SECTION 1

General Information

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SECTION 1 - GENERAL INFORMATION

MERCURY
SNOWMOBILES

MERCURY
MARINE

A BRUNSWICK COMPANY

INDEX

GENERAL INFORMATION

HOW TO USE MANUAL

This manual is a comprehensive overhaul, repair and maintenance manual designed as a mechanic's reference during Mercury Snowmobile repair.

The manual is divided into Sections and Parts. Each Section covers a general subject or system and is further divided into separate Parts which cover specific subjects or models. An index is included on the reverse side of all Part dividers.

This manual is divided into SECTIONS which cover a general subject or system, as follows:

Section	Section Heading
1	General Information
2	Chassis
3	Ignition and Electrical Systems
4	Fuel Systems
5	Engine Mechanical
6	Starters
7	Miscellaneous
8	Specifications
9	Tools

SECTIONS are separated by dividers (heavier color paper) which enable the user to quickly locate any desired SECTION. A table of contents, which lists major subjects and page numbers, is printed on the reverse side of each SECTION divider.

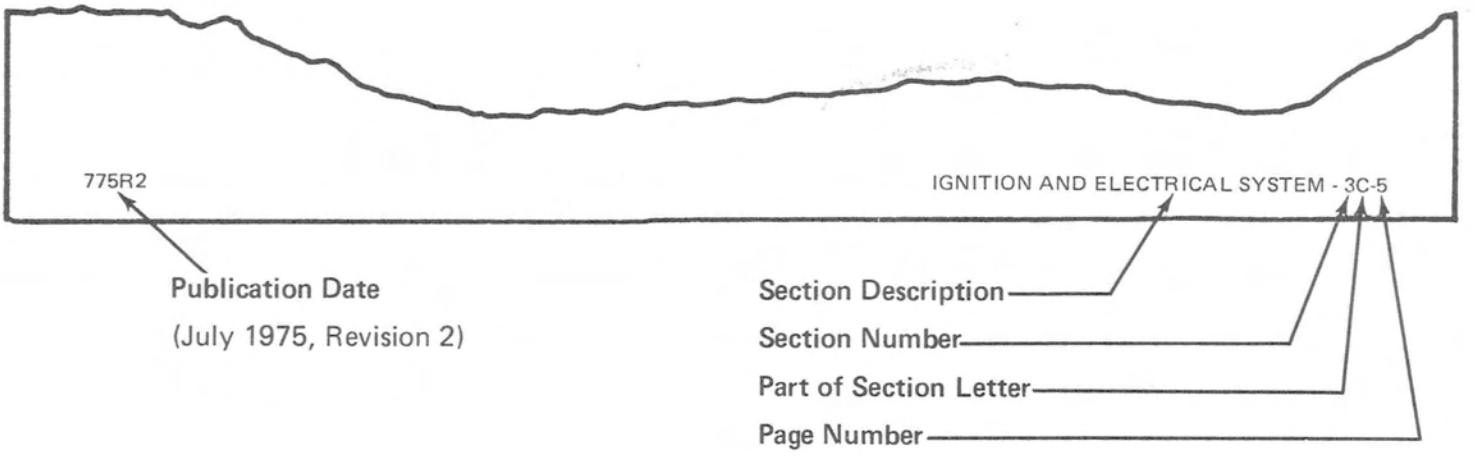
The SECTIONS are further divided into PARTS. Each PART has a colored title page which is the same color as the SECTION divider. An index for the particular PART is printed on the title page.

EXAMPLE: To find "Timing and Adjusting – Hurricane Model", turn to "Ignition and Electrical Systems" divider. The table of contents on the back side of the divider indicates that "Timing and Adjusting – Hurricane Model" is located in PART C, "Timing and Adjusting", Page 3C-7.

PAGE NUMBERING

Page numbering and dating is on bottom of pages as shown below.

EXAMPLE



SERIAL NUMBERS

The CHASSIS serial number of the snowmobile is stamped within the serial plate on the left or right side of the snowmobile chassis. (Figure 1) The ENGINE serial number is stamped into the serial plate on the engine fan housing or flywheel bell housing. (Figure 2) These serial numbers are the manufacturer's key to numerous engineering details which apply to the snowmobile. When ordering parts, accessories or tools, or when corresponding with the manufacturer or dealer in regard to service matters, always specify model and serial numbers.

Figure 1. Typical Chassis Serial Number Location

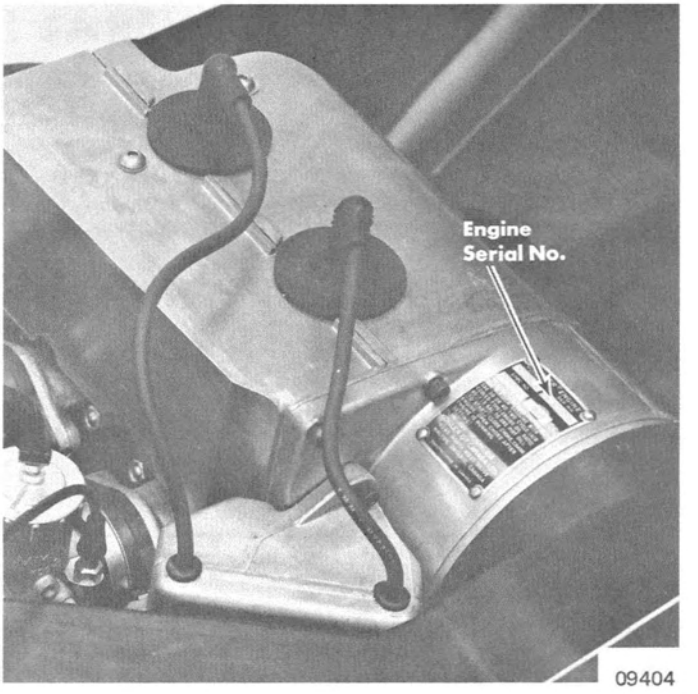


Figure 2. Typical Engine Serial Number Location

EMERGENCY STOP SWITCH

Emergency stop switch is located on the right hand side of the handlebar. (Figure 3 or 4) The stop switch serves as a safety device for stopping engine in emergency situations by depressing button (Figure 3) or rotating switch. (Figure 4) Switch is positive acting and, once actuated, must be reset or released by switching to "Run" position before engine can be restarted.

IMPORTANT: "On" or "off" position of the stop switch (Figure 3) can be noted by the shape of the button. For "off" position, switch is depressed and rubber is "squashed out". For "on" position, switch is up and not "squashed".

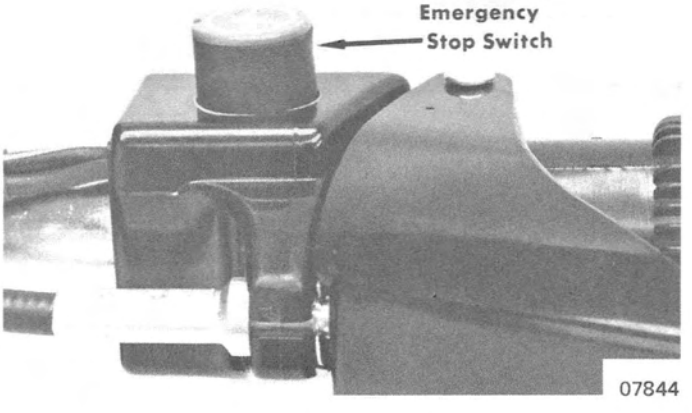


Figure 3. Emergency Stop Switch

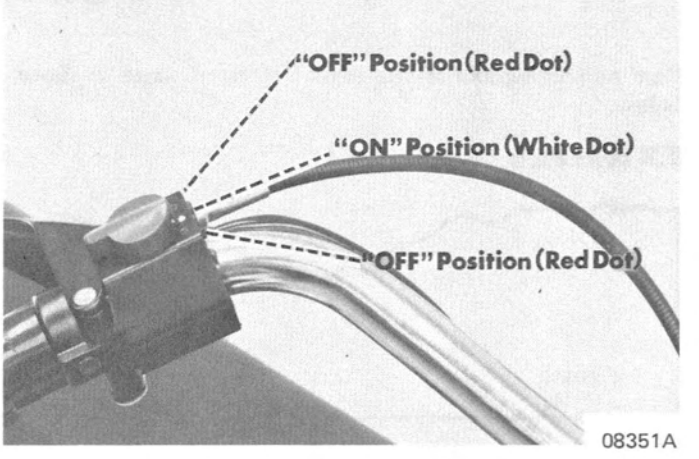


Figure 4. Emergency Stop Switch

NOTE: The 400 S/T model is equipped with a tether stop switch in addition to an emergency stop switch. Whenever tether pin is pulled from tether switch, engine ignition circuit "shorts" to ground, causing engine to stop. Tether pin must be in place in tether switch before attempting to start engine.

HEADLIGHT DIMMER SWITCH

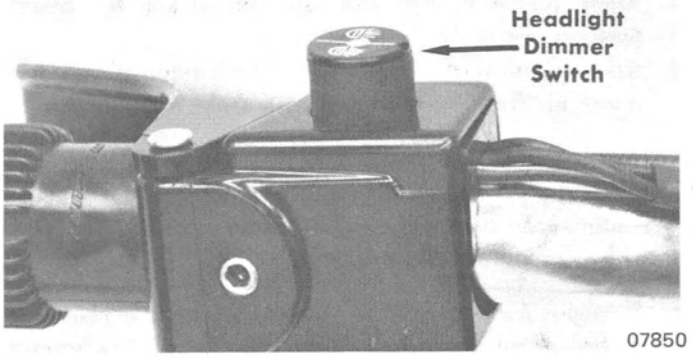


Figure 5. Headlight Dimmer Switch

The high-low beam switch is located on the left hand side of the handlebar. (Figure 5) Depress the button (Figure 5) or rotate switch (Figure 6) for low beam. Press again (or turn switch back) for high beam.

IMPORTANT: "High" or "low" position of the dimmer switch (Figure 5) can be noted by the shape of the button.

For "low" position, switch is depressed and rubber is "squashed out". For "high" position, switch is up and not "squashed".

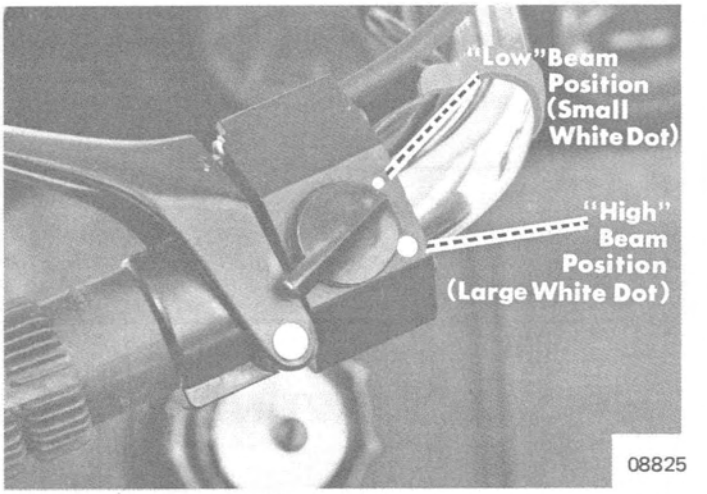


Figure 6. Headlight Dimmer Switch

MANUAL STARTING PROCEDURE

Always Make Certain That Emergency Stop Switch Is in "Run" Position and That Tether Pin (if So Equipped) Is in Place in Tether Switch before Attempting to Start Engine.

The manual starter handle is located on the right side of the engine. (Figure 7) This starter is an automatic rewind type and will provide many hours of trouble-free service by observing the proper operating technique, following:

1. Be sure that fuel tank contains a sufficient amount of fuel mixture and that fuel shut-off valve (if so equipped) is fully open.
2. Actuate choke system (if so equipped) and pump fuel primer (if so equipped) 3 or 4 times.
3. Turn the ignition key (if so equipped) to the "Run" or "On" position and apply partial throttle.

   IMPORTANT: On Twister models, DO NOT OPEN THROTTLE while carburetor choke system is actuated. If throttle is held open, carburetor choking system will be by-passed, and engine will not start (insufficient fuel).

WARNING: Use care while applying partial throttle, as the drive sheave is designed to engage at slightly above idle RPM, and forward motion of the snowmobile occurs upon engagement.

4. Grasp manual starting handle firmly and pull outward slowly until engagement of ratchet mechanism can be felt, then continue to pull outward with a full, vigorous stroke. Do not release handle at end of stroke and allow cable to snap back. Retain grip on handle and allow cable to rewind slowly. Do not pull cable to end of travel.

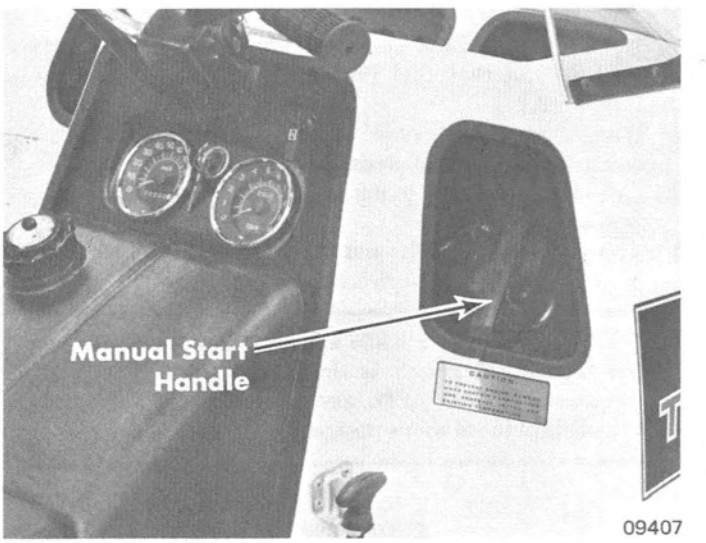


Figure 7. Typical Manual Starter Handle

5. When engine starts, de-actuate choke system. If engine falters, actuate choke. Do not use choke or primer when starting a warm engine, or engine flooding may occur.

   NOTE: On the Electric Reverse Model, the position of the "Forward-Reverse" start switch is not a factor when starting manually, as this switch is activated only when the ignition key is turned to "Start" position.

CAUTION: DO NOT use or operate the automatic rewind starter while the engine is running, or damage may occur to the rewind starter assembly.

ELECTRIC STARTING PROCEDURE (ELECTRIC START MODELS)

Always Make Certain That Emergency Stop Switch Is in "Run" Position before Attempting to Start Engine.

1. Make certain that fuel tank contains a sufficient amount of fuel mixture and that fuel shut-off valve (if so equipped) is fully open.
2. Pull choke out and pump fuel primer 3 or 4 times (if so equipped).

WARNING: Use care while applying partial throttle, as the drive sheave is designed to engage at slightly above idle RPM, and forward motion of the snowmobile occurs upon engagement.

3. Apply partial throttle and turn igntion key to "Start" position to activate electric starter.
4. When engine starts, release key, which automatically will return to "Run" position, and push choke in.

IMPORTANT: The starter motor is not designed for continuous operation, and serious damage may result if operated continuously (maximum of 30-second operating intervals with a 2-minute cooling-off period).

5. If engine falters, actuate choke. Do not use choke or primer when starting a warm engine, or carburetor flooding may occur.

ELECTRIC STARTING PROCEDURE (ELECTRIC REVERSE MODEL)

Always Make Certain That Emergency Stop Switch Is in "Run" Position before Attempting to Start Engine.

IMPORTANT: Do not operate or idle vehicle in reverse engine rotation for prolonged periods, or possible engine overheating may occur, as the cooling capacity of the fan is reduced in reverse rotation.

1. Be sure that fuel tank contains a sufficient amount of fuel mixture and that fuel shut-off valve (if so equipped) is fully open.
2. Place "Forward-Reverse" start switch in position for direction of operation desired.
3. Pull choke out and pump fuel primer 3 or 4 times (if so equipped).
4. Apply partial throttle and turn ignition key to "Start" position to activate electric starter.

WARNING: **Use care while applying partial throttle, as the centrifugal clutch is designed to engage at approximately 2200 RPM, and forward motion of the vehicle is induced upon engagement.**

5. When engine starts, release key, which automatically will return to "Run" position, and push choke in.

IMPORTANT: The starter motor is not designed for continuous operation, and serious damage may result if operated continuously (maximum of 30-second operating intervals with a 2-minute cooling-off period).

6. If engine falters, actuate choke. Do not use choke or primer when starting a warm engine, or carburetor flooding may occur.

NOTE: If an abrupt or emergency stop is made while operating the Electric Reverse Model at high speeds in forward direction, the variable speed drive belt may remain in high ratio position on the driven sheave assembly.

Should this occur, before reverse operation is possible, it will be necessary to operate the vehicle for a short distance in forward direction to allow the drive belt to return to low ratio position for reverse operation.

EMERGENCY ROPE STARTING PROCEDURE

Always Make Certain That Emergency Stop Switch Is in "Run" Position and That Tether Pin (if So Equipped) Is in Place in Tether Switch before Attempting to Start Engine.

If, for any reason, the electric starter (if so equipped) and manual starter become inoperative, the engine can be started via an emergency starter rope located in the tool packet in the storage compartment.

MODELS 200, ROCKET, LIGHTNING, 440 MAX, 440 M/X, 440 S/R, 340 S/R, 340 S/T, 400 S/T, 440 S/T, 340 T/T and 440 T/T

1. Unlatch and raise top cowl assembly.

   NOTE: On Twister models, remove carburetor air intake.

2. Remove wrench and emergency starter rope from tool packet.

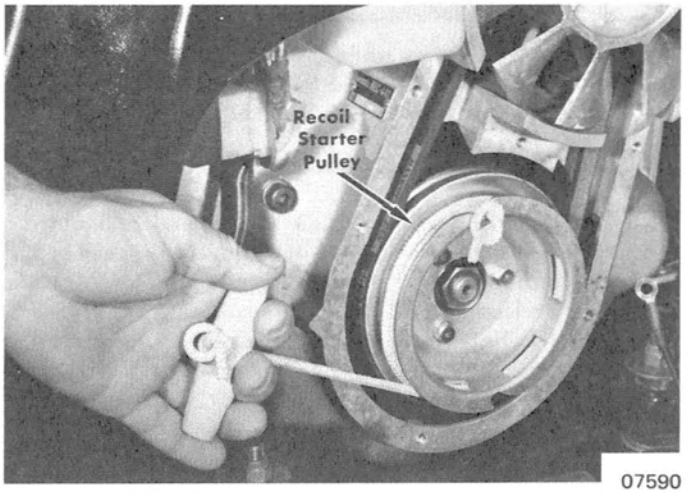


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Figure 8. Emergency Rope Starting

3. Remove bolts, which secure rewind starter to fan housing (or to flywheel bell housing), and remove complete starter housing assembly.
4. Wind the rope around the starter sheave in a clockwise direction. (Figure 8)
5. To start the engine, pull the rope with a full, vigorous stroke, following the procedure outlined in 2, 3 and 5 of "Manual Starting Procedure".

MODELS 220, 250, HURRICANE, MARK I, MARK II

NOTE: Mark I and Mark II Models are not equipped with an emergency rope starter.

1. Unlatch and remove or raise top cowl.
2. Remove emergency starter rope from tool packet. Wind rope around drive sheave in forward direction (counter-clockwise). (Figure 9)
3. To start engine, pull rope with a full, vigorous stroke, following the procedure outlined in 2, 3 and 5 of "Manual Starting Procedure", preceding.

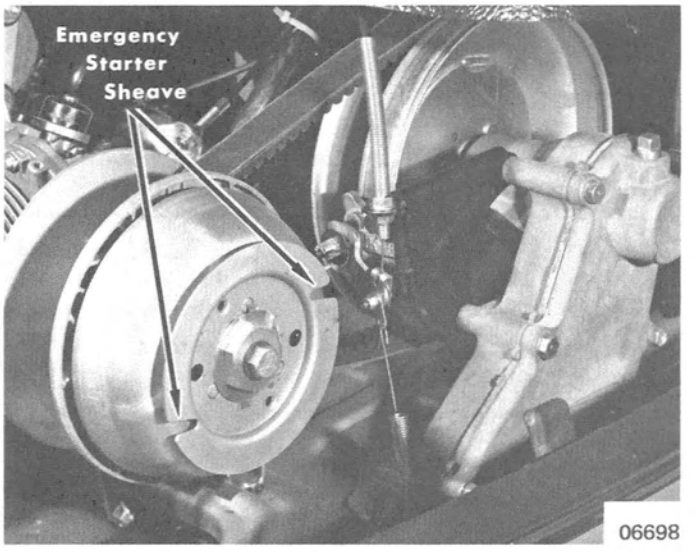

Figure 9. Emergency Starter Sheave

NORMAL OPERATION

Proper operating technique of your snowmobile varies with the type of terrain and condition of the snow on which the vehicle is to be used. The operator should familiarize himself with the performance of his vehicle on moderate terrain before attempting to use on rugged terrain.

In climbing steep hills, the proper procedure is to drive cross-hill, with slight throttle reduction (to reduce possibility of spinning track), and gradually work to the top. In decending steep hills, cross-hill descent is good practice while maintaining enough throttle to keep centrifugal clutch engaged, which will allow engine speed to check momentum of descent. The brake also can be used, but keep in mind that too much brake pressure can lock the track, which may cause vehicle to slide.

Follow these simple precautions to ensure full performance and longer service from the variable speed drive belt.

1. DO NOT operate at full throttle in deep snow, when stuck, or when load conditions restrict vehicle speed in relation to engine RPM.
2. Before attempting operation in extreme cold weather, place the vehicle on suitable blocking (on a firm surface) to lift the track off the ground. Block front end for stability and run vehicle at low speeds until normal movement of track and drive mechanism is attained.

WARNING: Keep hands and feet clear of moving parts at all times. Operate at low speeds until normal movement of track and drive mechanism is attained.

IMPORTANT: If track does not respond when clutch engages, discontinue operation immediately. Stop engine and check vehicle to make sure that track tunnel is free of snow and ice which could cause track to bind. If track and tunnel check satisfactorily, it may be necessary to rotate track approximately 1/8-turn by hand to assist starting of track movement.

WARNING: Stop Engine! DO NOT attempt to rotate track while engine is running, as any sudden movement of track could force hands and/or arms between track and chassis and/or bogie wheels and cause serious injury.

3. Avoid easing clutch into engagement. Start vehicle movement by accelerating throttle to give positive clutch engagement.

NOTE: Drive belts with baked or glazed appearance or premature wear in width are a result of drive belt slippage.

CORRECT FUEL MIXING PROCEDURE

WARNING: Observe fire prevention rules, particularly in the matter of "No Smoking". Mix fuel outdoors or in a well-ventilated location.

Mix fuel in a separate, clean container, measuring accurately the required amounts of oil and gasoline. Pour a small amount of gasoline into the container and add required amount of oil.

Mix thoroughly by shaking or stirring vigorously, then add balance of gasoline and mix again.

Always use fresh gasoline. Gasoline contains certain gum and varnish deposits and, when kept in a tank for a length of time, may give carburetor trouble and cause spark plug fouling.

Importance of Consistent Fuel Mixtures

Carburetor adjustments are sensitive to fuel mixture variations which result from use of different gasolines and oils or due to inaccurate measuring or mixing. Be consistent. Prepare each batch of fuel exactly the same as previous ones.

Using less than the recommended proportion of oil may result in very serious engine damage from lack of sufficient lubrication. Using more than the recommended proportion of oil will cause erratic carburetion, excessive smoking and faster-than-normal carbon accumulation.

RECOMMENDED GASOLINE/OIL MIXTURES

Fan Cooled Engines (50:1 Ratio)

A 50:1 gasoline/oil ratio is recommended for all Mercury fan-cooled snowmobile engines that are operated under "Normal Service".

A 25:1 gasoline/oil ratio is recommended for fan-cooled engines that are operated in "Severe Service". The following conditions (or any combination) are considered "Severe Service":

- **Break-in period.**
- **Use of 2-cycle oils other than Quicksilver Snowmobile Oil, Quicksilver Formula 50-D Outboard Oil or BIA rated TC-W oils. (In an emergency, if recommended oils are not available, use highest quality available oil.)**
- **Extended operation with outside air temperature above 50°F.**
- **Operation in an abnormally dusty or dirty environment.**

GASOLINE RECOMMENDATIONS

A good grade of REGULAR LEADED automotive gasoline with a posted minimum average octane rating of 86 (80 motor octane) is recommended for all Mercury Snowmobiles with fan cooled engines (except 1975 440 T/T, which requires premium automotive gasoline). If REGULAR LEADED gasoline is not available, premium automotive gasoline should be used. Avoid use of low-lead and lead-free gasolines.

NOTE: Refer to Section 8, "Specifications", for specific gasoline and oil recommendations for each model Mercury Snowmobile.

NORMAL SERVICE (50:1 Ratio)

1. Use Quicksilver Snowmobile Oil and mix with a good grade recommended gasoline. Thoroughly mix one 12 oz. can of Snowmobile Oil with each 5 U.S. gallons (4 imperial gallons, 19 liters) of gasoline (50:1 ratio). (Figure 10)
2. If Quicksilver Snowmobile Oil is not available, use Quicksilver Formula 50-D Outboard Oil and mix with a good grade recommended gasoline. Thoroughly mix 12 ozs. of Formula 50-D Oil with each 5 U.S. gallons (4 imperial gallons, 19 liters) of gasoline (50:1 ratio).
3. In an emergency, if Quicksilver Snowmobile Oil and Formula 50-D Oil are not available, substitute a high-quality, 2-cycle oil which meets BIA rating TC-W (shown on oil container) and mix with a good grade recommended gasoline. Thoroughly mix 16 ozs. of this oil with each 5 U.S. gallons (4 imperial gallons, 19 liters) of gasoline (40:1 ratio).

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Figure 10. Quicksilver Snowmobile Oil

CAUTION: Under no circumstances use a gasoline/oil ratio other than the recommended ratio, or serious engine damage could occur. DO NOT USE oils pre-diluted with kerosene or fuel oils -- multi-grade or high detergent automotive oils -- or oils which contain metallic additives -- as they also could be detrimental to engine operation.

SEVERE SERVICE (25:1 Ratio)

1. Quicksilver Snowmobile Oil

Mix two (2) 12 oz. cans with 5 U.S. gallons (4 imperial gallons, 19 liters) of recommended gasoline (25:1 ratio).

NOTE: If Quicksilver Snowmobile Oil is not available, use Quicksilver Formula 50-D Outboard Oil.

2. Quicksilver Formula 50-D Outboard Oil

Mix three (3) 8 oz. cans with 5 U.S. gallons (4 imperial gallons, 19 liters) of recommended gasoline (25:1 ratio).

Sno-Twister "Free Air" Engines (20:1 Ratio)

A 20:1 gasoline/oil ratio is recommended for all Mercury Sno-Twister "Free Air" engines.

GASOLINE RECOMMENDATIONS

A good grade of PREMIUM LEADED or SUPER REGULAR automotive gasoline with a posted minimum average octane rating of 96 is recommended for all Mercury Snowmobiles with "free air" engines, when used for trail riding (100/130 AvGas is recommended for competition). DO NOT use low-lead or lead-free automotive gasolines.

NOTE: Refer to Section 8, "Specifications", for specific gasoline, oil and timing recommendations for each model Mercury Snowmobile.

FUEL MIXTURE (20:1 Ratio)

1. Use Quicksilver Snowmobile Oil or Quicksilver Formula 50-D Outboard Oil and mix with a good grade recommended gasoline. Thoroughly mix 12 ozs. of oil with each 2 U.S. gallons (1.7 imp. gallons or 7.6 liters) of gasoline (20:1 ratio).
2. In an emergency, if Quicksilver Snowmobile Oil and Quicksilver Formula 50-D Oil are not available, substitute a high-quality, 2-cycle oil which meets BIA rating TC-W (shown on oil container) and mix with a good grade recommended gasoline. Thoroughly mix 32 ozs. of this oil with each 5 U.S. gallons (4 imp. gallons or 19 liters) of gasoline (20:1 ratio).

CAUTION: Under no circumstances use a gasoline/oil ratio other than the recommended ratio, or serious engine damage could occur. DO NOT USE oils pre-diluted with kerosene or fuel oils -- multi-grade or high detergent automotive oils -- or oils which contain metallic additives -- as they also could be detrimental to engine operation.

OUT-of-SEASON STORAGE

In preparing your Mercury Snowmobile for storage, two precautions must be taken into consideration: 1) The unit must be protected against physical damage, and 2) the unit must be protected from rust, corrosion and dirt. The following preventive measures should be applied to protect external and internal parts from rust and corrosion.

1. Close fuel shut-off valve and run engine until carburetor(s) is run dry and engine stops. While running carburetor(s) dry, fog internal engine surfaces by spraying Quicksilver Storage Seal into carburetor(s).

   NOTE: Hurricane, 440 MAX, 440 M/X, 440 S/R, 340 S/R, Mark I and Mark II Models are not equipped with a fuel shut-off. Siphon all possible fuel from fuel tank and run engine until tank and carburetor have run dry and engine stops.

2. Siphon all possible fuel from fuel tank. Check and clean fuel filter in fuel tank, if so equipped.
3. Make certain that ignition switch (if so equipped) or emergency stop switch is in the "OFF" position, then remove spark plug wire(s) from spark plug(s).
4. Remove spark plugs from engine and spray approximately one ounce of Quicksilver Storage Seal into each spark plug hole.
5. Turn engine over several times with manual starter to distribute Storage Seal throughout cylinders.
6. Reinstall spark plugs and spark plug lead wires.
7. Remove variable speed drive belt for duration of storage period. (See Sec. 2, Part B.) Wipe belt contact surfaces of driven sheave and spindle hub of drive sheave and driven sheave with light oil to prevent rusting. Wipe exposed surfaces of drive sheave (including spindle hub attached to fixed half) with light oil to prevent rusting.
8. Ease track tension. Refer to Section 2E, "Suspension and Track".
9. Place snowmobile on kick stand -- or use suitable blocking -- to release its weight from the track.
10. Thoroughly clean and inspect the snowmobile, including all accessible engine parts. Apply a thin coat of light oil to bottom of skis to eliminate possibility of rusting, and place a drop of light oil on moving parts, such as ski pivots, steering spindle bushings, upper steering post bushing, linkage, suspension pivot points, etc.
11. Lubricate chassis (steering and suspension) grease fittings with a low temperature grease.
12. If Electric Start model, observe battery storage and care as outlined in Section 3E, "Charging and Electric Start System".

Placing Snowmobile Back in Operation

1. Thoroughly clean all oil from driven sheave and drive sheave surfaces. Reinstall variable speed drive belt. (Refer to Section 2, Part B.)
2. If Electric Start model, reinstall battery.
3. Refuel with fresh fuel mixture.
4. Open fuel shut-off valve (if so equipped).
5. Adjust track tension and alignment. (Refer to Section 2, Part E.)