

HARDEE



BY EVH MFG CO

OPERATING INSTRUCTIONS

FOR

SKID SPRAYERS

THREE POINT HITCH SPRAYERS

TRAILER SPRAYERS

SPRAYER OPERATING INSTRUCTIONS

TO THE PURCHASER

Thank you for purchasing a new EVH SPRAYER. Your new SPRAYER has been designed to provide years of safe, dependable service. EVH has been manufacturing quality spraying equipment since 1958 and has used this experience to make EVH SPRAYERS the very best.

EVH'S people have used every possible resource to obtain the finest materials and components in order to provide a safe, efficient, economical, yet dependable piece of equipment. However, no matter how well made any equipment may be, it can be misused or abused. No equipment can perform better than its operator. It is with these statements in mind that we will try to provide, you, our customer, with the best and most complete operator information that we have available. We want every EVH SPRAYER owner to be satisfied with our equipment and the job it does. Proper operation is a must for your sprayer to deliver this satisfaction.



SAFETY INSTRUCTIONS FOR MAINTAINING AND OPERATING SPRAYERS

Powered spraying equipment may become hazardous if adequate maintenance is neglected. Therefore, maintenance recommendations suggested for sprayer and components should be closely followed.

1. DO NOT ALLOW ANYONE TO OPERATE THIS EQUIPMENT WHO HAS NOT BEEN TRAINED IN ITS SAFE OPERATION.
2. A scheduled preventive maintenance, lubrications, and inspection system should be followed. STOP ALL MOVING PARTS BEFORE MAKING ADJUSTMENTS OR SERVICING.
3. DO NOT leave equipment unattended in public areas.
4. All safety features such as hoods, guards, and labels should be kept in place and in good condition.
5. PTO drive shafts should be properly attached and shielded. Shields should always be installed and in good operating condition.
6. Fuel systems should be checked for leaks and condition of parts. DO NOT OPERATE until leaks are corrected.
7. WARNING - Never change from one type of chemical to another without thoroughly cleaning spraying systems.
8. Modifications and additions, which affect safe operation, should not be made by the customer or user without manufacturer's prior written approval.
9. Care should be taken to assure that all replacement parts are interchangeable with the original parts and of a quality equal to that provided in the original shipment.

UNLOADING:

1. Never load or unload sprayer with liquid in tank.
2. Any lifting device should be attached to equipment frame only. Never attach lifting device to tank or plumbing. When using fork-type-lifting apparatus, make sure forks are under both sides of frame. Be careful not to damage plumbing under tank or pumping unit.

MAKE SURE YOUR LIFTING DEVICE HAS SUFFICIENT LOAD RATING BEFORE LIFTING SPRAYER.

3. Secure unit to carrier with anchor brackets to prevent injury to personnel or equipment by shifting tank. Bolts, nuts, and washers are provided to bolt anchor to unit frame. Customer must supply hardware to fasten anchor to carrier.

UNPACKING:

1. Take care when cutting packaging or banding not to damage tank or hose.
2. Check inside tank for any attachments or optional parts shipped with sprayer. Remove any loose parts that may be strapped or taped to frame or other components.



PRE-USE CHECK LIST

CHECT LIST: Be Sure

1. All hose connections are correct and tight.
2. All fluid levels are correct.
3. All filters and strainers are installed and clean.
4. All lubrication points are serviced.
5. All safety guards are in place.
6. PTO hook-ups are correct and shielded.
7. All belt drives are properly adjusted.
8. All controls operate free and in correct manner.
9. All boom and handgun control valves are in closed position.
10. All personal and protective equipment is worn (where applicable).

LUBRICATION

IF YOUR SPRAYER IS EQUIPPED WITH:

1. Pump: See pump manufacturer's manual supplied with sprayer or parts manual supplied by EVH.
2. Engine: See engine manufacturer's manual supplied with sprayer.
3. Agitator: Grease agitator shaft bearings daily with high-grade multi-purpose grease. Replace packing in bearing at pulley end of shaft if leakage occurs and tightening nut does not stop it.
4. Wheel Bearings: Wheel bearings are packed at factory with multi-purpose grease and will normally not need cleaning or repacking more than once each season.
5. PTO Shafts: Lubricate universal joints (on PTO models) once each four operating hours with high-grade multi-purpose grease. Grease the exterior and interior of the sliding shaft generously and keep joints covered when not in use to protect exposed surfaces from damage by moisture and grit.
6. Boom: Lubricate brake-away hinge weekly or as needed with multi-purpose grease.

SET UP

Refer to “exploded” view drawings in the parts book supplied with your particular model sprayer to aid in assembling parts shipped loose or optional equipment.

1. Axle and Wheels: Attach axle to sprayer frame with hardware furnished. Secure the wheel assemblies to the hubs, which are attached to the axle spindles.
2. Draw Bar: Attach draw bar (tongue) to frame using hardware furnished.
3. PTO Shaft: It is important that each universal joint on a PTO shaft assembly take approximately an equal amount of flexing. Install the PTO shaft on PTO models so that the universal joints will be as level as possible and flex an equal amount on turning.
4. Skids mounted on truck or trailer beds must be anchored to bed using brackets furnished. Bolt brackets to skid frame side rail using pre-punched holes at each corner. Use 3/8 X 1 bolts with flat washers and lock nuts supplied. Fasteners to attach anchor brackets to bed must be furnished by customer.

SPRAYER OPERATIONS

Preparing your spraying equipment in advance of application may save you a lot of time. Your sprayer should be thoroughly cleaned, properly equipped, and checked.

BEFORE STARTING UNIT:

1. If engine-powered, read engine manufacturer’s operating instructions.
2. Read pump manufacturer’s operating instructions.
3. Look inside tank and make sure it is clean and remove any loose parts that may have been packed in tank for shipment.
4. Before each use, especially with a new unit, check your sprayer over for any loose fasteners. Pay special attention to tank straps, axle nuts, and wheel lug nuts, if so fitted.
5. Be sure tank drain is properly capped.
6. Inspect line strainer. Be sure element is in place and clean.

STARTING UNIT:

1. Fill sprayer about E full of clean water. Do not add any chemicals until operating pressure has been set and sprayer has been tested.
2. Make sure the suction line VALVE (S) near the bottom of the tank is FULL OPEN.
3. Before starting unit, turn the pressure regulator valve (on units with pressure control) to lowest pressure setting. See regulator instruction.

SETTING PRESSURE: (ON UNITS WITH PRESSURE CONTROL)

1. Start pump slowly and increase speed to make sure liquid is passing through the pump and back into the tank.
2. Slowly close relief valve and increase pressure to approximately 10 PSI above the pressure you expect to use in spraying.
3. Open handgun or boom control valve (not both), and check all fittings and clamps for possible leaks. Remember that this is a new sprayer and it is possible for clamps or fittings to be loose. Tighten any loose parts before proceeding. The entire system, including tanks, hoses, booms, and pumps, should be thoroughly flushed with water to remove loose rust particles, oil, scale, dirt, and other material.
4. THE PRESSURE SETTING SHOULD NEVER EXCEED THE RATED CAPACITY OF THE PUMP OR PRESSURE GAUGE.

NOTE: Pressure will drop when handgun or boom is opened. If a slight readjustment of the pressure control does not correct the pressure drop, the discharge capacity is probably more than the output of the pump.

WARNING: For all pressure regulators, avoid turning pressure control all the way down. This will lock the overflow valve closed and create a hazard.

5. Inspect the inside of the tank again for good agitation while the pump is in operation. Your EVH SPRAYER gives agitation while the pump is running. If you do not have good agitation, the agitation nozzle is probably clogged. It may be necessary to remove nozzle to clean it.
6. After the first few hours of use, again check all nuts and screws for tightness.
7. For longer pump life, and minimum pump wear, use the lowest pressure setting to accomplish the job.

STOPPING THE SPRAYER:

1. After pump is shut down, open pressure control to relieve pressure on handgun and boom.

MIXING CHEMICALS:

1. Wettable powders: Pre-mix Wettable powders in a separate container. Make a thin water slurry and pour into tank $\frac{1}{2}$ full of water with agitator working. Avoid allowing mix to stay in tank without agitator working. **DO NOT LEAVE WETTABLE POWDERS IN TANK FOR ANY EXTENDED TIME-SUCH AS OVERNIGHT.**
2. For mixing all chemicals, always read and follow manufacturer's recommendations for mixing and handling.
3. After each use it is a good practice to flush your sprayer system with clean water and clean strainer.
4. Never change from one type of chemical to another without thoroughly flushing sprayer. Some chemicals, such as 2, 4-D are very difficult to remove from the system to remove 2, 4-D, use the detergent and ammonia clean-up method prescribed by the manufacturer. If possible, a sprayer used to apply 2, 4-D should not be used to spray other chemicals.

STORAGE

1. **DAILY OR AFTER EACH USE.** Flush entire system, tank, pump, hose, boom and handgun using clean water. Continue flushing until water comes through clean. Frequently, clogging following a storage period can be traced to inadequate flushing of sprayer. Inspect all strainers, screens, and nozzle tips after each day's use. If they need cleaning, use a brush or toothpick, **DO NOT USE WIRE.**
2. **SHORT TERM STORAGE:**
 - A. Flush tank, pump, hose, and handgun using clean water. Continue flushing until water comes through clean. Next mix one quart of household ammonia with 25 gallons of water and flush complete system again. Drain.
 - B. Remove all nozzle tips and strainers. Clean tips with a brush or toothpick. **DO NOT USE WIRE.** Store nozzle tips in a clean container.
3. **WINTER STORAGE:**
 - A. Flush tank, pump, hose, and handgun using clean water. Continue flushing until water comes through clean.
 - B. Use 1-2 gallons of anti-freeze and run sprayer until anti-freeze flows through entire system.

CAUTION: This sprayer tank, pump, hose, handgun, and booms should be thoroughly drained to avoid damage by freezing in storage.

HELPFUL HINTS

1. Never operate a sprayer after tank is empty - pump damage will occur. **DO NOT OPERATE DRY!**
2. When pump is running, but not in use, turn pressure regulator to relief position.
3. Never use wire or metal object to clean nozzle tips. Use a toothpick or brush.

REMEMBER nozzle tips do wear, causing spray pattern distortion and varying spray volume rates. Replace nozzle tips as often as necessary to assure proper, uniform spray coverage and rates. Calibrate daily. Stainless steel nozzle tips provide the most wear resistance as compared to brass or other commonly used materials.

4. Always use clean water.
5. Check tank agitation frequently. At least twice daily.
6. Keep hoses in good condition, especially suction hose from tank to pump. Replace as needed.
7. Clean up when the job is complete. Always clean sprayer thoroughly after each use.
8. NEVER change from one chemical to another without thoroughly flushing sprayer system.
9. Remember that most chemicals should not be left in sprayer system overnight.

TROUBLE SHOOTING THE SPRAYER

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Erratic Pressure Indication on Pressure Gauge	Air leaking into suction line	Tighten all fittings & hoses hoses between pump & tank
	Trash in control valve or pressure gauge	Remove & clean parts
	Suction line kinked or clogged	Remove suction hose line & clean-check tank & strainer
	Air leak in suction hose	Replace hose
Pump Loses Suction	Suction hose collapsed	Replace hose
	Suction strainer clogged	Clean strainer & tank
	Air leak in suction hose	Replace hose
	Suction hose collapsed	Replace hose
	Pump air locked	Remove discharge line & Pump liquid through pump
	Pump worn & clearances too great	Repair or replace worn parts or pump
Noisy Pump	Seals worn out or deteriorated	Replace pump seals
	Excessive pump speed	Slow the pump
	Air leak in suction hose	Replace suction hose
Pumps show DECREASED Capacity	Partially clogged strainer	Clean strainer
	Suction strainer clogged	Clean strainer
	Air leak in suction hose	Replace suction hose
	Moving parts worn	Replace worn parts
	Worn out seal	Replace seals
	Pump rollers stuck	Clean pump inside
	Pump operating too slow	Speed up the pump
Nozzles too large for Capacity of pump	Use smaller nozzles or reduce the number of nozzles on the booms	
Pump leaks	Worn out seal	Replace seal
	Burned out seal	Replace seal & DO NOT continue to operate pump without liquid
	Worn or damaged diaphragms	Replace diaphragms

FIELD CALIBRATION OF SPRAYERS

Purpose

It is necessary to calibrate sprayers for two reasons: (1) to insure that the correct amount of pesticide in the recommended quantity of water is applied per acre, and (2) to determine how much pesticide and water to place in the tank to cover the desired area.

There are many ways to calibrate a sprayer. Several of the more common ones are included here; with "Spray an Acre" being the least complicated and most consistent method, thus the best to use where practical. Other methods may involve less time and work, however, pick a method which you understand and stick to it, rather than try to master all of them. Later on you may want to experiment with different methods.

Things to Do before Calibrating a Sprayer

1. Rinse and fill supply tank with clean water.
2. Remove and clean all nozzles and screens. An old toothbrush or a match is handy to clean nozzles without damaging the nozzle opening or screens. Do not use pocketknives or wire for cleaning.
3. Start sprayer and flush hoses and boom with plenty of clean water. (Remove end caps on boom.)
4. Replace the screens and nozzles, and make sure all nozzles are spraying properly. Make sure all nozzles are of the correct spray pattern type and capacity.
5. Check all connections for leaks.
6. Adjust the pressure regulator to the selected pressure with tractor engine running at field-operating speed, and the nozzles operating.
7. If everything is working properly, you are now ready to calibrate the sprayer.

Calibration Precautions

1. Calibrate the sprayer in the field under conditions similar to those for which sprayer will be used. Speed of tractor will vary some for a hard road, an established pasture, or a plowed field. Level-ground liquid outputs will vary from rolling-land outputs. Spray on the contour where possible.
2. In sprayers delivering low volumes of solutions, it is absolutely necessary to use clean water to minimize nozzle plugging and excessive pump wear.
3. Some nozzles may vary in output enough to affect results. Check the output of each nozzle and replace any that have an output difference of over 15% or 20%.
4. When using water to calibrate, the spray rate of the water may differ some from that of spray material used.

SPRAYER CALIBRATION BY THE 1/128 ACRE METHOD

This method involves collecting the output of one nozzle spraying 1/128 acre.

Prepare sprayer as discussed under “Things to Do Before Calibrating a Sprayer” and “Calibration Precautions.”

Procedure

1. Check the discharge from all nozzles and select a nozzle with an average flow.
2. Determine the average nozzle spacing (inches). For row spraying, the average spacing will be the row width divided by the number of nozzles per row (all nozzles must be the same size). For broadcast boom spraying the average spacing will be the distance between nozzles (inches) on the boom.
3. Determine the distance to drive in the field for each nozzle to spray 1/128 acre from the formula or table below.

Distance to drive (feet) = $\frac{4084}{\text{Average nozzle spacing (inches)}}$

Average nozzle spacing (inches)

4. Time the time required to drive the distance from formula or table, in the field.
5. Catch the output of an average nozzle for the same time it took to drive the above distance in the field.
6. Ounces output per nozzle equals gallons per acre or each 29.6 cubic centimeter (cm) equals one-gallon per acre.
7. If the rate is not acceptable, change speed, the sprayer will require retiming for the predetermined distance in the field. If only the pressure and/or nozzles are changed, the time will remain the same.

DISTANCE FOR EACH NOZZLE TO SPRAY 1/128
ACRE (One-ounce discharge per nozzle equals one gallon
per acre)

Average Nozzle Spacing (Inches)	Distance (Feet)	Average Nozzle Spacing (Inches)	Distance (Feet)
6	681	22	186
8	510	24	170
10	408	30	136
12	340	36	113
14	292	38	107
16	255	40	102
18	227	42	97
20	204	48	85

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Specialists Published by The North Carolina Agricultural Extension Service North Carolina State University at Raleigh and
the U.S. Department of Agriculture, Cooperating. State University Station, Raleigh, N.C., George Hoytt, Jr., Director.
Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

SPRAYER CALIBRATION BY SPRAY-AN-ACRE-METHOD

Procedure

1. Prepare sprayer as described under “Things to Do Before Calibrating a Sprayer” and “Calibration Precautions.”
2. Set the pressure on the sprayer with tractor operating at desired speed. Do not depend on tractor governor maintaining speed. Use speedometer if necessary.
3. Determine the effective boom width in feet. Effective boom width for broadcast spraying is usually the length of the boom plus 1-1/2 feet; for row crops; the number of rows times the row width.
4. Calculate the distance the sprayer must travel to cover one acre by dividing effective boom width into square feet per acre.

$\frac{43,560 \text{ (sq. ft/acre)}}{\text{effective boom width}}$ = Linear distance necessary for the sprayer to travel to cover one acre.

5. Fill the sprayer tank with clean water to a measured depth (filling completely may lead to a loss of water on rough ground by splashing). Operate the sprayer over the measured acre at the speed and the pressure already selected. Sprayer should be started promptly at the starting point and stopped promptly at the end of the measured area.
6. Refill the tank to original level measuring the water necessary to refill. This is the amount of water necessary to spray 1 acre at the speed and pressure and with the nozzles used.
7. Repeat the process carefully as a check.
8. A change in pressure, speed, or nozzles will change the amount of liquid delivered per acre.

HARDEE by EVH Mfg. Co. LIMITED WARRANTY

Hardee by EVH Mfg. Co. warrants its Equipment for one year to the original non-commercial, non-governmental, or non-municipal purchaser. Hardee by EVH Mfg. Co. warrants for 90 days to the original commercial, industrial or municipal purchaser, that the goods are free from defects in material or workmanship.

This limited warranty does not apply to any part of the goods which has been subjected to improper or abnormal use, negligence, alteration, modification, or accident, damaged due to lack of maintenance, wrong oil or lubricants, or which has served its normal life.

The Warranty Card must be filled out and returned within 30 days of purchase. NO warranty will be allowed without a properly completed and returned warranty card.

“Our obligation under this warranty shall be limited to repair or replacement of any part or parts of this implement which in our judgement shows evidence of such defect, and provided further, that said parts shall be removed and returned by the owner at the owner’s expense to Hardee by EVH Manufacturing Co. LLC, Loris, SC, through an authorized dealer, transportation prepaid, free and clear of liens or encumbrances.”

This warranty shall not include normal wear items.

Changes or alterations to the implement made without the **written** authorization of the manufacturer, will render this warranty void.

This warranty does not obligate this company to bear any labor costs in replacement of defective parts.

Hardee by EVH Manufacturing Co., LLC. reserves the right to make changes or improvements in its equipment at any time, with the express understanding that such changes or improvements do not impose any obligation of the company to install such changes or improvements on implements previously manufactured.

IMPLIED WARRANTIES: You may have some implied warranties. For example, you may have an implied warranty of merchantability (that the unit is reasonably fit for the general purpose for which it was sold) or an implied warranty of fitness for a particular purpose (that the unit is suitable for your special purposes). This special purpose must be specifically disclosed to Hardee by EVH Mfg. Co., itself, and not merely to the dealer before your purchase, and Hardee by EVH Mfg. Co., itself, not just the dealer must approve, in writing that the special purpose is warrantable.

These implied warranties DO NOT apply at all if you use your equipment for business or commercial use.