1973 EVINRUDE & JOHNSON SNOWMOBILE

SERVICE MANUAL

MODELS:

E1531	J27-153M
E1533	J30-153HP
E1534	J32-153HP

SNOWMOBILE DIVISION/ OUTBOARD MARINE CORPORATION
3031 NORTH 114th STREET
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PART NO. 406144

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 OF INSTRUCTIONS VITAL TO THE OPERATION OR MAINTENANCE OR YOUR EQUIPMENT.

Before proceeding with any repair or adjustments on this snowmobile, see △ SAFETY WARNINGS on inside front cover and on pages: 6-6, 7-3, 7-11, 8-2, 9-5, 10-2, 10-3, and 12-5.

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.

This 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 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 Sections 3 through 5 of this manual.

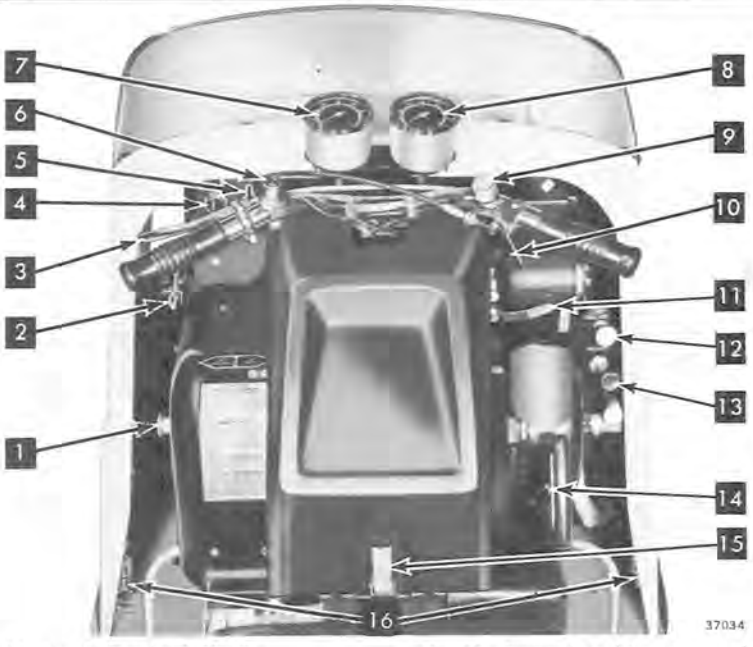
Figure 1-1

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.

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 snowmobile 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 serial 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. Neutral Control Knob
2. Headlight Connectors
3. Hand Brake
4. Ignition/Lights Switch
5. Parking Lock
6. Hi-Low Beam Headlamp Switch
7. Speedometer/Odometer (Accessory)
8. Tachometer (Accessory)
9. Safety Stop Switch
10. Throttle
11. Choke Lever
12. Compression Release Knob
13. Primer
14. Manual Starter Handle
15. Engine Cover Removal
16. Hood Removal

Figure 1-2

SECTION 2
SPECIFICATIONS

2

TABLE OF CONTENTS

Snowmobile Special Service Tools - 27, 30, 32 H.P.

PART NO.	DESCRIPTION
378103	Flywheel Puller
404032	Wrench - Primary Drive
*	Truarc Pliers
426020	Ring Compressor
383966	Spring Winder
*	Heli-Coil Installers and Inserts
404068	Riveting Tool
375632	Spark Plug Wrench
114146	Splined Wrench
113971	Flywheel Holding Tool
261906	Disassembly Tool (Primary Drive)
261132	Retaining Ring - Bearing Puller
261131	Half Steel - Bearing Puller
261129	Extractor - Crankshaft Bearing
317829	Driver
317830	Cone

* Refer to the Tool Catalogue

SPECIFICATIONS

PROHIBITED: Snow Vehicles 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		38.8 inches with windshield 32.4 inches without windshield
Engine		OMC 2-cycle opposed twin
Rating	Standard	27 HP @ 5800 rpm
	High Performance 399 cc	30 HP @ 6000 rpm
	High Performance 437 cc	32 HP @ 6000 rpm
Starter		Manual rewind
Variable speed drive		Centrifugal operated sheave engages V-belt
Overall ratio		3.33 to 1
Final drive		ASA 35 double chain
Sprocket ratio	standard	16:30
	optional sprocket	13:30
Muffler		Tuned for maximum performance
Brake		Disc type, hand operated
Throttle		Thumb operated
Track		Specially designed flexible track, fully adjustable
Width		15.4 inches
Skis		Formed steel, equipped with shock-absorbing leaf springs and replaceable wear runners
Seat		Vinyl coated cover, molded urethane foam cushion
Hood		Molded fiberglass
Headlamp		Sealed beam GE 4002
Taillamp/Stoplamp		GE 1157
Fuel Tank		Capacity 5 Imperial gallons, 6 U.S. gallons
Lubrication		OMC brand 50:1 lubricant
Carburetor Needle Adjustment		
High speed		1-1/4 turns off seat minimum
Low speed		1 to 1/4 turns off seat
RPM Ratings		
Idle		1300 - 1600
Transmission belt engaging speed		2500 - 2900
Maximum RPM at which neutral control will operate		Approx. 2000
Ignition		
Breakerless magneto C.D. (Capacitor Discharge) ignition		
Spark plug		Champion UJ2J
Spark plug gap		.028 - .033 inch
Advance sensor coil resistance		14-16 ohms
Retard sensor coil resistance		27-29 ohms
Magneto charge coil resistance (2 coils) total of		875 ± 75 ohms
Ignition coil secondary resistance		1900 ± 190 ohms
Lighting coil resistance (3 windings)		6.5 ohms
Engine		
Bore and stroke	Standard engine	2-3/4 x 2-1/4 inches
	High performance engine 399 cc	2-5/8 x 2-1/4 inches
	High performance engine 437 cc	2-3/4 x 2-1/4 inches
Piston displacement	Standard engine	26.7 cubic inches (437 cc)
	High performance engine 30 HP	24.35 cubic inches (399 cc)
	High performance engine 32 HP	26.7 cubic inches (437 cc)
Compression ratio	Standard engine	6.8 to 1
	High performance engine	7:1
Cylinder compression	Standard engine Minimum	105 PSI
	High performance engine Minimum	120 PSI
Ring diameter	Standard engine	2-3/4 inches
	High performance engine 39966	2-5/8 inches
	High performance engine 43766	2-3/4 inches
Ring thickness		1/16 inches
Clearances		
Piston - wrist pin		Press fit
Piston ring gap		.007-.017
Piston ring - ring groove		.002-.004
Cylinder piston	Top of piston to cylinder	.012-.015
	Bottom of piston to cylinder	.006-.008

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

TORQUE SPECIFICATIONS

PART	APPLICATION	SIZE	TORQUE	
			IN./ LBS.	FT./ LBS.
*Nut	Ball Joint to Steering Arm and Steering Column	3/8-24		18-20
*Nut	Bearing Cup to Chassis			6-8
Screw	Brake Lever to Handle Bar	#10-32	13-15	
*	Compression Relief Valve and Plug			14-16
*Screw	Connecting Rod			29-31
*Screw	Crankcase		60-80	5-7
*Nut	Cylinder to Crankcase			18-20
Nut	Drive Sprocket	1/2-20		25-35
*Screw	Engine Frame to Main Frame	3/8-16		18-20
*Screw	Engine to Engine Frame Assembly			33-38
*Nut	Exhaust Manifold to Cylinder	5/16-24		10-12
Screw	Exhaust Pipe to Muffler	3/8-16		18-20
*Screw	Flangettes to Frame	3/8-16		20-25
*Nut	Flywheel			40-45
*Nut	Front and Rear Truck Axles	5/8-18		35-45
*Screw	Idler Axle to Frame	3/8-16		20-25
*Bolt	Primary End Cap to Main Shaft	3/4-16		90-100
*Screw	Ratchet Mount to Flywheel			5-7
*Screw	Ratchet to Ratchet Mount			5-7
*Nut	Rear Axle Pivot	5/16-24		12-15
Setscrew	Locking Collars	5/16-18	70-90	
*Nut	Runner to Ski	5/16-18	90-100	
*Screw	Sensor Mounting Plate			5-7
*	Spark Plug			20-25
*Screw	Stator Assembly to Mounting Plate			5-7
*Nut	Steering Arm to Ski Column	3/8-24		18-20
*Nut	Throttle Cable Adjusting Screw	5/16-18	60-80	
*Nut	Tie Rod Jam Nut to Ball Joint	3/8-24		14-16
*Nut	Track Adjusting Bracket to Chassis	5/16-24		12-15
*Screw	Truck to Frame	3/8-16		25-30
*Screw	Truck to Frame	7/16-14		25-30
*Nut	U Bolt to Saddle			25-30
Screw	General Torque Requirements	#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

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*Use Torque Wrench

SECTION 3
GENERAL SNOWMOBILE INFORMATION

TABLE OF CONTENTS

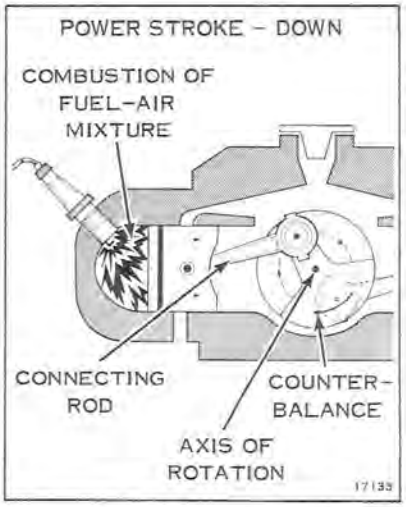


Figure 3-1

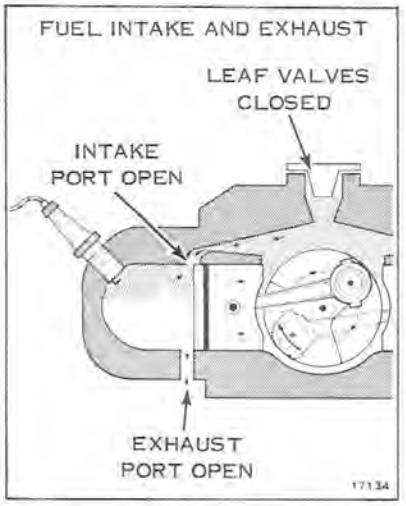


Figure 3-2

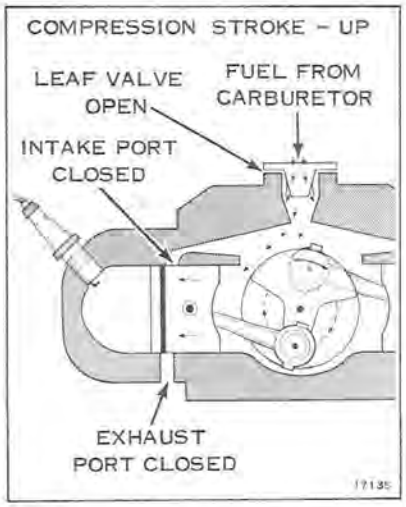


Figure 3-3

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 force 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 accumulation. 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 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 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 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 leakage will occur if the compression relief valve linkage is adjusted with insufficient clearance on the cable ends. The relief valves vent combustion chamber pressure through a by-pass port.

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 shooting procedures in Section 4 and the recommended tune-up procedures given in Section 5 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.

CARBURETION

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. A diaphragm and valve system allows a constant fuel supply to be maintained in the metering chamber at atmospheric pressure. Needle valves permit a precise amount of fuel to flow from the metering chamber to the carburetor throat. 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 3-4). The venturi has the effect of reducing air pressure in the air stream, creating a partial vacuum which draws fuel from the discharge port. As it is rushed along to the firing chamber, the fuel is swirled about in the air stream and vaporized.

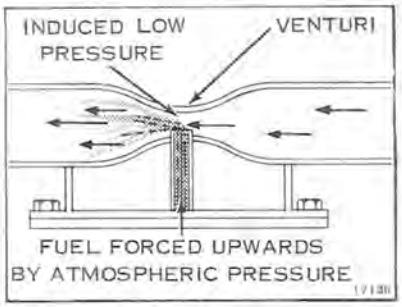


Figure 3-4

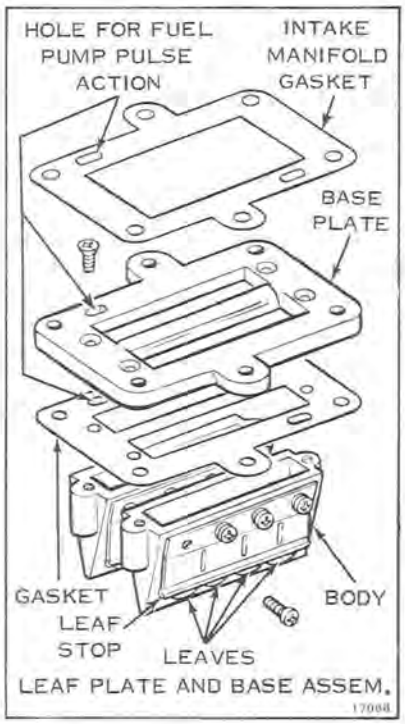


Figure 3-5

A throttle or butterfly valve in the throat regulates the amount of air drawn through the carburetor. To vary the speed of the engine, the throttle 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 allowed to flow from the carburetor.

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 3-5), 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.

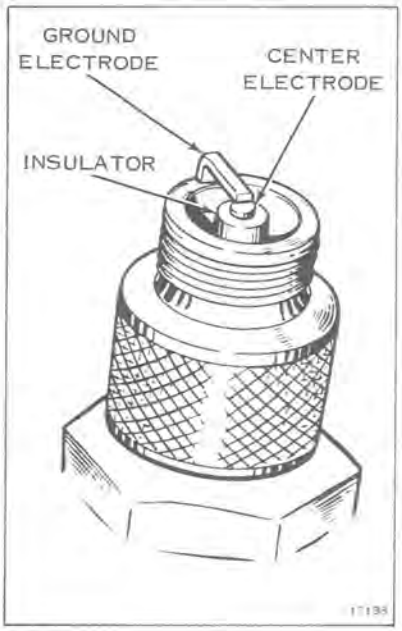


Figure 3-6

IGNITION

The magneto capacitor discharge (C.D.) ignition system generates a high voltage electric current which jumps the spark plug gap within the cylinder and thus ignites the compressed fuel-air mixture in the cylinder. See Figure 3-6.

This system is made up of the following major components:

1. Flywheel assembly
2. Sensor rotor
3. Stator and charge coil assembly
4. Sensor plate assembly
5. Power Pack I assembly
6. Ignition coils

The following sequence of events will illustrate how this system works.

The flywheel rotates around the stator and charge coil assembly. (See Figure 3-7.) The magnets in the flywheel and the (2) charge coils generate a voltage. This voltage (AC) flows into the Power Pack I. Here it is changed to DC and stored in a capacitor. At the same time the sensor rotor rotates by the sensor coils and a smaller AC voltage is generated. This smaller voltage flows into the Power Pack I and causes an electronic switch in the Power Pack I to turn on allowing the voltage stored in the capacitor to discharge into the primary of the ignition coils.

One thing to note in this system is that there are two sensor coils. Below the idle RPM range and up to approximately 900 RPM, the retard sensor turns on the electronic switch in the Power Pack I. At RPMs over 900 the advance sensor coil generates enough voltage to turn on the electronic switch in the Power Pack I before the retard sensor does. So, we have an automatic electronic advance built into the system.

The ignition coil primaries receive the voltage from the Power Pack I, building up the secondary voltage high enough to fire across the spark plug gaps.

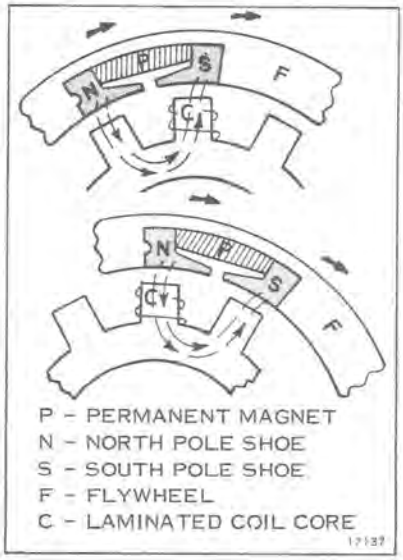


Figure 3-7

LIGHTING SYSTEM

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

The alternator A.C. output is used to operate lamps.

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 has its own mounting pedestal and is larger in diameter than the primary sheave assembly. The two are connected by a transmission belt.

PRIMARY DRIVE

The primary sheave is centrifugally operated and engages the transmission belt when the engine speed reaches 2500 to 2900 rpm. When the engine is rotating at idle speed or below 2500 to 2900 rpm, the transmission belt rides on a ball bearing between the halves of the primary sheave assembly (see Figure 3-8). The primary sheave assembly halves are separated by a compression spring in the hub of the movable sheave half.

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 sheave half. 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 3-9). Since the belt length remains constant, the secondary sheave halves spread apart, allowing the belt to ride on a smaller diameter. In this way, the engine transmits power through a variable ratio, presenting the engine with a mechanical advantage most favorable for the speed at which it is operating.

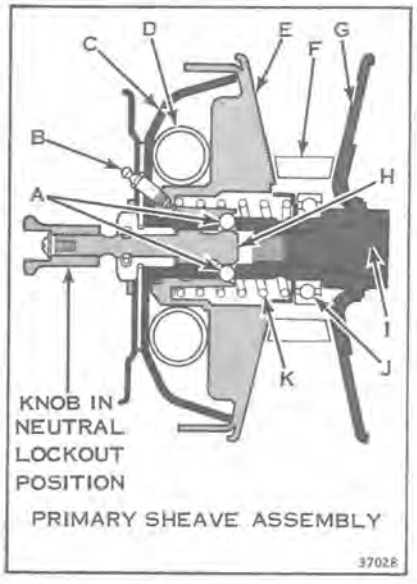


Figure 3-8

A – NEUTRAL LOCKOUT BALLS
B – GREASE FITTING
C – END CAP ASSEMBLY
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

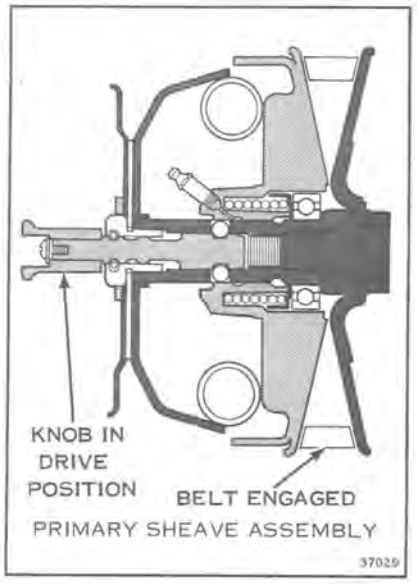


Figure 3-9

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 inclindes or deep snow. The mechanism immediately forces the secondary sheaves closer together to increase the drive 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 and the front axle is 16:30. An optional upper sprocket is available to change this ratio to 13:30 for high torque requirements.

SECTION 4
TROUBLE SHOOTING

TABLE OF CONTENTS

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, ignition, and proper drive system adjustment. Engine theory, compression, carburetion, ignition and power flow are discussed in Section 3. Correct fuel mixture for this snowmobile is outlined on the inside front cover, and fuel blending is discussed 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. Preliminary inspection.

c. Use of Trouble Check Chart to analyze engine performance.

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.

A preliminary inspection should include the following checks.

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. Compression. 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. Engine not primed

   g. Clogged fuel line or fuel filter

   h. Clogged check valve

   i. Carburetor adjustments too lean

   j. Low speed needle bent or bowed

   k. Engine flooded

   l. Leaf valves not functioning properly

   m. Faulty gaskets

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

   o. Loose or broken wire or frayed insulation in ignition system wiring

   p. Sheared sensor hub key

   q. Faulty coils

   r. Key switch, connector or grounded switch wire

   s. Binding in engine

   t. Faulty sensor, charge coils, Power Pack I or connecting wiring.

2. Engine won't turn over

   a. Cylinder wall corrosion, seized piston or bearing

   b. Engine improperly assembled after repair

3. Cranks over extremely easily

   a. Spark plug(s) loose

   b. Cylinder or pistons scored

   c. Rings worn or carboned

   d. Faulty crankcase gasket or crankseal(s)

   e. Broken or damaged leaf valves

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

   a. Leaf valves broken or not seating

   b. Sensor leads on Power Pack I terminals #6 & #8 reversed

   c. Timing out of adjustment (check sensor hub key)

   d. Advance sensor faulty or out of adjustment

   e. Power Pack I faulty

5. No spark one cylinder

   a. Faulty ignition coil, wire, or connections

   b. Faulty Power Pack I

6. No spark both cylinders
   a. Faulty charge coil
   b. Faulty sensor coil
   c. Faulty Power Pack I
   d. Grounded ignition switch and/or wire
   e. Flywheel not properly charged
   f. Faulty ignition coils or leads
7. Weak spark both cylinders
   a. Ignition switch or connection leakage
   b. Weak charge coil output
   c. Weak Power Pack I output
   d. Weak ignition coil output
8. Engine can be started by using primer, but dies out when primer is not used
   a. Fuel pump inoperative
   b. Fuel line or check valve between primer pick-up and carburetor clogged
   c. Fuel filter screen in fuel pump or carburetor inlet screen clogged
   d. Leaf block base plate reversed
   e. Carburetor inoperative

STARTING - MANUAL STARTER

1. Manual starter pulls out, but starter does not engage flywheel
   a. Friction spring bent or burred
   b. 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
   d. Grease on pawls or spring
3. Clattering manual starter
   a. Friction spring bent or burred
   b. Starter housing bent
   c. 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 coil wires
   f. Spark plug terminal loose
   g. Weak coil output
   h. Cylinder gasket or leaf plate gasket damaged
   i. Leaking crankcase gaskets or crankshaft seals
   j. Arcing around ignition coils or arcing in ignition switch
   k. Loose connections or intermittent grounding of leads in the: ignition coil, Power Pack I, charge coils, sensor coils, and ignition switch

RUNNING - HIGH SPEED ONLY

1. High speed miss
   a. Water in fuel
   b. Carburetor inlet needle sticking
   c. Spark plugs improperly gapped or dirty, cracked insulator
   d. Ignition coil - weak output
   e. Engine improperly timed
   f. Exhaust ports or exhaust system carboned
   g. Combustion chambers carboned or fouled
   h. Arcing around ignition coils or arcing in ignition switch
   i. Loose connections or intermittent grounding of leads in the: ignition coil, Power Pack I, charge coils, sensor coils, and ignition switch

2. Poor acceleration, top rpm is low

   a. Incorrect gas - lubricant ratio

   b. Old fuel

   c. Fuel hoses plugged or kinked

   d. Fuel filter restricted (fuel pump or carburetor)

   e. Fuel pump or pulse line faulty

   f. Incorrect carburetor adjustments

   g. Inlet needle and seat worn or sticky

   h. No spark advance

   i. Spark plugs dirty or improperly gapped

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

   k. Ignition coil weak output

   l. Leaf valves not properly seated, or broken

   m. Piston rings stuck or piston scored

   n. Excessive carbon on pistons and cylinder head

   o. Compression relief valve improperly adjusted or faulty

   p. Exhaust ports or exhaust system carboned up

   q. Charge coils, Power Pack I faulty

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

   a. Fuel lines or passages obstructed

   b. Fuel filter clogged

   c. Faulty fuel pump or pulse line

   d. Fuel cap vent clogged

   e. High speed nozzle or jet clogged

   f. Dirt or packing behind needles and seats

   g. Choke partly closed

   h. High speed needle set too lean

   i. Advance sensor faulty

   j. Advance and retard sensor leads interchanged on Power Pack I.

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

   a. Fuel lines or passages obstructed

   b. Fuel line leaks or fuel filter obstructed

   c. Fuel pump not supplying enough fuel

   d. Leaf block base plate reversed

   e. Dirt or packing behind needles or seats

   f. Carburetor adjustments

   g. Fuel cap vent clogged

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)

   d. Cooling fan obstructed

2. Engine seizes (stops suddenly)

   a. No lubricant in gas, or no fuel

   b. Rod or main bearing seized

   c. Cylinder or piston scored or seized

3. Engine knocks excessively

   a. Incorrect gas - lubricant ratio

   b. Flywheel loose

   c. Crankshaft end play excessive

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

   e. Worn or loose bearings, or pistons

   f. Loose assemblies, bolts, or screws

   g. Manual starter not centered

4. Excessive fuel consumption

   a. Carburetor casting porous

   b. Deteriorated carburetor gaskets

c. Carburetor improperly adjusted

d. Hole in metering diaphragm

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 passage to carburetor obstructed

d. Faulty ignition

6. No power under heavy load

a. Faulty carburetion

b. Faulty ignition coil(s)

c. Ignition timing off

d. Carbon build-up on piston head, exhaust ports, or exhaust system

e. Cylinder scored or rings stuck

f. Compression relief valve open

g. High speed adjustment lean

h. Spark plugs fouled or misfiring

7. Engine misfires

a. Spark plugs dirty, fouled

b. Grounding or leakage of secondary leads

c. Ignition coil faulty

d. Grounding or leakage of ignition switch, switch wire or connection

e. Loose connections at: ignition coils, charge coils, Power Pack I, and sensor coils

8. Spark on only one cylinder

a. Ignition coils

b. Power Pack I output

9. Engine will start and idle, but quits on accelerating

a. Check advance sensor coil and leads

b. Check Power Pack I output

c. Check timing

SECTION 5
TUNE-UP PROCEDURES

TABLE OF CONTENTS

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 oil 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. Inadequate fuel delivery, as the result of a faulty fuel pump or clogged filter, will affect high-speed performance. Incorrect carburetor needle adjustments may cause operating difficulties at any speed. Faulty choke operation or incorrect use of the manual choke by the operator may cause hard starting, rough running, or poor fuel economy. See Section 3 for a discussion on carburetion.

IGNITION SYSTEM

A good ignition system is of prime importance for peak engine performance. 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. See Section 3 for a discussion on ignition theory, and Section 7 for complete ignition system analysis.

COMPRESSION

Compression must be well sealed by the piston and piston rings in the cylinder to realize maximum power and performance. See Figure 5-1. A compression check is important because an engine with low or uneven compression cannot be tuned successfully to give peak performance. It is essential that compression be checked before proceeding with an engine tune-up.

NEW VEHICLE DELIVERY

Complete instructions for putting a new snowmobile into operation are included in the Owner Manual and assembly instruction 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 snowmobile 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 Manual.

e. Be sure that the customer understands how to operate the engine correctly, especially such things as the neutral control, compression release and choke.

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, see page 5-5.

c. If engine knocks, 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 should not exceed .019" after installation.

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

e. Test ignition system using spark checker and neon C.D. Tester. Inspect 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. Remove and drain fuel tank, flush, and clean thoroughly (see Section 6). Install tank, refill with fresh fuel mixture, and check primer operation.

h. Inspect fuel pump and hoses. Clean filter, or replace filter element and gasket.

i. Inspect and clean fuel screen behind carburetor fuel inlet elbow.

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

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

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.

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.

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 on the standard engine and 120 pounds per square inch minimum on the high performance engine. See Figure 5-1.

Figure 5-1

IGNITION TIMING CHECK

See Section 7 for procedure to check spark timing.

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 #114154.

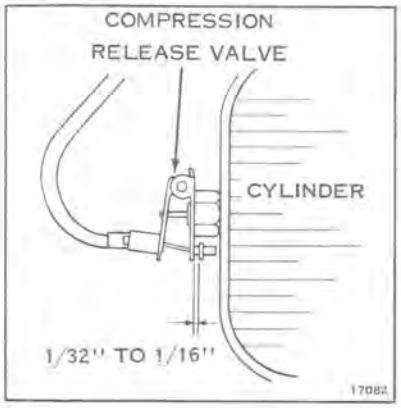


Figure 5-2

CARBURETOR ADJUSTMENTS

HIGH SPEED NEEDLE VALVE

NOTE

TO MAINTAIN ADEQUATE CYLINDER LUBRICATION, THE HIGH SPEED NEEDLE VALVE SHOULD NEVER BE LESS THAN 1-1/4 TURNS 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) 1-1/4 turns. See Figure 5-4.
2. Start engine and allow warm up time of 3-4 minutes. Turn choke lever to "open" position.
3. Drive snowmobile at full throttle to observe engine performance.
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.
8. Repeat steps #6 and #7 no more than is necessary to obtain smooth performance and maximum power.

Figure 5-3

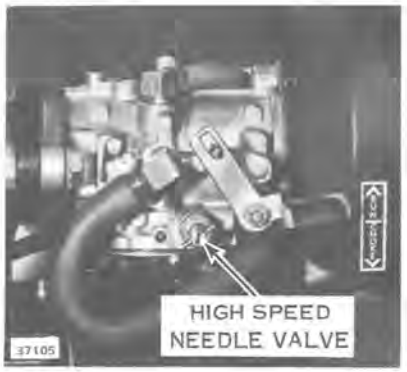


Figure 5-4

NOTE THE HIGH SPEED NEEDLE VALVE SHOULD NEVER BE SET LEANER THAN 1-1/4 TURNS 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.

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 5-5)

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 or 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 1300-1600 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 1300-1600 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 1300-1600 rpm each time low speed needle is adjusted.

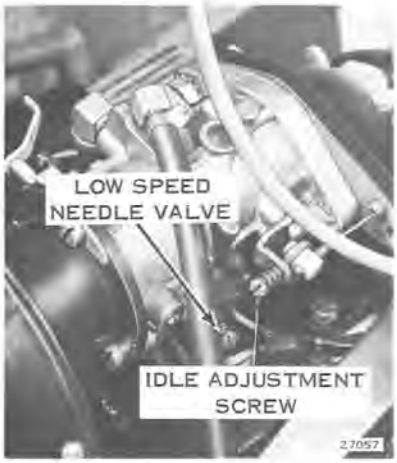


Figure 5-5

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 3-6.

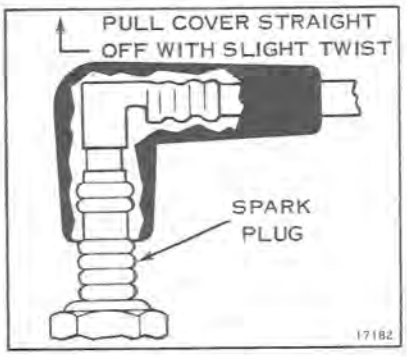


Figure 5-6

SPARK PLUGS

Using the correct spark plug is most important for efficient operation. The recommended spark plug for your engine is Champion UJ2J. The proper spark plug gap is .028" - .033".

Remove rubber covered spark plug terminal by pulling straight off, with a slight twist, see Figure 5-6. 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 page 7-14 for additional information on spark plugs.

SECTION 6
FUEL SYSTEM

TABLE OF CONTENTS

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).

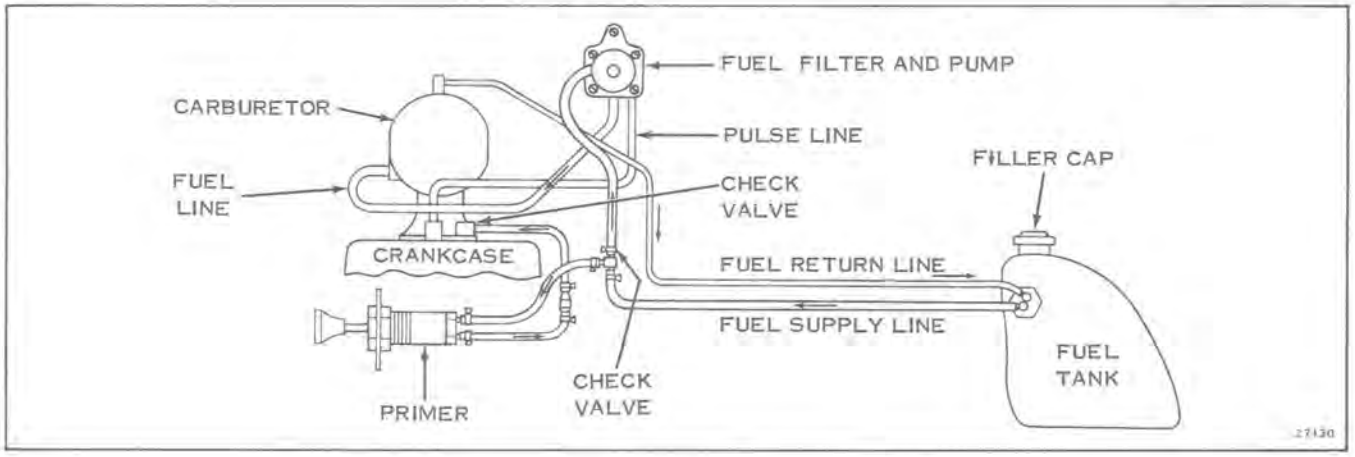


Figure 6-1

CARBURETOR

The carburetor used on this snowmobile is the diaphragm operated, HD series Tillotson. The carburetor should be cleaned and inspected at regular intervals, depending on service conditions.

DISASSEMBLY, CLEANING, REPAIR AND REASSEMBLY

1. a. 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 6-2.

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

Figure 6-2

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

   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.

3. 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 and stripped threads.

a. Remove the idle speed mixture screw (14), washer and tension spring. Inspect for damaged threads (see Figure 6-5).

b. Remove the metering diaphragm cover (29), the metering diaphragm (28), and gasket (27). Inspect the cover for nicks, dents, or cracks that might hamper operation. Inspect the metering diaphragm; the center plate must be riveted securely to the diaphragm and the diaphragm should be free of holes and imperfections. The gasket should be replaced if there are holes or creases on its sealing surface. The parts must be reassembled in the correct order. The gasket should be assembled onto the carburetor body casting first, then the metering diaphragm is assembled next to the gasket.

c. Remove the hinge pin retaining screw (25), the hinge pin (23), inlet control lever (26) and the inlet tension spring (24). Use caution in removing these parts. Spring pressure may push the inlet control lever out of the casting. Inspect the parts for wear or damage. The inlet control lever must rotate freely on the hinge pin.

d. Handle the inlet spring carefully. Do not stretch this spring or change its compression characteristics. If in doubt about its condition, replace it.

e. Remove the inlet needle (22). Remove the inlet seat assembly using a 3/8-inch thin wall socket. Remove the inlet seat gasket.

f. The inlet seat assembly consists of a brass cage and a rubber insert for the inlet needle seat. Assemble the insert into the cage with the molded rim side away from the inlet needle point.

Some HD carburetors are equipped with a rubber tipped needle, a brass inlet seat and a copper gasket. The installation instructions below apply to both types of inlet seats.

The inlet needles and seats are matched and tested for leaks at the factory and the parts must be kept in matched sets. When installing the insert cage into the carburetor body, use a new gasket. Do not force the cage, as you may strip the threads or distort the insert. Use a torque wrench to apply 40 to 50 inch-pounds torque. The needle and seat assembly must be clean to insure correct performance.

g. Remove and inspect the points of the high speed and idle mixture screws. See Figure 6-3. Through misuse, either mixture screw point may be bent (extruded) from being forced into the casting seat or possibly broken off in the casting (see Figure 6-5). If either mixture screw is damaged, be sure to inspect the casting. If the adjustment seats are damaged, a new body casting is required. Check for clogged inlet and return line screen.

IMPORTANT

Do not alter return line elbow openings. This elbow controls inlet pressure and fuel flow to prevent vapor locking in carburetor and fuel pump.

h. Welch plugs seal the idle by-pass ports and main nozzle ball check valve from the metering chamber. Accumulated dirt can usually be blown out through the mixture screwholes. However, an unusually dirty carburetor requires the removal of these plugs. Drill just through the welch plug carefully with a 1/8" drill. Drilling too deeply may ruin the casting or the ball check valve. Use a small punch to remove the plug.

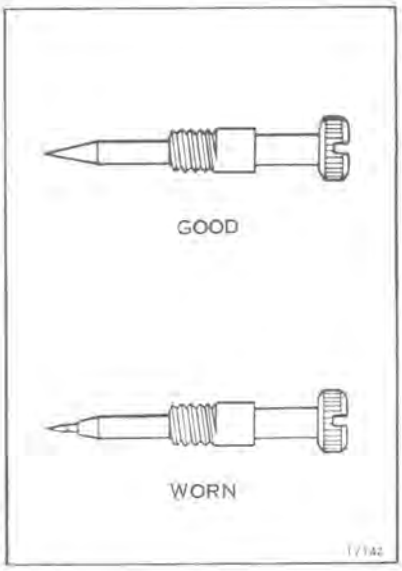


Figure 6-3

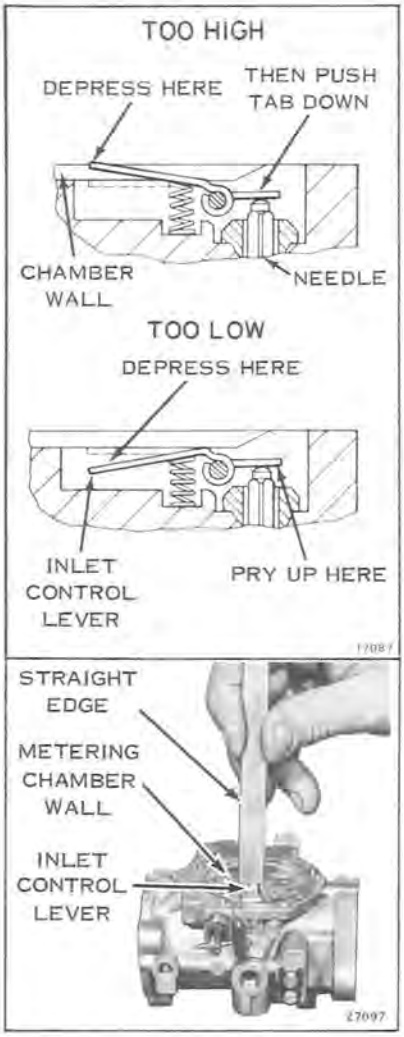


Figure 6-4

Inspect the idle by-pass holes to insure they are not plugged. Do not push drills or wires into the metering holes. This may alter carburetor performance. Blow plugged holes clean with compressed air. Remove the main nozzle ball check assembly (21), pressing it into the primary venturi. Press the new part in where required so its bottom surface is flush with the nozzle well surface. The nozzle pipe must be below the welch plug to receive enough fuel. An engine with a defective check ball (19) will not idle unless the high speed mixture screw is shut off. Replace the faulty parts.

i. Remove any worn choke or throttle shafts before cleaning. Leave unworn shafts in and clean the whole assembly.

Mark the throttle (3) and choke (16)shutters before removing them so that they can be reassembled correctly. The edges are tapered for exact fit into the carburetor bores. Remove two screws and pull the shutter out of the carburetor body. Remove the throttle shaft clip (5) and pull the shaft out of the casting. Examine the shaft and the body bearings for wear. If the shaft shows excessive wear, replace it. If the body bearing areas are worn, replace the body casting. Remove the choke shaft (33) from the body carefully so that the friction ball (17) and spring (18) will not fly out of the casting. Inspect the shaft and bushings.

1. Adjust the inlet control lever so that the center of the lever that contacts the metering diaphragm is flush to the metering chamber wall. Check with straight edge. See Figure 6-4.

2. Install new welch plugs at the nozzle well and by-pass chamber if needed. Place the new welch plug into the casting counterbore convex side up and flatten it to a tight fit, using a 5/16 inch flat end punch. If the installed welch plug is concave, it may be loose and cause an uncontrolled fuel leak. The correctly installed welch plug is flat. Stake plug at outer edge in three places to install.

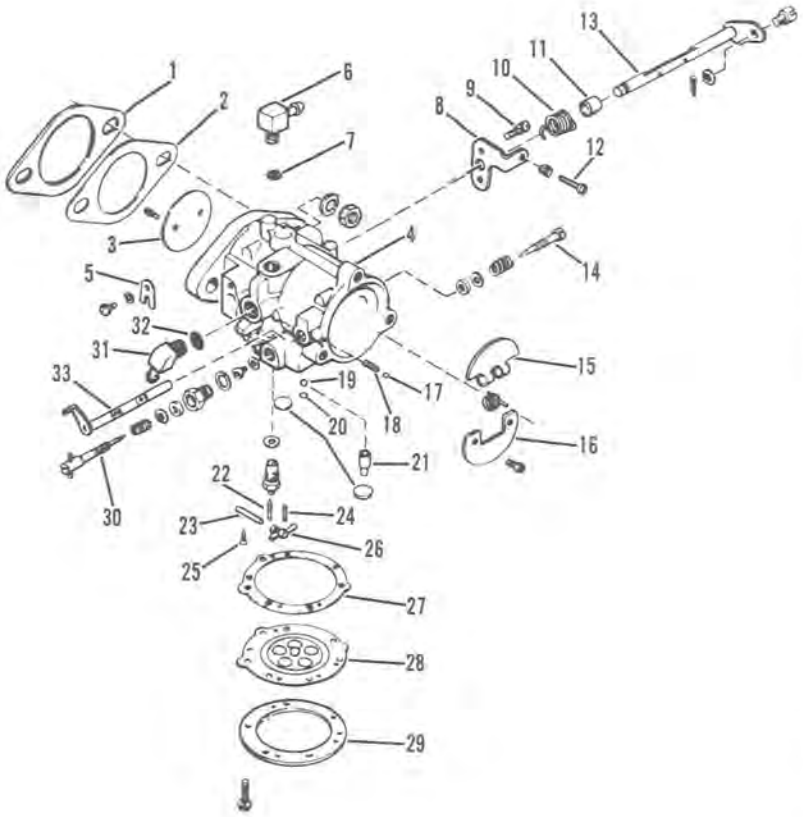
3. Assemble the gaskets, diaphragms and castings in the correct order.

4. Assemble the throttle shaft into the carburetor body and attach the throttle shaft clip before assembling the throttle shutter. With the shaft secured in place, assemble the shutter into the shaft. Be certain that the shutter fits accurately into the throttle bore in the closed position.

5. Assemble the choke friction spring and ball into carburetor body and assemble the shaft into position. Assemble the shutter to the choke shaft. Be certain that the choke shutter fits tightly to the carburetor bore in the closed position.

6. Assemble the carburetor to the intake manifold. Install fuel lines and air filter to carburetor. See procedure on page 6-8 for installing new fuel line tie straps.

7. Assemble throttle cable to carburetor in reverse order of disassembly. See page 6-2. Adjust throttle cable so that carburetor butterfly valve is full open when thumb throttle lever touches handle grip.



1. Carburetor Gasket
2. Flange Gasket
3. Throttle Shutter
4. Carburetor Body
5. Throttle Shaft Clip
6. Return Line Elbow
7. Return Line Screen
8. Idle Speed Bracket
9. Bracket Screw
10. Throttle Shaft Return Spring
11. Throttle Shaft Sleeve
12. Idle Speed Screw
13. Throttle Shaft
14. Idle Speed Mixture Screw
15. Choke Valve
16. Choke Shutter
17. Choke Friction Ball
18. Choke Friction Spring
19. Check Ball
20. Welch Plugs
21. Check Valve Nozzle
22. Inlet Needle
23. Hinge Pin
24. Inlet Tension Spring
25. Hinge Pin Retaining Screw
26. Inlet Control Lever
27. Diaphragm Gasket
28. Metering Diaphragm
29. Diaphragm Cover
30. High Speed Mixture Screw
31. Fuel Hose Elbow
32. Inlet Line Screen
33. Choke Shaft

Figure 6-5

When the lever on the carburetor is returned to the idle position, there must be 1/16" 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.

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

m. See page 5-5 for needle valve adjustment procedure.

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. Do not blow dry with air pressure, as damage to leaves may result.

c. Inspect the leaf valve assembly and disassemble if necessary (see Figure 6-6). 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.

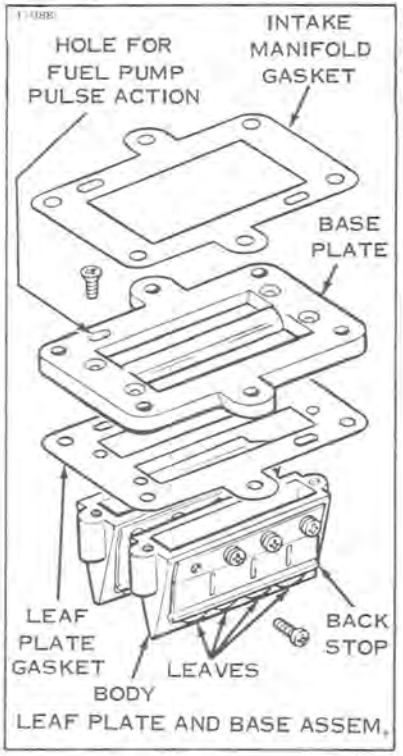


Figure 6-6

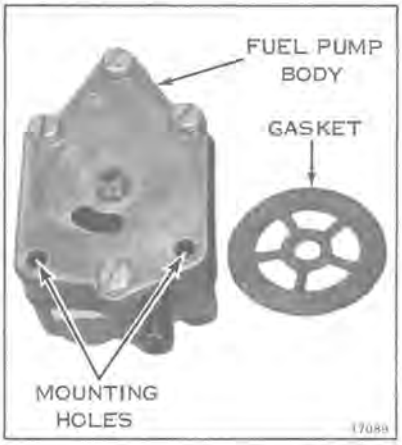


Figure 6-7

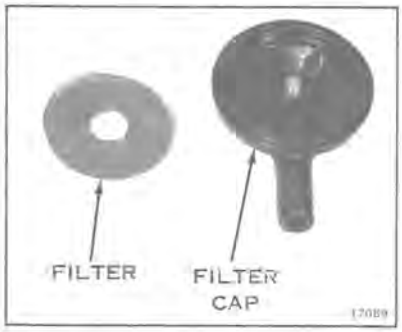


Figure 6-8

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 vacuum is applied. Inspect leaf plate assembly and replace leaf valve body assembly if damaged.

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, apply Gasket Sealing Compound #317201. 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 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. See Figure 6-6.

b. Attach primer check valve hose to check valve on manifold.

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

FUEL PUMP

REMOVAL

a. Disconnect three hoses from fuel pump and filter assembly (see Figures 6-7 and 6-8).

b. Remove two screws attaching pump and filter assembly to mounting plate (see Figure 6-7), 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 6-8). Clean the filter cover and fuel connectors in solvent and blow dry.

△ 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. 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 and gasket.

c. Reconnect fuel hoses and secure with new tie straps per procedure below. Refer to Figure 6-1 for hose positions.

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 6-1).

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).

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 6-9.

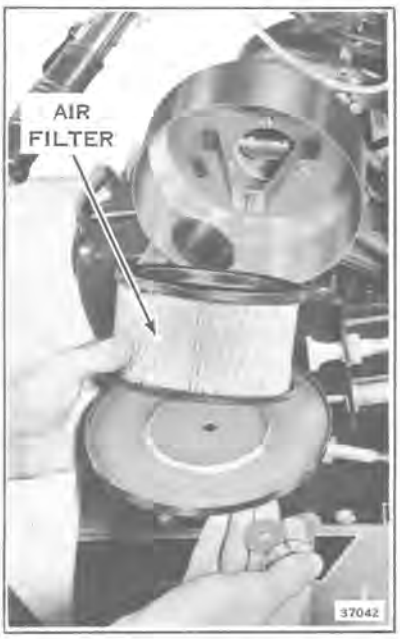


Figure 6-9

FUEL TANK

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

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. Remove straps and turn tank upside down. Remove adapter and fuel pick-up line in tank to check and clean filter screen. If adapter was removed, it is not necessary on reassembly that the adapter seat be tight against the end of the threaded boss on the fuel tank. Apply G.E. RTV-102 silastic adhesive sealer on adapter threads and immediately install to fuel tank. See Figure 6-10.

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.

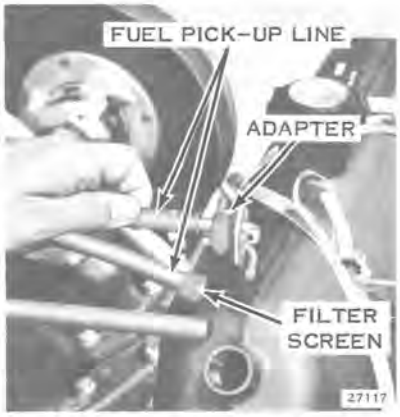


Figure 6-10

Figure 6-11

Figure 6-12

Figure 6-13

FUEL LINE TIE STRAP

a. Fuel line tie strap, part no. 262081 must be replaced with a new strap after its removal. (Cut tie strap head to remove.)

b. Assemble the new strap around the fuel line with the serrated side toward the inside. See Figure 6-11.

c. Snug up the head on the strap per Figure 6-12.

d. Tighten head on strap with pliers as illustrated in Figure 6-13.

SECTION 7
IGNITION AND ELECTRICAL SYSTEMS

TABLE OF CONTENTS

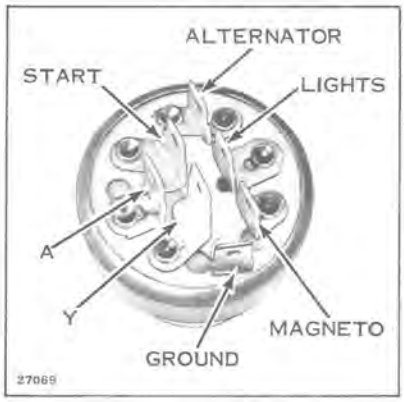


Figure 7-1

DESCRIPTION

The ignition system is made up of the following major components:

1. Flywheel assembly
2. Sensor rotor
3. Stator and charge coil assembly
4. Sensor plate assembly
5. Power Pack I assembly
6. Ignition coils

Because the engine is a two-cycle, twin opposed cylinder design, two ignition coils are used to supply spark simultaneously to both cylinders. An automatic spark retard/advance system has been incorporated to provide easier starting. (See Figure 7-1.)

The electrical system consists of the alternator coils, headlights 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. Alternating current is then used to power the headlights and taillights. See wiring diagram at end of manual.

This section gives complete service procedures on all components of the ignition and electrical systems. Principles of the magneto C.D. (capacitor discharge) ignition system are discussed in Section 3.

Figure 7-2

TEST EQUIPMENT

The test procedures outlined in this section require the use of the following equipment.

1. Multimeter (see Figure 7-2) or an ohmmeter.
2. Needle point spark checker, gap set to 1/2". See Figure 7-3.
3. Neon test light M-80 (Figure 7-4) or S-80 (Figure 7-5).
4. Power clamp on timing light. See Figure 7-6.
5. Ignition coil analyzer. See Figures 7-7, 7-8 and 7-9.
6. Volt-ohm-amp meter Model 700VOA Merc-O-Tronic, See Figure 7-10.

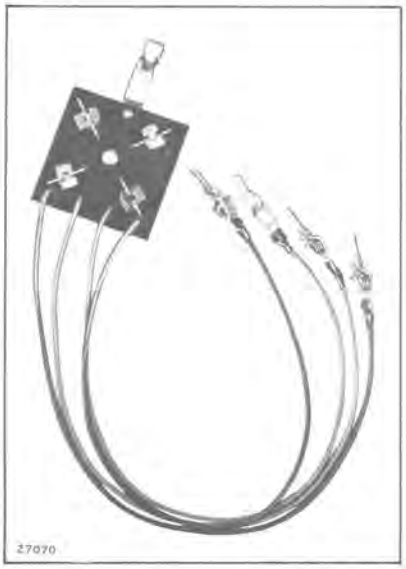


Figure 7-3

Figure 7-4

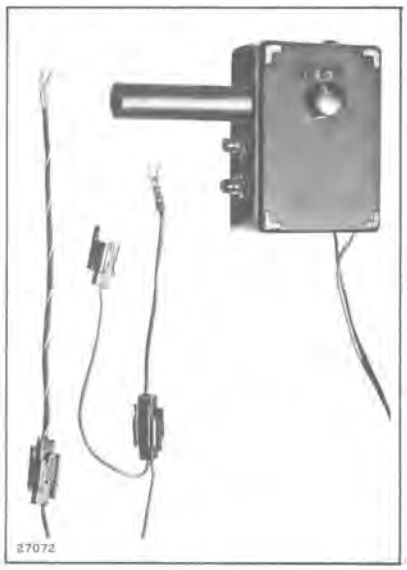


Figure 7-5

Figure 7-6

Figure 7-7

MERC-O-TRONIC

Figure 7-8

STEVENS

Figure 7-9

Figure 7-10

C.D. IGNITION SYSTEM TROUBLE SHOOTING

INTRODUCTION

An understanding of the theory of the C.D. ignition system is an invaluable asset in following the C.D. ignition trouble shooting procedure. See Section 3 for a discussion of the C.D. ignition theory. All the following tests can be conducted without the removal of the flywheel.

C.D. IGNITION SYSTEM DO'S AND DONT'S

1. Do make sure that all connections are clean and tight, especially ground connections. Poor connections mean problems.
2. Do make sure that all plug-in connectors are fully engaged and free of corrosion. Loose or corroded connectors mean problems.
3. Do make sure that all wiring is located properly so there is no chance of rubbing against any edges that can cause wear and insulation breakdown. This can create a difficult service problem.
4. Do make sure test equipment is in good working order before troubleshooting the system. Poor test equipment will not solve a problem.
5. Do use proper tools when working on system components. Wrong tools could damage components.

△ SAFETY WARNINGS (6 AND 7)

6. Do return key switch to OFF position after each test before touching any system leads. This will discharge capacitor in Power Pack I and prevent a possible high voltage electric shock.
7. Don't hold spark plug wires in your hand while checking for spark. A severe electrical shock could result. Use insulated pliers designed for this purpose.
8. Don't remove potting compound from Power Pack, as this will void any warranty.
9. Don't pull on high tension leads at the ignition coils. You might break the insulation or connection.
10. Don't open or close any plug-in connectors while the engine is running. You might cause damage to the system.
11. Don't attempt any tests other than those listed in the troubleshooting procedure. You might cause damage to the system.
12. Don't connect an electric tachometer into ignition system. You might damage the system. (This does not include the electronic, sensor type tachometers.)

13. Don't connect this sytem to any voltage source other than what is specified. You might damage the system.

NOTE

When connecting neon test light lead to Power Pack I be sure to use spade terminal to insure good connection.

NOTE

When connecting test equipment leads or reconnecting engine wiring leads to Power Pack I always refer to the diagram provided. You must hook leads in correct location or possible damage to system will result.

When removing Power Pack I cover plate, make sure you place it alongside Power Pack I in same direction it was removed. This will assure correct terminal identification. Also, replace black (ground) wire from terminal #4 and screw to Power Pack #I after cover is removed before conducting following tests.

TEST #1 IGNITION COILS OUTPUT CHECK

A. Pull high tension leads off spark plugs.

B. Connect spark gap checker with 1/2" gap. See Figure 7-11.

C. Put ignition switch in "RUN" position, remove plugs for easier cranking and use starter rope to crank. See Figure 7-11.

1. Strong steady spark from both coils, system is good.

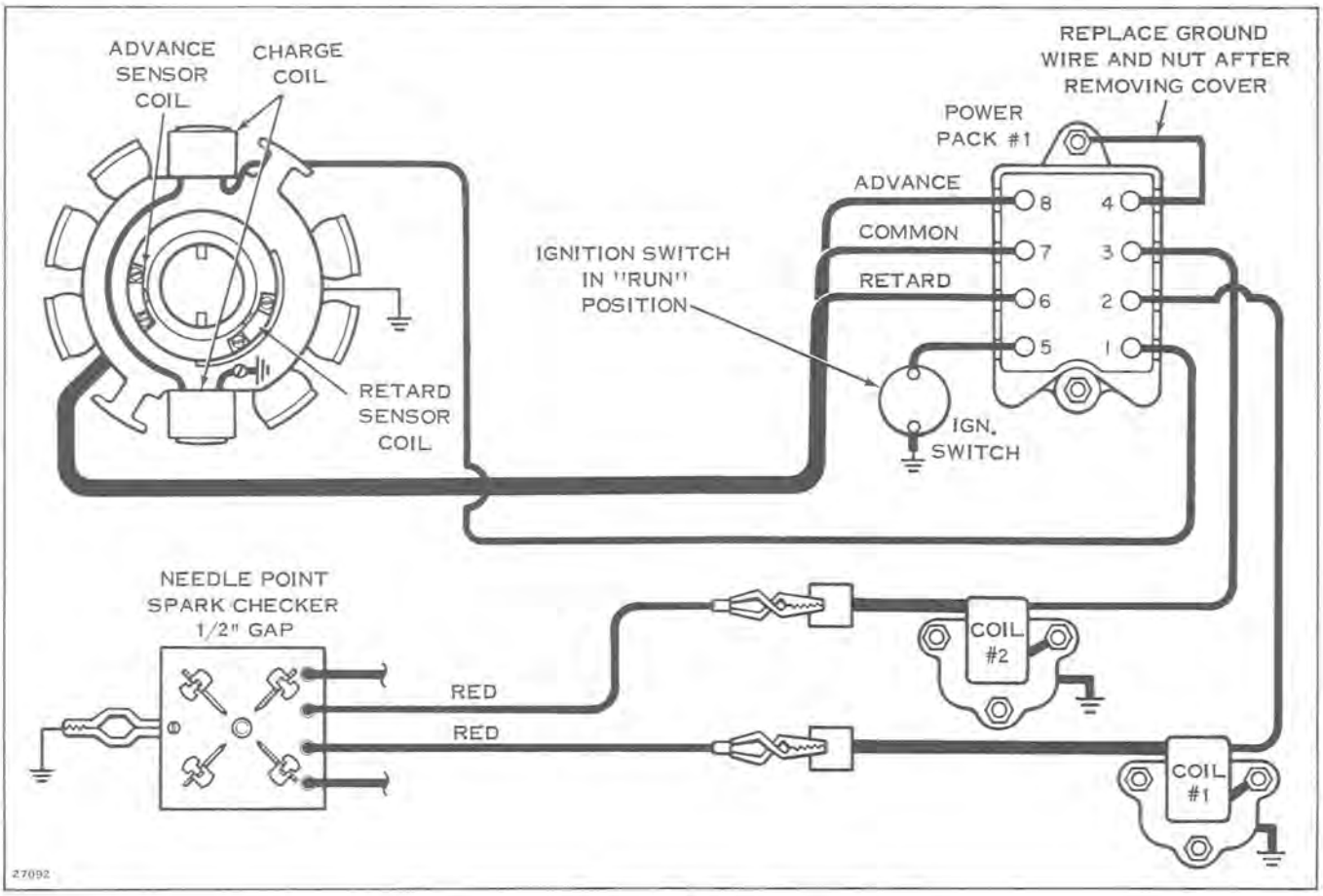


Figure 7-11

2. **Weak,** erratic or no spark from one ignition coil, switch ignition coil leads on Power Pack I - repeat test. Spark on same cylinder still erratic replace coil. Spark on opposite cylinder erratic replace Power Pack I.

3. Weak, erratic or no spark from both coils, go to next test (#2).

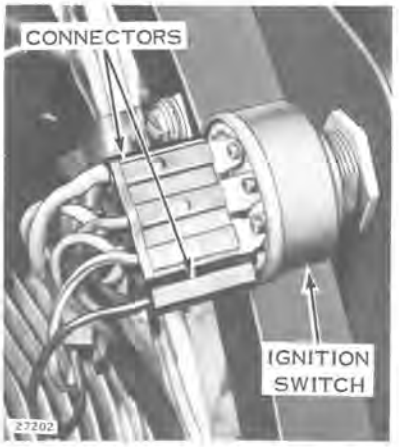


Figure 7-12

TEST #2 IGNITION SWITCH CHECK

A. Disconnect orange/black lead from Power Pack terminal #5. See Figure 7-18.

B. With ignition key in "RUN" position, check from orange/black lead to engine ground with ohmmeter set on Hi ohm scale. There should be no reading or infinite reading on meter indicating ignition switch not shorted and lead not grounded.

C. If less than 500k ohm reading, remove terminal connectors from ignition switch (see Figure 7-12) and remove ignition switch from dash panel. Turn ignition key to "RUN" position and take a resistance reading across the magneto and ground terminal of the ignition switch. See Figure 7-13.

D. If infinite reading indicated find problem in orange/black stripe lead.

E. If less than 500k ohm reading indicated, replace ignition switch.

F. Reconnect key switch lead to terminal #5 on Power Pack I.

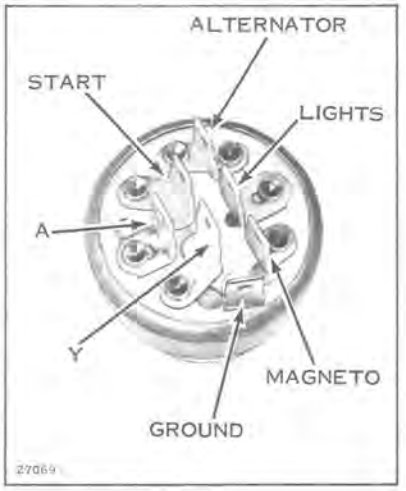


Figure 7-13

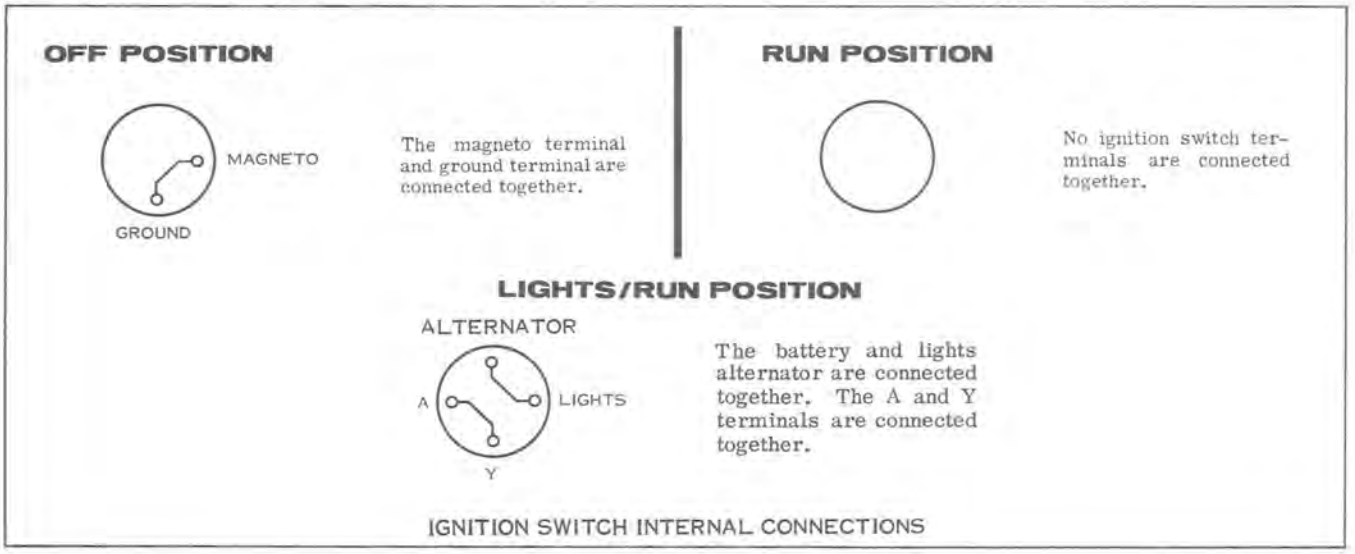


Figure 7-14

TEST #3 CHARGE COIL OUTPUT CHECK

A. Remove charge coil brown/white stripe lead from Power Pack terminal No. 1.

B. Use Neon tester S80 or M80. Connect neon tester black lead to charge coil brown/white stripe lead and tester blue lead to engine ground. See Figure 7-15.

C. Remove spark plugs for easier manual cranking of engine.

D. Set neon tester rotary switch to position #2. Depress load button "B."

E. Turn ignition switch to "RUN" position and crank engine with manual starter (with ignition switch "RUN") and observe neon tester light. See Figure 7-15.

1. If light is bright and steady, charge coils are good. Check Power Pack I output (Test #4).

2. If light is intermittent or no light, check for grounding or open leads to charge coils. Also check charge coils for correct resistance (Test #9).

F. Remove tester leads and reconnect charge coil lead to terminal #1 on Power Pack #I.

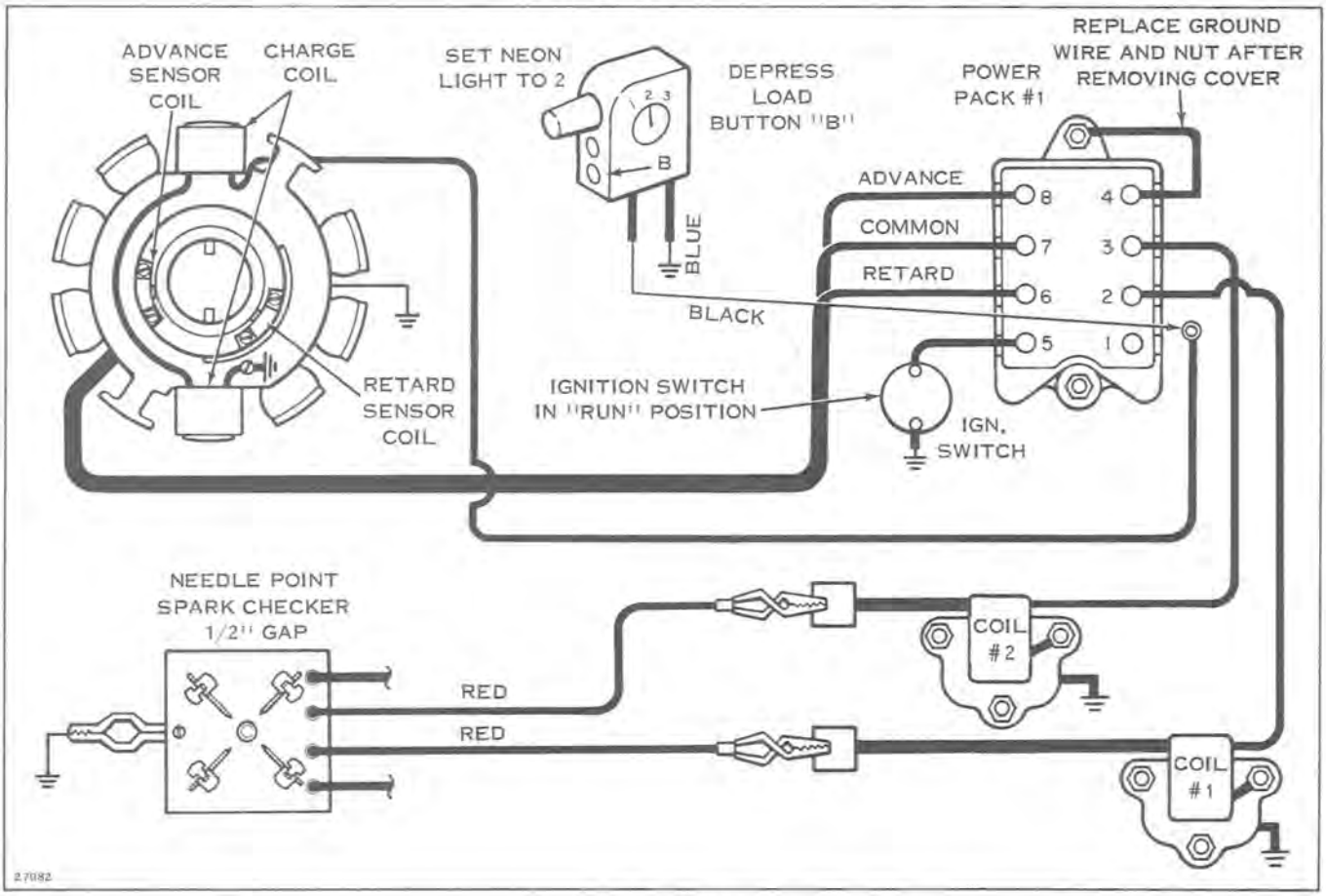


Figure 7-15

TEST #4 RETARD SENSOR COIL INPUT CHECK

A. Connect needle point spark checker as illustrated. See Figure 7-16.

B. Remove retard sensor white/green stripe lead and advance sensor lead white/black stripe from Power Pack terminals #6 and #8. (Do not allow leads to touch ground.) See Figure 7-16.

C. Connect neon tester S80 or M80 black lead to Power Pack terminal #6 and blue lead to sensor common (terminal #7). Set rotary switch to position #3. See Figure 7-16.

D. Turn ignition switch to "RUN".

E. Crank engine with manual starter, and at same time rapidly tap neon tester load button "B". See Figure 7-16.

1. If there is spark across both gaps, check retard sensor leads and check sensor coil for correct resistance (Test #8).

2. If there is no spark on both coils, go to test #3. If there is no spark on one coil go to tests #4 and #10.

F. Remove tester leads and reconnect sensor leads #6 and #8 on Power Pack I.

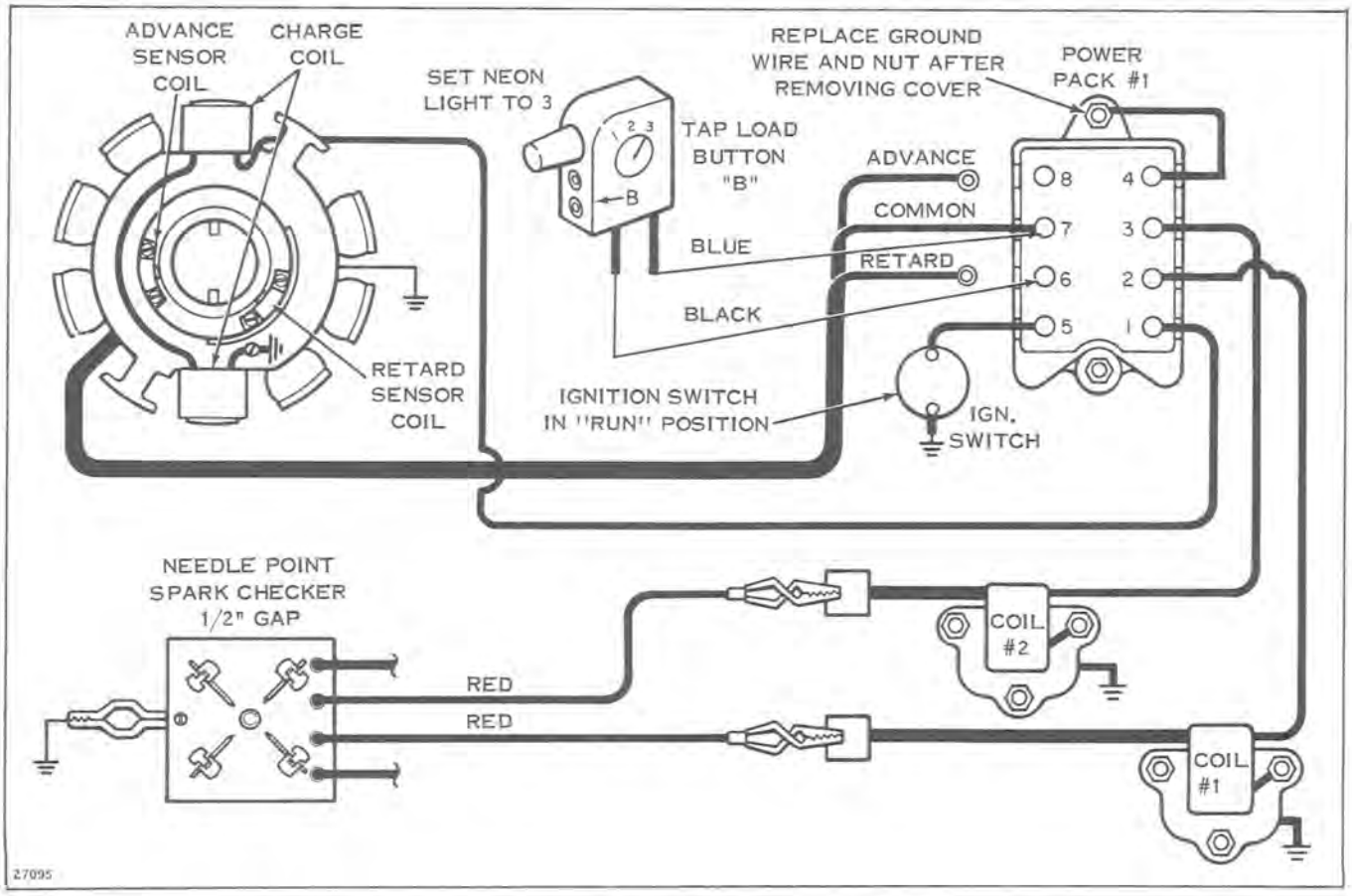


Figure 7-16

TEST #5 POWER PACK I OUTPUT CHECK

A. Remove ignition coil orange primary leads from terminals # 2 and 3 of Power Pack I.

B. Use neon tester S80 or M80. Set rotary switch on tester to position #1. Hook tester black lead to Power Pack I terminal #2 or #3, and tester blue lead to engine ground. See Figure 7-17.

C. Remove spark plugs for easier manual cranking of engine.

D. Depress load button "A" and crank engine with manual starter (with ignition switch "RUN") and observe light. See Figure 7-17.

1. If tester light is bright and steady, check ignition coils, test #10.

2. If tester light is weak or erratic, check ignition switch, test #5.

E. Remove tester leads and reconnect ignition coil primary leads to terminals #2 and #3 on Power Pack I.

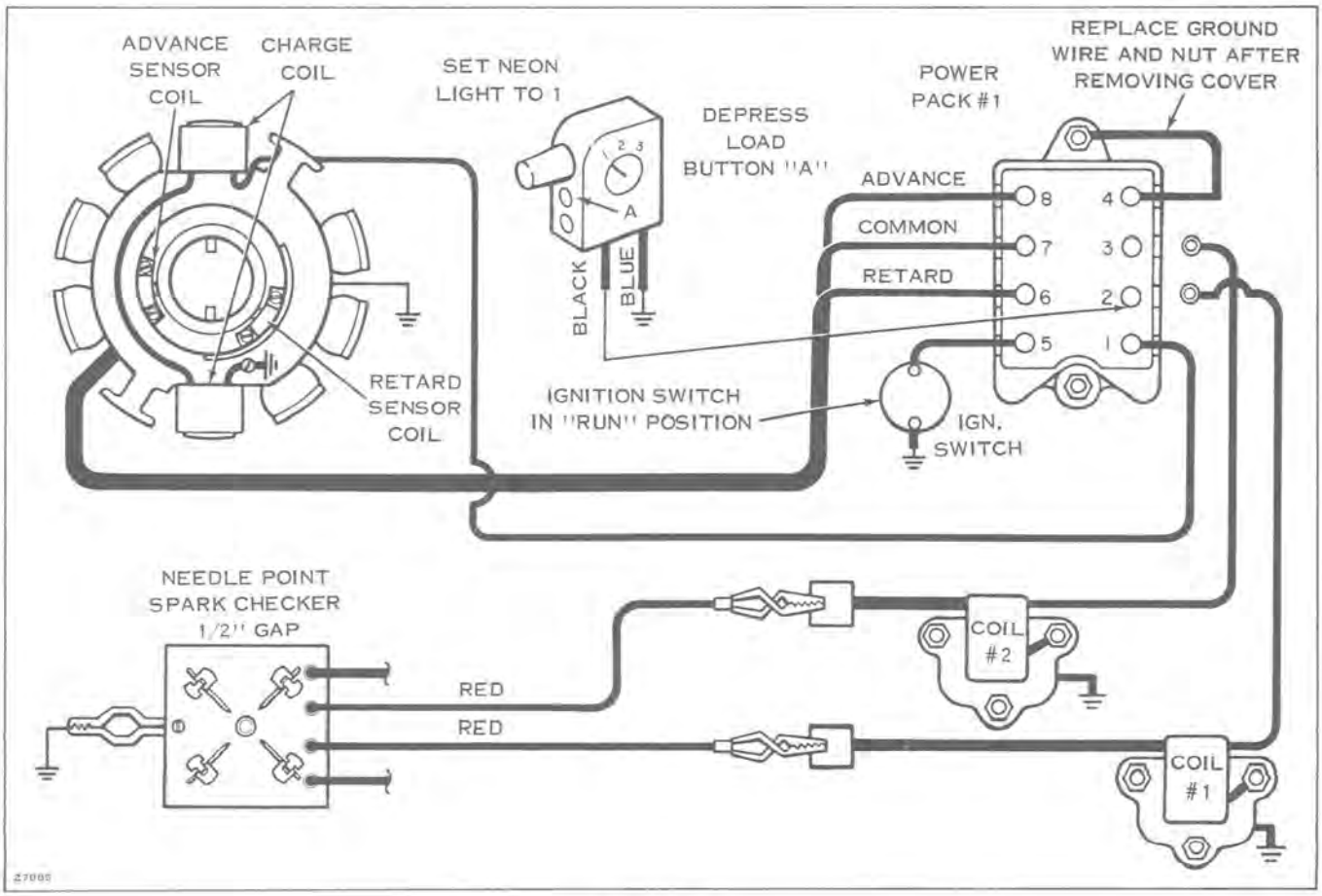


Figure 7-17

TEST #6 IGNITION SWITCH CONTINUITY GROUND CHECK

A. Connect spark gap checker with 1/2" gap. See Figure 7-18.

B. Put ignition switch in "RUN" position, remove plugs for easier cranking. See Figure 7-18.

C. Use manual starter to crank engine and observe spark at the needle point spark checker.

D. If weak, erratic, or no spark, disconnect ignition switch lead on Power Pack terminal #5. Repeat test, cranking engine with rope.

E. If spark is strong and steady, check leads going to ignition switch for grounds and check ignition switch.

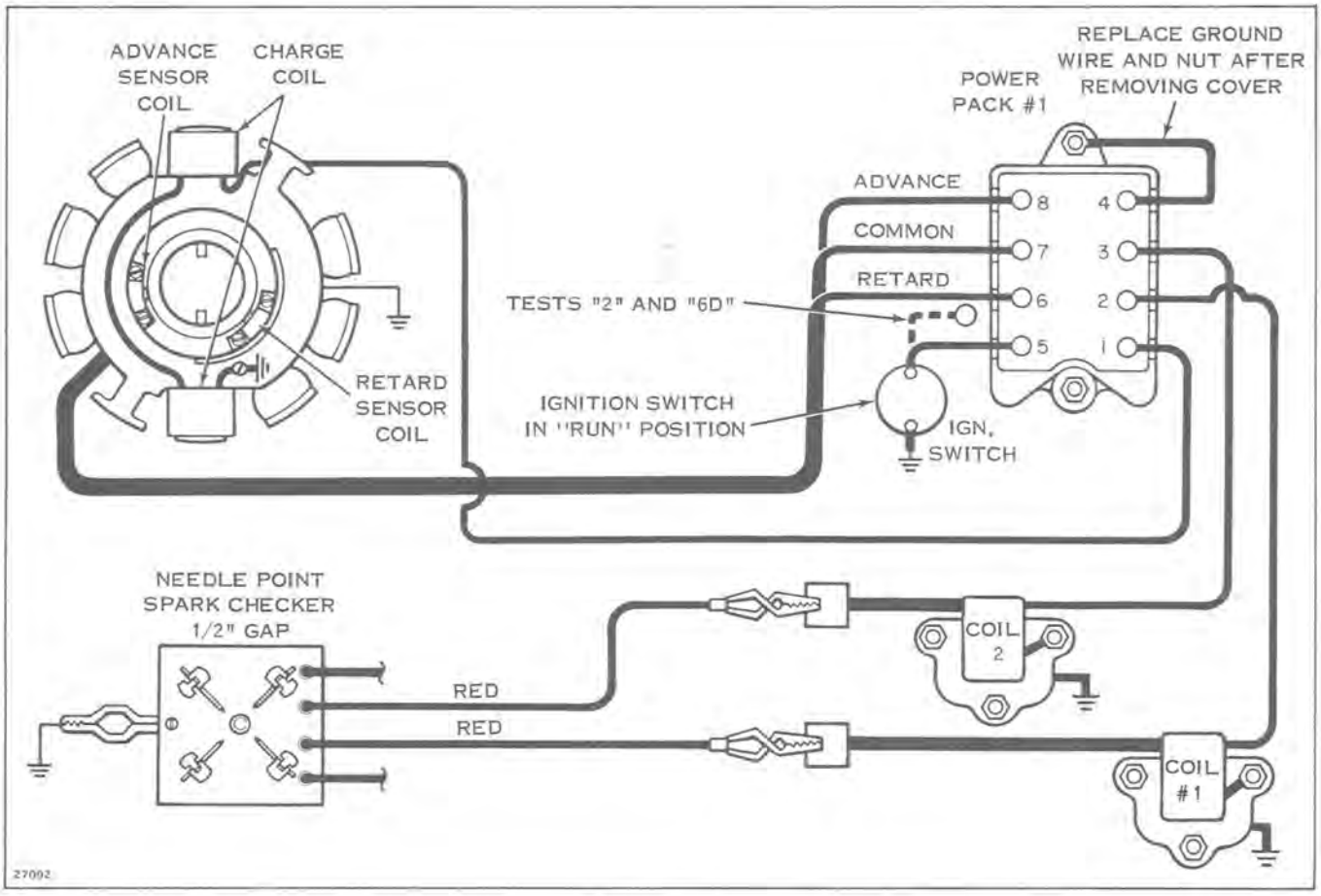


Figure 7-18

Figure 7-19

TEST #7 ADVANCE SENSOR COIL RESISTANCE CHECK

An engine that will start and idle, but dies out when accelerating, and with timing light connected will show the red fin (retard timing mark) and not the yellow fin (advance timing mark) when running has a bad advance sensor or Power Pack I. If previous tests on the Power Pack I were negative, a resistance check of the advance sensor coil should be made.

A. Remove the white/black stripe lead from terminal #8 of the Power Pack I, the black/white stripe lead from terminal #7, and the white/green stripe lead from terminal #6. Check for 14 to 16 ohms resistance between leads #7 and #8. See Figure 7-19. If sensor coil resistance does not come within these tolerances, it must be replaced.

B. Coil or leads must not be shorted to ground. On ohmmeter hi ohms scale, check for a reading of infinity from either coil lead to ground. If there is a leakage to ground, check coil and leads and insulate area of leakage with tape.

TEST #8 RETARD SENSOR COIL RESISTANCE CHECK

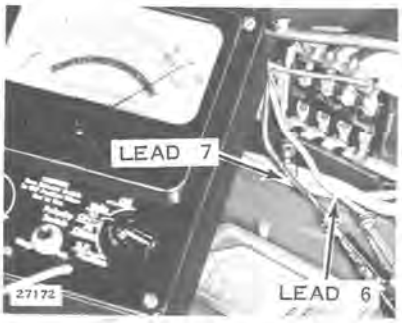


Figure 7-20

An engine that is hard starting, kicks back, and with timing light connected will show yellow fin when cranking, has a defective retard sensor coil or Power Pack. If previous tests on the Power Pack were negative, a resistance check of the sensor coil should be made.

A. Remove the white/black stripe lead from terminal #8, the black/white stripe lead from terminal #7 and the white/green stripe lead from terminal #6. Check for 27 to 29 ohms resistance between leads #6 and #7. See Figure 7-20. If retard coil resistance does not come within these tolerances, it must be replaced.

B. Retard coil or lead must not be shorted to ground. On ohmmeter hi ohms scale, check for a reading of infinity from either coil lead to ground. If there is a leakage to ground, check retard coil and leads and insulate area of leakage with tape.

TEST #9 CHARGE COIL RESISTANCE CHECK

A. Remove the brown/white stripe lead from Power Pack I terminal #1. Check for a total resistance of the two charge coils from lead to ground of 875 ± 75 ohms. See Figure 7-21. If resistance of the charge coils does not come within these tolerances, they must be replaced.

TEST #10 IGNITION COIL CONTINUITY, POWER AND INSULATION CHECKS

Figure 7-21

To determine accurately the condition of the ignition coil, an ignition analyzer should be used. Without the use of test equipment, coils may be replaced needlessly. A wide variety of ignition analyzers are available from various manufacturers. The use of the Graham, Merc-O-Tronic, or Stevens ignition analyzers, and their adapter for C.D. ignition are particularly recommended. See Figures 7-7, 7-8 and 7-9.

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.

The following values are provided for checking the ignition coil 580916 short, 580944 long.

Graham Tester Model 51

Maximum Secondary	1900 ± 190
Maximum Primary	Resistance test too low for reading on recommended test equipment
Coil Index	60
Minimum Coil Test	9
Gap Index	50

Merc-O-Tronic

Operating Amperage	1.4
Secondary Continuity	22 to 26 (index number)

Stevens Tester Model MA75

Switch A Index Adjustment 20

Figure 7-22

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 cannot be made to give a good reading on the specified primary current.

NOTE

Zero meter before performing the continuity test.

A. CONTINUITY TEST (using MERC-O-TRONIC TESTER)
Remove ignition coils. Connect meter leads to coil primary and secondary leads and turn meter selector switch to "Coil Continuity." See Figure 7-22. Index reading should be between 22 and 26.

B. POWER TEST (using MERC-O-TRONIC TESTER)
Connect meter leads to adapter. Adapter red lead to coil ground lead. Adapter black lead to coil primary. See Figure 7-23. Connect coil high tension lead to meter output lead. Turn meter selector to "Coil Power Test" and apply power to coil. Secondary voltage should produce a steady spark at meter spark gap at 1.4 amps (black figures on number 1 scale). Check insulation by probing the coil and entire secondary lead with the grounded test probe. See Figure 7-24. Arcing will be apparent wherever the insulation has broken down, due to moisture or carbon trails.

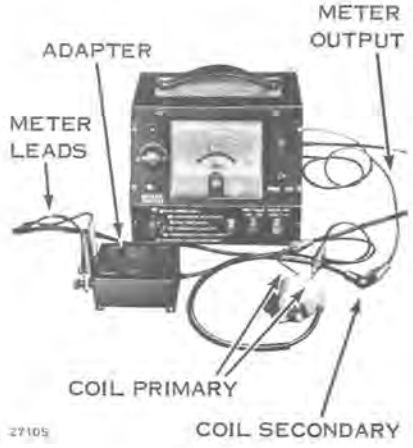


Figure 7-23

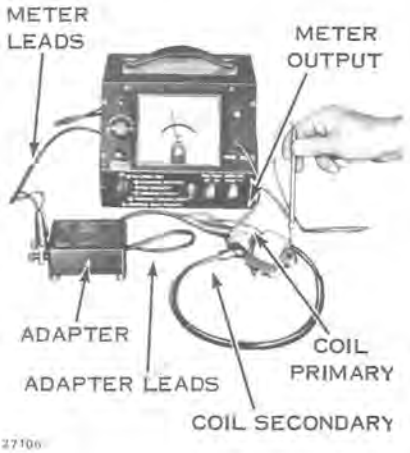


Figure 7-24

TEST #11 IGNITION TIMING CHECK

RETARD TIMING CHECK

Connect test light to 12 volt source. Remove spark plugs to release compression for easier manual turning of engine. Clamp the test light electronic pickup on a spark plug wire. (Arrow on pick-up must point toward ground. Connect spark checker to high tension leads and ground to engine. Turn ignition switch to "RUN" position. It will be required that one person pull the starter rope vigorously, and a second person aim the test light at the timing slot and check the retard (red) fin on the flywheel which should be visible at cranking speed in the timing slot. See Figures 7-25 and 7-26.

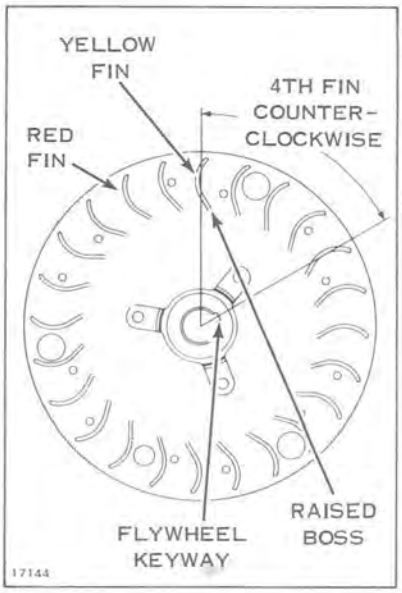


Figure 7-25

ADVANCE TIMING CHECK

Connect timing light to 12 volt battery. Clamp timing light electronic pickup to one high tension lead. Run engine at idle speed (1300-1600 RPM) and aim timing light at timing slot. The advance (yellow) fin should be visible in the timing slot. See Figure 7-26.

IGNITION SYSTEM REPAIR

DISASSEMBLY

a. Remove starter assembly (see Figure 7-27), outer fan housing, air filter, cover from top of ignition coils, engine cover and Power Pack cover.

b. Remove three screws attaching ratchet and ratchet mount to flywheel (see Figure 7-28). Remove ratchet mount.

c. Remove flywheel nut (see Figure 7-29). Use spark plug wrench handle in hole on rim of flywheel to keep flywheel from turning while removing nut.

d. Secure flywheel puller (Service Tool #378103) to flywheel with 5/16"-8 screws and remove flywheel from crankshaft. See Figure 7-30.

e. The magneto charge coils, alternator coils and sensor coils are now accessible for servicing. See Figure 7-33.

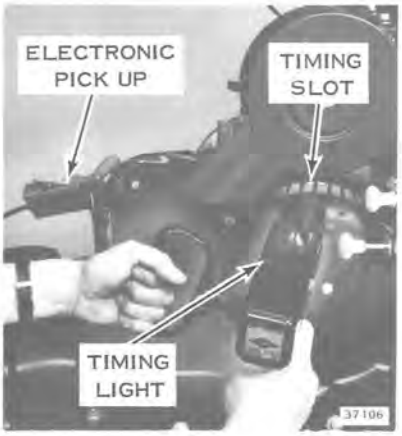


Figure 7-26

Figure 7-27

Figure 7-28

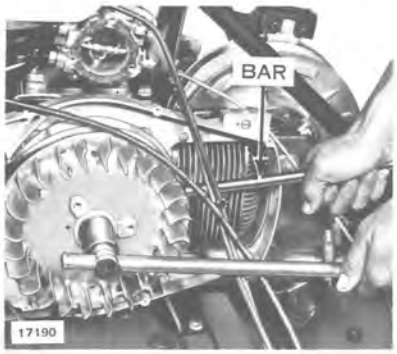


Figure 7-29

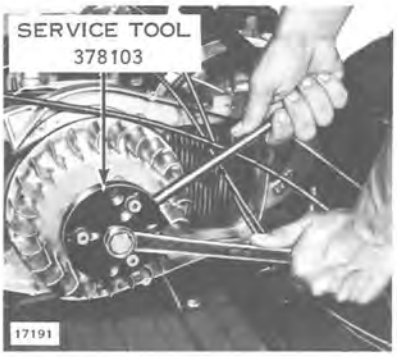


Figure 7-30

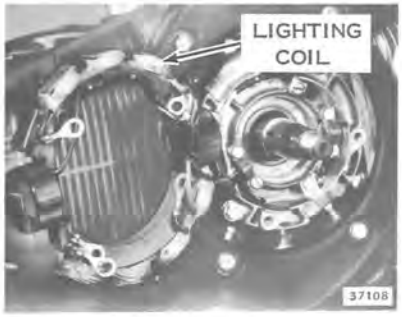


Figure 7-31

Figure 7-32

f. The wave washer and rotor can now be removed. See Figure 7-33.

g. Remove 4 screws holding lighting and charge coil assembly to stator plate. Assembly can now be removed from stator. See Figure 7-31. Sensor coils can now be removed for replacement if necessary.

h. Remove two screws, and sensor plate assembly can be removed. See Figure 7-32.

REASSEMBLY

a. Install sensor plate assembly and sensor coils. Important - Leads must be secured properly to prevent pinching or chafing.

b. Install rotor and wave washer. If sensor coils were removed, check for .010" gap between rotor and advance sensor coil. Use a .010" diameter wire or .010" plastic feeler gauge (Service Tool #604659) only, as a flat metal feeler gauge will not fit curvature. See Figure 7-33. Adjust if necessary by loosening screws securing the coil. Torque sensor screws 12 - 16 inch pounds.

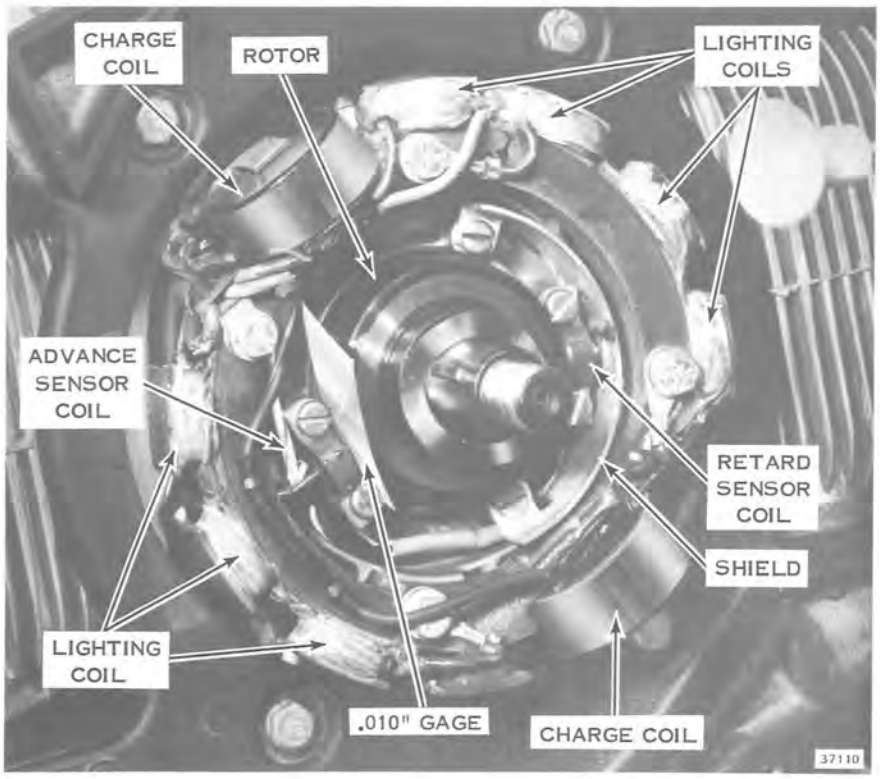


Figure 7-33

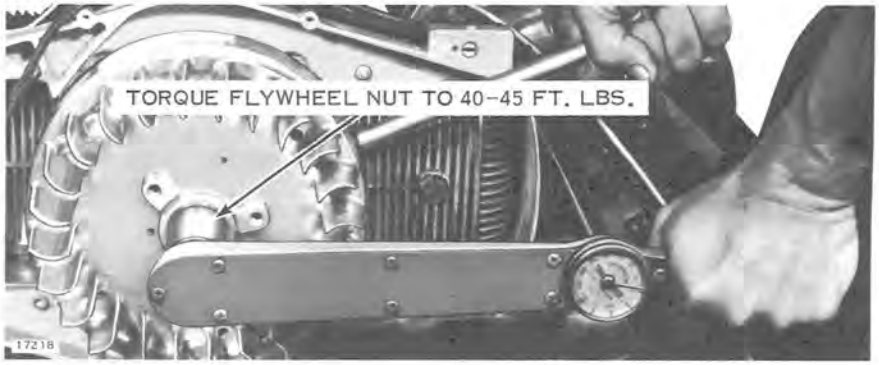
Figure 7-34

c. Install lighting and charge coil assembly.

d. Install flywheel. See Figure 7-34.

e. Place washer and flywheel nut in position. Hold flywheel with bar and torque flywheel nut to 40 - 45 foot pounds. See Figure 7-35.

f. Reassemble remaining parts in reverse order of disassembly.



IGNITION TIMING

Ignition timing is fixed. Therefore, if timing is found to be off in test #11, either the sensor lead wiring to the Power Pack I is switched, or the sensor hub key is sheared or missing.

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 7-36). 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 7-36

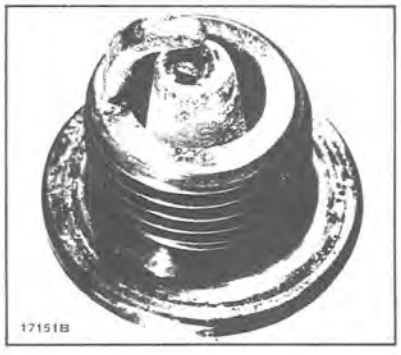


Figure 7-37

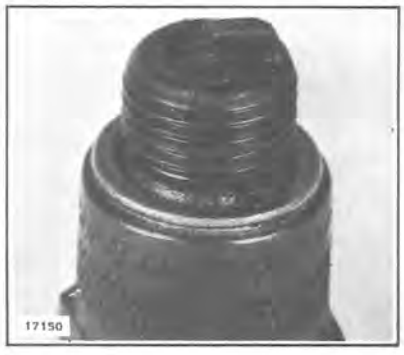


Figure 7-38

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 7-37).

b. A dark, black or sootish coloration, or wet appearance, ordinarily indicates the heat range as being too cold (see Figure 7-38). 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 7-39).

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 7-39

The condition of spark plugs may provide an indication of other conditions requiring attention. Inspect each plug and gasket as it is removed. 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.

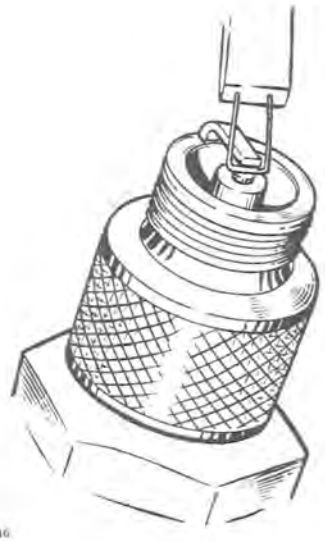


Figure 7-40

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 7-40).

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. Clean and inspect spark plug hole threads. Tighten spark plugs to 20 - 25 foot pounds, 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.

LIGHTING SYSTEM

TROUBLE SHOOTING

When a lighting failure occurs, first check the bulbs, then the electrical connections throughout the circuit before proceeding with electrical testing. A visual inspection may be all that is required to locate the trouble. Refer to wiring diagram at end of manual.

a. Wiring. The importance of connections which are good electrically and mechanically throughout the circuit cannot be overemphasized. The largest percentage of electrical system failures are caused by one or more loose or dirty connections. Check for corroded or loose connections, and for worn or frayed insulation.

b. Connections. Although connections are easily made, care must be used when fastening terminals together. If connectors are not assembled properly, one or more of the terminals may back out of the housing, preventing one or more of the electrical circuits from operating. To eliminate problems due to improper connections, examine the terminals on both halves of the connectors after assembly to be sure that all terminal ends are in place.

If a visual inspection of the electrical system shows all components to be in good condition, an electrical inspection will be necessary to determine which component of the lighting system is the cause of trouble.

LIGHTING COILS

The lighting coils are replaceable along with the charge coils as an assembly. See Figure 7-31. The lighting coils can be checked for their correct resistance without removal of the flywheel as shown in the following test.

LIGHTING COIL RESISTANCE TEST

a. Disconnect alternator lead at quick disconnect.

b. Connect ohmmeter, black meter lead to engine ground and red lead to yellow alternator lead. Resistance reading 1.5 ohms.

c. Repeat test (b) on yellow/gray stripe lead. Resistance reading 2.8 ohms.

d. Repeat test (b) on green lead. Resistance reading 2.2 ohms.

LIGHTING AND CHARGE COIL REPLACEMENT

a. Follow steps "a" thru "g" of "IGNITION SYSTEM REPAIR - DISASSEMBLY."

b. Disconnect lighting and charge coil leads.

c. Remove lighting and charge coil assembly.

d. Install and connect new lighting and charge coil assembly. Make certain that coil laminations are flush with bosses on fan housing.

e. Reassemble as described on page 7-13.

SAFETY STOP - SWITCH TEST

Pull connector apart and connect continuity meter across two stop switch leads.

1. Depress button - full continuity
2. Depress button - "RUN" position - no continuity

DIMMER SWITCH TEST

a. Disconnect lights connector

b. Ignition switch "Off". Connect continuity meter, one meter lead to engine ground other meter lead to black/white stripe wire terminal at male headlamp connector.

c. Depress button - full continuity
Depress button second time - no continuity

BRAKELAMP SWITCH TEST

a. Pull connectors apart (near brake switch).

b. Connect continuity meter to each of the terminals.

c. Pull up on switch plunger - full continuity.

d. Release plunger - no continuity.

NOTE

If brake is not properly adjusted brake switch will not function properly.

HEADLAMP ADJUSTMENT (See Figures 7-41 and 7-42)

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.

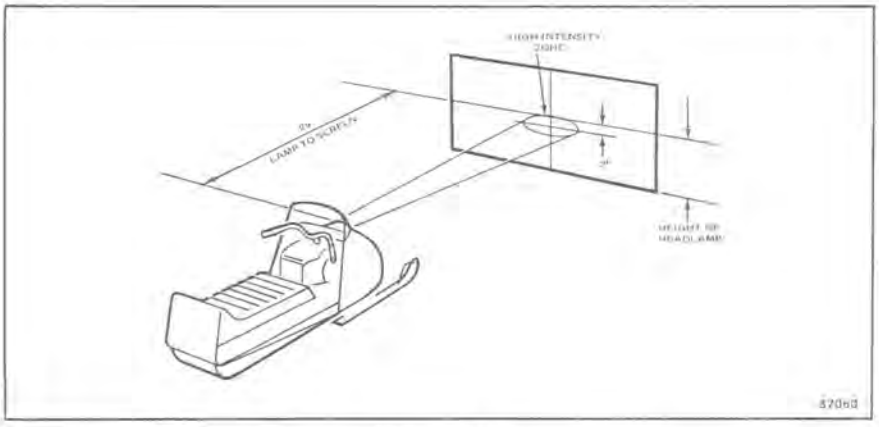


Figure 7-42

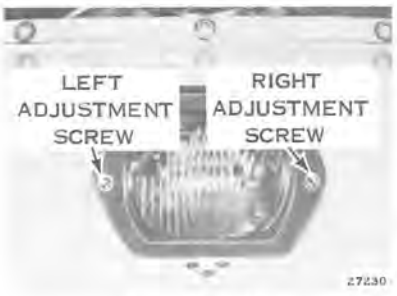


Figure 7-41

SECTION 8
MANUAL STARTER

TABLE OF CONTENTS

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 hood and engine cover.

b. Remove three screws attaching manual starter assembly to fan housing. Remove starter assembly from fan housing.

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

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

e. Remove spindle screw, and remove all components of starter pulley spindle assembly (see Figure 8-1).

f. 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.

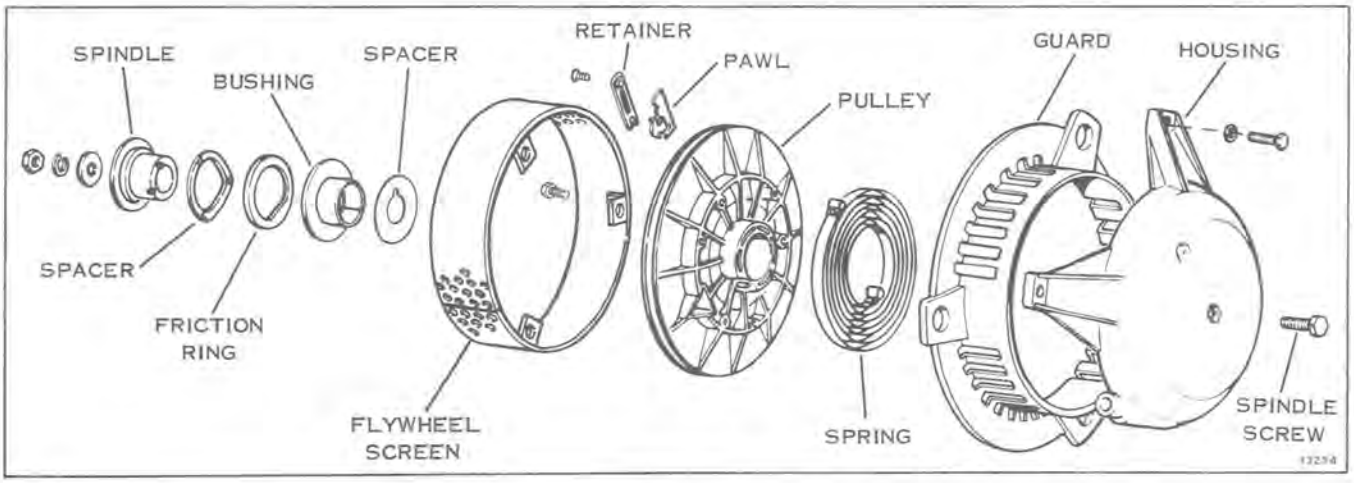


Figure 8-1

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 using fixture base #383966.

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.

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 8-2. 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.

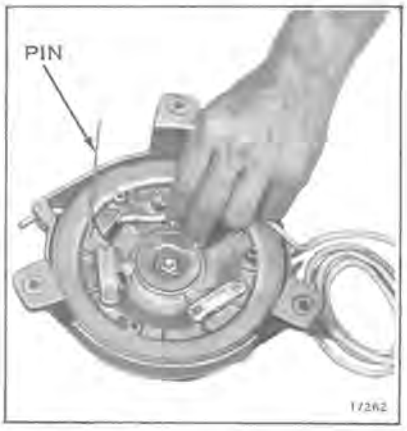


Figure 8-2

NOTE

Do not apply grease to starter spring. Many lubricants, including OMC Type "A", solidify in cold weather, and will make the starter inoperative.

SECTION 9
ENGINE

TABLE OF CONTENTS

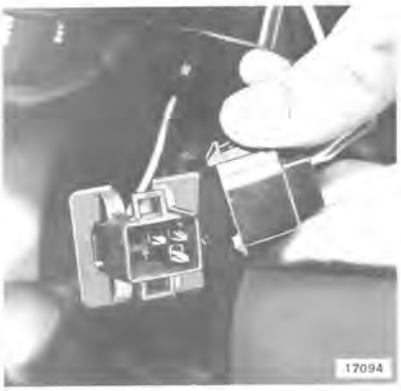


Figure 9-1

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 and engine cover.
   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. Disconnect compression relief at mounting bracket.
5. Disconnect inlet hose from fuel pump. See Figure 9-4. Disconnect primer line from intake manifold. Disconnect fuel return line from carburetor.
6. Remove ignition system cover by removing the three screws and washers. Disconnect wiring going to switch at quick disconnect.
7. Remove pipe to muffler screws. See Figure 9-21.
8. Remove screws securing heat shield.
9. Remove primary drive. See Section 10.
10. Remove four nuts and washers attaching engine frame to chassis.
11. Engine, exhaust manifold can now be lifted high enough to remove nuts from exhaust manifold studs on 30 and 32 HP.
12. Engine. Remove four bolts anchoring manifold to muffler on 27 HP.
13. Remove engine assembly from chassis.

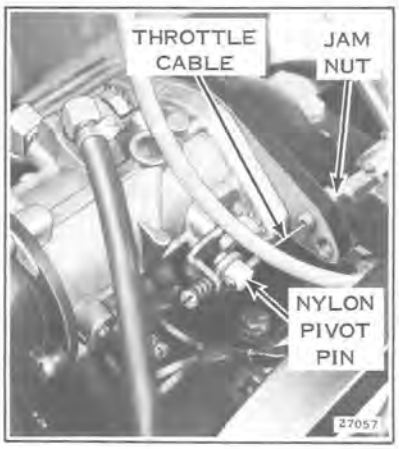


Figure 9-2

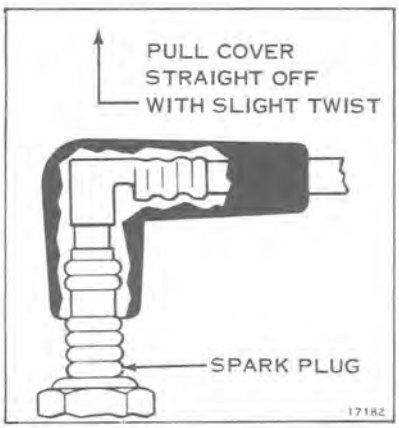


Figure 9-3

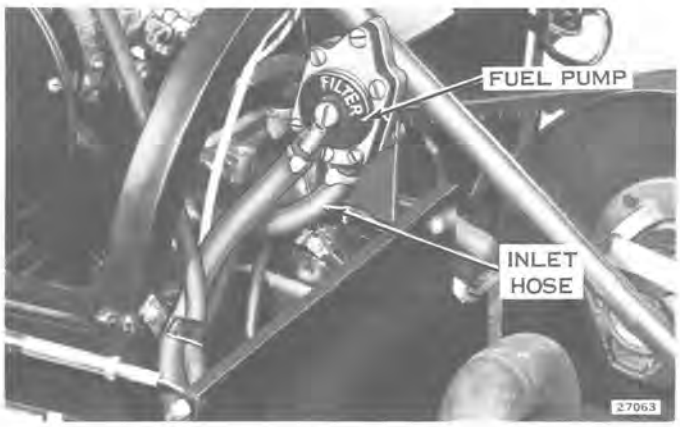


Figure 9-4

DISASSEMBLY

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

b. Remove spark plugs.

c. Remove exhaust manifolds.

d. Remove flywheel and rotor as described in Section 7.

e. Remove cylinder and crankcase group from engine frame assembly.

f. Remove compression relief valve.

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

NOTE

Cylinders and pistons can be serviced with only the cylinder barrels removed.

h. Remove screws from crankcase halves and drive out two alignment roll pins from flywheel side. Heat up crankcase halves in bearing area to approximately 250°F. Tap crankcase with rawhide mallet to break seal and separate crankcase halves.

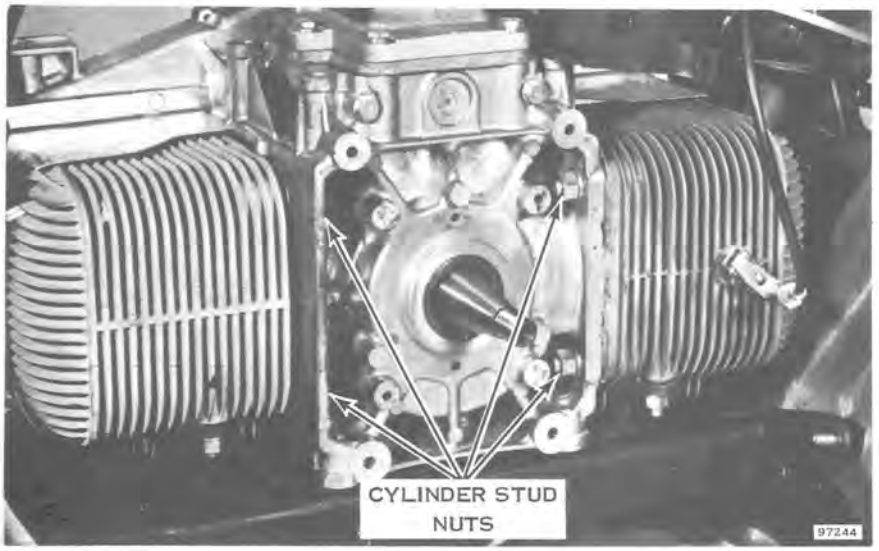


Figure 9-5

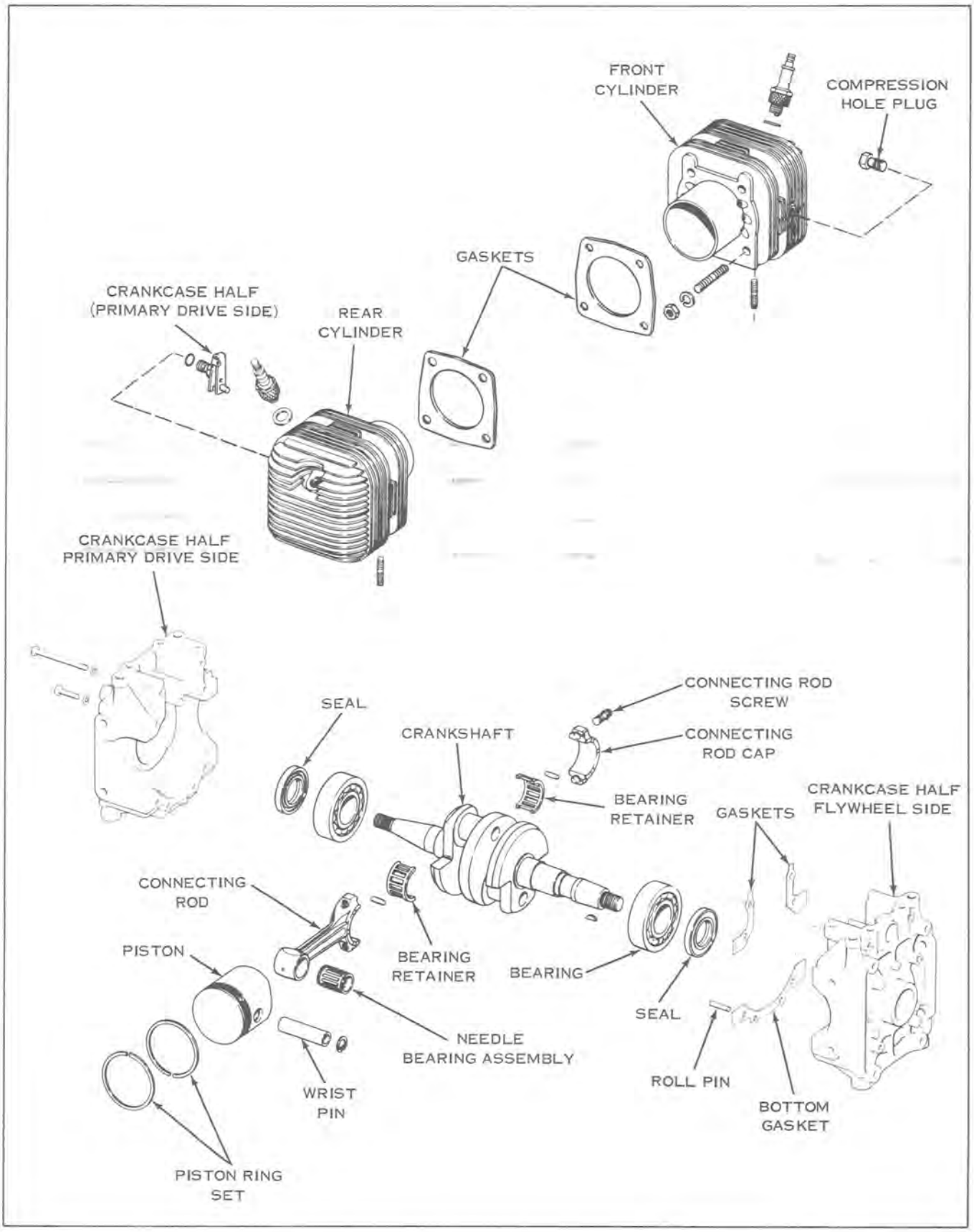

FRONT CYLINDER
COMPRESSION HOLE PLUG
GASKETS
CRANKCASE HALF (PRIMARY DRIVE SIDE)
REAR CYLINDER
CRANKCASE HALF PRIMARY DRIVE SIDE
SEAL
CRANKSHAFT
CONNECTING ROD SCREW
CONNECTING ROD CAP
BEARING RETAINER
GASKETS
CRANKCASE HALF FLYWHEEL SIDE
CONNECTING ROD
PISTON
BEARING RETAINER
BEARING
SEAL
NEEDLE BEARING ASSEMBLY
WRIST PIN
ROLL PIN
BOTTOM GASKET
PISTON RING SET

Figure 9-6

NOTE

Pistons, connecting rods, and caps are matched parts. 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.

i. Remove connecting rod caps. Remove connecting rods from crankshaft.

j. Reinstall matched caps on connecting rods.

k. Remove rings from pistons. DO NOT try to save the rings. Install a complete set of new rings on every overhaul.

NOTE

Open end of wrist pin retainer must face the top of the piston.

l. If necessary to remove connecting rods from pistons, remove wrist pin retaining rings, using screwdriver in slot in piston. Press out wrist pin to free piston from connecting rod. See Figure 9-7. Piston wrist pin hole marked "Loose" should be up when pressing out wrist pin to prevent piston damage.

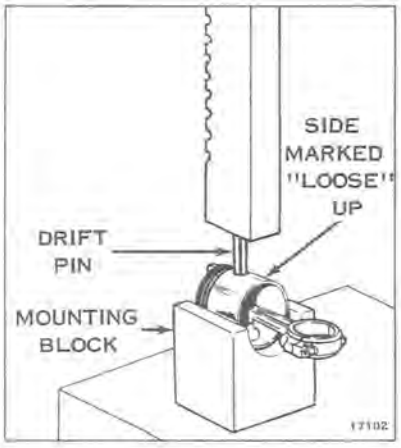


Figure 9-7

CLEANING, INSPECTION, AND REPAIR

SAFETY WARNING

When using trichlorethylene as a cleaning agent, use in a well ventilated area at normal room temperatures, and under no circumstances 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. Clean compression relief valve and check for free action.

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, badly scored, replace cylinders. Major portion of wear will be in port area and area covered by ring travel. See Specifications, Section 2.

Figure 9-8

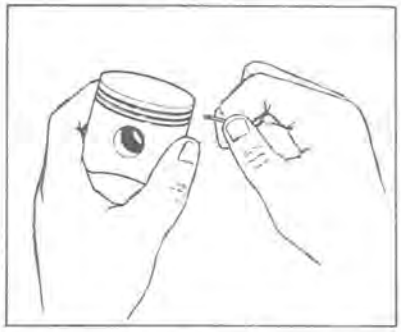


Figure 9-9

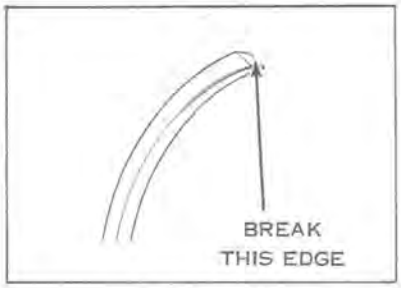


Figure 9-10

Figure 9-11

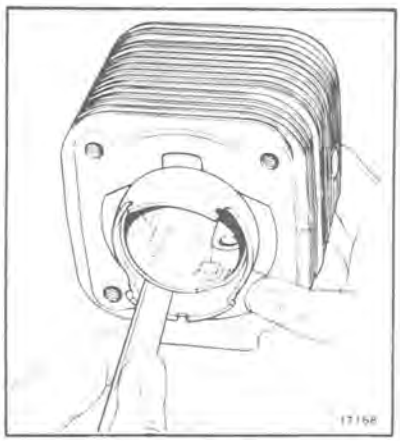


Figure 9-12

GASKETS AND GASKET SURFACES

a. Discard all gaskets, seals, and O-rings. Use only 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 are flanges are employed and are subject to temperature changes. To correct flatness, lay a sheet of No. 120 emery cloth on a surface plate or piece of plate glass (see Figure 9-8). 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 sprung, high spots marking 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 9-9, making certain that carbon clinging to bottom and sides 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 9-10).

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 9-11). Check clearance between piston and cylinder before reinstalling piston (see Figure 9-12). Check tolerances on specification 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 9-13). Press ring down in bore slightly with bottom of piston to square it up. Discard and replace with new ring if gap is excessive (see Section 2, Specifications).

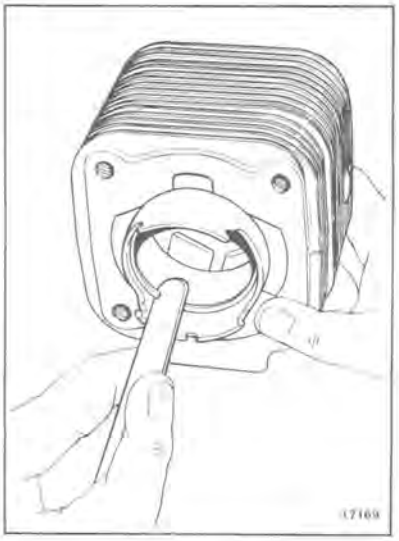


Figure 9-13

d. Check each ring in its respective ring groove for tightness or binding by rolling the ring around the piston groove (see Figure 9-14). Check for groove side clearance with feeler gage (see Figure 9-15) (see Section 2, Specifications).

BEARINGS

a. Work area 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.

b. 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 in 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.

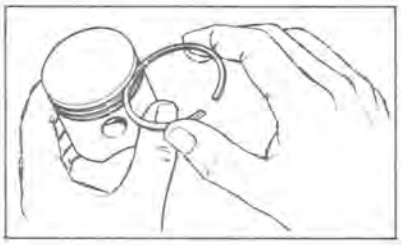


Figure 9-14

c. 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. Be careful not to spin bearings by force of air.

d. 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.

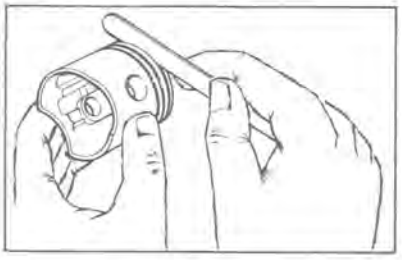


Figure 9-15

e. 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 heavy 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.

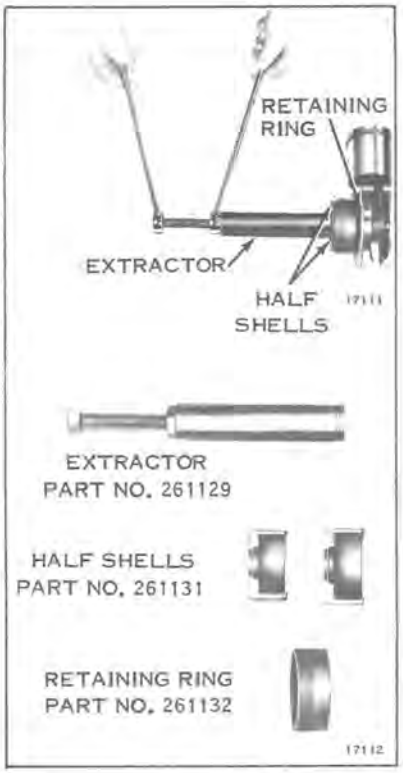


Figure 9-16

f. If bearings must be replaced, remove the old bearings using the following procedure: Use special bearing removal tool shown in Figure 9-16. 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 exploded views 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

NOTE

Pistons are not interchangeable with one another. The wrist pin hole is offset in different directions.

Piston Identification-
Piston Stamped No. 1 on head, place in front cylinder nearest bumper.
Piston Stamped No. 2 on head, place in cylinder nearest driver.

a. Install wrist pin needle bearing in connecting rod.

b. Apply a coat of oil to wrist pin, making sure the 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 loose side of piston. Place connecting rod in position in piston, then complete wrist pin installation in an arbor press.

d. Replace retaining rings, using Driver #317829 and Cone #317830, 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.

Figure 9-17

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 9-17). 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. When installed on the piston, rotate rings to seat gaps against dowel pins.

CRANKSHAFT

NOTE

Shims must be installed on crankshaft, between the bearing and thrust face of crankshaft on flywheel end.

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 crankshaft, between the bearing and thrust face of crankshaft. Crankshaft end play should not exceed .019" after installation. Total dimension across bearing should be 4.933" ± .001". See Figure 9-18.

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 bearing (16) and retainer halves, with connecting rod and connecting rod caps.

NOTE

Connecting rod caps are matched. Do not interchange connecting rod caps or turn them end for end.

c. Assemble piston and rod assembly to crankshaft with piston ring dowel pins facing top of engine. Attach caps to connecting rods.

d. Draw sharp pencil down four machined corners of connecting rod and cap assembly to insure proper alignment. (See Figure 9-20.) If misalignment offset edge will be felt with pencil point. If alignment is necessary, tap into alignment with drift punch. If alignment is satisfactory, tighten connecting rod cap screws to specified torque.

NOTE

It may be necessary to heat crankcase halves for easier installation of crankshaft.

e. Spread film of OMC Gasket Sealing Compound #317201 to both sides of gaskets.

f. Insert screws and finger tighten. Insert roll pins, locate and drive in. Torque bolts to 1/2 required torque (2-3 ft. lb.). Final torque bolts to 5-7 ft. lb. Trim gasket material from open areas of crankcase.

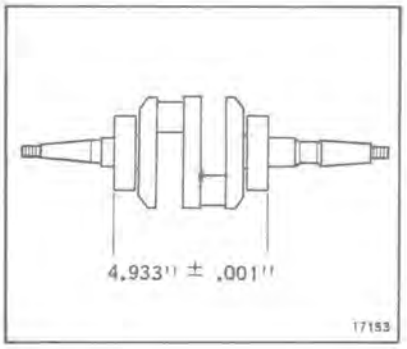


Figure 9-18

Figure 9-19

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

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

i. Install crankshaft seals in crankcase.

CYLINDERS

a. Coat cylinder gaskets with OMC Gasket Sealing Compound #317201 diluted with an equal amount of castor oil. Install cylinders to crankcase 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 9-20).

b. Assemble exhaust manifolds to cylinder barrels if they were removed. The gasket surfaces on cylinders and manifolds must be clean and smooth. Place new exhaust manifold gaskets over cylinder studs and assemble exhaust manifolds. See Figure 9-6.

c. Install leaf valve assembly, intake manifold and carburetor. For detailed instructions, see Section 6. Apply OMC Gasket Sealing Compound #317201 on intake manifold gaskets.

d. Attach cylinder and crankcase group to engine frame. Use Loctite Grade D on engine frame mounting screws.

e. Install compression relief valve using Dupage High Temperature Thread Compound applied to the threads.

f. Install alternator/charge coil assembly, sensor plate assembly, and cable clamp as described in Section 7.

g. Install sensor rotor and flywheel as described in Section 7.

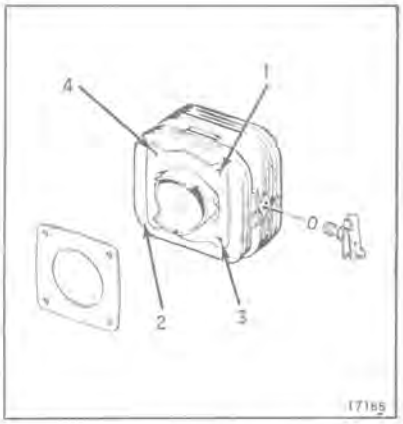


Figure 9-20

INSTALLATION

1. Install engine and frame to chassis. Secure pipe to muffler screws.
2. Install heat shield.
3. Install ignition system cover.
4. Install fuel inlet and return lines to carburetor and pulse and primer lines to intake manifold on crankcase.
5. Reconnect compression relief cable to compression relief valve. See Section 5 for adjustment procedure.
6. Install spark plugs and connect leads.
7. Reconnect throttle to carburetor. See Section 6 for cable adjusting procedure.
8. Install belt guard and transmission belt. See Section 10.
9. Replace hood and secure hood latches.
10. Reconnect headlight wiring.
11. Install remaining parts in reverse order of disassembly.

BREAK-IN

1. For the first tankful of fuel the vehicle must be operated at reduced speeds.
2. 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 while snowmobile is blocked up, as this can damage drive lugs on track.
3. Observe fuel mixing precautions as described in inside front cover.

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

Muffler replacement requires engine removal. See Page 9-2, steps 1 thru 10.

1. Slide engine back to clear exhaust system.
2. Remove four muffler mounting screws.
3. Loosen muffler.
4. Disconnect tie rods from steering column arm.
5. Muffler can now be removed from well.

INSTALLATION

Place muffler in well. Install muffler and tighten nuts equally and securely. Reconnect tie rods to steering column arm.

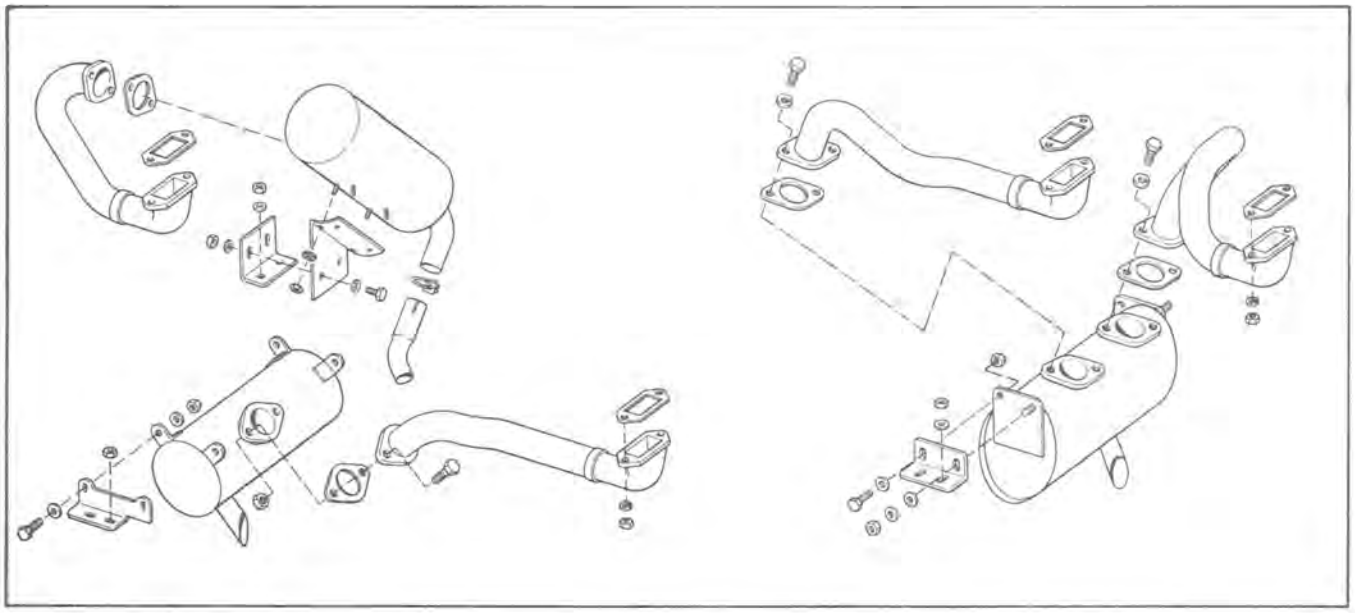


Figure 9-21

SECTION 10
DRIVE TRAIN

TABLE OF CONTENTS

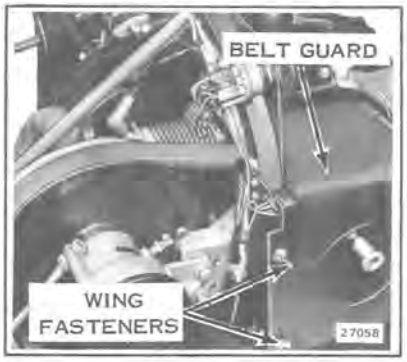


Figure 10-1

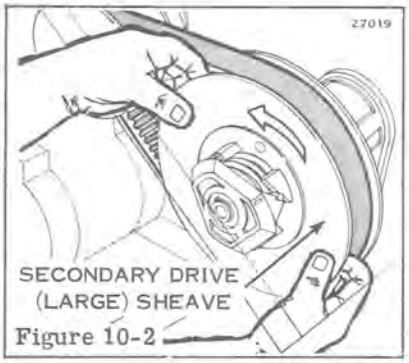


Figure 10-2

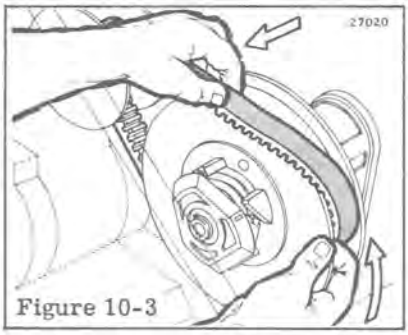


Figure 10-3

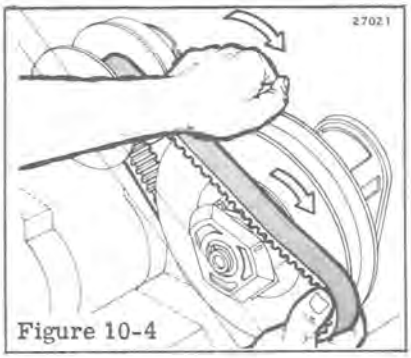


Figure 10-4

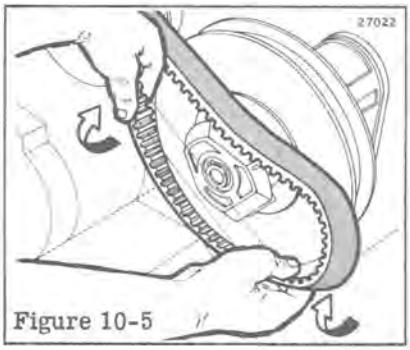


Figure 10-5

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. Put brake in lock position.

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

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

SAFETY WARNING

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

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

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

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

REPLACEMENT

Assemble in reverse order of disassembly.

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:

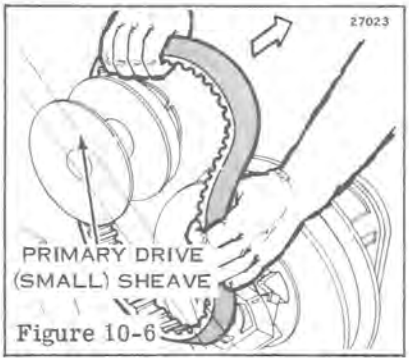


Figure 10-6

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 can be used to remove main shaft and sheave assembly from engine.

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).
c. Align holes vertically in fixed shaft and sheave assembly, neutral lockout balls should fall through holes freely.

Figure 10-8

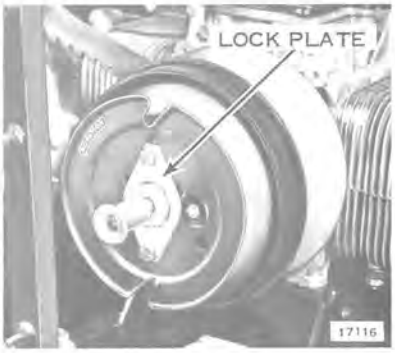


Figure 10-9

Figure 10-10

Figure 10-11

Figure 10-12

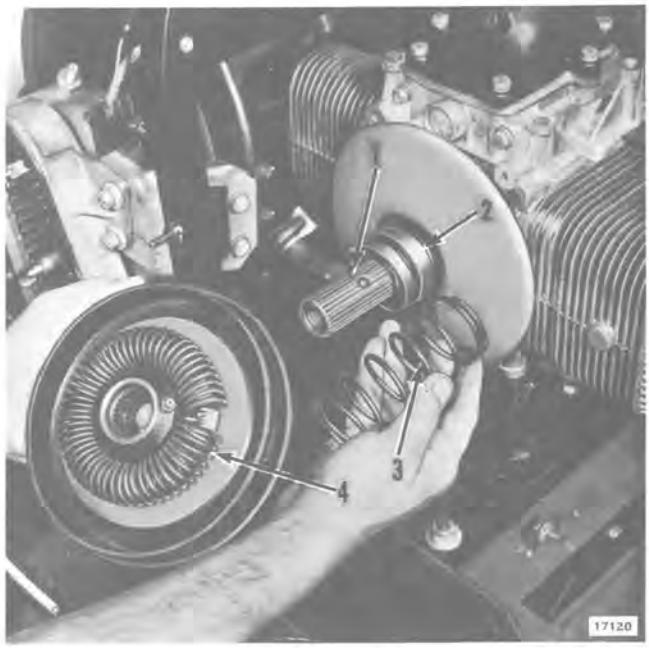


Figure 10-13

REASSEMBLY

NOTE

Internal threads and taper on fixed shaft and sheave must be cleaned prior to reassembly. When assembling fixed shaft and sheave to crankshaft be certain that fixed shaft and sheave is securely tightened to crankshaft.

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. See Figure 10-11
3. Assemble actuating spring, then assemble end cap on shaft, making sure end cap splines engage shaft splines.
4. Apply Loctite to end cap bolt.
5. Tighten end cap bolt to correct torque. See Page 2-3.
6. 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.
7. Clean inside of sheave halves of any grease that may have accumulated on them.
8. Reinstall transmission belt as described on page 10-2.

Figure 10-14

DRIVE CHAIN

REMOVAL

NOTE

Extreme caution should be taken when removing chain case cover, to overcome distortion of cover and damaging chain case.

1. Remove chain case cover. Oil will drain from chain case when cover is removed.

2. Loosen chain (see "Adjustment").
3. Remove cotter pin and nut from upper drive sprocket (see Figure 10-15).
4. Remove sprocket and chain from upper shaft.
5. Chain can now be removed from lower sprocket.

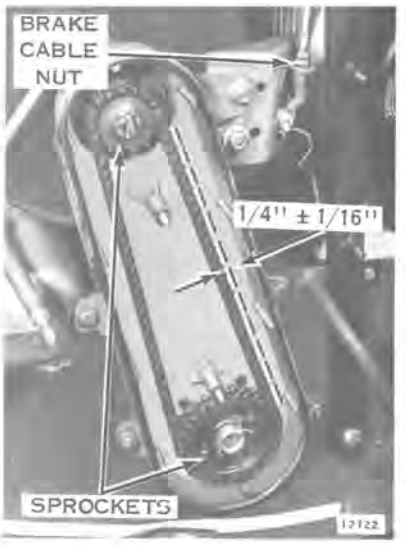


Figure 10-15

INSTALLATION

1. Assemble in reverse order of disassembly.
2. Adjust chain per "Adjustment."
3. Add chain lubricant per "Lubrication."

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).

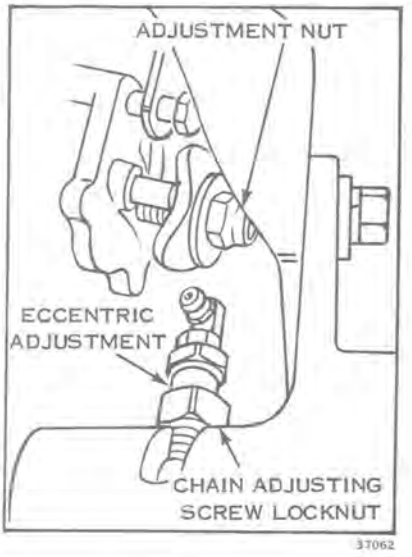


Figure 10-16

LUBRICATION

The drive chain is 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.

BRAKE

DESCRIPTION

The brake is caliper disc type with long lasting fibre pads (pucks).

REMOVAL

a. Loosen brake adjustment nut. See Figure 10-17.
b. Remove brake control cable from actuator cam arm.
c. Remove brakelamp plunger spring from actuator cam arm. See Figure 10-18.
d. Disconnect brakelamp wiring at quick disconnect. See Figure 10-18.
e. Remove brake bracket to chain case screws.

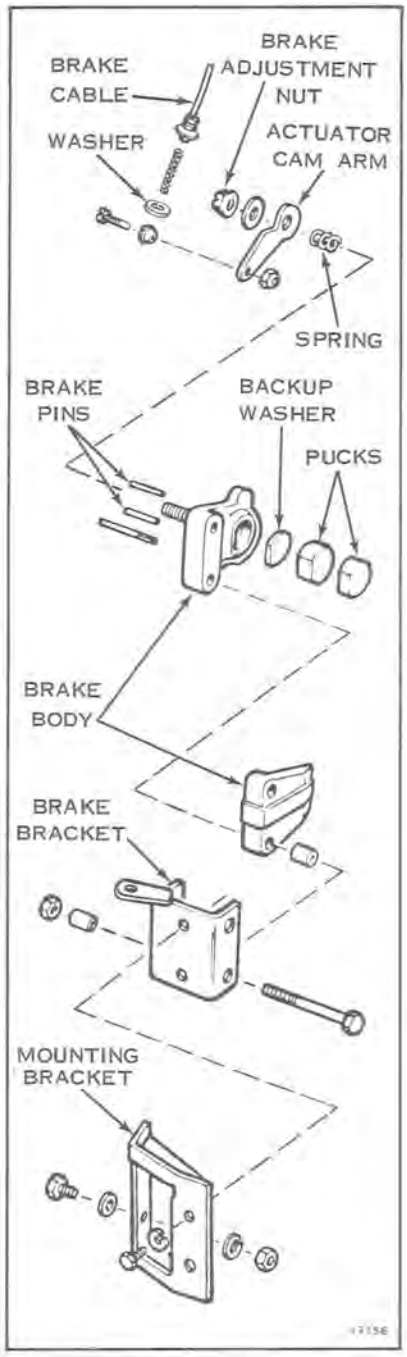


Figure 10-17

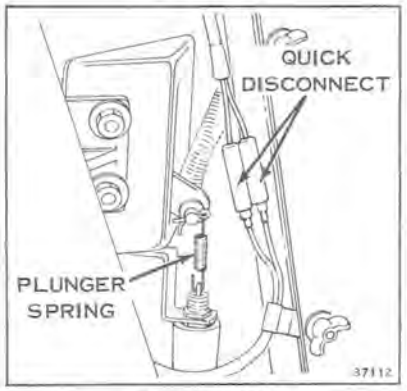


Figure 10-18

REPAIR

a. Disassemble brake assembly as required, noting relative positions of components to assure correct reassembly (see Figure 10-17).

b. Inspect brake pucks. If the free floating puck is one half of its original 1/2" thickness, it should be replaced. When the fixed puck is worn so that there is only 1/32" protruding from the carrier, 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 will be impaired by contaminated puck slipping on brake disc surface.

BRAKE CABLE AND CAM ASSEMBLY

a. Assemble in reverse order of disassembly.

b. Adjust brake.

NOTE

When reassembling brake to chain case be certain that brake body does not contact edge of secondary sheave.

BRAKE ADJUSTMENT

Brake adjustments can be made by turning the adjustment nut clockwise to tighten brake. See Figure 10-19.

a. Turn the nut until there is a slight drag on the brake, then back the nut off 1/4 to 1/2 turn.

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

c. Turn adjusting fitting located on brake bracket out 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.

d. Actuate hand lever and set parking brake lock to insure proper adjustment has been obtained.

e. Tighten nut on cable adjusting fitting on the brake bracket. When brake is off pucks should not drag on brake sheave.

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.

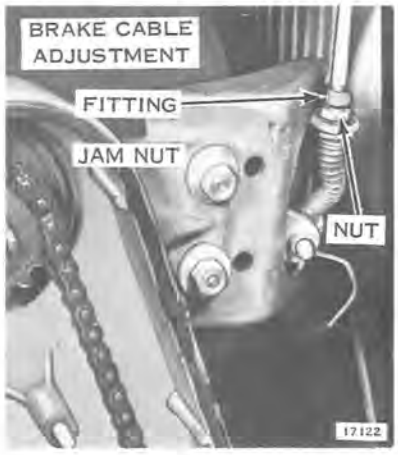


Figure 10-19

Figure 10-20

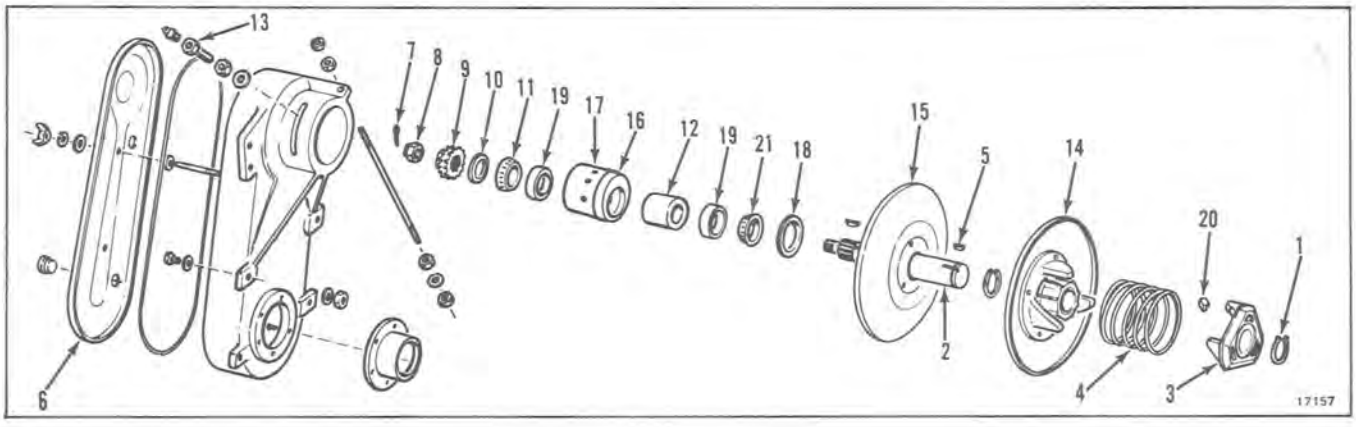


Figure 10-21

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 (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. Assemble fixed face and shaft into chain case.
11. Assemble eccentric to shaft through drive sprocket side.
12. Replace eccentric adjusting bolt.

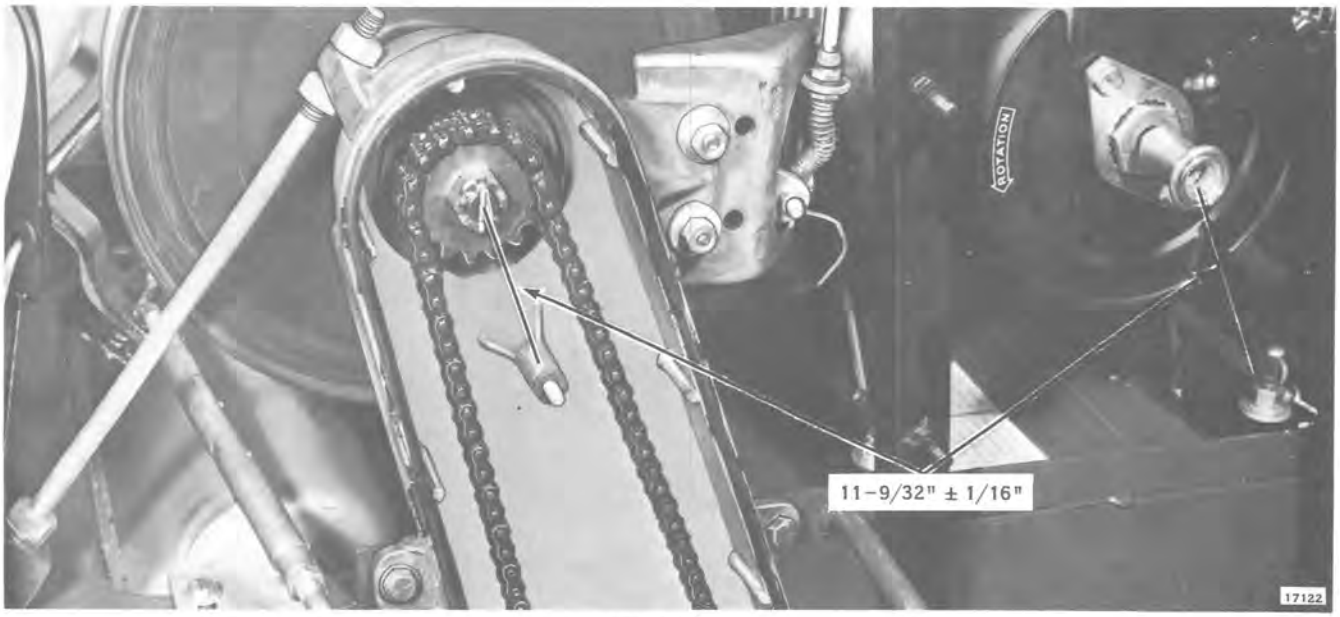


Figure 10-22

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 10-22.

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

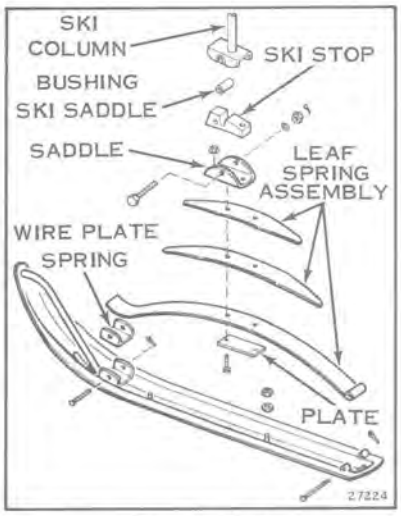


Figure 11-2

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 nut, cotter pin, lockwasher 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 12-4) 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.

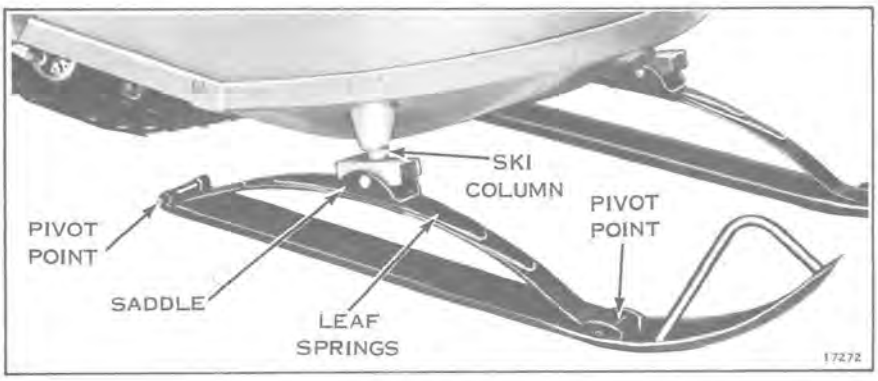


Figure 11-3

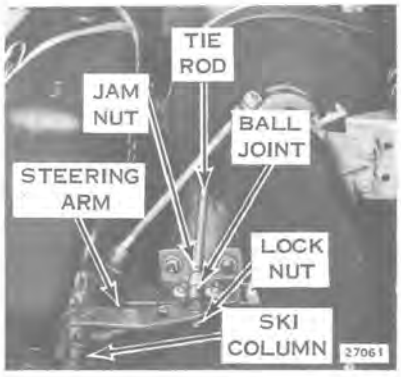


Figure 11-4

d. Apply grease to outside of bushing and assemble to ski column as shown in Figure 11-2. Secure with screw, lockwasher, locknut and cotter pin. 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 11-4. 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. Hold the ball joint with a wrench to prevent turning (see Figure 11-5) and 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 11-5.

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.

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 2-5/8 ± 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.

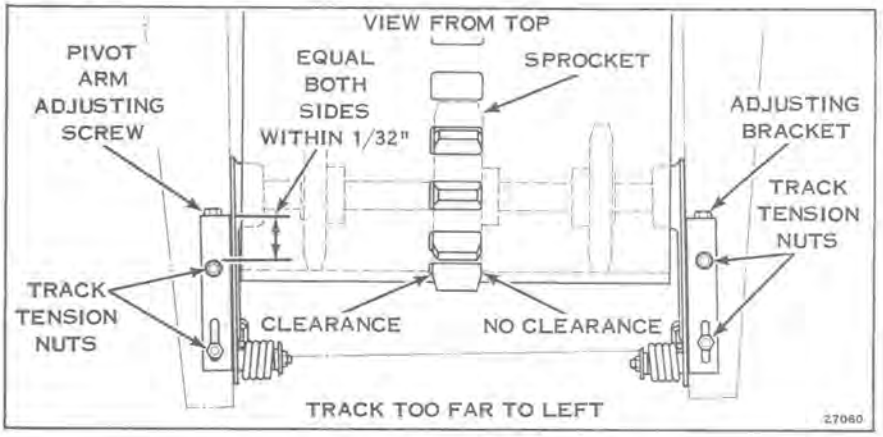


Figure 11-7

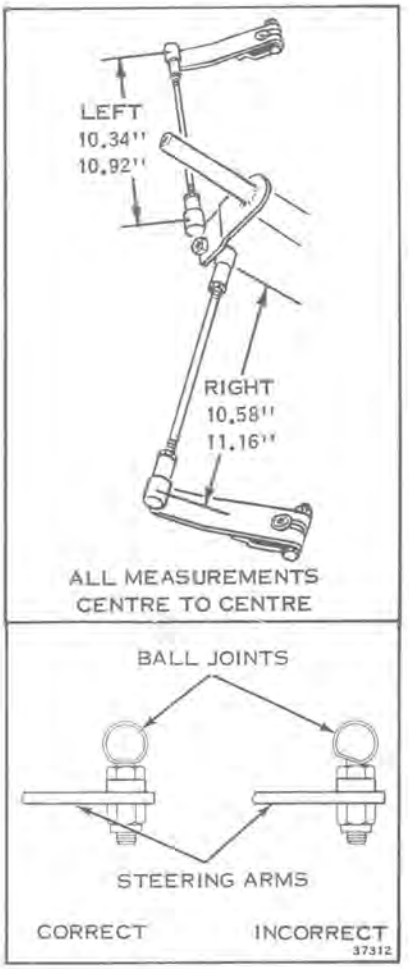


Figure 11-5

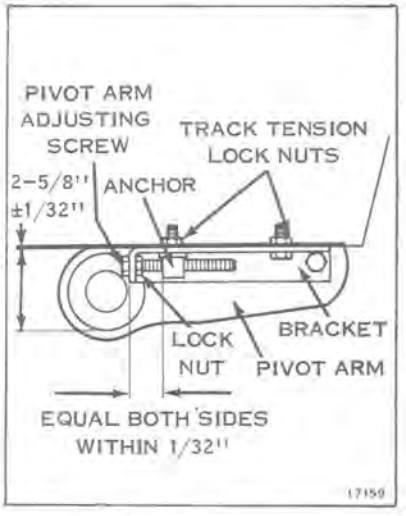


Figure 11-6

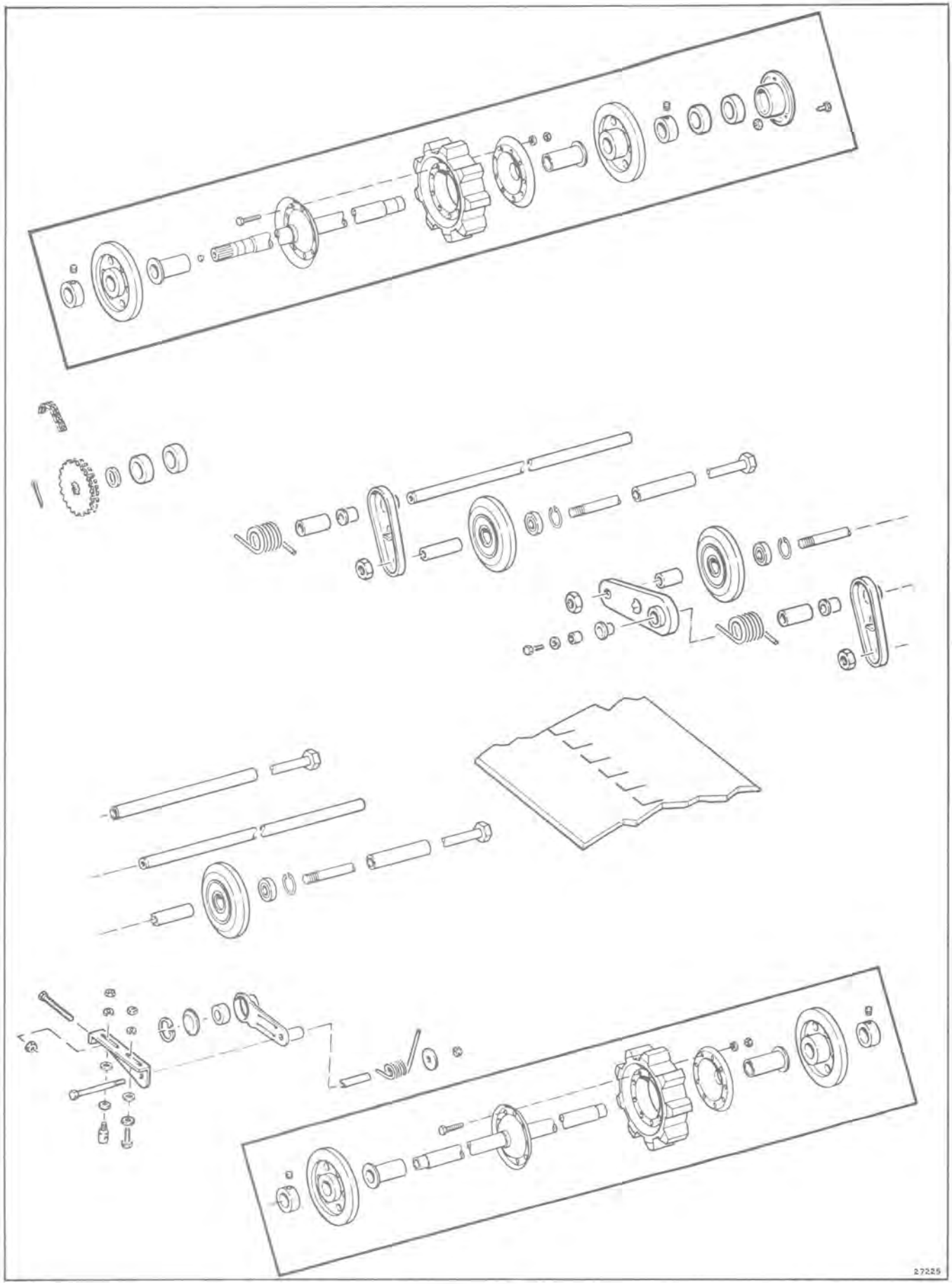


Figure 11-8

TRACK ALIGNMENT ADJUSTMENT

To check for proper track alignment, with snowmobile blocked up start engine and run track at slow speed. Drive sprocket must be centered in track slots as shown in Figure 11-7. If track is too far to the left, either left track adjusting bracket is too far forward, or right track adjusting bracket is too far to the rear. 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.

⚠ SAFETY WARNING

Do not run at high speed. Keep clothing and hair away from track to avoid becoming entangled.

1. Tighten (turn clockwise) "pivot arm adjusting screw" on left side and loosen "pivot arm adjusting screw" on right side.
2. Recheck track tension. Run track at slow speed and check alignment. Repeat procedure until sprocket is centered in track slots.
3. Tighten jam nuts and track tension nuts, and recheck track tension. Use same procedure to correct alignment if track is too far to the right.

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 from front and main trucks. See Figure 11-9. 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. Loosen screw - bearing retainer in bearing cup on chain case.
6. Remove chain case cover.
7. Remove cotter pin, bottom sprocket and washer. See Figure 11-10.
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.

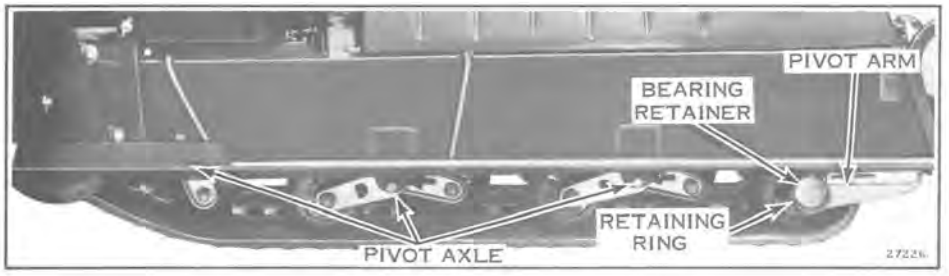


Figure 11-9

Figure 11-10

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. If they must be replaced, proceed as follows.

FRONT AXLE DISASSEMBLY STEEL HUB

1. Remove collars from axle. See Figure 11-8.
2. Remove wheel assembly and sprocket spacers.
3. Remove screws from steel hub and remove sprocket.

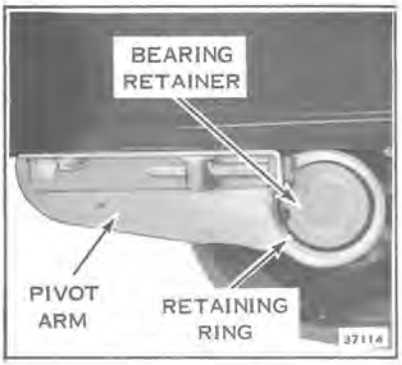


Figure 11-11

REAR AXLE DISASSEMBLY

1. Remove retaining ring and bearing retainer. See Figure 11-11.
2. Push pivot arm towards sprocket. See Figure 11-11.
3. Check bearings using the same procedure described under Front Axle Disassembly.
4. Remove bearings only if they must be replaced, or if sprocket must be replaced.
5. Inspect sprocket for excessive wear. (Refer to Front Axle.)

TRUCK DISASSEMBLY (See Figures 11-12 and 11-13)

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

Turn wheel by hand. If it does not turn freely, if there is excessive play, or if it is rough, wheel must be replaced.

Molded Track

1. A torn track cannot be vulcanized. It must be replaced if torn beyond use.
2. Small cracks will not hamper the operation of the snowmobile.
3. Liquid neoprene can be applied to cracks or frays to help restore its original appearance.

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 Front Axle - inspect for excessive wear.
3. Check to see that oil plug in front axle is in place and does not leak.

REFERENCE PICTURE

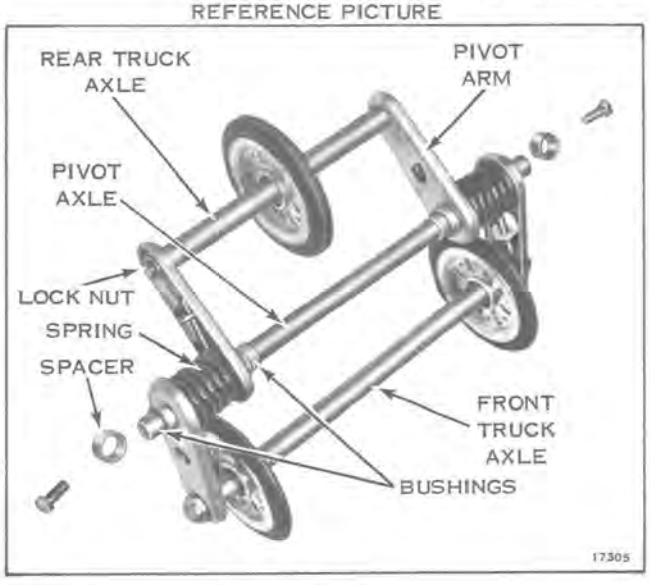


Figure 11-12

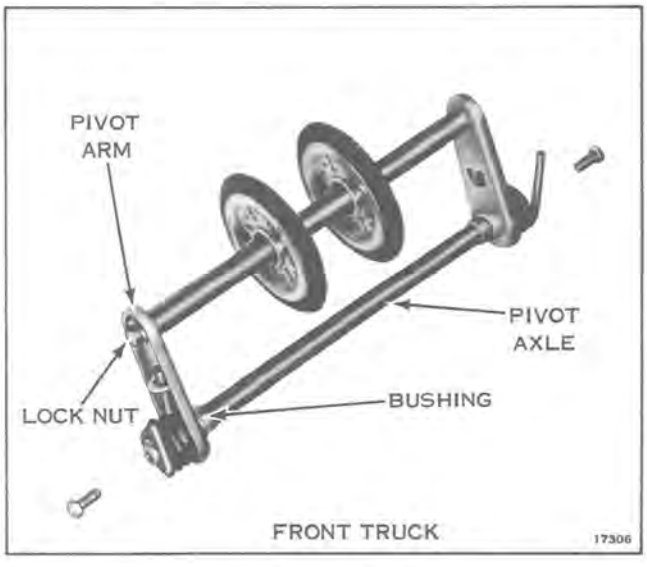


Figure 11-13

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

5. Check truck bushings for cracks or excessive wear. Replace if damaged. See Figures 11-12 and 11-13.

ASSEMBLY

Front Axle

Assemble drive sprocket to front axle, secure with screws. Apply a light oil to seals and assemble to front axle. Seat seals after axle is assembled to chassis.

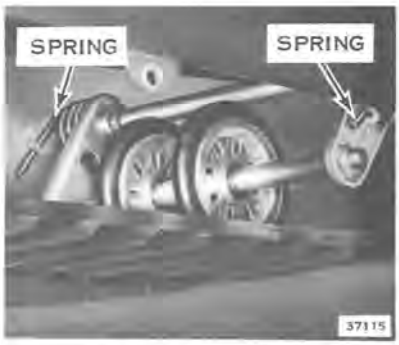


Figure 11-14

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 bushings and assemble to pivot axles. See Figure 11-12.

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

Middle and Rear Trucks

Assemble wheels and spacers to their original position 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 bushings and assemble to pivot axles. Assemble pivot arms and springs. See Figures 11-11 and 11-12.

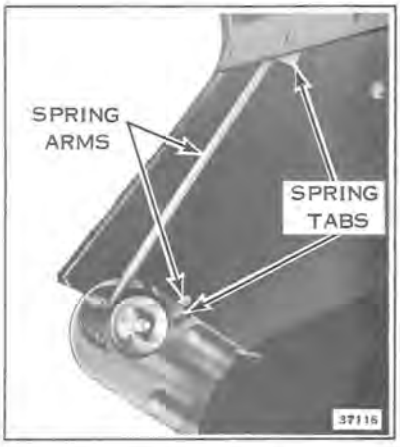


Figure 11-15

Rear Axle

Assemble sprocket, bearings, bearing retainer, retaining ring, pivot arms and brackets to rear axle. Use a clean light oil to assist in this assembly. Apply OMC Part No. 114154 grease to pivot arm bushings before assembly. See Figure 11-11.

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 11-15.

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

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

SECTION 12
LUBRICATION AND STORAGE

TABLE OF CONTENTS

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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 break-down. 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 mixing of fuel during break-in and normal operation as given here and in the Owner's Manual should be followed exactly.

The use of additive compounds, such as tune-up compounds, tonics, friction reducing compounds, etc., is discouraged. OMC Accessories Engine Cleaner and OMC Accessories Break-In Lubricant should be used as necessary according to instructions. See inside front cover for recommended fuel mixture.

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:

- 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.

To avoid cylinder scoring and premature engine wear, it is important that the gasoline and lubricant be properly mixed prior to putting the fuel in the tank. This is especially true in zero or sub-zero climates. Unless the fuel and lubricant are properly mixed, the engine could operate on a mixture which is too lean until the gasoline and lubricant have been agitated; by then, damage would have occurred and the engine would have to run on an excessively rich mixture.

 NOTE

The correct fuel mixture ratio is 50:1 or 1 pint of lubricant to 6 U.S. gallons (4.8 Imperial gallons) of gasoline. (See inside front cover.)

 NOTE

DO NOT POUR GASOLINE OR LUBRICANT DIRECTLY INTO VEHICLE FUEL TANK. USE AN APPROPRIATE CONTAINER FOR MIXING AND STORING THE FUEL.

To prepare the snowmobile fuel properly, pour into a SEPARATE, clean container half the amount of a good grade of regular leaded gasoline required and add all the required lubricant. Thoroughly agitate this partial mixture. Next, add the balance of gasoline necessary to bring the mixture to the required ratio of 50:1. Again, thoroughly agitate the mixture. A clean funnel equipped with a fine screen should be used when pouring the fuel mixture into the vehicle tank.

50 to 1 lubricant is prediluted to provide excellent mixability with gasoline at low temperatures. The addition of this dilutant does not in any way affect the lubrication qualities of the lubricant.

Whenever it is necessary to mix fuel and lubricant at temperature below 32°F (0°C), the lubricant should be prediluted with gasoline to improve its mixability. The lubricant should be prediluted with approximately one part gasoline to one part lubricant. Predilution of the lubricant should take place with the lubricant temperature above 32°F.

Do not use kerosene or fuel oils for pre-mixing.

NOTE: Thorough agitation is required to completely mix or blend the fuel; the lubricant adheres to the bottom and sidewalls of the container unless agitated. Simply pouring the gasoline onto the lubricant CANNOT accomplish thorough mixing.

LUBRICATION RECOMMENDATIONS

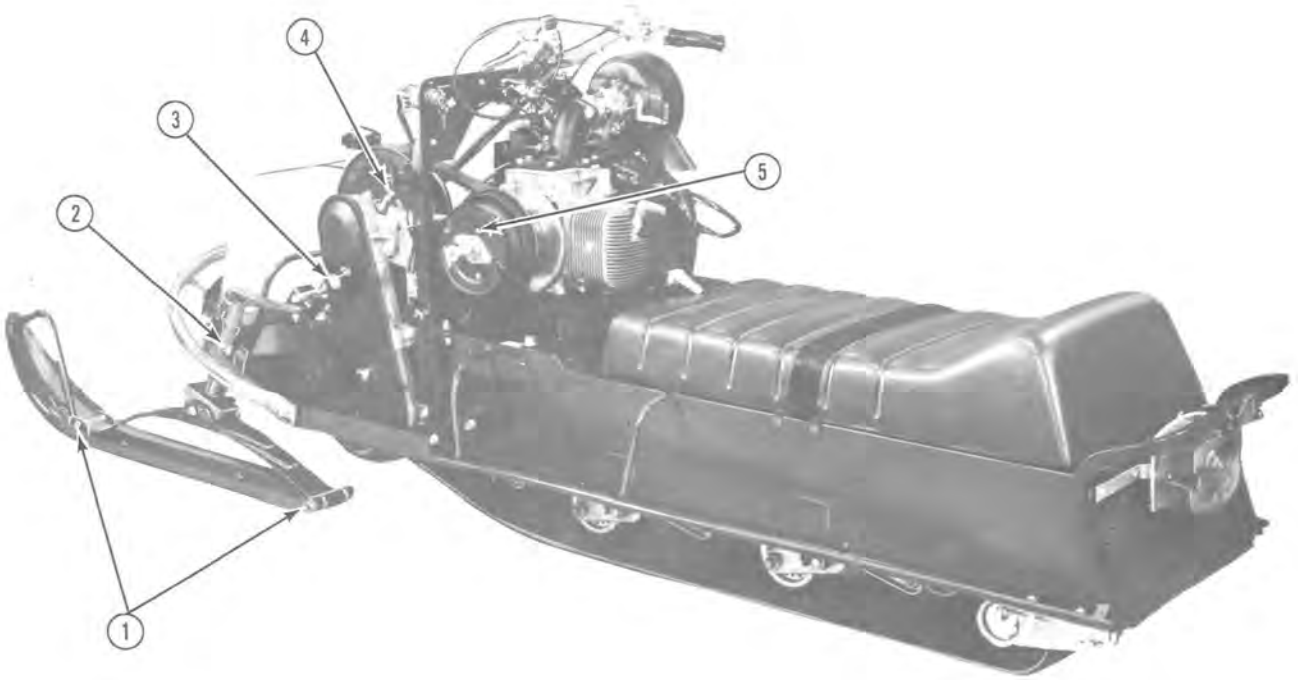

Figure 12-1

TIME	MAINTENANCE	LUBRICANT
① Every 25 hrs. ② Once a season ③ After 10 hrs. then every 25 hrs.	Ski Pivots (Leaf spring connections to skis) Ski columns (grease fittings). Drive Chain - oil bath - Refer to Page 14	SAE 10 Oil OMC Grease #114154 OMC Type "C"
④ Once a season	Secondary Drive (grease fitting. Two pumps of grease gun).	OMC Grease #114154
⑤ Once a season (normal use) Twice a season (extended use)	Primary Drive (grease fitting - 1/3 to 1/2 teaspoon. Do not over lubricate).	OMC Grease #114154

Specified lubricants available from your dealer

PREVENTIVE MAINTENANCE

TIME	MAINTENANCE
After first 10 hrs., then every 50 hrs. or as required	Adjust Chain Tension See Page 10-4
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
Once a season (see below)	Clean Filter Screen under Carburetor Fuel Inlet Elbow

Figure 12-2

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.

FUEL FILTER SCREEN, FUEL PUMP

△ SAFETY WARNING

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

Figure 12-3

The fuel filter is attached to the fuel pump. 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 clean solvent and brush. Assemble filter as shown in Figure 12-3, being careful to assemble gasket and filter screen on fuel filter cover. Tighten mounting screw securely with screwdriver (do not over-tighten).

FUEL FILTER SCREEN, CARBURETOR

△ SAFETY WARNING

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

The carburetor fuel inlet screen should be cleaned annually. To clean screen, remove fuel line and fuel inlet elbow. Do not remove screen.

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 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 or replace. See Page 12-4.

e. Remove air filter, run engine with neutral control knob pulled out and inject OMC Rust Preventative Oil (with oil can) rapidly into carburetor until engine stops.

f. Turn off ignition and replace fuel pump filter screen.

g. Clean air filter. See page 12-5.

h. Block rear of unit off ground to take weight off track.

i. Clean carburetor fuel filter screen. See Page 12-5.

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

k. Remove transmisssion belt. See Section 10.

l. Rub bottom of skis, and other unprotected surfaces of vehicle with cloth saturated in OMC Rust Preventative.

m. 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 neutral control
2. Function of brake
3. Engine performance

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