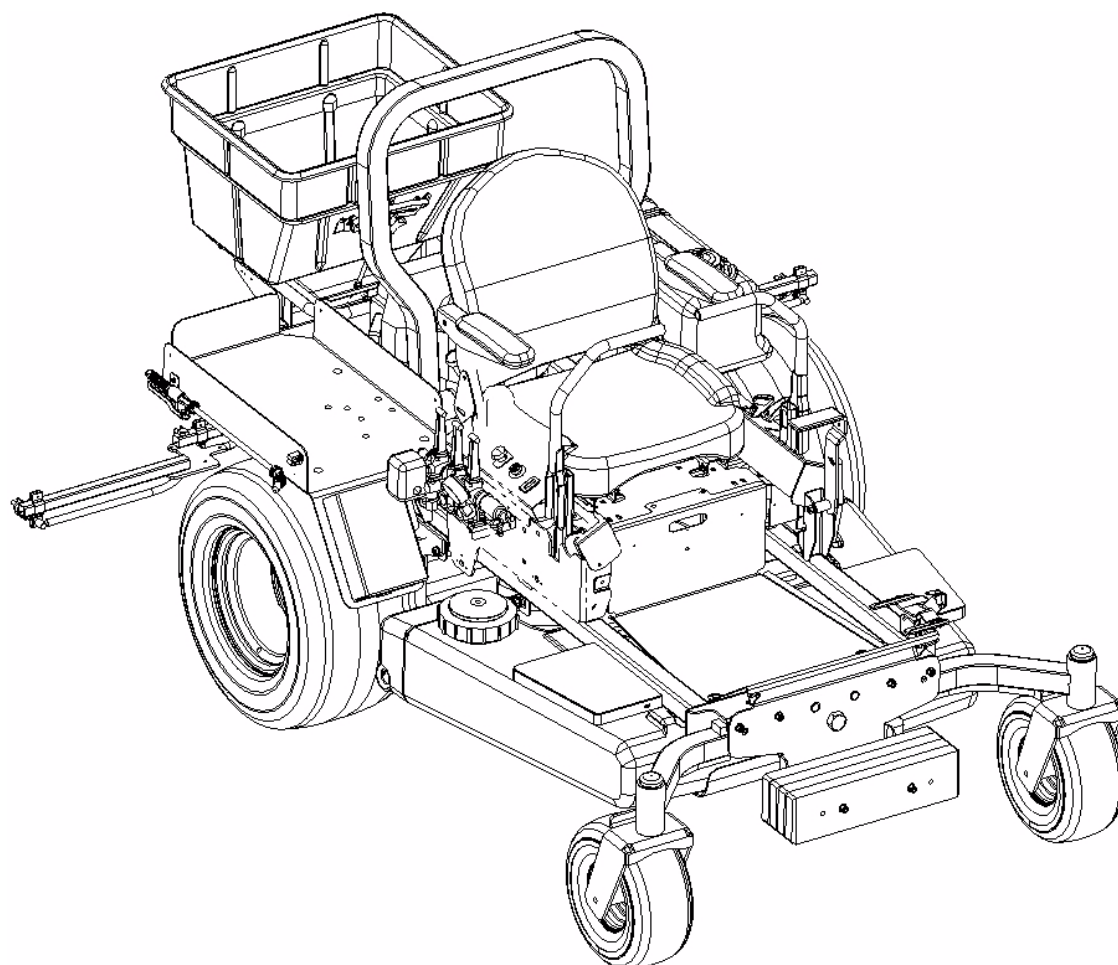




Commercial Tank Ride-On Sprayer-Spreader

Professional Turf Equipment



40 Gallon Tank
125 lb Hopper

OPERATOR'S MANUAL

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This product may be covered by one or more of the following patents:
D409,208; 5,946,894; 6,070,690; Pending

FOREWORD

The Hydrostatic drive Zero-Turn Commercial Riding Sprayer-Spreader provides superb maneuverability, for professional landscapers, commercial lawn service companies, professional turf managers and golf course superintendents. The machine incorporates many safety features that should be studied by all operators and maintenance personnel before use. The list of safety precautions should receive particular attention.

The sprayer is designed to provide professional turfgrass managers with reliable spray equipment. The sprayer includes 40 gallon polyethylene tank, 12 VDC electric powered pump with maximum output of 4.8 GPM. This manual presents the operating and maintenance instructions necessary to keep your Cub Cadet Commercial Sprayer at peak efficiency. If properly operated and maintained, your Cub Cadet Commercial Sprayer will provide dependable service.

This manual presents all of the operating and maintenance instructions necessary to keep your machine at peak efficiency. If operated and maintained properly, your machine will give dependable service.



CAUTION:

Only thoroughly trained persons should operate and maintain this machine. This machine can cause serious injury to anyone who misuses it and does not understand its operation. For their personal safety, all operators and maintenance personnel are required to read this entire manual before operating the machine.

Hazard control and accident prevention are partially dependent upon the design and configuration of the equipment. Notwithstanding, these factors are also dependent upon the awareness, concern, prudence and proper training of the personnel involved in the operation, transport, maintenance and storage of the equipment.

GENERAL SAFETY OPERATIONS

A. DANGER

1. Do not operate machine in confined areas where exhaust gases can accumulate.
2. Do not operate machine without mower chute deflector in place and operational.
3. Do not carry passengers.

B. WARNING

1. Do not operate machines under the influence of alcohol or drugs.
2. Do not operate machines without all guards and safety devices in place and functional.
3. Do not start machines if there are fuel or oil leaks or spillage — clean it up.
4. Do not operate machines near spilled or leaking fuels.
5. Do not stop or park machine over dry leaves, grass, debris, etc. that could be combustible.
6. Use extreme care when backing up.
7. Do not operate machine on slopes greater than 15 degrees (27%).
8. Do not operate machines on slopes when traction is reduced (wet grass, ice, soft ground, loose ground, leaves, pine needles, debris, etc.).
9. Avoid turning downhill if possible, go slowly and use extra care when turning downhill.
10. Do not operate machines during reduce visibility (low light, fog, rain, etc.).
11. Do not operate machines with non-approved attachments.
12. Do not operate machines that are damaged.....have machine repaired.
13. Do not operate machines that have not been properly maintained.
14. Use only replacement parts that are the same or equivalent to the original equipment.
15. Do not modify machines or any of their components, especially the engine governor!
16. Do not operate machine for more than 2 hours without hearing protection.

C. CAUTION

1. Use proper protective equipment when operating machine (gloves, boots, and hearing protection are recommended).
2. Read entire machine Operator's Manual.
3. Make sure operators are fully trained in the safe use of the machine.
4. Follow all safety instructions when using the machine.
5. Keep all safety signs legible and properly installed.
6. Do not check for hydraulic leaks with any part of the body.

7. Do not add fuel to a machine when the engine is running and/or the exhaust system is hot.
8. Keep machine clean and free of debris, grass, leaves, oil, grease, etc.
9. Place lap bars in neutral/start position, set park brake, disengage P.T.O., turn engine off, and remove ignition key before you dismount from machine.
10. Use machines laterally or diagonally across slopes, avoid going downhill when possible.
11. Go slowly and use extra care when descending slopes.
12. Use extra care when loading and unloading machines from trucks or trailers.

SAFETY PRECAUTIONS

A. General

1. Read this Operator's Manual before starting the machine. Study the controls and learn the proper sequence of operation.
2. Do not allow anyone to operate or maintain this machine who has not read this manual. Never permit children to operate this machine.
3. Never carry passengers.
4. Do not remove any shields, guards or safety devices. If a shield, guard or safety device is damaged or does not function, repair or replace it before operating the machine.
5. Always wear safety glasses and safety shoes when operating or maintaining this machine. Do not wear loose-fitting clothing.
6. Disconnect the spark plug wires and remove the key from the ignition to prevent the engine from accidentally starting before performing any maintenance on this machine.
7. Never run the engine indoors without adequate ventilation. Exhaust fumes are deadly.
8. To avoid serious burns, do not touch the engine, exhaust pipe or muffler while the engine is running or until it has cooled after it has been shut off.
9. The liquid in the battery is dilute sulfuric acid. Always wear safety glasses and rubber gloves when working on the battery. Do not overfill the battery.
10. Lead-acid batteries generate hydrogen and oxygen gases which form an explosive mixture. Keep sparks and flames away at all times.
11. When looking for oil leaks, never run your hand over hydraulic hoses, lines or fittings. Never tighten or adjust hydraulic hoses, lines or fittings while the system is under pressure. If high-pressure oil penetrates the skin, the oil must be removed within a few hours by a doctor familiar with this form of injury or serious complications may result.

12. Keep adults, children and pets away from the sprayer and the area to be sprayed.
13. Do not operate or store the machine or fuel container inside where there is an open flame, spark or pilot light such as a water heater, furnace, clothes dryer, etc.

B. Related to Fuel

1. Fuel is highly flammable and its vapors can explode if ignited. Please respect it.
2. Do not smoke or permit others to smoke while handling fuel.
3. Always use approved containers for fuel and fill slowly to decrease the chance of static electricity buildup and spillage.
4. Store fuel in well ventilated and unoccupied buildings away from sparks and flames.
5. When dispensing gasoline into approved containers, place the container on the ground when refueling to avoid a possible static electricity ignition of fuel vapors.
6. Do not fill containers while it is inside a vehicle, trunk, the bed of a pickup or floor of a trailer.
7. Always shut off the engine and permit it to cool before removing the fuel tank cap.
8. Always fill the fuel tank outdoors.
9. If the fuel container spout will not fit inside the fuel tank opening, use a funnel.
10. When filling the fuel tank, stop when the fuel reaches one inch from the top. This space is necessary for tank expansion. **Do not overfill.**
11. Wipe up any spilled fuel.

C. Related to Batteries

1. **The electrolyte in a lead-acid battery is dilute sulfuric acid which is a very dangerous and corrosive liquid. Always wear safety glasses or goggles and rubber gloves when working on a lead-acid battery.**
2. Do not overfill a lead-acid battery when filling the cells with distilled water.
3. Lead-acid batteries generate hydrogen and oxygen gases which form an explosive mixture. Keep sparks and flames away at all times.

D. When Applying Materials

1. Keep adults, children and pets away from the area where materials will be applied.
2. When operating this machine in the forward direction, DO NOT allow the steering levers to return to the neutral position on their own. Always maintain a firm grip on the levers, operate

- them smoothly and avoid any sudden movements of the levers when starting or stopping.
3. Always remove debris and other objects from the area where materials will be applied. **(Note: debris and loose grass will reduce traction.)**
4. Use the machine only in daylight.
5. Watch for holes, sprinkler heads and other hidden hazards.
6. Avoid driving too close to trees, creeks, ditches, sand traps and other obstacles.
7. Before backing up, check behind you and watch where you're going.
8. Always reduce speed when making a turn, and when grass is wet.
9. Always travel across slopes, never up and down the slope. Do not operate on steep slopes, and slow down before turning.
10. Be careful when crossing gravel paths or roadways. Always allow other vehicles to have the right-of-way.
11. If you hit a solid object while traveling, turn off the main switch, place the left and right steering levers in the neutral, opened-out position, move the throttle to slow, set the parking brake, shut off the engine and take the key from the ignition switch. Inspect for damage. Repair any damage.
12. Never leave the machine unattended without: placing the left and right steering levers in the neutral opened-out position; moving the throttle to slow; setting the parking brake; shutting off the engine and taking the key from the ignition switch.
13. Keep the machine and especially the engine and hydraulic components clean and free of grease, grass, leaves and materials to reduce the potential for over-heating and fire.
14. When spraying pesticides:
 - a. **ALWAYS FOLLOW THE DIRECTIONS ON THE LABEL**
 - b. Avoid breathing vapors.
 - c. Avoid contact with skin, eyes or clothing.
 - d. Wear rubber boots or rubberized shoes.
 - e. Wear work clothes with long-sleeved shirts and long-legged pants.
 - f. Change to clean clothing daily.
 - g. Wash hands and face before eating or smoking.
 - h. Bathe thoroughly as soon after spraying as possible.
15. Wear a face shield and rubber gloves when handling concentrates.
16. Do not remove any shields, guards or safety devices from the sprayer. If a shield, guard or safety device is damaged or does not function, repair or replace it before operating the sprayer.

E. General Requirements - Personal Protective Equipment

OSHA Standard 1910.132 through 1910.139

OSHA standard 1910.132 states in relevant part:

- a. Protective equipment, including personal protective equipment (PPE) for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

This standard is subject to change. Please check www.osha.gov for the latest regulatory updates

General

Sometimes, it is not possible to reduce a hazard by eliminating it, substituting a less hazardous process or product, making changes to equipment, or even by changing how you do the job. That's when you need personal protection.

PPE includes items like gloves, goggles, boots, hearing protection and respirators. Respirators filter out particles or block gases and vapors that can harm the respiratory system. With a surface area well supplied with blood vessels and equal in size to a tennis court, the lungs are the quickest and most direct route for absorbing harmful substance into your body.

Note: PPE does not prevent accidents, but it does prevent or reduce injury and even fatalities when used properly.

Equipment (PPE)

Protective equipment must be selected carefully. Always test fit the protective equipment to be sure it fits properly and comfortably. If it isn't comfortable -- it won't be worn; if it isn't worn -- it won't protect. PPE includes:

- respirators
- chemical-resistant clothing
- hearing protectors
- gloves
- safety goggles and glasses
- hard hats
- sensors to detect hazardous substance
- communication devices used for safe deployment of workers

Inhaling pesticide fumes and mists is a very common entry route of pesticides into the body. Absorption through the lungs is great and the sensitivity is high.

The National Institute for Occupational Safety and Health (NIOSH), under authority of the Federal Mine Safety and Health Act of 1977 and the Occupational Safety and Health Act of 1970, tests, approves, and certifies respiratory equipment as being safe for its intended purpose.

Note: Always be certain that the NIOSH compliance number is on the product before purchasing respiratory equipment.

Two systems of respiratory protection are available, depending on the type of respiratory risk involved: air-purification (filtering) and air-supplying. For most pesticide work, the air-purifying equipment is adequate and safe.

Protective equipment is usually required by the pesticide label in one form or another and is integral to safe pesticide application. Chemical-protective clothing consists of multi-layered garments made out of various materials that protect against a variety of hazards. Because no single material can protect against all chemicals, multiple layers of various materials usually are used to increase the degree of protection. Protection is maximized by total encapsulation (completely covering the wearer). An assortment of types of chemical-protective hats, hoods, gloves, and boot covers are used with the garments.

There are many brands and models of protective equipment available for use in pesticide application. Price is not always an indicator of quality, so shop carefully.

Note: Select equipment that is **NIOSH tested and approved**.

Protective equipment, appropriate for the task and hazards that an employee could be exposed, shall be provided by the employer. Since comfort and proper fit must be considered, the person who is going to use it must select the proper size to ensure correct fit and function. Unused protective equipment does not help anyone.

Note: Many supply centers, hardware stores, chemical retailers, and equipment/machinery dealers keep protective equipment in stock.

Training

Written procedures shall be developed for PPE use. These procedures shall include all information and guidance necessary for their proper selection, use and care. The employer shall provide fitting instructions including demonstrations and practice in how the PPE should be worn. It is essential that both supervisors and workers be properly instructed in PPE selection, use, and maintenance. Training shall provide the workers an opportunity to handle PPE, and have it fitted properly.

When to replace PPE

All PPE shall be inspected routinely before and after each use. A program for maintenance and care of PPE shall be initiated and be adjusted to the type of work place, working conditions, and hazards. It shall include the following:

- inspection for defects and damage
- cleaning and disinfecting
- repair
- storage

Many factors influence how long PPE (especially respirators) remains effective. As well as hours of use, an air-purifying respirator's service life is affected by the concentration of dust and other contaminants in the environment; the user's body size; how strenuously the user works while the respirator is worn; and how the respirator is stored.

Note: As a result, it's not possible to specify a length of time after which a respirator should be replaced.

In general, replace a mask or filter when it is visibly dirty or damaged, or when you experience difficulty breathing through it. Replace respirator cartridges when you can smell or taste chemical while or after using the respirator, or according to the manufacturer's recommendations. Replacement or repairs shall be done only by experienced person with parts designed for the PPE. No attempts shall be made to replace components or to make adjustments or repairs beyond the manufacturer's recommendations.

F. Operator Protection System

1. This machine is equipped with an Operator Protective System (OPS), which includes:
 - a. A Roll Over Protective Structure (ROPS) or Operator Protective Device (OPD) of the fixed configuration
 - b. Seat belt assembly with retractable function
2. ROPS and OPDs are structures designed to provide a crush-resistant space for the operator when properly seat-belted within the designated seating area of the machine in the event of a machine tip-over or roll-over.



DANGER:

Damaged ROPS and OPDs must be replaced prior to operator use!

3. Seat belts shall be used and shall be properly fastened about the operator's waist at all times, except when the ROPS or OPDs are:
 - a. not properly installed and/or not properly secured onto the machine
 - b. damaged in such manner that their structural integrity has been compromised
4. Seat belts are attached to the movable portion of the seat when suspension seats are utilized, and therefore the seat-mounting base must be secured to its pivot means and the pivot means latched to the frame of the machine.



DANGER:

If ROPS and OPDs are missing, seat belts shall not be fastened. Worn or damaged seat belt assemblies must be replaced prior to operator use.

5. The ROPS and seat belt are integral parts of this machine and should not be tampered with, modified in any manner, or removed.
6. The ROPS extends behind the operator position, and therefore the operator must be aware of potential contact of the ROPS with items such as trees, buildings, doorways, clothes lines, utility wires, etc., that could cause the machine to upset or rollover....use caution in (or avoid) areas where the ROPS could come in contact with any structures, trees, etc.
7. The ROPS and seat belt add additional mass that elevates the machine's Center of Gravity (C.G.) which negatively affects the machine's stability and traction....use extra caution when operating on slopes.
8. Inspect the ROPS and seat belt assemblies on a regular basis for damage and improper operation....replace all components that are damaged or are not functioning properly with authorized replacement parts.
9. Failure to use the seatbelt properly could result in serious injury or death if an accidental overturn occurs. In order for the ROPS to be effective, the seat belt must be securely fastened around the operator at all times when the operator is on the machine. Contact with the ROPS during an overturn could cause serious injury or death.
10. The ROPS will not prevent the machine from upsets or roll overs.
11. Only approved attachments should be used on this machine.

G. Hydraulic Devices and Systems

Hydraulic fluid escaping under pressure may have sufficient force to penetrate skin and to cause serious injury. If foreign fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this form of injury, or gangrene may result.

Warning: Keep body and hands away from pinholes or nozzles that could eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks!

Safely relieve all pressure in the system before performing any work on the system, and make sure that:

- the ignition switch is OFF
- the key is removed

- the engine sparkplug wire(s) removed
- all connections to the negative terminal of the battery are removed
- the park brake is set
- all by-pass valves, if so equipped, are open
- hydraulic controls are actuated to release pressure on pumps, cylinders, etc. If “float” positions are available, they should be used.

After the above operations are completed, it should be safe to begin disconnecting the lines or components. It is still a good idea to cover the connection with a cloth shield and then gently loosen connections.

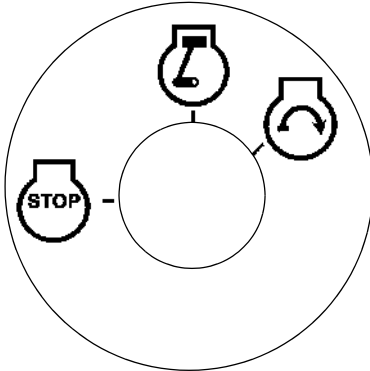
Warning: Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system.

SAFETY DECALS AND LABELS

⚠ WARNING

- Serious bodily injury may result from failure to follow safe operating procedures.
- Read the Operator's Manual before operating this machine.
- Clear area of debris and other objects before mowing.
- Do not operate the machine when children and others are around.
- Do not operate machine without guards, shields and safety devices in place and working.
- Slow down and use caution on slopes.

Part Number: 01003449



Part Number: 01003857

⚠ CAUTION

1. No one should operate or maintain this sprayer who has not read the Operators Manual and been properly trained.
2. Keep adults, children, and pets away from the sprayer and the area to be sprayed.
3. If truck or trailer mounted, make certain the sprayer is securely bolted to the frame of the truck or trailer.
4. When spraying chemicals:
 - a. ALWAYS FOLLOW THE DIRECTIONS ON THE LABEL.
 - b. Avoid breathing vapors.
 - c. Avoid contact with skin, eyes or clothing.
 - d. Wear rubber boots or rubberized shoes.
 - e. Wear work clothes with long-sleeved shirts and long-legged pants.
 - f. Change to clean clothes daily.
 - g. Wash hands and face before eating or smoking.
 - h. Bathe thoroughly as soon after spraying as possible.
5. Wear a face shield & rubber gloves when handling concentrates.
6. Do not remove any shields, guards or safety devices from the sprayer. If a shield, guard or safety device is damaged or does not function, repair or replace it before operating the sprayer.

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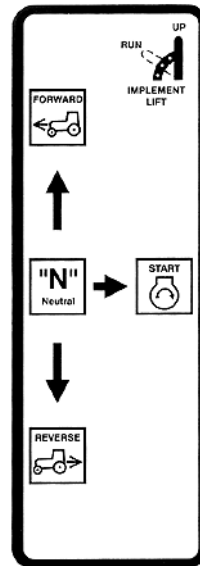
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⚠ WARNING

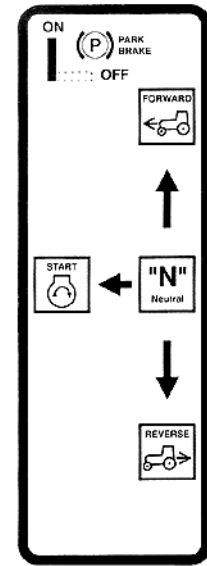
- Engage parking brake when leaving the machine.
- Do not add fuel while the engine is hot or running.
- Stop engine, disconnect spark plug before adjusting or servicing.
- Before leaving operator's position:
 - Disengage implement drive.
 - Place speed controls in neutral and set park brake.
 - Wait for all movement to stop.
- Do not allow operation by untrained personnel.

OFF ON

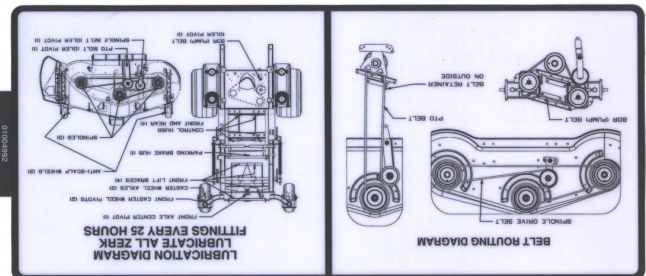
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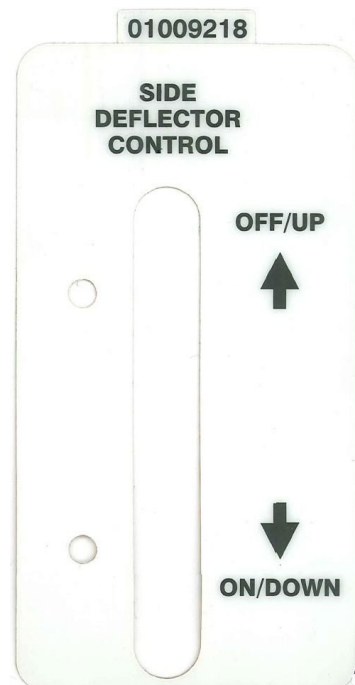
Part Number: 01003451



Part Number: 01003452



Part Number: 01004992



Part Number: 01009218

SPECIFICATIONS

Engine:	17HP Kawasaki
Type:	Vertical air cooled V-Twin
Air Cleaner:	Paper Element with foam pre-cleaner
Lube System:	Pressurized with oil filter
Starter:	12-volt electric
Traction Drive:	Dual variable-speed hydraulic pump and wheel
Hydraulic Tank:	10 quart capacity, One quart filter
Controls:	Engine ignition and start switch; throttle; choke; left and right steering levers; electric power switch; parking brake; foot operated spreader rate gate; side deflector; spreader power; sprayer power
Parking Brake:	Mechanical linkage attached to the brake handle, drum brakes
Front Caster Wheels:	13 x 6.50 x 6
Tire Pressure:	8-10 psi Rear, 20-25 psi front caster
Drive Wheels:	24x12 - 12
Frame:	2" Steel square tube and plate, all welded construction
Seat:	Adjustable seat with armrests. 5" Adjustment
Fuel Tank:	6.5 gallon w/ shutoff valve
Ground Speed:	0-10 + MPH forward. 0-4 MPH reverse
Instrumentation:	Hour meter, Tachometer, Maintenance-minder
Tank:	40 gallon polyethylene
Pump Motor:	12 VDC permanent magnet
Pump:	4.8 GPM @ 40 psi, diaphragm-type
Strainer:	In line 30 mesh, stainless steel
Agitation	By-pass, triple-jet
Pressure Regulator:	Adjustable valve with 60 psi glycerine-dampend gauge
Sprayer Boom:	10 foot, 3 section, 1: O.D. square tubular steel
Spray Nozzles	Five FL8VD wide angle full cone tips, 20" centers
Spreader Hopper:	125 pound capacity
Net Weight:	950 lbs

OPERATING INSTRUCTIONS

Figure. 1

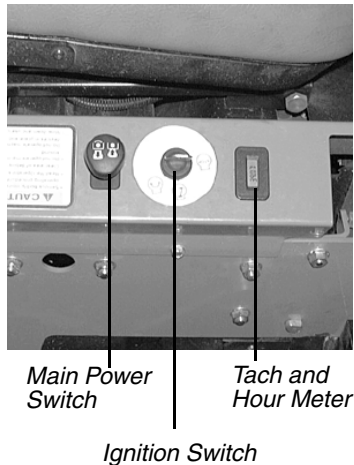
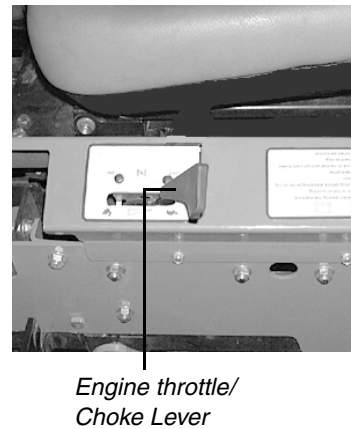


Figure. 2



A. General

1. When Applying Materials:

- a. Keep adults, children, and pets away from the area where material will be applied.
- b. When operating this machine, in the forward direction, do not allow the steering levers to return to Neutral on their own. Always maintain a firm grip on the levers, operate them smoothly and avoid any sudden movements of the levers when starting and stopping.
- c. Always remove debris and other objects from the area where materials will be applied (Note: debris and loose grass will reduce traction).
- d. operate machine only in daylight.
- e. Watch for holes, sprinkler heads, and other hidden hazards.
- f. Avoid driving too close to trees, creeks, ditches, sand traps, and other obstacles.
- g. Before backing up, check behind and watch where you are going.
- h. Always reduce speed when making a turn, and when grass is wet.
- i. Always travel across slopes, never up and down the slope. Do not operate on steep slopes and slow down before turning. Avoid turning downhill if possible, start at the bottom and work up to the top. Use extra care and go slowly when turning downhill.
- j. If you hit a solid object while traveling, turn off the main switch, place the steering levers in the neutral, opened-out position, move the throttle to slow, set the parking brake, shut off the engine, and take the key from the ignition switch. Inspect for damage. Repair the damage.
- k. Never leave the machine unattended without observing the following: placing the steering levers in the neutral open-out position, mov-

ing the throttle to slow, setting the parking brake, shutting off the engine and taking the key from the ignition switch.

- l. Keep the machine and especially the engine and hydraulic components clean and free of grease, grass, leaves and materials to reduce the potential for over-heating and fire.

2. Safety Awareness when Applying Materials

- a. Do not operate on steep slopes, those above 15 degrees (27% slope).
- b. Avoid turning downhill if possible, if not use extra care and go slowly.
- c. Avoid turning when going downhill, traction is at a minimum going downhill.
- d. Avoid operation or use extreme care if the traction surface is wet, unstable, or slippery.
- e. Use extra care when grass clippings, leaves, pine needles, or debris are present as traction can be reduced.
- f. Slow-down before turning and come to a complete stop before any zero turn maneuver.
- g. Do not stop machine or park machine over combustible materials such as dry grass, leaves, debris, etc.

3. To Apply Product in a Pattern

- a. Pick a point on the opposite side of the area to be mowed (post, tree, shrub, etc.).
- b. If on an hillside, start at the bottom so that the turns are uphill rather than downhill.
- c. Align the machine so as to head directly toward the object on the far side.
- d. Slowly increase the speed of the machine to match conditions, terrain, and operator familiarity with the controls and keep the machine headed directly toward the alignment object.
- e. When approaching the other end of a strip, slow down or stop before turning. A U-turn is recommended unless a zero turn is required. The speed of a U-turn that will allow for

machine controllability and minimal turf defacement will be dependent on several factors including: the speed of the turn, the radius of the turn, the tire tread pattern, the traction coefficient of the tire to the traction surface, the slope of the traction surface.

- f. Remember, a zero turn requires that the forward or reverse travel of the machine be stopped prior to the initiation of the turn or severe turf defacement can occur.
- g. To prevent rutting or grooving of the turf, change the direction that the strips are traveled by approximately 45 degrees the next and each subsequent time that materials are applied to the area.

B.Controls

1. **Engine Ignition and Start Switch:** (See Figure 1.) Located on the instrument housing below the right side of the operator's seat. When the key is inserted and turned clockwise, 45 degrees, the ignition circuit is closed. Turning the switch further against spring pressure starts the engine. The engine will only start if the main switch is in the "off" position, the parking brake is engaged and the left and right steering levers are in the neutral, opened-out position. The key should always be removed from the switch if the operator leaves the machine's seat.
2. **Engine Throttle Control:** (See Figure 2.) Located on the left side of the machine next to the operator's seat. Moving the throttle control from the rear to the front will increase the engine speed from slow to fast.
3. **Left and Right Steering Levers:** (See Figure 3.) These hinged levers open out to the side in the neutral position to permit the operator to be seated or to leave the machine's seat. The operator, when seated, can pull the levers up to the operating position, a comfortable forearm's length away. These levers control all of the movements of the machine. Pushing both levers forward causes the machine to move forward. Pulling both levers back causes the mower to machine backward. Pushing one lever ahead of the other lever causes the traction wheel on the side where the lever is ahead to rotate faster than the other traction wheel, making the machine turn toward the side where the lever is behind. When one lever is pushed forward and the other lever pulled back the same amount, one traction wheel will turn in reverse and the machine will turn within its own length.

In order to start the engine, both steering levers must be opened out to the side in the neutral position; the parking brake must be engaged; and the main power clutch switch must be "off". However, once the engine starts, the parking brake must be released before the operator places the steering levers into the operating

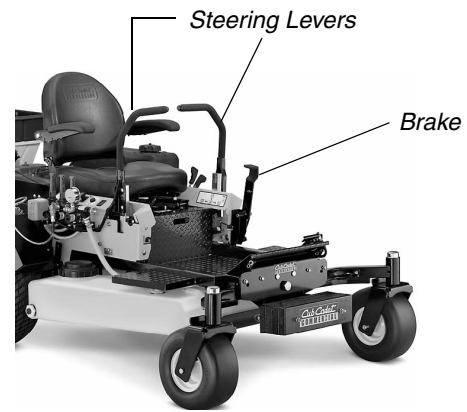


Figure. 3

position or the engine will automatically shut off.

Note: The Steering Levers will return toward neutral when released, but they should be placed in neutral by the driver. If the Drive Handles are not placed in neutral, the machine could creep.

4. **Main Power Switch:** (See Figure 1.) Located on the right side of the mower beside the ignition switch. This is an "on/off" push pull switch that controls the main electric power which supplies power to the spreader and the sprayer operating switches in the lap bar handles. The switch must be turned off to start the engine and should be turned off for safety any time another person approaches the machine. Power to the main switch will also be cut off if the operator leaves the operator's seat.
5. **Parking Brake:** (See Figure 3.) Located on the left side of the traction unit. The handle is an overcenter lever which applies the drum-type brake on each drive wheel when the handle is pulled to the rear. The brake must be engaged in order to start the engine.
6. **Fuel Shutoff Valve:** (See Figure 4.) Located on top of the fuel tank. When turned in a clockwise direction until it stops, it will shut off the flow of fuel to the engine. When turned in a counter-clockwise direction it will open and allow fuel to flow to the engine. Close this valve if you are not going to run the machine for a period of 30 minutes or more to prevent flooding the engine.



Note: The fuel tank capacity is 6.5 gallons.

Fuel Shutoff Valve

Figure. 4

7. **Seat Adjustment Lever:** The Seat Adjustment Lever is located beneath the seat. The Seat Adjustment Lever is used to move the seat forward and backward. To place the seat in the desired position pull the seat adjustment lever to the left then push the seat forward or back to the desired position. Release the lever so the seat will lock in place.
8. **Digital Tachometer and Hour Meter:** (See Figure 1) Located on the right side of the machine in front of the ignition switch. When the machine is running the tachometer displays engine rpm. When the machine is off the tachometer displays running time.
9. **Choke Lever:** (See Figure 2) The Choke is part of the throttle control on the left instrument panel next to the seat. The Choke is operated manually when the throttle is moved forward past the detent. Having the Choke in the ON position helps the engine to start during initial start-up. During normal operation the Choke should be OFF, move throttle aft to the detent location.
10. **Speed Control Adjusters:** Flip-in, flip-out speed limiters are provided for spray operations. They limit the maximum forward speed to 4.5 ± 0.2 mph.

Note: There will be a flashing "LUBE" for each recommended lubrication interval. There is a flashing "OIL" at each recommended engine oil and filter change.

C. Initial Adjustments

1. Check the fluid levels and tires:

Note: These checks should be made daily, before starting the engine.

- a. **Fuel:** Using a good grade of unleaded, regular gasoline (for a gasoline engine), fill the fuel tank (beside the engine on the right side of the machine). When the fuel reaches one inch from the top of the tank, stop. DO NOT OVER-FILL. Space must be left for expansion.
- b. **Engine Oil:** (Filled at the factory before shipment.) Pull out the oil dipstick, wipe it off and reinsert it. Pull it out again and read the oil level. If it is below the operating range, add oil through the fill tube using a funnel to bring it up to the top of the operating range.

Note: Gasoline Engine: Use SAE 15W40 engine oil, rated for service SJ.

- c. **Hydraulic Oil:** (Filled at the factory before shipment.) The hydraulic oil tank is located beneath the operator's seat. Always wipe off the area around the oil tank fill neck before checking the oil level to prevent dirt from contaminating the oil. Remove the cap and make sure the oil level is up to the lowest hole on

the oil tank fill neck. The top hole is for venting. If the oil level is low, fill with a good grade of SAE15W-40 oil.

- d. **Tires:** 8-10 psi Rear, 20-25 psi Front Caster Tires

Note: New tires are overinflated in order to properly seat the bead to the rim. The normal working pressure for the traction tires is 8-10 psi. The front caster wheels should be inflated to 20-25 psi.

2. Check that all Nuts, Bolts and Screws are Tight.

D. Zero Turn Break-In And Operating Procedures

The following procedures are suggested for operators of ride-on machines which have zero turn capabilities.

1. Orientation:

- a. Read the entire Operator's Manual.
- b. Sit on the machine, adjust the seat before-and-after, then adjust the speed/directional (lap bar) controls (they can be adjusted before-and-after, as well as up-and-down — 9/16" wrench required).
- c. Become familiar with all of the machine controls, instrumentation, safety and instruction signs, and safety devices.
- d. Move (or have moved) the machine to a safe, level area with no obstructions including objects, pedestrians, and animals.

2. Initial Operation:

- a. Use protective equipment for eyes, hands, hearing, feet, legs, head and other areas of the body if needed — safety eye glasses, gloves, earplugs, boots, hats, etc.



WARNING:

Hearing Protection is required for all operator exposure exceeding two (2) hours.

- b. Ensure that the area is free of animals and bystanders, especially children!
- c. Survey the area where the equipment is to be used to make sure it is free of debris, sticks, stones, wires, bones, and other foreign objects which could cause injury to bystanders, damage to the machine, or damage to nearby facilities.
- d. Inspect the machine to make sure:
 1. All guards, shields are in their proper place, are secure, and are functional.
 2. That there are no spilled or leaking fuel or oil sources, nor loose fuel or hydraulic tank caps, hoses or fittings.
 3. That there are no loose or missing hardware nor any missing items.

4. That no non-approved devices are installed.
5. That all safety signs and decals are properly installed and legible.
- e. This is a one person machine, operator only! Riders are not permitted under any circumstance!
- f. To start the engine on the machine:
 1. Make sure the park brake is set to the "ON" position, both lap bars are in the neutral/start (opened-out) position, and the main power switch is in the "off" (down) position.
 2. Move the throttle control forward to engage the engine choke.
 3. Insert the ignition key, turn the switch toward the spring-loaded "Start" position, maintain the Start position until the engine begins to run, then release the switch (it will return to the "Run" position).
 4. Retard the throttle slowly by moving it rearward to release the choke. If the engine is "cold", the choke may need to be partially applied for a few minutes. Be sure to totally retard the choke after the engine has "warmed up".
- g. Check safety devices:
 1. With the park brake engaged, move one of the lap bars (speed/directional control) from the neutral/start position to the neutral position (out of the slot, toward the center of the machine) — the engine should stop running. Move the lap bars back to the neutral/start position and the engine should run.
 2. Repeat this procedure with the opposite side lap bars.
 3. With the park brake engaged and the lap bars in the neutral/start position, advance the engine speed control completely forward (Hi-idle), engage the main power switch (pull upward), then lift off the seat — the engine should stop running. Sit down and the engine should run. Turn off the main power switch by pushing the control switch down.
- h. To drive in the FORWARD direction:
 1. Set the engine speed to 2000 to 2500 rpm (refer to tachometer on right control panel). This must be increased to full speed (3525-3675 rpm) after becoming familiar with the machine.
 2. Release the park brake.
 3. Move both lap bars out of the neutral/start position to the neutral position (toward center of machine). Slowly, move both lap bars toward the front of the machine until the machine begins to move forward — release the lap bars and the machine should stop. The more that the lap bars are moved toward the front of the machine, the faster the machine will move in the forward direction. Release the lap bars and the machine should stop traveling forward. (This is a safety check, the normal procedure is for the operator to slowly bring the lap bars to the neutral position).
4. Do not advance the lap bars rapidly as this could cause turf defacement, loss of traction, and/or instability.
5. To turn, advance one lap bar ahead of the other and the machine will turn toward the opposite from the side that was advanced — I.E. to turn clockwise (to the Right), move the LEFT lap bar forward more than the right side, and to turn counter-clockwise (to the LEFT), move the RIGHT lap bar forward more than the left side. NOTE: If one lap bar is in the neutral position and the other is advanced, the turn side tire will not rotate and a "pivot turn" will be executed — turf defacement could occur (if on grass) as well as potential damages to the traction surface and the tire. If the lap bar on the turn side is not brought all the way to neutral, then the turn side tire will continue to rotate and a "U-turn" will be executed with a low potential for turf defacement as well as traction surface and tire damage.
- i. To drive in the REVERSE direction:
 1. Make sure no bystanders, animals, or objects are behind the machine. Look behind the machine, and use extreme care.
 2. Slowly, move both lap bars toward the rear of the machine until the machine begins to move rearward. Release the lap bars and the machine should stop. The more the lap bars are moved toward the rear of the machine, the faster the machine will move in the reverse direction. Release the lap bars and the machine should stop traveling in reverse (this is a safety check, the normal procedure is for the operator to slowly bring the lap bars to the neutral position).
 3. Do not retard the lap bars rapidly as this could cause turf defacement and/or loss of traction.
 4. To turn, retard one lap bar ahead of the other and the machine will turn toward the same side that was retarded — I.E., to turn counter-clockwise (to the LEFT), move the LEFT lap bar rearward more than the right side, and to turn clockwise (to the RIGHT), move the RIGHT lap bar rearward more than the left side. NOTE: If one lap bar is in the neutral position and the other is retarded, the turn side tire will not rotate and a "pivot turn" will be executed. Turf defacement could occur (if on grass) as well

as potential damages to the traction surface and the tire. If the lap bar on the turn side is not brought all the way to neutral, then the turn side tire will continue to rotate and a “U-turn” will be executed with a low potential for turf defacement as well as traction surface and tire damage.

- j. To perform a “zero turn”:
 - 1. Please note, a zero turn maneuver can not be executed while the machine is moving in the Forward or, Reverse directions, the machine must come to a stop first.
 - 2. To turn clockwise, slowly move the LEFT lap bar forward while simultaneously moving the RIGHT lap bar rearward. Release both lap bars and the machine should stop turning.
 - 3. To turn counter-clockwise, slowly move the RIGHT lap bar forward while simultaneously moving the LEFT lap bar rearward. Release both lap bars and the machine should stop turning (this is a safety check, the normal procedure is for the operator to slowly bring the lap bars to the neutral position).

3. Start the Engine:

- a. Open the fuel shutoff valve.
- b. Sit on the Seat. Set the parking brake “On”.
- c. Move the left and right steering levers to the neutral, opened-out position.
- d. Turn the main power switch “Off”.
- e. Push the throttle control to a position a third of the way between slow and fast.
- f. Insert the key in the ignition and start switch and turn the switch to “On”.
- g. Gasoline Engine: If the engine is cold, push the choke to the on position.
- h. Turn the ignition key in a clockwise direction to the “Start” position until the engine starts.

Note: Do not hold the key in the “Start” position for more than 10 seconds or you may damage the starter. If the engine does not start in this time, wait about 30 seconds and try again.

- i. Gasoline Engine: Once the engine starts, push the choke on halfway and as the engine warms, push the choke off all the way.

- 4. **Operating the Machine:** Operating a zero-turning-radius machine is not like operating a tractor-type riding machine. The zero-turning-radius machine is much more maneuverable and much less fatiguing to operate. However, getting used to the fingertip control of the zero-turning-radius machine takes some practice. We strongly recommend that you locate a “test area” where you can operate the machine for about 30 minutes without being disturbed.

- a. Get into the operator’s seat.
- b. Start the engine.

- c. After the engine has warmed, adjust the throttle to the fast position.
- d. Release the parking brake.
- e. Fold in the steering levers to the operating position.



WARNING:

When operating this machine forward, do not allow the steering levers to return to the neutral position on their own. Always maintain a firm grip on the steering levers, operate them smoothly and avoid any sudden movements of the levers when starting or stopping.

- f. To go forward, move both steering levers slightly forward and the machine will slowly move forward. The farther you move the levers forward the faster the machine will go forward.
- g. To back up, move both steering levers slightly backward and the machine will slowly move backward. The farther you move the levers backward the faster the machine will go backward.
- h. To turn, pull the lever back on the side to which you want to turn. The farther back you pull the lever, the faster and more sharply you will turn. Initially, you will have to be careful to avoid turning to fast and too far.

5. Parking the Machine:

- a. Push off the main power switch.
- b. Drive the machine to the cleanup or storage area.
- c. Move the throttle to slow.
- d. Place the steering levers in the neutral position.
- e. Set the parking brake.
- f. Turn off the ignition switch and take the key from the switch.
- g. Close the fuel shutoff valve.

E.Controls for Sprayer

1. Valves

There are several ball valves used on the sprayers. They serve as pump outlets and are mounted under the pressure regulator. Ball valves operate with a quarter turn movement of the handle. When the handle lines up with the direction of flow, the valve is open. When the handle is at a 90° angle to the direction of flow, the valve is closed. There is a gate valve in the suction line at the front of the engine plate near the drain fitting. The handle should be turned all the way counterclockwise to open the valve and all the way clockwise to close the valve. To drain the tank, the cap must be removed from

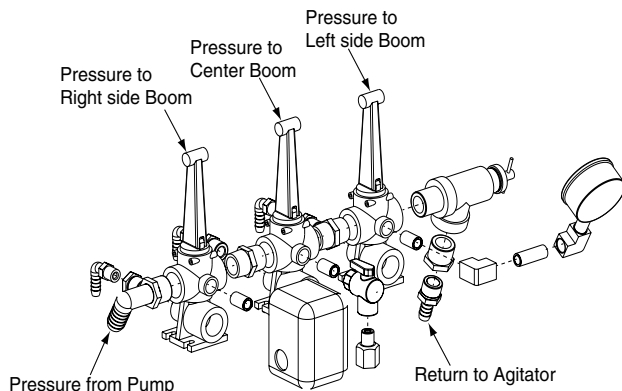
the drain fitting and the gate valve must be opened.

2. Pressure Gauge

Mounted in the pressure regulator housing, the pressure gauge indicates the pressure in the output line to the spray gun, wand or boom and the line to the hydraulic agitator, if used. The gauge is graduated in pounds per square inch (psi) and kilopascals (kPa).

3. Pressure Regulator

Located on the side of the pump opposite the drive shaft. There are different styles of regulators, but they all function in the same way. A spring-loaded plunger rests against a valve seat which forces the pump flow to the outlets. The springs are opposed by the hydraulic pressure generated by the pump. If this pressure exceeds the spring pressure, the plunger is lifted off of its seat and part or all of the flow goes to bypass. All of the pressure regulators have operating levers which in one position, remove the spring pressure from the plunger and permit the pump's flow to dump to bypass and in the other position, apply the spring pressure to the plunger and force the pump's flow to the outlets. One valve has a toggle-type operating lever with a ball which can be hooked in different notches for adjustment. Another regulator has a knob that turns about 90° from "OFF" to "ON". Still another has a hinged part of the plunger shaft work as the operating lever. All of the regulators also have a means for adjusting the operating pressure. This is a threaded knob, a ring or a brass adjustment nut which when threaded down toward the base of the pressure regulator, increases the spring pressure. Normally, the regulator should be set to provide about 100 psi with both output ball valves closed. Then the output ball valve to the application device is opened completely and with bypass or pressurized jet agitation, the output ball valve to the agitator line is adjusted to provide the desired flow rate and with the mechanical agitation, the pressure regulator is adjusted to provide the desired flow rate.



F.Set-Up for Sprayer

1. General

Check all bolts on the sprayer for tightness. Make certain all hose clamps are tight. Check that bolts on the tank support are tight on poly-tank. Check that electrical connections are sound on electric sprayers.

2. Starting the Sprayer (Electric-Powered)

- Check the battery connections.
- Clean the in-line strainer if it is dirty.
- Fill the tank one third full with clean water. Make certain the gate valve in the suction line is open.

Cub Cadet Commercial Electric Sprayers are designed to run in demand operation or constant operation.

Demand Operation

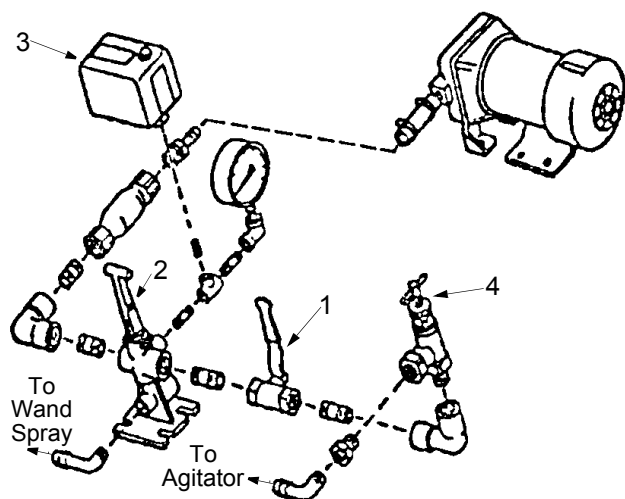
Close the ball valve (No. 1 in the the drawing on page 17) which stops all flow to the agitator, push the handle on the directo valve (No. 2) down which permits flow to the spray wand and turn on the pump switch. This will force all of the flow from the pump to go to the spray wand. The pump will operate for a short period to fill the hose to the spray wand and then will shut off. With the valves in this position, the pump will turn on when the spray wand is turned on and will shut off when the spray wand is turned off.

Note: If you are using a 1.5 GPM spray tip, the pump will turn on and off as you spray because the pump can output 4.8 GPM.

Note: The pressure gauge should show no more than 45 psi when the spray wand is off. This is controlled by the pressure switch (No. 3) which is preset at the factory. Pressure greater than 45 psi will activate an internal circuit breaker in the pump, stopping it but it will start again in about two minutes. If this repeats, you will have to adjust the pressure switch. To adjust the pressure switch, remove the cover from the switch and adjust the nut holding the small spring on the right side up for a lower pump turnoff pressure (or down for a higher pump turnoff pressure). The pump should turn on when the pressure drops to 25 psi. Adjust the nut holding the large spring in the center up for a lower turn-on pressure or down for a higher turn-on pressure. Replace the pressure switch cover.

After the pressure switch is properly adjusted, check the flow rate out of the spray wand with a calibrated container. (See Calibration.) This is the maximum flow rate

possible. To reduce the flow rate, you must adjust the valves so that the pump runs constantly.



Constant Operation

Open the ball valve (No. 1) which permits flow to the agitator, push the handle on the direct valve (No. 2) down which permits flow to the spray wand and turn on the pump switch. Now adjust the pressure regulator (No. 4) until the desired flow rate out of the spray wand is achieved.

Note: Do not thread the “T” handle of the regulator too far clockwise or the pump will start to operate intermittently. For maximum agitation, open the ball valve which permits flow to the agitator, pull the handle on the direct valve up which shuts off flow to the spray wand and turn the pressure regulator handle counterclockwise to relieve all of the spring pressure in the regulator and provide maximum flow to the agitator.

3. Calibration

a. Hand Spraying:

There are two keys to proper calibration of hand spraying. One is knowing your spraying pace, that is, the time it consistently takes you to spray an even application of product on each 1000 sq. ft. area. The other is always knowing the current flow rate out of the application device on your sprayer.

The first step is to set up your sprayer to spray two gallons per minute. This is a common flow rate that can be used to check your spraying pace. To do this, you need a graduated container. Fill the sprayer tank one third full with clean water and start it up. Using the gun or wand that is mounted on your sprayer, spray into the graduated container for one minute. Check how much water you collected. Adjust the flow rate by adjusting the ball valve in the line to the agitator or the pressure regulator if necessary, until you can collect two gallons in one minute.

The next step is to determine how long it takes you to evenly spray 1000 sq. ft. Measure an area 20 ft. by 50 ft. on a paved surface. Spray the area evenly with clean

water. Use a stop watch to time your application. After the water evaporates, spray the area again.

Repeat this several times and average the application times. Spraying on asphalt or concrete will permit you to see the pattern you are applying and will give you a better conception of even application. Check the spray pattern as the water evaporates. Spraying technique is just as important as volume sprayed.

If your sprayer is set at a flow rate of two gallons per minute and your spraying pace is .75 minutes per 1000 sq. ft., you are applying liquid at a rate of 1.5 gallons per 1000 sq. ft. which is your application rate. (2 gallons/minute x .75 minutes/1 000 sq. ft. = 1.5 gallons/ 1 000 sq. ft.) - the application rate.)

It is wise to check the flow rate out of the application device on your sprayer every working day. It is also wise to check your spraying pace and the spraying pace of anyone else who will be using the sprayer every month or so because as you can see, the amount of liquid you apply depends on the flow rate of your sprayer and your spraying pace. You can check your spraying pace on every lawn you spray if you have measured the lawn accurately. The use of a Electronic Digital Flow Meter will permit you to very accurately measure the flow rate and the total gallons of liquid sprayed on each lawn. (See page 17) Your tank has gallonage markers which may also be used to approximate the gallons of liquid that you spray on each lawn. This figure should equal your application rate times the number of 1000 sq. ft. in the lawn.

Example: You have sprayed a 10,000 sq. ft. lawn at an application rate of 1.5 gallons/1000 sq. ft. -- $10 \times 1.5 = 15$ gallons. A flow meter should read 15 gallons. When you started there were 40 gallons of liquid in your tank. Now there should be 25 gallons left in the tank.

Adding products to the tank:



CAUTION: AVOID ACCIDENTS. FOR SAFETY, READ THE ENTIRE PRODUCT LABEL INCLUDING PRECAUTIONARY STATEMENTS. USE ALL PRODUCTS ONLY AS DIRECTED.

The product label will tell you how much product should be used per 1000 sq. ft. If the label says you are to use 1.4 ounces per 1000 sq. ft. you divide the number of gallons of water in the tank by your application rate (gallons per 1000 sq. ft.) and multiply by the number of ounces of product per 1000 sq. ft.

Example: 40 gallons divided by 1.5 gallons / 1000 sq. ft. times 1.4 ounces / 1000 sq. ft. = 37.3 ounces (2.3 pints.)

You would fill the sprayer tank one third full with clean water and then add 2.3 pints of product to the tank through the strainer basket while the sprayer is running under full agitation. After the product is completely mixed, you would fill the tank to the proper level with clean water.

b. Boom Spraying:

There are two keys to proper calibration of boom spraying. One is knowing and controlling the sprayers speed over the ground and the other is always knowing the flow rate of the spray tips on the boom. The following is a simplified procedure, Measure and mark off a distance of 205 feet in an area that best represents the average topography for the area to be sprayed. Select a safe tractor (truckster) speed (usually three to six MPH) which can be maintained while spraying. Write down the engine's RPM and the gear selection so that this speed can be maintained during both calibration and actual spraying.

With the tractor (truckster) traveling at the selected speed and with the sprayer one half full of water, time and record the seconds taken to travel the 205 feet.

With the sprayer still half full of water, start the sprayer's engine and adjust the pump's pressure regulator to the desired liquid pressure (normally between 20 and 50 psi). Collect all the water from one nozzle for the same number of seconds taken to travel the 205 feet.

Example: If it took 35 seconds to travel the 205 feet, collect the discharge of one nozzle for 35 seconds.

BOOM WITH 20" NOZZLE SPACING: The number of fluid ounces collected equals the gallons per acre (GPA) output.

BOOM WITH 10" NOZZLE SPACING: Two times the number of fluid ounces collected equals the gallons per acre (GPA) output.

Repeat this procedure two more times, collecting water from a different nozzle each time. Use the average number of ounces collected from the three nozzles to determine the gallons per acre output of the boom at the set pressure. Note: If the ounces collected from any nozzle are 10% greater or less than the ounces collected from any other nozzle, it is a sign of wear and all the tips on the boom should be replaced.

To determine the amount of product to add to the spray tank, divide the capacity of the tank by the number of gallons of water per acre (GPA) to determine the area, in acres, that can be covered with a tankful of spray.

Example: 40 Gallon Tank divided by 10 GPA = 4 acres covered per tankful.

Multiply the application rate of the product per acre times the acres per tankful and add that amount of product to the tank through the strainer basket. The tank should be one third filled with clean water with the sprayer running under full agitation. After the product is completely mixed, you would fill the tank to the proper level with clean water.

Example: 2 quarts per acre x 4 acres per tankful = 8 quarts or 2 gallons of product to be added per tankful of clean water.

To decrease the output: Adjust the pressure regulator to a lower pressure that still maintains the spray pattern; or increase the speed of the tractor (truckster);

or change the nozzle tips to a smaller size.

To increase the output: Adjust the pressure regulator to a higher pressure that still maintains the spray pattern; or decrease the speed of the tractor (truckster); or change the nozzle tips to a larger size.

AFTER CHANGING OUTPUT - RECALIBRATE

4. Tips on Spraying

a. Mixing Dry-Bagged Products for Sprayer Use:

Dry-bagged products should be pre-mixed with clean water in a five gallon container to form a slurry. The sprayer should be one third filled with clean water and running under full agitation. The slurry should be slowly poured into the sprayer through the strainer basket. After the product is completely mixed, you would fill the tank to the proper level with clean water.

b. Use of the Spray Wand:

The Spray Wand consists of a ball valve which controls the width of the pattern, a handle, a trigger valve which turns the flow on and off, an extension, a screen strainer, a hex chamber which controls the flow to the tip, one of two brass tips and a nut to hold the tip in place. The low volume tip discharges about 1-1/4 gallons per minute and the high volume tip discharges about 1-1/2 gallons per minute. The tips throw the best pattern at a pump pressure of about 40 psi. Both tips throw a fan shaped pattern about eight feet wide with a droplet size large enough to help avoid drift.

Determine the application rate in gallons per 1000 sq. ft. from the product label. Divide this figure by your spraying pace in minutes per 1000 sq. ft. to determine the proper flow rate for the wand in gallons per minute. Use this figure to select the proper tip and then calibrate the sprayer to spray this flow rate.

To use the wand, hold it in your hand with the hose running around your body as described in the section on the Gun. Hold the wand so that the tip is 18 to 24 inches above the ground and the spray pattern covers a swath about eight feet wide. Hold the wand steady and lock the trigger on. Start at the sprayer and work into the lawn. Walk in parallel paths about eight feet apart and make sure your spray pattern slightly overlaps the previous pass. Use the ball valve to control the pattern width to keep the spray pattern away from ornamentals, trees and gardens.

The Spray Wand with the low volume tip is No. 00010856.

The low volume tip for the Spray Wand is No. 00010450.

The Spray Wand with the high volume tip is No. 00005419.

The high volume tip for the Spray Wand is No. 00006328.

5. Cleaning the Sprayer

After use, flush the sprayer tank, and the entire system, pump, plumbing, hoses and gun, wand or boom with Nutra-Sol to neutralize chemicals and reduce pump problems. Follow the instructions on the label. Extra

cleaning care should be taken after spraying herbicides to prevent possible damage to turf or plants when next spraying insecticides or fungicides. After the sprayer has been flushed, clean the in-line strainer. Hose off the outside of the sprayer to wash off dust and dirt. Do not spray water on the engine if it is hot.

6. Spreader Mounting

The Electric Spreader is mounted to the rear of the spreader-sprayer and is powered by a 12-volt electrical system. The spreader has been mounted at the center rear of the machine so that the impeller is 18 inches from the ground.

7. Push-Push Switch

This switch has been mounted in the left lap-bar (speed-direction control lever) in a position convenient to the operator.

8. Wiring

The motor wiring is provided with a disconnect plug so that the spreader can be taken off the machine and the wiring left intact. Check for proper rotation of the impeller by activating the push-push switch to start the impeller. When viewed from the top of the spreader, the impeller should rotate in a counterclockwise direction. If the rotation is incorrect, shut-off the switch and reverse the wiring.

9. Shut-Off Mechanism

A rate plate cable mechanism are used to open and close the spreader. It is positioned on the left side of the machine within easy reach of a foot pedal and the operator.

10. Proper Machine Speed is 3 M.P.H.

Adjust the spreader setting rate as recommended by the manufacturer of the product to be applied. At a speed of 3 m.p.h., the product will be distributed in a spread width of 8 to 12 feet. To spread material, activate the push-push switch to start the impeller when the machine reaches the area to be treated, then push the foot pedal forward to open the spreader. When you reach the end of the area to be treated, push the lower portion of the foot pedal to close the spreader. Then, with the spreader closed, turn around and then open the spreader again and make a pass parallel to and 8 feet away from the first. If you keep the passes 8 feet apart, the spreader patterns will overlap at the sides where they thin out and you will achieve even distribution. Reminder to close the spreader when you stop or turn the machine, also push into on the push-push switch to stop the impeller if you stop or when traveling from one area to another.

11. Spreader Calibration

Two items must be considered when calibrating a spreader. The first is the distribution pattern of the spreader. That is, the pattern the product makes as it strikes the ground after being thrown out by the spreader's impeller. There are many factors which affect the distribution pattern of a rotary spreader and some of them relate directly to the product. For this reason, we recommend that the spreader be calibrated separately for every product to be applied. Spreader calibration

should be checked at least once a month, or more often when the spreader is used frequently.

The second item is the product application rate, that is the amount of product applied per thousand square feet. This is important because over-application can be costly and may cause plant injury, while under-application will reduce the effectiveness of the product.

a.To calibrate a spreader, follow these steps:

Check the spreader discharge holes with the operating lever in the closed position. If the discharge holes are not fully closed, adjust the cable. Tighten the lower lock-nut and recheck. Repeat this procedure until the holes are fully closed.

b.To achieve a uniform distribution pattern:

The accurate method for checking pattern uniformity is to lay out shallow boxes or pans in a row on a line perpendicular to the direction of spreader travel. Eleven boxes or pans, two inches high placed on one-foot centers will provide accurate calibration. To conduct the test, begin with the pattern slide completely open and set the rate control arm at the suggested approximate setting. Make three passes over the boxes, pushing the spreader in the same direction each time. The product caught in each box is then evaluated to determine the distribution pattern. Weighing the product in each box is the most accurate, but a simpler method is to pour the contents of each box into a separate small vial or bottle. Then set the eleven vials or bottles side-by-side in order. This makes the pattern variation quite visible.

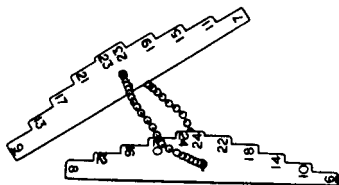
To reduce the amount of discharge to the right side (operator's right) the pattern slide should be partially closed and the test repeated until the distribution pattern is uniform.

c.To achieve the correct product application rate:

The approximate spreader settings printed on any product label should only be used as the initial setting for calibration. Set the rate control arm at this approximate setting. Using the collection boxes or pans, make a single pass over them to determine the effective pattern width. The effective pattern width is twice (2x) the distance to the point where the rate drops to one-half the average rate at the center. Example: If the product in the vials from the center boxes averages two inches in depth, count out to the vial which has one inch of product. If this is the fifth vial from the center and the boxes were on one-foot centers, the effective pattern width is ten feet (2 x 5 ft.).

Knowing the effective pattern width (ten feet), measure out a lineal distance to equal 1,000 sq. ft. (10 ft. x 100 ft. = 1,000 sq. ft.). Weigh 20 lbs. of product and place it in the spreader hopper and spread it over the distance necessary to equal 1,000 sq. ft. (100 ft.). Then weigh the product left in the hopper and subtract this amount from the amount with which you started. The result is the application rate for this product in pounds per 1,000 sq. ft. that your spreader is currently adjusted to disperse. Adjust the rate control arm up or down as needed and

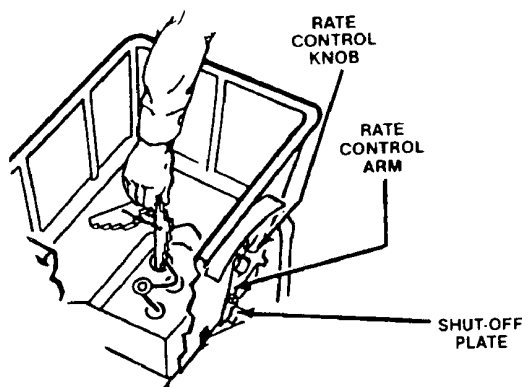
repeat this procedure until the correct application rate is achieved.



d. To use the calibration gauges:

The calibration gauges provide a series of “steps”, numbered in 1/32-inch increments, that will allow you to “fine-tune” the spreader. Once you have calibrated your rotary spreader for the product chosen, open the operating lever and insert the calibration gauges until you determine which step fits tightly into one of the open holes in the hopper bottom. Record that step number for future reference when using that product. You may choose to set other rotary spreaders for application of the same product by adjusting the shut off plate to that calibration gauge step. This will provide consistent settings for all of your spreaders. To recalibrate your rotary spreader after a period of use, adjust the rate control arm to the “24” position. Open the operating lever and insert the even-numbered Calibration Gauge into one of the open holes in the hopper bottom. Close the operating lever and let the shut off plate on the underside of the hopper make contact with the number 10 step on the Calibration Gauge. Move the rate control arm back toward the “6” position until the bottom of the arm makes contact with the shut off plate. If your spreader is prop-

erly adjusted, the top of the rate control arm should be at setting “10”. To correct variances, remove the rate control arm, place the bottom of the arm (up to the bolt hole) in a vise, and bend either to the right or the left.



e. Spreader tips:

1. Always close the operating lever before filling the hopper.
2. Be sure the screen is in place to prevent lumps or paper scraps from plugging the holes in the hopper bottom.
3. Always start traveling forward before opening the operating lever; close the operating lever before forward motion is stopped.
4. Empty the spreader after each use. Wash the spreader thoroughly and allow it to dry. Keep the impeller clean.

	4 mph	5 mph	6 mph	7 mph	8 mph		
20 psi, five Tee-Jet TF-VS2 tips in CP25600 - NYR Quick Tee-Jet caps							
Output	1.17 gal/min.....						
gal/acre	17.4	13.8	11.6	10.1	8.7		
gal/1000 ft²	2.0	1.6	1.4	1.2	1.0		
25 psi, five Tee-Jet TF-VS2 tips in CP25600 - NYR Quick Tee-Jet caps							
Output	1.46 gal/min.....						
gal/acre	21.7	17.3	14.5	12.6	10.9		
gal/1000 ft²	2.5	2.0	1.7	1.5	1.3		
30 psi, five Tee-Jet TF-VS2 tips in CP25600 - NYR Quick Tee-Jet caps							
Output	1.75 gal/min.....						
gal/acre	26.0	20.8	17.4	15.2	13.0		
gal/1000 ft²	3.0	2.4	2.0	1.8	1.5		
Note:	The above values are based on manufacturer's information, and actual values may vary based on chemical additives, temperature, as well as system cleanliness and wear.						

MAINTENANCE AND SERVICE



WARNING:

Disconnect the spark plug wires or remove the key from the ignition to prevent the engine from accidentally starting before performing any maintenance on this mower.

A. Hydraulic Oil



WARNING:

Never overfill the hydraulic units. Damage can occur if the oil level is not within the proper operating range.

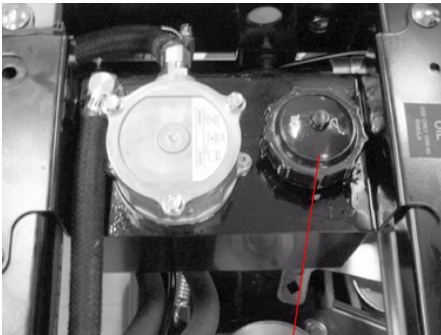


Figure. 5

Hydraulic Tank

Note: when adding hydraulic oil, do so in small quantities and recheck the oil level before adding more. It is important that you do not overfill the reservoir.

1. Adding Hydraulic Oil (use SAE15W 40)

- Place the Machine on a level surface and engage the parking brake.
- Stop the engine and remove the key from the ignition switch.**
- Clean the area around the Hydraulic Oil fill neck.
- Remove the hydraulic fill cap and check the level. The correct level is up to the lowest hole of the oil tank fill neck.
- Pour hydraulic oil into the reservoir up to the lowest hole in the oil tank fill neck, if necessary.

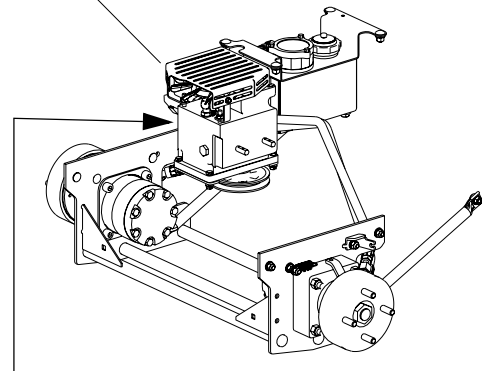
2. Draining Hydraulic Oil

Used hydraulic oil must be disposed of properly. Do not pour it down a drain or sewer, or dump it on open land, this creates an environmental hazard. Please be aware of the environment when disposing of used oil.

- Place the Machine on a level surface and engage the parking brake.
- Stop the engine and remove the key from the ignition switch.

- Raise the seat forward to expose the hydraulic oil fill point.
- Clean the area around the hydraulic fill oil cap.
- Remove hydraulic fill oil cap.
- Place a suitable container (at least 2 gallon) under the hydraulic reservoir and filter.
- Remove the hydraulic filter to allow hydraulic oil to drain. Remove the drain plug from the bottom of the hydraulic oil tank to drain. Replace the plug.
- Place a small pan under the pump motor frame. Remove fill oil cap from hydraulic reservoir for faster drainage. Remove nut caps and drain oil from both left and right pumps. Replace and retighten nuts.

Hydraulic pumps



Unfasten hose and drain from this side of both pumps.

Figure. 6

- Remove the three screws from the top of the oil filter and replace the oil filter element. Coat the sealing surface with Shell Rimula 15W40 oil or equivalent. Install the three screws back into the oil filter.
- Add proper amount of hydraulic oil to reservoir.
- Run and purge pumps and motors. Check oil level.
- Add proper amount of hydraulic oil to reservoir and repeat step k.

B. Electrical Circuit



Danger:

Read General Safety Precautions Nos. 9 and 10.

- Battery:** The battery is located beneath the operator's seat. Remove the fillcaps and check the level of the liquid electrolyte in the battery every 50 operating hours. If the level in any of the six cells has dropped below the bottom of the split ring inside the fill hole, refill the cell with distilled water. To keep the outside of the battery clean, brush on a strong solution of bicarbonate of soda and water and rinse with clean water.

Keep the contacts and cable ends clean with a wire brush and make sure the connections are tight. Coat the terminals with petroleum jelly to prevent corrosion.

2. **Battery Storage:** When storing the Machine for long periods of time the following guidelines should be taken.
 - a. Disconnect the battery cables from the terminals and remove the battery. You will have to remove the control panel to access the battery strap. Replace control panel.
 - b. Clean the battery before storing. A dirty battery will lose its charge over time.
 - c. Store the battery with a full charge. A discharged battery will freeze (refer to the table below).

Specific Gravity	Freezing Temp (°F)
1.265	-71
1.250	-62
1.200	-16
1.150	5
1.100	16

- d. Recharge battery when ever the specific gravity value is less than 1.225

3. Battery Removal



Warning:

When removing the cables from the battery follow these steps to avoid a short between the wrench and the frame.

- a. Remove the Negative (black) cable.
- b. Remove the Positive (red) cable.
- c. Release the hold down straps.
- d. Remove the battery without tipping.

4. Installing the Battery

Note: The battery is delivered from the factory fully charged and filled with electrolyte.

- a. Attach the Positive (red) cable.
- b. Attach the Negative (black) cable.
- c. Attach the rubber battery strap.

5. Jump Starting



Warning:

Failure to use this starting procedure can cause sparking, and the gases in the battery to explode.

- a. Attach the end of the red jumper cable to the Positive terminal (+) of the charged battery.

- b. Attach the other end of the red jumper cable to the Positive terminal (+) of the low charge battery.
- c. Attach the end of the black jumper cable to the Negative terminal of the charged battery.
- d. Attach the other end of the black jumper cable to the frame of the unit with the low charge battery.

6. **Fuses:** There is one fuse located in the wiring between the ignition and start switch and other electrical components. This is a standard plug-in type automotive fuse rated at 20 amp.

7. **Safety Switches:** There are five safety switches in the electrical circuit which control the engine. They are (1) the main power switch, (2) the parking brake switch, (3) the left and (4) the right steering lever switches and (5) the seat switch. They operate so that in order to start the engine, the main power switch must be off, the parking brake must be engaged, and both steering levers must be opened-out to the side in the neutral position. Once the engine is started, the seat must be occupied and the parking brake must be released before either of the steering levers is folded up to the operating position or the engine's electronic ignition will be grounded out and the engine will stop. Also, the seat must be occupied before the main power switch can cause the spreader and sprayer to operate.

8. **Safety Switch Operation Checks:** The following operational checks should be made daily.

- a. **Main Power Switch:** Sit in the operator's seat. With both steering levers opened-out in the neutral position and the parking brake engaged, turn the main power switch "on" and try to start the engine. The engine should not start. If it does, the main power switch must be replaced. If the engine does not start, turn the main power switch "off" and start the engine. Now turn the main power switch "on" and the power should be available for the spreader and sprayer. If the power is not available, the main power switch must be replaced, the seat switch must be replaced or the spreader & sprayer switch must be replaced.
- b. **Parking Brake Switch:** Sit in the operator's seat. With both steering levers opened-out in the neutral position and the main power switch "off", release the parking brake and try to start the engine. The engine should not start. If it does, the parking brake switch must be repositioned or perhaps replaced. If the engine does not start, engage the parking brake and start the engine. Swing one steering lever up to the operating position and the engine should stop. If the engine does not

stop, the parking brake switch must be repositioned or replaced.

c. **Left and Right Steering Lever Switches:**

Sit in the operator's seat. With both steering levers opened-out in the neutral position, the parking brake engaged and the main power switch "off", swing the left steering lever up to the operating position and try to start the engine. The engine should not start. If it does, the left steering lever switch must be repositioned or perhaps replaced. Open the left steering lever to the neutral position and swing the right steering lever up to the operating position and try to start the engine. The engine should not start. If it does, the right steering lever switch must be repositioned or perhaps replaced. If the engine does not start, Open the right steering lever to the neutral position and start the engine. Swing the left steering lever up to the operating position and the engine should stop. If the engine does not stop, the left steering lever switch must be repositioned or replaced. Open the left steering lever out to the neutral position and start the engine. Swing the right steering lever up to the operating position and the engine should stop. If the engine does not stop, the right steering lever switch must be repositioned or replaced.

- d. **Seat Switch:** With both steering levers opened-out to the neutral position, the parking brake engaged and the main power switch in the "off" position, start the engine. Now release the parking brake, hold down on the back of the operator's seat against spring pressure, and swing one of the steering levers up to the operating position. Release the operator's seat and the engine should stop. If the engine does not stop, the seat switch must be replaced. With both steering levers folded out in the neutral position, the parking brake engaged and the main power switch in the "off" position, sit in the operator's seat and start the engine. Turn the main power switch to the "on" position and the power should be available for the spreader and sprayer. Raise up slightly off the operator's seat and power should be discontinued at the spreader and sprayer. If power is not discontinued when you dismount from the operator's seat, the seat switch must be replaced.

C.Tires

The two front wheels are caster wheels that are free to swivel to accommodate the direction of the Machine.

The two rear wheels are used to propel the Machine in

the direction of input from the drive handles. Inflation pressure of the rear tires is important for stability while the Machine is in operation. If the tire diameter is not equal between the two tires, the Machine will pull to one side.

1. **Inflation Pressure:**

- a. Traction Tires—20 psi max; 8-10 psi recommended
- b. Front Caster Wheel—28 psi max; 20-25 psi recommended

Use the Following guidelines for maintaining the tires:

- a. Balance inflation pressure between the rear tires to help maintain straight travel (see tire side wall for proper inflation pressure).
 - b. Keep the valve caps tightened to prevent air pressure loss.
2. **Leaking Tires:** When a flat tire occurs, repair or replace immediately. The normal procedure is to remove the wheel and replace it with a spare. Take the leaking tire to a maintenance area and repair. If a tire is getting soft, park the mower on the nearest level, paved area. If the leaking tire is on a traction wheel, put blocks on each side of the opposite traction wheel and jack up the tire that leaks about an inch off the ground. Loosen and remove the lug nuts and remove the wheel. Mount a spare wheel and tire, replace the lug nuts, and using a torque wrench, tighten them to 60 ± 10 ft-lbs.

If the leaking tire is on a front caster wheel, block both traction wheels and raise the caster wheel so that the tire is an inch off the ground. Loosen and remove the locknut from the axle assembly and pull the axle assembly from the caster yoke. The wheel and two spacer sleeves will drop free. Slip the axle assembly through one side of the caster yoke, through a spacer sleeve, a spare wheel, the other spacer sleeve and finally through the other side of the caster yoke. Then tighten the locknut on the end of the axle assembly.

Lower the machine off the jack and continue to use. The wheel with the leaking tire should be taken to the maintenance area, the tire inflated to 20 psi and the wheel placed in a large bucket of water. Carefully inspect the tire, rim and valve for escaping air bubbles which indicate a leak. Mark each leak with a yellow marking crayon and then deflate the tire to 8 psi and repeat the inspection. If the leaks you find are pin hole size to 1/16" diameter, the tire can be repaired using an aerosol can of tire inflator and latex sealer available from any auto supply store. Follow the directions on the can. If the leaks are larger than 1/16" diameter, the tire can be repaired with rubber plugs also available

in a kit from any auto supply store. If the tire bead is damaged, a tube will have to be installed in the tire or the tire will have to be replaced.

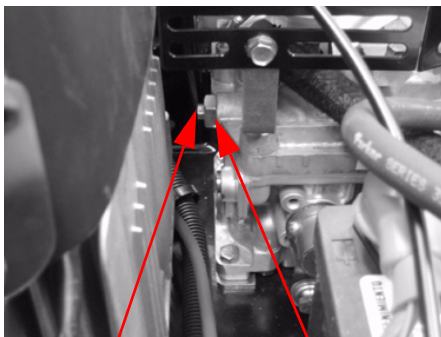
3. **Creeping:** Creeping is the slight forward or backward movement of the machine when the throttle is on and the lapbars are in the opened-out position. If your machine creeps do the following.
 - a. Jack up rear of unit.
 - b. Place Lapbars in neutral opened-out position.
 - c. Locate jam nuts. (Reference control assembly in parts list).
 - d. Loosen jam nuts on both ends of rod connectors. See Control Assembly in the Illustrated Parts Book (ONLY if machine creeps.)
 - e. Start unit and push throttle all the way on.
 - f. If unit creeps forward rotate rear rod connectors counter-clockwise. And if unit creeps in reverse, rotate clockwise.

Adjust the appropriate rod connector. The left rod for the left side of the machine and the right rod for the right side of machine. Afterward, retighten jam nuts.

D. Brakes

While the machine is in motion, all braking is performed dynamically through the hydraulic pumps and traction motors, controlled by the two steering levers. When the machine is parked with the engine shut off, the hydraulic system locks the traction wheels.

Note: To move the mower forward or in reverse by pushing, you must release the dynamic braking. Locate the valves on the pump. Using a 15mm wrench, loosen jam nut, then loosen the inner bolt with an 8mm wrench (1/2 turn). There are two by-pass valves, one for each pump. After pushing the mower to the desired location, return both valves to the operating position by turning the bolt clockwise, but do not overtighten (See photo below).



Inner bolt, 8mm

Jam Nut, 15mm

View looking from Trim Side of Mower

When the machine is parked with the engine running and the steering levers opened out in the neutral position, the parking brakes should be applied. The parking brakes are drum-type brakes mounted on each traction wheel. They are both engaged by the same operating

lever.

1. **Adjustments:** The parking brake handle is an overcenter lever that should engage with moderate force.

Note: To increase parking brake capacity tighten the brake rods connected to the brake arms equally. Tighten rods one full turn and check parking capacity. Repeat Step.

To adjust either brake individually, disconnect the brake rod from the brake arm by removing the cotter pin from the clevis pin and pulling the clevis pin from the brake clevis. Loosen the hex nut and turn the brake clevis in a clockwise direction one full turn looking down the brake rod. This will tighten the brake about .040 inch. Tighten the hex nut and reassemble the brake clevis to the brake shaft assembly. Normally, both brakes should be adjusted and equal amount.

2. **Repair:** The machine is equipped with internal drum brakes and will not normally require maintenance. If they are not working properly, please contact your service center.

E. Hydraulic System

1. **Hoses:** Check the hoses from the hydraulic oil tank to the oil filter to the hydraulic lines daily for leaks or abrasion and replace any damaged hoses. Make certain there are no kinks or twists in any hose.
2. **Hydraulic Oil Tank and Filter:**

Note: Change the hydraulic oil and the oil filter after the first 50 hours of operation and every 500 hours thereafter.

To drain the hydraulic oil tank, place a 2 gallon drain pan under the drain plug on the bottom of the hydraulic oil tank. Remove the drain plug, drain the tank, then replace the plug. Place the drain pan under the filter and remove the filter by unscrewing in a counterclockwise direction. The filter will be full of oil, so empty it into the drain pan. You don't have to drain the rest of the hydraulic system. Fill the replacement filter with a good grade of 15W-40 oil and lubricate the sealing surface. Screw the filter onto the filter base until it seats and then another one-half turn to seal.

Note: Always wipe off the hydraulic tank fill cap and the area around it before removing the cap to prevent dirt from contaminating the oil.

Remove the fill cap and fill the tank with the same 15W-40 oil selected for the filter until the oil level is up to the level of the second hole in the fill tube. Leave this air space for expansion. Start the engine and let it run at Lo-idle for about five minutes. Check the filter for leaks. Idling the engine and the pumps in this way will purge any air from the system. Shut off the engine and recheck

the oil level in the tank. Top-off if necessary until the oil level is up to the second hole in the fill tube.

Note: After unit is up to operating temperature, turn off engine and re-check hydraulic oil. If oil appears foamy or contains excessive air bubbles, DO NOT OPERATE UNIT. Contact service technician.

3. **Hydrostatic Pumps and Motors:** The pumps are the hardest-working components in the hydraulic system. They are in operation all the time the engine is running. Because of extremely close tolerances, wear is an important factor in their life. **Contaminants** in the hydraulic oil and **cavitation** does the greatest harm to the pumps. Cavitation is a blockage in the supply lines that produces a partial vacuum causing violent bubbling in the hydraulic oil in the pump.

Check the two suction hoses (the hoses connected to the filter) daily before starting the engine. Look for a flattened condition or any leaks and repair or replace as necessary. A flattened or leaking suction hose will permit cavitation to develop which can destroy the pumps in a short time.

Contaminants or foreign matter in the oil will also damage the pumps. To prevent this, use a filter that captures particles as small as 30 microns or 30 millionths of a meter in diameter. You can help in the battle against dirt by being very careful when you remove or repair a component in the hydraulic system. Thoroughly clean off any component before you work on it. Plug the ends of any hose or line you remove with a rubber or plastic plug. Use plastic caps to seal off the ends of hydraulic fittings. Place any component you remove in a clean plastic bag so it can't pick up dust or dirt. Clean your hands frequently when working on the hydraulic components.

Note: The pumps are not owner-repairable. If a pump fails, contact your Service Center. Do not disassemble the pump.

4. **Steering Lever Adjustments:** Place the machine on level ground with the engine running, parking brake off and steering levers opened out to the neutral position. If the Machine begins to creep, adjust the Steering Levers.

If the machine creeps, first determine whether it creeps to the right or left side and which direction the machine moves — to the front or the rear. To make the adjustment, place the steering levers in the opened-out neutral position and set the parking brake, shutoff the engine, take the key from the ignition switch and pivot the seat forward. If the machine creeps to the right, you will adjust the linkage on the left side of the machine and vice-versa. Remove the cap screw and lock

washer that secure the linkage control arm rod end bearing to the control lever pivot. Loosen the jam nut which prevents the rod end bearing from turning. If the mower creeps forward, thread the rod end bearing one-half turn clockwise into the linkage control arm. If the machine creeps backward, thread the rod end bearing one half turn counterclockwise out of the linkage control arm. Then tighten the jam nut and reconnect the rod end bearing to the control lever pivot by replacing the cap screw and lock washer.

After adjusting the steering linkage, swing the seat back to its normal position and place the steering lever on the side you adjusted up to the operating position. If you feel a slight push forward or a slight pull backward from the neutral position you must adjust the lever return assembly. To do this, swing the steering lever back out to the neutral position, pivot the seat forward and loosen the jam nut on the lever return rod where it is threaded into the hex-shaped end of the lever return bolt. If the steering lever was pushed forward, turn the hex-shaped lever return bolt clockwise one-half turn off of the lever return rod. If the steering lever was pulled back, turn the hex shaped lever return bolt counterclockwise one-half turn onto the lever return rod. Then tighten the jam nut, pivot the seat back into the operating position and start the machine to check that your adjustments were made correctly.

F. Storage

1. **General:** If your machine will not be in service for a few months, it should be stored in a dry location that is not subject to drastic changes in temperature. Before storing, the following maintenance procedures should be performed.
 - a. Clean the machine. The entire unit should be washed and cleaned.
 - b. Protect the metal surfaces. Repair scratches with the appropriate touch-up spray paint. Brush a rust preventive oil on any unpainted surfaces. (Be careful not to get any oil on the drive belts.)
 - c. Lubricate the machine.
 - d. Drain the engine oil. The engine should be warm so that all the oil drains. Replace the engine oil filter and refill the crankcase with fresh oil.
 - e. Gasoline Engine: Drain all the fuel. Close the fuel tank shutoff valve. Disconnect the fuel line from the carburetor and put the end into an approved fuel container. Open the fuel tank shutoff valve and drain the fuel tank and line into the approved container. Replace the fuel line on the carburetor. Start the engine and allow it to run out of fuel. This will prevent gum

and varnish deposits from forming. Replace the fuel filter.

- f. Gasoline Engine Only: Remove the spark plugs and pour approximately one ounce of oil into each cylinder. Crank the engine one or two turns to spread the oil evenly on the cylinder walls. Replace the spark plugs.
- g. Clean the battery and make sure it is fully charged.
- h. Inspect the hydraulic hoses, lines and fittings. Replace as necessary.
- i. Jack the machine up and store it on blocks to take the weight off of the tires.

2. To Put the Machine Back in Service:

- a. Check the battery. Charge if necessary.
- b. Gasoline Engine Only: Remove the spark plugs and wipe them off. Using the starter, crank the engine to pump the excess oil out of the spark plug holes. Replace the spark plugs and the ignition leads. Refill the fuel tank with fresh gasoline.
- c. Check the level of the oil in the crankcase and the hydraulic tank.
- d. Lower the machine off the block and check the tire pressure.
- e. Push the machine outdoors and start the engine. Let the engine idle until it has warmed up completely (4 to 5 minutes).

G. Pump

Diaphragm pumps require very little maintenance. The procedures that are required are listed in the pump Installation/Operation Instructions furnished with the sprayer.

H. Tank

The sprayer tank requires no scheduled maintenance. The inside of the tank should be flushed out after each use as described in the section on Cleaning the Sprayer. The outside of the tank should be hosed off after use and scrubbed occasionally with soapy water to remove ground-in dirt. If the tank is ever accidentally punctured, it can be repaired with a Poly Patch Kit.

I. In-Line Strainer

The in-line strainer should be cleaned each day after the sprayer has been flushed. Place a flat pan under the strainer bowl to catch the liquid and unscrew the bowl. Note: There is a washer-like seal between the top lip of the bowl and the strainer body. This seal will sometimes come off on top of the bowl or will drop out of the strainer body when the bowl is unscrewed. **DO NOT LOSE THIS SEAL!** It must be installed or you won't be able to operate your sprayer.

J. Hose

If the hose on your sprayer is treated carefully, it will give long and trouble free service. When you have finished spraying a lawn, carry the application device and drag

the hose back to the sprayer. This protects the application device from being damaged by being dragged through the turf and permits you to insure, as you walk back to the sprayer, that the hose is not snagged on something or wrapped around a tree. It also eases the load on your reel because the hose will be rewound from only half the distance. The hose should be flushed out daily as described in the section on Cleaning the Sprayer. Weekly, you should clean off the outside cover of the hose by rewinding it onto the reel while gripping it lightly with a rag dipped in soapy water.

K. Storage and Winterizing

If the sprayer will not be used for 30 days or more it should be thoroughly flushed out and cleaned as described in the section on Cleaning the Sprayer. The engine should be drained of fuel to prevent gum deposits from forming on essential carburetor parts. First, the fuel tank should be drained and then the engine should be started and allowed to run until it stops from lack of fuel. While the engine is still warm, the oil should be drained from the crankcase and then the crankcase refilled with fresh oil. The spark plug should be removed, a teaspoon of oil poured into the cylinder, the engine cranked slowly to distribute the oil and the spark plug replaced. The blower housing should be removed and any dirt should be cleaned from the engine's cooling fins. You should change the oil in the pump every 200 hours and at the end of the spraying season. You should change the pump's diaphragms at the end of each spraying season. The sprayer should be stored in a clean, dry area which should be heated if freezing weather will occur during the time of storage. If storing in a heated room is not possible, winterize the sprayer. Pour a gallon of antifreeze and a gallon of clean water into the sprayer. Start the engine and agitate the mixture. Then pump the antifreeze mixture through the plumbing and discharge it from the application device back into two one gallon containers. Store the 50/50 antifreeze mixture for future use. If a boom is your application device, spray a small amount of the antifreeze mixture from the boom and then shut it off and drain the rest of the mixture from the tank using the drain on the front of the sprayer.

L. Cleaning the Spreader

The spreader should be emptied and thoroughly cleaned after each use. **Cover the motor** and if possible clean the spreader hopper and working parts with a high pressure water spray. **Do not spray water directly on to the motor.** The motor should be cleaned by blowing it off with an air hose **(the motor and gearbox are not waterproof.)** Oil the latch-arm pivots after each use.

MAINTENANCE SCHEDULE

A. Daily Checks

1. Before starting engine:

- a. Check the fuel level.**
- b. Check the engine oil level.**
- c. Check the hydraulic oil level.
- d. Check the hydraulic hoses for leaks, abrasion, kinks, twists, or a flattened condition.
- e. Check the tires and tire pressure.
Drive Tires: 8-10 psi.
Front Caster Wheels: 20-25 psi.
- f. Check the mower drive belt.

2. When ready to start the engine:

- a. Check the five safety switches for proper operation.

3. After use:

- a. Clean the machine.
- b. Clean the engine air screen.
- c. Oil the wear points. Follow the Oiling Chart.
- d. After the first five hours, Change the engine oil and engine oil filter.

B. Every 25 Hour Checks

1. Service the engine foam element air pre-cleaner.*

C. Weekly or Every 50 Hour Checks

1. Change the engine oil. (Every 25 hours under heavy duty operation.)
2. Clean or replace the engine's paper air cleaner element.*
3. Check the battery's electrolyte level.
4. Clean the engine cooling fins and external surfaces.*
5. After the first 50 hours, change the hydraulic oil and the hydraulic oil filter. Change them every 500 hours thereafter.
6. Oil wear points. **Follow the Oiling Chart.**

7. Lubricate all grease fittings. **Follow the Lubrication Chart.**

D. Every 100 Hour Checks

1. Change the engine oil filter. (Every 50 hours under heavy duty operation.)
2. Check the engine spark plugs.

E. Yearly Checks

Check the oil in the hydraulic reservoir.

*** Perform maintenance more frequently under dusty conditions.**

****Reference Engine Owner's Manual**

OIL CHART Apply a few drops of SAE 15W-40 engine oil or use a spray lubricant. Apply the oil to both sides of pivot points. Wipe off any excess. Start engine and operate mower briefly to insure that oil spreads evenly.	
<i>Number of Oil Points</i>	<i>Description</i>
WEEKLY	
1	Seat Hinge
2	Steering Lever Linkage Rod End Bearings
2	Lever Return Assembly Rod End Bearings
2	Pump Control Lever Pivots
1	Brake Lever Pivot Clevis Pin
1	Brake Lever Control Rod Pivot
1	Brake Control Rod Swivel Joint
4	Brake Rod Clevis Pins
2	Brake Shaft Assembly Pivots

LUBRICATION CHART Use a grease-gun filled with NO. 2 Multipurpose Lithium Base Grease	
<i>No. of Grease Fittings</i>	<i>Description</i>
WEEKLY	
2	Front Caster Wheels
2	Front Caster Wheel Spindles
1	Axle Pivot
2	Steering Lever Pivots
1	Hydro Take-up Idler Pivot
1	Park Brake Pivot

Engine oil: Rimula 15W40 recommended or 10W40 engine oil rated SJ or higher.

Hydrostatic Fluid: Rimula 15W40 recommended.

Spindle Lubricant: Use only Shell Alvania RL 2 grease. This grease is an amber-colored grease designed for high speed bearing applications. It has a base oil viscosity that reduces running losses, has been formulated for low noise, has excellent corrosion protection, and has excellent bearing lubrication.

General Purpose Lubrication: Use any NLGI grade 2 multi-purpose grease. Shell Albida EP2 is recommended. Shell Albida EP 2 is a red-colored multi-purpose grease designed for heavy-duty bearing applications. It has high base oil viscosity for mechanical stability, has been formulated for high load, low-speed applications, and has excellent lubrication and corrosion protection.

Performance Adjustments

A. High Speed Tracking Adjustment

If machine tracks to one side with both lap bars in fully forward position:

1. Check air pressure in all four tires:
 - a. Pressure should be within specified ranges and balanced side-to-side.
 - b. Rear tires 8-10 psi. recommended (20 psi MAX.)
 - c. Front tires 20-25 psi. recommended (28 psi MAX.)
2. Check hydraulic fluid level (Ref. Engine owner's manual)
3. Verify that the machine does not creep when the engine is running, the lap bars are in the neutral position and the parking brake is released. (Refer to section C-3 on page 24 of this manual if this condition exists).
4. Recheck the tracking after any adjustments based on the above.
5. If uneven tracking persists, adjust as follows. (see Fig. 7)
 - a. Unit tracks to the RIGHT, adjust Left lap bar stop bolt to make it longer.
 - b. Unit tracks to the LEFT, adjust Right lap bar stop bolt to make it longer.
6. Re-check the tracking and make any fine tuning adjustments to the lap bar stop bolts as required.

Note: If stop bolt is adjusted too far, tracking problem will change sides. Make the fine tuning adjustments by shortening the same bolt.



Lap Bar Stop Bolt

Figure. 7

B. Engine RPM Check and Adjustment

Description	High RPM Spec.	Low RPM Spec.
17 Hp Kawasaki	3600 +/-50	1550 +/-100
NOTE: RPM Specs. are for free running engines under no load.		

1. Verify that the lap bars are in the neutral position, the parking brake is on, and the PTO drive is disengaged.
2. Start the machine and let it run at approximately half throttle for 3-5 minutes to bring the engine up to operating temperature.
3. Locate the Hour Meter/Tachometer/ Service Minder display on the right hand operator control panel. (see Fig.1 on page 11 of the manual) This display defaults to Tachometer mode when engine is running.
4. Move the throttle lever to the high speed position and note the RPM reading on the display.
5. Move the throttle lever back to the low speed position and again note the displayed RPM's.
6. Compare these noted RPM readings to the specifications in Table 1, for the engine that is on your machine.
7. If the readings do not correspond to the ranges in the table, refer to the engine owner's manual for the proper adjustment procedures.
8. If adjustments per the engine operator's manual do not result in proper RPM readings, contact your service technician.
9. Note: The throttle cable sheath may shrink or slip over time, changing the relationship between the throttle lever on the left hand operator control panel and the throttle arm on the engine. To readjust the throttle cable:
 - a. Make sure the engine is off, place lap bars in the neutral position, set the parking brake, and disconnect and ground both of the spark plug wires.
 - b. Locate and loosen the cable clamp on the engine throttle plate.
 - c. Place the operator's throttle lever to the high speed position and then slide the cable through the clamp until the throttle arm is in the full throttle position. (Ref. Engine owner's manual)
 - d. Tighten the cable clamp.
 - e. Move the operator's throttle lever between high and low speed and verify that the engine throttle arm also moves through it's full range of motion.
 - f. Repeat as required to obtain proper throttle adjustment.
 - g. Verify proper throttle adjustment by checking RPM readings as outlined above.

C. Lap Bar Adjustment

1. Proper lap bar and seat adjustment will result in the following:
 - a. In the neutral position with hands on the lap bars,
 1. Operator's upper arms should be relaxed and approximately vertical.
 2. Operator's forearms should be approximately vertical.
 - b. In the full forward position,
 1. Operator's back should stay in contact with the seat back.
 2. Lap bars should not contact operator's legs.
 - c. In the full reverse position,
 1. Lap bars should not contact the operator's legs or torso.
2. Set the seat to the preferred operating position.
 - a. Adjustment lever is located under the front edge of the seat.
 - b. The seat has five inches of front-to-rear adjustment available.
3. Check factory settings of lap bars for the conditions listed above.

Note: If lap bar adjustments are required, height adjustments should be made prior to angular adjustments.

4. To adjust the height of the lap bars,
 - a. Remove the nuts from the lap bar mounting bolts (see Fig. 11).
 - b. Remove the bolts and lap bar and reposition to the second set of holes in the mounting block.
 - c. Replace the bolts and nuts and tighten to 28-34 ft-lbs.
 1. If angular adjustments are also required, nuts can be tightened until snug at this point.
 - d. The same adjustments should be made to both sides of the mower.
5. To adjust the front-to-rear angle of the lap bars,
 - a. Loosen the nuts on the lap bar mounting bolts, leaving the bottom one fairly snug.
 - b. The top hole is slotted, allowing the lap bar to pivot on the bottom bolt.
 - c. Move lap bar to the desired angle and tighten the nuts to 28-34 ft-lbs.

Note: In the neutral position, the handles of the lap bars should be aligned with approximately a one inch gap between the tips. Adjust the gap by adding shim washers to the top mounting bolt between the lap bar and the mounting block.

- d. Check the results of any adjustments to the conditions described in section a,

above. Repeat any adjustment procedures as required until all conditions are met.

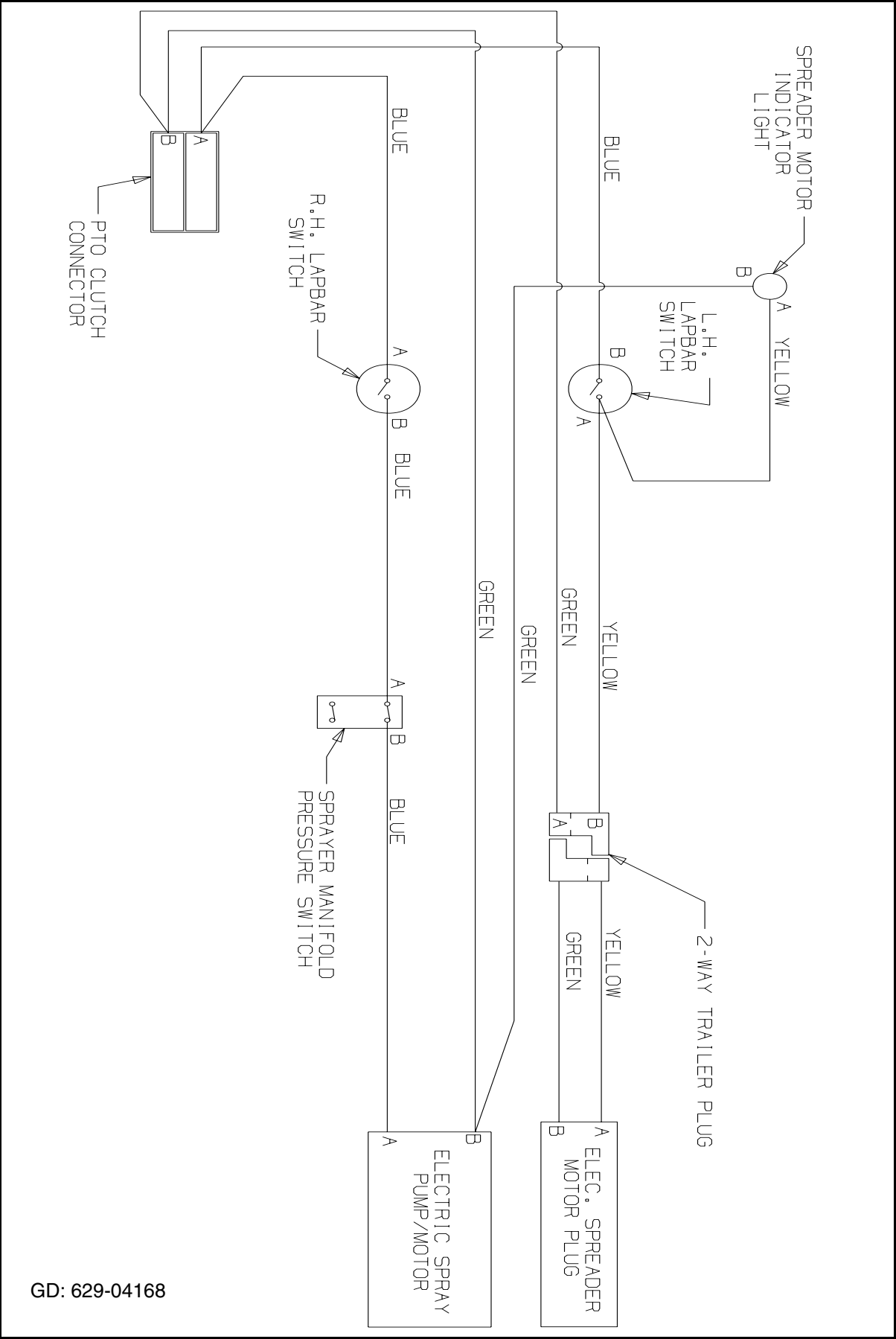


Figure. 8 Lap Bar Mounting Bolt and Nuts

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Pump does not draw water.	The in-line strainer is clogged. The suction line is plugged or collapsed. Gate valve in suction line is closed. One or more valves are seating improperly.	Clean the in-line strainer. Examine the suction line. Open gate valve. Examine the valve seatings and clean them or replace if scored or worn.
Oil comes out of the discharge port.	One or more diaphragms are split.	Drain the pump of oil. Dismantle the heads and replace the diaphragms. Refill the pump with fresh oil.
The pressure gauge fluctuates excessively	The pump is sucking in air somewhere in the suction line. Air has not been entirely evacuated from the pump.	Examine the suction line and make certain all parts are firmly secured. Run the pump with the outlet hose open to evacuate air from the pump.
The liquid flow is irregular.	Incorrect charge in the pulsation damper. One or more valves are seating improperly.	Check the charge in the pulsation damper. (10% of working pressure.) Examine the valve seatings and clean them or replace them if scored or worn.
The output drops and the pump is noisy.	The oil level is too low.	Add oil to the correct level for the pump.
No agitation.	Fiberglass sprayer - The agitator belt is loose. Poly sprayer -The ball valve to the agitator is shut off or the line is plugged.	Tighten the agitator belt. Open the ball valve to the agitator. Check the line to the agitator.

WIRING DIAGRAM



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CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board and MTD Consumer Group Inc are pleased to explain the evaporative emission control system warranty on your 2008 lawn mower. In California, new lawn mowers must be designed, built and equipped to meet the State's stringent anti-smog standards. MTD Consumer Group Inc must warrant the EECS on your lawn mower for the period of time listed below provided there has been no abuse, neglect or improper maintenance of your lawn mower.

Your EECS may include parts such as the carburetor, fuel-injection system, the ignition system, catalytic converter, fuel tanks, fuel lines, fuel caps, valves, canisters, filters, vapor hoses, clamps, connectors, and other associated emission-related components.

Where a warrantable condition exists, MTD Consumer Group Inc will repair your lawn mower at no cost to you including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE:

This evaporative emission control system is warranted for two years. If any evaporative emission-related part on your equipment is defective, the part will be repaired or replaced by MTD Consumer Group Inc.

OWNER'S WARRANTY RESPONSIBILITIES:

As the lawn mower owner, you are responsible for performance of the required maintenance listed in your owner's manual. MTD Consumer Group Inc recommends that you retain all receipts covering maintenance on your lawn mower, but MTD Consumer Group Inc cannot deny warranty solely for the lack of receipts.

As the lawn mower owner, you should however be aware that MTD Consumer Group Inc may deny you warranty coverage if your lawn mower or a part has failed due to abuse, neglect, or improper maintenance or unapproved modifications.

You are responsible for presenting your lawn mower to MTD Consumer Group Inc's distribution center or service center as soon as the problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact the MTD Consumer Group Inc Service Department at 1-800-800-7310.

GENERAL EMISSIONS WARRANTY COVERAGE:

MTD Consumer Group Inc warrants to the ultimate purchaser and each subsequent purchaser that the lawn mower is: Designed, built and equipped so as to conform with all applicable regulations; and free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to that part as described in MTD Consumer Group Inc's application for certification.

The warranty period begins on the date the lawn mower is delivered to an ultimate purchaser or first placed into service. The warranty period is two years.

Subject to certain conditions and exclusions as stated below, the warranty on emission-related parts is as follows:

1. Any warranted part that is not scheduled for replacement as required maintenance in the written instructions supplied, is warranted for the warranty period stated above. If the part fails during the period of warranty coverage, the part will be repaired or replaced by MTD Consumer Group Inc according to subsection (4) below. Any such part repaired or replaced under warranty will be warranted for the remainder of the period.
2. Any warranted part that is scheduled only for regular inspection in the written instructions supplied is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
3. Any warranted part that is scheduled for replacement as required maintenance in the written instructions supplied is warranted for the period of time before the first scheduled replacement date for that part. If the part fails before the first scheduled replacement, the part will be repaired or replaced by MTD Consumer Group Inc according to subsection (4) below. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
4. Repair or replacement of any warranted part under the warranty provisions herein must be performed at a warranty station at no charge to the owner.
5. Notwithstanding the provisions herein, warranty services or repairs will be provided at all of our distribution centers that are franchised to service the subject engines or equipment.
6. The lawn mower owner will not be charged for diagnostic labor that is directly associated with diagnosis of a defective, emission-related warranted part, provided that such diagnostic work is performed at a warranty station.
7. MTD Consumer Group Inc is liable for damages to other engine or equipment components proximately caused by a failure under warranty of any warranted part.
8. Throughout the lawn mower warranty period stated above, MTD Consumer Group Inc will maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
9. Any replacement part may be used in the performance of any warranty maintenance or repairs and must be provided without charge to the owner. Such use will not reduce the warranty obligations of MTD Consumer Group Inc.
10. Add-on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claims. MTD Consumer Group Inc will not be liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

WARRANTED PARTS:

The repair or replacement of any warranted part otherwise eligible for warranty coverage may be excluded from such warranty coverage if MTD Consumer Group Inc demonstrates that the lawn mower has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for repair or replacement of the part. That notwithstanding, any adjustment of a component that has a factory installed, and properly operating, adjustment limiting device is still eligible for warranty coverage. The following emission warranty parts are covered:

(1) Fuel Metering System

- Cold start enrichment system (soft choke)
- Carburetor and internal parts
- Fuel pump
- Fuel tank

(2) Air Induction System

- Air cleaner
- Intake manifold

(3) Ignition System

- Spark plug(s)
- Magneto ignition system

(4) Exhaust System

- Catalytic converter
- SAI (Reed valve)

(5) Miscellaneous Items Used in Above System

- Vacuum, temperature, position, time sensitive valves and switches
- Connectors and assemblies

(6) Evaporative Control

- Fuel hose certified for ARB evaporative emissions 2008
- Fuel hose clamps
- Tethered fuel cap
- Carbon canister
- Vapor lines

MANUFACTURER'S LIMITED WARRANTY FOR CUB CADET COMMERCIAL LAWN APPLICATION EQUIPMENT



IMPORTANT: To obtain warranty coverage owner may be required present proof of purchase and applicable maintenance records to the servicing dealer. Please see the operator's manual for information on required maintenance and service intervals. In addition, Cub Cadet may deny warranty coverage if the hour meter, or any part thereof, is altered, modified, disconnected or otherwise tampered with.

The limited warranty set forth below is given by Cub Cadet LLC with respect to new merchandise used for commercial and related purposes purchased and used in the United States and/or its territories and possessions, and by MTD Products Limited with respect to new merchandise purchased and used in Canada and/or its territories and possessions (either entity respectively, "Cub Cadet").

Cub Cadet warrants this product (excluding its *No-Fault Components*, as described below) against defects in material and workmanship for a period of one (1) year from the date of original retail purchase or lease and will, at its option, repair or replace, free of charge, any part found to be defective in materials or workmanship.

No-Fault Components include only belts, tires, and seats which are warranted to be free from defects in material and workmanship for a period of thirty (30) days from the date of original purchase or lease.

HOW TO OBTAIN SERVICE: Warranty service is available, WITH PROOF OF PURCHASE AND APPLICABLE MAINTAINCE RECORDS, through your local authorized service dealer. To locate the dealer in your area;

In the U.S.A.:

Check your Yellow Pages, or contact Cub Cadet LLC at P.O. Box 361131, Cleveland, Ohio 44136-0019, or call 1-877-282- 8684, or log on to our Web site at www.cubcadetcommercial.com.

In Canada:

For all provinces excluding Quebec contact Modern Power Products d/o MTD Canada Ltd. At 60 Ottawa Street South, Kitchener, Ontario N2G 3S7 or call 1-800-567-6775 or log on to our website at www.cubcadet.ca.

In Quebec contact Les Distributions RVI Ltee. d/o MTD Canada Ltd. 2955 Jean-Baptiste Deschamps, Ville Lachine, Quebec H8T 1C5 or call 1-800-361-5770 or log on to our website at www.cubcadet.info.

This limited warranty does not provide coverage in the following cases:

- a. Routine maintenance items such as lubricants, filters, tune-ups, brake adjustments, clutch adjustments, control linkages, drive system, engines, and normal deterioration of the exterior finish due to use or exposure.
- b. Service completed by someone other than an authorized service dealer.
- c. For products sold or exported outside of the United States and/or Canada, and their respective possessions and territories, except those sold through Cub Cadet's authorized channels of export distribution.
- d. Damage or failure resulting from the use of defective or improper replacement parts and/or accessories other than genuine Cub Cadet parts.
- e. Transportation charges and service calls.
- f. Failure to operate and maintain the product in accordance with the Operator's Manual furnished with the product,
- g. Damages and failures resulting from misuse, abuse, neglect, accident, improper maintenance, alteration, vandalism, theft, fire, water, or damage because of other peril or natural disaster.

There are no implied warranties, including without limitation any implied warranty of merchantability or fitness for a particular purpose. No warranties shall apply after the applicable period of express written warranty above. No other express warranties beyond those mentioned above, given by any person or entity, including a dealer or retailer, with respect to any product, shall bind Cub Cadet. The exclusive remedy is repair or replacement of the product as set forth above. The terms of this warranty provide the sole and exclusive remedy arising from the sale and/or lease of the products covered hereby. Cub Cadet shall not be liable for any incidental or consequential loss or damage including, without limitation, expenses incurred for substitute or replacement lawn care services or for rental expenses to temporarily replace a warranted product.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights that vary in different jurisdictions.

In no event shall recovery of any kind be greater than the amount of the purchase price of the product sold. **Alteration of safety features of the product shall void this warranty.** You assume the risk and liability for loss, damage, or injury to you and your property and/or to others and their property arising out of improper use, misuse or inability to use the product. This limited warranty shall not extend to anyone other than the original purchaser/Leasee or to the person for whom it was purchased or leased as a gift.