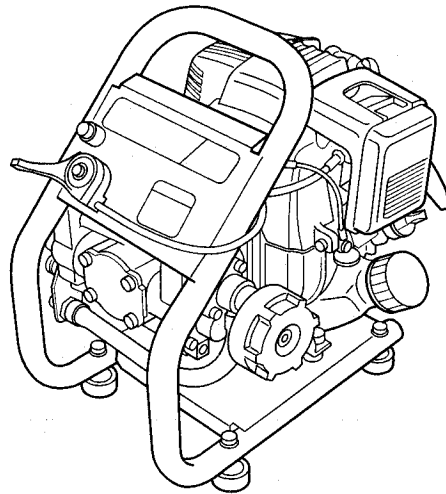


DRAMM

MS071EH - MS GAS PORTABLE POWER SPRAYER



Owner/Operators Manual

Completely read and understand this manual before using this product

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FOREWORD

This Owners/Operators Manual is designed to familiarize the operator with the various features and component parts of the equipment and to assist you with the assembly, operation and maintenance of your new Power Sprayer.

It is essential that any operator of this Power Sprayer read and understand this manual before using the Power Sprayer.

Important safety instructions will be identified by the following safety symbol:

Failure to comply with the instructions in this manual may result in serious injury or death. For additional assistance, contact any local authorized Dramm dealer or Dramm Corporation 2000 North 18th Street Manitowoc, WI 54220.

MANUAL SAFETY SYMBOLS

Throughout this manual and on the product itself, you will find safety alerts and helpful information messages preceded by symbols or key words. The following is an explanation of those symbols and key words and what they mean to you.



This symbol accompanied by the words **WARNING** and **DANGER** calls attention to an act or condition that can lead to serious personal injury to operator and bystanders.

DRAMM

Limited Warranty Statement

All Dramm products are warranted to the original purchaser to be free from defects in material and workmanship **from the date of purchase** for the time periods listed as follows:

Lifetime for inner drive shafts on trimmers and brush cutters and all ignition modules. **3 years** for residential, non-institutional, non-income producing use. **1 year** for industrial, commercial, institutional, rental and income producing use. **Refer to the Engine manufacture warranty statement for Engine warranty information.**

Any part of a Dramm product found to be defective within the applicable warranty period shall, at Dramm's option be repaired or replaced without charge. Warranty consideration is obtained by delivering any Dramm product believed to be defective to an authorized Dramm Servicing Dealer within the applicable warranty period.

The purchaser shall not be charged for diagnostic labor that leads to the determination that a warranted part is defective, if the diagnostic work is performed at Dramm.

Any warranted part which is not scheduled for replacement as required maintenance, or which is scheduled only for regular inspection to the effect of "repair or replace as necessary" shall be warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance shall be warranted for the period of time up to the first scheduled replacement point for that part. Dramm Corporation is liable for damages to other engine components caused by the failure of a warranted part still under warranty. The purchaser is responsible for the performance of the required maintenance, as defined by Dramm Corporation in the Owners/Operators Manual.

EMISSION-RELATED PARTS WARRANTY: In addition to the above warranty coverage, Dramm Corporation will repair or replace, free of charge, for the original purchaser and each subsequent purchaser any emission-related part or parts found to be defective in material and workmanship for two (2) years from original retail delivery date. **Emission-related parts are the carburetor assembly, the ignition coil assembly, the ignition rotor and the spark plug.** Any replacement part that is equivalent in performance and durability may be used in non-warranty maintenance or repairs, and shall not reduce the warranty obligations of Dramm Corporation.

This warranty does not cover the following:

1. Maintenance items (excluding defects in materials and workmanship) including hoses, spark plugs, starter rope, air and fuel filters, vibration isolators, throttle cables and all cutting attachments.
2. Extra expenses including shipping and handling, travel, payment for lost time or pay and for any inconvenience and storage.
3. Alterations or modifications including aftermarket parts not authorized by Dramm Corporation
4. Wear, accident, abuse, neglect, misuses, negligence, improper fuels, lubricants, fuel mixtures (when applicable), or failure to operate or maintain the product in accordance with instructions approved by Dramm.

Repair or replacement as provided under this warranty is the exclusive remedy of the consumer. Dramm shall not be liable for any incidental or consequential damages for breach of any express or implied warranty on these products except to the extent prohibited by applicable law. Any implied warranty of merchantability or fitness for a particular purpose on these products is limited in duration to the warranty period as defined in the limited warranty statement. Dramm reserves the right to change or improve the design of the product without notice and does not assume obligation to update previously manufactured products.

This warranty provides you with specific legal rights which may vary from state to state.

It is the Owners and Dealers responsibility to make sure the Warranty Registration Card is properly filled out and mailed to Dramm Corporation. Proof of purchase and registration will be required in order to obtain warranty service.

Dramm Corporation
2000 North 18th Street
Manitowoc, WI 54220

DRAMM LIMITED WARRANTY CALIFORNIA AND FEDERAL EMISSION CONTROL SYSTEMS LAWN AND GARDEN AND UTILITY ENGINES

The California Air Resources Board, the Environmental Protection Agency (EPA), and Dramm Corporation (hereinafter "Dramm") are pleased to explain the Emission Control System Warranty on your Dramm Lawn and Garden and Utility engine. In California, new Lawn and Garden and Utility engines produced after January 1, 1995 must be designed, built and equipped to meet the state's stringent anti-smog standards. In other states, new 1997 and later model Lawn and Garden and Utility engines must meet the U.S. EPA Phase One regulations for small non-road engines. Dramm must warrant the emission control system on your Lawn and Garden and Utility engine for the period of time listed below provided there has been no abuse, neglect or improper maintenance of the Lawn and Garden and Utility engine. Your emission control system may include parts such as the carburetor and ignition system. Also included may be hoses, belts, connectors and other emission related assemblies that are a part of the Lawn and Garden and Utility engine. Where a warrantable condition exists, Dramm will repair you Lawn and Garden and Utility engine at no cost to you including diagnosis (if the diagnostic work is performed at a Dramm or Dramm certified dealer), parts and labor.

OWNERS WARRANTY RESPONSIBILITIES: The following obligations must be fulfilled by the owner to maintain the validity of the Dramm California / EPA Phase One Emissions Systems Warranty:

- (a) As the Lawn and Garden and Utility engine owner, you are responsible for the performance of the **required maintenance listed in your owner's manual**. Dramm recommends that you retain all receipts covering maintenance on your Lawn and Garden and Utility engine, but Dramm can not deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- (b) You are responsible for presenting your Lawn and Garden and Utility engine to an authorized Dramm engine dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.
- (c) As the Lawn and Garden and Utility engine owner, you should also be aware that Dramm may deny you warranty coverage if your Lawn and Garden and Utility engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
- (d) If you have any questions regarding your warranty rights and responsibilities, you should contact Dramm Sprayer Division, 2000 North 18th Street, Manitowoc, WI 54220 920.684.0227 or in the case of California residents, you may contact, the California Air Resources Board, 9528 Telstar Avenue, El Monte, California 91731.

1. **COVERAGE.** Dramm warrants to the initial owner and each subsequent purchaser that the Lawn and Garden and Utility engine is free from defects in materials and workmanship which cause a failure of a warranted part for a period of two years. Dramm is liable for damages to other engine components caused by the failure of a warranted part still under warranty. The 1995 and later model year Lawn and Garden and Utility engines are warranted part still under warranty. In all other states, the 1997 and later model year Lawn and Garden and Utility engines are warranted for two years. If any emission-related part on your engine is defective, the part will be repaired or replaced by Dramm. This warranty time period shall begin on the date the Lawn and Garden and Utility engine is delivered to the initial purchaser, or on the date the Lawn and Garden and Utility engine is first placed in service.

CONTINUED

Warranty defects shall be remedied during customary business hours at any authorized Dramm Lawn and Garden and Utility engine dealer located within the United States of America. Any manufacturer-approved replacement part may be used in the performance of any warranty maintenance or repairs on emission-related parts, and must be provided without charge to the owner if the part is still under warranty. Any part or parts replaced under this warranty shall become the property of Dramm.

The emission related warranted parts are specifically defined by the California Air Resources Board's Emission Warranty parts List. (EPA's regulations do not include a parts list, but EPA considers emission-related parts to include all parts listed here.) These warranted parts are: carburetor and internal parts, spark advance/retard system, cold start enrichment system, magneto or electronic ignition system, air cleaner element, and spark plugs if failure occurs prior to the first required scheduled replacement, hoses, clamps, fittings, gaskets, sealing devices, mounting hardware and tubing used directly in these parts. Since emission related parts may vary slightly from model to model, certain models may not contain all of these parts and certain models may contain functionally equivalent parts.

2.LIMITATIONS. This Emission Control System warranty shall not cover any of the following:

- (a) Repair or replacement required as a result of (I) misuse or neglect, (II) lack of required maintenance, (III) repairs improperly performed or replacements improperly installed, (IV) use of replacement parts or accessories not conforming to Dramm specifications which adversely affect performance and/or durability, (V) alterations or modifications not recommended or approved in writing by Dramm.
- (b) Replacement of parts and other services and adjustments necessary for required maintenance at and after the first scheduled replacement point.

3.LIMITED LIABILITY

- (a) The liability of Dramm under this Emission Control Systems Warranty is limited solely to the remedying of defects in materials or workmanship by any authorized Dramm Lawn and Garden and Utility engine dealer at its place of business during customary business hours. This warranty does not cover inconvenience or loss of use of the Lawn and Garden and Utility engine or transportation of the Lawn and Garden and Utility engine or transportation of the Lawn and Garden and Utility engine to or from Dramm or the Dramm dealer. DRAMM SHALL NOT BE LIABLE FOR ANY OTHER EXPENSE, LOSS OR DAMAGE, WHETHER DIRECT, INCIDENTAL, CONSEQUENTIAL (EXCEPTION LISTED UNDER COVERAGE) OR EXEMPLARY ARISING IN CONNECTION WITH THE SALE OR USE OF OR INABILITY TO USE THE DRAMM LAWN AND GARDEN AND UTILITY ENGINE FOR ANY PURPOSE.
- (b) NO EXPRESS EMISSION CONTROL SYSTEMS WARRANTY IS GIVEN BY DRAMM WITH RESPECT TO THE DRAMM LAWN AND GARDEN AND UTILITY ENGINE EXCEPT AS SPECIFICALLY SET FORTH HEREIN. ANY EMISSION CONTROL SYSTEMS WARRANTY IMPLIED BY LAW, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE EMISSION CONTROL SYSTEMS WARRANTY TERMS SET FORTH HEREIN. THE FOREGOING STATEMENTS OF WARRANTY ARE EXCLUSIVE AND IN LIEU OF ALL OTHER REMEDIES.
- (c) No dealer is authorized to modify this Dramm Limited Emission Control Systems Warranty.
- (d) Dramm is not liable for parts which are not genuine Dramm parts except when genuine Dramm parts cause damage to non-Dramm parts.

4.LEGAL RIGHTS. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS.

5.THIS WARRANTY IS IN ADDITION TO THE DRAMM LIMITED LAWN AND GARDEN AND UTILITY ENGINE WARRANTY.

Effective 09/01/97



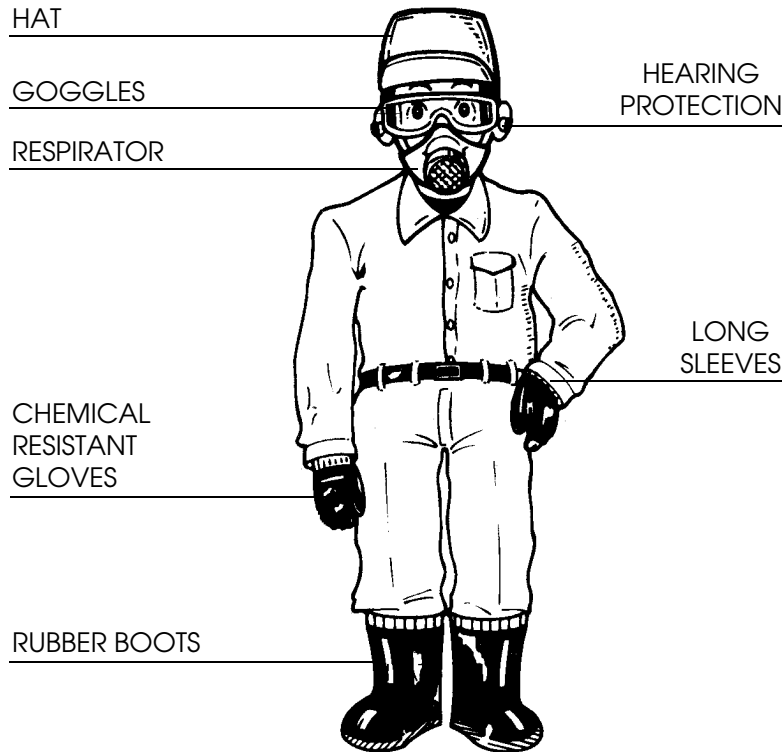
WARNING



- 1) Read and understand the owner's manual before using the power sprayer. Be thoroughly familiar with the proper use of the sprayer.
- 2) Never allow children to operate the power sprayer. It is not a toy. Never allow adults to operate the unit without first reading the owners/operators manual.
- 3) Become familiar with the controls and know how to stop the engine quickly.
- 4) Always use eye protection and hearing protection.
- 5) Keep the area of operation clear of all persons, particularly small children and pets.
- 6) Do not point the discharge hose in the direction of children or pets.
- 7) Never operate power sprayer when you are fatigued.
- 8) Never operate power sprayer without proper guards or other protective safety devices in place.
- 9) Dress properly. Do not wear loose clothing or jewelry that can be caught in moving parts. Always wear substantial footwear, long pants, and long sleeved shirt.
- 10) Gasoline is highly flammable, handle it carefully.
 - a) Do not smoke while handling gasoline.
 - b) Use an approved fuel container for storing gasoline.
 - c) Do not fill the fuel tank when the engine is hot or running.
 - d) Fill the fuel tank outdoors and only up to one-half inch from the top of the tank. Do not fill the filler neck.
 - e) Wipe away any spilled gasoline before starting the engine.
- 11) Always be sure of your footing; keep a firm grip on discharge hose when applying spray.
- 12) Use the correct accessories. Do not use the power sprayer for any job except that for which it is intended.
- 13) Keep all fasteners tight and be sure the power sprayer is in safe working condition. Follow the maintenance instructions provided in this manual.
- 14) Do not put hands or feet near or under rotating parts. Keep clear at all times.
- 15) If the power sprayer should start to vibrate abnormally, stop the engine immediately and check for the cause. Vibration is generally a warning of trouble.
- 16) Avoid using the power sprayer near rocks, gravel, stones and similar matter in order to avoid dangerous flying debris.
- 17) Use the power sprayer only in daylight or good artificial light.
- 18) Do not allow bystanders in work area.
- 19) Do not operate without guard(s) in place.
- 20) Do not operate in unventilated area.
- 21) To reduce the risk of injury associated with the inhalation of dust, always use a respirator.
- 22) To reduce the risk of injury associated with contacting rotating part, stop the engine before installing or removing attachments.
- 23) To reduce the risk of fire or burn injury:
 - a) Move at least 10ft (3m) away from the fueling point before starting engine.
 - b) Always store gasoline in approved container.

SAFETY PRECAUTIONS FOR APPLYING CHEMICALS

Wear appropriate protection when spraying chemicals to eliminate hazard caused by contact with skin or inhalation of chemicals (herbicides, pesticides, etc.), Always wash clothing thoroughly after applying chemicals. Shower with soap and water after applying any chemicals.



Always read and follow all chemical cautions or handling and usage instructions supplied by the chemical manufacturer. Remember, many chemicals are considered hazardous.

Dispose of chemical containers as instructed on chemical label.

Inspect equipment for loose screws, and damage to parts before starting operation.

Check connections of spray hose, nozzle, etc., for leakage.

Insure proper ventilation when you operate the equipment in a greenhouse or other enclosed area.

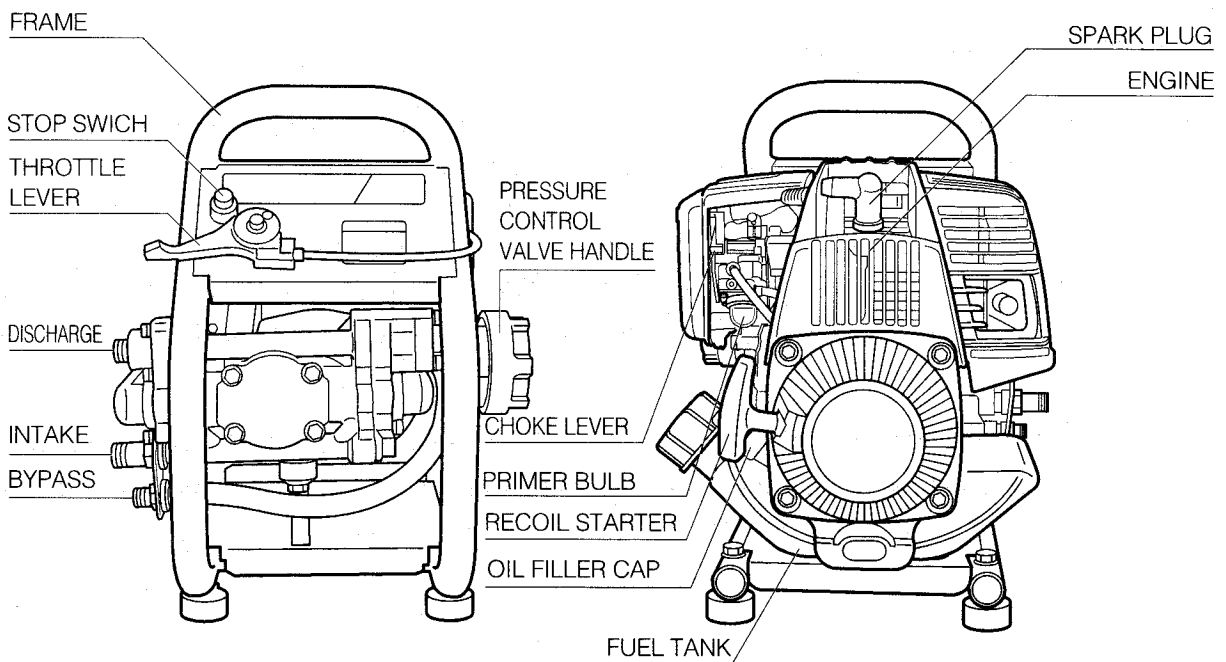
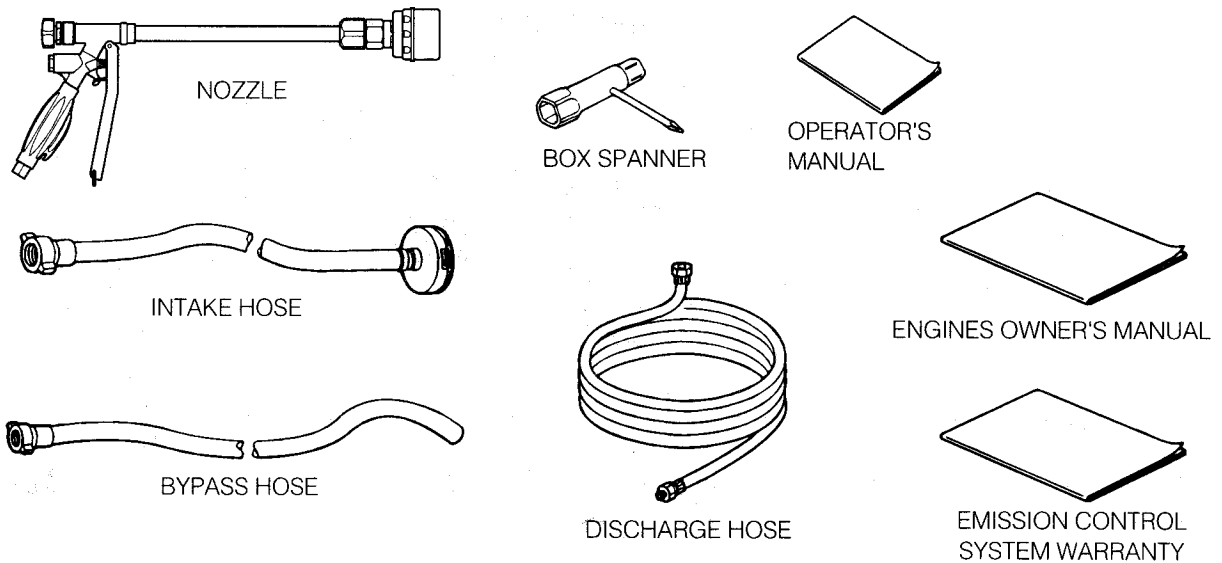
Dilute and prepare chemicals in accordance with chemical manufacturers instruction.

Make sure the covers of chemical tank and fuel tank are secured.

The DRAMM POWER SPRAYER comes with an Owner's / Operator's Manual and a Warranty Registration Card. Assembly and attachment of NOZZLE, INTAKE HOSE, BYPASS HOSE, DISCHARGE HOSE are required.

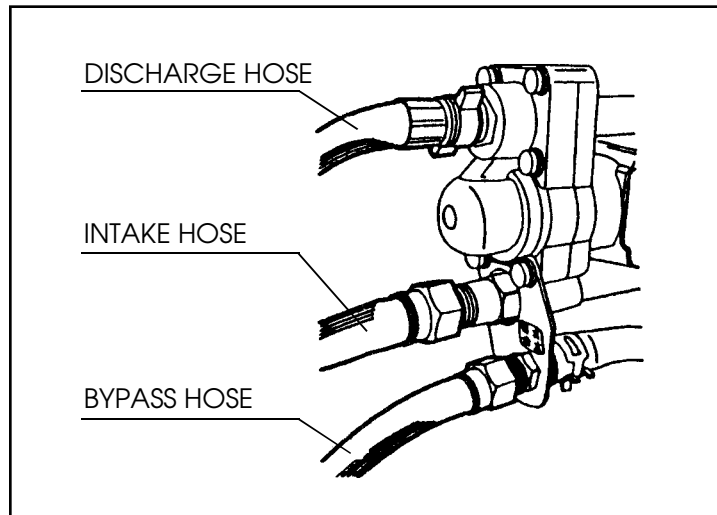
ASSEMBLY INSTRUCTIONS

Locate and identify all the components (see sketch)



ASSEMBLY INSTRUCTIONS

- 1) Check for loose parts.
- 2) Connect hoses to pump as shown below. Connect discharge hose first, then bypass hose, and then intake hose. Then connect discharge hose to applicator (spray gun, spray wand, etc.).



- 3) Before starting, make sure the pickup or intake hose is submerged in water. The water provides lubrication for the pump and will prevent damage to the pump.
- 4) Check the engine oil level. Engine should be stopped and in a level position. Remove the oil filler cap/dipstick and wipe clean. Insert and remove the dipstick without screwing into the filler neck. Check the oil level shown on the dipstick. If the oil level is low, fill to the edge of the oil filler hole with the recommended oil (SAE 10W-30, or 5W-30 if below 25 degrees Fahrenheit). To avoid over-filling or under-filling, be sure the engine is in a level position when adding oil.
- 5) Check the fuel level by looking through the translucent fuel tank. If the fuel level is low, refuel in a well ventilated area with the engine stopped. If the engine has been running, allow it to cool. To refuel, rest the engine on the ground with the fuel tank cap facing up. Remove the fuel tank cap, and fill the tank with gasoline to the bottom of the filler neck. The recommended fuel is unleaded gasoline with a pump octane rating of 86 or higher. Refuel carefully to avoid spilling fuel. Do not overfill. There should be no fuel in the filler neck. After refueling, tighten the fuel tank cap securely.



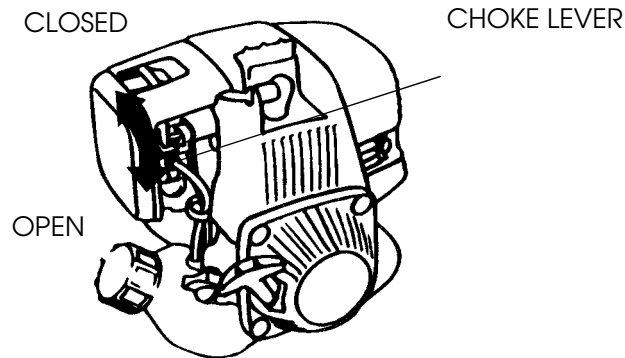
WARNING: Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Stop the engine and keep heat, sparks, and flame away. Handle fuel only outdoors. Wipe up spills immediately.

CAUTIONS DURING OPERATION

- 1) When operating the pump for the first time with the pickup hose submerged in solution, set the pressure control valve handle to the "Start" position, and allow free flow of air or water out of spray gun or wand, to allow pump to prime with minimal resistance.
- 2) If the pump is operated without the pickup hose being submerged in solution it will cause damage to the pump packing. Do not run the pump without liquid, except when draining, and then for not more than 20 seconds.
- 3) When chemical is depleted, set the engine immediately to idle. This allows the clutch to disengage the engine from the pump.
- 4) When the spraying condition is not satisfactory, increase the rpm of the engine, or remove and clean the nozzle, and replace the orifice disk with a new disk if there are any signs of wear or damage.
- 5) The equipment has a centrifugal clutch, therefore running at low rpm's will not allow the clutch to completely expand and engage the drum. If the equipment is used with the clutch not properly engaged, the clutch can be damaged.
- 6) When the engine is operated continuously at a low or medium speed for a long time carbon deposits will build up on top of the piston and in the exhaust port. Therefore, occasionally run up to high speed to help remove carbon deposits. Removal of carbon should be performed as regular maintenance.

STARTING ENGINE

1) To start a cold engine, move the choke lever to the CLOSED position. To restart a warm engine, leave the choke lever in the OPEN position.

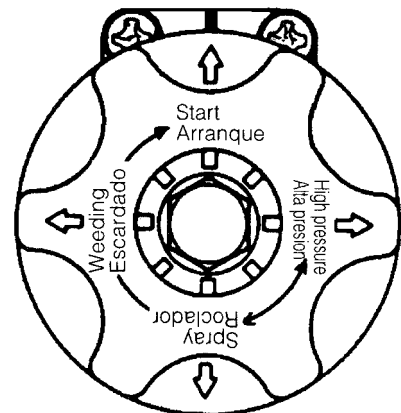


2) To start a cold engine, or after refueling an engine that has run out of fuel, press the priming bulb repeatedly until fuel can be seen in the clear plastic fuel-return tube. To restart a warm engine, it is not necessary to press the priming bulb.

3) Turn the ignition switch on the equipment to the ON position.

4) Always make sure the pickup hose is located in water source before starting. Running the pump without water can damage the pump. The pump should always be flushed with water before applying chemicals, as there may be residue remaining in the pump and hoses.

5) Set the pressure control valve handle to the "Start" position.



6) Pull the starter grip lightly until you feel resistance, then pull briskly. Return the starter grip gently. Always pull the starter grip briskly. If not pulled briskly, sparks may fail to jump across the spark plug electrodes, resulting in failure to start the engine.

7) If the choke lever has been moved to the closed position to start the engine, gradually move it to the OPEN position as the engine warms up.



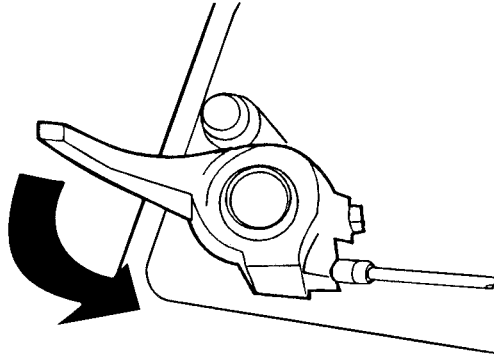
WARNING: IF THE ENGINE DOES NOT START IN SPITE OF REPEATED OPERATION, OPEN THE CHOKE LEVER FULLY, THEN PULL THE CORD TO START THE ENGINE.

CAUTION: Make sure the spray gun or wand is in the CLOSE position, or when the engine starts water or chemical will flow freely and can be hazardous. This unit should only be operated in well ventilated areas. The exhaust fumes are hazardous to your health.

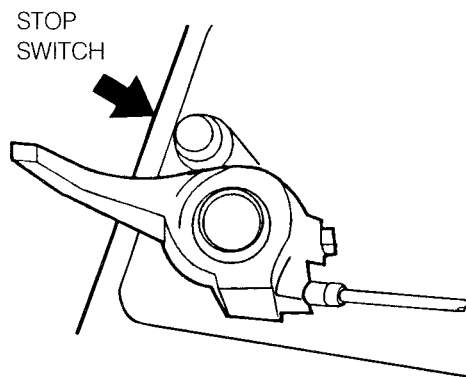
STOPPING THE ENGINE

To stop the engine in an emergency, simply press the stop switch, located above the throttle control. Under normal conditions, use the following shut down procedure.

- 1) Move the throttle lever to the SLOW position.



- 2) Press the STOP switch.

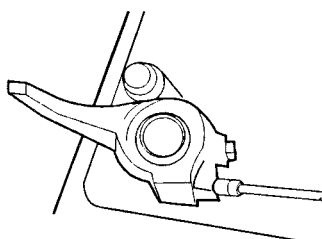


SPRAYER OPERATION

- 1) Turn the handle of the control valve, and set it to the position for weeding, spray, or high pressure (stationary) to match the pressure to operation conditions.

- 2) Check spraying conditions and the status of the equipment.

- 3) Move the throttle to the high speed position.



PRESSURE CONTROL SETTINGS

- 1) **START** - When the engine starts and the pump is priming.
- 2) **WEEDING** - When low pressure spraying is necessary. (For spraying herbicides, and other chemicals in a controlled area.)
- 3) **SPRAYING** - Normal spraying.
- 4) **HIGH PRESSURE** - When high pressure is especially required. When using an extended length of hose and additional pressure is needed to push chemical.



WARNING: When the pressure control valve handle is changed from "High Pressure" to "Spray" or "Weeding", the engine speed can be too high, corresponding to the extent of lowered pressure. Therefore, before readjusting the pressure control valve handle, move the throttle to the idle position. Then adjust throttle after handle has been changed to the desired setting.

CAUTION - Do not run engine without having the pickup hose submerged in liquid.

CAUTION - Only run pump for 20 seconds after removing pickup hose from solution to flush solution of chemical. Pump should be flushed with clean water.

STORAGE

- 1) Flush pump with clean water. Allow pump to run dry to exhaust water out of pump. DO NOT RUN PUMP DRY FOR MORE THAN 20 SECONDS AS THIS WILL CAUSE DAMAGE TO PACKINGS. Do not store pump with chemical or any liquid remaining in pump as this can cause corrosion and damage if allowed to freeze.
- 2) Drain fuel from fuel tank and dispose of waste fuel in a proper manner.
- 3) With control valve set at start, run engine at idle to exhaust fuel from fuel lines and carburetor.
- 4) Leave throttle set at low speed.
- 5) Leave control valve set at start position.
- 6) Store engine and pump in dry and clean area in moderate temperature condition away from humidity.

RECOMMENDATION – Make repairs before storing. Always use genuine DRAMM parts to assure the highest quality.

SPECIFICATIONS

MODEL	MS071EH
Dimension L x D x H	14.1 x 10.8 x 13.8 in. (360 x 275 x 350mm)
Dry Weight	17.2 lb. (7.8 kg)
Pump Type	Piston Pump
Maximum Pressure	360PSI (25kgf/cm ²)
Suction	1.8 GPM (7.1 l/min)
Rotational Frequency	1930RPM
Engine Model	HONDA GX22
Type	Forced Air Cool, 4-cycle
Displacement	22cc
Fuel	Unleaded Gasoline
Ignition System	Electronic Ignition
Spark Plug	(NGK) CR5HSB
Starting System	Recoil Starter

The specifications may be changed for product improvement, without prior notice

TROUBLESHOOTING: PUMP

Trouble	Cause	Countermeasure
No suction	Looseness in the hose	Tighten securely
	Suction hose is clogged with chemicals	Disassemble and clean
	Worn piston packing	Replace with new one
	Foreign object in valve parts	Disassemble and clean
Poor spray quality	Worn piston packing	Replace with new one
	Flaw on cylinder inside surface	Replace with new one
	Flaw on exhaust valve	Replace with new one
	Worn pressure control valve seat	Replace with new one
	Worn pressure control valve handle	Replace with new one
	Foreign object in valve parts	Disassemble and clean
	Worn nozzle hole	Replace with new one
	Too many nozzles attached	Reduce number of nozzles or replace with nozzle of smaller holes