Parts & Service

Operators

Smithco

Wayne, PA 19087 www.smithco.com

Spray Star 300T

Base Model 31-300-A

31-185-A w/ 18’ Boom

31-200-A w/ 20’ Boom

SN PB-301

Product Support: ***Hwy 55 & Poplar Ave; Cameron WI 54822***
1-800-891-9435 productsupport@smithco.com

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INTRODUCTION

Thank you for purchasing a ***Smithco*** product.

Read this manual and all other manuals pertaining to the Spray Star 300T carefully as they contain safety, operating, assembly and maintenance instructions. Failure to do so could result in personal injury or equipment damage.

Keep manuals in a safe place after operator and maintenance personnel have read them. Right and left sides are from the operator's seat, facing forward.

WARNING:

Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm. For more information visit *www.P65Warning.ca.gov*

WARNING

Failure to follow cautious operating practices can result in serious injury to the operator or other persons. The owner must understand these instructions, and must allow only trained persons who understand these instructions to operate this vehicle.

All ***Smithco*** machines have a Serial Number and Model Number. Both numbers are needed when ordering parts. Serial number tag is located on main frame in front of engine.

For product and accessory information, help finding a dealer, or to register your product please contact us at www.Smithco.com.

Information needed when ordering replacement parts:

1. Model Number of machine
2. Serial Number of machine
3. Name and Part Number of part
4. Quantity of parts

For easy access record your Serial and Model numbers here.

SMITHCO

WAYNE, PENNSYLVANIA 19087 USA
610-688-4009 Fax 610-688-6069

CE

SERIAL NO.	kW/hp	DATE OF MFG.

MODEL NO.	lb/kg Empty	lb/kg Full

SAFE PRACTICES

1. It is your responsibility to read this manual and all publications associated with this machine.
2. Never allow anyone to operate or service the machine or its optional equipment without proper training and instructions. Never allow minors to operate any equipment.
3. Learn the proper use of the machine, the location and purpose of all the controls and gauges before you operate the equipment. Working with unfamiliar equipment can lead to accidents.
4. Wear all the necessary protective clothing and personal safety devises to protect your head, eyes, ears, hands and feet. Operate the machine only in daylight or in good artificial light.
5. Inspect the area where the equipment will be used. Pick up all debris you can find before operating. Beware of overhead obstructions and underground obstacles. Stay alert for hidden hazards.
6. Never operate equipment that is not in perfect working order or without decals, guards, shields, or other protective devices in place.
7. Never disconnect or bypass any switch.
8. Carbon monoxide in the exhaust fumes can be fatal when inhaled, never operate a machine without proper ventilation.
9. Fuel is highly flammable, handle with care. When filling tank stop 1 inch(2.54 cm) from top. Leave room for expansion. **DO NOT OVERFILL.**
10. Keep engine clean. Allow the engine to cool before storing.
11. Never use your hands to search for oil leaks. Hydraulic fluid under pressure can penetrate the skin and cause serious injury.
13. This machine demands your attention. To prevent loss of control or tipping of the vehicle:
    A. Use extra caution in backing up the vehicle. Ensure area is clear.
    B. Do not stop or start suddenly on any slope.
    C. Reduce speed on slopes and in sharp turns. Use caution when changing directions on slopes.
    D. Stay alert for holes in the terrain and other hidden hazards.
    E. Before unhitching, lower jack and secure pin.
14. Before leaving operator's position:
    A. Disengage all drives.
    B. Set park brake.
    C. Shut engine off and remove the ignition key.
    D. If engine has to run to perform any maintenance keep hands, feet, clothing and all other parts of body away from moving parts.
15. Keep hands, feet and clothing away from moving parts. Wait for all movement to stop before you clean, adjust or service the machine.
16. Keep the area of operation clear of all bystanders.
17. Stop engine before making repairs/adjustments or checking/adding oil to the crankcase.
18. Use parts and materials supplied by ***Smithco*** only. Do not modify any function or part.
19. Use caution when booms are down as they extend out beyond the center line of the machine.
20. The spray tank is a confined space, take precaution.

THESE MACHINES ARE INTENDED FOR PROFESSIONAL MAINTENANCE ON GOLF COURSES, SPORTS TURF, AND ANY OTHER AREA MAINTAINED TURF AND RELATED TRAILS, PATHS AND LOTS. NO GUARANTY AS TO THE SUITABILITY FOR ANY TASK IS EXPRESSED OR IMPLIED.

Read and understand this manual and all safety signs before operating and maintaining. Review the safety instructions and precautions annually.

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

Safety Alert Symbol

This symbol with a warning statement means:
WARNING! BE ALERT!
YOUR SAFETY IS INVOLVED!

Carefully read the message that follows

SAFETY SIGNAL WORDS

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each has been selected using the following guidelines:

DANGER: Red. Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

WARNING: Orange. Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION: Yellow. Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT: Blue. Indicates procedures which should be followed to avoid damage to the machine.

SAFE SPRAYING PRACTICES

Persons engaged in the handling, preparation or application of chemicals must follow accepted practices to insure the safety of themselves and others,

1. **WEAR** protective clothing including: gloves, hat, respirator, eye protection and skin covering suitable for protection from chemicals being used.
2. **BATHE** thoroughly after any exposure to chemicals, giving particular attention to eyes, nose, ears and mouth.
3. **CLEAN** equipment and materials in accordance with employer, municipal and state regulations. Use only approved areas and drains.
4. **DISPOSE** of chemicals and rinse solutions by approved and legal means.
5. **PROVIDE** methods and materials for operators to wash eyes and hands immediately during the spraying process.
6. **PROVIDE** methods and materials for control, safe dilution and neutralization of chemical spills during preparation, spraying, transporting and cleanup.
7. Always check and follow the directions and safety warnings of the chemicals to be used.
8. Secure the discharge lines before starting the pump. An unsecured discharge line may whip.
9. Periodically inspect the pump and the system components.
10. Check hoses for weak or worn condition before each use. Make certain that all connections are tight and secure.
11. Do not operate unit with leaks, frayed, kinked hoses or tubing. Repair or replace immediately.
12. Use only pipe, hose and fittings rated for maximum pressure or pressure at which pressure relief valve is set at. When replacing pipe, hose or fittings, use new product.
13. Do not operate an engine in an enclosed area. Be sure the area is well ventilated.
14. Do not use these pumps for pumping water or other liquids for human or animal consumption.
15. **⚠ WARNING** **Do not pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc.**
Do not use in explosive atmospheres. The pump should be used only with liquids compatible with the pump component materials.
16. Be sure all exposed moving parts are guarded and that all coupling devices are securely attached before applying power.
17. Before servicing, disconnect all power, make sure all pressure in the system is relieved, drain all liquids from the system and flush.
18. Protect pump from freezing conditions by draining liquid and pumping rust inhibiting antifreeze solution through the system, coating the pump interior.
19. **TRANSPORT** - Machine **must be stopped** to raise or lower booms. Because of cam system, if booms are raised in transit they can fall forward or backward when coming to a stop or while traveling on uneven terrain.

⚠ IMPORTANT 20. If using Simulated Speed with a Radion 8140, one needs to change back to Ground Speed for proper rate control when spraying.

Read and understand this manual and all safety signs before operating and maintaining. Review the safety instructions and precautions annually. Read all chemical labels and adhere to their safe handling instructions.

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

SPECIFICATIONS FOR SPRAY STAR 300T

WEIGHTS AND DIMENSIONS

Length	164" (416.56 cm)
Width	88" (223.52 cm)
Height w/ Booms Folded	136" (345cm)
Wheel Base	74" (187.96 cm)
Weight Empty	1315 lbs (596.5kg)

ENGINE

Make	Briggs and Stratton
Model#	19L237
Type / Spec#	0042-F1
Horsepower	10 hp (7.46 kW)
Fuel	Minimum of 87 octane
Alternator	10 Amp

WHEELS & TIRE

Rear: Two 29 x 14.00 x 15 Multi-Trac; 30 psi (2.0 bar)

BATTERY

Automotive type 24F - 12 volt

BCI Group	Size 24
Cold Cranking Amps	575 minimum
Ground Terminal Polarity	Negative (-)
Maximum Length	10.25" (26.04 cm)
Maximum Width	7" (17.78 cm)
Maximum Height	8.88" (22.55 cm)

FLUID CAPACITY

Crankcase Oil	28 oz. (SF, SG, SH, SJ or higher" SAE 30 oil)
Fuel	.95 gallon (3.6liters)

TOW VEHICLE

Minimum draw bar power of 20 HP (15 kW)
Heavy Duty Vehicle with 4 wheel brakes
3500 lb (1587,57 kg) Towing Capacity
40 Amp Charge Capacity

SETUP

⚠ IMPORTANT **Battery not included.**

1. Install an Automotive type 24F-12 Volt battery into the Power Box and secure with the battery hold-down.
2. Fill the fuel tank to bottom of neck. Check engine oil.
3. Check the tire pressure. The tires are 30 psi (2.0 bar).
4. Connect hitch to tow vehicle. Pull pin on jack and swivel to horizontal position.
5. Install Radion console and control box on tow vehicle battery. Route cables to the tow vehicle. Avoid exhaust, heat and moving parts.
6. Attach the Spray Boom and any other Optional Equipment to the Prime Mover, in accordance with instructions in the *Spray Star 300T Parts/Service Manual*. The nozzles must be the correct distance above the turf as described in *Turf Spraying Guide*. The spray boom must operate properly and the outer sections must break away safely if an object is struck by them, they must then return to normal operation position.
7. Be sure to double check boom heights, nozzle spacing and displacement before spraying.
8. Machine is shipped with windshield washer fluid in to prevent freezing. Flush system completely with clear water. Fill tank with water and re-tighten the four bolts used to hold the tank in place.
9. Fill spray tank with water/chemical mixture. Tank holds 300 gallons (1135 l).
10. Read operating instructions before starting.

⚠ IMPORTANT **Never allow pump to run dry! The valve on the suction side of the pump (between the pump and tank) must be fully open whenever the pump is operated.**

WHEEL MOUNTING PROCEDURE

1. Set park brake on tow vehicle. Turn machine off and remove key.
2. Turn off main power switch on power box.
2. Block one of the other wheels.
3. Loosen nuts slightly on wheel to be removed.
4. Lift with floor jack until wheel is off the ground.
5. Remove nuts, remove wheel.
6. Place new wheel on hub lining up bolt holes.
7. Torque nuts to 64-74 ft/lb (87-100Nm) using a cross pattern. Re-torque after first 10 hours and every 200 hours thereafter.

TIRE PRESSURE

Caution must be used when inflating a low tire to recommended pressure. Over inflating can cause tires to explode. Tires on the machine should be 30 psi (2.0 bar). Improper inflation will reduce tire life considerably.

HILLSIDE OPERATION

Do NOT stop or start suddenly on any slope. Be especially cautious when changing direction. **Do NOT** operate on slopes greater than 10°.

TOWING

Tow vehicle must have a minimum draw bar power of 20 HP (15 kW), a heavy duty vehicle with 4 wheel brakes and 3500 lb (1587,57 kg) Towing Capacity.

Before operating the Spray Star 300T, become familiar with all controls and functions. Also complete all maintenance requirements and read all safety warnings. Knowing the Spray Star 30T0 thoroughly, how it operates, and by doing the prescribed maintenance steps, you can expect trouble free operation for years to come.

SAFETY

Safety needs to always be the concern of the operator on a moving vehicle or any machine with moving parts.

1. Keep all shields and guards in place.
2. Keep the parking brake engaged any time the operator is away from the vehicle or whenever service is performed.
3. Always wear the necessary protective clothing and equipment.
4. Turn engine off when refueling or performing maintenance not specifically requiring engine power.

DAILY CHECKLIST

1. Check the engine oil level. Add as needed. **DO NOT OVERFILL**. Refer to engine owner's manual for oil grade and procedure.
2. Tire pressure should be 30 psi (2.0 bar).
3. Inspect the electrical system and battery cables for loose connections or frayed wiring. Replace any faulty equipment or tighten if loose.
4. Check hardware for loose or missing nuts, bolts, screws, etc., And tighten or replace as needed.

STARTING THE ENGINE

1. Check the engine oil. Check the fuel level.
2. Move the fuel lever to the on or start position.
3. Move the throttle control to the fast position. Operate the engine in the fast position.
4. Move the choke control to the closed position. Choke is unnecessary when restarting warm engines.
5. Move the stop switch to the on position.
6. Rewind Start: Firmly hold the starter cord, pull the starter cord handle slowly until resistance is felt ,then pull rapidly.
7. Electric Start: Turn the electric start switch to the on or start position. To extend the life of the starter use short starting cycles(five second maximum). Wait one minute between starting cycles.
8. As the engine warms up, move the choke control to the open position.

STOPPING THE ENGINE

1. Disengage spray pump.
2. Stop Switch: Move the stop switch to the stop position.
3. Fuel Ignition Lever: Move the fuel lever to the off or stop position.
4. Electric Start: Remove the key. Keep the key out of reach of children

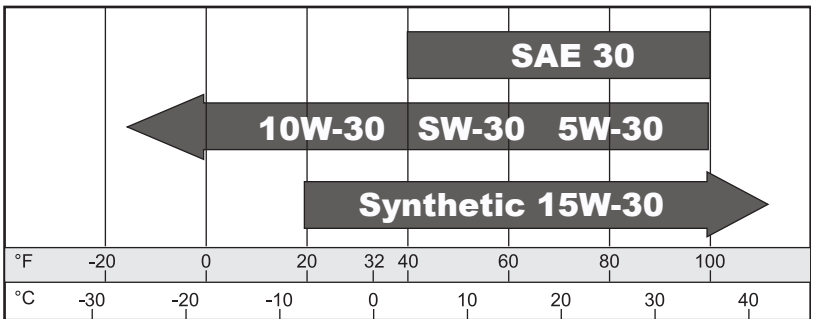
⚠ CAUTION **Never leave the vehicle unattended with the engine running. Always bring the vehicle to a complete stop, engage park brake, turn key off and remove key.**

MAINTENANCE

ENGINE

Change and add oil according to temperature chart below. Do not overfill. Use a high quality detergent oil classified "For Service SF, SG, SH, SJ or higher" SAE 30 oil. Use no special additives with recommended oils. Do not mix oil with gasoline.

SAE VISCOSITY GRADES



Starting Temperature Range Anticipated Before Next Oil Change

Outdoor temperatures deteremine the correct oil viscosity for the engine. Use the chart to select the best oil for outdoor temperature range expected. Engiens on most poutdoor power equipment operate well with 5W-30 synthetic oil. For equipment operated in hot temperatures 15W-30 synthetic oil gives the best protection.

DAILY CHECKLIST

1. Check engine oil level in tow vehicle. Add as needed. DO NOT OVERFILL.
2. Check Spray Star 300T for loose or missing nuts, bolts, screws, etc., and tighten or replace as needed..
3. Check that boom is in good condition.
4. Grease boom arms after the first 10 hours of operation and then every 100 hours thereafter..
5. Check tire pressure. 30 psi (2.0 bar)
6. Check electrical system for loose connections or frayed wiring, including battery cables. Replace any faulty equipment or tighten if loose.
7. Fill spray tank.

SERVICE INTERVALS

After First 5 hours:

Check engine oil.

After First 8 hours or daily

Check engine oil.

Clean area around muffler and controls.

Clean air intake grille.

After 25 hours:

Clean air filter.

Clean pre-cleaner.

After 50 hours:

Check wheel lug nuts torque to 64-74 ft/lb (87-100Nm).

Inspect tires - Check air pressure 30 psi (2.0 bar)

Change engine oil.

Service exhaust system.

BATTERY

Batteries normally produce explosive gases which can cause personal injury. Do not allow flames, sparks or any ignited object to come near the battery. When charging or working near battery, always shield your eyes and always provide proper ventilation.

Battery cable should be disconnected before using “Fast Charge”.

Charge battery at 15 amps for 10 minutes or 7 amps for 30 minutes. Do not exceed the recommended charging rate. If electrolyte starts boiling over, decrease charging.

Always remove grounded (-) battery clamp first and replace it last. Avoid hazards by:

1. Filling batteries in well-ventilated areas.
2. Wear eye protection and rubber gloves.
3. Avoid breathing fumes when electrolyte is added.
4. Avoid spilling or dripping electrolyte.

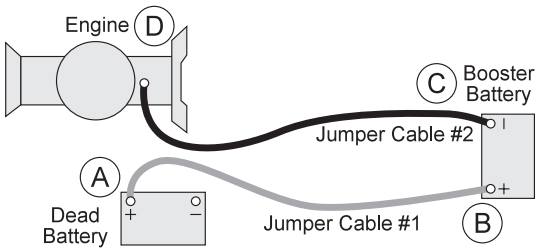
⚠ WARNING **Battery Electrolyte is an acidic solution and should be handled with care. If electrolyte is splashed on any part of your body, flush all contact areas immediately with liberal amounts of water. Get medical attention immediately.**

JUMP STARTING

⚠ WARNING **Use of booster battery and jumper cables. Particular care should be used when connecting a booster battery. Use proper polarity in order to prevent sparks.**

To jump start (negative grounded battery):

1. Shield eyes.
2. Connect ends of one cable to positive (+) terminals of each battery, first (A) then (B).
3. Connect one end of other cable to negative (-) terminal of "good" battery (C).
4. Connect other end of cable (D) to engine block on unit being started (NOT to negative (-) terminal of battery)



To prevent damage to other electrical components on unit being started, make certain that engine is at idle speed before disconnecting jumper cables.

TANK AGITATION

Before using the Spray Star, the operator and spray technician must familiarize themselves with all of the information on chemical spraying contained in the *Turf Spray Guide*.

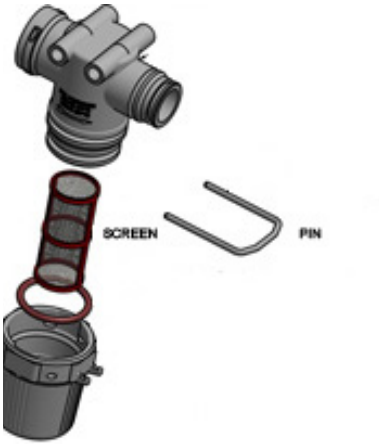
All testing and calibrating of sprayers is to be done with water, not chemicals. This insures the safety to all involved in performing the calibration operation. Only after all calibration procedures are completed should chemical be added to the sprayer.

SPRAYER VALVE SETTINGS AND SPRAY TANK AGITATION

The 3-way valve on the suction side of the pump, between the tank and the pump must be open before pump is engaged. Close this valve only when necessary to clean the filter with spray material in the spray tank.

There is one control valve on the discharge side of the spray system. This valve controls the agitator. This valve may be opened as much as necessary to provide hydraulic agitation through the quadrajet agitator in the tank bottom. When the liquid level in the spray tank reaches a certain level (usually 1-25 gallons (3.8-95 Liters) depending on terrain and other conditions) it may be necessary to close the valve in the agitator line in order to prevent loss of suction prime.

If your Spray Star is fitted with a hose reel, there is a second ball valve on the discharge system to supply material to the hose reel. The Quadrajet agitation system operates with four venturi jets in the tank bottom.



AGITATION LINE STRAINER CLEANING

Agitation line strainer is located below the sprayer filter. This strainer catches impurities that go to the turbo-jet agitation system in the spray tank. It has a quick disconnect pin on it to remove the bowl. **After EVERY use**, remove bowl and clean screen. Replace screen as needed. We recommend a 50 Mesh screen.

SPRAYER CLEANING

One of the most common causes for faulty-pump performance is corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix according to manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

TO PREVENT CORROSION

After cleaning the pump as directed, flush it with a permanent type automobile antifreeze (Prestone, Zerex, etc.) containing a rust inhibitor. Use a 50% solution that is, half antifreeze and half water. Then coat the interior of the pump with a substance which will prevent corrosion such as Fluid Film or WD40. If unit will not be used for an extended period of time, disconnect hoses into and out of the pump, seal openings to the pump with caps or tape. Dispose of fluids according to all federal, state and local regulations.

⚠ IMPORTANT **All chemicals and chemical residue must be removed after each use. Dispose of fluids and residue according to all federal, state and local regulations.**

SPRAYER CLEANING

Empty tank and clean unit thoroughly after each use following these instructions:

1. Turn off 3-way valve and rinse inside of tank thoroughly with clean water, remove cap from valve to drain.
2. Fill tank ten percent full with clean water, Turn 3-way valve on and start pump and discharge water through spray hose or spray boom (with nozzles removed), until empty.
3. Turn off 3-way valve again and rinse tank interior thoroughly. Remove cap from 3-way valve to drain.
4. Rinse exterior of sprayer thoroughly with clean water.
5. This sprayer is equipped with a self cleaning strainer. The strainer uses the excess pump flow to bypass clogging particles back to the spray tank. There is a gap between the tapered inner cylinder and the screen face that causes the inlet fluid to flow at a high velocity past the screen face providing a continuous wash down of particles. For this wash down to occur a minimum of +GPM/23 l/min is required through the bypass line.

AGITATION LINE STRAINER CLEANING

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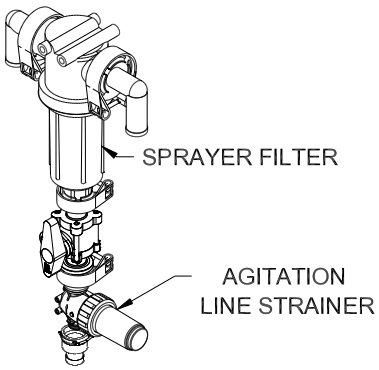


STORAGE

1. Before storing clean machine thoroughly.
2. Check bolts and nuts, tighten as necessary.
3. Make all repairs that are needed and remove any debris.
4. Store in a clean and dry area.
5. Disconnect control cord on Radion computer to prevent unintended deployment.
6. Clean and dry remote Control Box
7. Store the remote Control Box when not in use on the machine.
8. Store Radion console in tool box on right side of machine.
9. Protect pump from freezing conditions by draining liquid and pumping rust inhibiting antifreeze solution through the system, coating the pump interior.

SPRAYING INTRODUCTION

This section is intended to offer practical guidelines for the distribution of liquid chemicals over an area of turf grass such as golf courses, park land, school grounds and lawns. SMITHCO makes no representation as to the suitability of any technique or product for any particular situation. This section is suitable for self-propelled spray vehicles or sprayers mounted onto vehicles.

Boom Spraying is the most effective, accurate and efficient method of applying chemicals to large turf areas. It may be done by means of:

- A dedicated spray vehicle
- A sprayer mounted upon a utility vehicle

Sprayers are typically equipped with wide spray booms. They are divided into three sections, with hinges that permit the long outer sections to automatically move out of the way and reset if an obstacle such as a tree or fence is in you path.

To minimize the chance for missed areas or double application use a device to mark the outside boundaries of each spray swath. Foam markers and dye markers are advisable.

SPRAY OPERATION (After Proper Setup and Calibration)

1. Add $^{1}/_{2}$ the amount of water required for the spray operation to tank using air gap filler.
2. Start engine, set engine speed below 2000 RPM, and engage pump after taking all previously described safety and operation precautions.
3. Open agitator valve.
4. Add chemicals (taking all precautions described in this manual and by the chemical manufacturer).
   a. Liquids may be poured directly into tank.
   b. Wettable powder chemicals must be pre-mixed with water in a container to form a slurry. The mixture is then added to the tank through the fill-well strainer.
   c. Chemical in soluble packs are place into the fill-well strainer basket and dissolved by adding water through the basket.
   d. Use Chemical Clean-load Safe-fill System on rear of machine if installed.

   The balance of the water required for the spray operation is added to the tank through the fill-well strainer, using the air gap filler. This will wash any undissolved chemical into the tank.
5. Transport to sprayer site with and agitator operating.
6. Set Engine speed between 2000-3200 RPM.
7. (Optional) Engage ground speed control.
8. Obtain desired spraying speed before activating spray with switches on spray control console.
9. The master boom switch, located on the left floorboard is used to override the master switch on the computer console of the spray systems. By pushing down it will turn on/off the booms. *For the Radion System* the Master Switch on the computer **must be off** for the master boom control switch to work.

Review the capacity of nozzles being used. Total capacity of all nozzles plus agitation system must not exceed pumping system capabilities refer to *Spraying Procedure* section of this manual. FLUSH PUMP AFTER USE

Shut-Off	20GPM	40GPM	60GPM	80GPM	100GPM
120psi	100psi	80psi	60psi	30psi	10psi
100psi	95psi	76psi	52psi	26psi	5psi
80psi	75psi	62psi	45psi	21psi	-
60psi	55psi	40psi	25psi	5psi	-

To determine the correct performance data for your application, first shut off all flow on discharge side of pump and determine the shut-off pressure at the pump. Use this Shut-Off pressure to determine which line of data applies.

TURF MANAGEMENT

Turf management chemicals are made for four general purposes:

1. **Fungicides:** Prevent or cure fungus on turf grass. They are made in 2 general types:
   - Systemic - Chemicals enter the plant system and protect or cure it of, fungus.
   - Contact - Kills fungus with which it comes into contact.
2. **Insecticides:** Eliminate damaging insects and worms (such as grubs, beetles, ants, etc.)
3. **Herbicides:** Control and eliminate undesirable weeds and grass from turf areas and non-turf areas such as bunkers, trails, fences, etc.
4. **Nutrients & Fertilizer:** Promote growth, beauty and color in turf grass.

Some materials have to be applied so that they get into the soil below the plant leaves, This is called *"soil application".* In order to do this, they are best applied with a *large volume of* water. They are often then *watered-in* using the irrigation system. This type of chemical material includes systemic chemicals and chemicals designed to destroy pests which live in the thatch and the soil.

Other materials must be applied to reach a problem that is present on the plant leaves. This is called *"Foliar Application"* and requires a *lower volume* of water. Instead of irrigation water, these materials are further activated by dry air and sunshine. They include contact fungicide and many herbicides.

The user of sprayers and chemicals must follow the directions provided with the spray material. It is the only way to insure safe and effective results. It provides information on how much chemical and how much water is to be applied to the area to be sprayed.

Though there are many types and sizes of nozzles, two specific types have proven most successful in turf grass management.

- The first type is **target-directed.** It sprays material in a direct line downwards to the target turf grass. These are flat fan nozzles, commonly referred to as TeeJet nozzles. They are available in a wide variety of sizes for any required discharge volume rate. They are the best for many contact or foliar applied pesticides. They are spaced either 10" (25 cm) or 20" (51 cm) apart and overlap one another by about ⅓.
- The second type useful in turf management are **broadcast** type nozzles. They are commonly referred to as raindrop or floodjet nozzles. They spray a hollow-cone shaped pattern of much larger droplets which fall quickly to the turf under their own weight. They are best for systemic pesticides or any material requiring a large volume of water for soil application. The larger droplets are not as subject to drift from wind and are a safer, more environmentally friendly choice in many situations.

NOZZLE SCREENS (STRAINERS)

Smaller nozzles require nozzle screens or strainers to prevent clogging.

- Teejet type nozzles size 8001 and 80015 require 100 mesh screens.
- Teejet type nozzles from size 8002 through 8008 require 50 mesh screens.
- Turbo TurfJet Nozzles Size 1/4 TTJ02-VS and larger do not require strainers.
- Turbo Floodjet Nozzles TF-VS2 through TF-VS3 require 50 mesh screens.
- Turbo Floodjet Nozzles TF-VS4 and larger do not require screens.

SPACING

Turf spray nozzles are normally 20" (51 cm) apart. Some cases 40" (101 cm), depending on the type of spray boom and type of area to be sprayed.

Very fine, level areas (golf greens and tees, bowling lawns, tennis courts, etc.) may be sprayed with nozzles spaced every 10" (25 cm).

Optimum Spray Height

15″	9″
20″	12″
30″	18″

BOOM HEIGHT

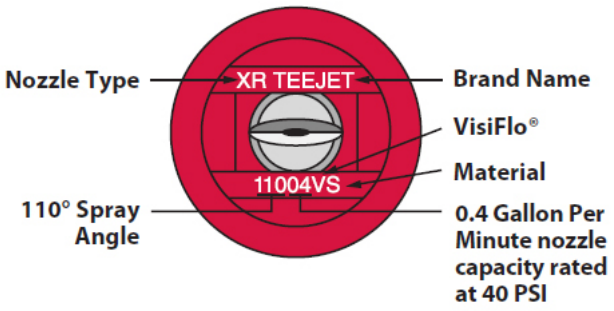
Height is very important in permitting spray nozzles to develop their proper spray pattern. If nozzles are too high, excessive overlap develops. If nozzles are too low, there is not enough overlapping of nozzle spray patterns.

NOZZLE TYPE	NOZZLE SPACING	HEIGHT ABOVE THE GROUND
80° Flat Fan	20" (51 cm)	18" (45 cm)
65° Flat Fan	20" (51 cm)	12" (30 cm)
Turbo TurfJet	20" (51 cm)	15" (38 cm)
Turbo TurfJet	40" (101 cm)	19" (48 cm)
Turbo Floodjet	20" (51 cm)	16" (41 cm)
Turbo Floodjet	40" (100 cm)	18" (45 cm)

Improper nozzle height or spacing prevents proper application of chemical. Some areas are under treated and chemicals are ineffective. Some areas are over treated with wasted chemical and possible turf damage.

Operating your sprayer at a desired speed and pressure on a hard, dry surface is a good method of checking spraying consistency. Observe nozzles in operation, observe if the area dries evenly. If there are alternating wet and dry streaks, raise or lower the spray boom. If the wet streaks are directly under the nozzle, the boom is too low. If the wet streaks are between the nozzles, the boom is too high.

NOZZLE NOMENCLATURE



NOZZLES

Always be alert to the possibility of a plugged or damaged nozzles. Serious misapplications may result. Check nozzle output periodically.

Modern nozzles use spring and diaphragm check valves to insure positive cutoff of chemicals without drip.

Snap-on caps make replacing and cleaning nozzles, quick, easy and fool proof with proper re-installation.

An operator can see at a glance if all nozzles are the same size by the color code.

3 FUNCTIONS FOR A SPRAY BOOM NOZZLE

1. Regulating the flow is done through size of the orifice (opening) within the nozzle. All nozzles, regardless of type, have some point within them that regulates the flow of liquid. Obviously, the larger the opening the greater the rate of flow volume. Volume is expressed in Gallons Per Minute (gpm) or Liters Per Minute (lpm). Do not confuse the term volume with application rate, which will be covered later.

   As pressure increases, the flow volume in a given nozzle also increases. For example, an average size nozzle which discharges 0.52 gpm (1.4 lpm) at 30 psi (2 bar), will discharge 0.73 gpm (2 lpm) at 60 psi (4 bar). In this example, an increase in pressure of 100% has caused an increase in discharge of 40%.

   Some nozzles deliver a small volume (for example: 0.2 gpm (0.75 lpm)). Some nozzles deliver a relatively large volume (for example: 1.5 gpm (5.7 lpm)), or $7^{1}/_{2}$ times as much as the smaller nozzle in this example.

   The amount of material (volume) to be applied is determined by the effect the chemical has on the turf.

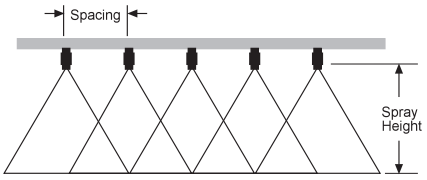
2. The nozzle on a sprayer is to form the liquid into droplets. The size of the droplet is determined by two factors design and system pressure (psi/bar).

   Particular applications are done best by big droplets such as systemic fungicides, insecticides and some herbicides in order to reduce drift. Other applications require small droplets like contact fungicides and some herbicides. Again, this is determined by whether the chemical is foliar applied or soil applied. Large droplets for soil applied material, small droplets for foliar applied materials that evenly cover the plant better.

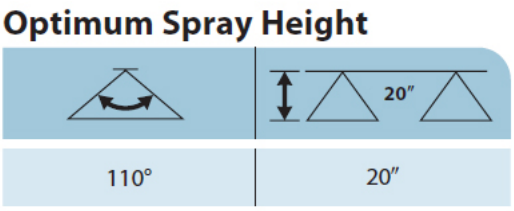
   Pressure also affects droplet size. More pressure at the same nozzle produces smaller droplets, more subject to drift. The general rule on pressure is to use the lowest pressure possible with just enough to form adequate spray nozzle patterns.

3. Disperse the material in a specific pattern that will insure even distribution of chemical across the swath covered by the boom.

   The pattern of liquid dispersed by the hollow-cone is more even across its width. Each nozzle overlaps the adjoining nozzle by 100%. That is to say the area covered by each nozzle extends to the center of the two nozzles on either side.



   As shown (to the right) the pattern formed by flat fan (TeeJet) nozzles would show most liquid concentrated at the center, then tapering off where it begins to overlap with the next nozzle-approximately $^{1}/_{3}$.



   In order to properly develop their spray pattern, each nozzle must be the proper distance from the next nozzle (spacing) and the proper height above the ground.

CALIBRATION INTRODUCTION

Calibrating simply means to adjust a set of variables on the sprayer in order to deliver the desired amount of chemical to a known area of turf.

The job of calibrating the sprayer consists of balancing these variables so that your sprayer delivers the desired application rate. That is, an amount of chemical on a given area. It is expressed as:

Gallons Per Acre (gpa) (1 US gpa = 0.83 UK gpa)

or **Gallons Per 1,000 Square Feet (gpt)**

or **Liters Per Hectare (lph)** (1 US gpa = 9.35 lph)

A number of acceptable methods for calibrating a turf sprayer are widely available. The calibration method chosen must take these variables into account. They must include known ground speed (by measurement or from an accurate speedometer) and nozzle output (gpm or lpm) from a nozzle chart or from actual measurement. The variables are:

PRESSURE

Just as pressure increases the volume discharge rate, it also increases the application rate. Pressure must increase by 4 times in order to double the application rate. Small pressure changes of 10 psi (1.4 bar) or less do not greatly affect performance.

Pressure is established and maintained by a pressure control valve or by a flow control valve located on the sprayer.

NOZZLE CAPACITY (VOLUME)

We have covered the different types of spray patterns of various nozzles and made our selection of type accordingly. We now have to choose a size which will provide the correct application rate.

Sizes are available for all requirements. Consult the nozzle chart in this manual for your nozzle type in order to select the correct size.

TRAVEL SPEED

Increased travel speed decreases the application rate (gpa, gpt or lph). Travel speed must be safe and appropriate for the area to be sprayed.

Unlike pressure changes which have only a minor effect on application rate, ground speed changes have a more major and direct effect. For example: 50% decrease in ground speed means a 100% increase in application rate. If the vehicle does not have an accurate speedometer, correct speed must be determined by timing the sprayer travel over a measured distance. (Refer to the page in this manual titled, “Abbreviations and Conversions”.

To calibrate a sprayer, the user must:

1. **Understand** the Variables
2. **Set** those variables using one of the proven methods available.
3. **Make** a trial run and measure the output (use water, not chemical).
4. **Determine** the output.
5. **Make** adjustments to the 3 variables until the output is at the desired level.

This covers the principles of what must be known to prepare a sprayer for operation.

⚠ IMPORTANT **There are other acceptable and proven methods of calibrating a turf sprayer for application. Other techniques may be more suitable depending on operational needs and technical competence of the operator.**

THE NOZZLE CHART METHOD OF CALIBRATION

The Nozzle Chart Method is useful when the sprayer nozzles are new or nearly new. It is also the most useful method to employ when the sprayer is equipped with an Electronic Spray Control System. The Electronic Spray Control System does most of the calibration work, it is up to the operator to select the proper combination of nozzle size and ground speed which will deliver the desired application rate.

The nozzle chart method requires the use of the appropriate nozzle charts which are found in the back of this manual. Nozzle charts for other nozzles are available from the manufacturer.

CALIBRATION STEPS

1. **Determine "HOW"** your sprayer is to be calibrated from the list of variables below.
   a. **Nozzle Type** (Teejet, Turbo Turf, Turbo Flood)
   b. **Spacing** (10" (25 cm) or 20" (51 cm) or 30" (76 cm))
   c. **Expression of Application Rate** (gpa or gpt or lph)

   The answers to these three questions will direct you to the appropriate nozzle chart for your application. The correct nozzle chart MUST be used.

2. **Determine the Desired Application Rate.**

   This is determined from the information on chemical labels or other technical information available from a variety of sources.

3. **Determine an Acceptable Ground Speed.**

   Conditions over which the sprayer will operate generally dictate the appropriate ground speed. Within the limits of practicality and efficiency, spraying should generally be done at lowest possible speed. This increases operator safety and contributes to more precise application of chemicals. For example, golf greens and tees and hill areas would generally be sprayed in the range of $2^1/_2$ to $3^1/_2$ mph (4-6 kph). Larger, open and more level areas such as golf fairways and park or school grounds would be sprayed at $4^1/_2$ to 6 mph (7-10 kph).

   The vehicle which carries or tows the sprayer should be equipped with a precise low-speed speedometer. If it is not, exact ground speed at a given engine speed must be determined by timing the travel of the sprayer over a measured distance.

4. **Determine Nozzle Size.**

   You will note from the chart, that application rates from any given nozzle decrease as the ground speed increases. In other words, the faster you drive, the less material you are applying.

   Application rates are shown in the columns to the right of the charts. Once the desired application rate is decided upon, it should be located, as nearly as possible in one of these columns on the appropriate chart for your operation. It could well be that the approximate rate desired would be obtained from the nozzles already installed in the boom. If this is not possible, then nozzles will need to be changed.

⚠ IMPORTANT **When selecting a new nozzle size the Discharge Rate (gpm or lpm) multiplied by the number of nozzles should not exceed 75% of the actual discharge volume of the sprayer pump. [i.e., if you need to use nozzles which discharge 0.8 gpm (3.0 lpm), and the spray boom is equipped with 12 nozzles, the sprayer pump would have to produce an actual discharge volume of 13 gpm (49 lpm) in order to properly supply these nozzles.] If the collective volume of the spray boom nozzles exceeds the actual discharge volume of the pump, inadequate pressure and poor nozzle distribution patterns may result.**

Once nozzle type and size have been determined, those nozzles are installed in the sprayer boom. Nozzles should be expected to be replaced after 15-20 hours of actual sprayer operation. After nozzles are installed, make trial application of water over a known area to check application rate.

5. **For Sprayer with Electronic Spray Control Systems.**

   On sprayers equipped with Electronic Spray Control Systems such as those manufactured by TeeJet, Raven Ind., and Micro-Trak Co., It is still important to select the right type and size of nozzle for the required operation. Electronic Spray Control Systems cannot function properly if the nozzles are not capable of delivering the programmed (desired) application rate. Nozzles which are too large will not develop adequate pressure or satisfactory spray patterns. Nozzles which are too small will not allow the discharge of spray material at the programmed application rate.

   Further, when calibrating sprayers which are equipped with Electronic Spray Control Systems, care must be taken to use the mode of operation on the Spray Control System (Gallons per acre "US" Mode); Gallons per 1,000 Square Feet ("Turf" Mode); or Liters per Hectare (Standard International Model), which corresponds with the nozzle calibration charts (gpa, gpt or lph).

6. **Using the Nozzle Charts.**

   Select the correct chart based on your nozzle type, nozzle spacing and desired expression of application rate (gpa, gpt or lph). If the desired operating speed is not found on the nozzle chart, it is simple to determine application rate at different speeds by estimating from the known facts.

   Example 1: If the desired speed is $2^1/_2$ MPH (4 kph) on a sprayer using TurfJet nozzles (Chart 5). The average between the application rates for 2 MPH and 3 MPH may be assumed to be the application rate for $2^1/_2$ MPH.

   Example 2: The desired speed is 6 MPH. Use the application rate column for 3 MPH a divide by 2.

7. **Converting Nozzle Chart Method to British Gallons.**

   To convert any of the Gallon Per Acre rates to Imperial Gallons per acre, (Imp gpa) multiply by 0.83. To convert any of the Liter Per Hectare rates to Imperial Gallons Per Hectare (Imp GPH), multiply by 0.22.

8. **Checking the Actual Application Rate.**

   After the combination of ground speed, nozzle size and operating pressure has been selected, the sprayer should be operated with water only to determine if the target application rate is achieved.

THE "128" METHOD OF BOOM SPRAYER CALIBRATION

The "128" Method is useful for calibrating sprayers and also for checking the calibration of sprayer calibrated by the Nozzle Chart Method and sprayers using Electronic Spray Control Systems. The "128" is based on a convenient mathematical relationship that exists between US Gallons, liquid ounces and acres.

An ounce is 1/128th of a (US) gallon. If an area which was "1/128th of an acre" could be found, the number of ounces applied to that small area would be equal to the number of gallons applied to the acre Thus, no mathematical computations would be required.

To determine an area which is 1/128 of an acre:

- On nozzles with 20 inch (51 cm) spacing, measure off a distance of 204 ft (62 meters). Mark a "START" and a "STOP" line. The rectangle formed by this distance and the spraying width of one nozzle 20" (51 cm) is equal to 340 square feet which is equal to 1/128 acre. Therefore, the amount of material applied to this area by one nozzle in OUNCES is the same amount of material applied to an acre in GALLONS (gpa).
- On nozzles with 10 inch (25 cm) spacing, the measure distance is 408 feet (124 meters).
- On nozzles with 30 inch (76 cm) spacing the measured distance is 136 feet (41 meters).

CALIBRATING FOR APPLICATION

1. Fill the sprayer tank with water. Run the sprayer, inspect it for leaks and make sure all systems function properly.

THE "128" METHOD OF BOOM SPRAYER CALIBRATION

2. Drive the sprayer through the measured distance discussed above at normal spraying speed, record the travel time required to cover the measured distance in seconds with a stopwatch. The carrying or towing vehicle is to be traveling at the desired speed when it crosses the start line of the measured course. **Repeat this procedure and determine the average of the two times.**
3. With the sprayer parked, run the sprayer at the required pressure level. Catch the output of each nozzle in a container which is marked or graduated in Ounces for the exact same period of time which it took the sprayer to cover the measured course in step #2. It is necessary to operate the vehicle engine at spraying speed using a hand throttle.
4. Observe the volume of water in the collection bottle. The number of OUNCES collected in the time it takes to cover the marked course. Take the average nozzle output by adding the outputs of each nozzle and then dividing that sum by the number of nozzles.

   The NUMBER OF OUNCES collected in the time required to cover the SMALL AREA is equal to the NUMBER OF GALLONS applied per ACRE. For example: if an average of 40 ounces of water is collected in the time required to cover the 1/128 acre area, the application rate is 40 gallons per acre (gpa).

As a practical matter, if high application rates are desired (above 75 gpa), the measured course length should be reduced by half (i.e. 102 ft (31 m) for 20 inch (52 cm) spaced nozzles). The volume collected (above) is then doubled (multiplied by 2).

AVERAGE OUTPUT (Ounces) = APPLICATION RATE (gpa)

5. Observe individual nozzle output volumes. If an individual nozzle is 10% above or below the average output, check for blockages in the nozzle or in the nozzle strainer. If the nozzle is worn or damaged, replace it.
6. Compare this actual application rate with the recommended rate. If the actual rate is more than 5% higher or lower than the intended rate, adjustments must be made.
7. Minor adjustments in application rate may be made by increasing or decreasing the spraying pressure. Lowering spraying pressure decreases application rate. Increasing spraying pressure increases application rate. This procedure normally does not apply to spray systems controlled by an Electronic Spray Control System, which governs flow rate.
8. Adjustments in application rate may be made by increasing or decreasing the travel speed of the sprayer if conditions permit. Slower speeds increase application rate. Faster speeds decrease application rate.
9. Nozzle sizes can be changed to provide the correct application rate. Refer to the nozzle charts in this book for the desired nozzle type.
10. Re-calibrate the sprayer (steps 2-6) after any adjustments are made.

    As previously discussed, there are other acceptable methods of Turf Sprayer Calibration. Chemical suppliers, Agricultural Extension Agents, Universities and consultants of various types offer helpful advice on this subject. Technical catalogs are available from nozzle manufacturers.

TRANSFERRING THE "128" METHOD INTO METRIC (LITERS PER HECTARE)

The same steps are used that are used when calibrating in gallons per acre. First a relationship between a measurable amount (milliliters) and the calibration amount (liter) is determined. That ratio is 1:1000.

Now an area which is 1/1000th of a hectare must be measured.

On spray booms with 51 cm (20 inch) spacing, mark off an area which is 20 meters (65.6 feet) long . The area formed by that length and the width of one spray nozzle (20 meters by 0.5 meters) is 10 square meters which is 1/1000 of a hectare. Therefore, the amount of spray material applied to this small area in milliliters is equal to the amount applied to one hectare in liters.

Then, follow the remaining steps 2-10, substituting milliliters for ounces, liters for gallons, square meters for square feet and hectares for acres.

AVERAGE OUTPUT (Milliliters) = APPLICATION RATE (LITERS/HECTARE)

gpm	Gallons per minute	cm	Centimeters
lit/min	Liters per minute	dm	Decimeters
dl/min	Deciliter per minute	m	Meter
psi	Pounds per square inch	mm	Millimeters
km	Kilometers	m.p.h.	Miles per hour
gpa	Gallon per acre	km/h	Kilometers per hour
lit/ha	Liters per hectare	us	Volume per ACRE
ml/ha	Milliliter per hectare	Si	Volume per hectare
gpk	Gallons per 1,000 sq ft	TU	Volume per 1,000 sq ft

AREA & SPEED

Distance (feet) x 0.68 = Travel Speed (m.p.h.) Travel Time (seconds)

	Time Required in Seconds to Travel a Distance of:		
Speed (m.p.h.)	**100 Ft**	**200 Ft**	**300 Ft**
1.0	68	136	205
1.5	46	92	136
2.0	34	68	103
2.5	27	54	82
3.0	23	46	68
3.5	20	40	58
4.0	17	34	52
4.5	15	30	46
5.0	13	28	41

LIQUID/VOLUME

1 US Gallon x 128 = Fluid Ounces

1 US Gallon x 3.785 = Liters

1 US Gallon x 0.83267 = Imperial Gallons

1 US Gallon x 8.34 = Pounds (Water)

1 Gallon Per Acre = 2.9 Fluid Ounces per 1,000 Square Feet = 9.35 Liters Per Hectare

1 Gallon Per 1,000 Square Feet = 43.56 Gallons Per Acre

1 Gallon = 128 Fluid Ounces = 8 Pints = 4 Quarts = 3.79 Liters = 0.83 Imperial Gallons

$$\text{gpa} = \frac{5940 \times \text{GPM (per nozzle)}}{\text{MPH} \times \text{W(nozzle spacing)}}$$

$$\text{GAL. 1,000 Square Feet} = \frac{136 \times \text{GPM (per nozzle)}}{\text{MPH} \times \text{W(nozzle spacing)}}$$

LENGTH/DISTANCE

1 millimeter (mm) = 0.039 inch

1 centimeter (cm) = 0.393 inch

1 meter (m) = 3.281 feet

1 kilometer (km) = 0.621 mile

1 inch = 25.4 millimeters; 2.54 centimeters

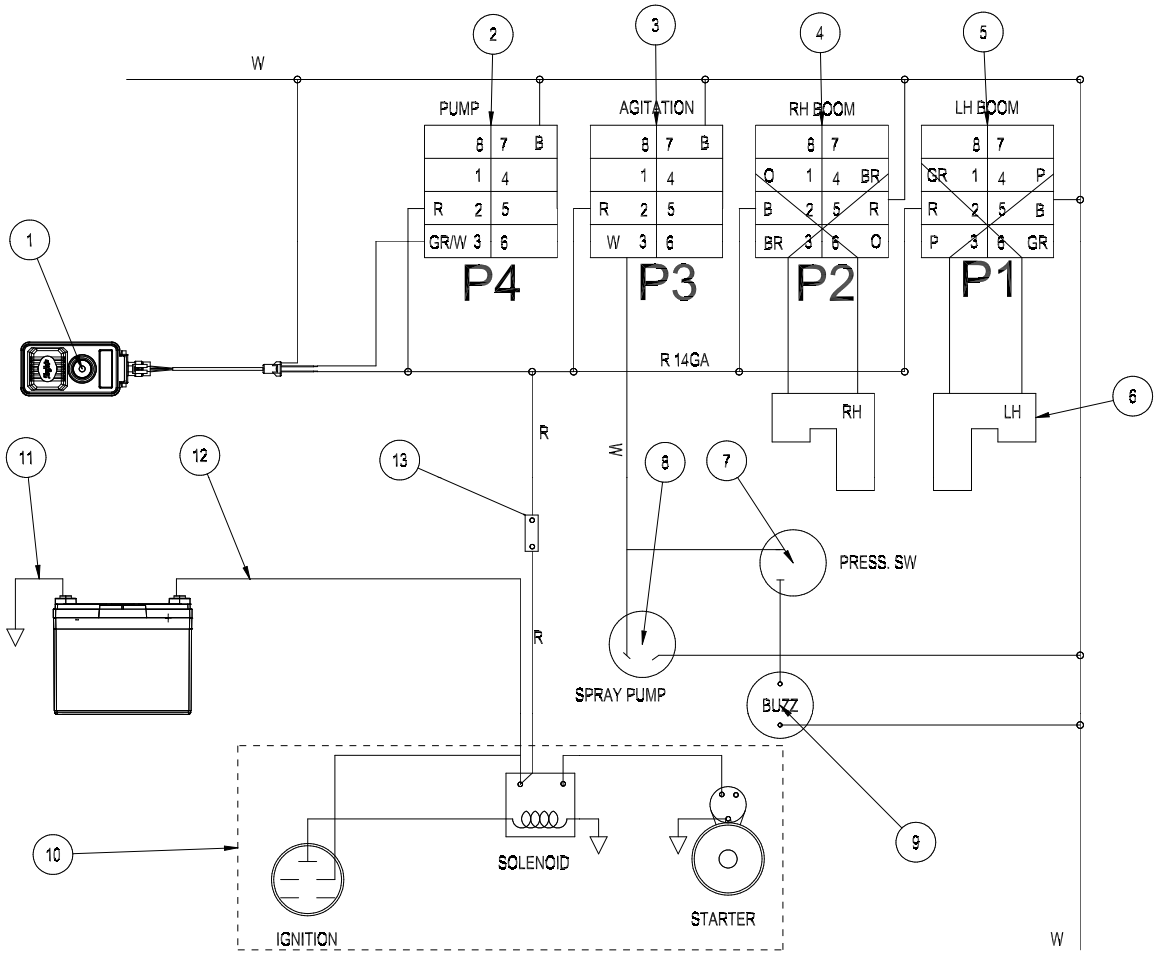
1 mile = 5280 Feet = 1610 Meters = 1.609 Kilometers

RE-CALIBRATE FLOWMETER

$$\text{Corrected Meter Cal number} = \frac{\text{Meter Cal} \times \text{Total Volume}}{\text{Predetermined amount of measured liquid}}$$

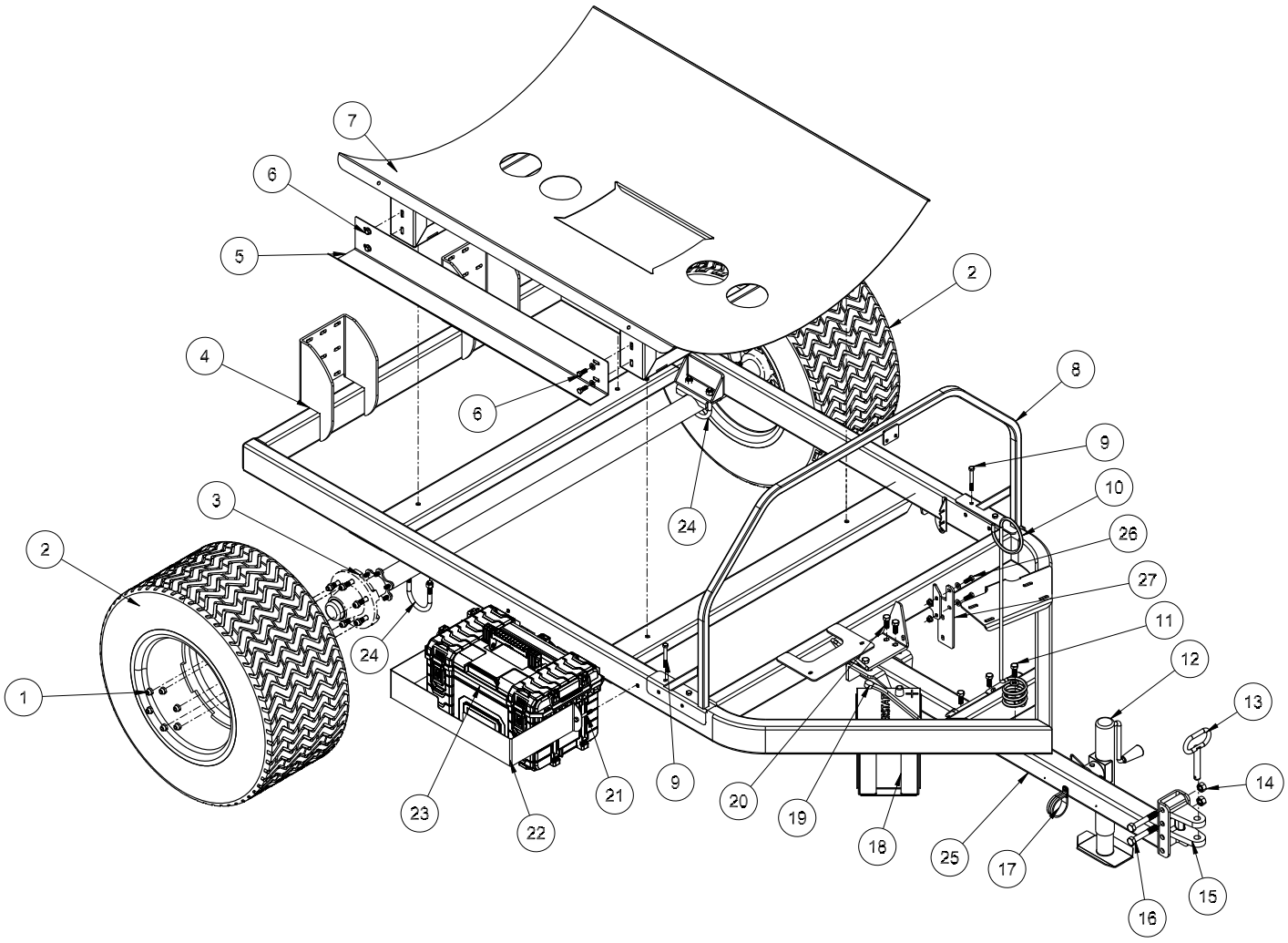
NOTES

WIRING



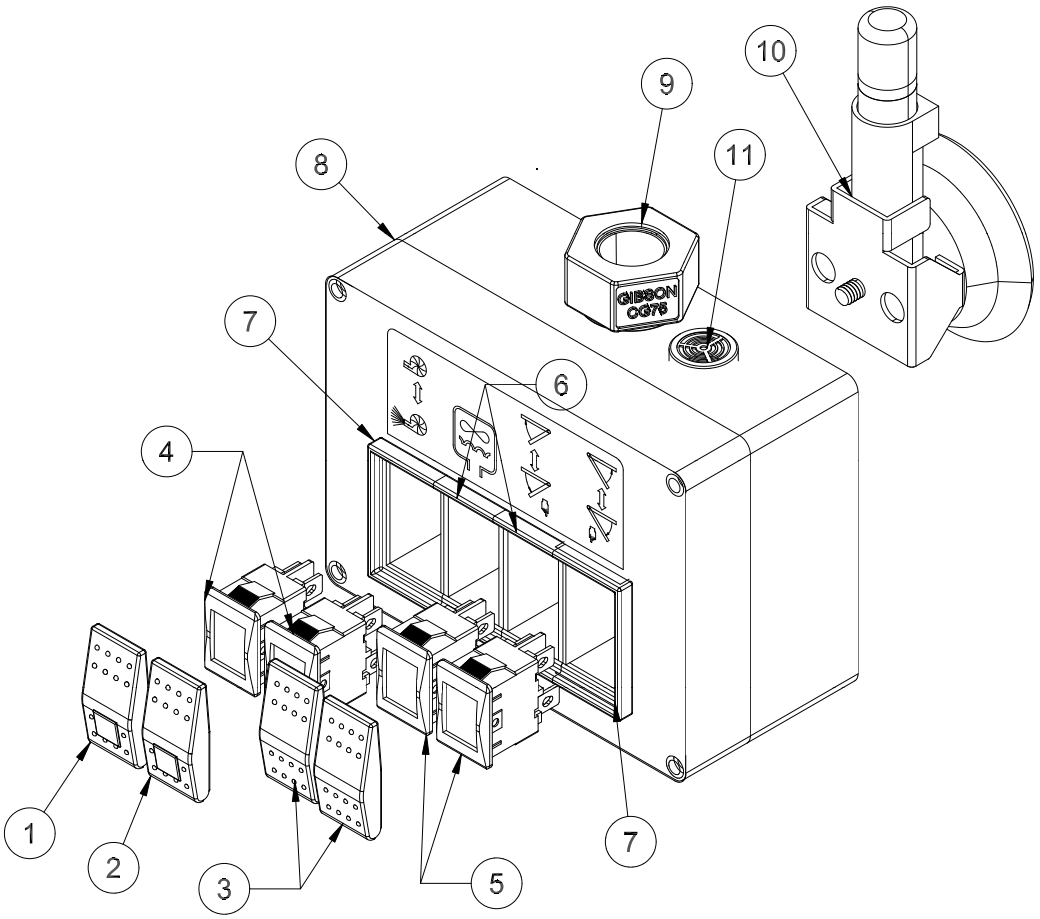
REF#	PART#	DESCRIPTION	QUANTITY
1	14-673	Shut Off Valve	1
2	15-726	Lighted Switch	1
	15-732	Rocker, Green	1
3	15-726	Lighted Switch	1
	15-731	Rocker, Amber	1
4	15-727	Rocker, No Light	1
	15-728	Centering Switch, Momentary, On-Off-On	1
5	15-727	Rocker, No Light	1
	15-728	Centering Switch, Momentary, On-Off-On	1
6	30-214	Electric Boom Actuators	2
7	33-480	Pressure Switch	1
8	16-998	Hypro Pump	1
9	77-207	Buzzer	1
10	41-082	Engine, Briggs 7 Stratton 10HP	1
11	48-147	Battery Cable, Negative	1
12	48-157	Battery Cable, Red	1
13	8975	Circuit Breaker	1
	8977	Circuit Breaker Boot	1
NS	31-326	Wire Harness	1

MAIN DRAWING

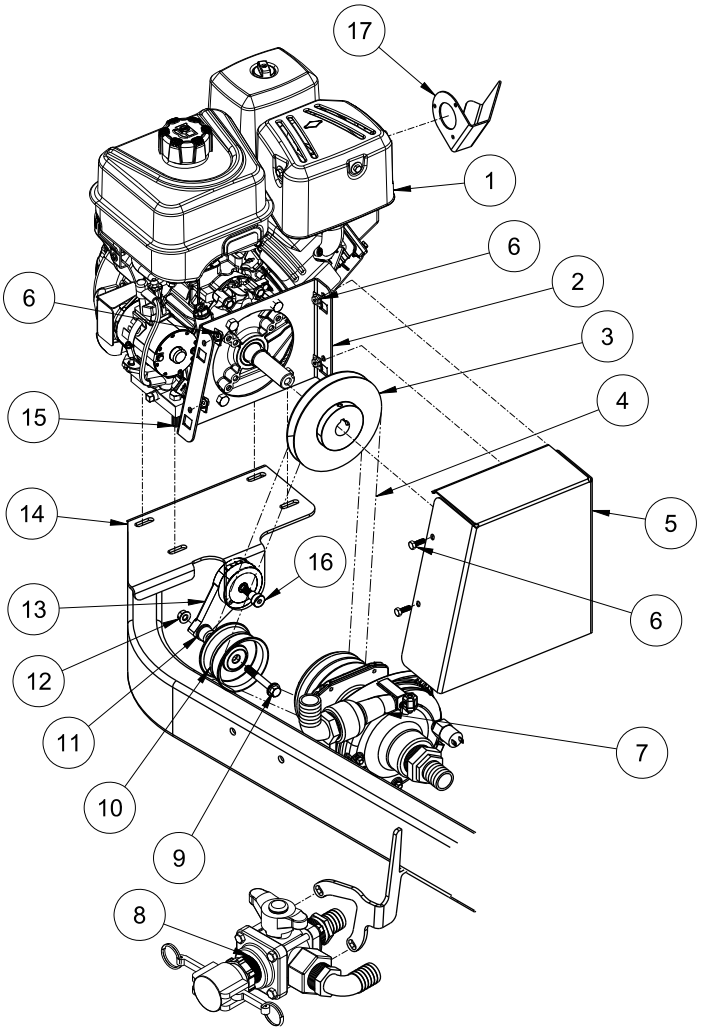


REF#	PART#	DESCRIPTION	QUANTITY
1	HNL-12-20	Replacement Lug Nut, ½ -20	10
2	31-328	Tire and Wheel	2
	30-048-01	Tire, 29-14.00 x 15	2
	31-328-02	Wheel	2
	25-380	Decal, Tire Pressure, 30PSI	2
3	31-311	Axle	1
4	31-310	Mainframe	1
5	31-316	Hose Trough	1
6	HB-38-16-100	Hex Bolt, ⅜ -16 x 1	4
	HW-38	Flat Washer, ⅜	4
	HNFL-38-16	Flange Whiz-loc Nut, ⅜ - 16	4
7	31-314	Tank Carrier	1
	HB-38-16-225	Hex Bolt, ⅜ - 16 x 2¼	4
	HW-38	Flat Washer, ⅜	4
	HNFL-38-16	Flange Whiz-loc Nut, ⅜ -16	4
8	31-313	Bulkhead Frame	1
9	HB-38-16-300	Hex Bolt, ⅜ -16 x 3	4
	HNFL-38-16	Flange Whiz-loc Nut, ⅜ - 16	4
10	31-331	Hydraulic Hose Holder	1
11	HB-12-13-125	Hex Bolt, ½ -13 x 1¼	1
	HW-12	Flat Washer, ½	1
12	78-240	Jack	1
13		Hitch Pin	1
14	HNTL-58-11	Lock Nut, ⅝ - 11	2
15	78-244	Clevis Hitch	1
16	HB-58-11-400	Hex Bolt, ⅝ - 11 x 4	2
17	HLC-A-200	Loom Clamp	1
	HSDPS-14-075	Drill Screw, ¼ -20 x ¾	1
18		Battery	1
19	8-603	Battery Strap	1
20	HB-12-13-125	Hex Bolt, ½ -13 x 1¼	8
	HNFL-12-13	Flange Whiz-loc Nut, ½ - 13	8
21	HB-516-18-250	Hex Bolt, 5⁄16 -18 x 2½	2
	HNFL-516-18	Flange Whiz-loc Nut, 5⁄16 - 18	2
22	33-317	Toolbox Strap	1
23	31-329	Toolbox	1
24	31-332	U-bolt	2
25	31-312	Tongue	1
26	HB-38-16-125	Hex Bolt, 3⁄8 - 16 x 1 1⁄4	2
	HNFL-38-16	Flange Lock Nut, 3⁄8 - 16	2
27	31-344	Pump Mount	1

CONTROL BOX DRAWING

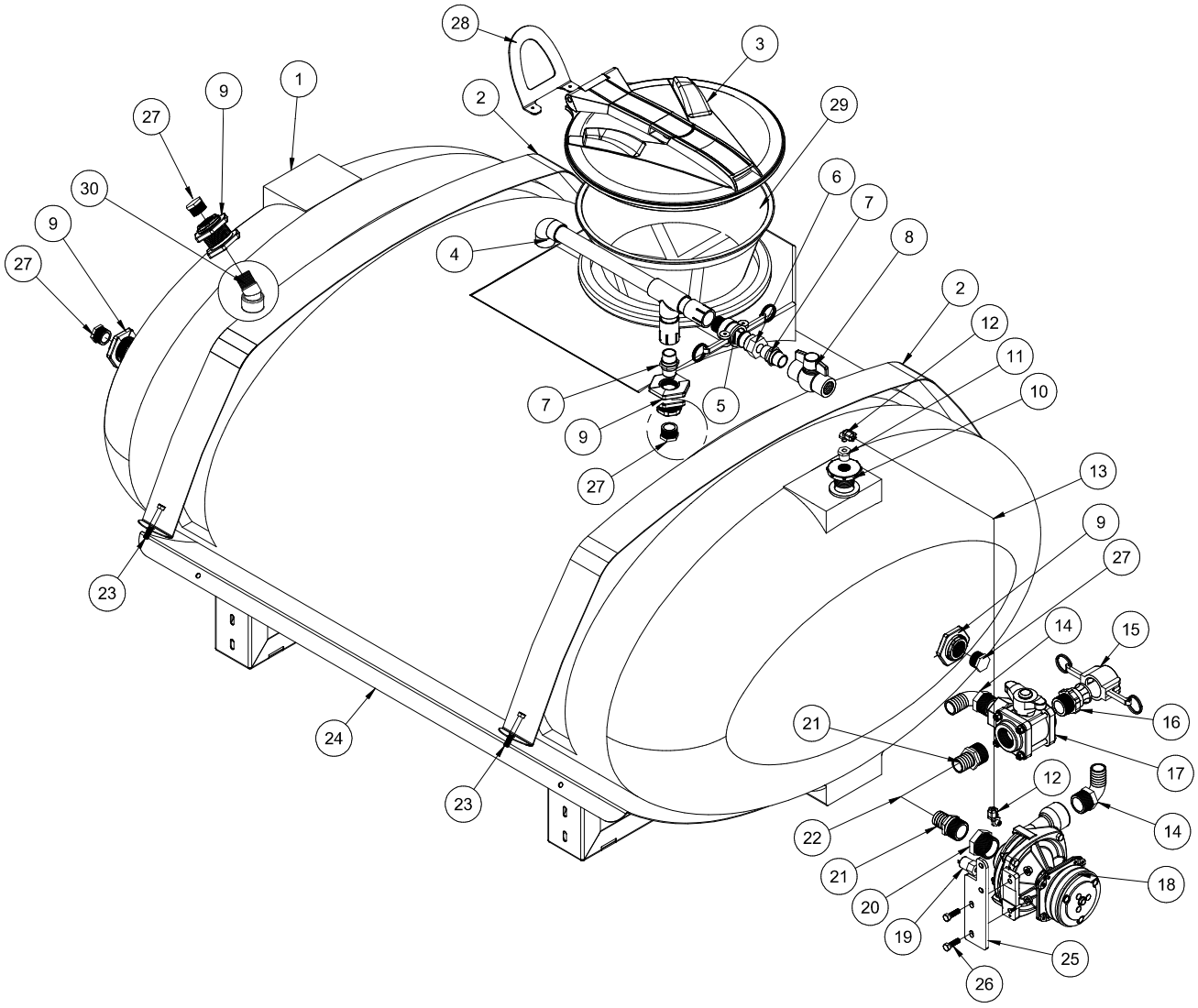


REF#	PART#	DESCRIPTION	QUANTITY
1	15-732	Rocker, Green	1
2	15-731	Rocker, Amber	1
3	15-727	Rocker, Unlit	2
4	15-726	Lighted Switch, On-Off	2
5	15-728	Centering Switch, On-Off-On	2
6	15-729	Panel Mount, Middle	2
7	15-725	Panel Mount, End	2
8	31-325	Control Box	1
	31-330	Decal, Control Box	1
9	31-324	Cord Grip Connector	1
10	31-322	4½" Suction Cup Mount	1
11	77-207	Buzzer	1
	31-326	Wire Harness	



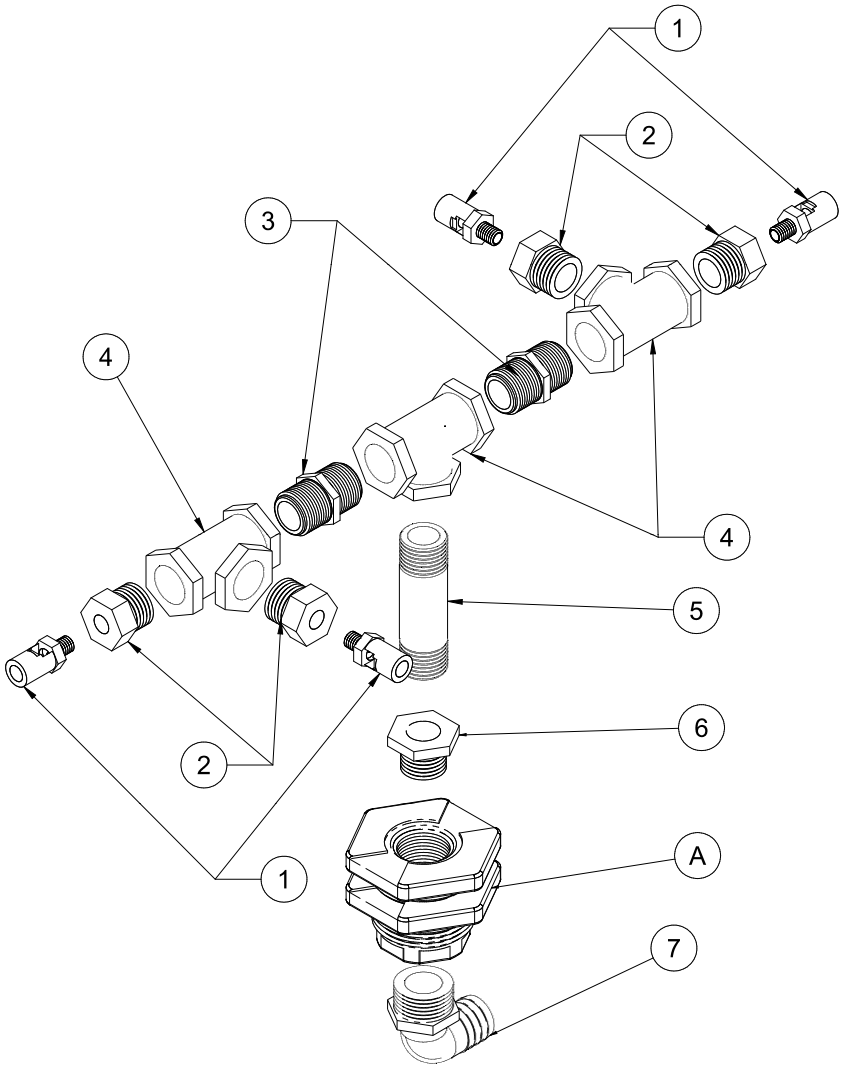
REF#	PART#	DESCRIPTION	QUANTITY
1	41-082	Engine, 10HP	1
2	31-320	Belt Guard mount	1
3	10-578	Pulley	1
4	15-124	Belt	1
5	31-319	Belt Guard	1
6	HB-516-18-075	Hex Bolt, 5⁄16 - 18 x 3⁄4	4
	78-274	Cage Nut, J-Type	4
7	16-998	Pump	1
8	18-372	3-Way Valve	1
9	HB-38-16-275	Hex Bolt, 3⁄8 - 16 x 2 3⁄4	1
	HWL-38	Lock Washer, 3⁄8	1
	HMB-12-14	Machine Bushing, 1⁄2 x 14GA	2
10	42-358	Idler Pulley	1
11	16-990	Replacement Spacer	1
12	HNFL-38-16	Flange Whiz-loc Nut, 3⁄8 - 16	1
13	42-327	Belt Tensioner	1
14		Main Frame	1
15	HB-516-18-175	Hex Bolt, 5⁄16 -18 x 1 3⁄4	4
	HNFL-516-18	Flange Whiz-loc Nut, 5⁄16 - 18	4
16	42-352	Hex Socket Head Shoulder Screw	1
17	31-351	Exhaust Deflector	1

SPRAY TANK DRAWING

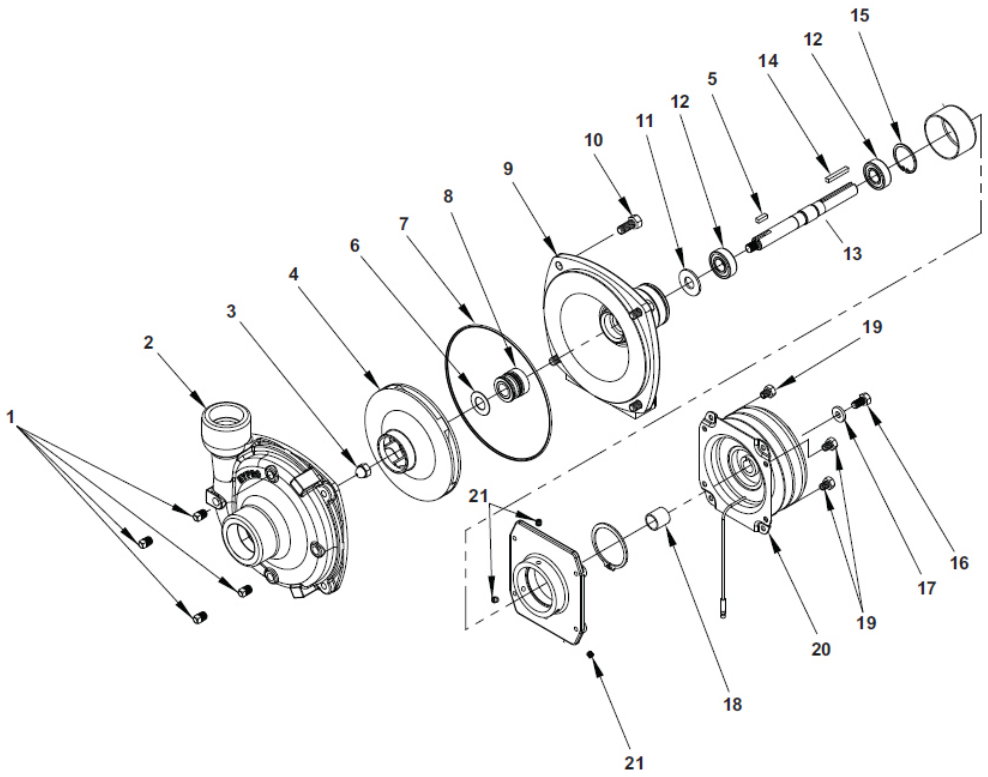


REF#	PART#	DESCRIPTION	QUANTITY
1	31-302	300 Gallon Poly Tank	1
	16-945	Double Thread Fitting(Agitation bottom of tank)	1
	16-194	Anti Vortex Fitting (bottom of tank)	1
	31-327	Decal, Spray Star 300T	2
2	31-318	Tank Strap	2
3	16-953	Tank Lid	1
4	14-365	Air Gap Filler	1
5	16-962	Coupler, 1"	1
6	16-961	Adapter, 1"	1
7	16-851	Close Nipple, 1"	2
8	18-448	PVC Ball Valve, 1"	1
9	16-945	Double Thread Fitting, 1"	4
10	33-495	Bulkhead Fitting	1
11	33-496	Reducer	1
12	18-475	Male Elbow	2
13	9038-34	Tubing x 34"	1
14	16-156	Elbow, 1¼ HB	2
15	16-935	Quick Coupler Cap	1
16	16-180	Quick Coupler	1
17	18-372	3-Way Valve	1
	18-372-01	Replacement Handle	1
18	16-998	Pump, Hypro	1
19	33-480	Pressure Switch	1
20	16-973	Hex Bushing	1
21	16-161	Fitting, 1¼ HB	2
22	8897-10	Discharge Hose, 10"	1
	18-116	Hose Clamp	1
23	HB-38-16-275	Hex Bolt, ⅜ - 16 x 2¾	4
	HW-38	Flat Washer, ⅜	4
	HNFL-38-16	Flange Whiz-loc Nut, ⅜ -16	4
24	31-314	Tank Carrier	1
25	31-344	Pump Mount	1
26	HB-38-16-125	Hex Bolt, ⅜ - 16 x 1¼	2
	HNFL-38-16	Flange Lock Nut, ⅜ - 16	2
27	16-162	1" Plug	4
28	10-639	Lid Stop	1
	HRS-316-100	Rivet, 3/16 x 1	2
	HW-316	Washer, 3/16	2
29	16-169	Strainer Basket	1
30	16-971	45° Elbow (inside tank)	1

TURBO QUAD AGITATOR



REF#	PART#	DESCRIPTION	QUANTITY
1	18-510	Mini Eductor	4
2	16-288	Reducer, 3/4 x 1/4	4
3	16-158	Close Nipple, 3/4 x 3/4	2
4	16-157	Female Pipe Thread Tee, 3/4 x 3/4 x 3/4	3
5	16-172	Nylon Nipple, ¾ NPT x 3½	1
6	18-388	Reducer, 11/4 x 3/4	1
7	16-168	Elbow, 11/4 MPT x 1HB	1
A	Comes with tank. Order parts below for replacement.		
	16-945	Double Thread Fitting	1
	16-163	Reducer Bushing. 1 x ¾	1
	16-164	Elbow, 1"	1

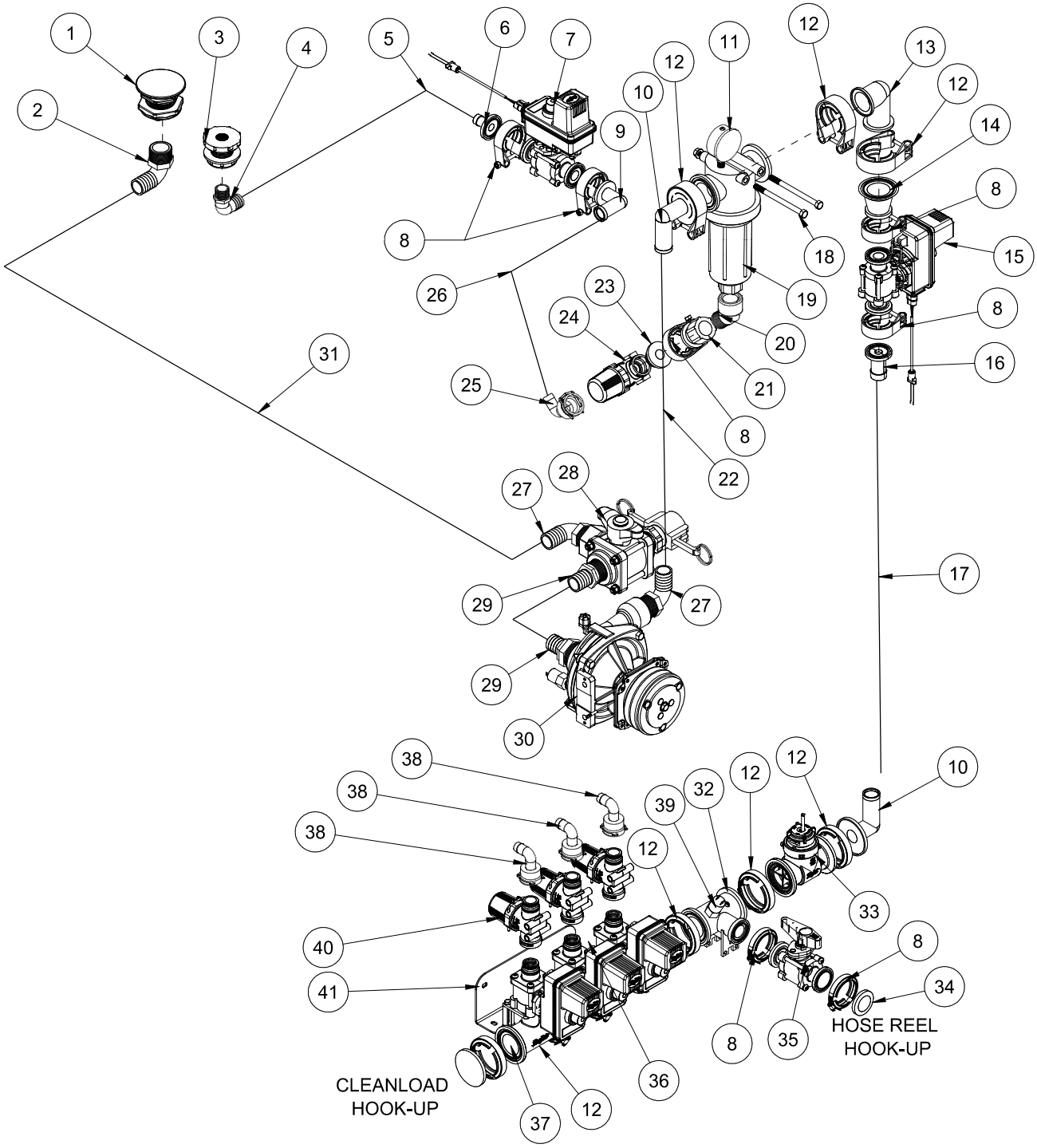


⚠ IMPORTANT **When servicing the spray pump or filter, all control valves must be shut off if there is liquid in the tank.**

REF#	PART#	DESCRIPTION	QUANTITY
1	16-998-01	Drain Plug	4
2	16-998-02	Pump Casing	1
3		Impeller Nut	1
4	16-966-16	Impeller	1
5	16-966-11	Key	1
6	16-998-10	Gasket	1
7*	16-998-04	O-Ring	1
8*	16-967	Mechanical Seal (Silicon Carbide)	1
9	16-998-06	Mounting Flange	1
10	16-998-07	Hex Bolt	
11	16-966-06	Slinger Ring	1
12	16-966-10	Ball Bearing	2
13	16-966-12	Pump Shaft	1
14	16-822-20	Key	1
15	16-966-13	Bearing Retainer	1
16	16-994-05	Hex Bolt	1
17	16-994-06	Retaining Washer	1
18	16-994-03	Spacer	1
19		Hex Bolt	4
20	16-994-01	Clutch	1
21	16-994-04	Set Screw	3
	16-998-12	Pump Only	
*	16-967	Silicone - Carbon Seal Kit	

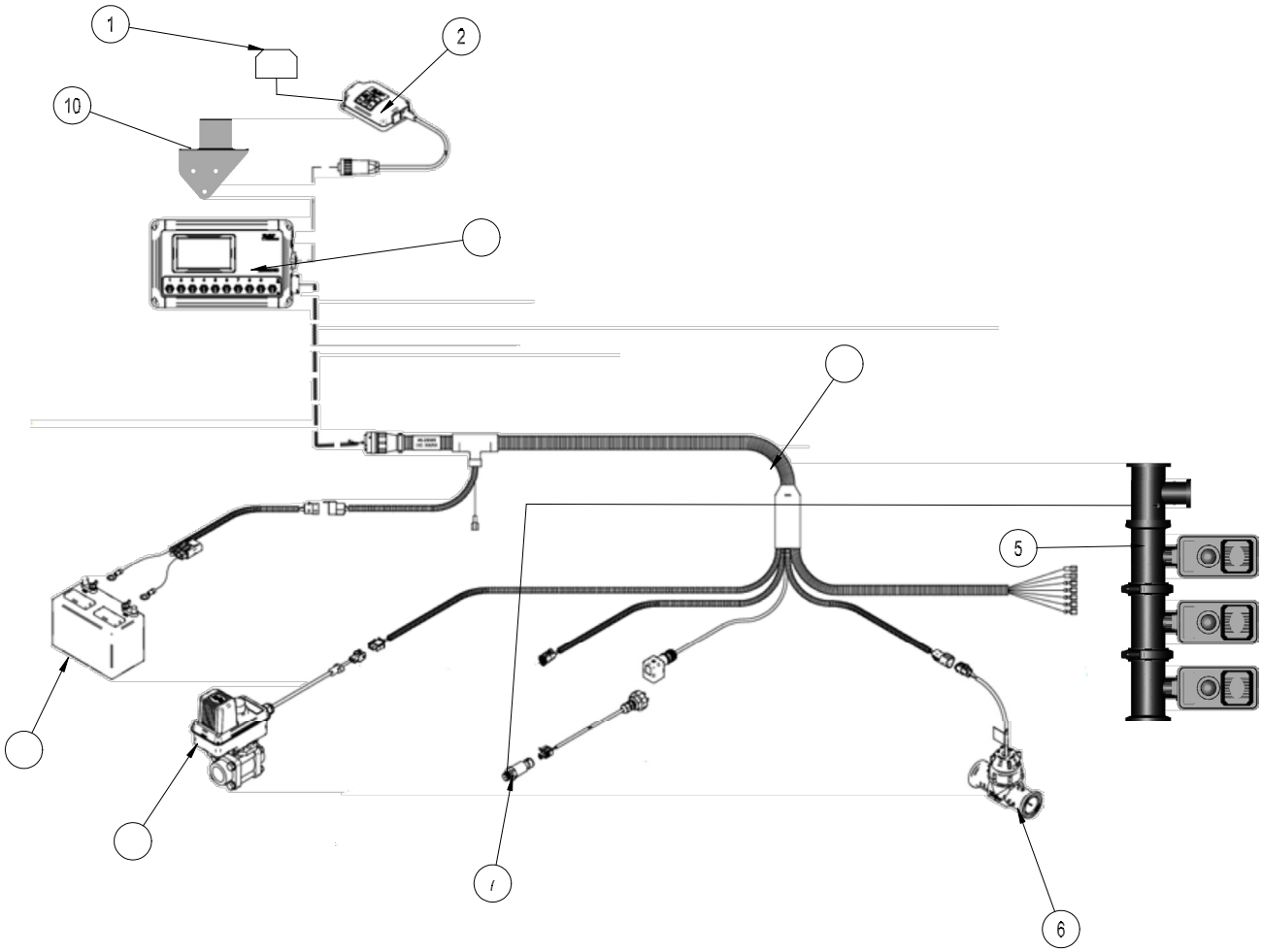
RADION PLUMBING

	18' BOOM	20' BOOM
Center	9032-106"	9032-106"
Left	9032-149"	9032-159"
Right	9032-116"	9032-126"



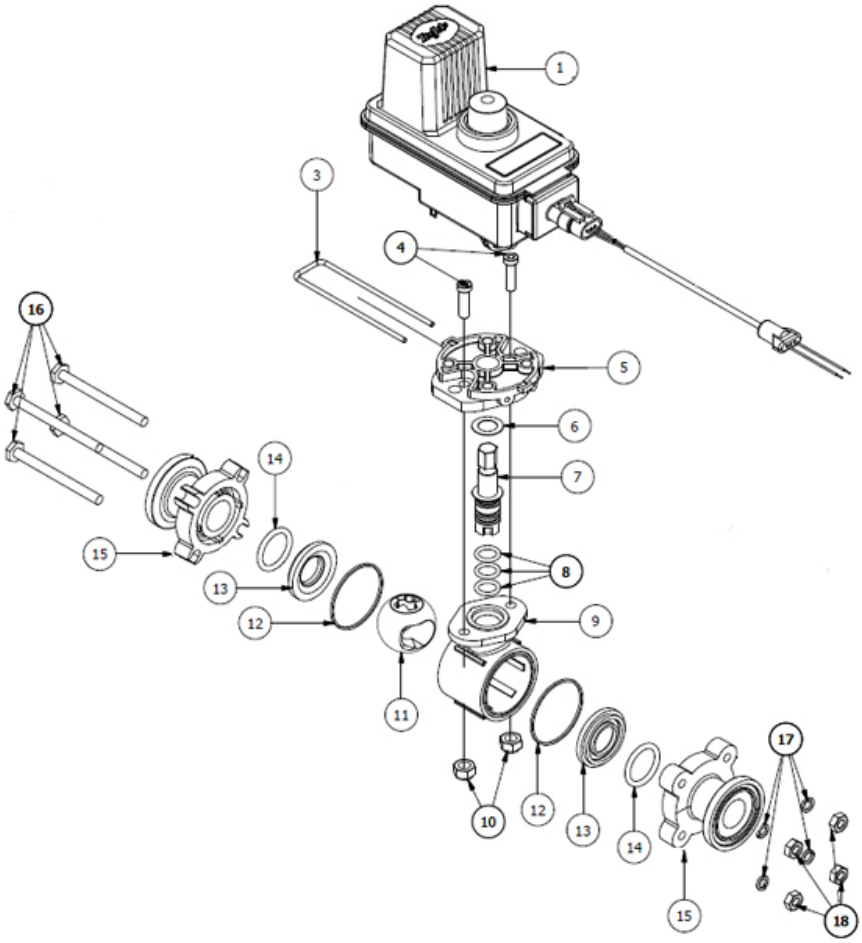
REF#	PART#	DESCRIPTION	QUANTITY
1	16-194	Anti-Vortex Fitting (part of tank)	1
2	16-156	Elbow, 1¼ MPT x 1¼ HB	1
3	16-945	Double Thread Fitting	1
4	16-164	Elbow, 1MPT x 1 HB	1
5	8896-33	1" Discharge Hose x 33"	1
	18-222	Hose Clamp	2
6	15-808	Hose Barb	1
7	14-673	Valve, Shutoff	1
8	15-740	#50 Hose Clamp	7
9	15-746	#50 90° x 1" Hose Barb	1
10	15-739	#50 90° x 1¼" Hose Barb	1
11	16-281	Liquid Filled Gauge	1
12	15-741	#75 Hose Clamp	7
13	15-734	#75 Elbow Coupling	1
14	15-748	#50 to #75 Reducer Coupling	1
15	20-785	6RPM Regulating Valve	1
16	15-870	#50 1-1/4" Hose Barb	1
17	8897-10	1-1/4" Discharge Hose x 10"	1
	18-116	Hose Clamp	2
18	HBFL-38-16-500	Flange Whiz-loc Bolt, ⅜ -16 x 5	2
	HNFL-38-16	Flange Whiz-loc Nut, ⅜-16	2
19	15-737	Flanged Strainer	1
20	16-971	45° Elbow	1
21	15-735	#50 Adapter	1
22	8897-43	1¼" Discharge Hose x 43"	1
	18-116	Hose Clamp	2
23	15-825	QC Flange Adapter	1
24	14-801	QC Strainer, 50 Mesh	1
25	14-671	90° Elbow	1
26	8896-21	1" Discharge Hose x 21"	1
	18-222	Hose Clamp	2
27	16-156	Elbow, 1¼ MPT x 1¼ HB	2
28	18-372	3-Way Valve	1
	18-372-01	Replacement Handle	1
29	16-161	Fitting, 1¼ MPT x 1¼ HB	2
30	16-998	Hypro Pump	1
31	8897-37	1¼" Discharge Hose x 37"	1
	18-116	Hose Clamp	2
32	30-164	Tapped Reducer Tee	1
33	20-684	#802 Flowmeter	1
34	15-778	Blank Gauge Port Flange	1
35	15-738	Flanged Ball Valve	1
36	15-743	453 Manifold	1
37	15-742	#75 Cover	1
38	15-553	¾ - 90° Hose Barb	3
	9032	Black Hose, ¾"	
	18-040	Hose Clamp	6
39	20-670-04	Pressure Sensor	1
40	14-607	Strainer, QC 100 Mesh	3
41	31-347	Vavle Adapter Plate	1
	HB-516-18-100	Hex Bolt, 5⁄16 -18 x 1	2
	HNFL-516-18	Flange Whiz-loc Nut, 5⁄16-18	2

RADION WIRING



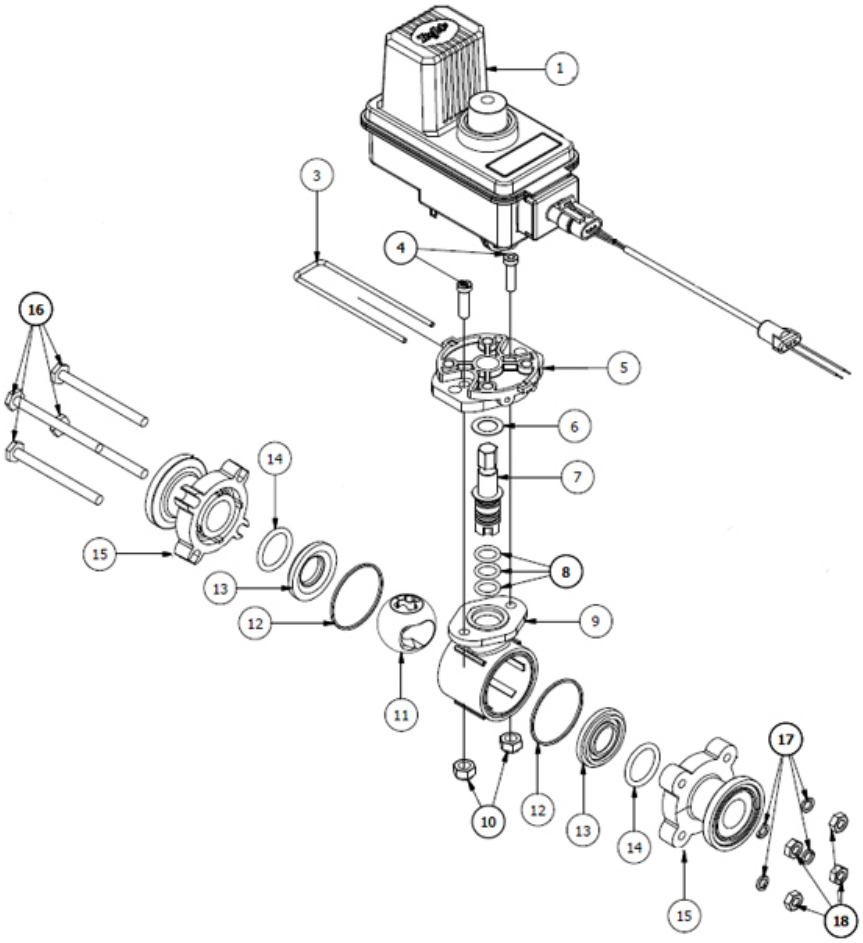
⚠ IMPORTANT If using Simulated Speed with a Radion 8140, one needs to change back to Ground Speed for proper rate control when spraying.

REF#	PART#	DESCRIPTION	QUANTITY
1*		Antenna	1
2*	20-687-02	GPS Speed Sensor	1
3*	20-697-01	Radion 8140 Console	1
	31-222	Suction Cup Mount	1
4*	20-697-02	Wire Harness	1
5	15-743	Manifold Valve	1
6	20-684	Flow Meter	1
7*	20-670-04	Pressure Sensor	1
8	20-785	Regulator Valve	1
9		Battery	1
10	31-343	Controller Mount	1
*	20-697	TeeJet® Radion Kit (includes * items)	1

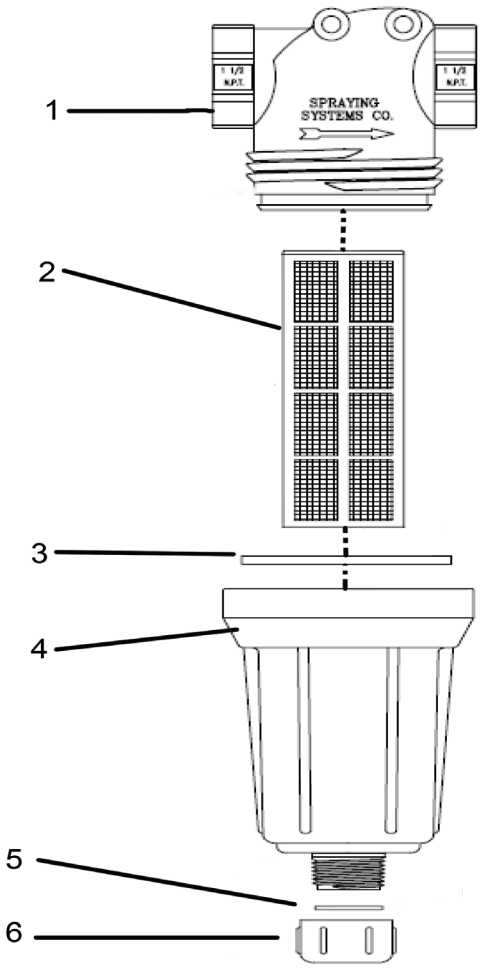


REF#	PART#	DESCRIPTION	QUANTITY
1	20-785-01	Motor, 6RPM	
3	15-552-24	Retaining Clip	1
4	15-552-25	Socket Head Cap Screw, Stainless Steel	2
5	15-552-26	Motor Adapter, Polypropylene	1
6*	15-517-11	Thrust Washer, Teflon	1
7	15-552-27	Stem, Stainless Steel	1
8	15-552-05	O-ring, Viton	3
9	15-517-16	Body, Nylon	1
10		Lock Nut, Stainless Steel	2
11	20-685-02	Ball, Polypropylene	1
12*	15-552-13	Gasket, Viton	2
13*	15-517-19	Seal, Teflon	2
14*	15-517-20	O-ring, Viton	2
15	15-743-01	End Cap	1
16		SS Hex Bolt, 1/4 - 20 x 3	4
17		SS Lock Washer, 1/4	4
18	15-517-23	SS Nut, 1/4 - 20	4
*	15-552-10	Spare Parts Kit	
	20-785	Complete Regulator Valve	

15-743 MANIFOLD BALL VALVE



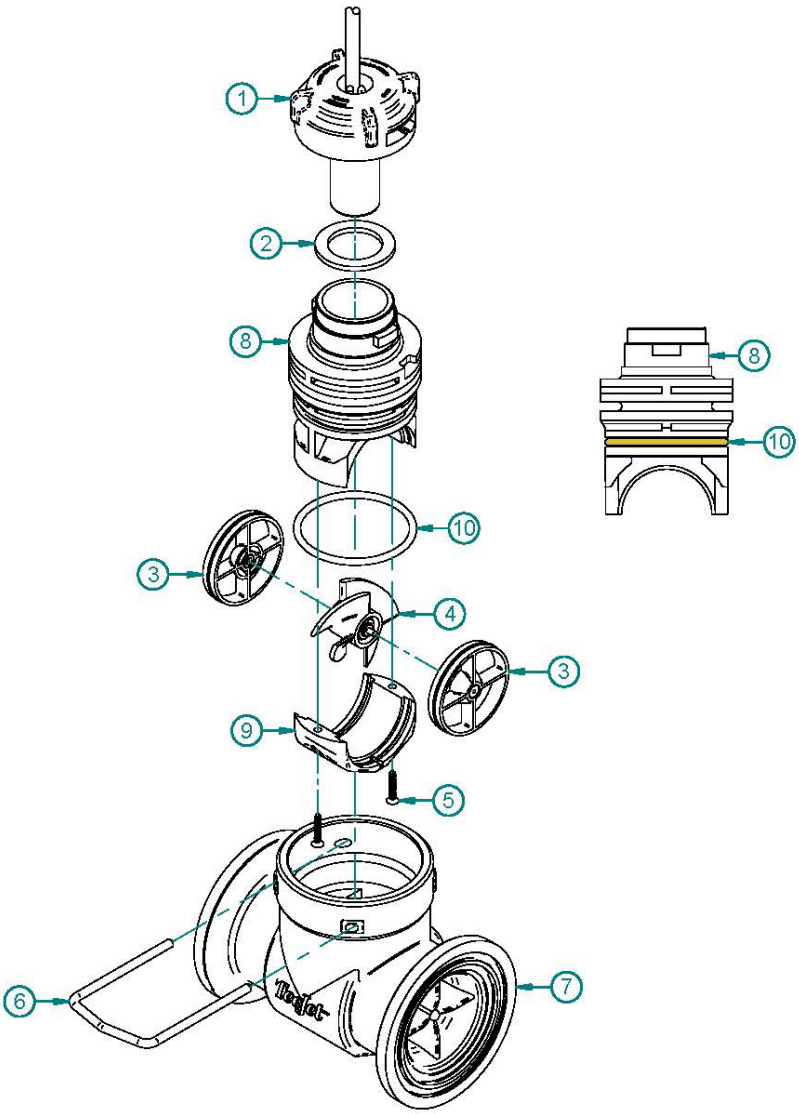
REF#	PART#	DESCRIPTION	QUANTITY
1	15-552-23	Motor	
2	15-878	Metri-Pack Cable (comes with motor)	1
3	15-552-24	Retaining Clip	1
4	15-552-25	Socket Head Cap Screw, Stainless Steel	2
5	15-552-26	Motor Adapter, Polypropylene	1
6*	15-517-11	Thrust Washer, Teflon	1
7	15-552-27	Stem, Stainless Steel	1
8*	15-552-05	O-ring, Viton	3
9	15-517-16	Body, Nylon	1
10		Lock Nut, Stainless Steel	2
11	15-743-04	Ball, Polypropylene	1
12*	15-552-13	Gasket, Viton	2
13*	15-517-19	Seal, Teflon	2
14*	15-517-20	O-ring, Viton	2
15	15-743-01	End Cap	1
16	15-743-02	#75 Tee Body	1
17	15-743-06	Screw, SS	4
18	15-743-03	Mounting Rail Aluminum	1
*	15-552-10	Spare Parts Kit (includes all * items)	
	15-743-05	Single Valve (shown)	



REF#	PART#	DESCRIPTION	QUANTITY
1	15-737-01	Strainer Head 75 Series	1
2*	16-968-03	50 Mesh Strainer	1
**	16-968-05	80 Mesh Strainer	1
3	14-521-02	EPDM Gasket	1
4	14-521-03	Bowl 1" NPT	1
5	14-521-04	EPDM Rubber gasket	1
6	14-521-05	Cap	1

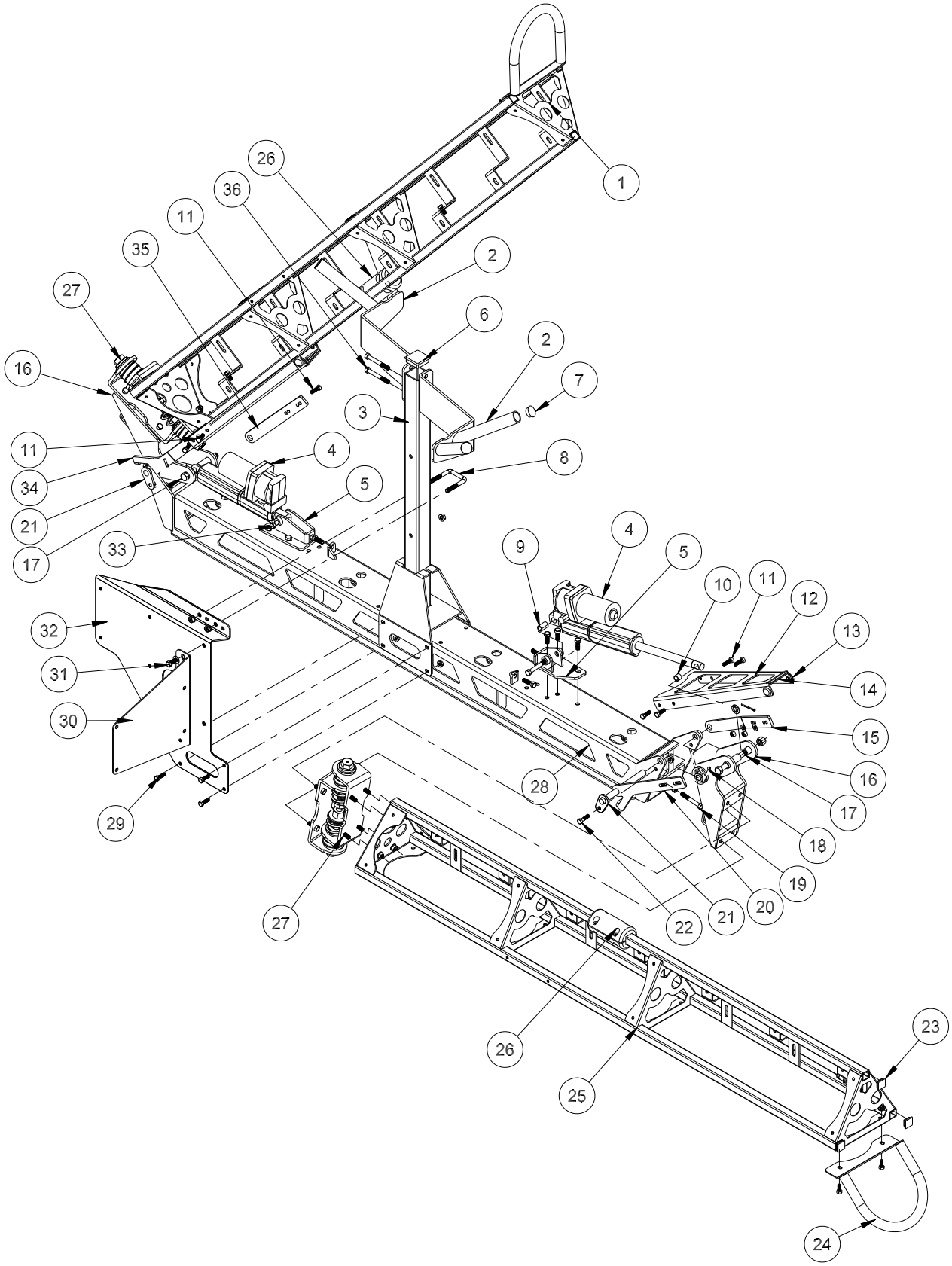
*	15-737	Flanged Strainer Assembly with 50 Mesh Screen

20-684-P FLOW METER



REF#	PART#	DESCRIPTION	QUANTITY
1	20-684-01	Sensor, PCB Assembly	1
2		Washer, Seal	1
3*		Guide Vane Bearing	2
4*		Turbine Assembly	1
5*		Flat HEad Screw, #6 - ⅝	2
6		Pin, Retaining	1
7	20-684-04	Body	1
8*		Insert, Body	1
9*		Endcap	1
10*	20-684-02	Oring	1
*	20-684-03	802 Flowmeter Repair Kit (includes all * items)	

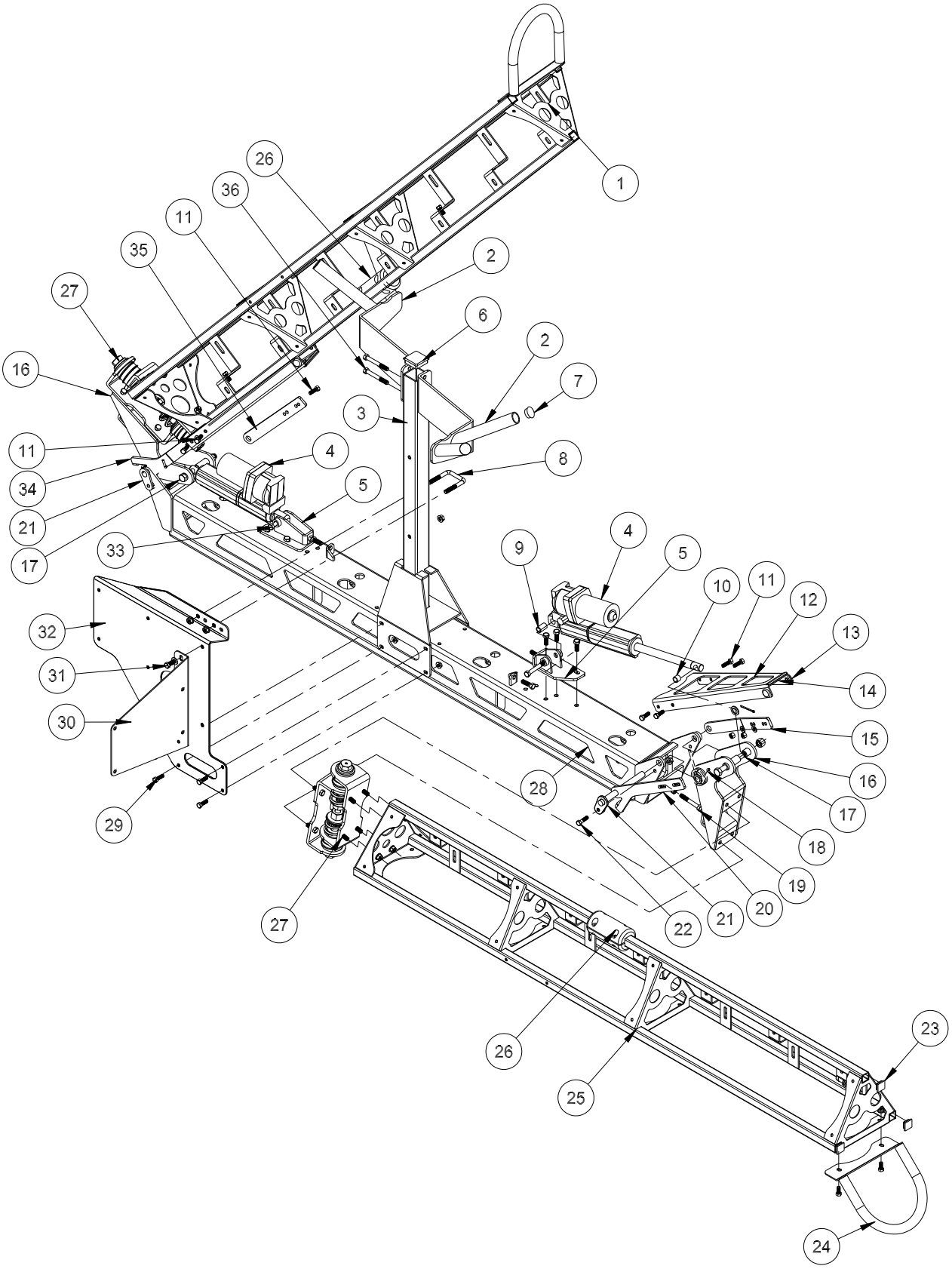
17-580 20' HEAVY BOOM



REF#	PART#	DESCRIPTION	QUANTITY
1	17-652	Left Boom Arm	1
2	17-631	V-Boom Nest	2
3	17-578	Boom Nest Post	1
4	30-214	10" Electric Hydraulic Actuator	2
5	30-184	Actuator Mount	2
	HN-38-16	Hex Nut, 3/8 - 16 (adjustment Hex Bolt)	4
	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	6
	HW-38	Flat Washer, 3/8	6
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 -16	6
6	18-297	Cap Plug	1
7	17-619	Push in Plug	4
8	17-537	Square U-Hex Bolt	1
9	18-036	1" Bushing (part of 30-214)	2
10	18-234	1/2" Bushing (part of 30-214)	2
11	HB-516-18-100	Hex Bolt, 5/16 -16 x 1	8
	HW-516	Flat Washer, 5/16	4
	HNTL-516-18	Nylon Lock Nut, 5/16 - 18	8
12	32-564	Boom Lock	2
13	8803-2.75	Trim Lace, 2 3/4	2
14	42-116	Rubber Insert	4
15	17-588	Lock Hinge, RH	1
16	30-185	Arm Pivot Hinge	2
	HG-14-28-180	Grease Fitting, 1/4 - 28 x 180°	2
	76-128	Bushing	4
17	HB-12-13-500	Hex Bolt, 1/2 - 13 x 5	2
	HNTL-12-13	Nylon Lock Nut, 1/2 - 13	2
18	17-597	Torsion Spring, RH	1
19	HB-38-16-175	Hex Bolt, 3/8 - 16 x 1 3/4	2
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 -16	4
20	17-589	Limit Hinge, RH	1
21	17-596	Hinge Pin w/Spacer	2
	HP-18-100	Cotter Pin, 1/8 x 1	2
22	HB-516-18-100	Hex Bolt, 5/16 -16 x 1	2
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 - 18	2
23	30-258	1" 10-14ga Ribbed Plug	10
24	17-541	Boom End Guard	2
	HBFL-516-18-075	Flange Whiz-loc Bolt, 5/16 - 18 x 3/4	4
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 - 18	4
25	17-653	Right Boom Arm	1
26	17-573	Guide Block Set	2
	HB-14-20-125	Hex Bolt, 1/4 -20 x 1 1/4	8
	HNTL-14-20	Nylon Lock Nut, 1/4 - 20	8
27	17-632	Boom Hinge Complete	2
	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	16
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 - 16	16
28	17-651	Boom Center	1
29	HB-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	8
	HW-516	Flat Washer, 5/16	8
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 - 18	8

(Continue on next page)

17-580 20' BOOM DRAWING

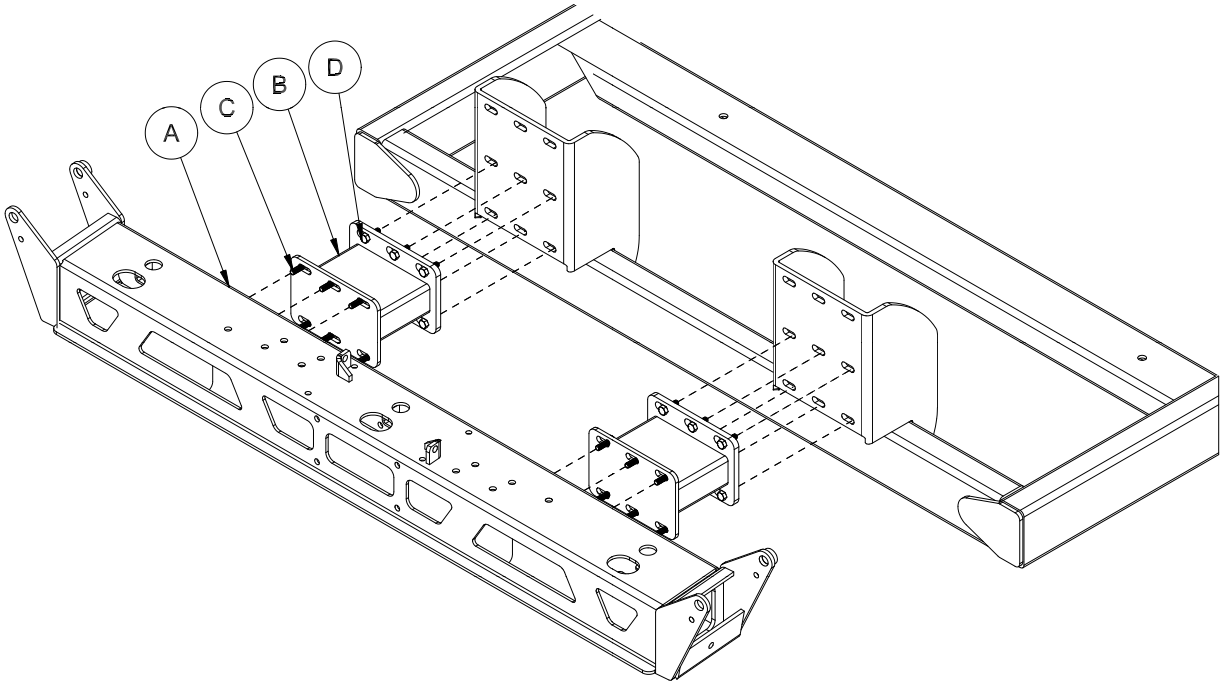


17-580 20' BOOM PARTS LIST

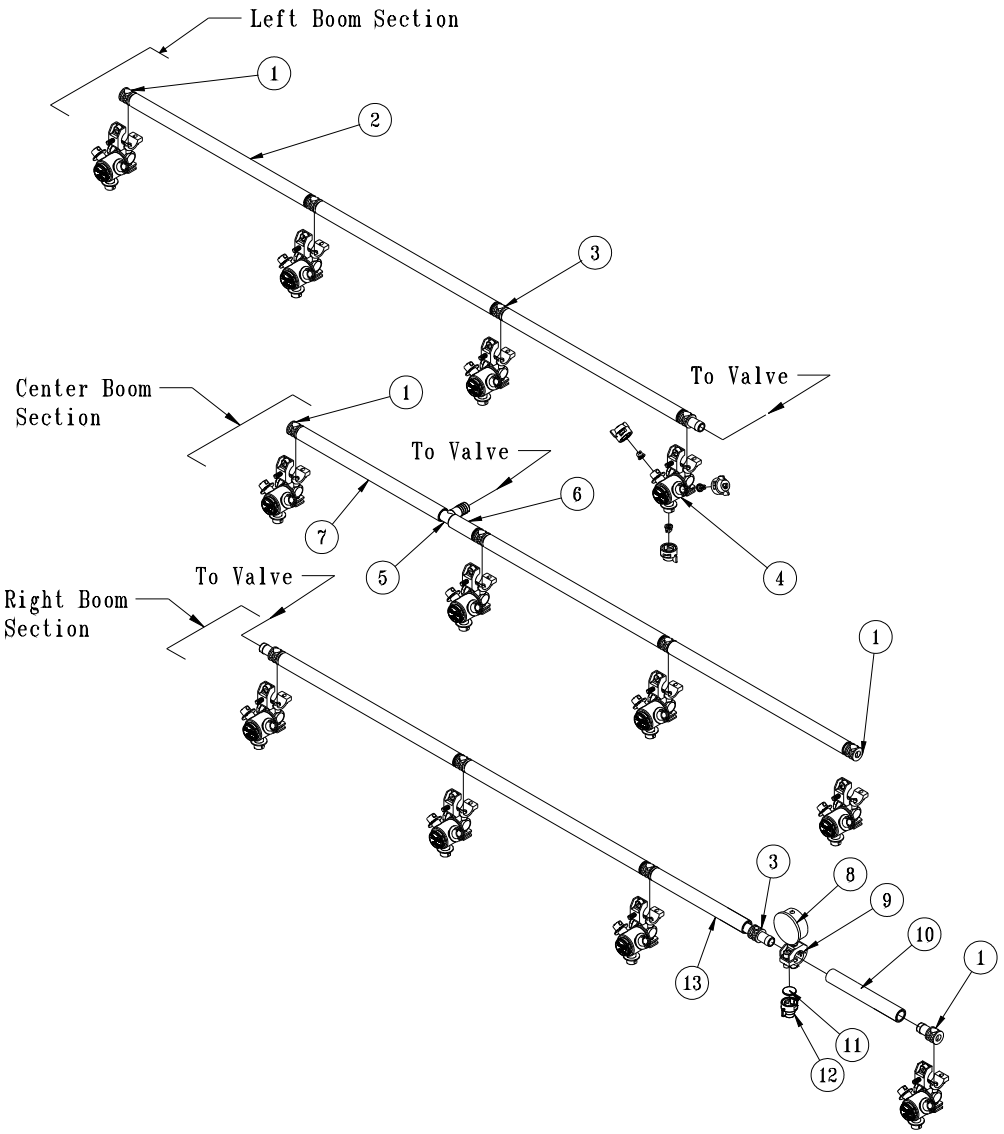
REF#	PART#	DESCRIPTION	QUANTITY
30	17-636	Fresh Water Tank Mount	1
31	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	2
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 - 16	2
	HW-38	Flat Washer, 3/8	2
32	17-660	Clean Load Mount	1
	8803-13	Black Trim, 13"	1
33	HB-12-13-300	Hex Bolt, 1/2 - 13 x 3	2
	HNTL-12-13	Nylon Lock Nut, 1/2 - 13	2
34	17-593	Limit Hinge, LH	1
	17-598	Torsion Spring, LH	1
35	17-592	Lock Hinge, LH	1
36	HB-38-16-300	Hex Bolt, 3/8 - 16 x 3	2
	HNTL-38-16	Nylon Lock Nut, 3/8 - 16	2

BOOM MOUNT TO TRUCK

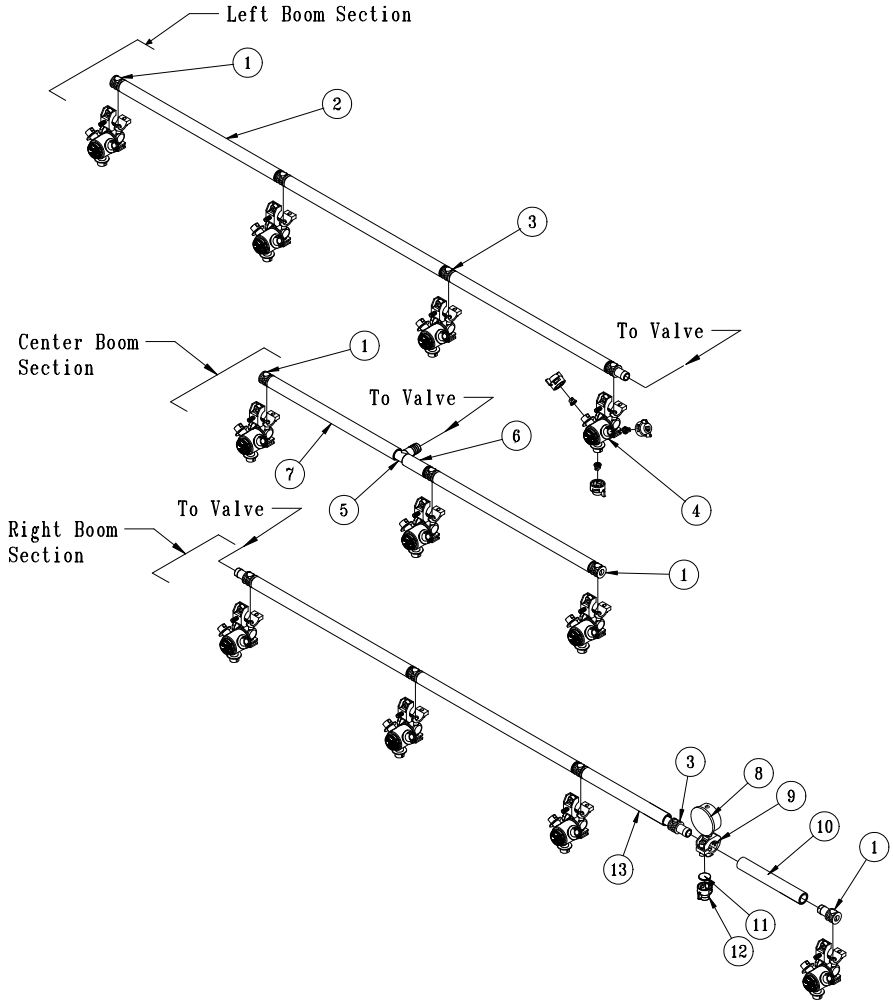
REF#	PART#	DESCRIPTION	QUANTITY
A		Center Boom Mount	1
B	17-614	Boom Spacer	2
C	HB-516-18-100	Hex Bolt, 5/16 -18 x 1	12
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 -18	12
D	HB-38-16-125	HexBolt, 3/8 -16 x 1¼	12
	hnfl-38-16	Flange Whiz-loc Nut, 3/8 -16	12
	HW-38	Flat Washer, 3/8	12
	HW-516	Flat Washer, 5/16	12



17-580 20' HD BOOM PLUMBING

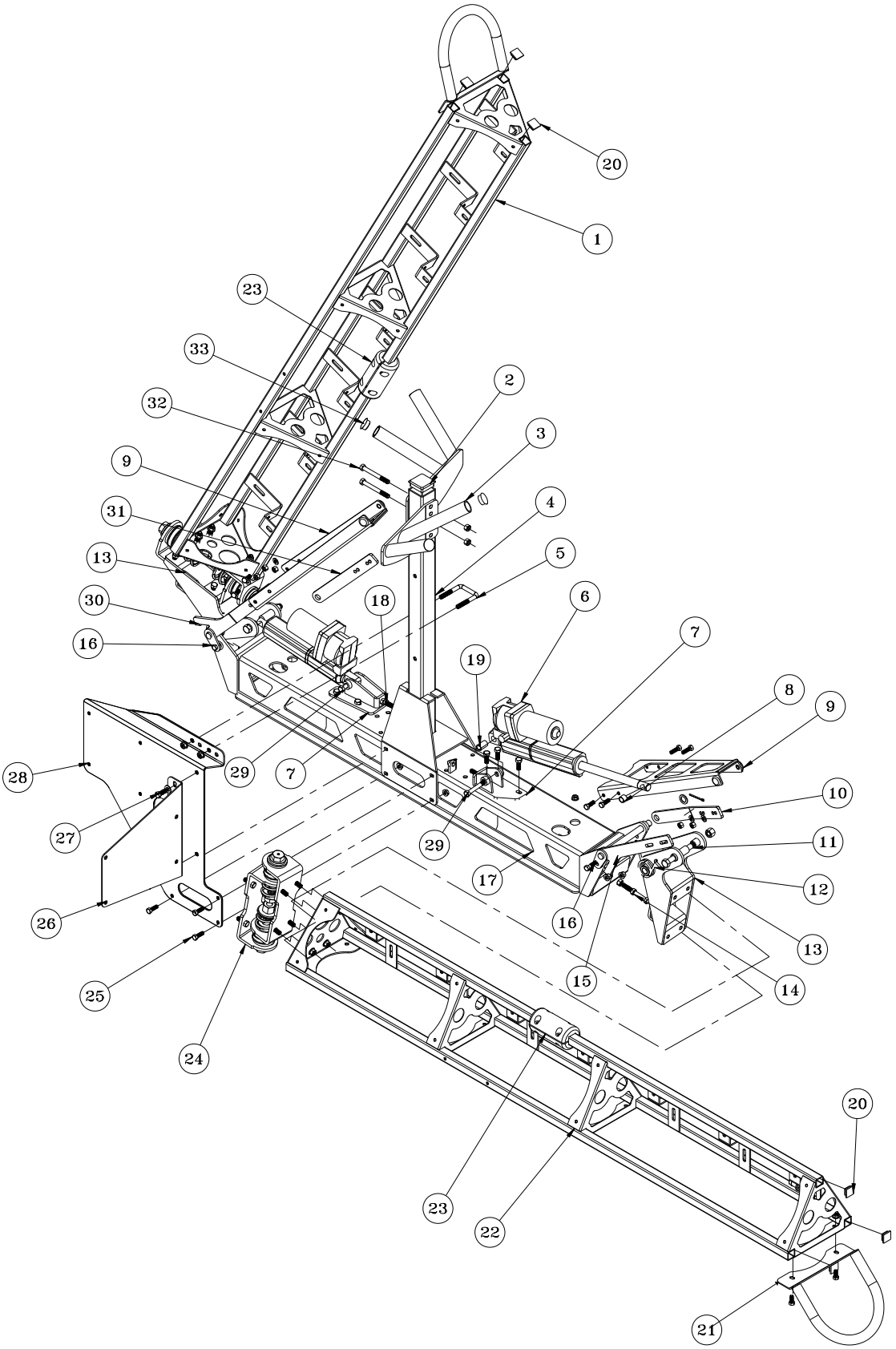


REF#	PART#	DESCRIPTION	QUANTITY
1	18-417	Single Barb	4
2	9032-19	Black Hose, 3/4" x 19"	7
	18-040	Hose Clamp	14
3	18-416	Double Barb	9
4	33-506	Nozzle body (see nozzle drawing)	12
5	18-415	3/4" Hose Barb	1
6	9032-2.5	Black Hose3/4" x 2 1/2"	1
	18-040	Hose Clamp	2
7	9032-15.5	Black Hose 3/4" x 15 1/2"	1
	18-040	Hose Clamp	2
8	16-281	Gauge	1
9	17-602	Nozzle Body	1
10	9032-5	Black Hose 3/4" x 5"	1
	18-040	Hose Clamp	2
11	16-800	Gasket	1
12	16-921	Cap	1
13	9032-13	Black Hose 3/4" x 13"	1
	18-040	Hose Clamp	2



REF#	PART#	DESCRIPTION	QUANTITY
1	18-417	Single Barb	4
2	9032-19	Black Hose, 3/4" x 19"	6
	18-040	Hose Clamp	12
3	18-416	Double Barb	8
4	33-506	Nozzle body (see nozzle drawing)	11
5	18-415	3/4" Hose Barb	1
6	9032-2.5	Black Hose, 3/4" x 2 1/2"	1
	18-040	Hose Clamp	2
7	9032-15.5	Black Hose, 3/4" x 15 1/2"	1
	18-040	Hose Clamp	2
8	16-281	Gauge	1
9	17-602	Nozzle Body	1
10	9032-5	Black Hose, 3/4" x 5"	1
	18-040	Hose Clamp	2
11	16-800	Gasket	1
12	16-921	Cap	1
13	9032-13	Black Hose, 3/4" x 13"	1
	18-040	Hose Clamp	2

17-585 18' HD BOOM DRAWING

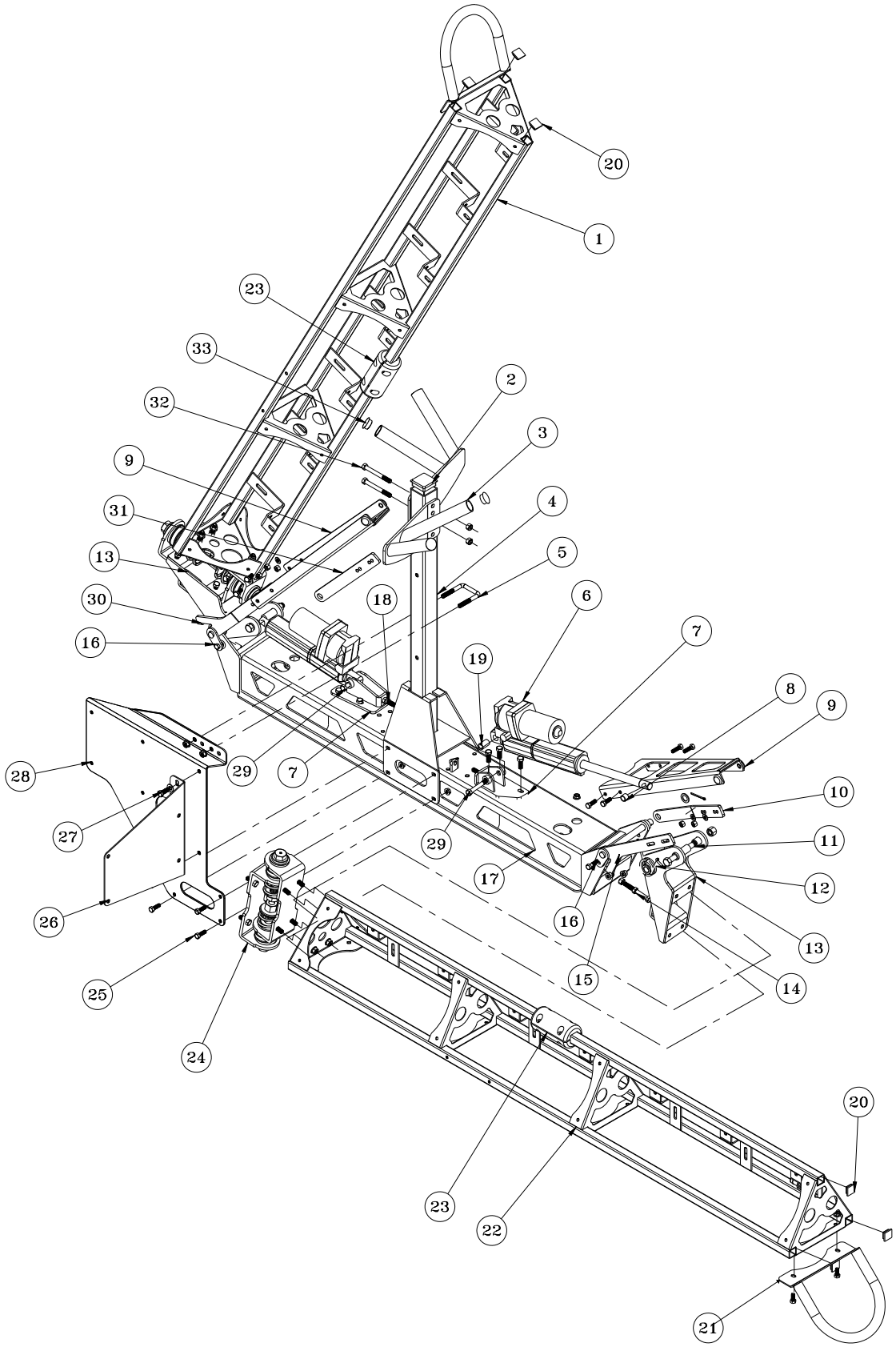


17-585 18' HD BOOM PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	17-652	Left Boom Arm	1
2	18-297	Cap Plug	1
3	17-617	Boom Nest	2
4	17-578	Boom Nest Post	1
5	17-537	Square U-Hex Bolt	1
6	30-214	KYB Electric/ Hydraulic Actuator (includes * items)	2
7	30-184	Ram Mount	2
	HN-38-16	Hex Nut, 3/8 - 16 (for adjustment Hex Bolts)	4
	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	6
	HW-38	Flat Washer, 3/8	6
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 -16	6
8*	18-036	1/2" Bushing (part of 30-214)	2
9	32-564	Boom Lock	2
	HB-516-18-100	Hex Bolt, 5/16 - 18 x 1	8
	HW-516	Flat Washer, 5/16	4
	HNTL-516-18	Nylon Lock Nut, 5/16 -18	8
	42-116	Rubber Insert	4
	8803-2.75	Trim Lace, 2.75"	2
10	17-588	Lock Hinge, RH	1
11	HB-12-13-500	Hex Bolt, 1/2 - 13 x 5	2
	HNTL-12-13	Nylon Lock Nut, 1/2 - 13	2
12	17-597	Torsion Spring, RH	1
13	30-185	Arm Pivot Hinge	2
	HG-14-28-180	Grease Fitting, 1/4 - 28 x 180°	2
	76-128	Bushing (part of 30-185)	4
14	HB-38-16-175	Hex Bolt, 3/8 - 16 x 1 3/4	2
	HNFL-38-16	Flange Whiz-loc Nut,3/8 - 16	4
15	17-589	Limit Hinge, RH	1
16	17-596	Hinge Pin w/ Spacer	2
	HP-18-100	Cotter Pin 1/8 x 1	2
	HB-516-18-100	Hex Bolt, 5/16 - 18 x 1	2
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 -18	2
17	17-650	Boom Center	1
18	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	2
	HNFL-38-16	Hex Nut, 3/8 - 16	4
19*	18-234	1" Bushing (part of 30-214)	2
20	30-258	Ribbed 1" Plug	10
21	17-541	Boom End Guard	2
	HBFL-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	4
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 - 18	4
22	17-653	Right Boom Arm	1
23	17-573	Guide Block Set	2
	HB-14-20-125	Hex Bolt, 1/4 - 20 x 1 1/4	8
	HNTL-14-20	Nylon Lock Nut, 1/4 - 20	8
24	17-632	Boom Hinge Complete	2
	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	16
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 - 16	16
25	HB-516-18-100	Hex Bolt, 5/16 - 18 x 1	8
	HW-516	Flat Washer, 5/16	8
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 - 18	8

(Continue on next page)

17-585 18' HD BOOM DRAWING

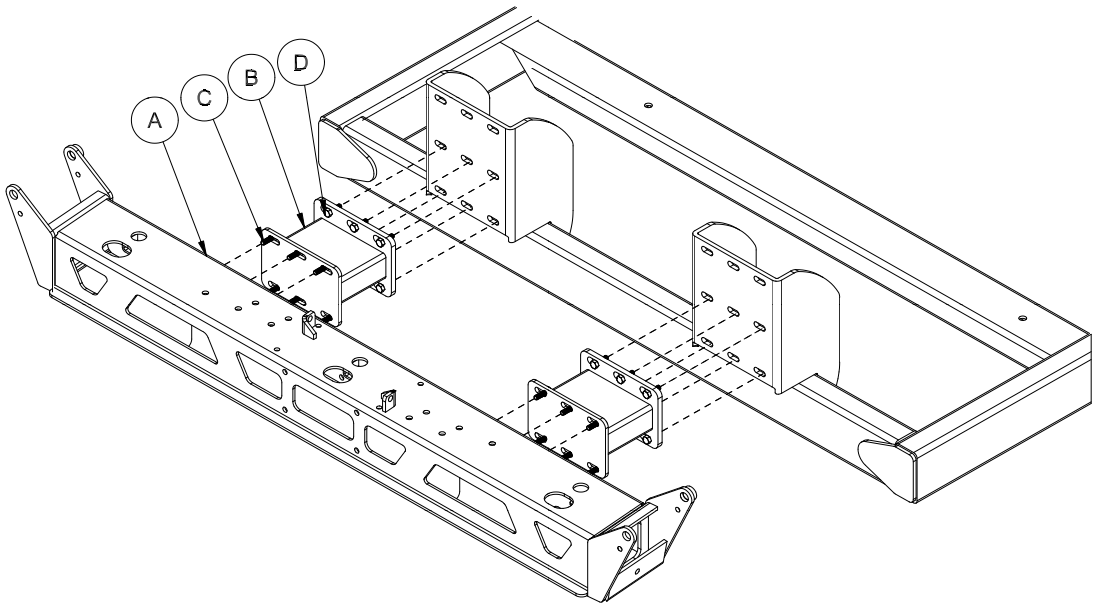


17-585 18' HD BOOM PARTS LIST

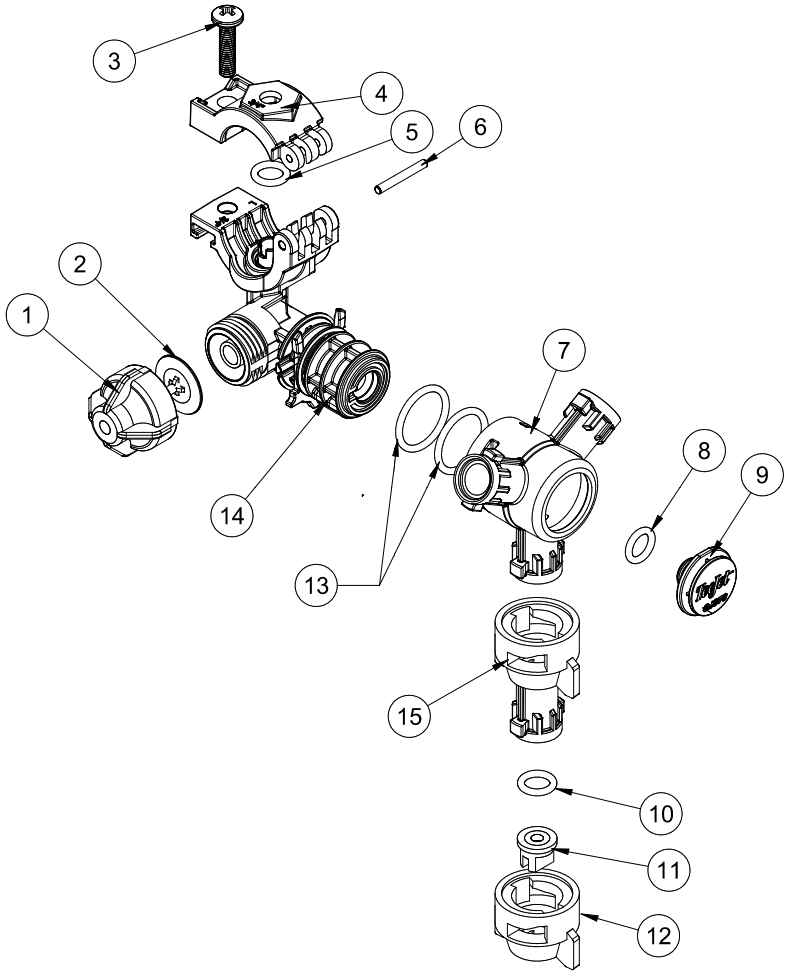
REF#	PART#	DESCRIPTION	QUANTITY
26	17-636	Fresh Water Tank Mount	1
27	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	2
	HNFL-38-16	Flange Whiz-loc Nut, 3/8 - 16	2
	HW-38	Flat Washer, 3/8	2
28	17-660	Clean Load Mount	1
	8803-13	Black Trim x 13"	1
29	HB-12-13-300	Hex Bolt, 1/2 - 13 x 3	2
	HNTL-12-13	Nylon Lock Nut, 1/2 - 13	2
30	17-593	Limit Hinge, LH	1
	17-598	Torsion Spring, LH	1
31	17-592	Lock Hinge, LH	1
32	HB-38-16-300	Hex Bolt, 3/8 - 16 x 3	2
	HNTL-38-16	Nylon Lock Nut, 3/8 - 16	2
33	17-619	Tube Cap	4

BOOM MOUNT TO TRUCK

REF#	PART#	DESCRIPTION	QUANTITY
A		Center Boom Mount	1
B	17-614	Boom Spacer	2
C	HB-516-18-100	Hex Bolt, 5/16 -18 x 1	12
	HNFL-516-18	Flange Whiz-loc Nut, 5/16 -18	12
D	HB-38-16-125	HexBolt, ⅜ -16 x 1¼	12
	hnfl-38-16	Flange Whiz-loc Nut, ⅜ -16	12
	HW-38	Flat Washer, ⅜	12
	HW-516	Flat Washer, 5/16	12



33-563 STANDARD NOZZLE ASSEMBLY



REF#	PART#	DESCRIPTION	QUANTITY
1*	16-988	Cap Assembly	1
2*	16-920-06	Diaphragm, EPDM	1
3*		Stainless Steel Screw	1
4*		Upper Clamp	1
5*	16-920-03	O-ring	1
6*		Pivot Pin, Stainless Steel	1
7*		Turret, 3-Outlet, Nylon	1
8*		O-ring, EPDM	1
9*		Plug	1
12	33-538	Cap - White	1
11	33-554	Nozzle Tip - White (XR11008-VS)	1
10	16-800	Viton Gasket	1
13*		O-ring, Teflon	2
14*	33-563	Nozzle Body (includes all * items)	1
15	20-779	Nozzle Tip Extension	1

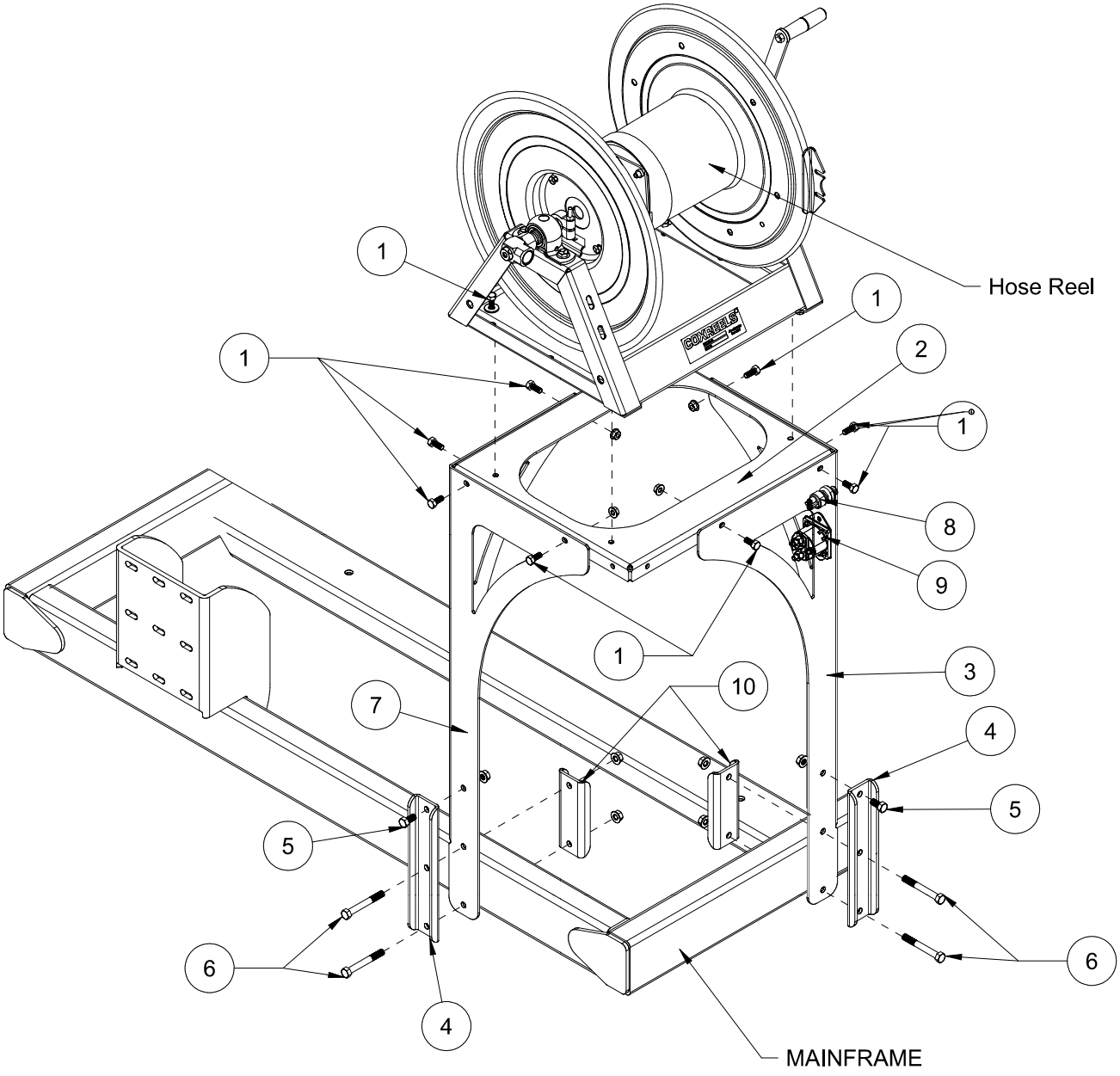
Quantity is per nozzle body. For 18' booms multiply quantity by 11.

Quantity is per nozzle body. For 20' booms multiply quantity by 12.

Nozzles are located 20" (51 cm) apart on the right, left, and center tubes.

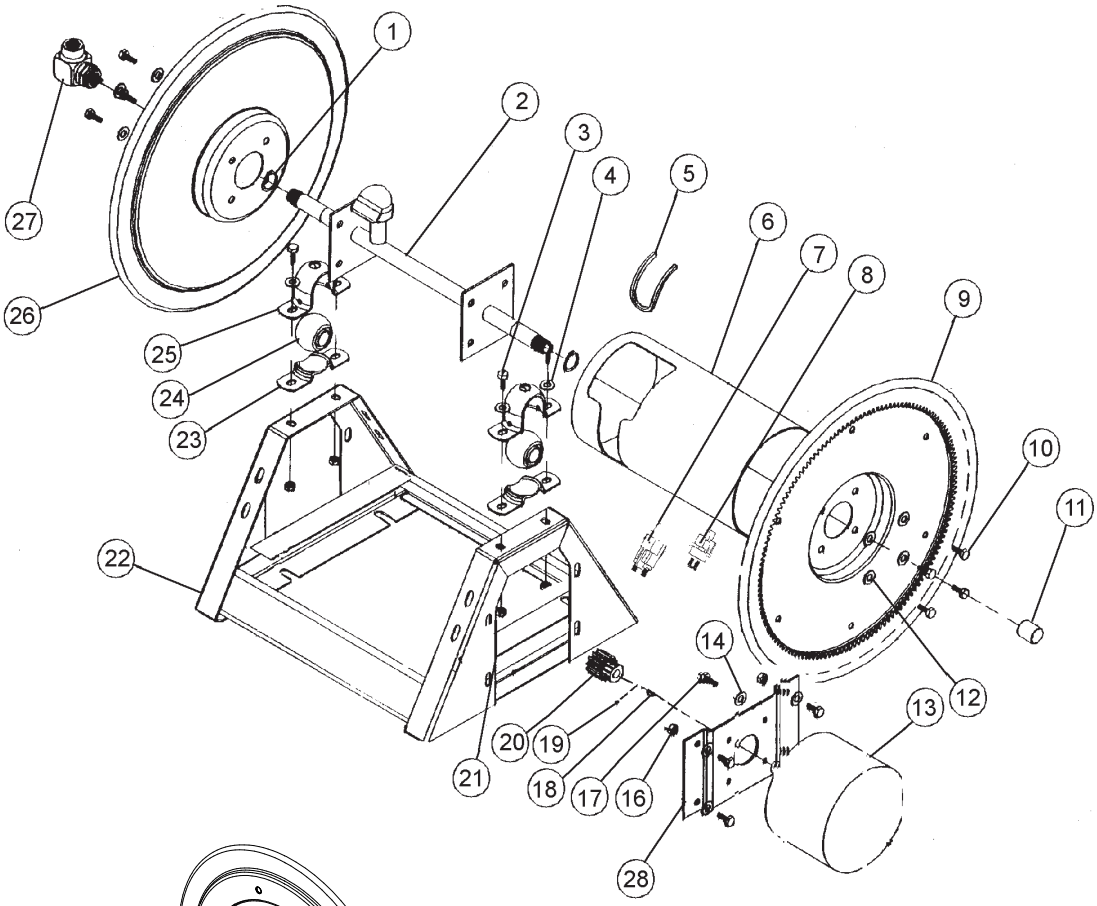
Nozzles are 20" high off ground.

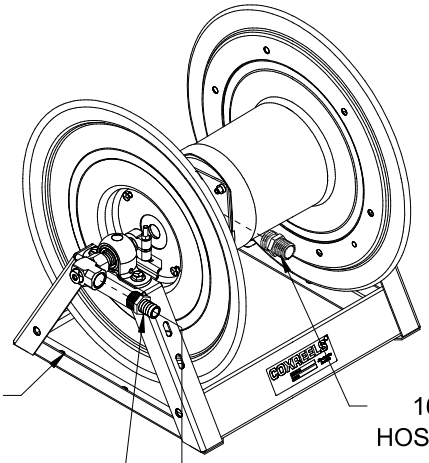
31-305/31-306 HOSE REEL MOUNT DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	HB-516-18-075	Hex Bolt, 5⁄16-18-3⁄4	12
	HNFL-516-18	Flange Whiz-loc Nut, 5⁄16 -18	12
2	31-315	Hose Reel Plate	1
3	31-333	RH Leg	1
4	31-336	Leg Brace	2
5	HB-38-16-075	Hex Bolt, 3⁄8 - 16 x 3⁄4	2
	HNFL-38-16	Flange Whiz-loc Nut, 3⁄8 - 16	2
6	HB-38-16-300	Hex Bolt, 3⁄8 -16 x 3	4
	HNFL-38-16	Flange Whiz-loc Nut, 3⁄8 - 16	4
7	31-334	LH Leg	1
8	33-251	Switch - Electric Hose Reel ONLY	1
9	13-750	Solenoid - Electric Hose Reel ONLY	1
10	31-335	Clamp	2

31-306 ELECTRIC HOSE REEL DRAWING

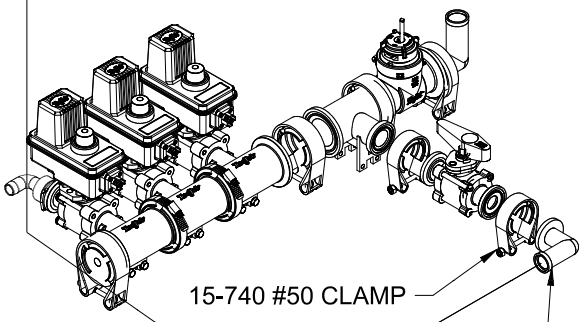




16-982-P
HOSE REEL

16-295-P
HOSE FITTING

18-249-P
BARB FITTING



15-740 #50 CLAMP

9032-132 3/4" HOSE
18-040 HOSE CLAMP

15-746 90° HOSE BARB

31-306 ELECTRIC HOSE REEL PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-906-25	Retaining Ring	2
2	16-906-22	Axle Assembly	1
3	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	4
4	HW-38	Flat Washer, 3/8	4
5	16-906-27	Trim, Drum Edge	1
6	16-906-21	Drum Center	1
7	13-750	Solenoid	1
	HB-14-20-075	Hex Bolt, 1/4 - 20 x 3/4	2
	HWL-14	Lock Washer, 1/4	2
	HN-14-20	Hex Nut, 1/4 - 20	2
8	33-251	Switch	1
9	16-906-19	Disc and Gear Assembly	1
10	HB-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	8
11	16-906-26	Pipe Cap, 3/4	1
12	HWL-516	Lock Washer, 5/16	8
13	16-906-15	Motor 12VDC	1
14	HW-516	Flat Washer, 5/16	4
16	HNTL-516-18	Nylon Lock Nut, 5/16 - 18	4
17	HB-516-18-100	Hex Bolt, 5/16 -18 x 1	4
18	16-906-17	Key	1
19		Set Screw	2
20	16-906-29	Pinion	1
21	HNTL-38-16	Nylon Lock Nut, 3/8 - 16	4
22	16-906-18	Frame Assembly	1
23	16-906-08	Mounting Pillow Block (Bottom)	2
24	16-906-24	Bearing	2
25	16-906-07	Mounting Pillow Block (Top)	2
26	16-906-20	Disc, 17 1/2"	1
27	16-906-23	Swivel Assembly 3/4	1
	16-906-30	Seal Kit (For 16-906-23)	1
28	16-906-28	Bracket 12VDC	1
	16-982	Electric Hose Reel (only)	1

HOSE REEL ADJUSTMENTS

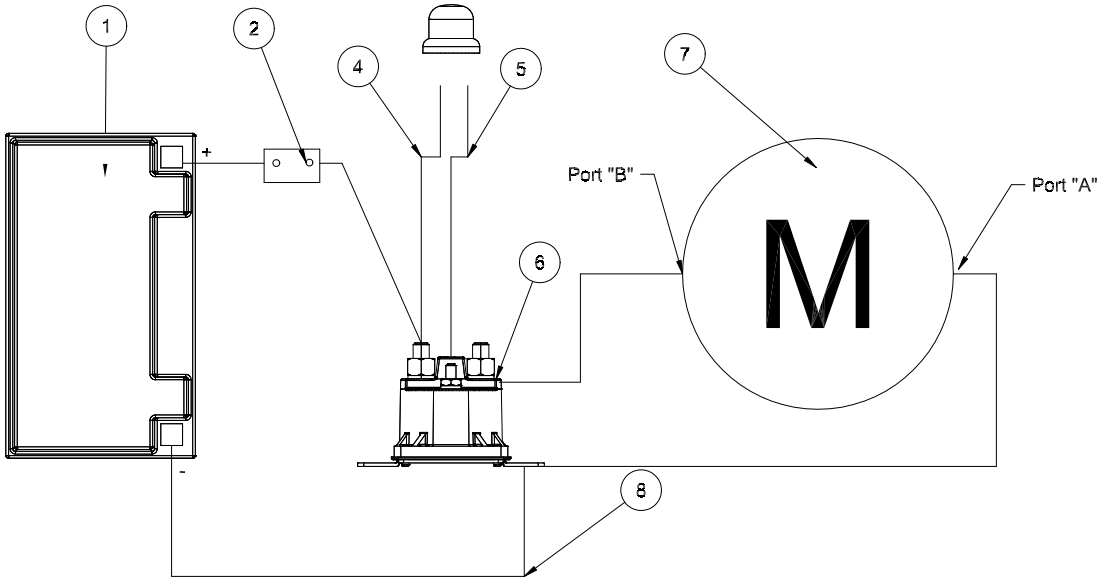
OPERATIONAL CHECK:

1. Pull hose off drum at least one full revolution. A clicking noise should be heard from locking mechanism.
2. Let the hose retract.
3. Pull the hose off until the first click is heard. Drum should lock when the hose tension is removed.
4. Continue pulling the hose, no more than one revolution, until no clicking is heard. Hose should rewind when tension is removed.

HOSE REPLACEMENT PROCEDURE:

1. Facing swivel, turn the hose drum clockwise until all of the hose is removed from the drum and the drum is held by locking mechanism. Make sure spring is locked.
2. Remove hose clamps and disconnect hose from swivel. Remove old hose.
3. Insert new hose through roller guide, connect to swivel and reinstall hose clamps. Use spring guard over hose to protect the hose from being cut by the drum.
4. Remove check ball from old hose and install on replacement hose.
5. Carefully, keeping the tension on the hose, pull the hose to release the locking mechanism. Let the hose wind on the drum.

ELECTRIC HOSE REEL WIRING DIAGRAM



REF#	PART#	DESCRIPTION	QUANTITY
1		Battery	1
2*	8975	Circuit Breaker	1
*	8977	Circuit Breaker Boot	1
4*		Red Wire, Switch to Solenoid Hot Terminal	1
3	33-251	Push Button Switch	1
5*		Red/White Wire, Switch to Solenoid Start Terminal	1
6	13-750	Solenoid	1
	HN -516-24	Hex Nut , $^{5}/_{16}$ - 24	2
	HN -10-32	Hex Nut, 10 - 32	1
7	16-906-15	Motor	1
8	31-337	Wire Harness (includes * items)	1

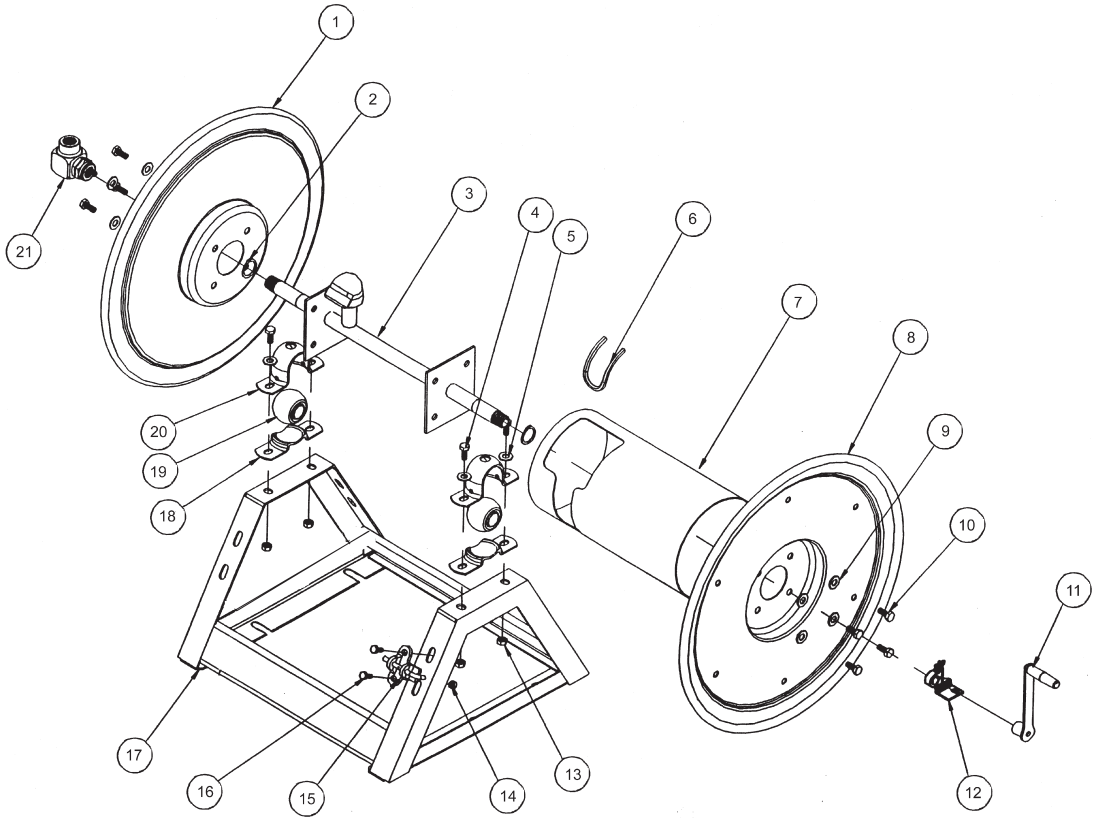
CONNECTION INSTRUCTIONS

1. Install push button switch on forward reel mount post in provided hole.
2. Install solenoid relay on forward post using two 1/4" bolts and flange whiz-loc nuts.
3. Install two 5⁄16 ring terminals and heat shrink sleeves on motor power leads
4. Route wire harness along side of tank and over the hoses, taking care to stay clear of moving parts or hot engine components. Hook ring terminals to battery.
5. Connect wires as shown in diagram.
6. Test operation. If reel rotates wrong direction reverse motor leads.

⚠ WARNING

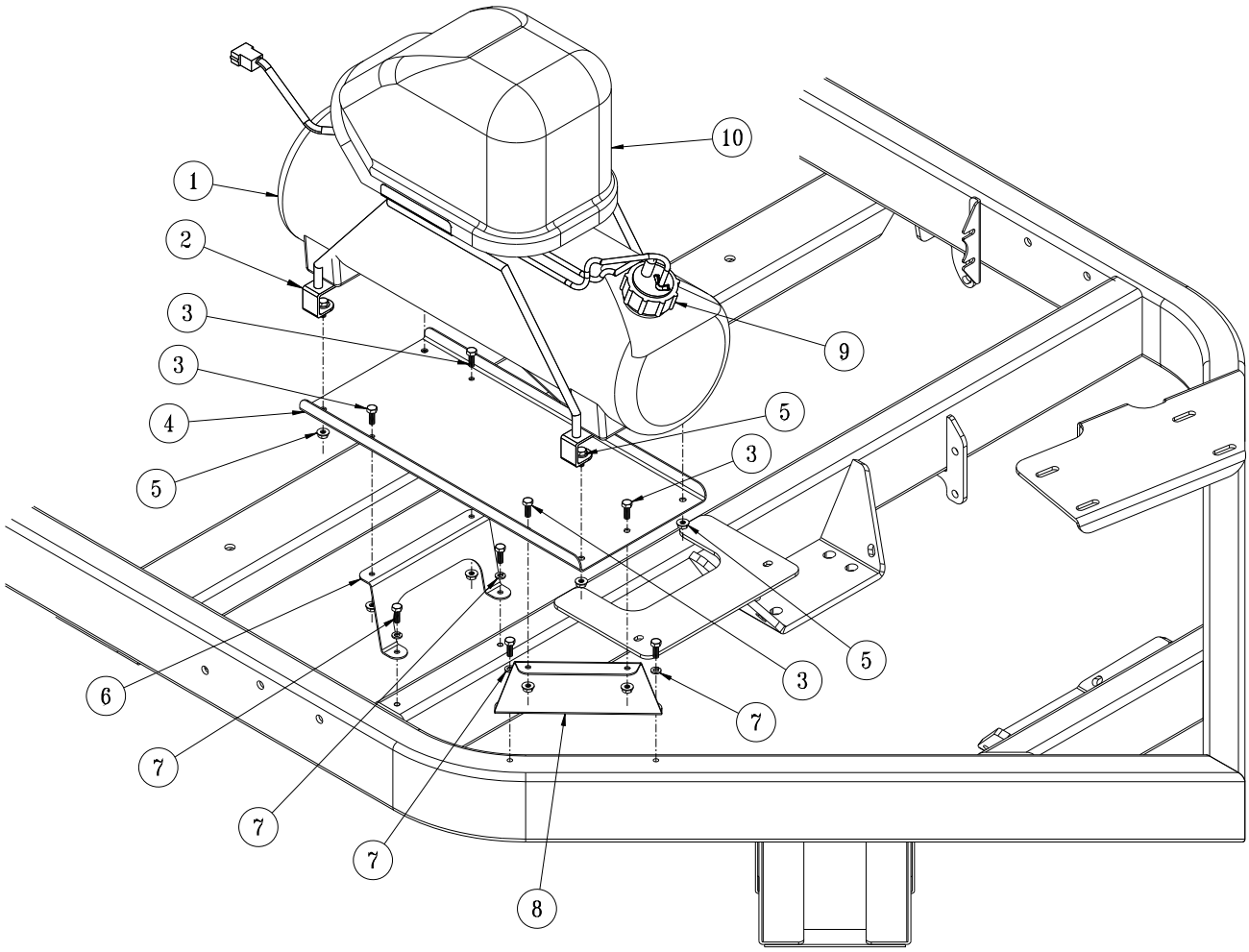
Make certain you are connecting positive (+) to positive; negative (-) to negative while attaching power leads. If you do not observe polarity, damage will result to electrical components.

31-305 MANUAL HOSE REEL DRAWING

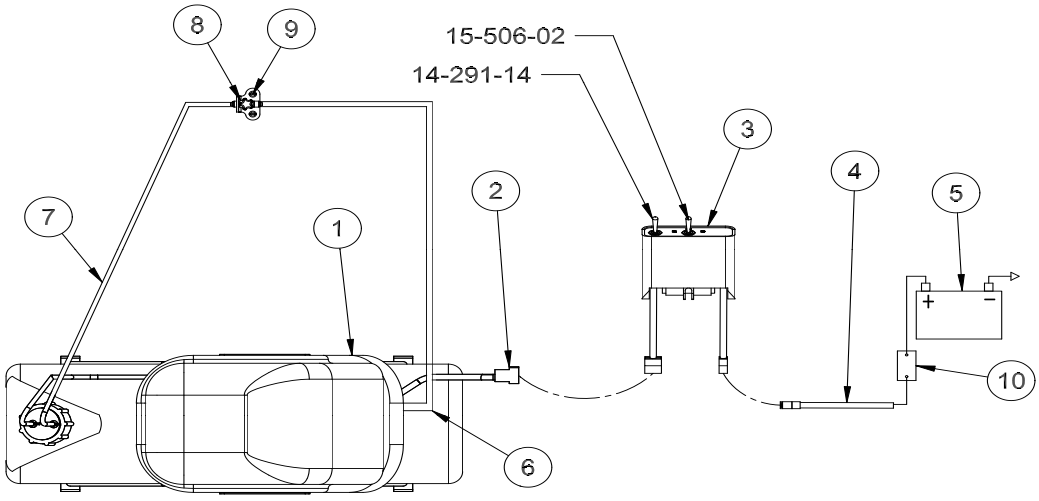


REF#	PART#	DESCRIPTION	QUANTITY
1	16-129-11	Disc, 17 1/2"	1
2	16-906-25	Retaining Ring	2
3	16-906-22	Axle Assembly 3/4	1
4	HB-38-16-100	Hex Bolt, 3/8 - 16 x 1	4
5	HW-38	Flat Washer, 3/8	4
6	16-906-27	Trim, Drum Edge	1
7	16-906-21	Drum Center	1
8	16-906-20	Disc 17 1/2", Crank Side	1
9	HWL-516	Lock Washer, 5/16	8
10	HB-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	8
11	16-129-09	Crank Assembly, 3/4	1
12	16-129-10	Brake Assembly, 3/4	1
13	HNTL-38-16	Nylon Lock Nut, 3/8 - 16	4
14	HNTL-516-18	Nylon Lock Nut, 5/16 - 18	2
15	16-129-08	Lock Pin Assembly	1
16	HB-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	2
	HW-516	Flat Washer, 5/16	2
17	16-129-07	Frame Assembly	1
18	16-906-08	Mounting Pillow Block (Bottom)	2
19	16-906-24	Bearing	2
20	16-906-07	Mounting Pillow Block (Top)	2
21	16-906-23	Swivel Assembly, 3/4	1
	16-906-30	Seal Kit (For 16-906-23)	1

31-304 FOAM MARKER DRAWING



FOAM MARKER WIRING DRAWING



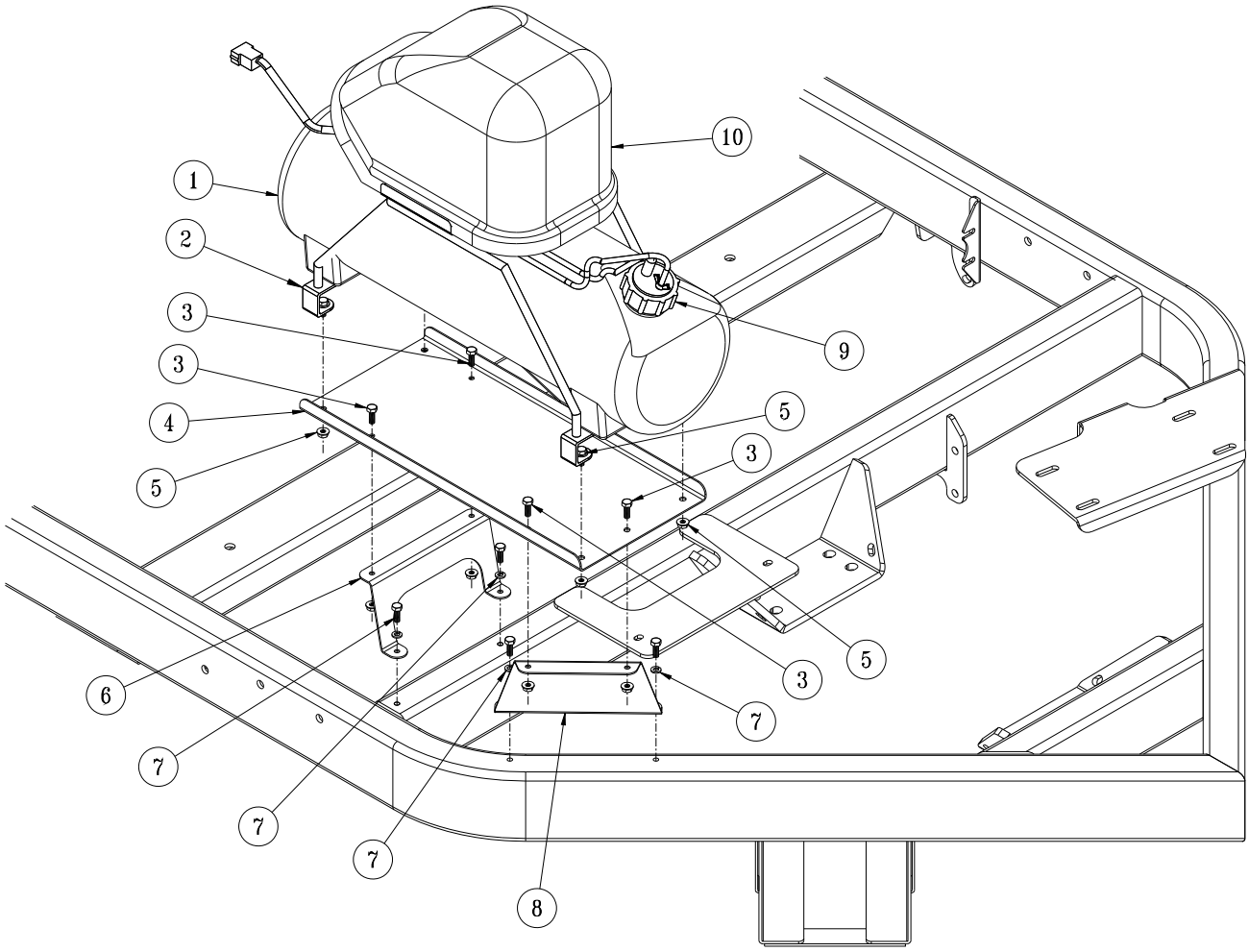
31-304 FOAM MARKER PARTS LIST

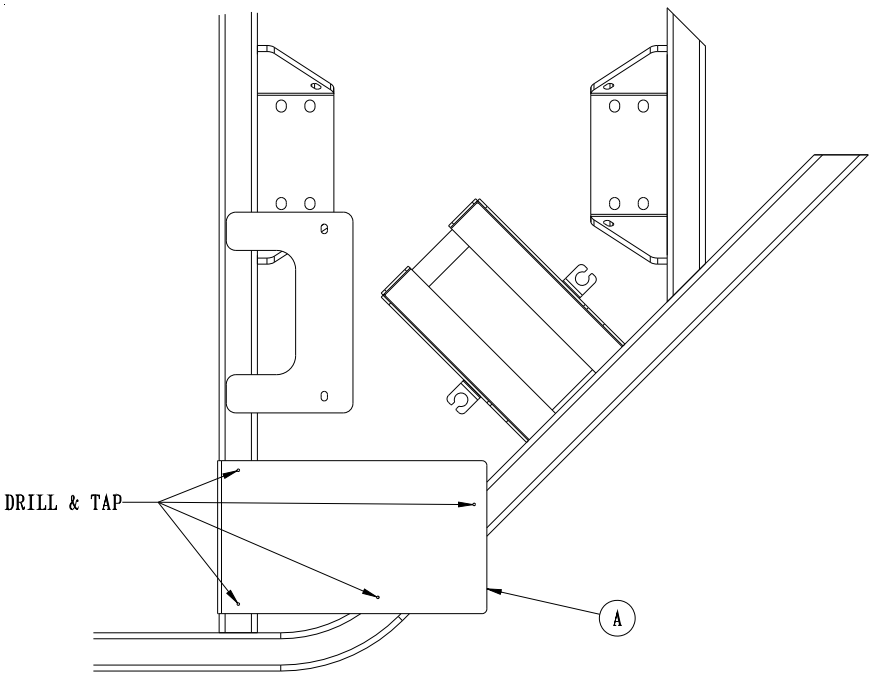
REF#	PART#	DESCRIPTION	QUANTITY
1*	14-291-02	Foamer Tank	1
2*	14-291-04	Tank Bracket	2
3	HN-14-20-075	Hex Bolt, 1/4-20 x 3/4	4
	HBFL-14-20	Flange Lock Nut, 1/4-20	4
4	31-338	Foamer Plate	1
5	HN-14-20-075	Hex Bolt, 1/4-20 x 3/4	4
	HBFL-14-20	Flange Lock Nut, 1/4-20	4
	HW-14	Flat Washer, 1/4	4
6	31-339	Mount Leg 1	1
7	HN-14-20-075	Hex Bolt, 1/4-20 x 3/4	4
	HWL-14	Lock Washer, 1/4	4
8	31-341	Mount Leg 2	1
9*	14-284-02	Cap Assembly	1
*		Blue Tube	1
*		Clear Tube	1
10*	14-291-03	Compressor Only	1
	14-291-01	Black Cover	1
*	14-291	Foamer (includes * parts)	1

FOAM MARKER WIRING PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	14-291-03	Compressor	1
2	15-504-04	Wiring Harness	1
3	14-291-05	Switch Box	1
	15-506-02	Switch - middle	1
	14-291-14	Switch - outside	1
	15-472	Switch Boot	2
4	15-509	Power Cable	1
5		Battery	1
6	15-507	Tubing -Blue	
7	15-507	Tubing - White	
8	14-699	Male Coupler	1
	14-291-09	Blue Wing Nut	1
	14-702	Red Washer	1
9	20-769	Mount Bracket	1
10	8975	Circut Breaker	1
	8977	Circut Breaker Boot	1

31-304 FOAM MARKER DRAWING





Safety: Before working on machine stop engine, set park brake, remove key from ignition and block wheels. Disconnect negative (-) battery terminal.

1. Drill & tap mainframe. Position the supplied template (Ref. A) as illustrated. Space the template 1" from the inside edge of the Mainframe to the edge of the template. Pilot drill holes at 3/16". Remove template and drill holes out to 7/32" and tap to 1/4 - 20. Discard template.
2. Loosely install Mount Legs (Refs 6 & 8) to mainframe using $^1/_4$-20 x $^3/_4$ Bolts and Lockwashers (Ref 7).
3. Install Foamer Plate (Ref 4) to Mount Legs using $^1/_4$-20 x $^3/_4$ Bolts and $^1/_4$-20 Flange Lock Nuts (Ref 3).
4. Tighten all hardware from steps 2 & 3.
5. Mount Foamer Unit (Ref. 1) to Foamer Plate (Ref 4) with fill opening facing forward. Secure using $^1/_4$-20 x $^3/_4$ Bolts, $^1/_4$-20 Flange Lock Nuts and $^1/_4$ Flatwashers (Ref 5).
6. Foamer Control can be mounted to the top of the Boom Control Box. Position Control with base on top of the Boom Control Box. Mark and drill 3, $^3/_{16}$" holes, and fasten the Foamer Control to the Box using 3 #10-32 x $^5/_8$ Machine Screws, #10 Flatwashers and #10 Flange Lock Nuts.
7. Connect he inline fuse and boot to the foamer control power cord, then connect to the battery.
8. Connect control cable from Control Box to the Foamer. Route Foamer Cable with Boom Control Cable. Secure using cable ties.

CONNECTING THE CAP ASSEMBLY

Connect the blue tube to the tank cap connector which is also connected to the large blue tube which hangs below the cap. This is the soap outlet tube. Connect the clear tube to the other connector on the tank cap. This is the air input tube. Tighten connectors hand tight, assembly tank cap onto tank.

HOSES

Being careful not to cut the tubing, cut the oversleeve back approximately 2" (5 cm) to expose blue and clear tubing. Remove blue wing nut from top connector of foam nozzle and slide it on the blue tube with the threads facing toward end of tube. Slide blue tube all the way over the top of the small tube on foam nozzle. Slide wing nut back to the threads and hand tighten. Follow the same steps for the clear tube and tube nut.

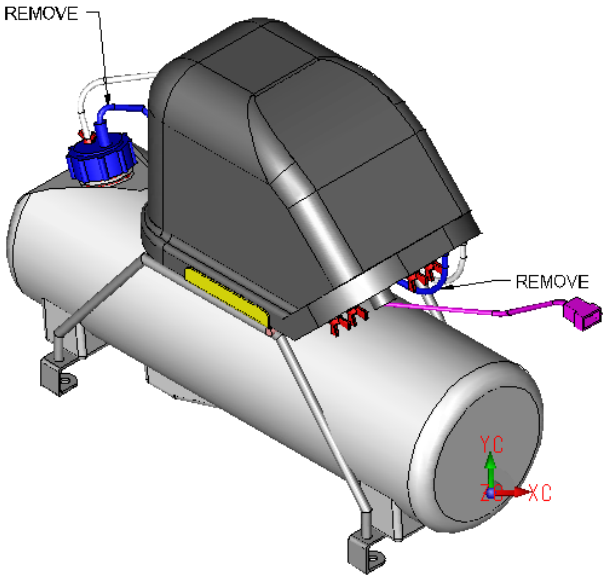
Route the tubing along underside of main frame using tie downs as necessary.

Install opposite ends of air-liquid tubes to compressor, again cutting back the oversleeve approximately 2" (5 cm) and inserting blue and clear tubes for the left boom section into the tubing connectors on the right side of compressor as far as possible. Follow the same steps for the right boom tubing. Notice the right boom is inserted into left side of compressor. To release tubing from compressor, hold black ring around tubing, and pull tube out.

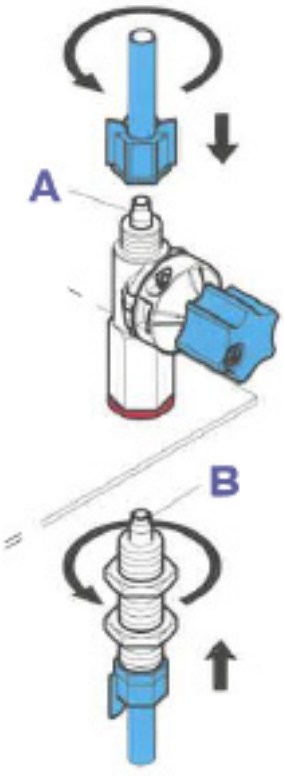
REMOTE FLOW REGULATOR VALVE

This allows you to place a flow valve at driver position so you can regulate the foamer without getting off the machine. When using this you will remove the flow valve from the tank cap and move to the front of the machine.

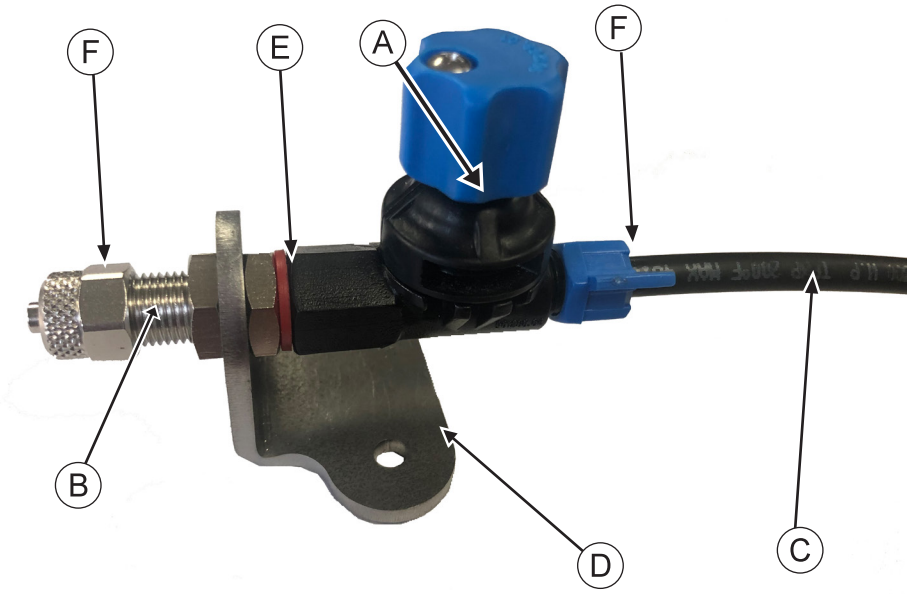
1. Remove the blue tubing that goes from the foamer tank cap to the compressor.
2. Remove the flow valve from the foamer tank cap.
3. This kit comes with 15-507 foamer tubing. The tubing is white and blue tubing wrapped in a coating. You will need to remove the coating and use the white tubing on foamer cap and the blue tubing on the compressor.
4. Route white and blue tubing to the front of the machine where you will be mounting the flow regulator valve.
5. Install bracket (Ref D) where you can get at easily from the drivers position. Use the machine screw and flange whiz-loc nut that are provided. The flow regulator valve can be mounted wherever the user would like. **We recommend installing within reach of driver position.**



6. Install male coupling (Ref B) onto flow regulator valve (Ref A) as shown in the picture.
7. The tubing we provide is very long. Cut to the length that you will need.
8. Insert the white tubing into the fitting A. Insert the blue tubing onto fitting B. Screw the regulator (Ref A) onto male coupling (Ref B).
9. Install male coupling (Ref B) onto valve bracket as shown.
10. Check all connections for tightness. With water in foamer tank, start up foamer and check for any leaks.



FLOW REGULATOR VALVE

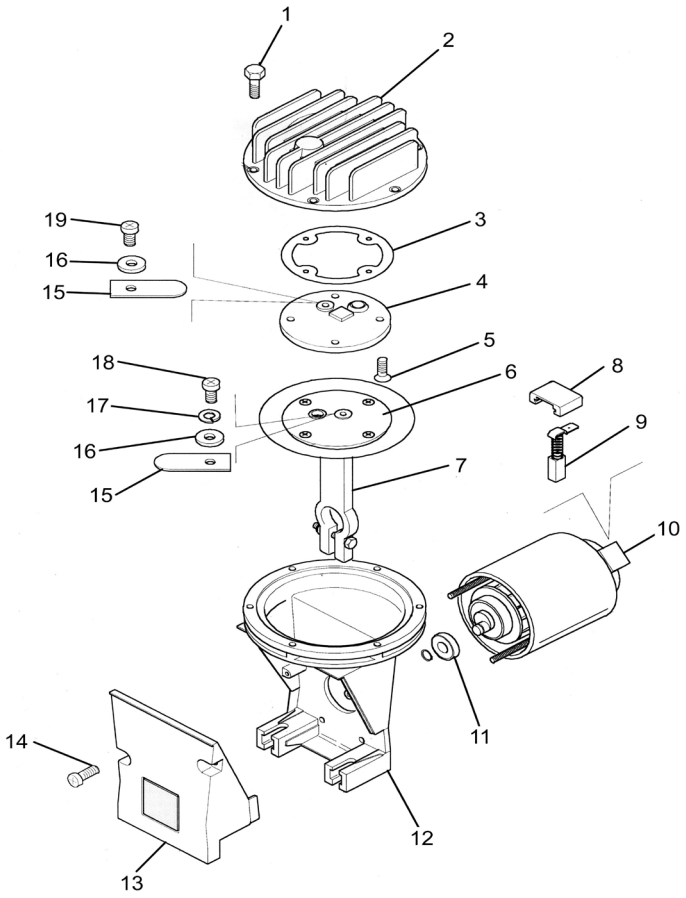


REF#	PART#	DESCRIPTION	QUANTITY
A		Flow Regulating Valve	1
B	14-699	Male Coupling	1
C	15-507	Tubing	1
D	20-769	Regulating Valve Bracket	1
E	14-702	Red Washer	1
F	14-291-09	Replacement Blue Wing Nut	1

14-291 FOAM MARKER DRAWING

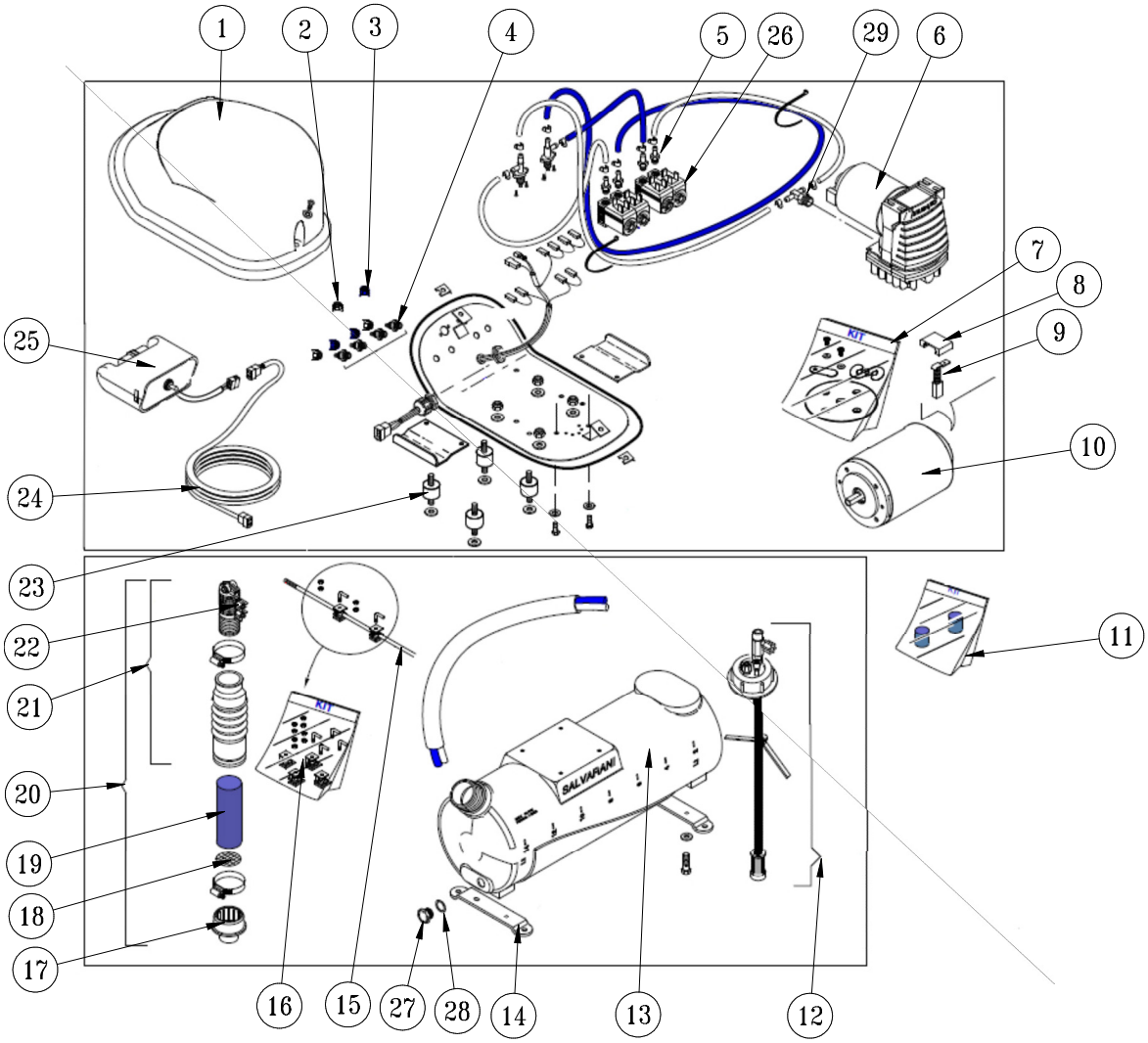
REF#	PART#	DESCRIPTION	QUANTITY
1	15-507	Foamer Tubing	2
2	14-291-02	Tank	1
3	14-291-01	Black Cover	1
	14-536	Compressor Complete	1
4	14-284-02	Cap Assembly	1
5	14-291-04	Tank Bracket	2
6	14-291-05	Switch Box	1
7	15-511	Foam Nozzle	2
8	15-510-01	Nozzle Mounting Rod	2
9	16-987	Foam Nozzle Mounting Kit	1
10	14-284-05	Extension Wire	1

15-505 MOTOR SUB ASSEMBLY DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1†		Bolt	6
2		Head	1
3		Exhaust Manifold Gasket	1
4		Exhaust Manifold	1
5†		Manifold Screw	8
6†		Diaphragm	1
7†		Piston	1
8		Brush Retainer	2
9	15-505-06	Brush	2
10	15-505-07	12 Volt Electric Motor	1
11	15-505-05	Stainless Steel Bearing	1
12		Block	1
13		Cover	1
14		Cover Screw	2
15*		Exhaust Reed Valve	1
16*†		Washer	2
17*†		Split Lockwasher	1
18*†		Intake Valve Screw	1
19*		Exhaust Valve Screw	1
*	15-505-02	Intake Exhaust Valve Sub Assembly	
†	15-505-04	Intake Piston Sub Assembly	

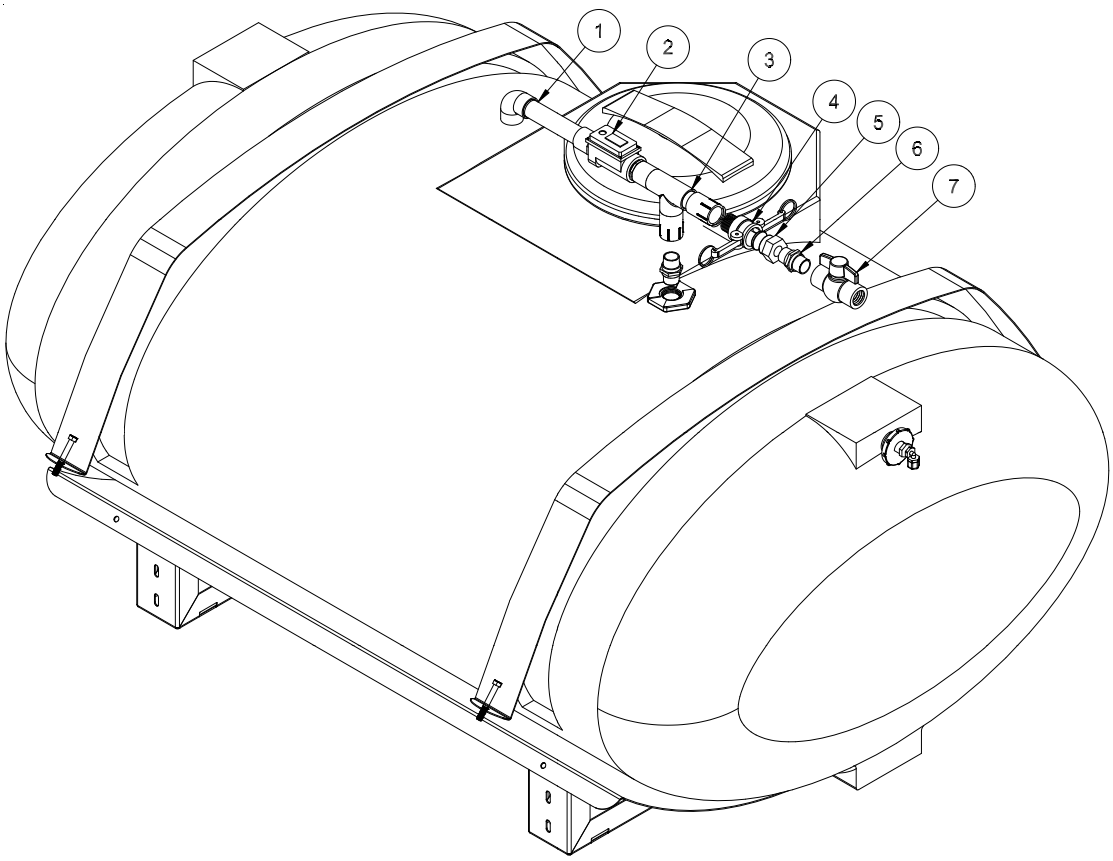
14-291 FOAMER REPLACEMENT PARTS



14-291 FOAMER REPLACEMENT PARTS

REF#	PART#	DESCRIPTION	QUANTITY
1	14-291-01	Black Cover	1
2	14-291-08	White Fly Nut	1
3	14-291-09	Blue Fly Nut	1
4	14-284-10	Tubing Connector	1
5	14-291-17	M6 Tubing Connector	1
6	14-536	Compressor Complete	1
7	14-291-11	Diaphragm Replacement Kit	1
8	15-505-08	Brush Retainer	1
9	15-505-06	Brush	1
10	15-505-07	12V Electric Motor	1
11	15-511-02	Foam Sponge	1
12	14-284-02	Cap Assembly	1
13	14-291-02	Foamer Tank	1
14	14-291-04	Tank Brackets	2
15	15-510-01	Nozzle Mounting Rod	2
16	16-987	Foam Nozzle Mounting Kit	1
17	14-284-09	Foam Nozzle Reducer	2
18	15-511-09	Stainless Steel Screen	2
19	15-511-08	Long Foam Sponge	2
20	15-511	Foam Nozzle	2
21	15-511-07	Foam Nozzle Assembly	1
22	15-511-01	Foam Nozzle Sub Assembly	1
23	14-291-15	Shock Absorber	4
24	14-284-05	Extension Wire	1
25	14-291-05	Switch Box	1
	15-506-02	Switch	1
26	14-284-11	Solenoid Valve	4
27	14-291-19	Drain Plug	1
28	14-291-18	Drain Plug Seal	1
29	14-291-21	Tee, Hose Connector	1
NS	15-507	16M Blue & White Tubing	

14-515 WATER METER KIT



REF #	PART #	DESCRIPTION	QUANTITY
1	14-524	Filler Outlet	1
2	14-804	Water Meter	1
3	14-525	Filler Inlet	1
4	16-962	1" Quick Coupler (already on machine)	1
5	16-961	1" Adapter Quick Coupler (already on machine)	1
6	16-851	1" Nipple (already on machine)	1
7	18-448	1" Ball Valve (already on machine)	1

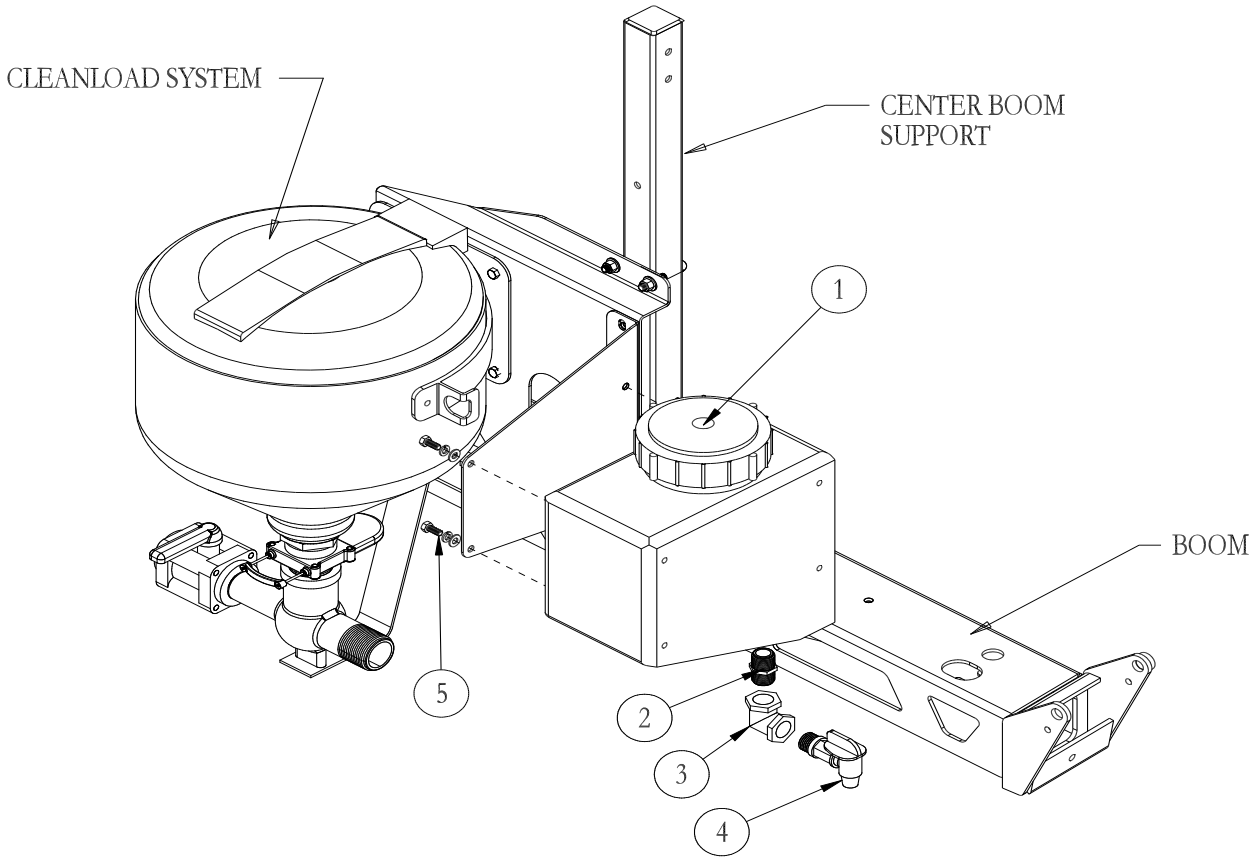
1. Thoroughly flush the service line upstream of the meter to remove dirt and debris.
2. The Meter is for use **only** with **COLD WATER** up to 122°F (50°C)
3. Slowly open any upstream valves to prevent damage to the meter.

Gallons to Cubic feet Conversion :

Multiply gallons reading by 0.1337 to get cubic feet.

There are 7.48052 gallon per cubic foot.

30-006 FRESH WATER TANK - REAR MOUNT



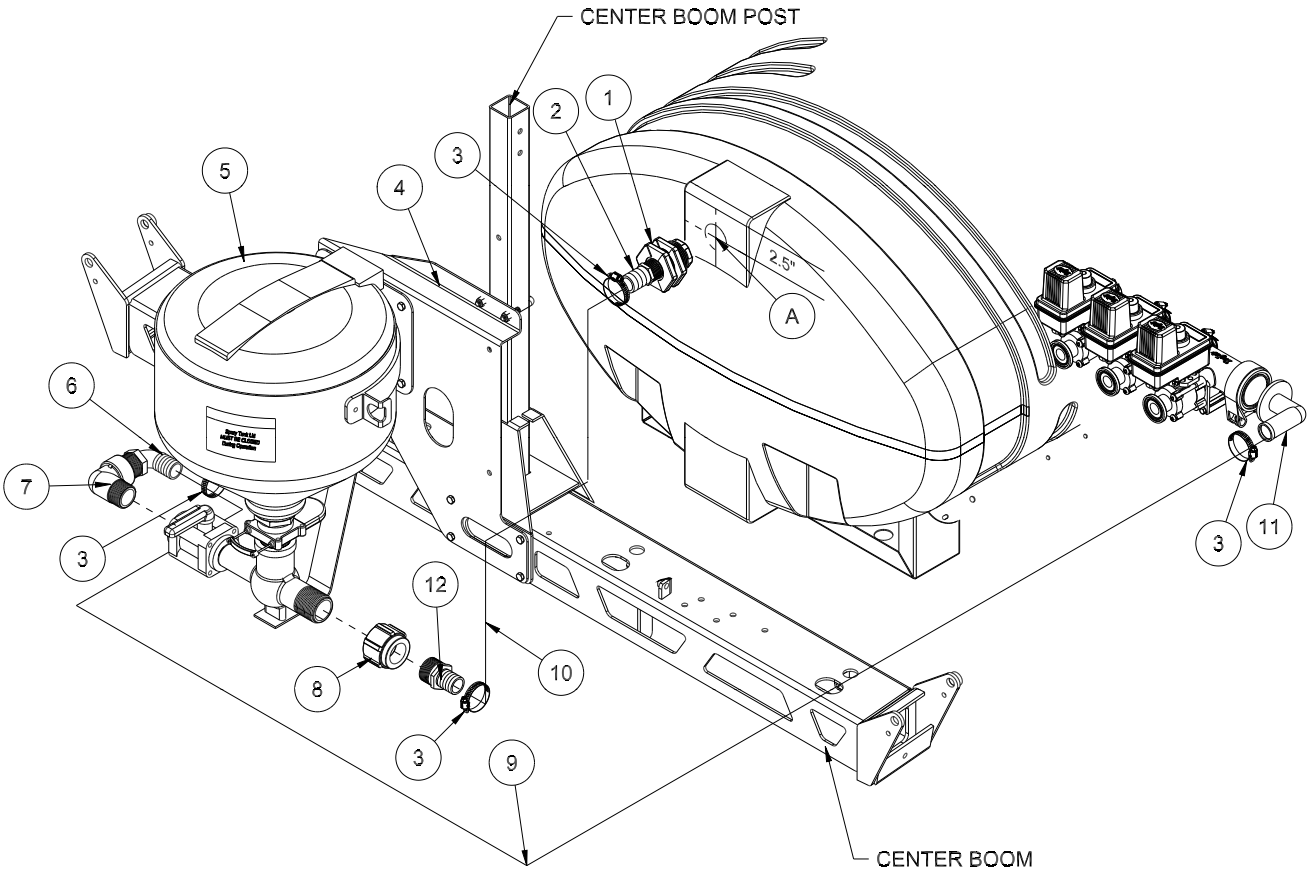
REF#	PART#	DESCRIPTION	QUANTITY
1	10-234	Wash Tank	1
2	16-158	Close Nipple	1
3	16-151	Elbow	1
4	16-960	Spigot	1
5	HB-516-18-075	Hex Bolt, $^{5}/_{16}$ - 18 x $^{3}/_{4}$	4
	HWL-516	Lock Washer, $^{5}/_{16}$	4
	HW-516	Flat Washer, $^{5}/_{16}$	4

1. Fresh Water Wash Tank mounts on the rear of all the machines.
2. The Bracket is already attached to the Super Boom center boom post.
3. Install the nipple (Ref 2), elbow (Ref 3) and spigot (Ref 4)into the bottom of wash tank (Ref 1). Use thread tape on all threads.
4. Mount the tank onto the mount bracket using four $^{5}/_{16}$ x $^{3}/_{4}$ Hex Bolts, washers and lock washers. Tighten.
5. Rinse tank with clear water and check for leaks around fittings.

This tank is for fresh clear water ONLY. Do not put chemicals in this tank.

31-303 CHEMICAL CLEANLOAD DRAWING

DIAGRAM #1



31-303 CHEMICAL CLEANLOAD PART LIST

REF#	PART #	DESCRIPTION	QUANTITY
1	16-945	Double Thread Fitting	1
2	16-159	Straight Fitting, 1 x 1 1/4 HB	1
3	18-116	Hose Clamp	4
	9024	Clamp Cover	4
4	17-635	Clean Load Mount (comes with boom)	1
5	15-620	Cleanload Assembly	1
	25-389	Decal, Tank Lid	1
	HB-516-18-075	Hex Bolt, 5/16 - 18 x 3/4	4
	HNFL-516-18	Flange Lock Nut, 5/16 - 18	4
6	16-156	90° Hose Barb	2
7	16-972	Street Elbow	1
8	18-391	Coupling	1
9	8897-134	1 1/4" Discharge Hose 134"	1
10	8897-48	1 1/4" Discharge Hose 48"	1
11	15-739	#75 Hose Barb	1
12	16-161	Straight Fitting, 1 1/4 x 1 1/4 HB	1

INSTALLATION INSTRUCTIONS

1. Make sure sprayer tank is empty and flush all chemical residue from sprayer. Always wear protective clothing, goggles and gloves.
2. You will have to drill a hole in the back of the tank(Ref A). Using a hole saw cut a 2.25" round hole in back of tank, 2.5" down from top.
3. Install double thread fitting (Ref 1), into the hole drilled in the tank. Install a straight fitting(Ref 2) into the double thread fitting.
4. Mixer Mount (Ref 4) is already installed on boom center post.
5. Mount Cleanload Assembly (Ref 5) onto mixer mount using 5/16 x 3/4 flange bolts and flange nuts. Tighten.
6. Install 18-391 reducer coupling (Ref 8) onto outlet side. Then a 16-161 fitting (Ref 12) into the coupling. Tighten fittings.
7. Install a street elbow (Ref 7) and hose barb elbow (Ref 6) onto the inlet side of the cleanload. Tighten fittings.
8. Now the 48" hose (Ref 10) can be installed from the tank to the outlet fitting. Tighten with hose clamps.
9. You will need to install A #75 elbow (Ref 11) onto the end of the manifold valve. Loosen clamp and remove blank. Place #75 elbow on end of valve and tighten clamp.
10. Connect the 134" hose (Ref 9) from the manifold valve to the inlet fitting on the cleanload and tighten with hose clamps.
11. Make sure all hardware, fittings and clamps are tight. Add about 25 gallons of water to the spray tank. Start sprayer and circulate water through system to check for leaks.
12. Be sure to read start up, loading and shutdown instructions for Cleanload Assembly before using with chemicals. When working with chemicals **Always** wear protective clothing, goggles and gloves.
13. **NOTE: For Maximum performance, you must manually open throttle valve, on engine, to full position.**

⚠ WARNING **SPRAY TANK LID MUST BE CLOSED WHEN USING CLEANLOAD.**

SHUT SPRAY TANK LID

STARTUP

1. All Cleanload valves must be closed prior to starting: inlet ball valve, knife valve and hopper rinse ball valve.
2. Open lid to check for foreign objects which may hinder performance or contaminate the system.
3. Close and lock lid by turning cover clockwise.
4. Engine throttle must be fully opened for maximum performance.
5. Divert pump flow to Cleanload inlet line. A pressure of 30 PSI minimum and 150 PSI maximum must be used. Highest pressures increase eduction rate and available wand suction.
6. Turn inlet ball valve on (yellow handle).
7. Open knife valve, located on the bottom of hopper, by pushing handle in (red handle).
8. Unlock and open lid slowly by turning cover counterclockwise.

LOADING LIQUID OR POWDERED CHEMICAL INTO HOPPER

9. Pour required amount of chemical into hopper. Avoid splashing liquids or powdered chemicals outside of hopper.
10. Rinse empty chemical containers if applicable. Place container opening over container rinse valve and press down. This will activate the rinse valve and rinse container.
11. Rinse Cleanload hopper. Close and lock lid by turning cover clockwise. Release the safety locking band on the hopper rinse ball valve and turn on for 20 seconds. Close ball valve and return locking band to locked position.
12. Open lid and inspect for chemical residue. Repeat step 10 as necessary.
13. Close knife valve by pulling red handle out towards you. Turn inlet (yellow handle) off.

LOADING LIQUID AND/OR POWDERED CHEMICAL WITH SUCTION LANCE

Note: Lance suction is dependent upon eductor pressure and flow. For best results, use highest pressure available up to 150 PSI maximum.

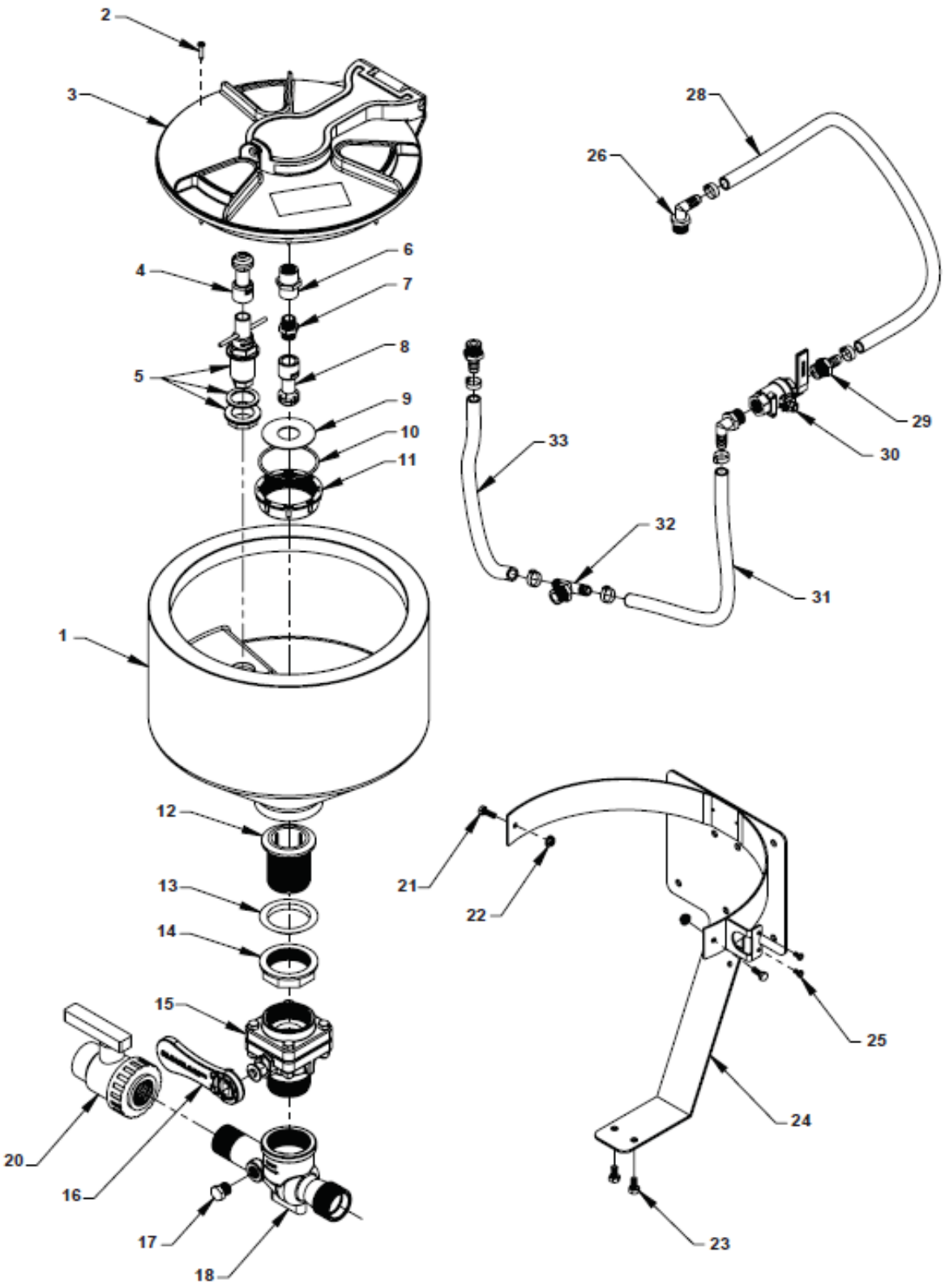
9. Insert lance body with o-ring into eductor until the o-ring is sealed.
10. Use the free end of the lance to pierce bag or container to vacuum powdered or liquid chemical.
11. Rinse lance. Place lance end into a clean container of water to rinse lance assembly.
12. Remove lance body from eductor and drain any remaining fluid into hopper.
13. Close knife valve (red handle). Turn inlet valve (yellow handle) off.

SHUTDOWN

1. Ensure that:
   - All valves are closed. Be sure to close knife valve first. (Close by pulling red handle out towards you.)
   - Chemical residue has been cleaned.
   - Hopper lid is closed and locked by turning cover clockwise.
2. Divert pump flow back to normal operation.

Symptom	Corrective Action
Low eduction rate	Check pump pressure and flow. Cleanload Eductor performance is based on flow and pressure to the system. Note requirements for high eduction rates. Increase outlet hose size back to tank.
Plugged or clogged bottle rinse nozzle	Disassemble rotary portion of nozzle from lower valve assembly and back flush until nozzle ports are clear of debris.
Plugged or clogged tank rinse nozzle	Disassemble rotary portion of nozzle from NPT hose barb and back flush until nozzle ports are clear of debris. Remove screen and flush with water to clear away foreign material.
Fitting leaks	Check for cracks in fitting. Replace fitting if necessary. Disassemble and add more joint seal in compound if leak occurs on threads.

15-620 CHEMICAL CLEANLOAD® DRAWING



15-620 CHEMICAL CLEANLOAD® PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	15-620-21	Tank	1
2		Screw, #6 x 1”	8
3	15-620-02	Tank Lid	1
4	15-620-22	ProClean Container Nozzle	1
5	15-620-23	ProClean Push Valve Assembly	1
	15-620-19	Tank Rinse	1
	15-620-20	Gasket, 1”	1
6		1/2 x 1/2 FNPT Coupler	1
7		1/2 x 1/2 Thread Nipple	1
8		ProClean Tank Wash Nozzle	1
9		Splash Retainer	1
10		O-ring Breather	1
11		Nut, Breather	1
12	15-620-18	Drain Head, 2”	1
13	15-620-17	Gasket: 2”, Tapered	1
14	15-620-16	Locking Ring, 2”	1
15	15-620-12	Ball Valve	1
	15-620-15	Gasket: 2” BSP	1
16	15-620-13	Handle, Clean-load	1
17		1/2 MNPT PP Hex Plug	1
18	15-620-04	Clean-load Eductor	1
20	15-620-14	Ball Valve, 11/4 Single Union	1
21		Screw	2
22		Flange Nut	2
23		Hex Head Screw	2
24	15-620-01	Frame, Back Mount	1
25		Phillips Head Screw	2
26	15-620-11	Elbow 1/2”	2
28	15-620-08	Hose, Tank Rinse, 1/2” EPDM	1
29	15-620-09	HB, 1/2 MNPT x 1/2 HB	2
30	15-620-10	Valve, SS Tank Rinse	1
31	15-620-06	Hose, Valve Feeder, 1/2” EPDM	1
32	15-620-05	HB Tee, 1/2 MNPT to 1/2 HB	1
33	15-620-07	Hose, Bottle Rinse, 1/2” EPDM	1

EC Declaration of Incorporation

In accordance with EN ISO 17050-1:2004

We

Smithco Inc.
34 West Avenue
Wayne, PA USA
19087-3311

In accordance with the following Directive:

2006/42/EC **The Machinery Directive**

hereby declare that for the partly completed machinery identified as :

Equipment	Spray Star 300T
Model number	31-300
Serial Number	PB301 -PB500

the following EHSRs have been complied with:

B71.4:2012	**Commercial Turf Equip. Safety Specificatic**
ISO 4254-1:2013	**Ag Machinery General Requirements**
BS EN 349	**Safety of Machinery**

and the technical documentation is compiled in accordance with Annex VII(B) of the Directive.

We undertake to transmit, in response to a reasoned request by the appropriate national authorities, relevant information on the partly completed machinery identified above. The method of transmission shall be electronically

The machinery is incomplete and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive.

Technical Documentation for this machinery is available from

2006/42/EC Annex II 1A: 10
Dawn Bryngelson
Technical Documentation Advisor
Smithco West Inc.
200 West Poplar Avenue
Cameron, WI 54822 USA
18-Mar-22

2006/42/EC Annex II 1A: 2
John Moore
Sales, Director, Owner
Moore Turf Care
Thieplatz 4
49583 Lienen Germany

The Smithco Commercial Products Two-Year Limited Warranty

Smithco, Inc. (Smithco) warrants your 2016 or newer Smithco Commercial Product ("Product") purchased after October 1, 2016 to be free from defects in materials or workmanship for the period of time listed below. Where a warrantable condition exists, Smithco will repair the Product at no cost to you including diagnosis, labor (at the Smithco standard labor rate, subject to the Smithco flat rate schedule), and parts.

Warranty Duration is:

(1) Two years, 1500 operational hours* from the date of delivery to the original purchaser or Five years from the date of original manufacturer of the product, whichever occurs first. (*Products equipped with hour meter).

(2) Products used in rental situations are covered for 90 days from date of delivery to original user/renter.

Owner Responsibilities:

As the Product owner, you are responsible for required maintenance and adjustments stated in your Owner's Manual. Failure to perform required maintenance and adjustments can be grounds for disallowing a warranty claim. **You are particularly responsible to train all present and future operators of this product on the safe operation of this product at your location.**

Instructions for Obtaining Warranty Service:

You are responsible for notifying the Authorized Smithco Products Distributor from whom you purchased the Product as soon as you believe a warrantable condition exists and not later than 30 days from discovery of the condition.

If you need help locating an Authorized Smithco Distributor, or if you have questions regarding your warranty rights or responsibilities, you may contact us at:

Smithco Product Support Department
200 West Poplar Ave.
Cameron, Wisconsin 54822
Telephone: 800-891-9435 E-Mail: ProductSupport@Smithco.com

Maintenance Parts:

Parts scheduled for replacement as required maintenance ("Maintenance Parts"), are warranted for the period of time up to the scheduled replacement time for that part.

Items/Conditions Not Covered:

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. The items/conditions listed below are not covered by this warranty:

- Product failures which result from the use of non-Smithco replacement parts, or from installation and use of add-on, modified, or unapproved accessories are not covered.
- Product failures which result from failure to perform required maintenance and/or adjustments are not covered.
- Product failures that result from operating the Product in an abusive, negligent or reckless manner are noT covered.
- This warranty does not apply to parts subject to consumption through use, unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to: blades, tines, teeth, scarifiers, rakes, plates, wear plates, castor wheels, tires, batteries, filters, belts, nozzles, etc.

- This warranty does not apply to failures caused by outside influence. Items considered to be outside influence include, but are not limited to, weather, storage practices, contamination, use of unapproved coolants, lubricants, additives, or chemicals, etc.

- This warranty does not apply to normal “wear and tear” items. Normal “Wear and Tear” includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows, etc.

- Smithco may require the return of failed parts or components in order to determine the validity of any warranty claim.

- Smithco will not be obligated to replace components of other manufacturers if inspection by the original component manufacturer indicates that failure was due to normal wear and tear, expected consumption through use or improper care or service.

Other Legal Disclaimers:

The above remedy for product defects through repair or replacement by an authorized Smithco distributor or dealer is the purchaser’s sole remedy for any defect. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

THERE ARE NO OTHER EXPRESS WARRANTIES OTHER THAN THOSE SET FORTH ABOVE. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE ARE LIMITED TO THE DURATION OF THE LIMITED WARRANTIES CONTAINED HEREIN.

Some states may not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

THE SMITHCO COMPANY IS NOT LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE USE OF THE PRODUCT, INCLUDING ANY COST OR EXPENSE OF PROVIDING A SUBSTITUTE PRODUCT OR SERVICE DURING PERIODS OF MALFUNCTION OR NON-USE.

Some states may not allow the exclusion of indirect, incidental or consequential damages, so the above exclusion may not apply to you.

Smithco neither assumes, nor authorizes any person to assume for it, any other liability in connection with the sale or use of this product.

Smithco

Wayne, PA 19087 www.smithco.com