure 9-26.

4. Install muffler brackets

5. Assemble muffler clamps and tighten equally on both sides of "U" bolt. Assemble in position per Figure 9-23.

6. Assemble lower steering column in bushing. Install upper yoke to bracket on steering column support with brake cable and wiring clamp under lock nuts on right side (facing front) of yoke.

7. Install ball joints in steering arms and secure with lock nuts.

8. Install flat washers, lock washers and nuts on mounting studs over engine frame.

9. Replace high tension leads on ignition coils.

10. Replace transmission belt and belt guard. See Section 10.

SECTION 10
DRIVE TRAIN

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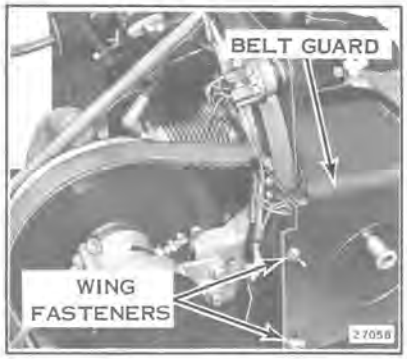


Figure 10-1

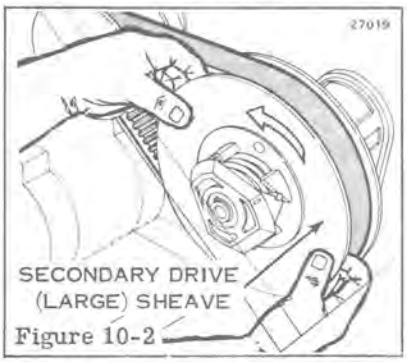


Figure 10-2

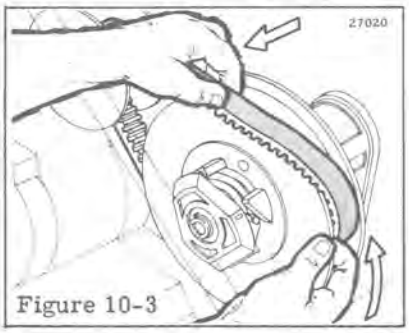


Figure 10-3

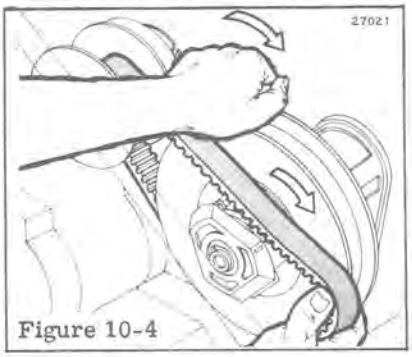


Figure 10-4

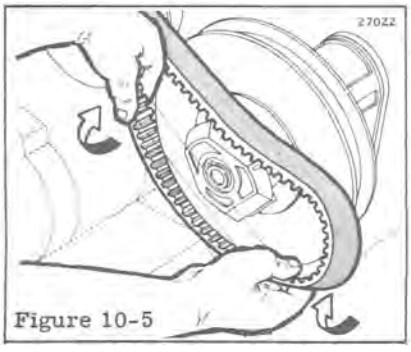


Figure 10-5

DESCRIPTION

This section gives complete service instructions on the snowmobile drive train. A brief discussion of the power flow system is included in Section 3.

TRANSMISSION BELT INSPECTION & REPLACEMENT

A belt measuring less than 1-1/16" across the width or outer surface must be replaced with a new one. Worn belt may be retained and used as a spare. A spare belt should be carried at all times.

☐ NOTE:
DO NOT RUN ENGINE WITHOUT BELT.

BELT REMOVAL

a. Remove four wing fasteners and belt guard, Figure 10-1.

b. To release belt, pull secondary sliding sheave while twisting to left, Figure 10-2.

c. Work belt over top of sheave, Figure 10-3.

△ SAFETY WARNING

Keep fingers from between halves of secondary sheave when performing next step.

d. Ride belt off sheave as sheave is twisted to right and closed, Figure 10-4.

e. Work belt out from under bottom of sheave and between steering column and end cap, Figure 10-5.

f. Move belt from around primary drive, Figure 10-6.

REPLACEMENT

a. Loop one end of the replacement belt around the primary sheave.

b. Pull movable half of secondary sheave toward center of machine. Hook belt on bottom of sheave and roll sheave forward. Belt will ride the sheave up and fall in place between the two halves.

c. Replace belt guard.

PRIMARY DRIVE

REMOVAL OF PRIMARY SHEAVE ASSEMBLY

☐ NOTE

Primary drive assembly is dynamically balanced. Before disassembly mark relative position of end cap and pulley assembly ① , sliding sheave ② and fixed sheave ③ for proper alignment on reassembly. See Figure 10-9.

After removing the transmission belt as described above, the primary sheave assembly can be removed using the following procedure:

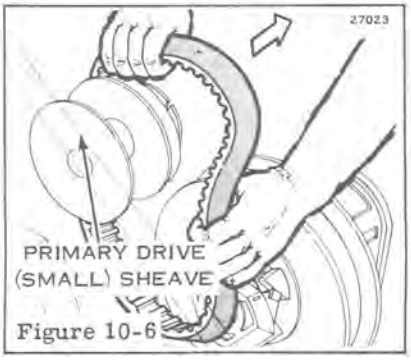


Figure 10-6

1. Remove starter housing. See Section 7.

2. Remove ratchet mount.

3. Attach Service Tool No. 113971 to flywheel with three bolts. See Figure 10-7.

Figure 10-7

4. Use flat, open end wrench (Service Tool No. 404032) on the square nut on back side of the fixed sheave. See Figure 10-8.

5. While holding the service tool attached to the flywheel, rap the open end wrench with a rawhide mallet in counterclockwise direction. (Power take-off end of crankshaft has right hand thread.) After nut is loosened, the primary sheave assembly can be turned off the crankshaft.

DISASSEMBLY OF SHEAVE WHILE ON ENGINE

1. Remove transmission belt (see Page 10-2).

2. Remove two screws securing lock plate to end cap assembly (see Figure 10-9).

SAFETY WARNING

Primary sheave is spring loaded. Clamp primary sheaves together with strap (Service Tool No. 261906) (see Figure 10-11) before proceeding with following steps.

3. With flat, open end wrench (Service Tool No. 404032) on inside, and socket wrench on outside, break loose end cap bolt from main shaft (see Figure 10-10).

4. Finish removing bolt with strap holding sheave halves together. Remove end cap assembly.

5. Remove strap while pressing movable half of sheave toward fixed half of sheave (see Figure 10-12).

NOTE

When used with Service Tool 113971, spline wrench service tool Part No. 114146 can be used to remove main shaft and sheave assembly from engine. See Figure No. 10-13A.

CLEANING, INSPECTION AND REPAIR

a. Clean all parts with a cleaning solvent such as Trichloroethylene (see SAFETY WARNING page 9-5) and blow dry with compressed air.

b. Remove sliding sheave and inspect spline (Ref. 1), primary sheave bearing (Ref. 2), compression spring (Ref. 3) and garter (activating) spring (Ref. 4) (see Figure 10-13).

Figure 10-8

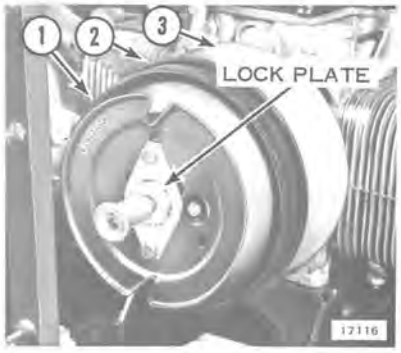


Figure 10-9

Figure 10-10

Figure 10-11

Figure 10-12

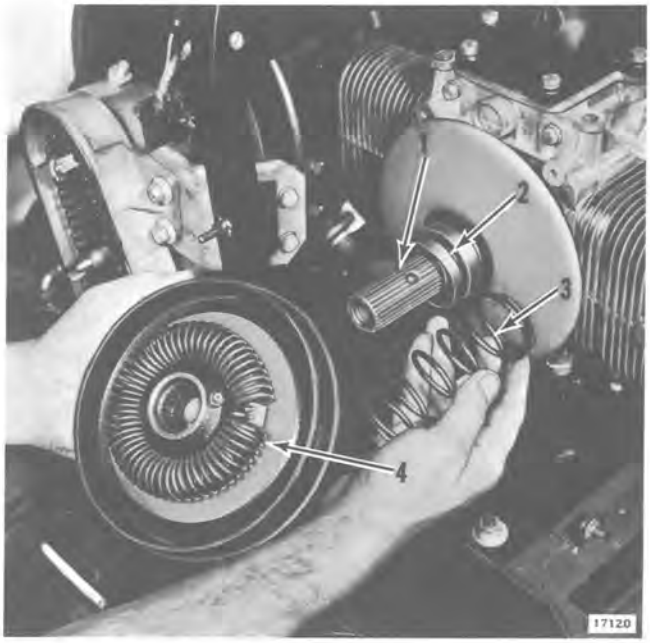


Figure 10-13

Figure 10-13A

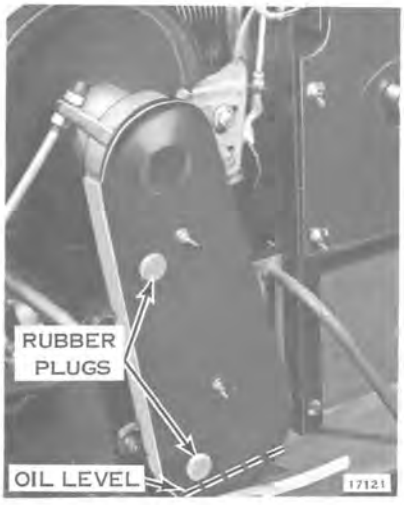


Figure 10-14

REASSEMBLY

1. Place compression spring on shaft with closed side of spring cup toward bearing.
2. Place movable half of sheave on shaft, compress spring and lock in place with strap (Service Tool No. 261906). Lubricate splines with OMC Part No. 114154 BEFORE REASSEMBLY.
3. Assemble actuating spring, then assemble end cap on shaft, making sure end cap splines engage shaft splines.
4. Tighten end cap bolt to correct torque. See Page 2-3.
5. Assemble lock plate to end cap. Locks on lock plate may engage bolt by turning lock plate over. Otherwise, a slight loosening or tightening of bolt may be necessary in order to align bolt with lock.
6. Clean inside of sheave halves of any grease that may have accumulated on them.
7. Reinstall transmission belt as described on page 10-2.

DRIVE CHAIN

LUBRICATION

The drive chain and chain bearings are lubricated by oil in the chain case. Should it be necessary to add oil use only OMC Type "C" and follow these instructions.

Remove rubber plugs (top and bottom). Pour oil in top hole until it reaches level as shown in Figure 10-14. (It will hold approximately 4 oz.) Replace plugs.

ADJUSTMENT

Total slack must be 1/4" ± 1/16" as shown in Figure 10-15. To measure this distance, first remove the chain case cover. (Note: Oil will drain when cover is removed unless snowmobile is tilted on its side.) Place a straightedge over the chain at the sprockets, press in on the center of the chain and measure the slack at this point. If the chain requires adjustment, use the following steps:

1. Loosen adjusting screw locknut (see Figure 10-16).
2. To tighten chain, pivot the eccentric adjustment downward (see Figure 10-16).
3. To loosen chain, pivot eccentric adjustment upward (see Figure 10-16).

REMOVAL

1. Remove chain case cover. Oil will drain from chain case when cover is removed.
2. Loosen chain (see "ADJUSTMENT" above).
3. Remove cotter pin and nut from upper drive sprocket (see Figure 10-16).
4. Remove sprocket and chain from upper shaft.
5. Chain can now be removed from lower sprocket.

INSTALLATION

1. Assemble in reverse order of disassembly.
2. Adjust chain per "ADJUSTMENT" above.
3. Add chain lubricant per "LUBRICATION" above.

REPAIR

A broken drive chain can be repaired with master links available from your dealer. See Figure 10-17. File off peened over rivet of links to be removed and replace with master link.

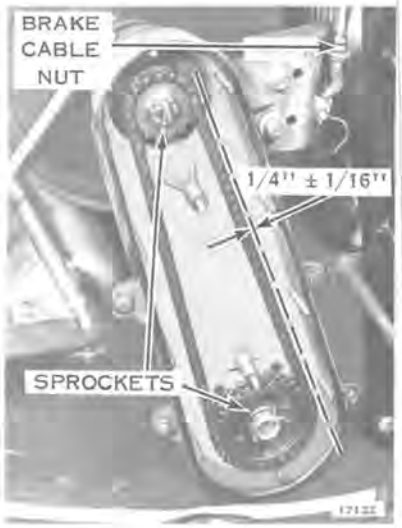


Figure 10-15

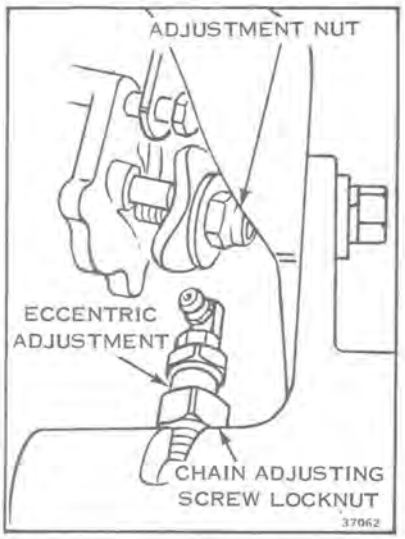


Figure 10-16

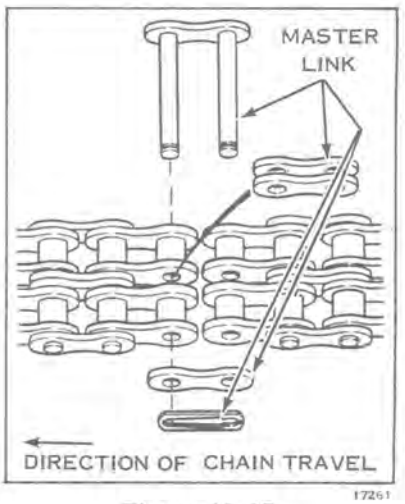


Figure 10-17

BRAKE

DESCRIPTION

The brake is positive acting disc type with long lasting fibre pads (Pucks).

ADJUSTMENT

The brake is tightened by turning the adjustment nut, Figure 10-16, to the right. To obtain the correct adjustment, turn the nut until there is a slight drag on the brake disc. Then the nut should be turned to the left, about 1/4 turn.

If hand brake lever does not have proper amount of travel, it can be adjusted by loosening the locknut, then turn the brake cable fitting for proper parking brake adjustment and retighten locknut. (See Figure 10-15.)

IMPORTANT

Before completing the adjustment, be certain there is sufficient movement of the lever to permit use of the parking lock.

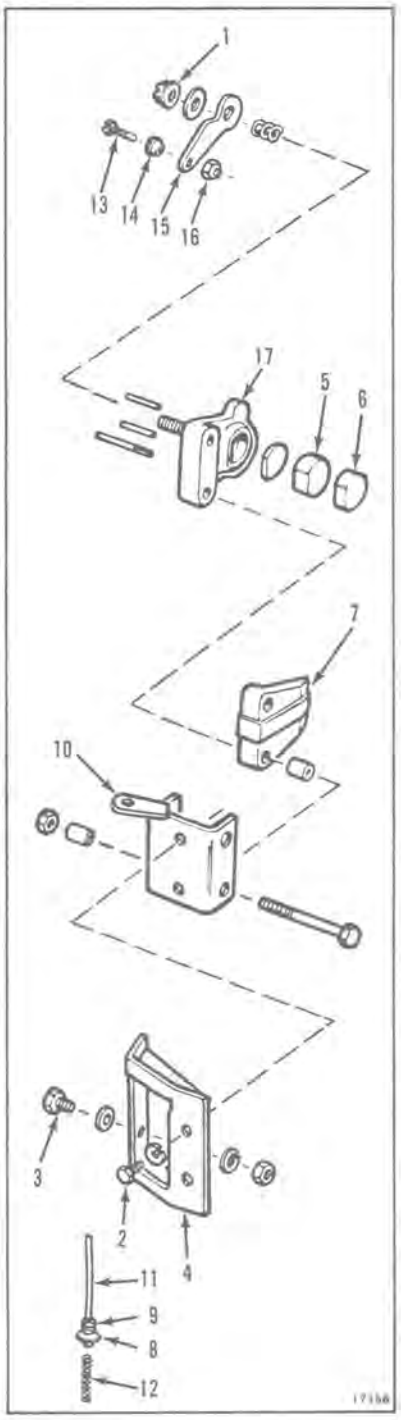


Figure 10-18

REMOVAL

a. Loosen brake adjustment nut (1). See Figure 10-12.

b. Loosen brake body screws (2).

c. Remove mounting screws (3) from brake bracket (4).

d. Brake assembly can now be lifted off fixed half of secondary sheave.

REPAIR

a. Disassemble brake assembly as required, noting relative positions of components to assure correct reassembly (see Figure 10-18).

b. Inspect brake pucks. If the free floating puck (5) is one half of its original 1/2" thickness, it should be replaced. When the fixed puck (6) is worn so that there is 1/32" or less protruding from the carrier (7), it should be replaced. Use a contact cement to secure new puck to carrier.

NOTE

Keep all oil and grease from puck surfaces. Braking action could be impaired by contaminated puck slipping on brake disc surface.

BRAKE CABLE AND CAM ASSEMBLY

a. Reassemble the brake assembly in reverse order and assemble to bracket. See Figure 10-18.

b. Tighten the adjustment nut until pins are seated properly at bottom of actuator cam.

c. Install adjusting fitting (8) and nut (9) to brake body (10).

d. With cable installed in hand lever, insert brake end of cable (11) through adjusting fitting (8). Pull the cable through the casing as far as possible and install return spring (12).

e. Assemble clamp screw (13) and bushing (14) to the brake cable (11), insert screw thru hole in actuator cam (15) and secure with nut (16).

f. Pull brake cable through clamp screw (13) until the hand lever is fully extended and all cable end fittings are seated. Tighten nut (16) until screw makes contact with the cable. Tighten nut an additional 1 turn to clamp the cable (torque 30-35 in. lbs.). Bend excess cable to 90°.

g. Back off adjusting nut about 1/4 turn.

h. When properly adjusted, there should be no drag on brake pucks when brake is released. Rotate sheave to check.

i. Work brake lever several times to insure that there is no cable slip at clamp screw.

FINAL ADJUSTMENT BRAKE

A. Loosen jam nut then turn adjusting fitting located on brake bracket in until hand lever will just allow the parking brake lock to be engaged. When parking brake lock is released, the hand lever must return to free position without binding. See Figure 10-17.

b. Actuate hand lever and set parking brake lock to check for proper adjustment.

c. Release parking brake lock and check if the cable clamps retain cable in static position during brake operation.

d. Tighten nut on adjusting fitting down on the brake bracket.

e. When brake is off, pucks should not drag on brake disc.

Figure 10-19

SECONDARY DRIVE

DISASSEMBLY

1. Remove gas tank.
2. Remove belt guard (see page 10-2).
3. Remove transmission belt (see page 10-2).
4. Remove brake assembly (not necessary to disconnect cable) (see page 10-5).
5. See Figures 10-20 and 10-21 for following steps. Remove chain case cover (6). Caution should be taken not to warp cover.
6. Loosen chain (see page 10-5).
7. Remove cotter pin (7), nut (8) and upper sprocket (9).
8. Remove outer bearing cone washer (10), outer bearing cone (11) and bearing spacer (12).
9. Remove eccentric adjusting screw (13).
10. Remove chain case support stud (2).
11. Loosen the four chain case mounting screws (22).
12. Pull chain case away from fixed face and shaft (15).
13. Remove eccentric (17).
14. Remove O-Ring (16).
15. Remove seal (18) and cone (21) from eccentric.
16. Press cups (19) from eccentric.

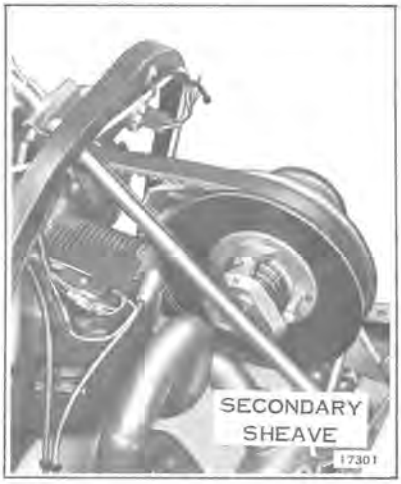


Figure 10-20

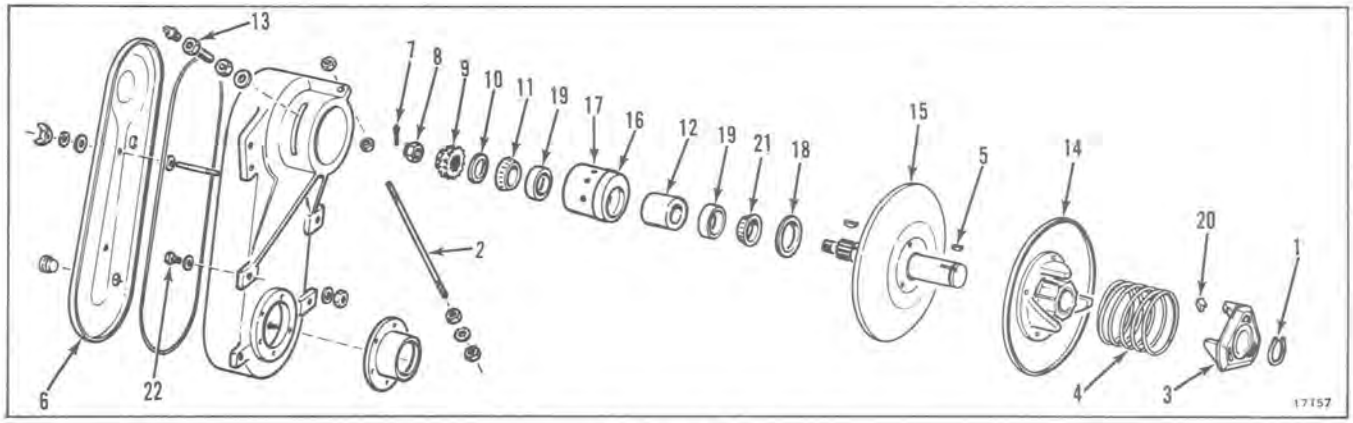


Figure 10-21

17. Remove secondary drive.

18. See Figure 10-21 for following steps. Remove retaining ring (1) from fixed face and shaft (15).

19. Remove end cap (3), spring (4) and key (5).

CLEANING AND INSPECTION

1. Clean bearing in trichloroethylene (see SAFETY WARNING on page 9-5).

2. Check bearing for wear or roughness.

3. Check shaft, sheaves, woodruff keys and Delrin ramp shoes (item 20) for excessive wear.

REASSEMBLY

1. Assemble movable half of sheave (See Figure 10-21 (1), (3), (4), (14) and (20)) to shaft.

2. Press bearing cups into eccentric.

3. Grease inner bearing cone with OMC No. 114154 grease, and install on shaft.

4. Install seal. NOTE: A new seal must be used if shaft was pressed from eccentric.

5. Insert woodruff key in shaft.

6. Engage spring ends in holes in movable sheave and end cap.

7. Preload spring by holding end cap stationary and rotating movable sheave clockwise to engage next ramp on end cap (approximately 1/3 turn).

8. Compress spring to allow installation of end cap retaining ring.

9. Replace retaining ring.

10. Assembly fixed face and shaft into chain case.

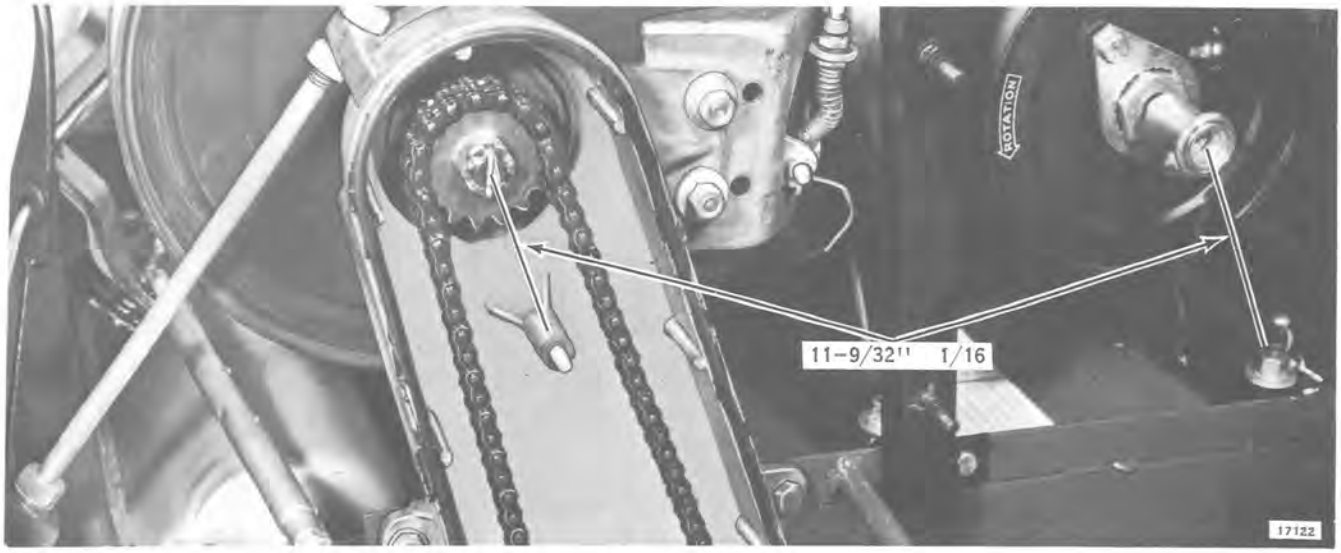


Figure 10-22

11. Assemble eccentric to shaft through drive sprocket side.

12. Replace eccentric adjusting bolt.

13. Reinstall chain case support stud.

14. Tighten chain case mounting screws.

15. Reinstall bearing spacer.

16. Assemble bearing cone to shaft.

17. Replace upper sprockets, nut and cotter key.

18. Torque nut to 25 ft. lbs. Continue torquing until cotter key can be inserted.

19. Assemble brake assembly on sheave and secure with mounting bolts.

20. Reinstall brake assembly to chain case mounting boss.

21. Clean inner surfaces of sheave halves of grease.

22. Reinstall transmission belt.

23. Grease assembly thru fitting on eccentric adjustment. Two pumps from a grease gun is sufficient. OMC grease part no. 114154 is recommended.

24. Check for proper position of secondary drive assembly. Distance from center of primary drive shaft to center of secondary drive (top) sprocket must be 11-9/32" ± 1/16". See Figure 10-21.

25. Replace drive chain and adjust. See page 10-5.

26. Chain case seal groove should be cleaned. NOTE: A new chain case cover seal must be used.

27. Apply 3M cement to seal.

28. Drive chain lubrication-refer to section 12.

29. Replace belt guard.

30. Replace gas tank.

31. Primary and secondary alignment should be 2-1/16" plus or minus 1/16", measured from flanged edge of fixed primary sheave to flanged edge of fixed secondary sheave.

SECTION 11
STEERING, TRACK AND SUSPENSION

TABLE OF CONTENTS

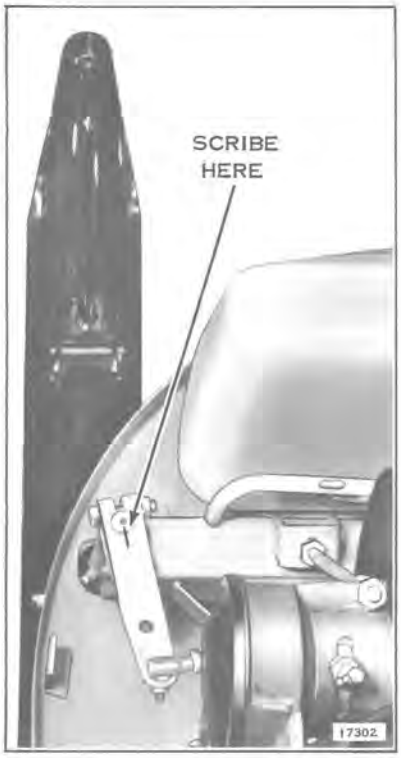


Figure 11-1

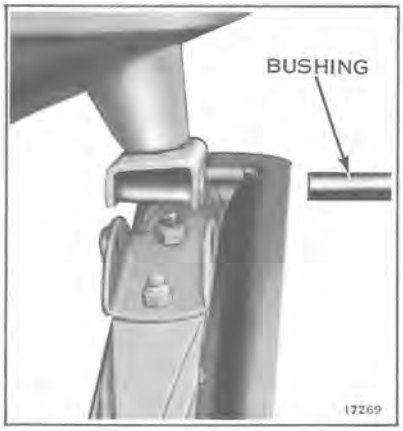


Figure 11-2

DESCRIPTION

This section gives complete service instructions on the snowmobile steering, tracks and suspension.

STEERING

DISASSEMBLY

1. Support front end of snowmobile to remove weight from skis.
2. Scribe ski column and steering arm to maintain original position for reassembly of skis. See Figure 11-1.
3. Remove locknut and screw from saddle and bushing. Remove ski and spring assembly from ski column. See Figures 11-2 and 11-3.
4. Remove steering arms from ski column. See Figure 11-4.
5. Disassemble leaf springs, if required, for servicing.

CLEANING, INSPECTION AND REPAIR

a. Remove all dirt and old grease from ski columns and from inside ski column tube.

b. Inspect ski column and bushing and replace if worn or bent.

c. Inspect ski runners and replace if worn. (See torque specs.)

d. Inspect leaf springs for cracks or weakness.

e. Inspect tie rods and ball joints. Replace if worn or damaged.

f. Check for 1/16" end play in steering column. Correct by moving steering column support.

REASSEMBLY

a. Reassemble skis to leaf springs. Lubricate pivot points using SAE #10 oil. See Figure 11-3.

b. Lubricate ski columns (see page 12-3) and assemble in steering column tube. Note do not interchange right and left ski columns.

c. Attach steering arms to ski columns noting original position. Tighten to torque value shown in Section 2. Adjust ski alignment as described below.

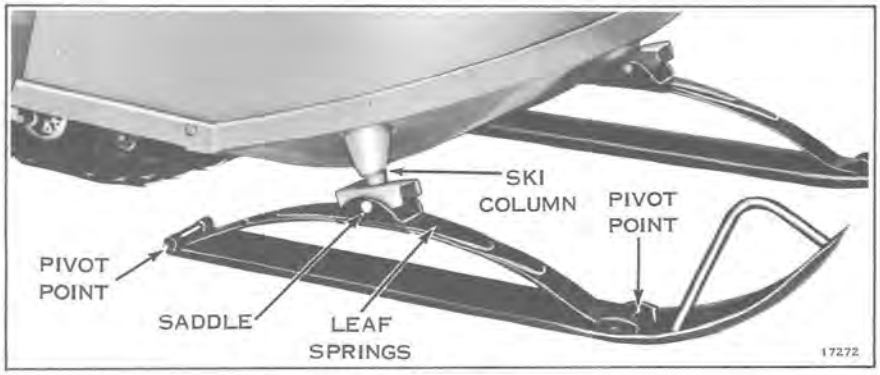


Figure 11-3

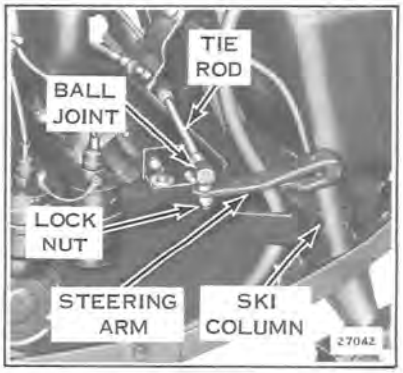


Figure 11-4

d. Apply grease to outside of bushing and assemble to ski column as shown in Figure 11-2. Secure with screw and locknut. See torque specs.

SKI ALIGNMENT

a. Ski alignment is necessary when skis are not parallel with each other and the vehicle body, with the handle bar in the normal straight-driving position.

b. If alignment is necessary, loosen the outer jam nuts, see Figure 11-5. Do not attempt to loosen these nuts without first holding the ball joint. Next remove lock nut from ball joint. Turn ball joint clockwise to toe skis out or counterclockwise to toe skis in. Tighten jam nuts when skis are parallel. Replace ball joint lock nut.

c. In order to verify your ski alignment use the measurements shown in Figure 11-5A.

d. The ski columns are not identified right and left. One flanged side is shorter. This shorter side must be kept to the inside of the snowmobile. Do not interchange or assemble in reverse.

e. There should be approximately the same amount of threads showing on each end of the tie rod when the skis have been adjusted.

f. Replace hood.

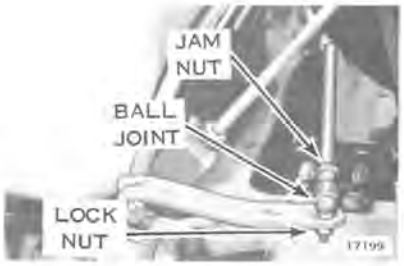


Figure 11-5

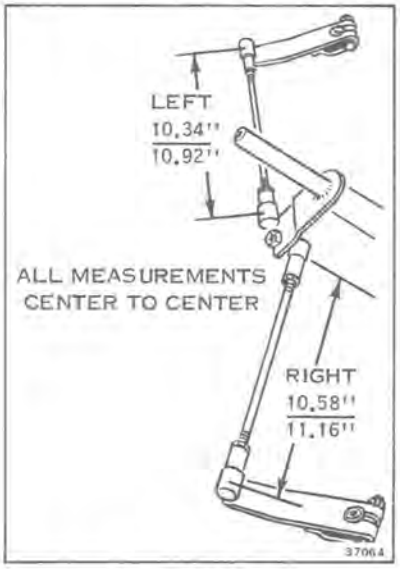


Figure 11-5A

TRACK AND SUSPENSION

TRACK TENSION ADJUSTMENT

Track tension must be checked after the first ten hours of operation and then every 25 hours, or as required, to maintain efficient, economical operation. Improper adjustment will result in undue wear to the track and drive components.

Track tension is checked when the track is not supporting the weight of the snowmobile, and the pivot arm is pulled down.

Track tension is correct when the distance from the bottom of the pivot arm bearing bore to the underside of the running board is 2-3/4 ± 1/32" on both sides. See Figure 11-6.

If adjustment is necessary, perform the following steps on both sides of the vehicle.

a. Vehicle should be in right side up position with track off the ground.

b. Loosen track tension lock nuts and lock nut on pivot arm adjusting screw. See Figure 11-6.

c. Adjust track so that the dimension shown in Figure 11-6 is obtained.

d. Measure distance from front edge of adjusting bracket to anchor. If this distance is not equal on both sides, loosen the adjustment on the side nearest to the rear until the distance from front edge of the adjusting bracket to the anchor is equidistant within 1/32 inch. See Figure 11-6.

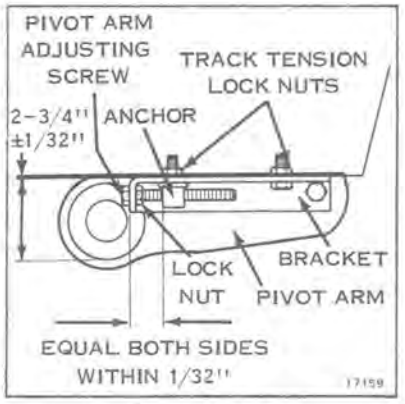


Figure 11-6

TRACK ALIGNMENT ADJUSTMENT

Proper track alignment is essential to keep sprocket and track wear at a minimum. Alignment can be seriously altered by improper adjustment of the track tension and rear axle location.

When aligning track, block up snowmobile so that track is off ground and place front edge of skis against stationary object. Start engine and run at idle allowing track to turn free. The track edges must be clear of pivot arms as shown in Figure 11-7. If alignment cannot be obtained, check for bent pivot arms, loose bearings in pivot arms, deformed slots in adjusting bracket, or bent running board in area of adjusting bracket.

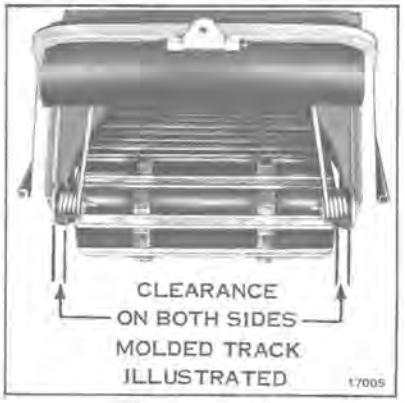


Figure 11-7

REMOVAL OF TRUCKS AND TRACK

1. Support snowmobile so that weight is removed from track.
2. Release track tension. See Page 11-3.
3. Remove pivot axle bolts and lockwashers from front and main trucks. See Figure 11-8. Truck assemblies are now free of chassis.
4. Remove bearing cup from front axle on side opposite the drive sprocket. Remove 3 nuts and lockwashers.
5. Remove bearing retainer screw from bearing cup on chain case.
6. Remove chain case cover.
7. Remove cotter pin, bottom sprocket and washer. See Figure 11-9.
8. Slide axle to right and drop left end of axle out bottom of chassis.
9. Front axle with bearings and seals is now free of chassis.
10. Remove four track tension locknuts. See Figure 11-6. Rear axle can now be removed.
11. Trucks, axles and track are now free of the chassis.

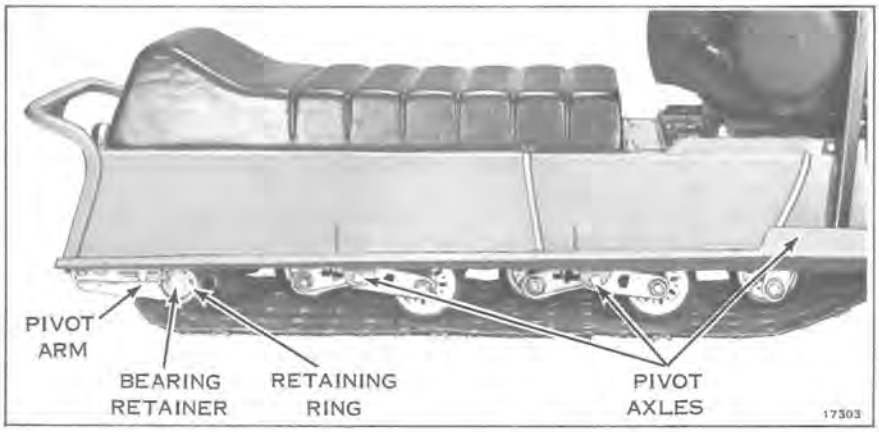


Figure 11-8

Figure 11-9

FRONT AXLE DISASSEMBLY

1. Turn bearings by hand. If they do not turn freely, if there is excessive play, or if they are rough, they must be replaced. Remove bearings with bearing puller or arbor press. Take care not to damage seal which will come off with bearing.
2. Inspect drive sprockets. Check for excessive wear or peeling of coating. If they must be replaced, first drive out roll pins.

SAFETY WARNING

If heat is necessary to remove, or reassemble front sprockets or rear axle wheels or sprockets, use heat lamp or hot air gun for heating. DO NOT use open flame.

3. Press drive sprockets off front axle after marking reassembly position.

REAR AXLE DISASSEMBLY

1. Remove retaining ring and bearing retainer. See Figure 11-10.
2. Push pivot arm towards sprocket. See Figure 11-10.
3. Check bearings as on front axle.
4. Remove bearings only if they must be replaced, or if sprockets must be replaced.
5. Inspect sprockets for excessive wear. Check for peeling of coating. If they must be replaced, loosen Allen set screws to remove sprockets from axle. See Figure 11-10.

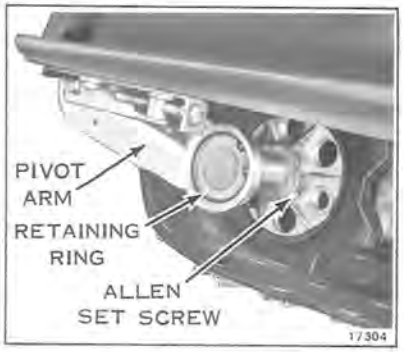


Figure 11-10

TRUCK DISASSEMBLY (See Figures 11-10 and 11-11)

1. Remove lock nuts from truck axles.
2. Remove pivot arms, spacers, bushings, and springs from pivot axle.
3. Wheels and spacers will now slide off truck and pivot axles.

CLEANING, INSPECTION AND REPAIR

Track

Rivets and tread bars are serviceable. Part numbers are listed in parts catalog. Riveting tool, OMC Part No. 404068 is available for making this repair.

Trucks and Axles

1. Axles - check for straightness by rolling on a flat surface. If drive axles are bent they must be replaced. Truck axles may be straightened.
2. Splines - inspect for excessive wear.
3. Check to see that oil plug in front axle is in place and does not leak.

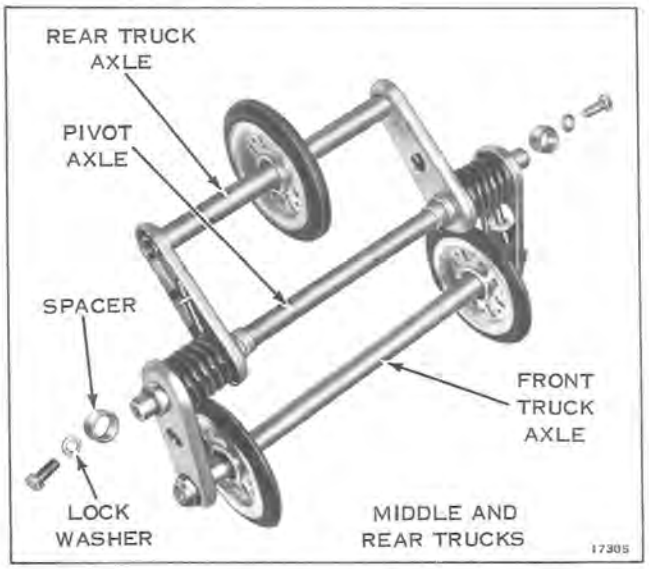


Figure 11-11

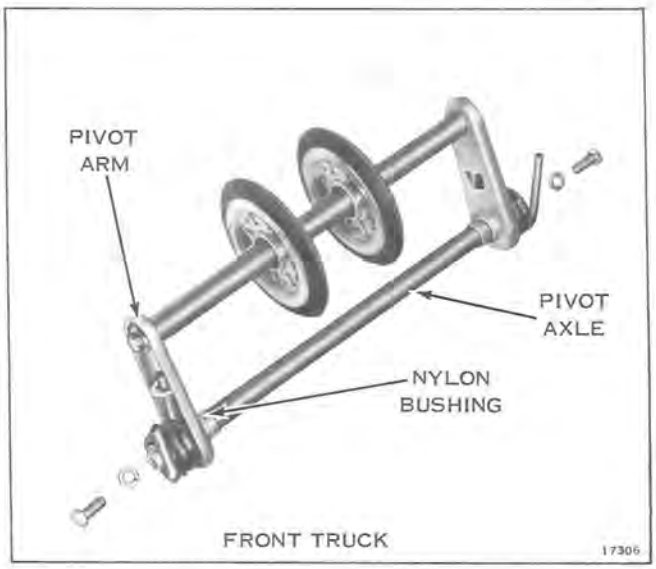


Figure 11-12

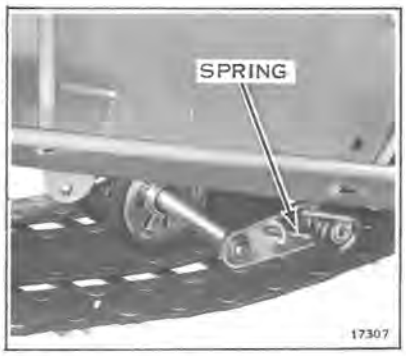


Figure 11-13

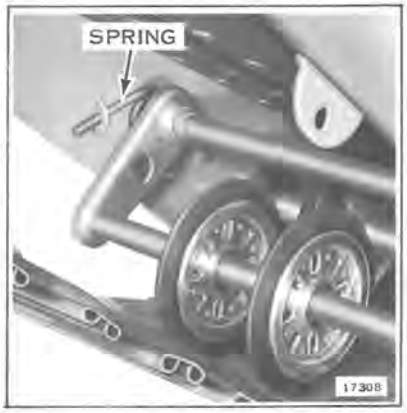


Figure 11-14

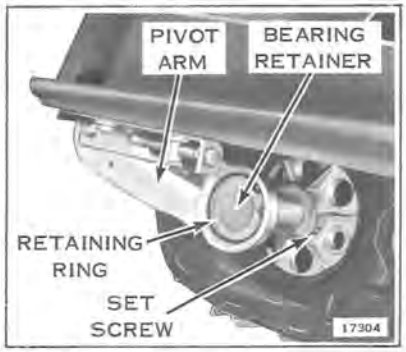


Figure 11-15

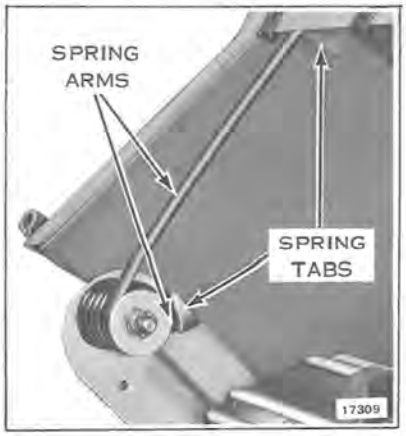


Figure 11-16

4. Check condition of seals on front axle and replace if seal lip is not tight on axle.

5. Check nylon truck bushings for cracks or excessive wear. Replace if damaged. See Figure 11-12.

REASSEMBLY

Front Truck

Assemble wheels and spacers on axle. Application of a light oil on the axles will assist in this procedure. Apply OMC Part No. 114154 grease in bore of nylon bushings and assemble to pivot axles. See Figure 11-12.

Assemble front truck with spring in position shown in Figure 11-13. Lock spring in place as shown in Figure 11-14.

Middle and Rear Trucks

Assemble wheels and spacers to their original positions on the front and rear truck axles. Application of a light oil on the axles will assist in this procedure. Apply OMC Part No. 114154 grease in bore of nylon bushings and assemble to pivot axles. Assemble pivot arms and springs. See Figure 11-11.

Front Axle

Assemble drive sprockets to front axle. Observe SAFETY WARNING on Page 11-4. Drive roll pins in sprockets. Press bearings on axle. Apply a light oil to seals and assemble to front axle. Seat seals after axle is assembled to chassis.

Rear Axle

Assemble sprockets, bearings, bearing retainer, retaining ring, pivot arms and brackets to rear axle. Use a clean light oil to assist in this assembly. Observe SAFETY WARNING on Page 11-4. Apply OMC Screw Lock Part No. 384848 to set screws before installing. Note pads in axle for seating set screws. Apply OMC Part No. 114154 grease to pivot arm bushings before assembly. See Figure 11-15.

INSTALLATION

1. Install trucks and front and rear axle assemblies inside track and install to snowmobile chassis. The rear spring is loose when installing front and rear axles to bearing cups. Before adjusting track tension, place spring arms inside spring tabs. See Figure 11-16.

2. Install spacer, drive chain sprocket and cotter pin on front axle and replace drive chain. See Page 10-4.

3. Assemble bearing retainer screw into chaincase bearing cup to locate front axle. Torque screw to 60-80 in. lbs.

4. Adjust track tension as described on Page 11-3.

SECTION 12
LUBRICATION AND STORAGE

TABLE OF CONTENTS

ENGINE LUBRICATION

Since fuel vapors are first compressed in the crankcase of the two-cycle engine, the most practical method of lubrication is by mixing the lubricant with the gasoline. As the mixture of lubricant and gasoline enters the crankcase, the gasoline is vaporized, leaving the lubricant to lubricate the bearings and other moving parts. Eventually the lubricant reaches the combustion chamber where it is burned and discharged through the exhaust ports. In this way the fuel mixture conveys to the engine's moving parts a metered amount of lubricant in proportion to the speed of the engine.

Both optimum performance and lubrication depend on maintaining the correct ratio between gasoline and lubricant in the fuel mixture. The use of too little lubricant leads to premature wear and early breakdown. A fuel mixture richer in lubricant than recommended is not only wasteful, but will contribute to faulty performance, and to excessive carbon accumulation in the cylinders and on the spark plugs. Frequent spark plug replacement can often be traced to an excess of lubricant in the fuel mixture. Instructions for the blending of fuel as given here and in the Owner's Manual should be followed exactly. See inside front cover for recommended fuel mixture.

The use of additive compounds, such as tune-up compounds, tonics, friction reducing compounds, and de-icing compounds, etc., is discouraged. OMC Accessories Engine Cleaner and OMC Accessories Break-In Lubricant should be used as necessary according to instructions.

OMC 2+4 FUEL CONDITIONER

OMC 2+4 Fuel Conditioner is recommended for added protection to your snowmobile engine. It is especially recommended as an additive between extended periods of snowmobile use. OMC 2+4 Fuel Conditioner is available from your dealer. OMC 2+4 Fuel Conditioner features are as follows: See Figure 12-1.

- Fuel Stabilizer - prevents formation of gum and varnish deposits in fuel system for one year of storage. Eliminates need for draining fuel for storage.
- Carburetor Cleaner - dissolves gum and varnish deposits in carburetor and fuel system.
- Corrosion Resistance - protects carburetor, fuel system and internal engine parts from corrosion.
- De-icer - prevents carburetor icing and gas line freezeup.
- Absorbs moisture and water in fuel system.
- Extends spark plug life by reducing fouling and misfire.

LUBRICATION RECOMMENDATIONS

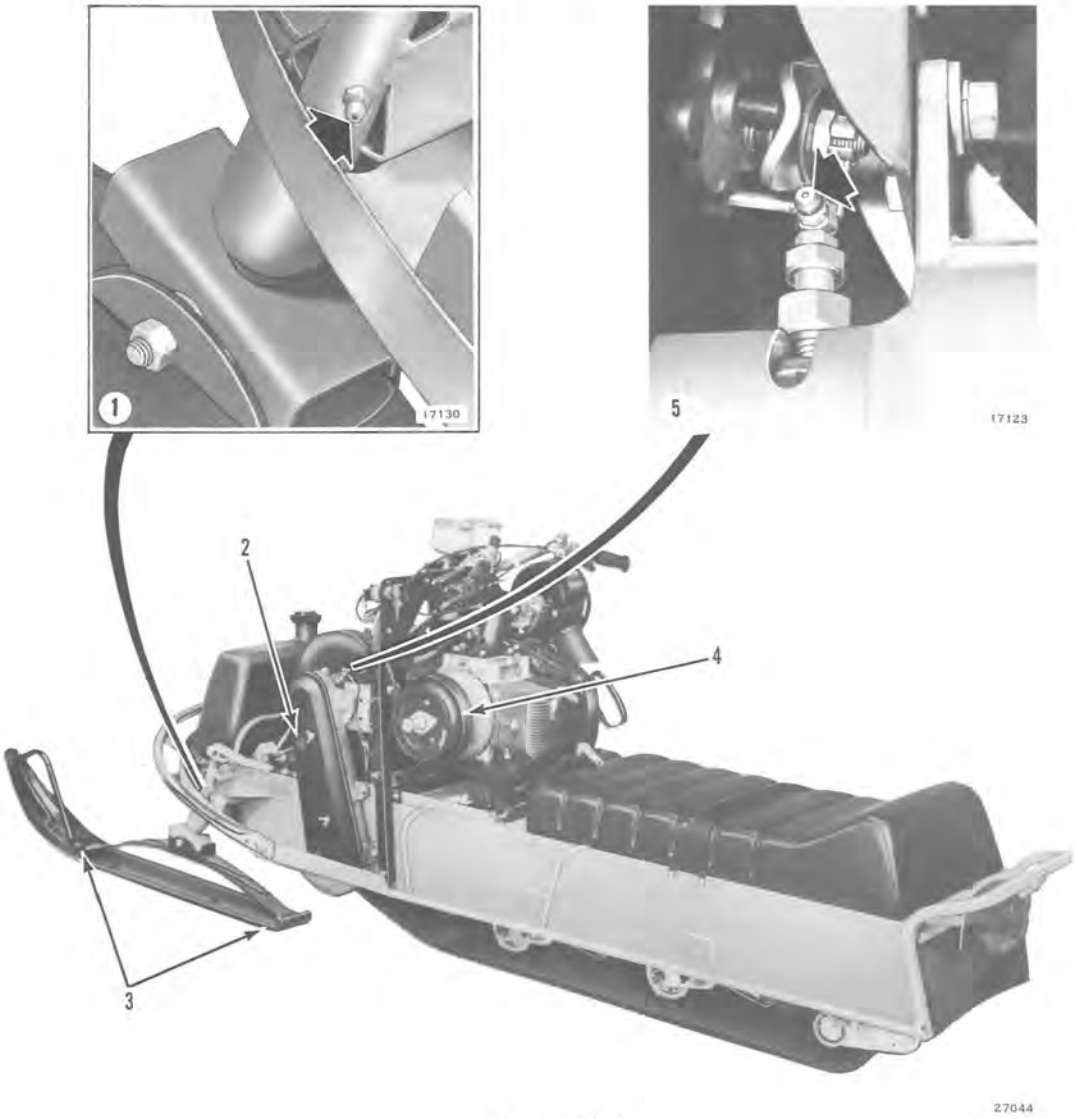


Figure 12-1

TIME	MAINTENANCE	LUBRICANT
① Once a season	Ski Columns	OMC grease Part No. 114154
② Once a season	Drive Chain (See Page 10-4)	OMC - Type "C"
③ Every 25 hrs.	Pivot Points (Leaf spring connection to skis)	SAE 10 Oil
④ Once a season (Normal Use) Twice a season (Extended Use)	Primary Drive	OMC grease Part No. 114154
⑤ Once a season	Secondary Sheave (two pumps of grease gun)	OMC grease Part No. 114154

Specified lubricants available from your dealer.

PREVENTIVE MAINTENANCE

TIME	MAINTENANCE
After first 10 hours., then every 25 hrs. or as required	Adjust Chain Tension (See Section 10)
After first 10 hrs., then every 25 hrs. or as required	Adjust Track Tension Check Track Alignment (See Section 11)
Twice a season (See Below)	Clean Air Filter
Once a season (See Below)	Clean or install new fuel pump filter screen

AIR FILTER

The carburetor is equipped with an automotive type paper air filter element that should be cleaned once during the operating season, and replaced after a year's service. When pores in paper are plugged, engine will receive a rich fuel/air mixture and run rough and get poor fuel economy. To clean filter element, shake to dislodge dirt particles and blow with compressed air from inside, holding nozzle about two inches from filter. DO NOT wash or oil filter element. See Figure 12-2. When reassembling tighten wing nut until 3 to 4 threads show beyond nut.

FUEL FILTER

SAFETY WARNING

Exercise care to prevent fuel spillage when removing fuel filter when engine is hot.

The fuel filter is attached to the fuel pump. See Figure 12-3. To inspect for sediment or water accumulation, back off the mounting screw approximately three turns (counterclockwise) and remove the cover together with the screen, gasket and mounting screw. Remove and wash filter screen with solvent and brush. Replace filter screen if it is varnished badly. Assemble filter as shown in Figure 12-4, being careful to assembly gasket and filter screen on fuel filter cover. Tighten mounting screw securely with screwdriver (Do not overtighten).

Figure 12-2

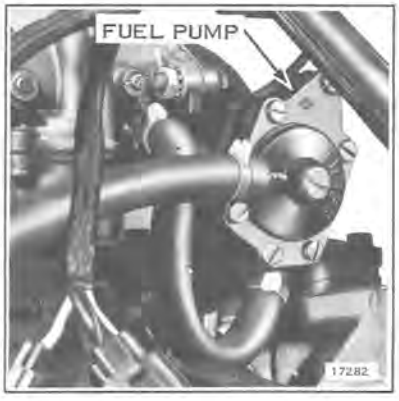


Figure 12-3

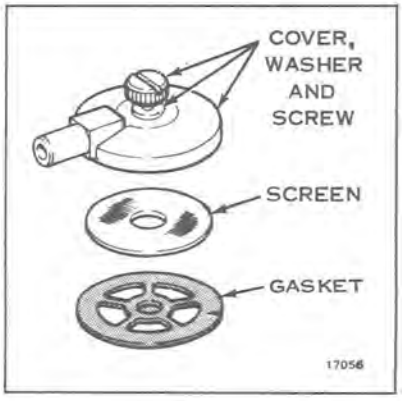


Figure 12-4

STORAGE

PREPARATION FOR STORAGE

a. Add one ounce of OMC 2+4 fuel conditioner to each gallon of gasoline in tank and mix thoroughly. Run engine a few minutes until mixture is in fuel lines, and carburetor, where it can prevent gumming of check valves and carburetor jets.

b. Wash down machine. Be certain to hose out undercarriage. Clean seating with automotive foam type upholstery cleaner.

c. Treat engine with OMC Accessories Engine Cleaner.

d. Remove fuel pump filter screen and clean. See Page 12-5.

e. Clean air filter. See Page 12-5.

g. Turn off ignition and replace or install new fuel pump filter screen.

h. Block vehicle off ground to take weight off track.

i. Drain and clean fuel tank (see Section 6).

j. Remove transmission belt (see Section 10).

k. Rub bottom of skis, primary and secondary drive sheaves, and other unprotected surfaces of vehicle with cloth saturated in OMC Rust Preventative.

l. Store in dry, well-ventilated area.

REMOVAL FROM STORAGE

a. Fill tank with fresh fuel mixture.

b. Tune-up engine (see Section 5).

c. Lubricate all points, as described under "Lubrication".

d. Adjust track for proper tension, and check track alignment (see Section 11).

e. Align skis (see Section 11).

f. Check brake and throttle control adjustments.

g. Tighten all screws and nuts.

h. Clean inner surfaces of primary and secondary sheave halves of oil and grease. Replace transmission belt.

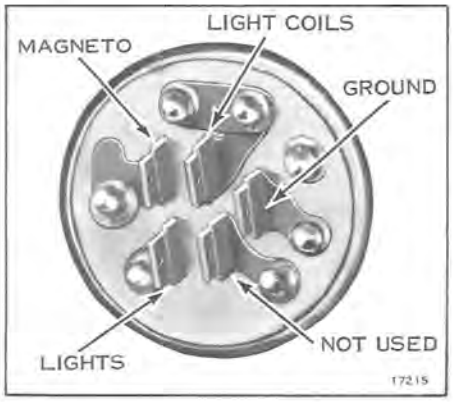
i. Test vehicle, checking particularly the following items:

    1. Function of brake.

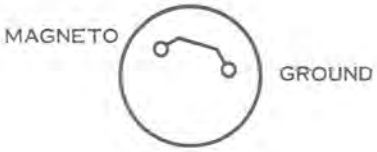
    2. Engine performance

j. Thoroughly clean any surfaces that need refinishing, and touch-up.

INTERNAL CIRCUIT CONNECTIONS OF IGNITION SWITCH

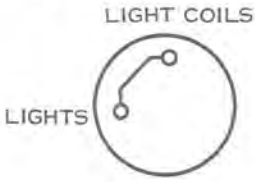


OFF POSITION



The magneto terminal and ground terminal are connected together.

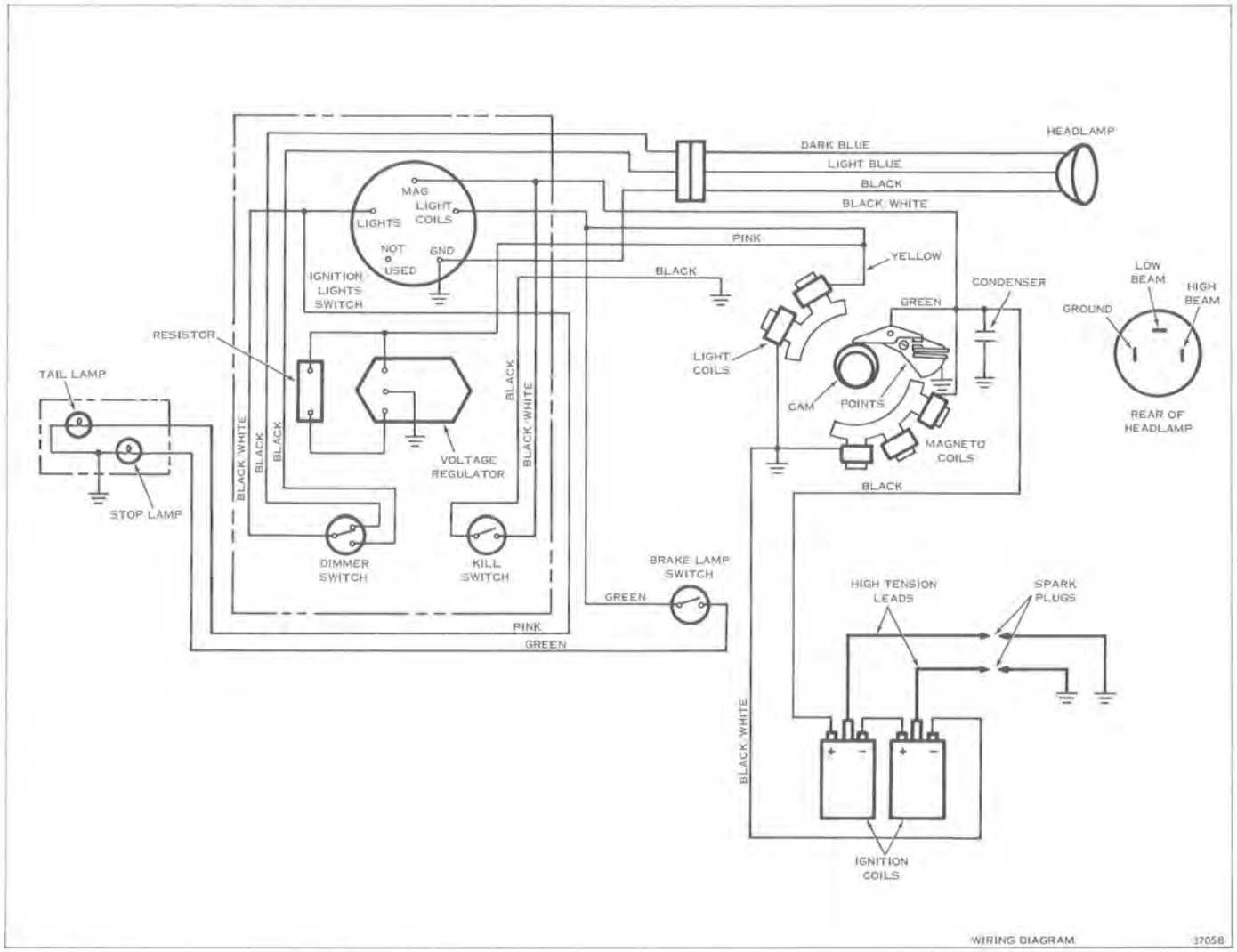
LIGHTS/RUN POSITION



The light coils and lights terminals are connected together.

RUN POSITION

No ignition switch terminals are connected together.


HEADLAMP
DARK BLUE
LIGHT BLUE
BLACK
BLACK WHITE
PINK
YELLOW
BLACK
CONDENSER
GREEN
LOW BEAM
HIGH BEAM
GROUND
REAR OF HEADLAMP
MAG
LIGHT COILS
LIGHTS
NOT USED
GND
IGNITION LIGHTS SWITCH
RESISTOR
TAIL LAMP
STOP LAMP
VOLTAGE REGULATOR
LIGHT COILS
CAM
POINTS
MAGNETO COILS
BLACK WHITE
BLACK
BLACK
BLACK WHITE
BLACK
DIMMER SWITCH
KILL SWITCH
BRAKE LAMP SWITCH
GREEN
PINK
GREEN
HIGH TENSION LEADS
SPARK PLUGS
BLACK WHITE
IGNITION COILS
WIRING DIAGRAM
17058