EVINRUDE &
JOHNSON

'74

snowmobile

service manual

30 HP MODELS: E-244Q
J-244Q

SNOWMOBILE DIVISION/OUTBOARD MARINE CORPORATION, 3031 NORTH 114th STREET, MILWAUKEE, WISCONSIN 53222
OUTBOARD MARINE CORPORATION OF CANADA LTD., PETERBOROUGH, CANADA.

PART NO. 406222

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: 5-6, 6-6, 7-3, 7-18, 7-19, 8-2, 9-5, 10-2, 10-3, 11-4 and 12-5.

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The snow vehicle has been designed and built for dependable, high performance. It is important to every snow vehicle 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 the model in question. 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.

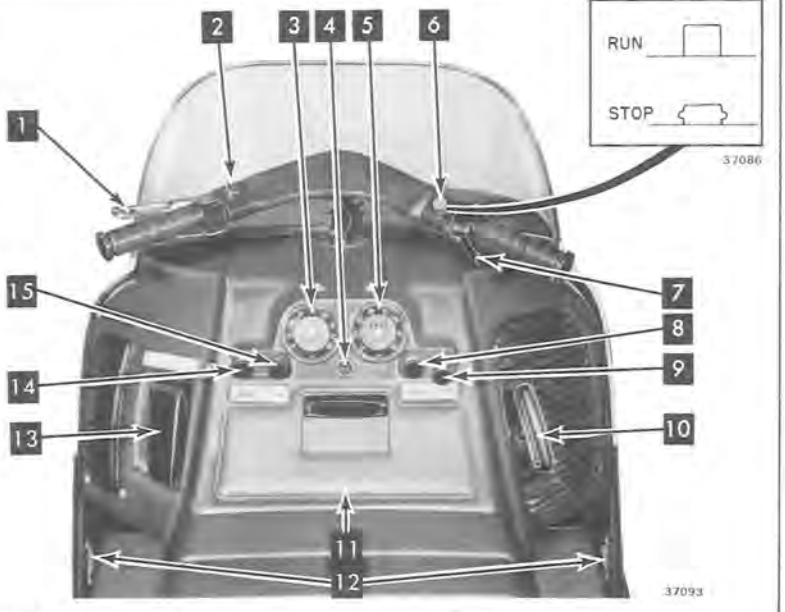
Figure 1-1

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 identification number.

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



1. Hand Brake and Parking Lock
2. Hi-Lo Beam Headlight Switch
3. Tachometer
4. Ignition/Lights Switch
5. Speedometer
6. Safety Stop Switch
7. Throttle
8. Compression Release
9. Primer
10. Manual Starter Handle
11. Instrument Panel Door
12. Hood Latches
13. Reverse Control
14. Neutral Lockout
15. Choke

Figure 1-2

SECTION 2 SPECIFICATIONS

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Snowmobile Special Service Tools - Quiet Models

PART NO.	DESCRIPTION
378103	Flywheel Puller
404032	Wrench - Primary Drive
*	Truarc Pliers
426020	Ring Compressor
383966	Spring Winder
*	Heli-Coil Installers & Inserts
375632	Spark Plug Wrench
114146	Splined Wrench
113971	Flywheel Holding Tool
162282	Drive Alignment Gauge
261906	Disassembly Tool (Primary Drive)
261132	Retaining Ring - Bearing Puller
261131	Half Steel - Bearing Puller
261129	Extractor - Crankshaft Bearing
317829	Driver
317830	Cone
604659	Air Gap Gauge

*Refer to the Tool Catalogue

SPECIFICATIONS

O 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 . . . . . 107 inches
Width . . . . . 37 inches
Height . . . . . 44.9 inches with windshield
37 inches without windshield
Engine . . . . . OMC 2-cycle opposed twin
Rating . . . . . Maximum 30 hp at 5800 rpm
Starter . . . . . Electric and manual
Variable speed drive . . . . . Centrifugal operated sheave engages V-belt
Overall ratio . . . . . 5 to 1
Final drive . . . . . ASA 35 double chain
Sprocket ratio . . . . . 16 to 42
Reverse transmission . . . . . Dog clutch and bevel gears
Mufflers . . . . . Tuned mufflers for quiet operation
Brake . . . . . Disc type, hand operated
Throttle . . . . . Thumb operated
Track . . . . . Polyurethane - Specially designed-fully adjustable
Width . . . . . 20.4 inches
Skis . . . . . Formed steel, equipped with shock-absorbing leaf springs and replaceable wear runners
Seating capacity . . . . . Two adults. Vinyl coated cover, molded urethane foam cushion
Hood . . . . . Molded fiberglass
Head lamp . . . . . Sealed beam GE 4002
Tail lamp/stop lamp . . . . . GE 1157
Tach and speedometer light OMC 262779
Fuel tank . . . . . Capacity 4.4 Imperial gallons, 5.5 U.S. gallons
Gasoline . . . . . Regular leaded
Lubrication . . . . . Evinrude or Johnson Lubricant (In Canada OMC 2-Cycle Motor Oil 50:1 Lubricant
Carburetor Needle Adjustment (Bendix Float Type Carburetor)
High speed . . . . . 1-1/4 turns off seat minimum
Low speed . . . . . 1 to 1-1/4 turns off seat
RPM Ratings
Idle . . . . . 1000 - 1200
Transmission belt engaging speed . . . . . Approx. 2500-2800
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 . . . . . 1700-2400 ohms
Lighting coil resistance . . . . . 1.3 ohms total both sides
Battery . . . . 12 volt Canada Prestolite No. 2920 U.S.A. Prestolite No. 9955X or equivalent with a minimum 32 ampere hour rating, and with a minimum of 2.2 minutes cold starting capacity at 150 amperes discharge, 0° Fahrenheit, and a 5-second voltage reading of 7.8 volts. Dimensions in inches are approximately 7-3/4 long, 5-1/8 wide and 7-1/4 high (to top of terminals). Weight dry 17 lbs., wet 21.4 lbs. Electrolyte to fill 0.44 U.S. gallons. Specify gravity 1.265
Engine
Bore and stroke . . . . . 2-3/4 x 2-1/4 inches
Piston displacement . . . . . 26.7 cubic inches (437 cc)
Compression ratio . . . . . 6.8 to 1
Cylinder compression . . . . . Minimum 105 PSI
Ring diameter . . . . . 2-3/4 inches
Ring thickness . . . . . 1/16 inch
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 & Rod Ends to Steering Column	3/8-24		18-20
Nut	Cable to Solenoid		36-60	
*Screw	Connecting Rod			29-31
*Screw	Crankcase		60-80	5-7
*Nut	Cylinder to Crankcase			18-20
*Screw	Engine to Engine Frame Assembly	3/8-16		33-38
*Nut	Exhaust Manifold to Cylinder	5/16-24		10-12
*Screw	Flangettes to Frame	3/8-16		20-25
*Nut	Flywheel			40-45
*Screw	Engine Frame to Main Frame	3/8-16		18-20
*Nut	Front and Rear Truck Axles	5/8-18		35-45
*Screw	Idler Axle to Frame	3/8-16		20-25
Setscrew	Locking Collar	#10-32	25-35	
Bolt and Nut	Rear Axle Pivot	5/16-24		12-15
Setscrew	Rear Sprocket	3/8-16		18-20
Nut	Rear Suspension to Frame	5/16-24		12-15
*Nut	Runner to Ski	5/16-18	90-100	
*Nut	U Bolt to Saddle			10-12
*	Spark Plug			20-25
*Nut	Throttle Cable Adjusting Screw	5/16-18	60-80	
*Screw	Truck to Frame	3/8-16		25-30
*Screw	Truck to Frame	7/16-14		25-30
*Screw	Secondary End Cap to Shaft	3/8-16		22-25
Screw	Drive Sprocket	1/4-20		15-17
*Screw	Shifter Clevis to Pinion Shaft	1/4-28	160-180	
*Screw	Primary Sliding Sheave to Hub	1/4-20		7-10
*Bolt	Primary End Cap to Main Shaft	3/4-16		90-100
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

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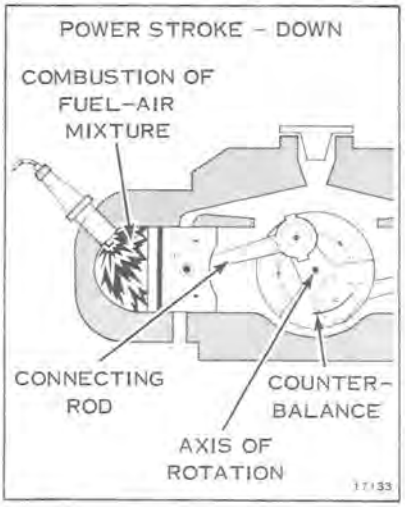

Figure 3-1

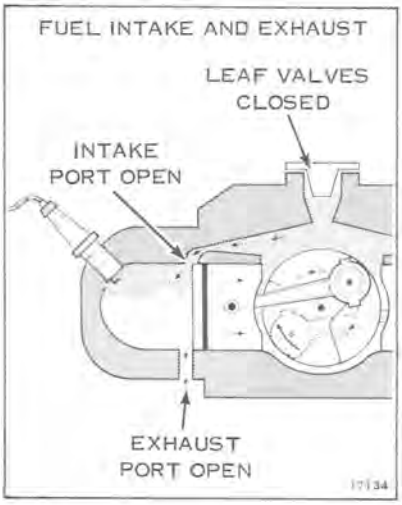

Figure 3-2

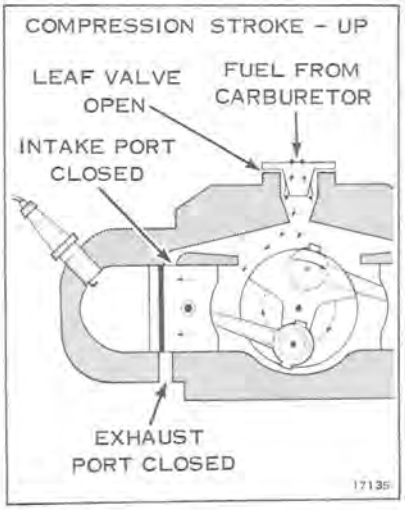

Figure 3-3

TWO CYCLE ENGINE THEORY

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

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

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

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

COMPRESSION

The pistons and piston rings perform two functions. They compress the mixture of fuel and air in the cylinders before ignition, and receive the force of the power after ignition. For maximum compression, the cylinder must be round and the piston and piston rings correctly fitted to it. The rings must be properly seated in the ring grooves and free to expand against the walls of the cylinder. The rings will not retain the 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.

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.

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 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.

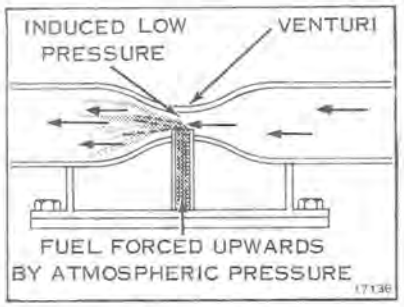

Figure 3-4

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 slow with an even flame. However, when gasoline is combined with air to form a vapor, the mixture becomes highly flammable and burns very fast. To obtain best results, the fuel and air must be correctly proportioned and thoroughly mixed. Fuel is atomized by spraying thru a nozzle into an air stream. This is the function of the carburetor.

The atomized mixture is later vaporized in the carburetor barrel, intake manifold and crankcase.

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.

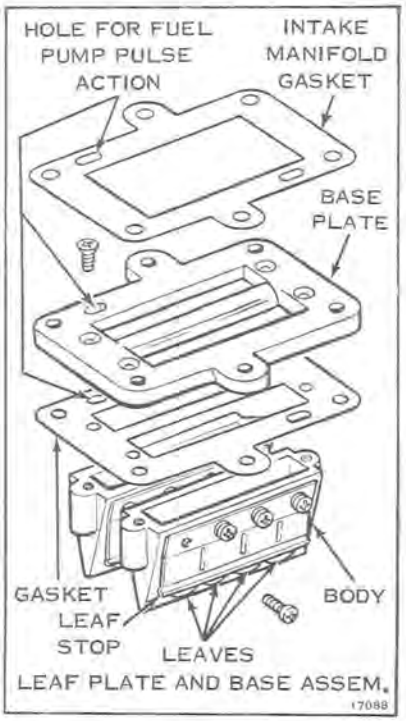

Figure 3-5

The carburetor is essentially a simple metering device. Needle valves permit a precise amount of fuel to flow to the carburetor throat. A small chamber holds the fuel before it is consumed by the engine. Nozzles in the carburetor throat extend down into the fuel chamber. The upstroke of the piston creates a suction which draws air through the leaf valves and the carburetor throat. At a particular point the throat is restricted by a venturi (see Figure 3-4). The venturi has the effect of reducing the pressure in the air stream, creating a partial vacuum which draws fuel from the nozzle. As the atomized mixture is rushed along to the firing chamber, it is swirled about in the air stream and vaporized.

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 to restrict the flow of air. When the choke valve 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 leaf valves 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 leaf valves 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.

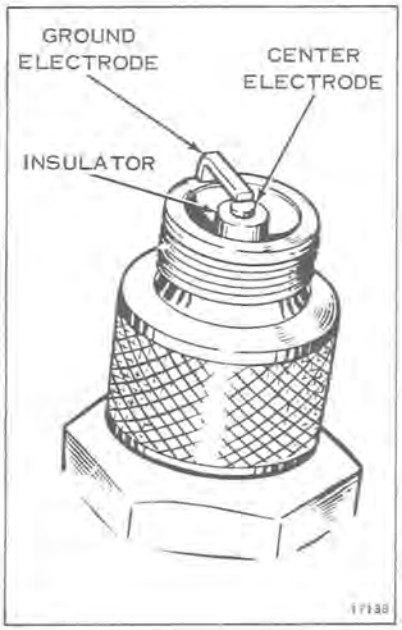

Figure 3-6

IGNITION

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

The (C.D.) 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 assembly
6. Ignition coils
7. Spark plugs

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

REFERENCE PICTURE

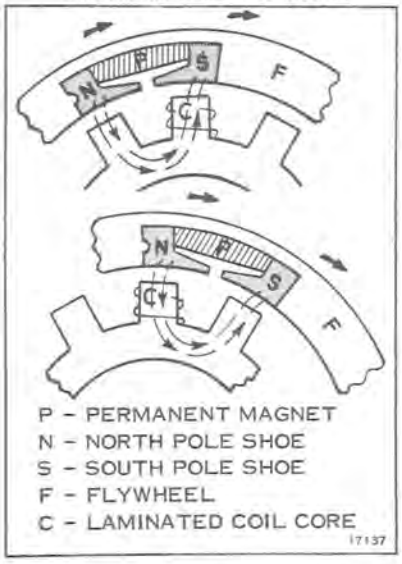

Figure 3-7

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. 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 and causes an electronic switch in the Power Pack 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. At RPMs over 900 the advance sensor coil generates enough voltage to turn on the electronic switch in the Power Pack before the retard sensor does. So, we have an automatic electronic advance built into the system.

An added feature of this snowmobile is the idle speed switch on the carburetor. Closing the throttle closes the idle speed switch which shorts out the advance sensor. This will cause the engine ignition system to immediately fire in the retard position.

The ignition coil primaries receive the capacitor discharge voltage from the Power Pack, and induces a secondary voltage high enough to fire across the spark plug gaps.

LIGHTING SYSTEM

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

This alternating current output is converted to direct current by a diode bridge rectifier and used to charge the battery. Direct current from the battery is then used to power the headlamp and taillamp, and the electric starter motor.

The alternator output is automatically increased to maximum charge when lights are turned on.

A. Neutral Lockout Plunger
B. Emergency Starting Sheave
C. Garter (Activating) Spring
D. End Cap
E. Movable Half of Sheave
F. Transmission Belt
G. Fixed Half of Sheave
H. Crankshaft
I. Ball Bearing
J. Spring Cup
K. Compression Spring
L. Neutral Lockout Balls
M. Splined Shaft
N. Bolt, End Cap to Splined Shaft
O. Spring
P. Neutral Lockout Rod
R. Spring

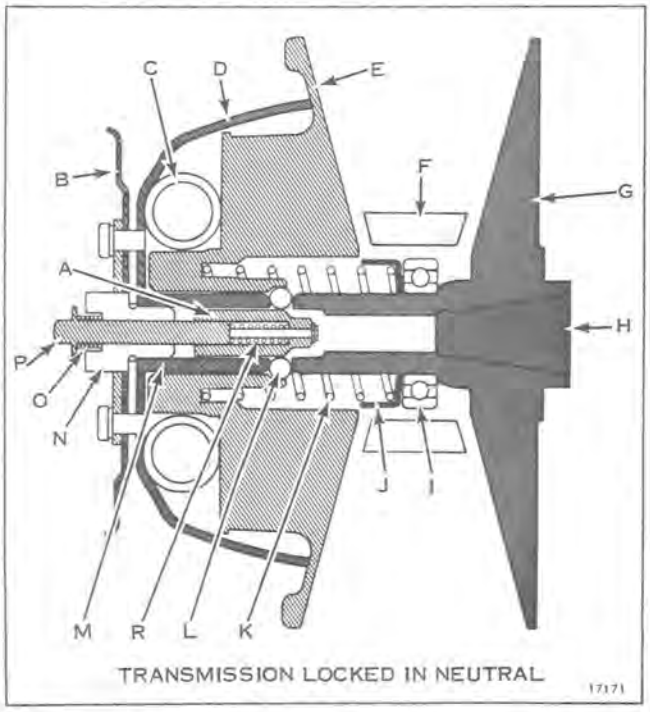

Figure 3-8

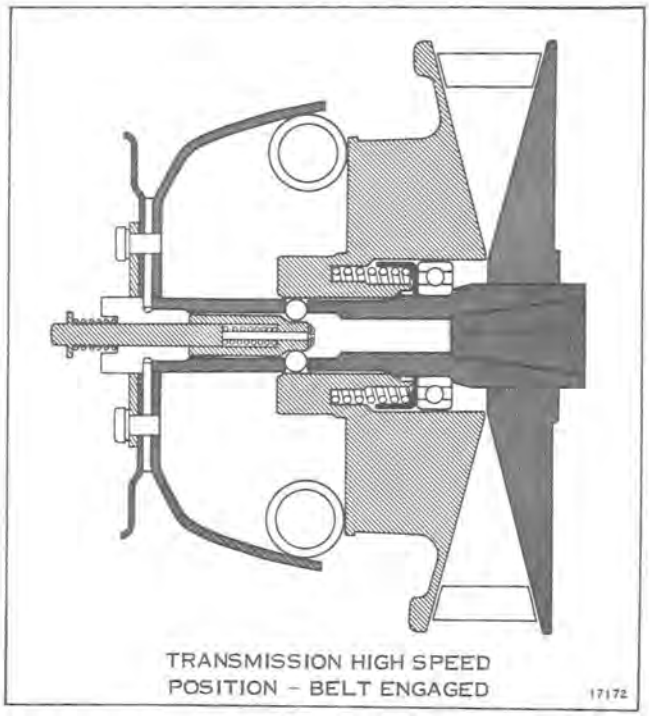

Figure 3-9

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 2800 rpm. When the engine is rotating at idle speed or below 2500 to 2800 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.

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 is spring actuated and will engage only when the engine is below approximately 2000 rpm.

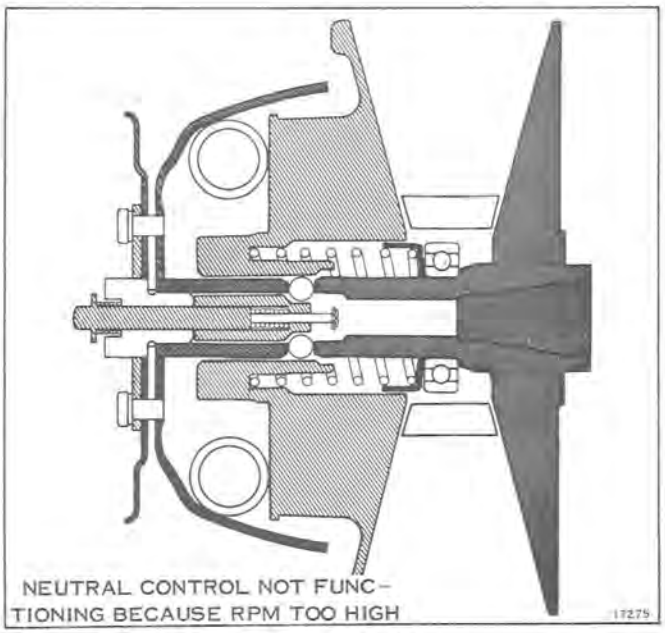

Figure 3-10

When the engine is running above approximately 2000 rpm, the garter spring will expand by centrifugal effect. See Figure 3-10. The garter spring will then ride up the ramp of the end cap and push the movable sheave toward the fixed sheave. In doing this, the movable sheave has covered the holes in the splined shaft. When the neutral lockout rod (P-Figure 3-8) is now pushed in, the spring loaded plunger (A-Figure 3-8) cannot move in because the moveable sheave now covers the neutral lockout balls. Spring (R-Figure 3-8) will therefore be compressed as shown in Figure 3-10. If the engine speed is now reduced to below 2,000 rpm, the garter spring will close and allow the movable half of the sheave to move away from the fixed sheave. Spring (R) will then push the plunger inward. The neutral lockout balls will then move outward, through the splined shaft. The movable sheave will now be locked in the neutral position. See Figure 3-8.

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 raise the transmission ratio and provide a higher torque to the drive chain and track.

The drive ratio varies from 3.3 to 1 in low to .67 to 1 in high which yields an overall drive range of approximately 5 to 1. Power is transmitted from the secondary sheave assembly through a drive chain to the front axle.

The ratio between the secondary sheave assembly and the front axle is 16:42.

REVERSE TRANSMISSION

The reverse gear is designed as part of the secondary drive. In "Forward" gear, the input shaft drives the output shaft directly by means of a "dog" type clutch. IN "reverse" gear, the dog clutch is released while a gear set engages to reverse rotation of output shaft.

☐ NOTE

Shifting must be done with the engine at idle and machine at rest.

COOLING

Cooling air is drawn thru louvers on the right side of the instrument panel. It is then passed thru openings under the manual starter and pushed over the engine and thru the cooling fins. The warmed air is discharged thru louvers on the left side of the instrument panel. See Figure 3-11.

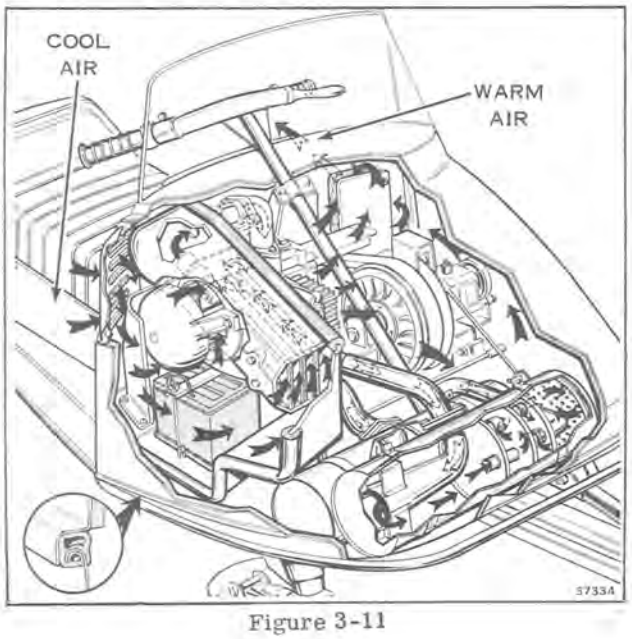

Figure 3-11

SECTION 4
TROUBLE SHOOTING

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DESCRIPTION

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

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

Any service operation can be broken down into three steps:

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

Familiarity with the factors which affect two-cycle engine performance is important in making a correct service diagnosis. Factors which affect engine performance include the quality of the fuel and fuel mixtures, compression, 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 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 Packterminals #1 and #3 reversed

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

   d. Advance sensor faulty or out of adjustment

   e. Power Pack faulty

5. No spark one cylinder

   a. Faulty ignition coil, wire, or connections

   b. Faulty Power Pack

6. No spark both cylinders
   a. Faulty charge coil
   b. Faulty sensor coil
   c. Faulty Power Pack
   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 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 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 ring bent or burred
   b. Starter housing bent
   c. Grease on pawls or spring
   d. Dry starter spindle

STARTING - ELECTRIC STARTER

1. Starter cranks too slowly
   a. Weak battery
   b. Loose or corroded connections or ground connection
   c. Starter belt slipping
   d. Faulty starter solenoid or solenoid wiring
   e. Worn armature brushes or spring
   f. Faulty field or armature (shorted or open windings)
2. Starter will not crank engine
   a. Weak battery
   b. Loose or corroded connections or ground
   c. Broken wire in harness or connector
   d. Faulty ignition key switch
   e. Faulty starter solenoid or solenoid wiring
   f. Moisture in starter motor
   g. Broken or worn brushes or broken brush spring
   h. Faulty field or armature (shorted or open windings)

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. See NOTE page 9-3.

j. Arcing around ignition coils or arcing in ignition switch

k. Loose connections or intermittent grounding of leads in the: ignition coil, Power Pack, charge coils, sensor coils, ignition switch and idle 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, 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)

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 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

K. Idle switch

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, sensor coils and idle switch

8. Spark on only one cylinder
   a. Ignition coils
   b. Power Pack output

9. Engine will start and idle, but quits on accelerating
   a. Check advance sensor coil and leads
   b. Check Power Pack output
   c. Check timing
   d. Check idle switch

10. Transmission belt flips over in sheaves
   a. Sheaves are out of alignment (see Section 10)

SECTION 5
TUNE-UP PROCEDURES

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DESCRIPTION

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

FACTORS AFFECTING PERFORMANCE

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

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

FUEL SYSTEM

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

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. Function of compression release
2. Function of brake
3. Engine performance
4. Ski alignment and handling
5. 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 is spring actuated, and 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. Thoroughly lubricate snow machine (see Section 12).

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

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

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

m. Repeat test run on vehicle. Check carburetor needle adjustments.

n. 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.

o. 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.

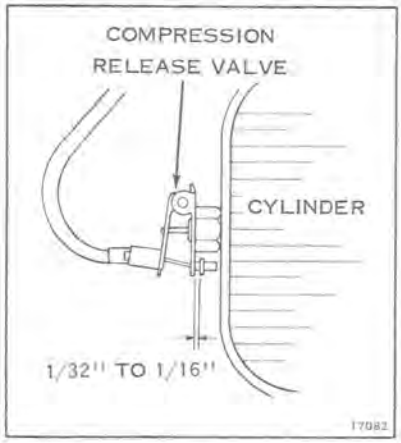

Figure 5-1

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.

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.

REFERENCE PICTURE

Figure 5-2

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

Turn high speed needle valve in until lightly seated. Back out (counterclockwise) 1-1/2 turns. See Figure 5-3. Start engine and allow warm up time of 2-3 minutes. Push choke knob in all the way. Drive snowmobile at full throttle to observe engine performance. Observe all safety warnings while driving.

1. Setting is too lean if engine misses, backfires, or runs rough. Open high speed needle an additional 1/8 turn (counterclockwise). Repeat this test procedure until engine begins to 4-cycle (load up). At this point turn high speed needle 1/8 turn in (clockwise) until smooth engine performance is obtained.

2. Setting is too rich if engine 4-cycles (loads up and fires on every other cycle) resulting in a loss of power. Turn high speed needle in 1/8 turn (clockwise) until smooth engine performance is obtained.

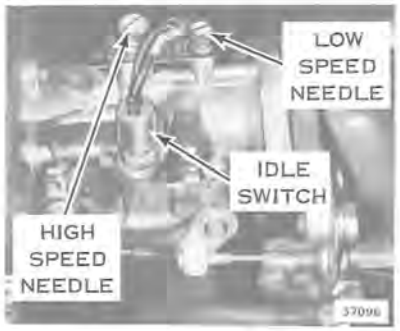

Figure 5-3

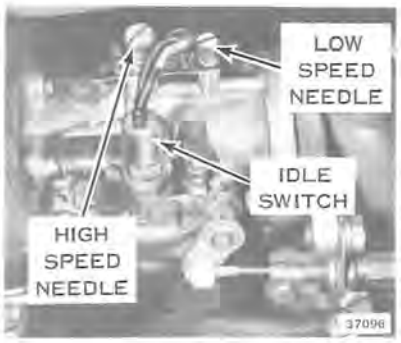

Figure 5-4

LOW SPEED NEEDLE (See Figure 5-4)

1. Pre-set "low speed needle valve" 1-1/2 turns open.
2. Engage neutral lockout and set parking brake in lock position.
3. Start engine and allow warm up time of 2 or 3 minutes. If engine will not idle, adjust idle switch as outlined below. After engine is warm, push choke knob in all the way.
4. 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 until engine accelerates properly.
5. 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 switch" to attain 1000-1200 rpm each time low speed needle is adjusted, as outlined below.

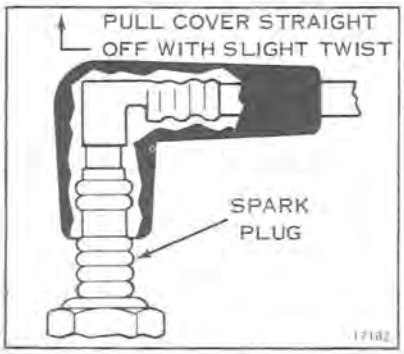

Figure 5-5

IDLE ADJUSTMENT SWITCH (See Figure 5-4)

The idle adjustment switch mechanically controls the idle speed and electrically controls the spark retard or advance. Use following procedure for changing idle speed:

1. Disconnect the idle switch connector which can be reached thru the instrument panel door.
2. Turning the idle switch clockwise increases idle speed; turning switch counterclockwise decreases idle speed.
3. Tighten jam nut, reconnect the connector to idle switch and check the engine idle speed for 1000-1200 RPM.

SAFETY WARNING

Operating above recommended idle rpm can result in neutral control not operating. If it is necessary to idle at above recommended rpm, check operation of neutral control to insure it is functioning properly. See page 3-6.

SAFETY WARNING

Snow vehicles should not be run at full throttle when rear end of vehicle is raised off the ground.

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 5-5. Remove spark plugs for inspection or replacement as necessary. See Figure 5-6.

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 7-15 for additional information on spark plugs.

SECTION 6
FUEL SYSTEM

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DESCRIPTION

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

FUEL FLOW

Fuel is drawn from the fuel tank by the fuel pump, which is operated by changes in crankcase pressure. These changes in crankcase pressure are transmitted to the fuel pump via the pulse line. The filter element removes water, dirt, or other impurities from the fuel before the fuel passes through the pump or carburetor. The primer assembly, operated from the control panel, injects raw fuel into the crankcase before starting (see Figure 6-1).

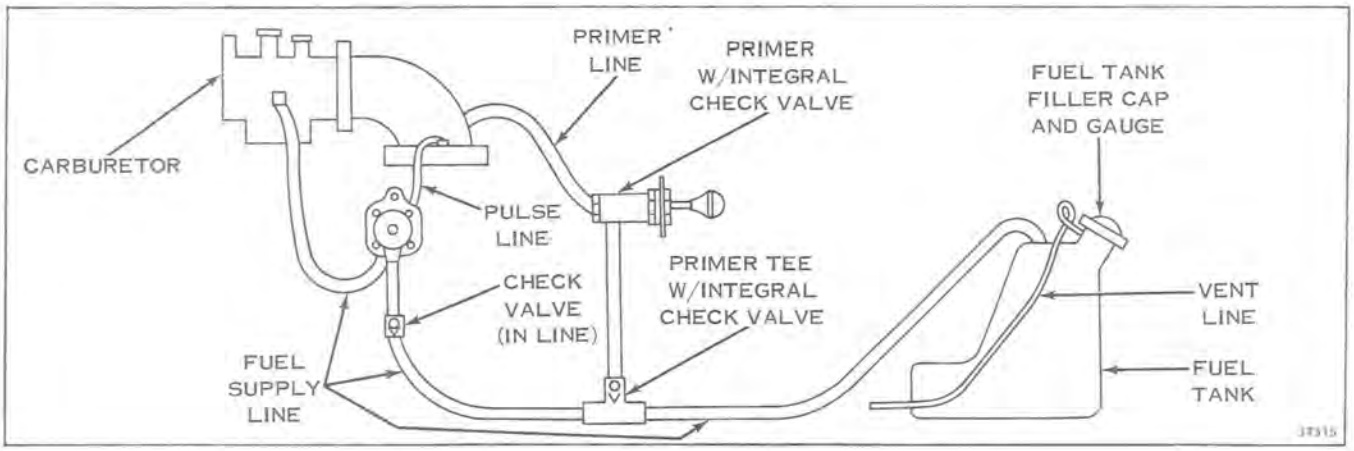

Figure 6-1

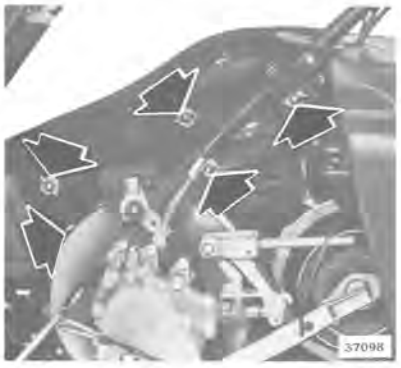

Figure 6-2

CARBURETOR

The carburetor used on this snowmobile is the float type Bendix. The carburetor should be cleaned and inspected at regular intervals, depending on service conditions.

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

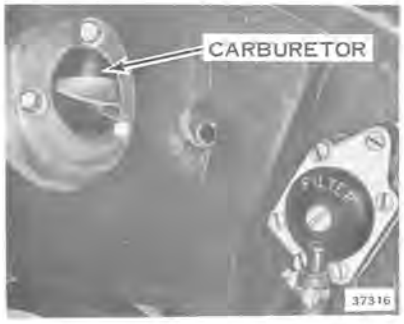

Figure 6-3

REMOVAL

1. Remove (5) wing nuts from the back of air duct. See Figure 6-2.
2. Remove air silencer from air duct.
3. Remove (3) nuts supporting carburetor to air duct. See Figure 6-3.
4. Disconnect idle switch connector through access door on instrument panel. See Figure 6-4.
5. Disconnect throttle and choke cable.
6. Remove (2) bolts holding carburetor to manifold.
7. Push back on air duct and pull carburetor straight out. See Figure 6-4.

DISASSEMBLY (See Figure 6-5)

1. Remove high speed jet assembly and gasket. Float bowl can now be removed.
2. Remove hinge pin. Float and spring. Inlet needle and clip can now be removed.
3. Remove float bowl gasket.
4. Remove inlet needle seat and gasket.
5. Remove high speed needle and spring, low speed needle and spring and instruction plate.

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.

Figure 6-4

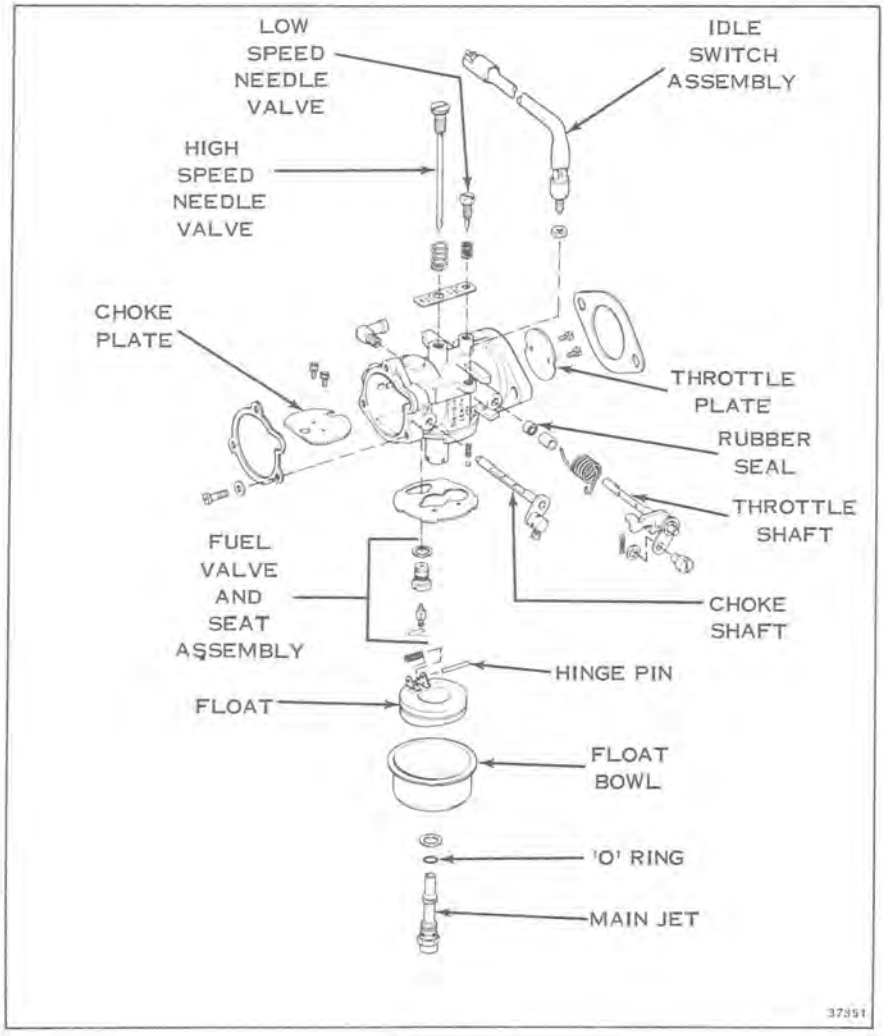

Figure 6-5

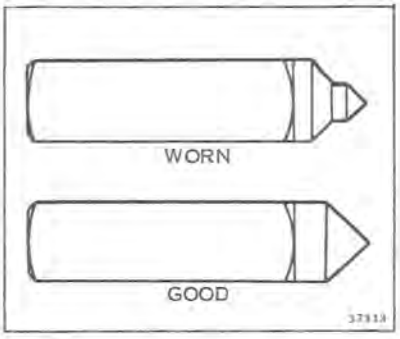

Figure 6-6

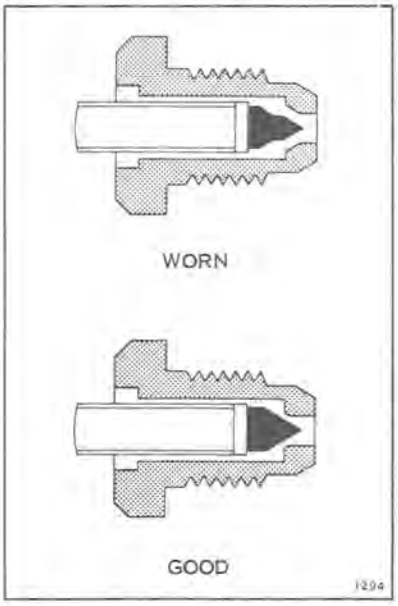

Figure 6-7

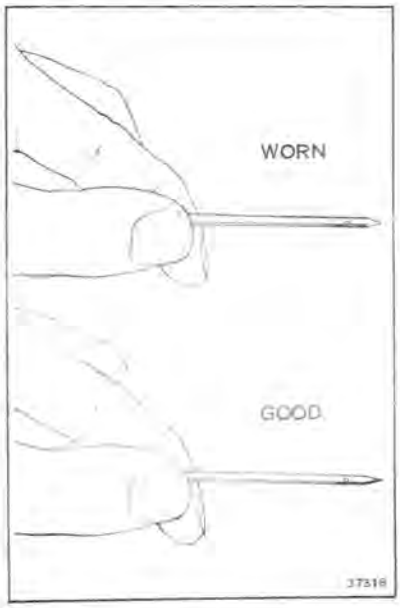

Figure 6-8

CLEANING, INSPECTION AND REPAIR

General Instructions

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

Inlet Needle Valve and Seat

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

b. Check the needle valve seat with a magnifying glass; if seat is nicked, scratched, or worn out-of-round, it will not give satisfactory service. See Figure 6-7. The valve seat and needle are a matched set; if either is worn, both parts must be replaced. Use a new gasket when reinstalling the needle seat.

High and Low Speed Needle Valves

a. Inspect the tapered end of the needle valves for grooves, nicks, or scratches; replace if necessary. See Figure 6-8. Blow through lower end of high speed needle valve to make sure it is open to orifice at top end of valve stem.

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

High Speed Jet

a. Check for open orifices in tube. Use new gasket and "O" ring on reassembly.

Carburetor Body

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

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

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

REASSEMBLY OF CARBURETOR

General Instructions

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

Reassemble carburetor in reverse order of disassembly. See section 5 for adjustment of needle valves. Check choke and throttle for free operation. Check for correct positioning of float. Turn carburetor body upside down so weight of float closes inlet needle. Top of float should be parallel and 1/16" above gasket surface. If adjustment is required, use long nosed pliers to bend the tab that contacts the inlet needle.

REASSEMBLY OF CARBURETOR TO ENGINE

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

b. Install fuel line to carburetor. See procedure on page 6-7 for installing new fuel line tie straps.

LEAF VALVES

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

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

c. Inspect the leaf valve assembly and disassemble if necessary (see Figure 6-9). Special caution is necessary in disassembling the leaf valve assembly. DO NOT damage or interchange the leaves.

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

e. The leaves are designed to maintain contact with the leaf valve body, and to spring away from the leaf 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 OMC 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 6-9.

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. Remove (5) wing nuts from back of air duct. See Figure 6-10.

b. Remove air silencer from air duct.

c. Remove (2) screws holding fuel pump to air duct. See Figure 6-11 and 6-12.

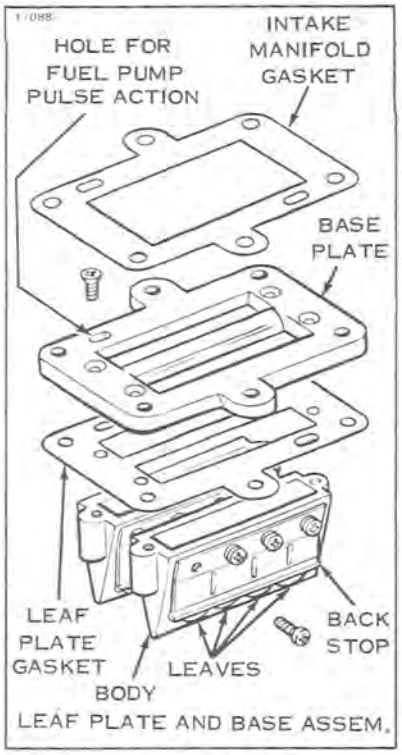

Figure 6-9

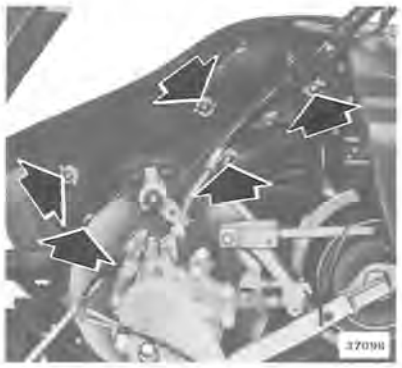

Figure 6-10

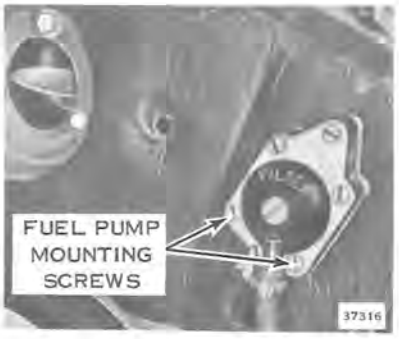

Figure 6-11

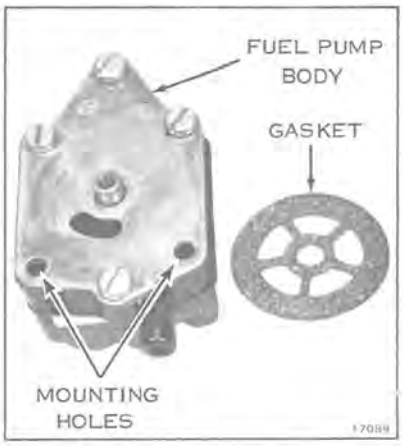

Figure 6-12

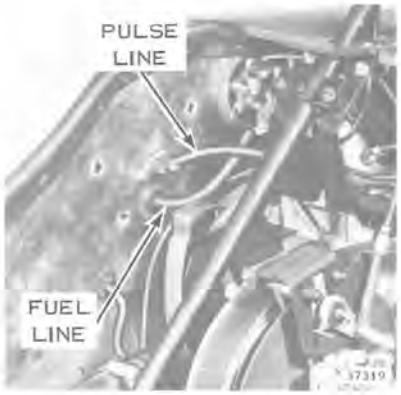

Figure 6-13

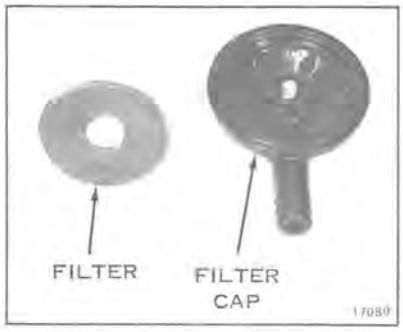

Figure 6-14

Figure 6-15

d. Remove (2) fuel hoses and pulse line from fuel pump. See Figure 6-13.

NOTE

Filter assembly may be removed for cleaning and inspection without removing pump assembly by removing filter cap screw (see Figure 6-14). 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

Assemble in reverse order of removal.

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.

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).

FUEL TANK

a. For correct fuel and lubricant mixtures see Section 12.

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

c. Use following procedure to remove fuel tank:

1. Remove two plastic plugs in rear of chassis. See Figure 6-15.

2. Remove two Rawl nuts thru holes in rear of chassis. See Figure 6-15.

3. Remove two screws securing back rest to chassis. See Figure 6-16.

4. Remove two slotted screws securing strap to chassis. See Figure 6-17.

5. Remove spring strap. See Figure 6-17.

6. Remove fuel hoses.

7. Tank can now be removed from chassis.

d. Clean the tank by pouring some gasoline into the tank through a filtering funnel. Shake the tank and contents and empty the contents through the fill opening. Then reinstall the tank and hoses. 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.-102 Silastic Adhesive Sealant on adapter threads and immediately install to fuel tank.

e. Install tank in reverse order of removed.

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

Figure 6-16

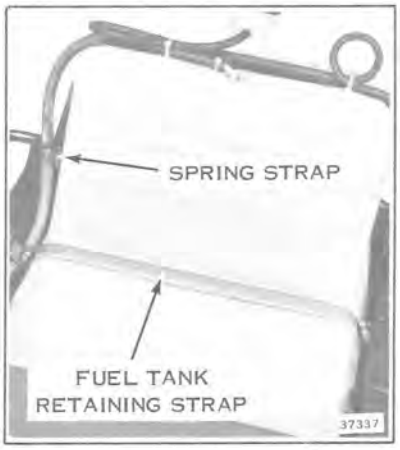

Figure 6-17

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 6-18.

c. Snug up the head on the strap per Figure 6-19.

d. Tighten head on strap with pliers as illustrated in Figure 6-20.

SAFETY WARNING

- Never remove a fuel hose without first removing the tie rap clamp. Never attempt to install a fuel hose with a tie rap pre-assembled. Always assemble the tie rap after the fuel hose is assembled to the nipple. Improper assembly could result in a leak. All reassembled tie raps should be located in the original assembled location.

Figure 6-18

Figure 6-19

Figure 6-20

SECTION 7
IGNITION AND ELECTRICAL SYSTEMS

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WIRING DIAGRAMS ..... AT BACK OF MANUAL

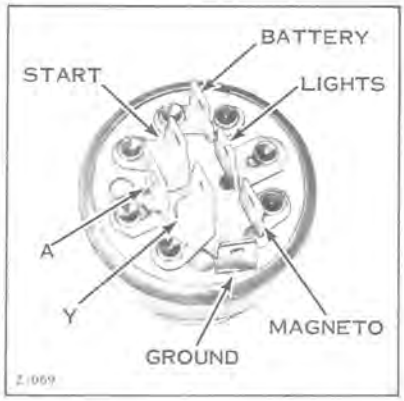

Figure 7-1

DESCRIPTION

The ignition system is made up of the following major components; flywheel assembly, sensor rotor, stator and charge coil assembly, sensor plate assembly, Power Pack IS assembly, ignition coils and idle switch adjustment. 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.

The electrical system consists of the alternator coils, headlamp, taillamp, stoplamp, ignition switch, kill button, dimmer switch, wiring, storage battery, electric starting motor, starter solenoid, and rectifier. The alternator coils produce alternating current which changes in frequency and voltage in proportion to engine speed. This alternating current output is rectified (changed to direct current) by a full wave diode bridge rectifier and used to charge the battery. Direct current is then used to power the headlamp and taillamp and the electric starter motor. See wiring diagram at the end of manual.

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

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 700-V0A Merc-O-Tronic. See Figure 7-9A.
7. Peak reading Kilovolt meter model 172 Merc-O-Tronic. See Figure 7-9B.

Figure 7-2

NOTE

DO NOT use a test instrument having more than a 12 volt source to check rectifier diodes.

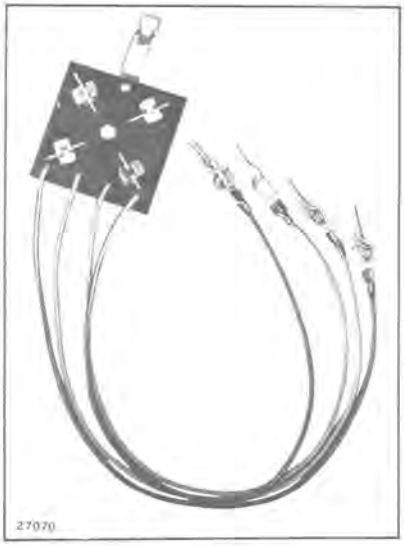

Figure 7-3

Figure 7-4

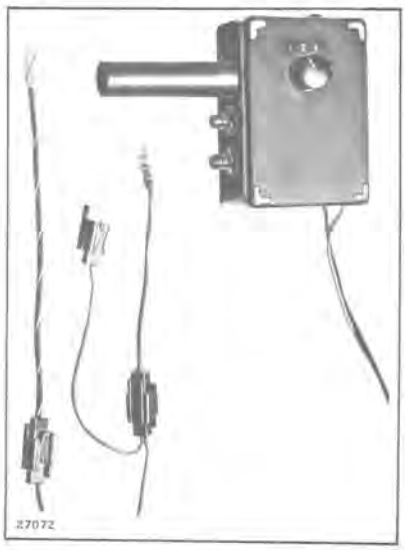

Figure 7-5

Figure 7-6

Figure 7-7

MERC-O-TRONIC
Figure 7-8

STEVENS
Figure 7-9

Figure 7-9A

Figure 7-9B

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 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 system to any voltage source other than what is specified. You might damage the system.

NOTE

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

NOTE

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

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

NOTE - IGNITION TEST RECOMMENDATIONS are as follows;

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 7-10. (See optional Kilovolt test page 7-26.)
C. Crank engine with electric starter or manual starter (with ignition switch in "RUN" position). Remove plugs for easier cranking.
   1. Strong steady spark from both coils, system is good.
   2. Weak, erratic or no spark from one ignition coil, switch ignition coil leads on Power Pack - repeat test. Spark on same cylinder still erratic replace coil. Spark on opposite cylinder erratic replace Power Pack.
   3. Weak, erratic or no spark from both coils, go to test (#2).

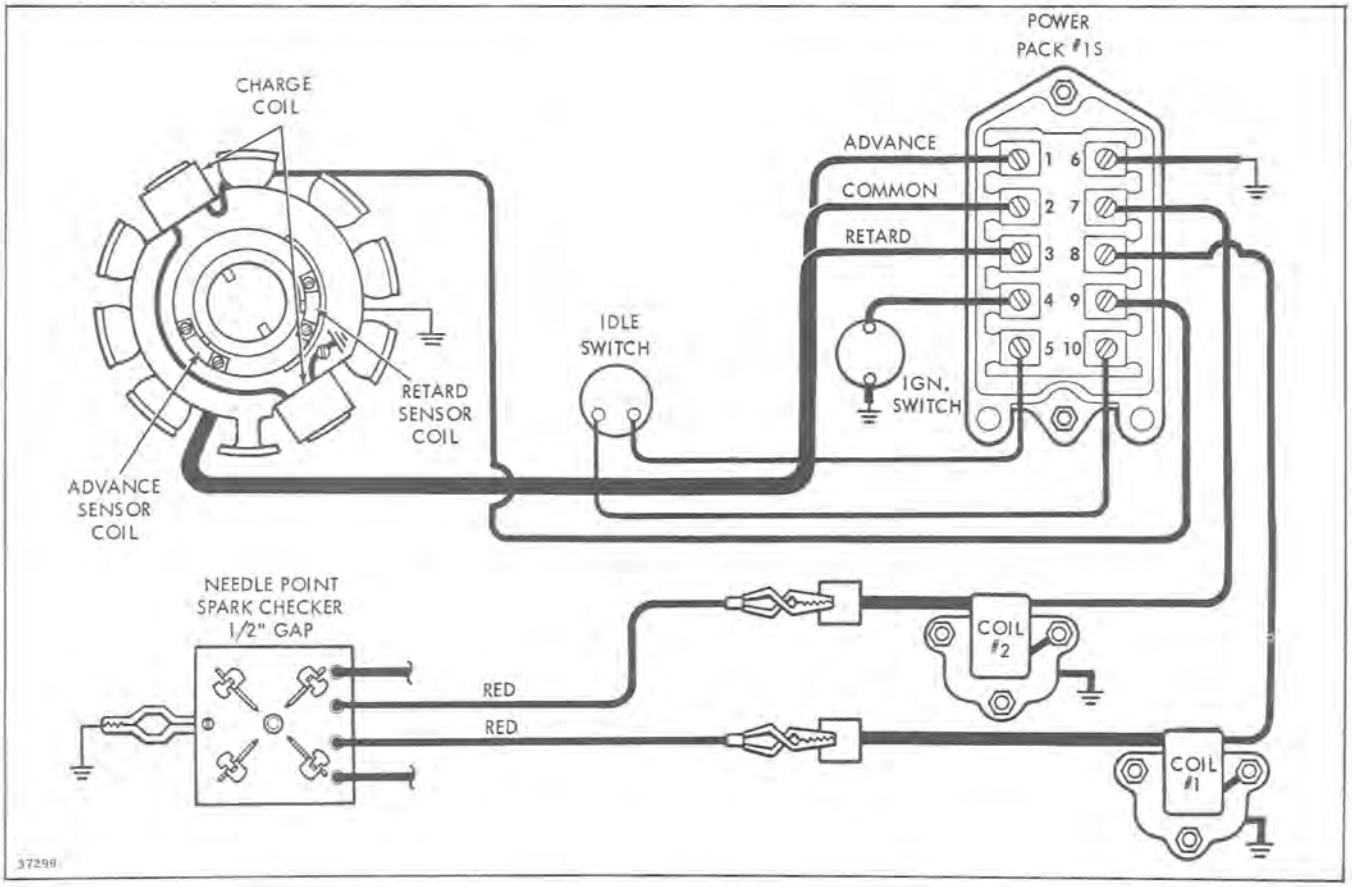

Figure 7-10

TEST #2 IGNITION SWITCH CONTINUITY GROUND CHECK

A. Pull high tension leads off spark plugs.

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

C. Crank engine with electric starter or manual starter (with ignition switch in "RUN" position). See Figure 7-11.

D. If weak, erratic, or no spark, disconnect ignition switch lead on Power Pack terminal #4. Repeat test, cranking engine with manual starter.

E. If spark is strong and steady, check leads going to ignition switch for grounds and check ignition switch (Test #2A).

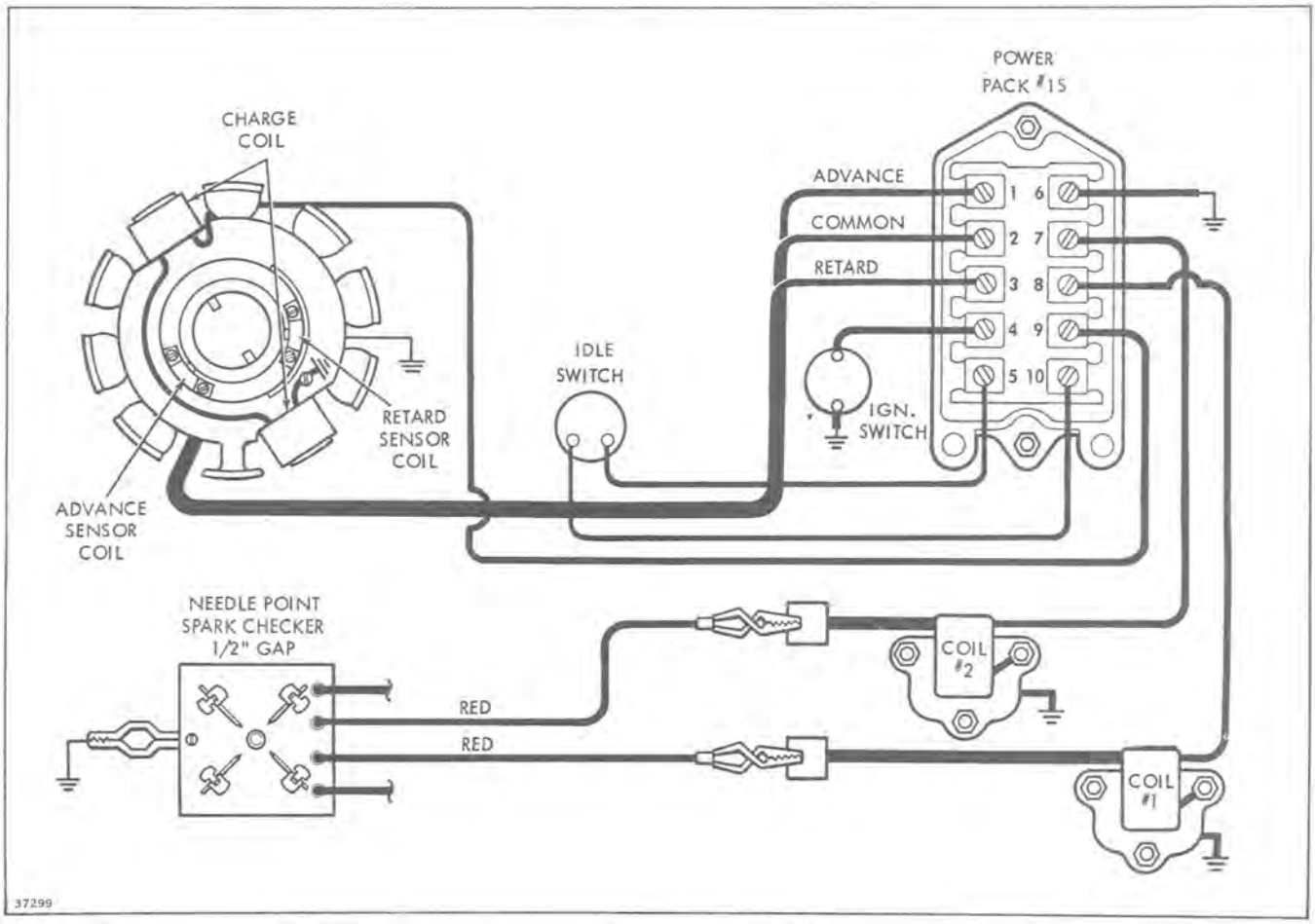

Figure 7-11

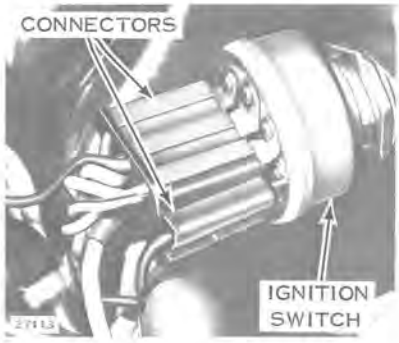

Figure 7-12

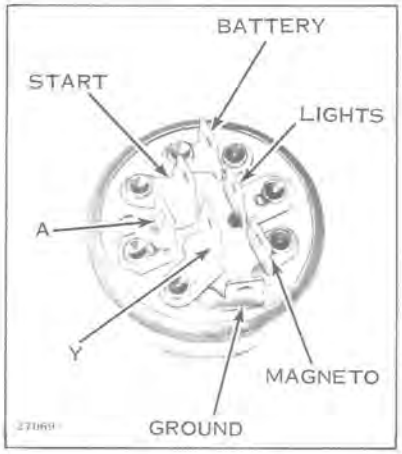

Figure 7-13

TEST #2A IGNITION SWITCH CHECK

A. Disconnect orange/black lead from Power Pack terminal #4. See Figure 7-14. Crank engine; if spark present go to step "B." If no spark go to Test #3.

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 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 #4 on Power Pack.

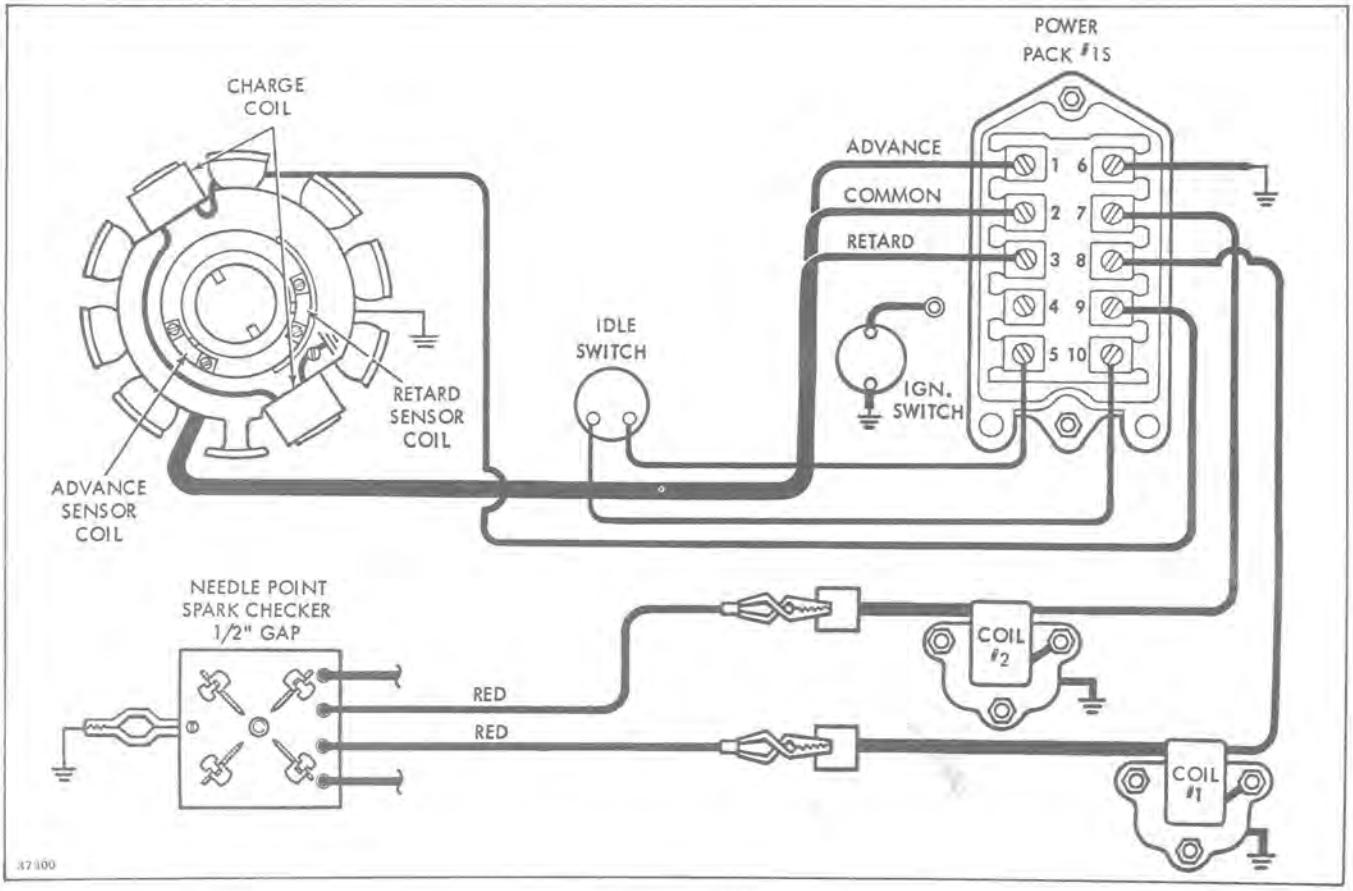

Figure 7-14

TEST #3 POWER PACK 1S OUTPUT CHECK

A. Remove ignition coil orange primary leads from terminals #7 and 8 of Power Pack.

B. Use neon tester S80 or M80. Set rotary switch on tester to position #1. Hook tester black lead to Power Pack terminal #7 and tester blue lead to engine ground. See Figure 7-15.

C. Depress load button "A" and crank engine with electric starter or manual starter (with ignition switch in "RUN" position) and observe light. See Figure 7-15.

1. If light, check ignition coils, test #9.
2. Repeat step "B" using Power Pack terminal #8.
3. If no light, reconnect ignition coil primary leads to terminals #7 and #8 on Power Pack. Go to next Test #4.

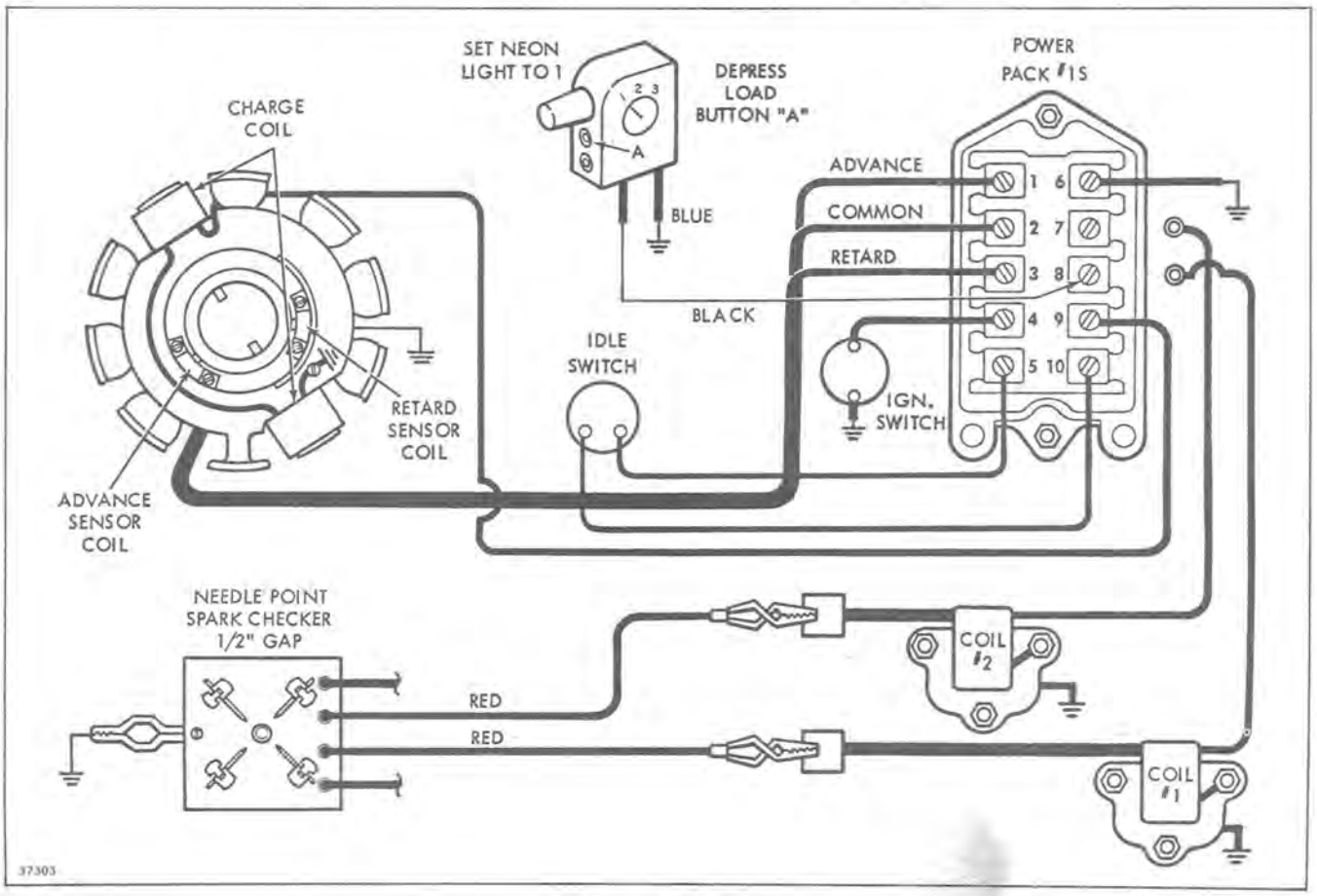

Figure 7-15

TEST #4 CHARGE COIL OUTPUT CHECK

A. Remove charge coil lead from Power Pack terminal No. 9.

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 7-16.

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

D. Crank engine with electric starter or manual starter (with ignition switch in "RUN" position) and observe neon tester light. See Figure 7-16.

1. If light, charge coils are good.

2. If no light, check for grounding or open leads to charge coils. Also check charge coils for correct resistance (Test #8).

E. Reconnect charge coil lead to terminal #9 on Power Pack.

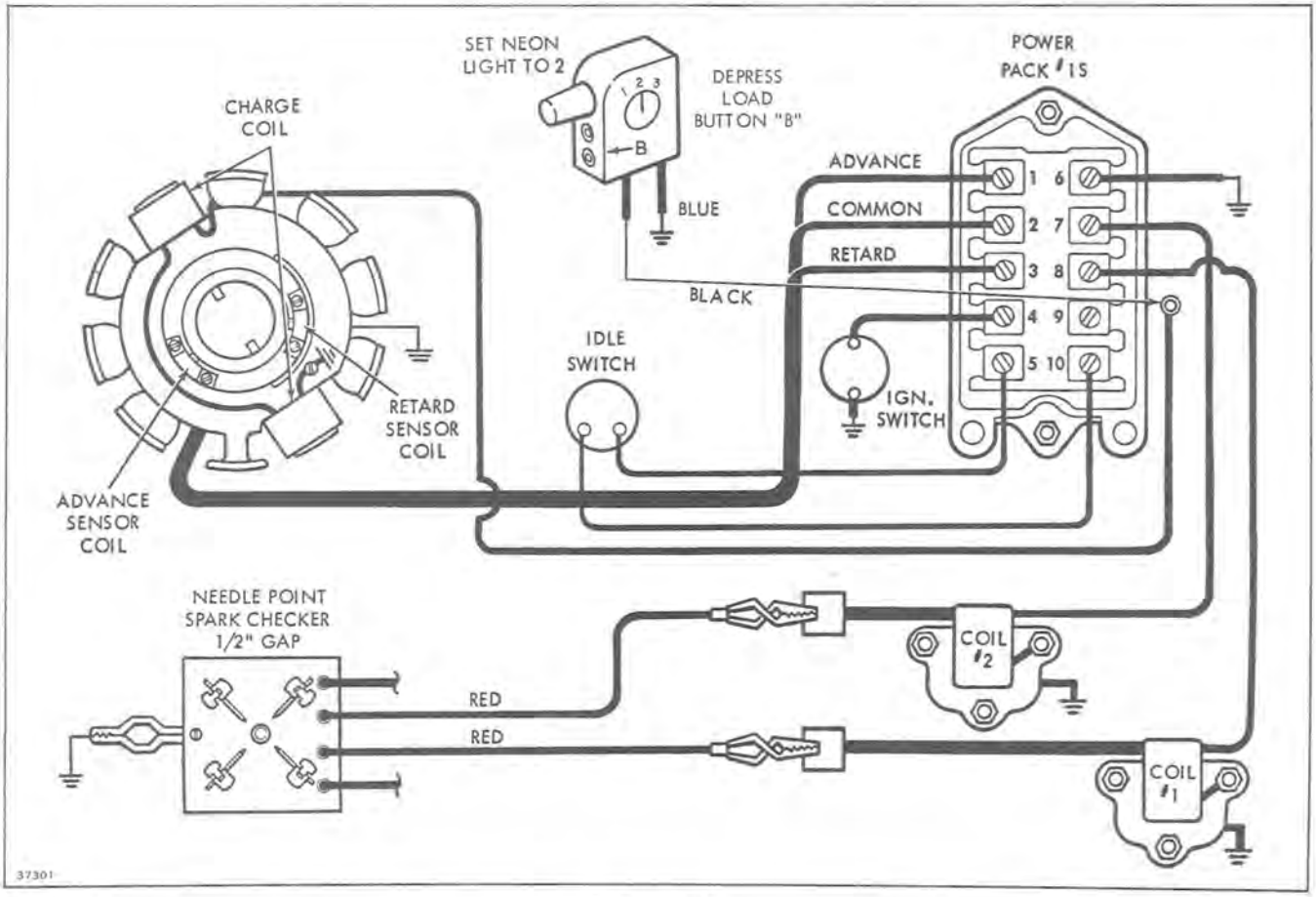

Figure 7-16

TEST #5 RETARD SENSOR COIL INPUT CHECK

A. Remove retard sensor white/green stripe lead and advance sensor lead white/black strip from Power Pack terminals #1 and #3. (Do not allow leads to touch ground.) See Figure 7-17.

NOTE

Test voltage output of S80 or M80 Battery output must be above one volt.

S80 OR M80 INTERNAL BATTERY TEST

1. Set rotary switch to position #3.
2. Use a voltmeter.
3. Connect positive lead of voltmeter to black lead of S80 or M80.
4. Connect negative lead of voltmeter to blue lead of S80 or M80.
5. Depress load button "B" on S80 or M80 output must be above one volt.

B. Connect neon tester S80 or M80 black lead to Power Pack terminal #3 and blue lead to sensor common (terminal #2). Set rotary switch to position #3. See Figure 7-17.

C. Crank engine with electric starter or manual starter (with ignition switch in "RUN" position) and at same time rapidly tap neon tester load button "B." See Figure 7-17.
   1. If there is apark across both gaps, check retard sensor leads and check sensor coil for correct resistance (Test #7).
   2. If there is no spark on both coils, Power Pack is defective.

D. Reconnect sensor leads #1 and #3 on Power Pack.

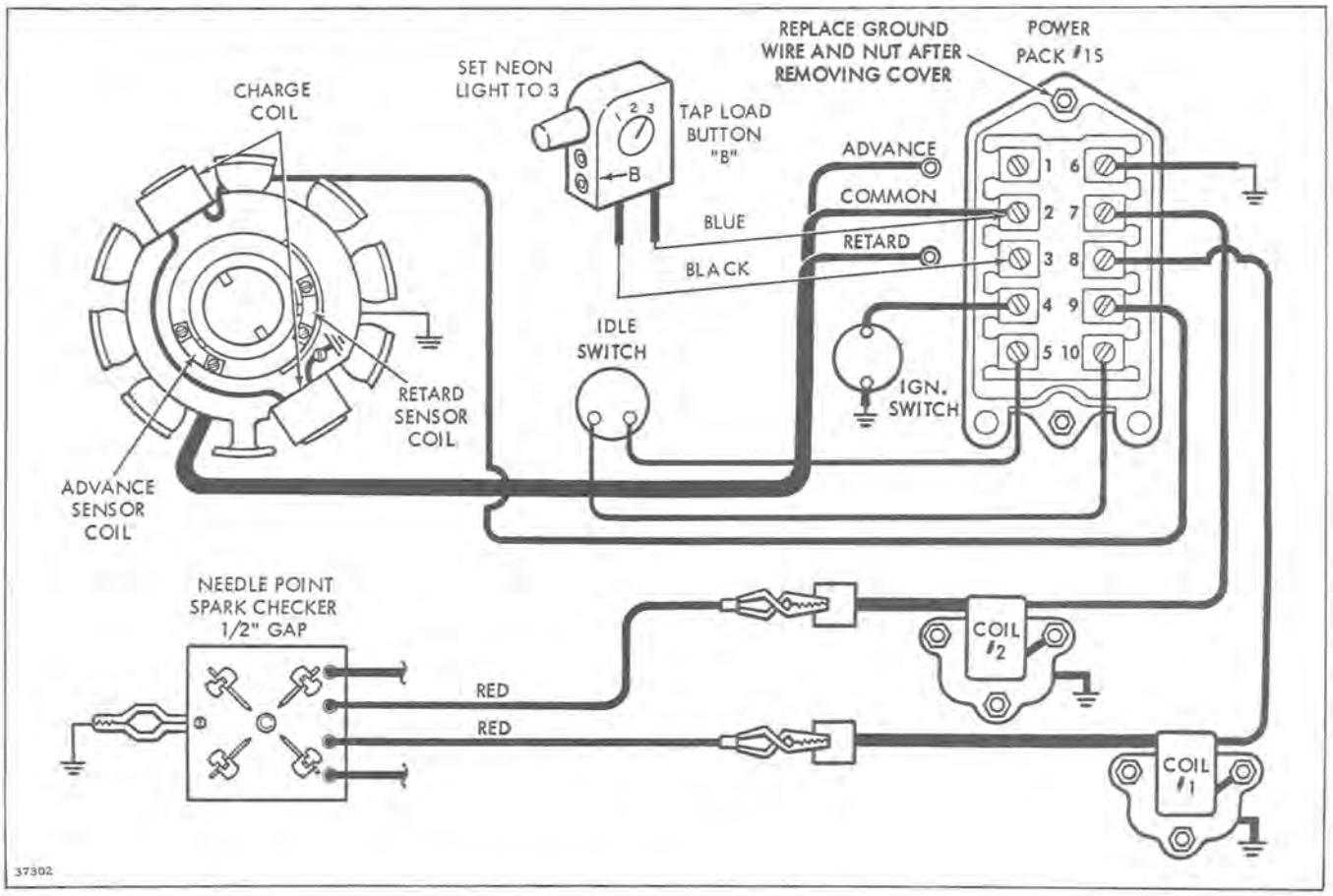

Figure 7-17

TEST #6 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, Power Pack IS or idle switch. If previous tests on the Power Pack were positive, a resistance check of the advance sensor coil should be made. (Idle Switch Test Page 7-25.)

A. Remove the white/black stripe lead from terminal #1 of the Power Pack IS, the black/white stripe lead from terminal #2, and the white/green stripe lead from terminal #3. Check for 14 to 16 ohms resistance between leads #1 and #2. 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 #7 RETARD SENSOR COIL RESISTANCE CHECK

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, Power Pack or idle switch. If previous tests on the Power Pack were positive, a resistance check of the retard sensor coil should be made. (Idle Switch Test Page 7-25.)

A. Remove the white/black stripe lead from terminal #1, the black/white stripe lead from terminal #2 and the white/green stripe lead from terminal #3. Check for 27 to 29 ohms resistance between leads #3 and #2. 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 #8 CHARGE COIL RESISTANCE CHECK

A. Remove the brown/white stripe lead from Power Pack terminal #9. Check for a total resistance of the two charge coils from lead to ground 875 ± 75 ohms. If resistance of the charge coils does not come within these tolerances, they must be replaced.

TEST #9 IGNITION COIL CONTINUITY, POWER AND INSULATION CHECKS

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 coils.

Graham Tester Model 51

Maximum Secondary	1900 ± 190 ohms
	Resistance test too low for reading on recommended test equipment.
Maximum Primary 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

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 7-18. 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 7-19. 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 7-20. Arcing will be apparent wherever the insulation has broken down, due to moisture or carbon trails.

NOTE

1. Do not permit test probe to linger too long at any point while conducting this test.
2. Complete test as rapidly as possible, as this is a severe test on a coil.

TEST #10 IGNITION TIMING CHECK

RETARD TIMING CHECK

Connect timing light to 12 volt battery. Remove spark plugs to release compression for easier manual turning of engine. Clamp the timing light electronic pick-up on a spark plug wire. (Arrow on pick-up must point toward spark cap.) 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 timing 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 Figure 7-21.

Figure 7-18

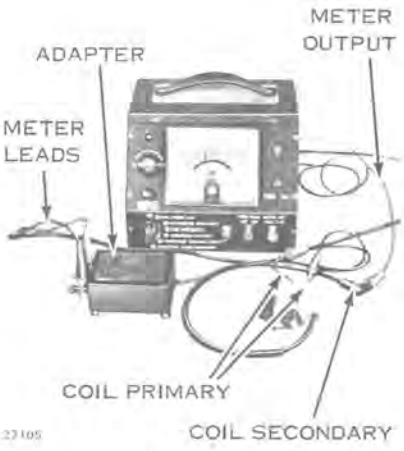

Figure 7-19

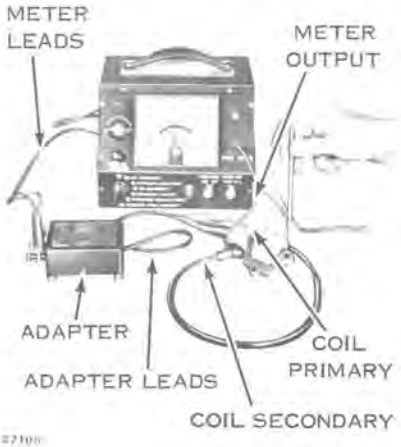

Figure 7-20

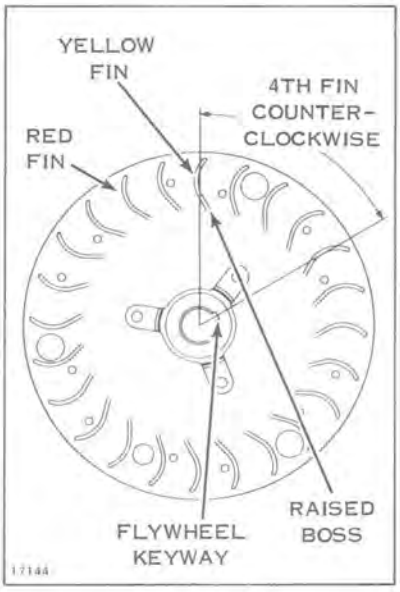

Figure 7-21

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 7-21.

ALTERNATOR AND IGNITION SYSTEM REPAIR

DISASSEMBLY

a. Remove battery. See Figure 7-22.

b. Remove (3) bolts securing battery box to air duct.

c. Remove (5) wing nuts on the back of air duct.

d. Remove air silencer.

e. Remove (3) screws manual starter.

f. Remove manual starter.

g. Remove (3) screws air duct to carburetor.

h. Remove fuel pump hoses.

i. Remove ratchet.

j. Remove grommet and positive lead from air duct assembly.

k. Remove air duct.

l. Remove eight screws and separate outer fan housing from inner fan housing. See Figure 7-23.

m. Hold flywheel with bar from flywheel puller, and turn flywheel nut off crankshaft. Remove lockwasher. See Figure 7-25.

n. Secure flywheel puller (Service Tool #378103) to flywheel with 5/16"-8 screws and remove flywheel from crankshaft. See Figure 7-25.

o. The charge coils, alternator coils and sensor coils are now accessible for servicing. See Figure 7-26.

Figure 7-22

Figure 7-23

p. The wave washer and rotor can now be removed. See Figure 7-26.

q. Remove 4 screws holding alternator and charge coil assembly to stator plate. Assembly can now be removed from stator. See Figure 7-27. Sensor coils can now be removed for replacement if necessary.

r. Remove two screws, and sensor plate assembly can be removed. See Figure 7-28.

REASSEMBLY

a. Assemble in reverse order of disassembly.

b. Install rotor and wave washer. If sensor coils were removed, check for .010" gap between rotor and advance sensor coil. Use OMC Air Gap Gauge No. 604659. Torque sensor screws 12-16 inch pounds.

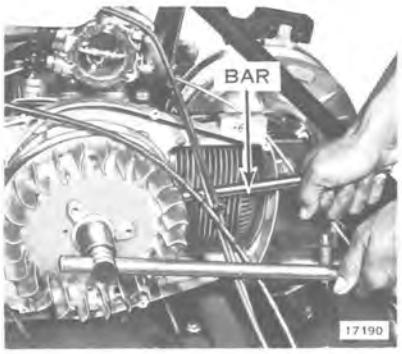

Figure 7-24

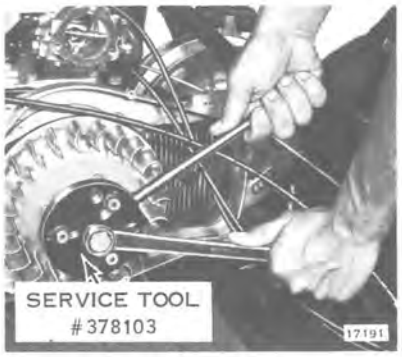

Figure 7-25

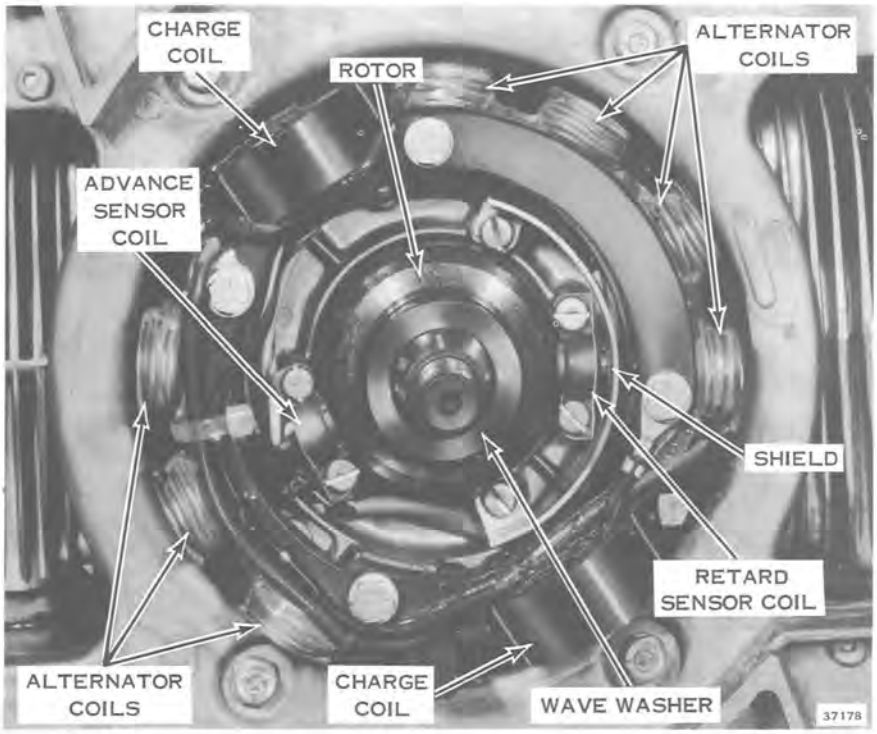

Figure 7-26

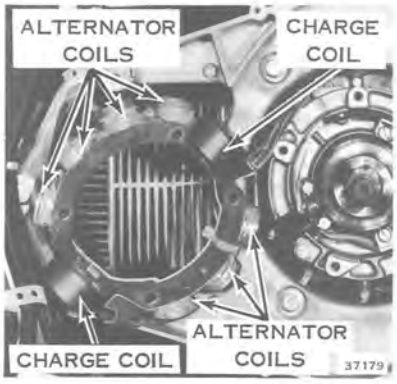

Figure 7-27

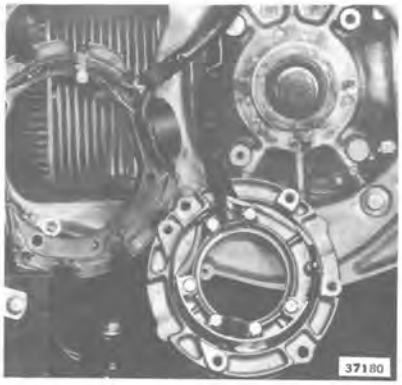

Figure 7-28

c. Install alternator and charge coil assembly.

d. Install fan housing assembly.

e. Install flywheel. See Figure 7-29.

f. Place washer and flywheel nut in position. Hold flywheel with bar and torque flywheel nut to 40 - 45 foot pounds. See Figure 7-30.

g. Reassemble remaining parts in reverse order of disassembly.

Figure 7-29

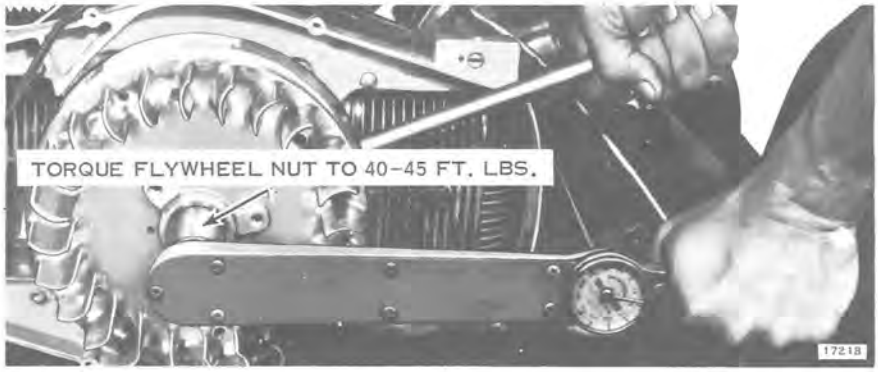

Figure 7-30

IGNITION TIMING

Ignition timing is fixed. Therefore, if timing is found to be off in test #10, 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 7-31). 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

Figure 7-31

Figure 7-32

Figure 7-33

plug performance if plugs are cleaned at regular service intervals. See page 4-3 for a discussion on spark plug heat range.

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 7-32).

b. A dark, black or sootish coloration, or wet appearance, ordinarily indicates the heat range as being too cold (see Figure 7-33). 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 7-34).

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 7-34

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

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

After the plug has been cleaned, adjust the gap to .028 to .033 inch by bending the side electrode. Adjust only the side electrode, as attempting to bend the center electrode will crack the insulator. Use a round wire feeler gage to measure gap adjustment (see Figure 7-35).

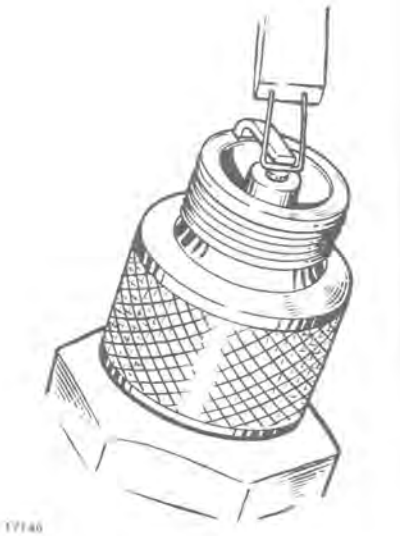

Figure 7-35

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.

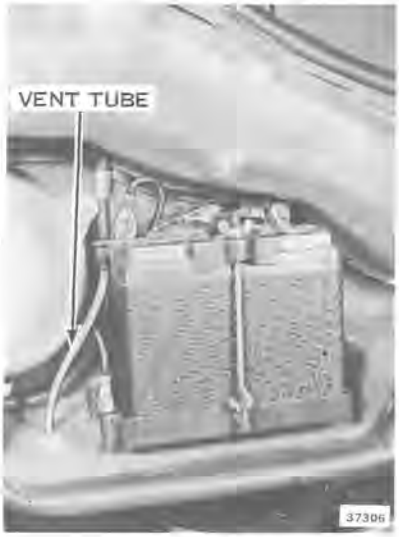

Figure 7-36

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.

BATTERY

NOTE

Electric start model snowmobiles should not be started and operated with battery not connected in circuit. Operation without battery can damage rectifier and tachometer. If snowmobile must be operated without battery, disconnect the stator three way twin lock connector (curved connector).

DESCRIPTION

The battery's primary function is to provide power to operate the starting motor; however, the battery also supplies power to operate the lights when the engine is not running at higher speeds. The storage battery is a secondary chemical generator - one that produces an electric current by chemical action after having been charged from an outside source. Each cell in the storage battery consists of a negative plate of sponge lead and a positive plate of lead peroxide immersed in a solution of water and sulphuric acid. After being charged, each cell will produce a voltage of about 2.1 volts. Six cells, connected in series, are assembled in a case to make up a 12-volt battery.

SPECIFICATIONS

Due to the extreme weather and temperature conditions under which the battery must operate, proper battery selection is very important. The battery recommended for best performance is a 12-volt, 32 ampere hour battery, or better, with a minimum of 2.2 minutes cold starting capacity at 150 amperes discharge, 0° Fahrenheit, and a 5-second voltage reading of 7.8 volts. It is important to remember that a customer's complaint of poor starting may be traceable to a battery not having these recommended specifications. The dimensions are 7-3/4" long x 5-1/8" wide x 7-1/4" high (to top of terminals).

The Prestolite brand battery, which is included with this vehicle, is recommended and is manufactured for snow vehicle use. Anchored elements reduce the possibility of vibration damage. This battery is manifold vented. It does not have vented cell caps, and vented caps should not be used on this battery. A vent tube from the battery manifold exits through the snowmobile chassis. The dangerously explosive hydrogen gases generated when charging or jumping a battery are therefore vented a safe distance from the hazard of spark at the battery terminals. Check vent tube periodically to make sure that it is not pinched, clogged, or ruptured. The battery is shipped dry. It is activated with dry charge electrolyte available locally. Replacement battery is Prestolite Part No. 2920 in Canada and 9955X in the USA.

REMOVAL AND INSTALLATION

Filler caps must be tight and plastic tube outlet extended below battery for manifold system to function correctly. See Figure 7-36.

Prior to removing battery from compartment, disconnect vent tube. Pull tube straight down to remove it from the battery. Reconnect vent tube when battery is replaced in vehicle. Push tube straight up into battery until seated.

SAFETY WARNING

Battery Electrolyte is a strong acid solution and should be handled with care. If Electrolyte is spilled or splashed on any part of the body, IMMEDIATELY flush the exposed area with liberal amounts of water and obtain medical aid as soon as possible.

Connect battery cables, making sure clamps are tight on battery posts to insure good contact. Apply a coat of petroleum jelly to exposed areas of the battery posts and clamp connectors to retard corrosion.

NOTE

Correct battery polarity is extremely important. Battery must be connected with negative (-) post (black lead) to ground and positive (+) post (red lead) to starter solenoid. If positive (+) post is connected to ground, damage to the charging system will result.

BATTERY SERVICING

Check outside of battery for damage or signs of abuse such as broken case or broken cover. Check inside of battery by removing vent caps and inspecting for low electrolyte level. If battery shows signs of serious damage or abuse, it should be replaced. Visually inspect the battery for the following:

1. Corrosion
2. Frayed or broken cables
3. Cracked case or cell covers
4. Loose hold down clamps
5. Low or overfilled electrolyte

BATTERY CARE

Check the following at regular intervals:

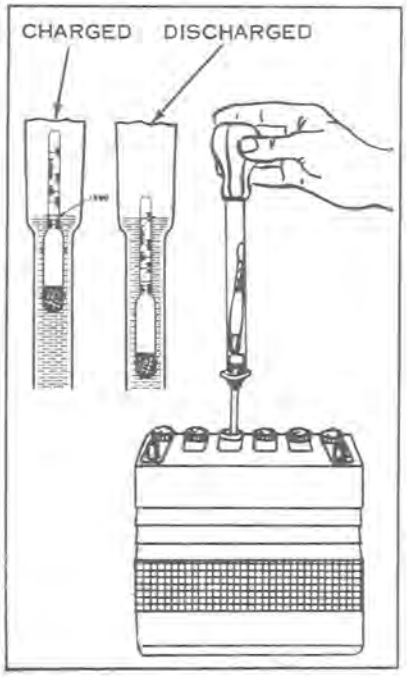

Figure 7-37

1. Clean battery top and terminals by washing with a solution of ammonia or baking soda. Keep caps tight so that solution does not enter cells. After washing, flush top of battery with clean water.
2. Keep battery terminal connections tight and free from corrosion. If corroded, clean cable terminals and battery posts separately with a soda solution and a wire brush. Inspect cables for fraying or broken strands.
3. Keep electrolyte above the plates and separators at all times. Adhere to manufacturer's instructions for maintaining fluid level. Check electrolyte and add distilled water as necessary at weekly or semi-monthly intervals. Never add acid except when it is definitely known that some has been lost by spilling. If water is added in freezing weather, charge the battery to full charge at once. Chargeing the battery will mix the water with the electrolyte and prevent water freezing in the battery.

   SAFETY WARNING

   Do not overfill, spilled acid may damage surrounding parts.
4. Keep the battery nearly fully charged at all times. Check the state of charge at frequent intervals by making specific gravity readings with a battery hydrometer (see Figure 7-37). Note that a hydrometer reading is not accurate if water has been added recently, due to the fact that the water may not be mixed with the electrolyte.

Self-discharge will cause storage batteries to become discharged and sulphated if they are not properly maintained in storage. To minimize self-discharge, store batteries in as cool a place as possible, so long as the electrolyte does not freeze. A battery which has been allowed to stand idle for a long period of time may be so badly damaged by sulphation that it can never be restored to a normal charge condition. Batteries should be recharged every 30 days to prevent this damage. Disconnect one of the battery leads before charging battery. If storage temperature is hot, more frequent charging will be necessary. Add water if necessary before charging, to bring electrolyte to proper level. Fully charged batteries have been known to withstand temperatures as low as -90° F.; a discharged battery will freeze at about -19° F., perhaps causing bursting of both the cell and battery cases.

5. Check manifold vent hose to see that it is not blocked.

BATTERY TESTING

a. Make sure battery is fully charged as described under SLOW CHARGING. Hydrometer readings taken on partially charged batteries are unreliable for the following test.

b. Measure specific gravity of electrolyte in each cell and compare readings with the following; if cell readings are between 1.250 and 1.290, the battery is ready for use. Any variation in the specific gravity between cells within this range does not indicate a defective battery. Readings should be corrected to 80° Fahrenheit for comparison. If this specific gravity of any cell falls outside this range (1.250 to 1.290), replace the battery.

BATTERY CHARGING

SAFETY WARNING

Gases given off by a battery being charged or jumped are highly explosive. Keep battery in a ventilated area and away from cigarettes and open flames when charging or jumping. Turn off battery charger before removing cables from battery. Remove cables from good battery first, when jumping.

For best performance a good battery should be fully charged before being returned to service. DO NOT recharge the battery by the fast charge method. This method does not restore the full charge and also shortens the life of the battery.

NOTE

DISCONNECT one of the battery leads before attaching battery charger to battery.

SLOW CHARGING

Battery is kept charged by alternator coils located beneath flywheel. It may be necessary to use a separate 12 volt battery charger occasionally to keep battery fully charged during long storage periods, or in extreme cold weather if engine is started repeatedly. Battery should be removed from compartment for charging and initial filling. Prior to removing battery from compartment, disconnect vent tube. Pull tube straight down to remove it from the battery. Reconnect vent tube when battery is replaced in vehicle. Push tube straight up into battery until it is seated. Adjust electrolyte to proper level by adding water, then charge battery at a maximum rate of 4 amperes until fully charged. Leave caps on battery while charging. Battery is fully charged when hydrometer scale shows a corrected reading of 1.260 and does not change after three hourly readings. Cells will gas freely when fully charged.

PRESTOLITE BATTERY WARRANTY

Warranty on Prestolite batteries used in this snowmobile is covered directly by Prestolite, through their authorized battery service stations, for a period of 18 months in the United States and 9 months in Canada. Should a battery fail, due to inherent defects, during the first three (3)

months of service, it will be replaced on a no-charge basis. Batteries that fail during the balance of the warranty period (15 months) in the U.S. and (6 months) in Canada will be replaced on a prorata basis.

In Canada Prestolite warranty should be handled through the dealer from whom the snowmobile was purchased or through a Prestolite battery depot.

The warranty period starts on the date the snowmobile is delivered to the original owner.

Should a battery fail, due to inherent defects, during the first three (3) months of service, it will be replaced on a no-charge basis. Batteries that fail during the balance of the warranty period (15 months) will be replaced on a prorata basis.

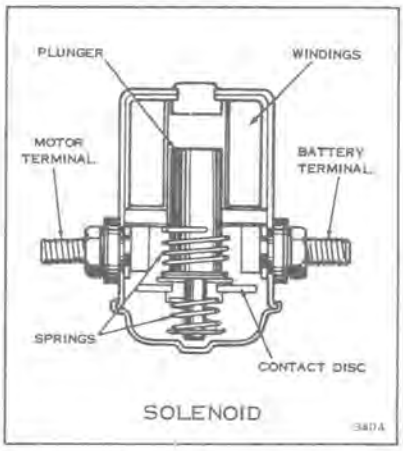

Figure 7-38

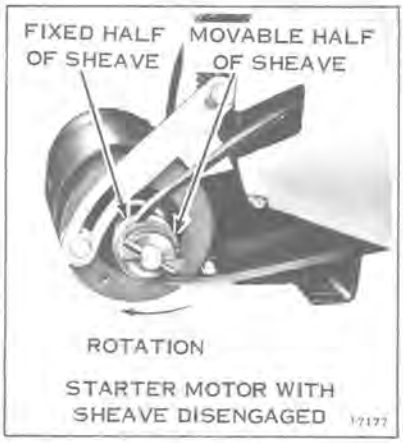

Figure 7-39

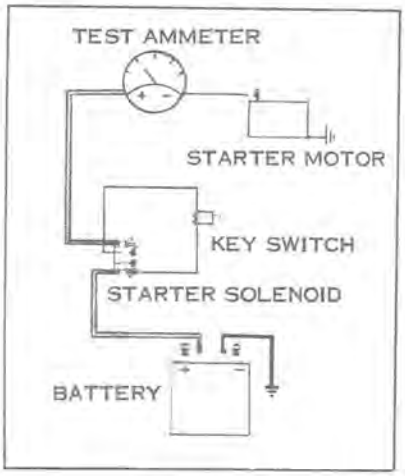

Figure 7-40

STARTER SYSTEM

DESCRIPTION

The electric starter system consists of the starter motor, starter solenoid, and the necessary cables and wires with their connectors. The starter motor converts electrical energy from the battery into mechanical power which is transmitted to the engine through the starter belt. The starter switch controls the operation by activating the starter solenoid which makes and breaks the high current circuit between the battery and the starter motor.

The starter solenoid (see Figure 7-38) closes the circuit through a movable contact disc which strikes two terminal contacts that are connected to the starter motor circuit. The solenoid winding, when energized, exerts a magnetic pull on the solenoid plunger, causing it to move the contact disc against the terminal contacts.

The starter motor sheave is disengaged when at rest and when engine is running. The rotation of the starter motor drives the pin on the motor shaft against the cam on the movable half of the sheave, forcing it to move in a lateral direction toward the fixed half of the sheave, engaging the starter belt. When the engine starts, the sheave is driven faster than the motor and sheave halves separate to the disengaged position. See Figure 7-39.

NOTE

Starter belt tension must be set with sufficient slack to prevent the engine from driving the starter motor. (See "BELT TENSION.")

MAINTENANCE

The only starter motor maintenance required is periodic cleaning of the outside of the starter motor and drive and a check of the starter belt tension. No periodic lubrication of the starter motor or solenoid is required. Starter motor need be removed for reconditioning only every 1000 hours or if the following tests indicate that the starter is not operating properly. If the starter motor does not crank the engine or if it cranks too slowly, check the battery, cables, and connections. Inspect all wiring connections in the starter circuit to insure that they are clean and tight. Proceed with the following tests if additional troubleshooting is necessary.

STARTER SYSTEM TESTING

The following tests fall into two groups, starter circuit tests and starter motor tests. Starter circuit testing is a quick means of pinpointing causes of hard starting which may result from a faulty electrical component in the starter circuit, and can be performed without removing any components from the engine. NOTE: All starter circuit testing must be done with a fully charged, 12-volt battery.

STARTER CIRCUIT TESTING

Starter Motor Amperage Draw Test

a. Ground spark plug high tension leads so that engine can be cranked without firing. Place clamp-on DC ammeter capable of reading at least 200 amperes around starter motor lead (see Figure 7-40).

b. Turn ignition switch to START and observe amperage reading with engine cranking. Current should be between 75 amperes minimum and 140 amperes maximum after initial surge.

NOTE

DO NOT operate starter motor for more than thirty seconds at a time without pausing to allow motor to cool for at least two minutes.

Starter Motor Available Voltage Test

a. Inspect battery and cables to make sure that battery has ample capacity for cranking. NOTE: Engine must be at normal operating temperature when test is made.

b. Ground spark plug high tension leads so that engine can be cranked without firing.

c. Connect a voltmeter across starter motor (see Figure 7-41), with positive (+) lead to starter motor terminal, and negative (-) lead to ground on starter frame.

d. Turn ignition switch to START to crank engine and observe voltmeter reading as quickly as possible.

NOTE

Avoid running starter motor continuously for more than 30 seconds during test to prevent overheating. Allow ample time between tests for starter motor temperature to normalize. Voltmeter readings will rise as starter temperature increases.

e. If starter motor turns engine at normal cranking speed with a voltage reading between 9.5 volts minimum and 10.5 volts maximum, starter motor is satisfactory. If available voltage reading at the starter motor is low, review the following chart for probable causes.

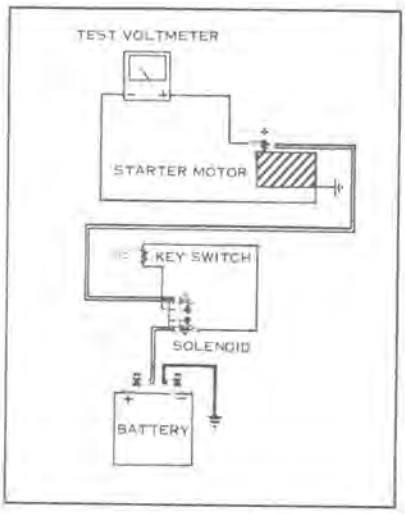

Figure 7-41

Starter System Voltage Drop Test

a. By making a systematic check from the positive battery terminal, through the starting circuit and back to the negative battery terminal, any component or electrical connection having excessive resistance, thus causing high voltage drop and subsequent hard starting, can be pinpointed (see Figure 7-42).

b. Ground spark plug high tension leads so that engine can be cranked without firing. Connect voltmeter and turn ignition switch to START to crank engine. NOTE: By placing voltmeter leads against battery, solenoid, and starter motor terminals rather than against connecting cable ends, each connection can be tested for high resistance along with component.

c. Clean and retighten, or replace, any connection, cable, or component having greater than specified voltage drop.

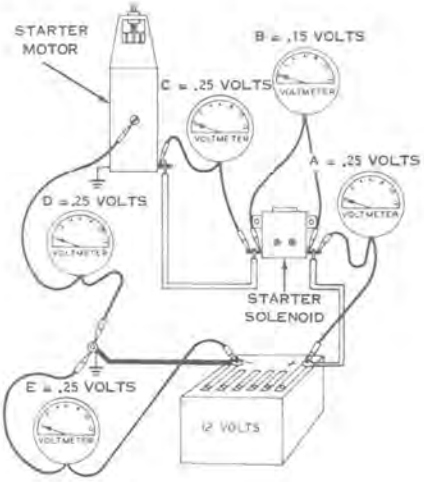

Figure 7-42

STARTER MOTOR TESTING

The no-load test is used to determine quickly the general mechanical and electrical condition of the starter motor. The stalled torque test is used to determine whether or not the starter motor has sufficient torque to crank the engine for fast starting.

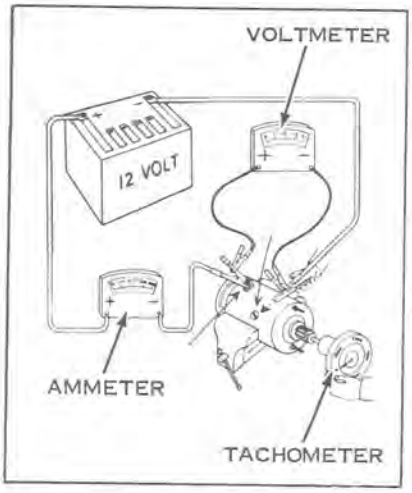

Figure 7-43

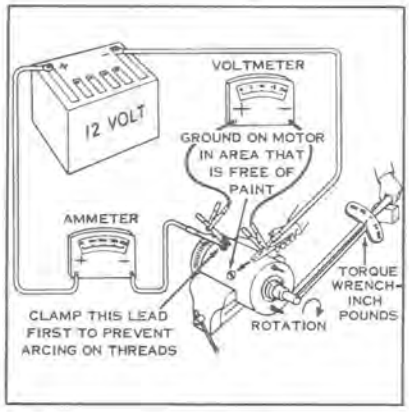

Figure 7-44

Figure 7-45

No-Load Test

a. Connect starter, with an ammeter in series, to a 12-volt source (see Figure 7-43). Use a tachometer or rpm indicator to indicate armature speed.

b. Ammeter should indicate 60 amperes maximum; rpm indicator should indicate 4200 rpm minimum. If readings are not as specified, check for binding in starter or failure of windings. NOTE: If starter motor turns slowly, smokes after a very few seconds of running, or gets hot instantly, stop testing. Disassemble starter and check for shorts.

Stalled Torque Test

a. Connect a voltmeter between the starter terminal (+) and motor frame (-). Using a torque wrench to stall motor armature (see Figure 7-44, connect starter motor through an ammeter to a 12-volt battery.

b. Voltmeter reading should be approximately 10 volts during this test. Torque should be a minimum of 108 inch pounds or 9 foot pounds and current should be a maximum of 405 amperes.

NOTE

If motor smokes or gets hot instantly, stop testing, disassemble starter and check for shorts. Use only a fully charged 12-volt battery when making stalled torque test. Obtain readings as rapidly as possible to prevent starter overheating. Allow sufficient time for starter to return to room temperature if it is necessary to repeat stalled torque test.

c. Check each armature coil for open circuits by rotating torque wrench handle through a 180 degree arc after initial torque reading has been noted. This must be done quickly. Torque should be uniform through this arc, although reading will decrease slightly each time brush moves from one commutator segment to another. If an appreciably wide area is found in which torque is very low, disassemble starter and check armature.

INSPECTION OF STARTER MOTOR

a. Check armature on a growler for shorted turns (see Figure 7-45). NOTE: Follow operating instructions furnished with armature growler for proper test procedures. Clean between commutator segments of armature and recheck armature on growler. If shorted turns are still indicated, replace armature.

b. Check armature for grounded windings (see Figure 7-46). Rotate one lead of continuity tester (test light or meter) around circumference of commutator while holding other continuity meter leads on the armature core or shaft. An indication of continuity means that the armature windings are grounded and armature must be replaced.

c. Check armature for open windings by using an ohmmeter. Measure resistance between adjacent commutator segments, using LO OHMS scale. Rotate leads around entire circumference of commutator. An open winding is indicated if any one reading is much higher (three times higher or more) than the average reading.

d. Inspect commutator segments. If they are dirty or show signs of wear, turn commutator in a lathe until surface is clean and smooth.

e. After turning commutator, undercut insulation between commutator segments to a depth of approximately 1/32 inch. The undercut must be flat at the bottom (triangular groove cuts are unsatisfactory) and should extend beyond the brush contact area for the full length of each insulated groove (see Figure 7-47).

f. After commutator has been undercut, sand lightly with No. 00 sandpaper to remove burrs left during the undercutting process. After sanding, clean commutator thoroughly, removing all traces of metal chips or sanding grit, and recheck armature on growler.

g. Inspect armature insulation for indications of overheating or damaged windings. Clean off any deposits of carbon which may contribute to later failure of the windings. NOTE: Starter motor components should not be washed off in cleaning solvents. Most solvents will soften varnish insulation used on armature and field windings. All starter motor components can be cleaned adequately with a clean cloth or soft brush. Cleaning end heads in solvent may dissolve the oils that have impregnated into the armature shaft bearings. If these oils are removed, bearing or armature shaft wear can be expected. Cleaning of armature in solvent will leave oily residue on the commutator segments, causing arcing between the commutator and brushes.

Figure 7-46

Brushes

a. Inspect the brushes; replace if worn to one-third their original 3/8" length, or if damaged or cracked. Replace brush springs if weak.

b. Inspect brush springs. Springs should have a pressure of 35 to 90 ounces when compressed to 9/32 inch. Measure brush tension with scale hook under brush screw or under bend in brush spring, and take reading as brush just leaves commutator. Pull off spring scale must be directly opposite line of force exerted by brush spring.

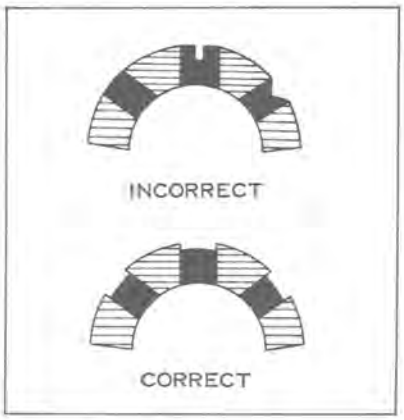

Figure 7-47

BELT TENSION

a. Correct starter motor drive belt tension is extremely important. A loose belt will cause slippage and a tight belt will result in a ruined starter when it is driven overspeed by the engine after starting. See STARTER SYSTEM-DESCRIPTION.

b. Install starter belt between starter and flywheel pulleys.

c. Turn movable half of pulley counterclockwise to drive position. See Figure 7-48.

d. Move starter down to tighten belt. Be certain that pulley halves are CLOSED or in driving position when making the adjustment.

e. Belt must be free when pulley is turned fully clockwise (engine run position).

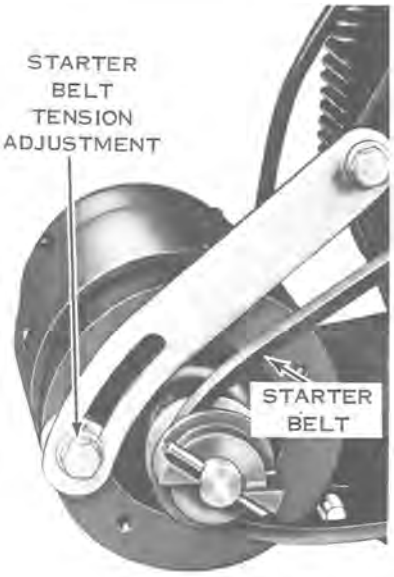

Figure 7-48

ALTERNATOR

TROUBLE SHOOTING

Failure in the alternator charging circuit will usually show up when the battery fails to retain a charge sufficient to start the engine consistently. To determine the cause of trouble, check the condition of the battery and electrical connections throughout the circuit, before proceeding with electrical testing. A visual inspection may be all that is required to locate the trouble.

Figure 7-49

NOTE

Disconnect battery leads before tightening or changing any connections, to avoid the possibility of shorting out the electrical system.

a. Battery. Check condition as described under Battery Testing, Battery Inspection, and Battery Care.

b. 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. Check the battery cables for possible reverse polarity.

c. 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 charging system is the cause of trouble.

ALTERNATOR COILS

The alternator coils are replaceable along with the charge coils as an assembly. See Figure 7-49. The alternator coils can be checked for their correct resistance without removal of the flywheel.

TEST #1 ALTERNATOR COIL RESISTANCE TEST

NOTE

Do not take resistance test at rectifier.

a. Disconnect alternator lead at quick disconnect (through access door).

b. Connect ohmmeter, one meter lead to yellow alternator lead the other meter lead to yellow/gray stripe lead. Resistance reading is .95 ohms.

c. Connect ohmmeter, one meter lead to yellow/gray stripe lead and the other meter lead to green lead. Resistance reading is .4 ohms.

d. Connect ohmmeter, one meter lead to yellow lead and the other meter lead to green lead. Resistance reading is 1.3 ohms.

NOTE

On reassembly be certain that wiring is clear of starter belt and pulley.

TEST #2 ALTERNATOR COIL OUTPUT TEST

a. Remove yellow lead from positive terminal of rectifier.
b. Connect positive DC amp meter lead to positive terminal of rectifier.
c. Connect negative amp meter lead to yellow lead removed in step (a). Run engine to 4500 RPM with key switch in "RUN" position. Amp meter should read 4 amps. Turn ignition switch to lights position, amp meter should read 11 amps at 4500 RPM. If amp meter hand deflects to left in above test reverse amp meter leads.

CHECKING RECTIFIER DIODES

Use an ohmmeter (HI OHMS SCALE) to check for shorted or open diodes. This is basically a continuity test.

Disconnect all leads from rectifier assembly. Check a diode by connecting test leads to adjacent terminals on rectifier assembly and noting the reading (see Figure 7-50). Reverse the test leads and again note the reading. If both readings are very low, or if both readings are very high, the diode is defective. A good diode will give one low reading and one high reading.

Repeat the test procedure for the other diodes by connecting the test leads between adjacent terminals.

Connect leads to correct terminals. See Figure 7-50, and wiring diagram at end of manual.

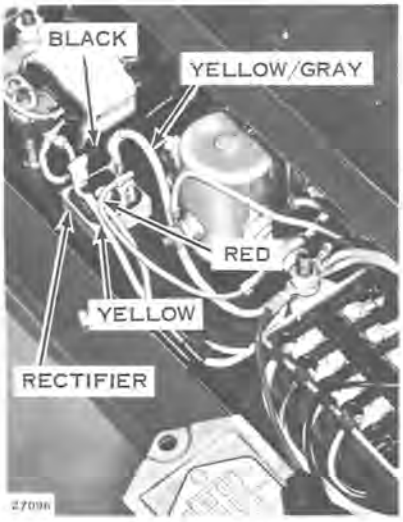

Figure 7-50

ALTERNATOR AND CHARGE COIL REPLACEMENT (SEE ALTERNATOR AND IGNITION SYSTEM REPAIR)

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

Repeat stop switch test.

BLOCKING DIODE TEST

a. Remove diode leads and connect continuity meter (HI OHMS SCALE) between gray and yellow lead. Reverse leads and note reading. Meter should read in one direction only.

b. Repeat blocking diode test on gray and blue lead. Meter should read in one direction only.

c. Repeat blocking diode test on yellow and blue lead. Meter should read in both directions.

BRAKELAMP SWITCH TEST

a. Pull connectors apart (near brake switch).

b. Connect continuity meter to each of the brakelamp switch terminals.

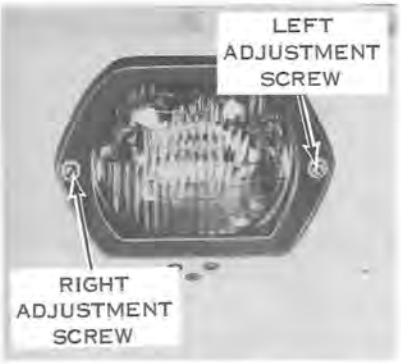

Figure 7-51

c. Squeeze brake lever - full continuity.

d. Release brake lever - no continuity.

NOTE

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

IDLE SWITCH TEST

a. Remove idle switch leads from Power Pack terminals no. 5 and 10. See Figure 7-10.

b. Connect ohmmeter using low ohms scale to idle switch leads. With the throttle lever released the meter should read 0 ohms indicating continuity (switch closed). Pressing the throttle lever should cause the meter to read infinity (switch opened). Releasing the throttle lever should cause the meter to again read 0 ohms.

NOTE

Idle switch test can be done by using coil continuity scale on Merc-O-Tronic analyzer.

HEADLAMP ADJUSTMENT (See Figures 7-51 and 7-52.)

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.

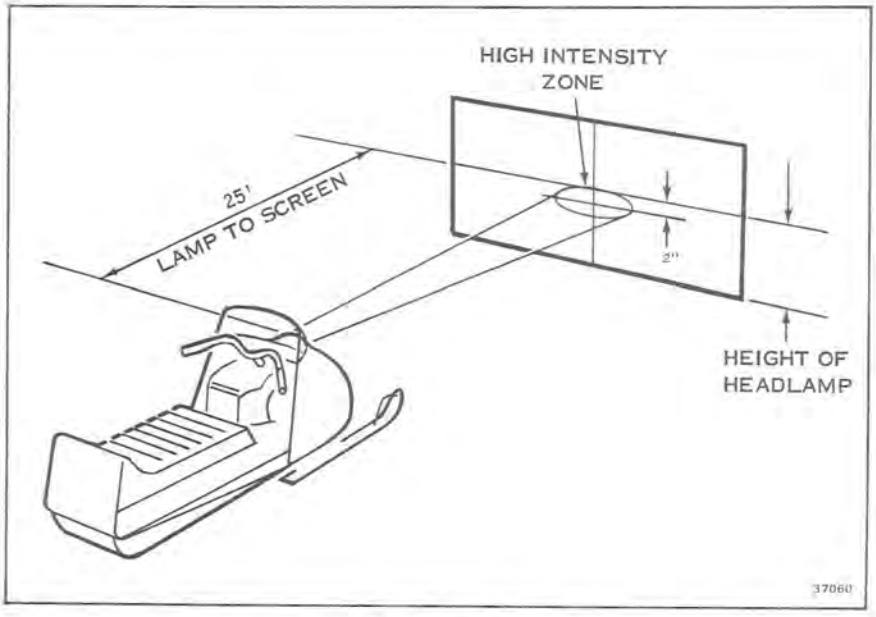

Figure 7-52

Figure 7-53

PEAK VOLTAGE TEST (USING MERC-O-TRONIC KILOVOLT METER MODEL 172)

1. Remove spark plugs.

2. Connect high voltage probe to spark plug high tension lead and meter ground lead to a good engine ground. Set switch to -60 scale.

3. Pull starter vigorously with ignition and safety stop switches in run position. Observe meter reading.

4. Reading should be 18 kilovolts (minimum) (using manual starter).

5. If the reading on the kilovolt meter is 18 KV on above, the ignition system is functioning properly.

6. If the reading is lower than 18 KV troubleshoot the ignition system components.

SECTION 8
MANUAL STARTER

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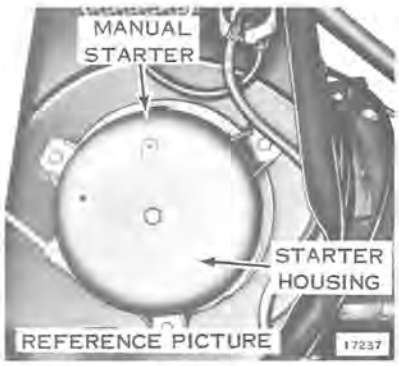

Figure 8-1

DESCRIPTION

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

NOTE

Never allow rope to snap back. Serious damage will result.

REMOVAL AND DISASSEMBLY

a. Pull starter rope out and tie knot at starter housing. Handle assembly can now be removed.

b. Pull rope thru hole in air duct.

c. Untie knot and ease rope back into starter until starter spring is fully unwound.

d. Remove three screws securing starter assembly to air duct.

SAFETY WARNING

Because of the rewind spring, it is good practice to wear safety glasses when disassembling and reassembling the manual starter.

e. Remove screw (pulley to housing) and remove all components of starter pulley spindle assembly. See Figure 8-2.

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

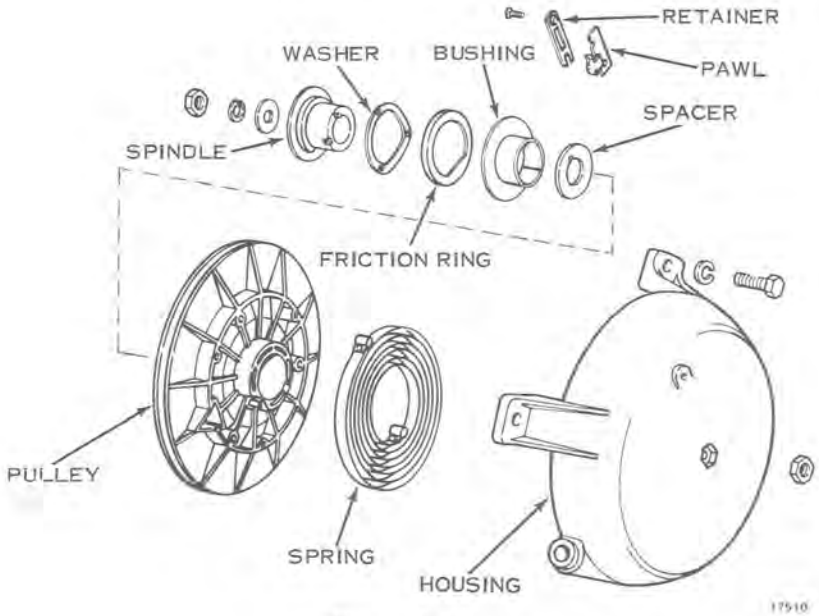

Figure 8-2

CLEANING, INSPECTION, AND REPAIR

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

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 73-1/4 inches.

f. Examine bushing in instrument panel and starter housing for sharp edges and rough surfaces that might cause rope fraying. File and polish as necessary.

REASSEMBLY

a. Rewind starter spring using fixture base No. 383966.

b. Insert handle shaft with bushing through pulley bore and into fixture base.

c. Use fixture crank to wind spring counterclockwise until tight. Release at least one turn, continuing to release until loop end spring lines up with hole drilled through edge of pulley. Slide one end of pin through holes in pulley and spring loop.

d. Carefully remove the hand crank and bushing. Lift pulley off base plate, holding spring in pulley.

e. Place pulley and spring into starter housing, making certain that spring loop is lined up exactly with pin in starter housing. Press pulley into starter housing, forcing out pin which held spring.

f. Apply OMC Grease #114154 to spindle and spindle bushing.

NOTE

Do not grease starter spring. Many lubricants solidify in cold weather, and will make the starter inoperative.

Install spindle, spring washer, friction ring, and bushing. Fasten with screw, washers, and nut.

g. Tie a knot in one end of starter rope. Install 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 end must be stiff to hold in pulley. See Figure 8-3.

h. Turn starter pulley counterclockwise to make sure starter spring is fully wound. After spring is fully wound, allow it to unwind one turn so that pulley rope hole aligns with housing rope hole. Insert rope through pulley and starter housing. Seat rope knot firmly in pulley. Tie a slip knot in starter rope and allow pulley to rewind.

i. Install pawls, retainers, and screws.

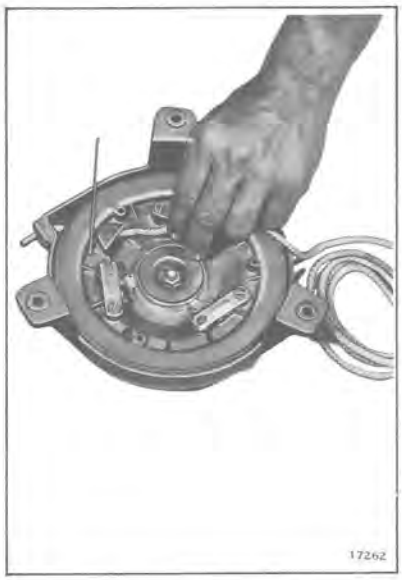

Figure 8-3

j. 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.

k. Attach manual starter assembly to fan housing with 3 screws.

SECTION 9
ENGINE

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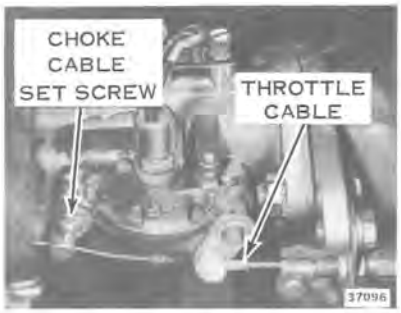

Figure 9-1

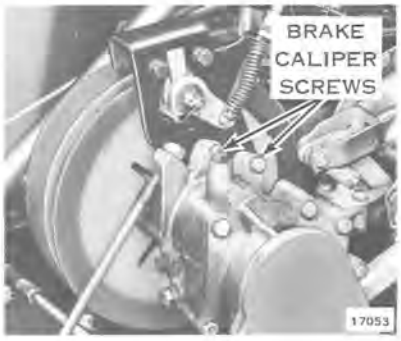

Figure 9-2

Figure 9-3

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 - See Section 7, "IGNITION SYSTEM REPAIR" steps a thru n.

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

b. Disconnect brakelamp switch.

c. Remove right tie rod and ball joint assembly.

d. Remove 4 nuts and 2 bolts securing steering column bracket to engine.

e. Disconnect primer line from intake manifold.

f. Remove neutral lockout cable from bracket. See Section 10.

g. Disconnect compression relief cable from compression relief valve. See figure 9-3.

h. Disconnect cable from speedometer.

i. Disconnect spark plug leads. See Figure 9-4.

j. Remove (4) bolts manifold flange to muffler.

k. Remove primary drive assembly. See Section 10.

l. Remove four engine frame mounting bolts. Engine and electric starter assembly is now free to be removed from chassis.

DISASSEMBLY

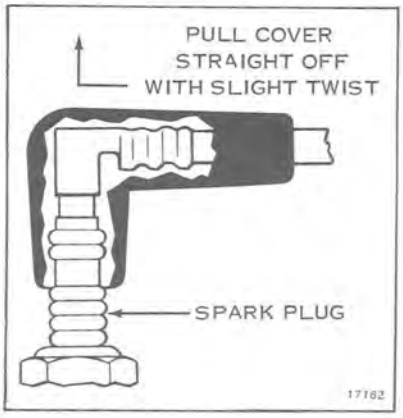

Figure 9-4

NOTE

If crankcase leaks are suspected, remove one spark plug and place piston at TDC. Remove fuel pump pulse line and inject smoke into fitting. Smoke will be visible at leak.

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

b. Loosen starter belt tension, remove belt tension bracket and starter.

c. Remove spark plugs.

d. Remove power frame.

e. Remove exhaust manifolds.

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

g. Remove compression relief valve.

h. Remove the cylinder stud nuts and lockwashers. The cylinder barrel can now be removed from the crankcase. See Figures 9-5 and 9-6.

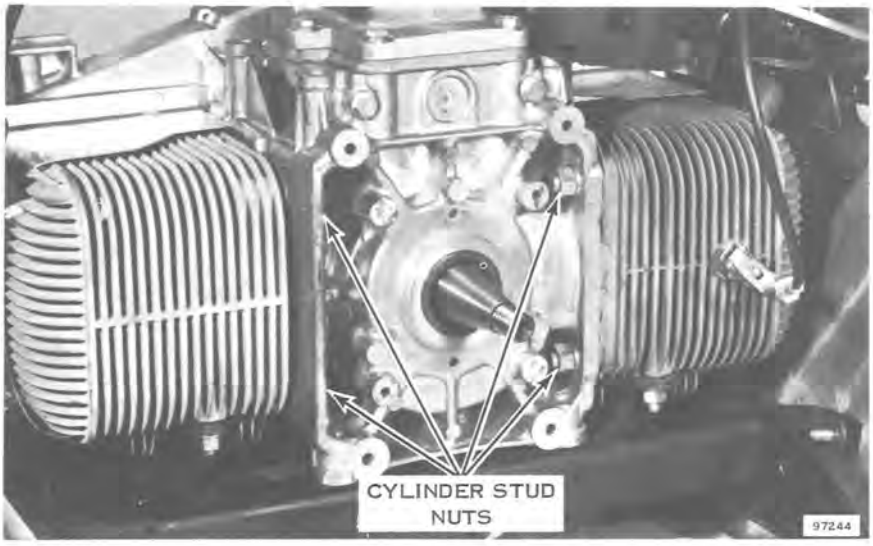

Figure 9-5

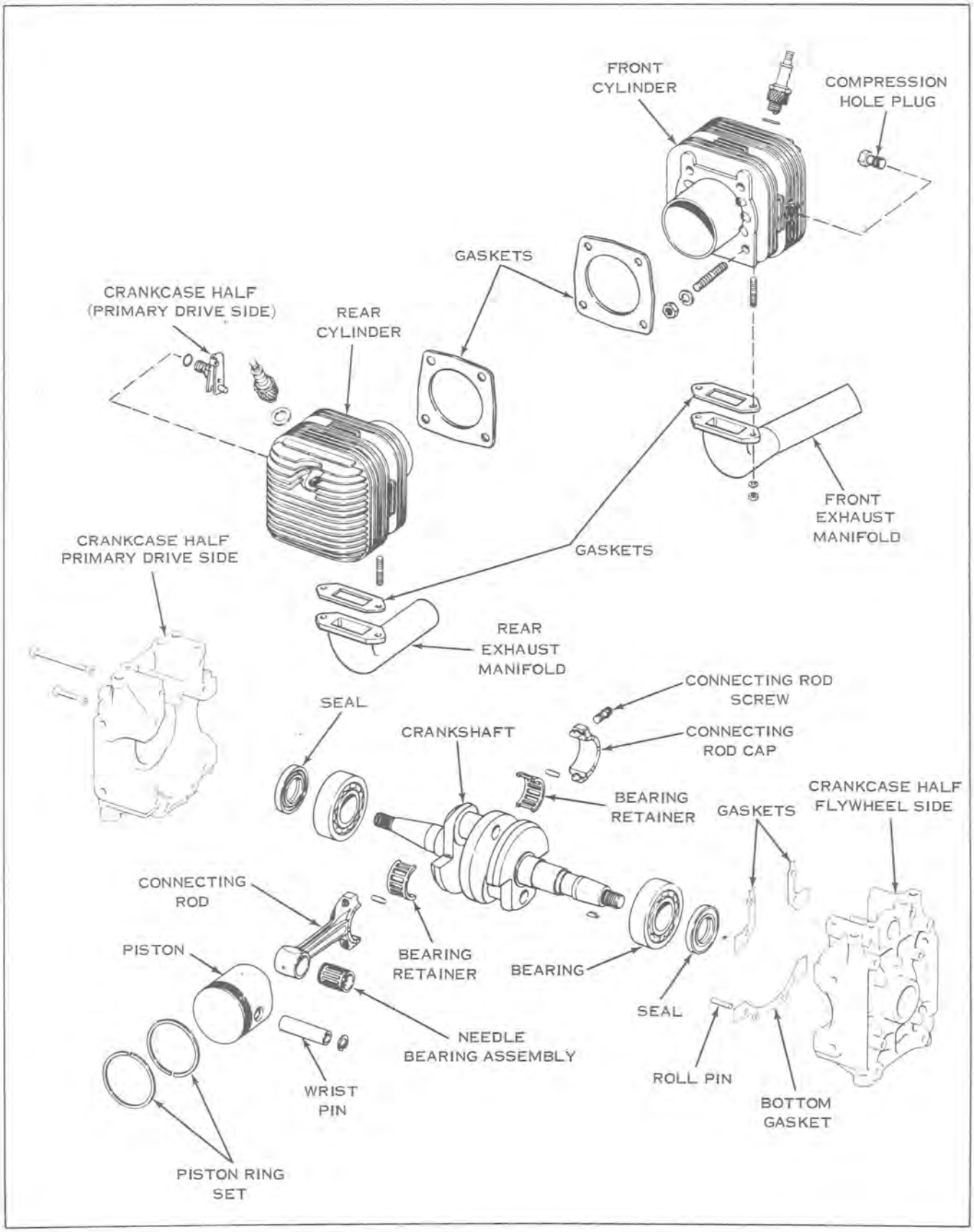
FRONT CYLINDER
COMPRESSION HOLE PLUG
GASKETS
CRANKCASE HALF (PRIMARY DRIVE SIDE)
REAR CYLINDER
FRONT EXHAUST MANIFOLD
CRANKCASE HALF PRIMARY DRIVE SIDE
GASKETS
REAR EXHAUST MANIFOLD
CONNECTING ROD SCREW
SEAL
CRANKSHAFT
CONNECTING ROD CAP
BEARING RETAINER
GASKETS
CRANKCASE HALF FLYWHEEL SIDE
CONNECTING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

Figure 9-6

NOTE

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

i. 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.

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.

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

k. Reinstall matched caps on connecting rods.

l. 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 piston.

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

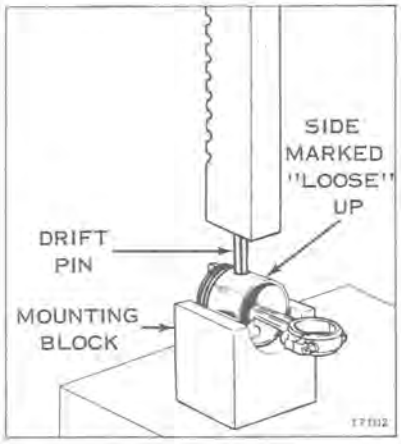

Figure 9-7

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

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.

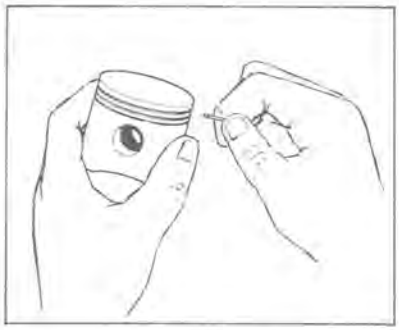

Figure 9-9

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 check for 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.

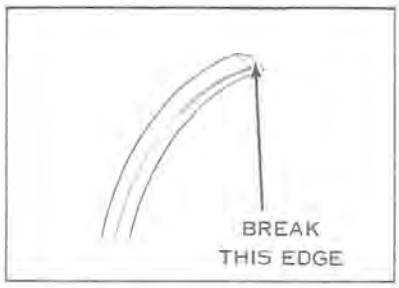

Figure 9-10

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).

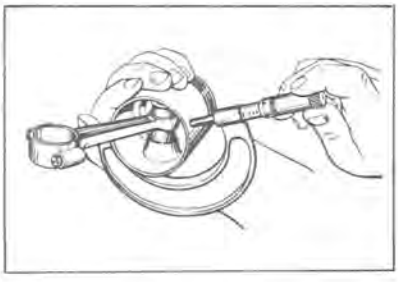

Figure 9-11

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).

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).

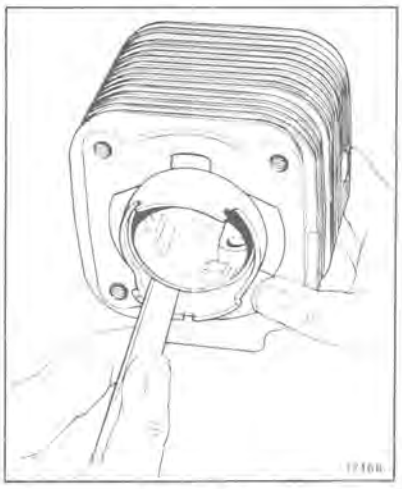

Figure 9-12

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.

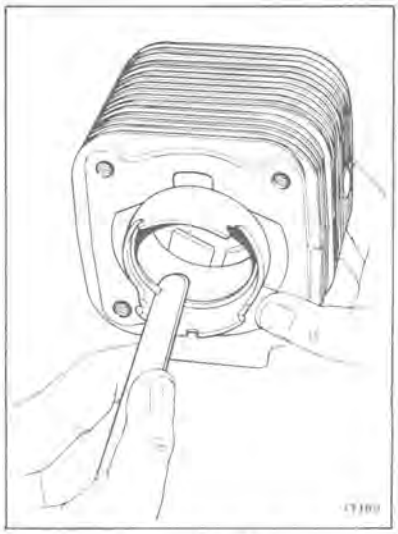

Figure 9-13

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.

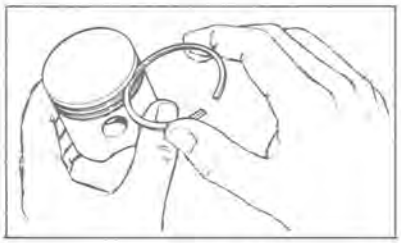

Figure 9-14

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 alone is not a cause for discard.

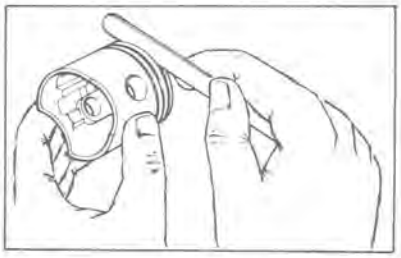

Figure 9-15

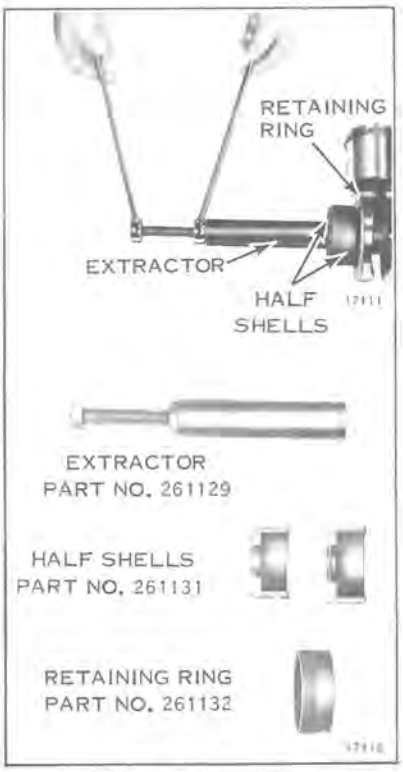

Figure 9-16

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 dash panel.

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 one 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 No. 317829 and Cone No. 317830. Make 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.

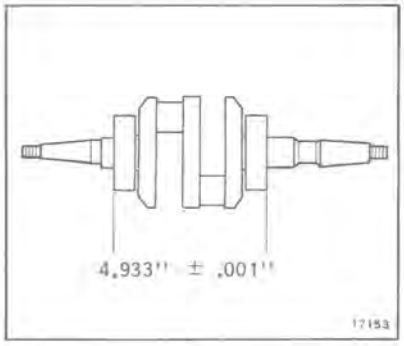

Figure 9-18

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 bearings (16) and retainer halves, with connecting rod and connecting rod cap, to crankpin.

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 ensure proper alignment. (See Figure 9-19). 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.

Figure 9-19

NOTE

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

e. Spread film of OMC Gasket Sealing Compound No. 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.

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.

Figure 9-20

CYLINDERS

a. Coat cylinder gaskets with Perfect Seal #4 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, and air cleaner. For detailed instructions, see Section 6. Apply OMC Gasket Sealing Compound No. 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 high temperature thread compound applied to the threads.

INSTALLATION

a. Install engine and frame to chassis. Apply muffler cement to mating surfaces of exhaust manifold pipes. Apply cement sparingly. Work exhaust manifolds into exhaust pipes.

b. See Section 7, Reassembly, "IGNITION SYSTEM REPAIR" steps a thru f.

c. Install primary sheave assembly. See Section 10.

d. Check alignment of secondary to primary sheave. See Section 10.

e. Install steering column assembly. Connect control linkages and adjust.

f. Install transmission belt. See Section 10.

g. Reconnect neutral lockout cable to bracket and actuating arm.

h. Install belt guard.

i. Reconnect red lead to electric starter motor. Install starter belt. Adjust tension as described in Section 7.

j. Install spark plugs and connect leads.

NOTE

Make sure that harness is secured away from starter belt.

k. Install fuel inlet and return lines to carburetor and pulse and primer lines to intake manifold on crankcase.

l. Connect cables to speedometer and tachometer if used.

m. Install right hand tie rod.

n. Reconnect compression relief cable to compression relief valve. See Section 5 for adjustment procedures.

o. Reinstall brake caliper to secondary. Brake cable adjustment should not have been disturbed. See Section 10 if adjustment is required.

p. Reconnect throttle and choke cables to carburetor. See Section 6 for cable adjusting procedure.

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.

1. Remove four muffler mounting screws. See Figure 9-24.
2. Loosen muffler clamps. See Figure 9-24.
3. Disconnect tie rods from steering column arm.
4. Remove steering limit bolt and swing arm up.
5. Muffler can now be removed from well.

INSTALLATION

Place muffler in well. Apply muffler cement to mating surfaces of exhaust pipe to muffler and exhaust manifolds. Install muffler clamps and tighten nuts equally and securely. Reconnect tie rods to steering column arm.

SECTION 10
DRIVE TRAIN

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Figure 10-1

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 1-9/16" 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.

REMOVAL

SAFETY WARNING

Keep fingers from between halves of secondary sheaves when removing belt.

a. Remove two hair pins anchoring belt guard. See Figure 10-1.

b. Rotate secondary drive to obtain widest clearance between end cap and front cylinder. See Figures 10-2 thru 10-6.

c. Engage brake and apply parking brake lock.

d. Exert pressure on secondary sliding sheave and rotate toward cylinder.

e. Work belt over secondary sliding sheave.

f. Push neutral lockout button in (on dash).

g. Belt can now be removed from primary drive by working it between actuating arm and neutral lockout plunger.

REPLACEMENT

Assemble in reverse order of removal.

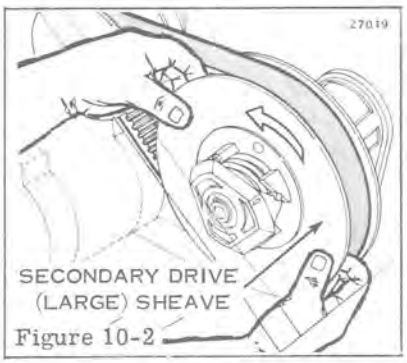

Figure 10-2

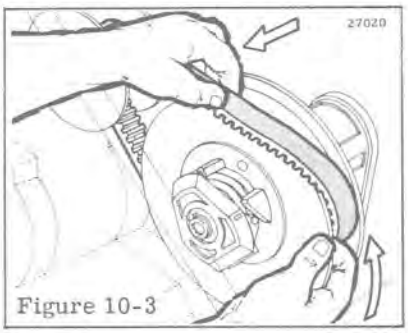

Figure 10-3

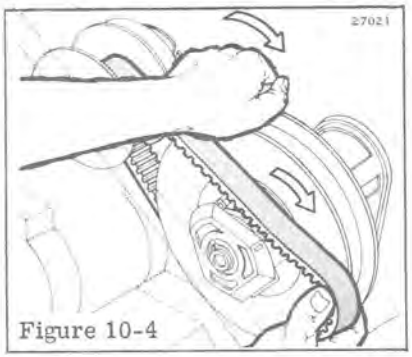

Figure 10-4

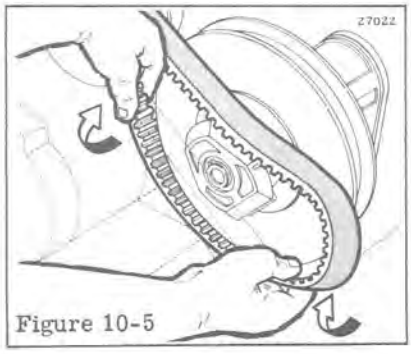

Figure 10-5

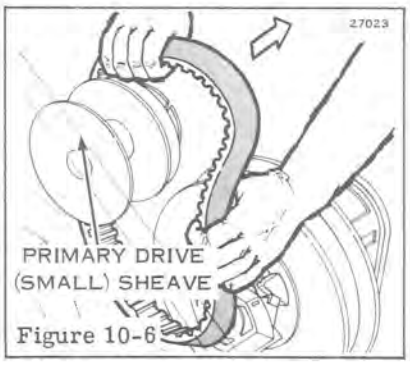

Figure 10-6

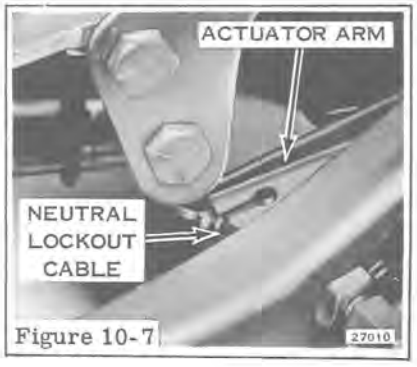

Figure 10-7

PRIMARY DRIVE

REMOVAL OF PRIMARY SHEAVE ASSEMBLY

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

a. Remove starter assembly.

b. Remove ratchet mount.

c. Attach Service Tool No. 113971 to flywheel with three bolts from ratchet mount (see Figure 10-8).

d. Use flat, open end wrench (Service Tool No. 404032) on the square nut on back side of the primary fixed sheave.

e. 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

a. Remove one screw, loosen other screw attaching neutral lockout bracket to chain case. Move bracket downward.

b. Remove belt (see page 10-2).

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

d. With flat, open end wrench (Service Tool No. 404032) on inside, and 1-1/8" deep socket wrench on outside, loosen end cap bolt. (See Figure 10-10.)

⚠ SAFETY WARNING

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

e. Remove end cap assembly. See Figure 10-11.

f. Remove strap while pressing movable half of sheave toward engine.

g. Remove sliding sheave and inspect main shaft spline, neutral lockout balls, bearing, compression spring and garter (activating) spring (see Figure 10-5).

h. Fixed sheave can now be removed, using Service Tool #114146 (Spline Wrench).

CLEANING, INSPECTION AND REPAIR

a. Clean all parts with a cleaning solvent such as Trichloroethylene (see ⚠ SAFETY WARNING page 9-6) and blow dry with compressed air.

b. Inspect main shaft and sheave assembly splines for wear.

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

d. Inspect neutral lockout plunger for wear. Replace if required.

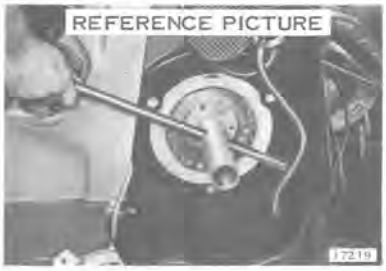

Figure 10-8

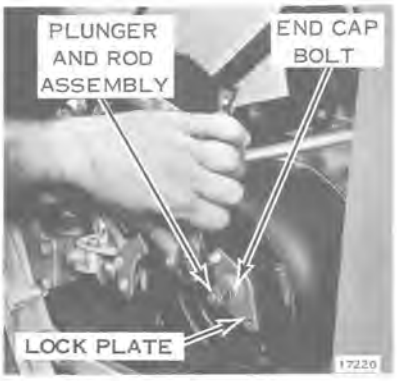

Figure 10-9

Figure 10-10

Figure 10-11

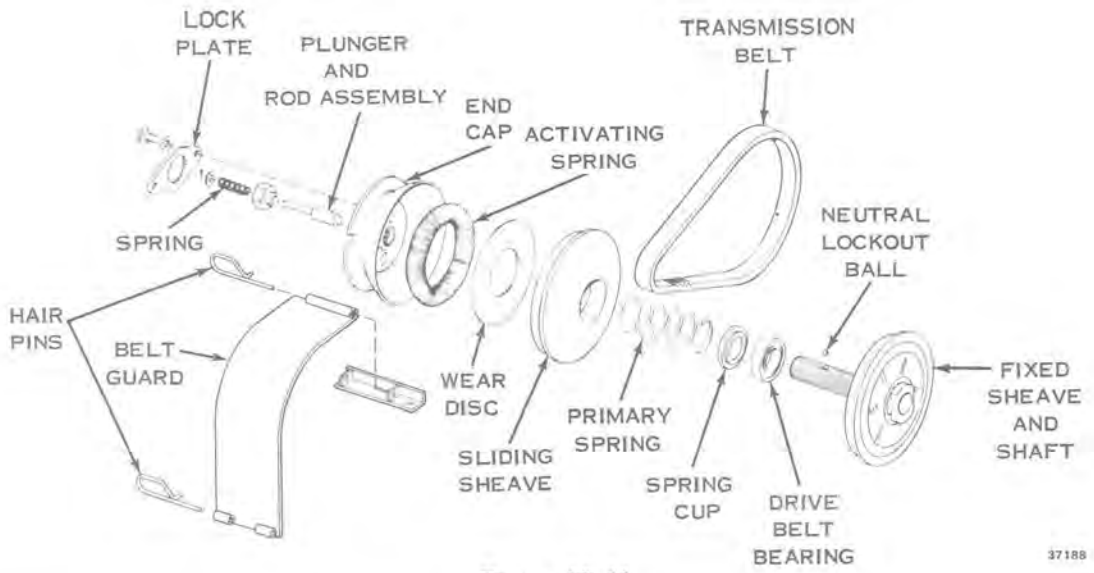

Figure 10-11

REFERENCE PICTURE

Figure 10-13

REFERENCE PICTURE

Figure 10-14

e. Inspect transmission belt. A glazed or burned belt, or one measuring less than 1-9/16" across width or outer surface must be replaced with a new one. Worn belt should be returned to owner for use as a spare. A spare belt should be carried at all times.

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.

REASSEMBLY

1. Align holes in main shaft spline in horizontal plane. Use OMC Part No. 114154 to lightly coat splines and retain neutral lockout balls in holes.
2. Place primary spring on shaft with closed side of spring cup toward bearing. See Figures 10-12 and 10-13.
3. Place sliding sheave assembly on shaft, compress spring and lock in place with strap (Service Tool No. 261906).
4. Assemble activating spring, and end cap on shaft, making sure end cap splines engage shaft splines.
5. Before placing end cap bolt in shaft, check to see that neutral lockout balls have not fallen from their holes in main shaft.
6. Apply Loctite to end cap bolt. Tighten end cap bolt to 90-100 ft. lbs. See Figure 10-14.
7. If serrations do not allow alignment of holes in lockplate and end cap, turn lockplate over and rotate until aligned position is obtained. Torque lockplate screws to 60-80 in. lbs.
8. Check the neutral lockout plunger to see that it snaps in and out properly. When neutral lockout is pushed in the sliding sheave must not slide on spline far enough to contact belt. When neutral lockout is out (normal operating position) the sliding sheave must slide freely on spline restricted only by the primary spring.
9. Clean inside of sheave halves to remove any grease that may have accumulated.
10. Reinstall transmission belt as described on Page 10-2.
11. Reassemble neutral lockout bracket to chain case.

DRIVE CHAIN

REMOVAL

a. Extreme care should be taken when removing chain case cover, to prevent distortion of cover and damage to chain case.

b. Loosen chain (see "Adjustment").

c. Remove screw and washer from upper drive shaft.

d. Remove sprocket and chain from upper shaft. Remove retaining ring to release idler sprocket if additional clearance is required to remove chain.

e. Remove lock ring from front axle drive sprocket. Slide sprocket off axle to obtain clearance for chain removal.

f. Chain can now be removed from lower sprocket.

Figure 10-15

INSTALLATION

Assemble in reverse order of disassembly.

CHAIN ADJUSTMENT INSTRUCTIONS

Chain adjustment must be done with transmission in forward position. Total slack must be 1/4" ± 1/16".

Rotate secondary drive pulley clockwise as seen from left side of machine until all slack in the chain is transmitted toward right side of chain case. Hold secondary pulley securely in clockwise position while checking chain adjustment. Remove rubber plug and check position of chain relative to forward edge of hole. See Figure 10-15. Outer edge of chain should line up with edge of hole when chain is properly adjusted. If the chain requires adjustment, use the following steps:

Figure 10-16

1. Loosen jam nut.

2. To tighten chain, turn adjusting screw clockwise. See Figure 10-16.

3. To loosen chain, turn adjusting screw counterclockwise.

4. Retighten jam nut to 10-12 ft. lbs.

5. On models with chain case cover removed, apply (EC1022 3M adhesive in U.S.A., in Canada use OMC No. 277026) in groove of chain case prior to assembling seal.

Insert new seal into groove with joint in line with top right cover mounting screw hole. Replace chain case cover. Torque the screws to 60-80 inch. lbs. Replace oil in chain case.

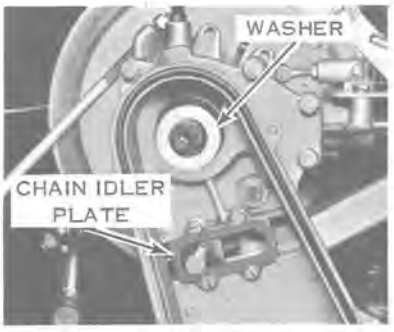

Figure 10-17

LUBRICATION

The drive chain and sprockets are lubricated by the chain running through an oil bath. Check oil level by removing oil level plug in the bottom of the chain case cover. Oil should come up to bottom of oil level hole. See Figure 10-15. Fill with Dexron ATF Lubricant. It will hold approximately 4 oz. Replace plug.

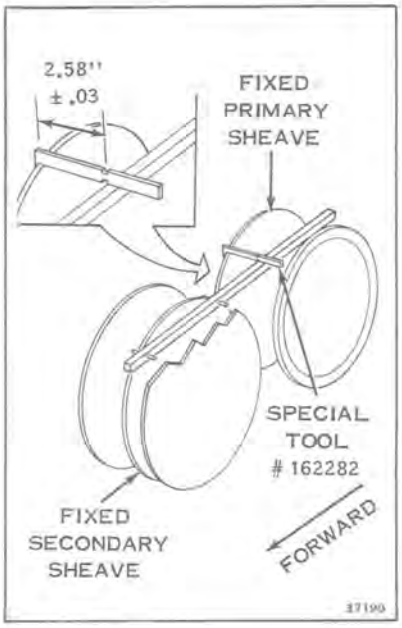

Figure 10-19

Figure 10-20

SHEAVE ALIGNMENT

If chain case or engine has moved on chassis, sheave alignment must be checked as follows:

ALIGNMENT

Using service tool #162282 check for 2.58 ± .03 from outside edge of primary fixed sheave to outside edge of secondary fixed sheave at top and bottom of sheaves as shown in Figure 10-19. If long bar lines up within slot in short bar at top and bottom, front and rear, sheaves are in correct alignment. If not, sheaves must be aligned as follows:

Measurement of 1-1/16" to 1-1/8" between rear edge of secondary sliding sheave and front edge of stationary primary sheave must be obtained for proper distance between drives for belt length.

ADJUSTMENT PROCEDURES (See Figure 10-20)

NOTE

After above adjustments it is important to maintain a clearance of .005 between support rod nut (1) and transmission case projection.

1. Loosen five chain case support brackets to chassis screws.
2. Loosen two screws (4) through chassis into bottom of chain case. Figure 10-20.
3. Chain case and secondary sheave can now be moved freely.
4. Adjust position of chain case and secondary sheave so that it is aligned with primary sheave.
5. Tighten two screws (4) through bottom of chassis into chain case.
6. Tighten two screws through chain case support bracket into chain case securely.
7. Tighten three screws through chain case support bracket into chassis securely.
8. Check alignment again.
9. Torque all seven screws securing chain case to 18-20 ft. lbs.

BRAKE

DESCRIPTION

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

ADJUSTMENT

Brake adjustments can be made by turning the adjustment nut clockwise to tighten brake. Turn the nut until there is a slight drag on the brake, then back the nut off 1/4" turn. See Figure 10-21.

NOTE

Be certain there is proper movement of the brake lever control to permit use of the parking lock. Loosen control cable locknut and adjusting screw to obtain proper control lever movement. See Figure 10-21. Tighten locknut.

REMOVAL

a. Loosen brake adjustment screw lock nut. See Figure 10-21.
b. Screw in adjusting screw full length of thread.
c. Loosen cam adjusting nut 3 or 4 turns.
d. Compress brake return spring and remove cable from pivot pin.
e. Unscrew cable adjusting screw from brake bracket.
f. Disconnect brake lamp switch from pivot pin.
g. Remove brake bracket assembly from transmission.

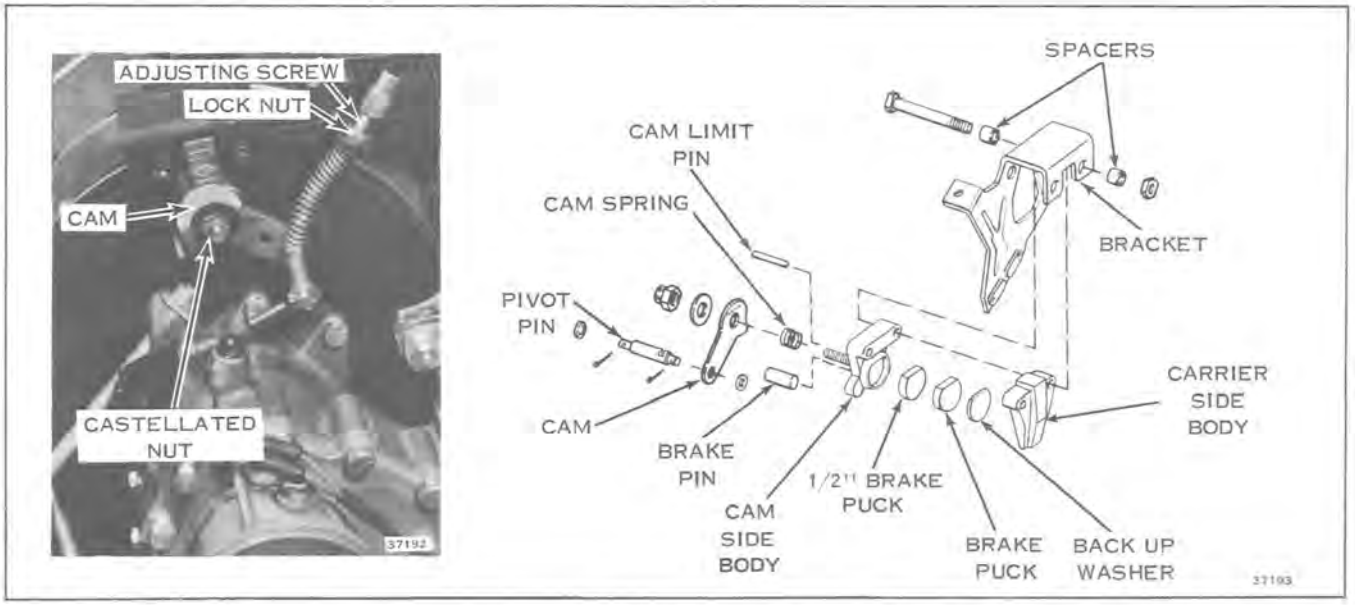

Figure 10-21

REPAIR

a. Disassemble brake assembly as required, noting relative positions of components to assure correct reassembly (see Figure 10-21).

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.

BRAKE CABLE AND CAM ASSEMBLY

Assemble in reverse order of disassembly.

SECONDARY DRIVE

DISASSEMBLY

a. Remove transmission belt (see page 10-2).

b. Remove brake assembly (2 screws).

c. Remove screw, tab lockwasher, secondary washer, spring cap, spring, and sleeve. See Figure 10-22.

d. Slide movable sheave from transmission input shaft. To remove fixed sheave and brake disc it will be necessary to loosen chain case.

NOTE

DO NOT strike sheaves with hammer. Cast aluminum sheaves will bend.

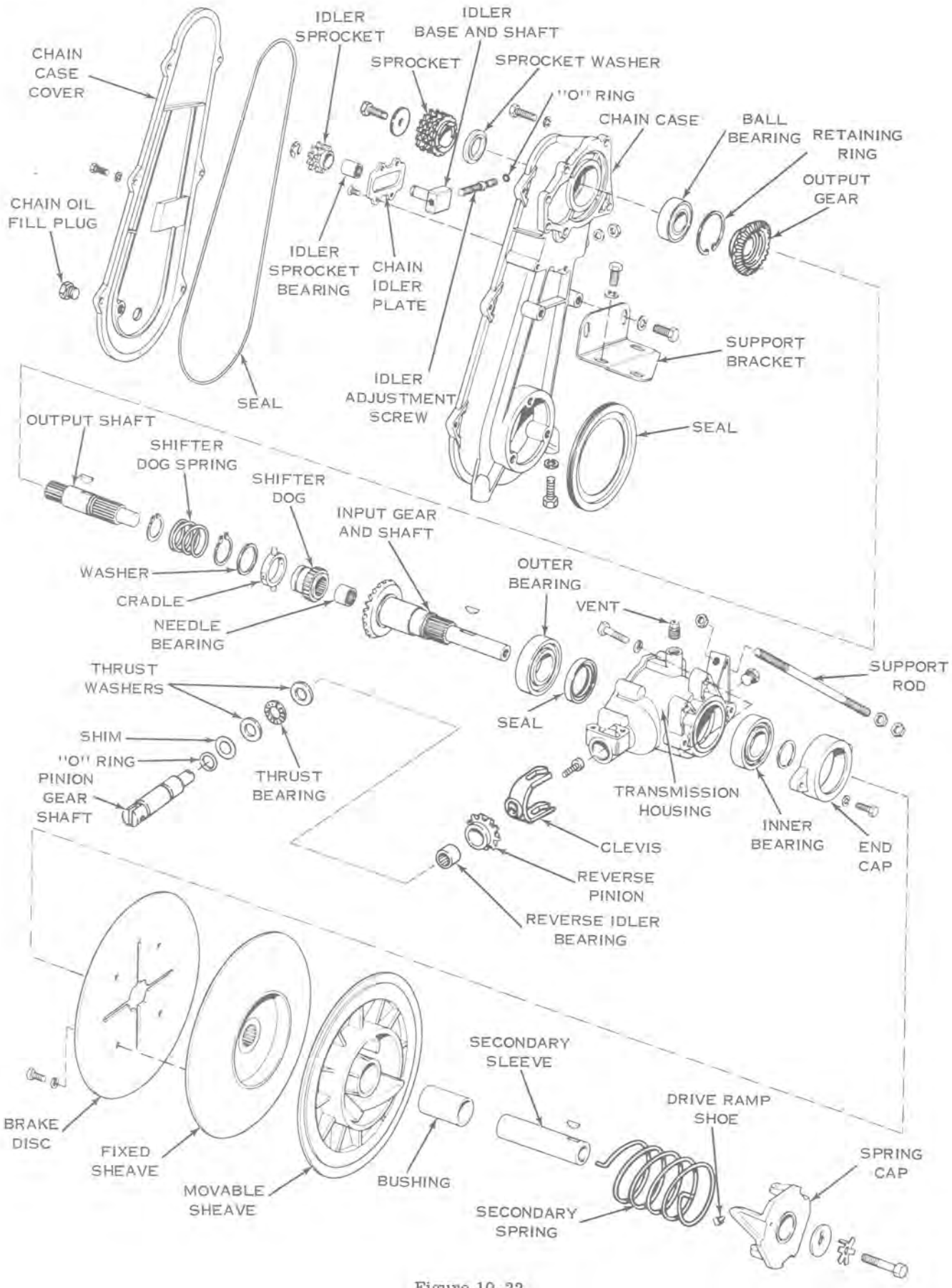
CHAIN CASE COVER
IDLER SPROCKET
IDLER BASE AND SHAFT
SPROCKET
SPROCKET WASHER
"O" RING
CHAIN CASE
BALL BEARING
RETAINING RING
OUTPUT GEAR
CHAIN OIL FILL PLUG
IDLER SPROCKET BEARING
CHAIN IDLER PLATE
SUPPORT BRACKET
SEAL
IDLER ADJUSTMENT SCREW
SEAL
OUTPUT SHAFT
SHIFTER DOG SPRING
SHIFTER DOG
INPUT GEAR AND SHAFT
WASHER
CRADLE
NEEDLE BEARING
OUTER BEARING
VENT
SUPPORT ROD
THRUST WASHERS
SEAL
SHIM
"O" RING
PINION GEAR SHAFT
THRUST BEARING
TRANSMISSION HOUSING
INNER BEARING
END CAP
CLEVIS
REVERSE PINION
REVERSE IDLER BEARING
SECONDARY SLEEVE
DRIVE RAMP SHOE
SPRING CAP
BRAKE DISC
FIXED SHEAVE
MOVABLE SHEAVE
BUSHING
SECONDARY SPRING

Figure 10-22

CLEANING AND INSPECTION

1. Clean all parts except movable sheave bushing in trichlorethylene. Bushing is oil impregnated. DO NOT clean with solvent. (See ⚠ SAFETY WARNING on page 9-5.)
2. Check bushing for wear.
3. Check shaft, sheaves, woodruff keys and Delrin ramp shoes for excessive wear. Check sleeve for burrs and nicks.

REASSEMBLY

a. Lubricate movable sheave bushing with OMC Grease #114154. Use a small amount (0.3cc) in groove in bushing.

b. Assemble secondary sheave assembly on transmission input shaft in reverse order of disassembly. Engage spring ends in holes in movable sheave and end cap. Start end cap on key, holding end cap stationary turn sliding sheave counterclockwise to next ramp approximately 1/3 turn. Torque sleave screw to 22-25 ft. lbs. torque and secure with new lockwasher tab. Replace transmission belt guard, belt and brake assembly. See Figure 10-22.

NOTE

When reassembling steering column use new lock nuts.

c. Check sheave alignment, see Page 10-6.

REVERSING TRANSMISSION

DESCRIPTION

In forward operation, the power flow from the secondary sheave is transmitted to the input shaft and gear directly to the clutch dog which engages the output shaft gear. Therefore input and output shafts rotate in the same direction. See Figure 10-23. At this time, the pinion gear shaft and pinion gear are retracted from the thru-shaft gears.

In reverse operation, the power flow from the secondary sheave to the input shaft and gear is, because of the release of the dog clutch and the engagement of the pinion gear (see Figure 10-24), transferred to the output gear and shaft in reverse rotation.

Linkage adjustment is important for proper reverse performance. See "REVERSING TRANSMISSION LINKAGE ADJUSTMENT" for adjustment information.

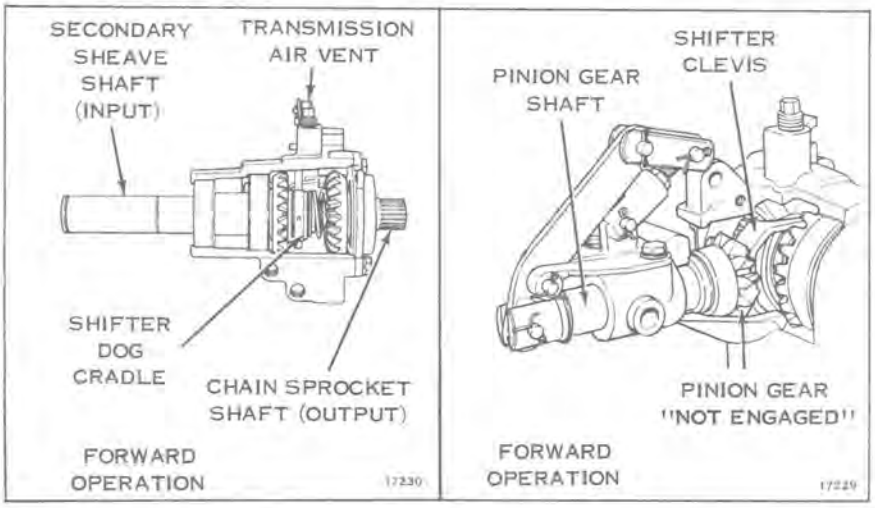

Figure 10-23

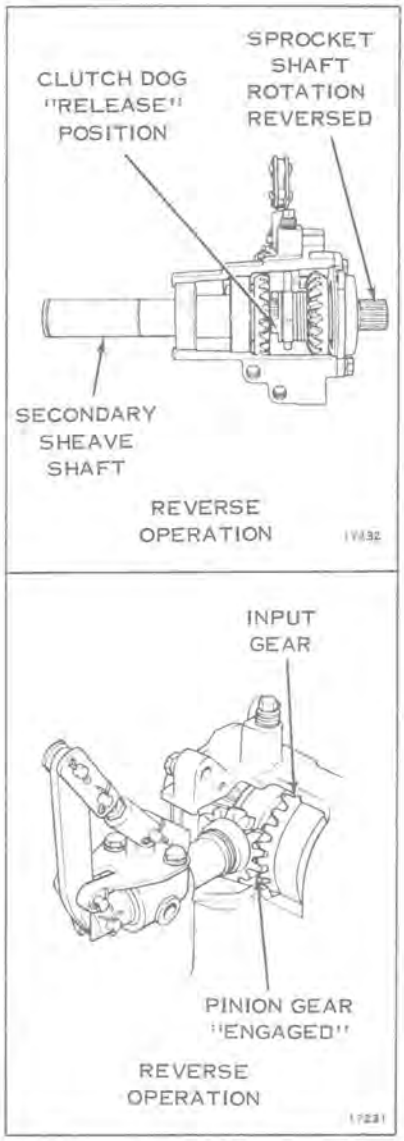

Figure 10-24

Figure 10-25

LUBRICATION

Use the following procedure to check the oil level in the reversing mechanism. See Figure 10-25.

1. Remove the oil level plug. If oil runs out, or is up to the threads in the hole, the level is satisfactory.
2. If oil level is low, remove the oil fill plug, and slowly pour Dexron ATF Lubricant oil in this hole until it runs out the lower hole.
3. Replace plugs.

REMOVAL AND DISASSEMBLY

a. Remove secondary drive as described under "Secondary Drive" see page 10-7.
b. Remove upper chain sprocket from output shaft as described under "Drive Chain" see page 10-5.
c. Disconnect support rod.
d. Disconnect shift handle.
e. Remove transmission to chain case screws and lockwashers. Beware of hidden screw inside chain case. See Figure 10-25.
f. Remove transmission housing from chain case. Output shaft assembly can now be removed.
g. Remove shifter dog assembly from shifter clevis by turning upside down.
h. Remove hex head socket screw from pinion gear shaft. See Figure 10-26. The shifter clevis, pinion gear, pinion bearing, thrust washers, thrust bearing and shims, if studed, can be removed.
i. Remove end cap and bearing. Remove input shaft and gear. The pinion gear shaft and "O" ring can be removed when the linkage is disassembled from the shaft.

CLEANING, INSPECTION AND REPAIR

a. Clean all parts with a cleaning solvent such as Trichloroethylene and blow dry with compressed air. (See △ SAFETY WARNING on page 9-5.)
b. Inspect shafts and output shaft splines for wear.
c. Turn bearings by hand; discard any which do not rotate smoothly or which have excessive play.
d. Inspect clevis, clutch dog, and cradle for wear or damage.
e. Inspect "O" ring on pinion gear shaft. Replace if required.

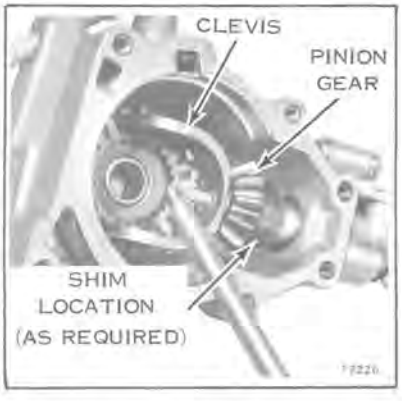

Figure 10-26

ASSEMBLY AND ADJUSTMENT

a. Install input shaft and gear. Use Loctite bearing mount on the O.D. and I.D. of the sealed bearings, see Figure 10-22.
b. Insert pinion shaft and assemble shim, thrust washer, thrust bearing, thrust washer, pinion gear and bearing assembly and shifter dog clevis.
c. Install output shaft, output gear and retaining ring. Install bearing in transmission case, using Loctite bearing mount on O.D. and I.D. Mount transmission to chain case. Gear backlash measured by placing a feeler gauge between pinion gear and thrust washer. Gear backlash should be .004" - .006" when the pinion gear shaft retaining ring is held against the outside of pedestal housing. This may be adjusted by means of shims installed on the pinion shaft and these are available in .002", .003", .004", .005" thousandths. See Figure 10-26.
d. Remove housing, output shaft and gear. Apply Loctite stud lock to clevis socket screw. Complete pinion assembly.
e. Install clutch dog assembly and output gear on shaft splines and assemble transmission to chain case with nine screws and lockwashers.
f. Install secondary sheave on input side as described under "SECONDARY DRIVE."

REVERSING TRANSMISSION LINKAGE ADJUSTMENT

DESCRIPTION

An "over center" type linkage is used to operate the reversing mechanism. This linkage, when correctly adjusted, provides an effect which locks the transmission firmly in the selected output rotation until the dash panel lever is moved.

ADJUSTMENT

a. Be sure that the linkage has been correctly assembled. See Figure 10-27.

b. Loosen or remove dash panel shift control handle so that it will not affect linkage adjustment.

c. Loosen lock nut on reverse lock clevis and eyebolt assembly.

d. With the transmission in reverse (pinion shaft in), adjust reverse lock clevis so that the threaded eyebolt touches the pinion shaft link.

e. Tighten eyebolt lock nut. Check reverse locking by visually checking center lines of reverse lock clevis and lock plates. These centerlines must cross as shown in Figure 10-28.

SHIFT CONTROL ROD ADJUSTMENT

a. Assemble control rod thru dash panel.

b. Place transmission in forward operating position.

c. Attach end of control rod to linkage. See Figure 10-28. Attach assist spring.

d. Place transmission in reverse. Assemble shift handle thru instrument panel and adjust so that handle is locked behind shift rod bushing.

e. Check operation of shift mechanism, moving from forward to reverse several times. Use a quick, abrupt action. Be certain that the reverse lock clevis goes "over center" (see Figure 10-28) each time. Check to see that the shift handle will lock in reverse position and will not release until it is lifted and pushed forward.

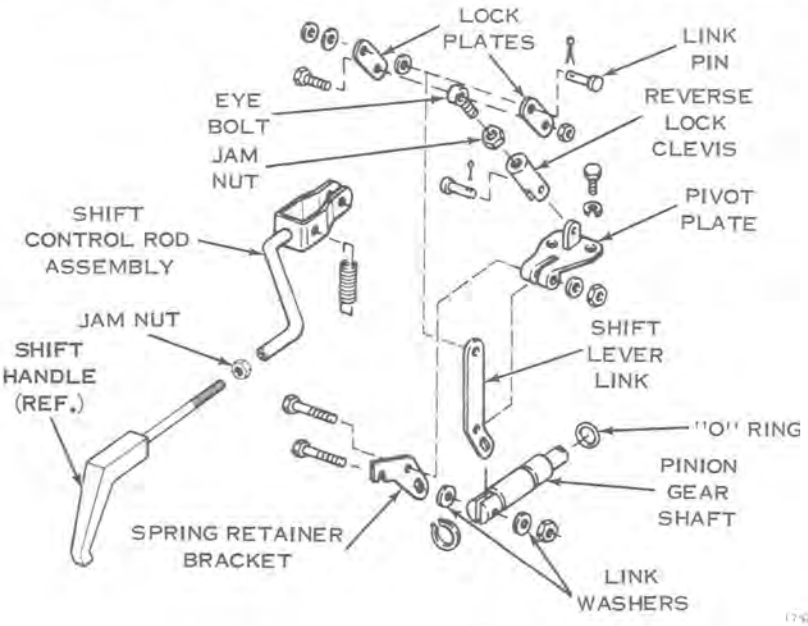

Figure 10-27

Figure 10-28

SECTION 11
STEERING, TRACK AND SUSPENSION

TABLE OF CONTENTS

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- DISASSEMBLY 11-2
- CLEANING, INSPECTION, AND REPAIR 11-2
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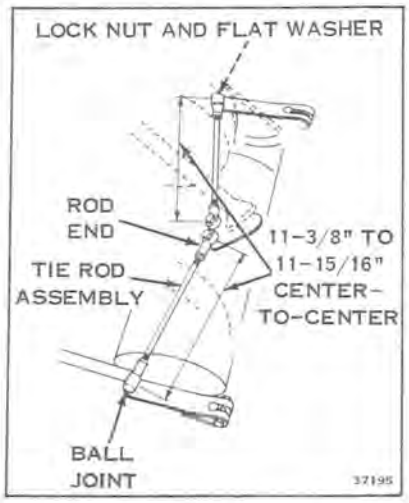

Figure 11-1

DESCRIPTION

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

STEERING

DISASSEMBLY

a. Support front end of snowmobile to remove weight from skis.

NOTE

Mark ski column and steering arm with center punch as shown in Figure 11-1. Marking is required to assure correct steering geometry on reassembly.

b. Remove ski and leaf spring assembly. Disassemble leaf spring, if required, for servicing.

c. Identify ski columns as left or right for correct reassembly. Remove steering arm from ski column. See Figure 11-2.

d. Remove ski columns.

CLEANING, INSPECTION, AND REPAIR

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

b. Inspect steering column bushing and replace if worn. See Figure 11-2.

c. Inspect ski column upper and lower rubber mounts and bushings for wear, damage, or deterioration.

d. Inspect ski runners and replace if worn.

e. Inspect leaf springs for cracks or weakness.

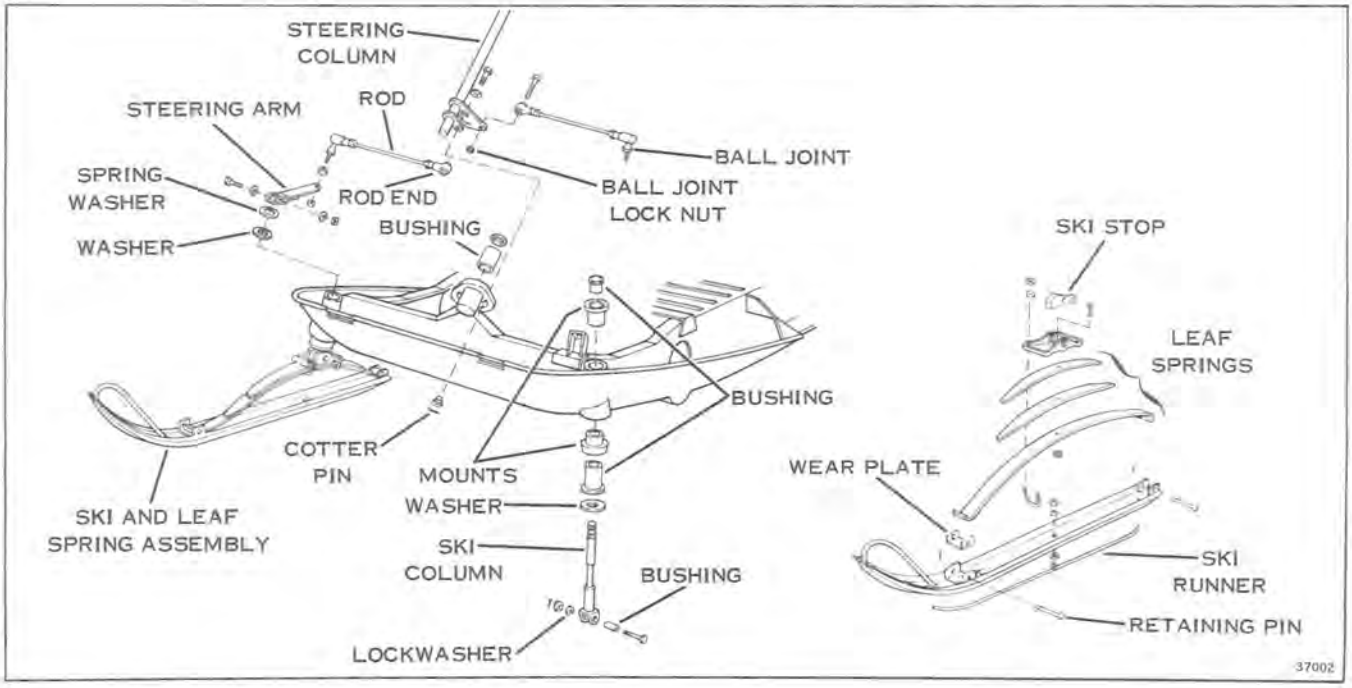

Figure 11-2

REASSEMBLY

a. Reassemble skis, springs, and columns, if these were disassembled. Refer to Section 2 for Torque.

b. Lubricate ski columns with OMC Part No. 114154 grease. Place ski and column assemblies in position in frame assembly. NOTE: DO NOT interchange right and left ski columns.

c. Attach steering arms to ski columns, using punch marks to obtain original position. Tighten to torque value shown in Section 2. Adjust ski alignment as described below.

SKI ALIGNMENT

The skis require alignment if the skis are not parallel with each other and the vehicle body when the steering bar is in the normal straight-driving position.

To align skis, proceed as follows:

1. Open hood.
2. Place steering bar in the normal straight-driving position.
3. Remove lock nut and flat washer from ball joint. See Figure 11-1.
4. Turn rod assembly clockwise to toe skis out or counterclockwise to toe skis in.
5. When skis are parallel with each other and snowmobile body reassemble flat washer and lock nut on ball joint.

SAFETY WARNING

Minimum thread engagement of rod assembly into ball joint must be .500 inches. See Figure 11-3.

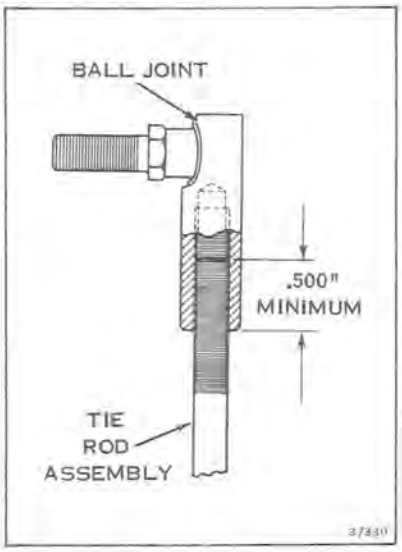

Figure 11-3

TRACK AND SUSPENSION

TRACK TENSION ADJUSTMENT

NOTE

Do not run track dry. Apply soap and water to inside of track to prevent damage.

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 arms are pulled down.

Track tension is correct if the distance from the bottom of the pivot arm bearing bore to the bottom of the adjusting bracket is 2-7/8" + 1/8" - 0". See Figure 11-4.

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.

c. Turn pivot arm adjusting screws to obtain the correct track tension as shown in Figure 11-4. Measure distance from bracket to anchor on each side, Figure 11-4, dimension A. If measurements are not equal, loosen adjustment on the side with longest dimension until measurement is equal within 1/32". This is done by turning the pivot arm adjusting screw counterclockwise. Tighten all retaining nuts.

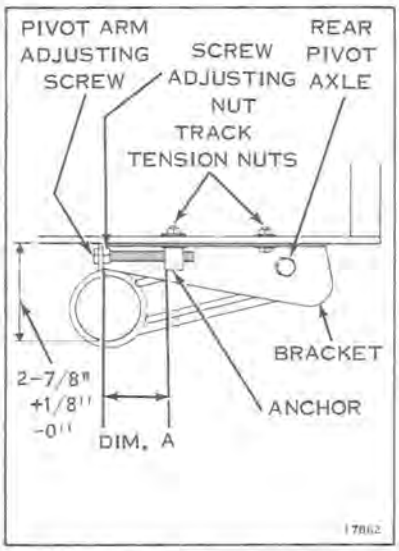

Figure 11-4

TRACK ALIGNMENT ADJUSTMENT

Proper track alignment is essential to keep rubber sprocket and track wear at a minimum.

When aligning track, block up snowmobile so that track is off ground and place front edge of skis against stationary object. Start engine and run at idle allowing track to turn free. The track edges must have a minimum of 1/8" from edge of track to pivot arms as shown in Figure 11-5.

SAFETY WARNING

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

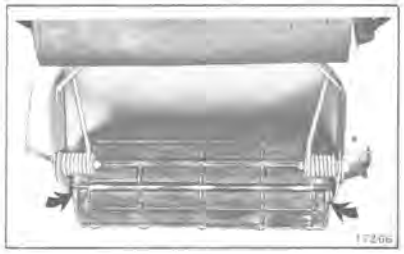

Figure 11-5

REMOVAL OF TRUCKS AND TRACK

a. Support snowmobile so that weight is removed from track.

b. Loosen track tension nuts. See Figure 11-4.

c. Release pivot axle spring. See Figure 11-6.

d. Remove screws retaining trucks to chassis. Bring truck assemblies out of chassis.

e. Remove rear axle bolts. Complete rear axle assembly can now be removed.

f. Remove chain case cover.

g. Remove retaining ring, sprocket and spacer from end of axle. See Section 10.

h. Loosen set screws from bearing locking collars and rotate collars counterclockwise to free axle from bearings.

i. Disconnect speedometer.

j. Remove three screws - flangette to chain case - on left side of vehicle and three screws - flangette to chassis - on right side of vehicle.

k. Remove front axle from chassis.

l. Remove idler assembly. Remove screw and washer from each end of axle.

m. Track will now be free of chassis.

Figure 11-6

FRONT AXLE DISASSEMBLY

a. Remove bearings and flangettes from axle.

b. Drive out roll pins from track drive sprockets.

SAFETY WARNING

If heat is necessary to remove, or reassemble front sprockets or rear axle wheels, do not use open flame because of danger of igniting the magnesium metal.

c. Press drive sprockets off front axle after marking position for reassembly.

REAR AXLE DISASSEMBLY

a. Remove retaining ring and bearing retainer.

b. Push pivot arm towards wheel.

c. Remove bearing.

d. Loosen Allen set screws and remove wheels from axle.

TRUCK DISASSEMBLY

a. Remove nuts from each end of front and rear truck axles.

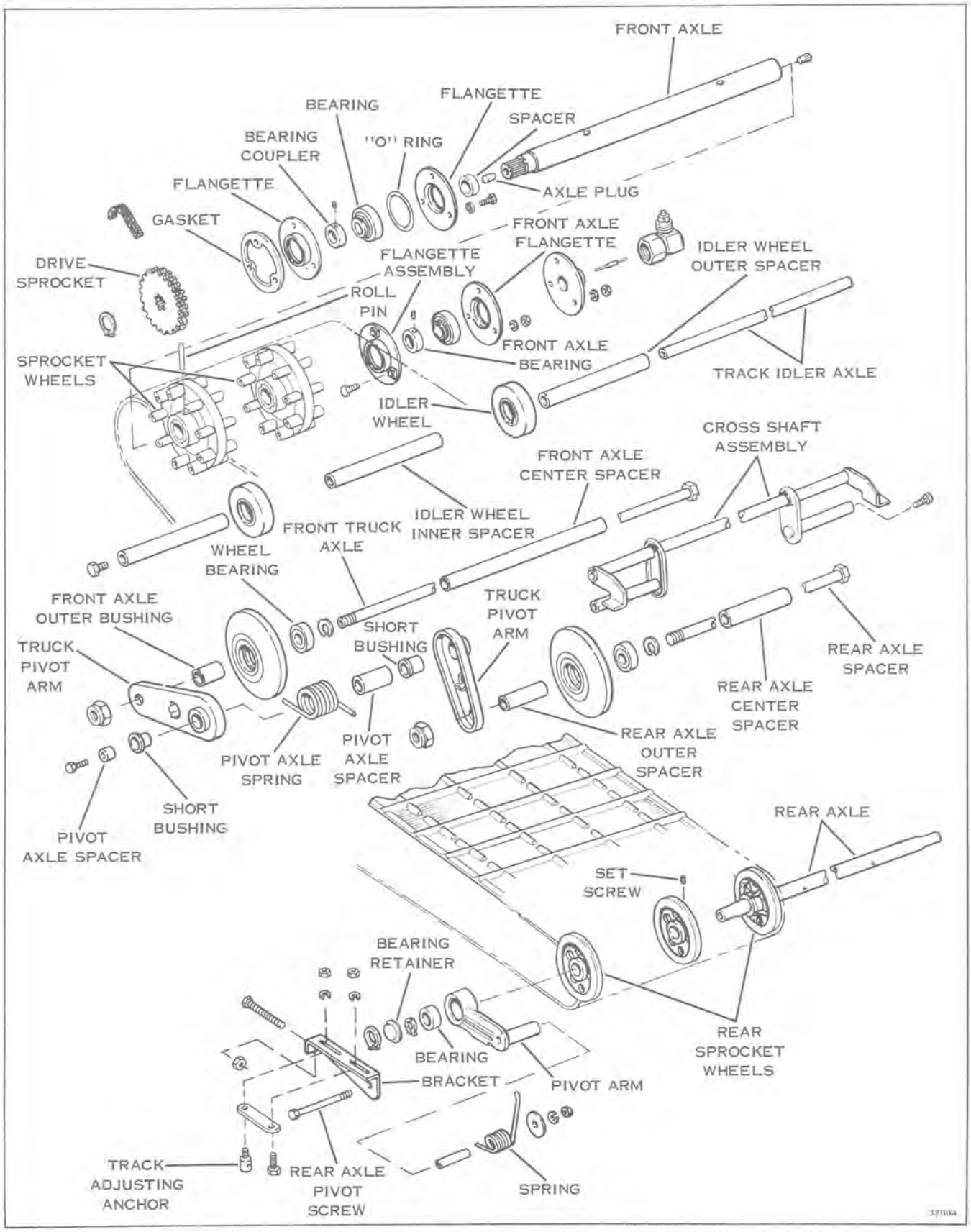
FRONT AXLE
FLANGETTE
SPACER
BEARING
"O" RING
BEARING COUPLER
FLANGETTE
AXLE PLUG
GASKET
FRONT AXLE FLANGETTE
IDLER WHEEL OUTER SPACER
DRIVE SPROCKET
FLANGETTE ASSEMBLY
ROLL PIN
FRONT AXLE BEARING
SPROCKET WHEELS
TRACK IDLER AXLE
IDLER WHEEL
CROSS SHAFT ASSEMBLY
FRONT AXLE CENTER SPACER
IDLER WHEEL INNER SPACER
FRONT TRUCK AXLE
WHEEL BEARING
FRONT AXLE OUTER BUSHING
SHORT BUSHING
TRUCK PIVOT ARM
REAR AXLE SPACER
TRUCK PIVOT ARM
REAR AXLE CENTER SPACER
REAR AXLE OUTER SPACER
PIVOT AXLE SPRING
PIVOT AXLE SPACER
SHORT BUSHING
REAR AXLE
PIVOT AXLE SPACER
SET SCREW
BEARING RETAINER
REAR SPROCKET WHEELS
BEARING
BRACKET
PIVOT ARM
TRACK ADJUSTING ANCHOR
REAR AXLE PIVOT SCREW
SPRING
37004

Figure 11-7

REFERENCE PICTURE

Figure 11-8

REFERENCE PICTURE

Figure 11-9

Figure 11-10

b. Remove pivot arms, spacers, bushings, and springs from pivot axles.

c. Wheels and spacers will now slide off front and rear truck axles.

CLEANING, INSPECTION, AND REPAIR

Track

Damaged tracks cannot be repaired.

Liquid neoprene can be applied to a frayed track to help restore its original appearance.

Bearings

Bearings are sealed, therefore require no greasing. Turn bearings in hand. Sealed bearings do not turn freely, but if they are rough, they must be replaced.

Axles and Sprockets

Axles - check for straightness by rolling on a flat surface. Truck and idler axles maybe straightened if bent. Front and rear axles should be replaced if bent.

Splines - inspect for excessive wear.

Sprockets - check for excessive wear.

Oil plug must be in good condition, and placed in front axle (spline end) to retain oil in chain case.

Check condition of "O" ring.

Check nylon truck bushings for cracks or excessive wear. Replace if damaged.

FRONT AXLE ASSEMBLY (See Figure 11-7)

Refer to Figure 11-7 for assembly of sprocket wheels to front axle. Driving lugs on sprockets must be in line with each other.

a. Assemble bearings, flangette gasket and "O" ring to chain case.

b. Assemble flangette assembly, bearing and flangette to right end of axle.

c. Insert left end of axle thru bearing in chain case far enough so that right end of axle can be secured to chassis.

d. Tighten 6 screws through flangettes. Torque to 20-25 ft. lbs. (Axle should be able to slide back and forth in bearings.)

e. Assemble spacer and sprocket with chain and retaining ring to left end of axle in chain case.

f. Pull axle to right side to take up space between sprocket, spacer, retaining ring and bearings on left end of axle.

g. Rotate collar in direction of axle rotation on both bearings to tighten collar on bearing. Use pin punch and hammer to make sure collar is tight on bearing. See Figure 11-8.

h. Apply locktite screw lock to set screws on collar and torque to 25-35 in. lbs. See Figure 11-9.

IDLER ASSEMBLY

a. Assemble idler wheels to shaft with retaining rings to inside to chassis.

b. Assemble idler wheels inside of track. Torque idler axle screws to chassis 20-25 ft. lbs. See Figure 11-10.

TRUCK REASSEMBLY

1. Assemble wheels and spacers to their original positions on the front and rear truck axles. Application of a light oil on the axles will assist in this procedure. Apply OMC Grease #114154 to nylon bushings and assemble to axles. Assemble pivot arms and springs. arms and springs.

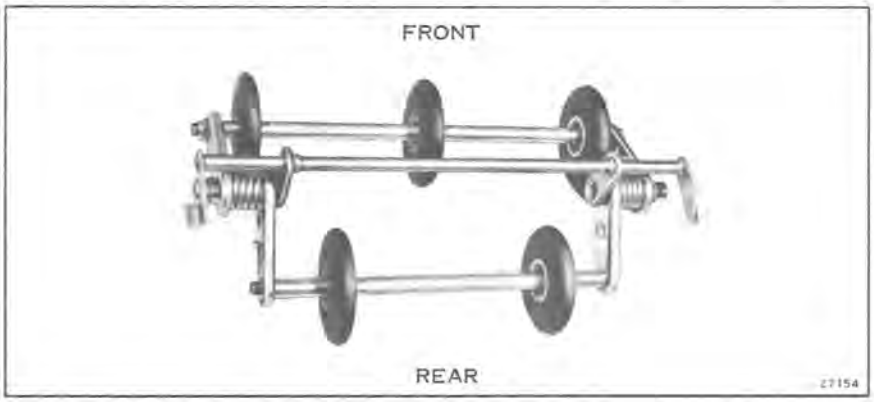

Figure 11-11

REAR AXLE ASSEMBLY

a. For sequence of assembly of sprockets, bearings, pivot arms, and brackets refer to Figures 11-5 and 11-7.

b. Lubricate the outside of the pivot bushing with OMC Grease #114154.

c. Lubricate outside face of pivot arm side with OMC Grease #114154.

d. Apply Loctite grade A to the set screws for sprockets or wheels prior to assembly. Torque set screws to 18-20 ft. lbs.

e. Torque rear axle pivot nuts to 12-15 ft. lbs. Axle must rotate freely when assembled to chassis. Pivot arms must rotate on bushings with no binding or other restriction. See figure 11-11.

SECTION 12
LUBRICATION AND STORAGE

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STORAGE 12-6
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REMOVAL FROM STORAGE 12-6

ENGINE LUBRICATION

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

Both optimum performance and lubrication depend on maintaining the correct ratio between gasoline and lubricant in the fuel mixture. The use of too little lubricant leads to premature wear and early breakdown. A fuel mixture richer in lubricant than recommended is not only wasteful but will contribute to faulty performance, and to excessive carbon accumulation in the cylinders and on the spark plugs. Frequent spark plug replacement can often be traced to an excess of lubricant in the fuel mixture. Instructions for the 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.

FUEL BLENDING

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

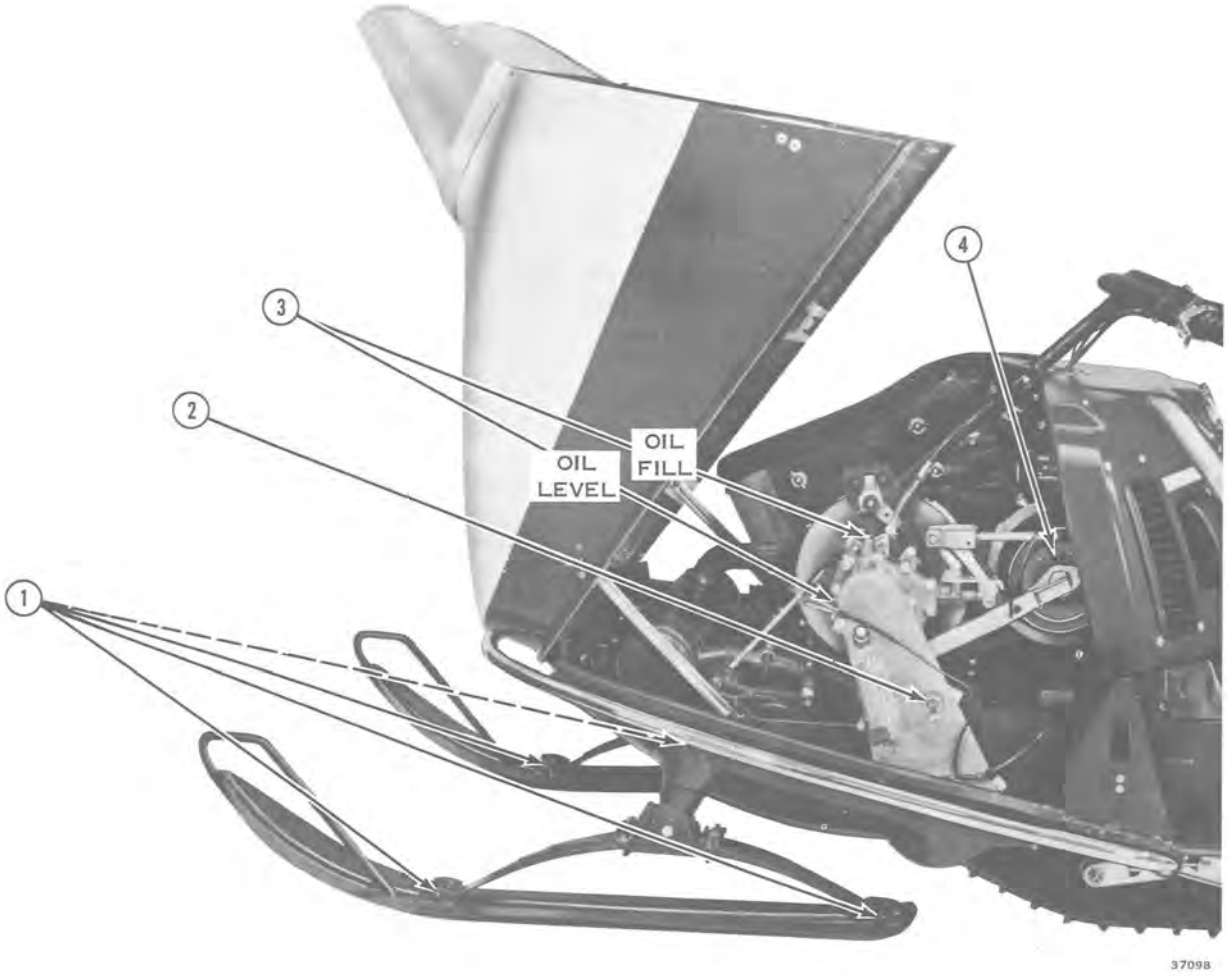

Figure 12-1

TIME	MAINTENANCE	LUBRICANT
Every 25 hrs.	(1) Ski Pivots (leaf spring connections to skis)	SAE #10 oil
After 10 hrs. then every 25 hrs. of operation	(2) Drive Chain - oil bath. See page 10-5	Dexron ATF
	(3) Reversing transmission. See page 10-10.	Dexron ATF
Once a season (normal use) Twice a season (extended use)	(4) Primary Drive (disassembly required, see your dealer)	Lubriplate 907 (OMC Part No. 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)
Once a season (see below)	Clean or install new Fuel Pump Filter Screen

FUEL PUMP FILTER SCREEN

SAFETY WARNING

Exercise care to prevent fuel spillage when removing fuel filter when engine is hot. Fuel in filter could drip on hot engine or muffler and ignite.

The fuel filter is located under the air silencer. Lift the hood and remove five wing nuts securing air silencer to air duct. Remove air silencer. The fuel filter is attached to the fuel pump. See Figure 12-2. 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).

Figure 12-2

Figure 12-3

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. 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. Block front and rear of unit off ground to take weight off track and skis.

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

i. Provide for proper battery maintenance, as described in Section 7.

j. Remove transmission belt. See Section 10.

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

l. Store in dry, well-ventilated area.

SAFETY WARNING

To prevent possible explosion or ignition of vaporized fuel, do not store snowmobile with fuel in tank or carburetor in enclosure with open flame. (EXAMPLE: Furnace or water heater pilot light.)

REMOVAL FROM STORAGE

a. Fill tank with fresh fuel mixture. Install battery.

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.