

Parts & Service



Spray Star 2000  
Model 20-500-A  
SN: 200G036

November 2012

**Product Support:**

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

Read this manual and all other manuals pertaining to the Spray Star 2000 carefully as they have 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.

All **SMITHCO** machines have a Serial Number and Model Number. Both numbers are needed when ordering parts. The serial number plate on the Spray Star 2000 is located on the right middle main frame. Refer to engine manual for placement of engine serial number.

For easy access record your Serial and Model numbers here.

<b>SMITHCO</b>		DATE OF MFG.
WAYNE, PENNSYLVANIA 19087 USA 610-688-4009 Fax 610-688-6069		<input type="text"/>
SERIAL NO.	kW/hp	
<input type="text"/>	<input type="text"/>	
MODEL NO.	kg/lb	
<input type="text"/>	<input type="text"/>	



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

## 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 devices 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.
10. Keep engine clean. Allow the engine to cool before storing and always remove the ignition key.
11. Disengage all drives and set park brake before starting the engine.
12. 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.
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 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.***



## SPECIFICATIONS SPRAY STAR 2000

### WEIGHTS AND DIMENSIONS

Length	132" (335cm) - w/ booms 137" (348 cm) - w/ Cleanload 151" (384 cm)
Width	72" (183cm)
Height w/ Booms Folded	110" (279 cm)
Wheel Base	61" (155cm)
Weight Empty	1990 lbs (903 kg)
Weight Loaded	3605 lbs (1635 kg)

### SOUND LEVEL (DB)

At ear level	93 dBA
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### ENGINE

Make	Briggs & Stratton
Model#	543477
Type / Spec#	0175-G1
Horsepower	31 hp (23 kW)
Fuel	Unleaded 87 Octane Gasoline Minimum
Cooling System	Air Cooled
Lubrication System	Full Pressure
Alternator	20 Amp

### WHEELS & TIRE

Front:	Two 20 x 10.00 x 10 NHS Multi-Rib; 20 psi (1.4 bar)
Rear:	Two 24 x 13.00 x 12 NHS Multi-Trac; 18 psi (1.3 bar)

### SPEED

Infinitely Variable	0-10 m.p.h. (0-16 kph)
---------------------	------------------------

### BATTERY

	Automotive type 24F - 12 volt
BCI Group	Size 24
Cold Cranking Amps	900 minimum
Ground Terminal Polarity	Negative (-)
Maximum Length	10.25" (26 cm)
Maximum Width	6.88" (17 cm)
Maximum Height	10" (25 cm)

### FLUID CAPACITY

Crankcase Oil	See Engine Manual
Fuel	6 gallon (22.7 liters)
Hydraulic Fluid	5 gallon (19 liters)
Grade of Hydraulic Fluid	SAE 10W-40 API Service SJ or higher Motor Oil

## OPTIONAL EQUIPMENT

15-618	Water Meter Kit (liters)	14-515	Water Meter Kit (Gallons)
20-503	Chemical Cleanload Safe Fill	15-850	Sunshade Canopy
30-009	Manual Rewind Hose Reel, 200-foot/61-meter capacity		
30-010	Electric Rewind Hose Reel, 200-foot/61-meter capacity		
30-004	Foam Marker	30-006	Clear water Wash Tank
15-835	Tank Rinsing System	30-141	26 Gal Wash System
17-585	18' HD Super Boom	17-580	20' HD Super Boom
17-590	Lazer-Beam Automatic Boom for HD Booms	31-004	All Weather Top



## MAINTENANCE

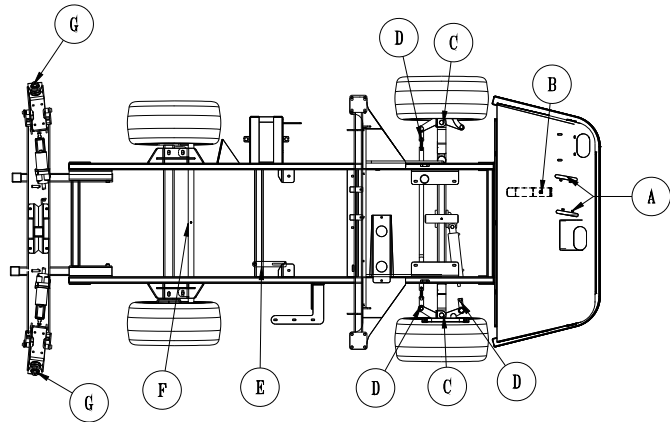


Before servicing or making adjustments to machine, stop engine and remove key from ignition.

**NOTE:** Use all procedures and parts prescribed by the manufacturer's. Read the engine manual before operation.

Use No. 2 General purpose lithium base grease and lubricate every 100 hours. The Spray Star 2000 has 14 grease fittings.

- A. One on each pedal mount.
- B. Pedal relay.
- C. Right and left spindles.
- D. All three rod ends.
- E. Idler arm.
- F. Brake relay.
- G. Top and bottom pivot bolts on boom



### ELECTRICAL CONNECTIONS

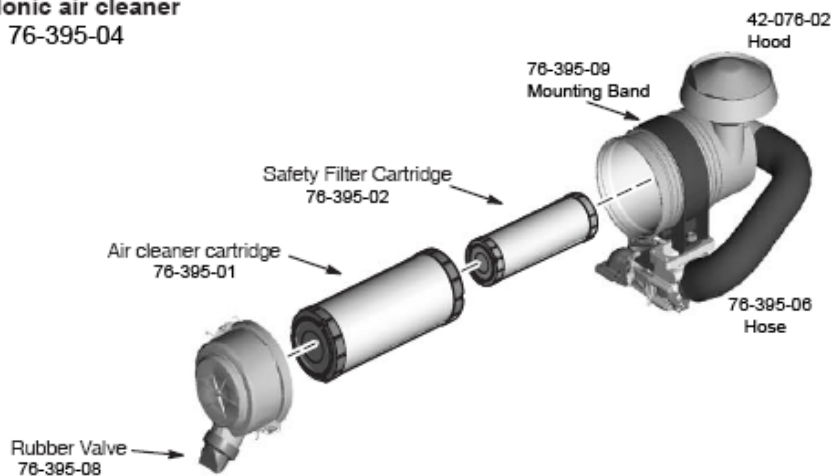
Use dielectric grease on all electrical connections.

### AIR CLEANER ON ENGINE

1. Unclip the two clips, remove the cover and pull out the element.
2. To service, clean by tapping gently on flat surface. Do not oil. Replace if very dirty or damaged.
3. Clean out the inside of the body and cover.
4. Place the element into the body and put the cover back on..

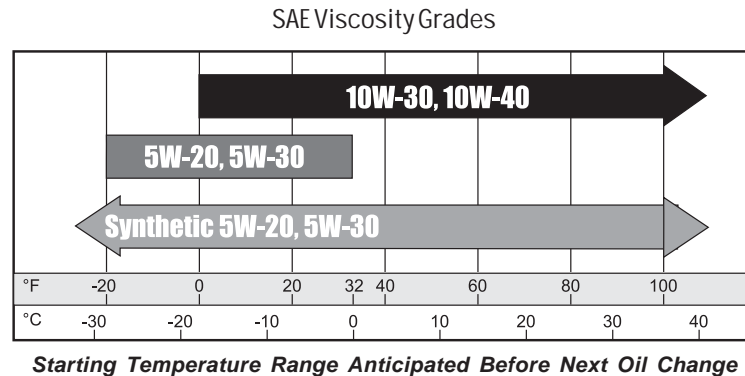
**NOTE:** Do not use petroleum solvents, e.g., kerosene, which will cause cartridge to deteriorate. Do not use pressurized air to clean cartridge. Pressurized air can damage cartridge.

### Cyclonic air cleaner 76-395-04



ENGINE OIL

Change and add oil according to chart below based on air temperature at the time of operation. Do not overfill. Use a high quality detergent oil classified "For Service SJ or higher" oil. Use no special additives with recommended oils. Do not mix oil with gasoline.



HYDRAULIC OIL

1. Use SAE 10W-40 API Service SJ or higher motor oil.
2. For proper warranty, change oil every 500 hours or annually, whichever is first.
3. Oil level should be 2-2½" (5-6.4cm) from top of the tank when fluid is cold. Do not overfill.
4. After changing oil, run the machine for a few minutes. Check oil level and for leaks.
5. Always use extreme caution when filling hydraulic oil tank or checking level to keep system free of contaminants. Check and service more frequently when operating in extremely cold, hot or dusty conditions.
6. If the natural color of the fluid has become black or smells burnt, it is possible that an overheating problem exists.
7. If fluid becomes milky, water contamination may be a problem.
8. If either of the above conditions happen, change oil immediately after fluid is cool and find the cause. Take fluid level readings when the system is cold.
9. In extreme temperatures you can use straight weight oil. We recommend SAE 30W API Service SG when hot (above 90°F (33°C)) and SAE 10W API Service SJ or higher when cold (below 32°F (0°C) ambient temperature. Use either motor oil or hydraulic oil, but do not mix.
10. Oil being added to the system must be the same as what is already in the tank. Mark the tank fill area as to which type you put in.

TIRE PRESSURE

Caution must be used when inflating a low tire to recommended pressure. Over inflating can cause tires to explode. Front tires should be 20 psi (1.4bar) and rear tires should be 18 psi (1.3 bar). Improper inflation will reduce tire life considerably.

WHEEL MOUNTING PROCEDURE

1. Set park brake. Turn machine off and remove key.
2. Block wheel on opposite corner.
3. Loosen nuts slightly on wheel to be removed.
4. Jack up machine being careful not to damage underside of machine.
5. Place wheel on hub lining up bolt holes.
6. Torque to 64-74 ft/lb (87-100Nm) using a cross pattern. Retorque after first 10 hours and every 200 hours thereafter.
7. Lower machine to ground and remove blocks and jack.

## MAINTENANCE

### 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**

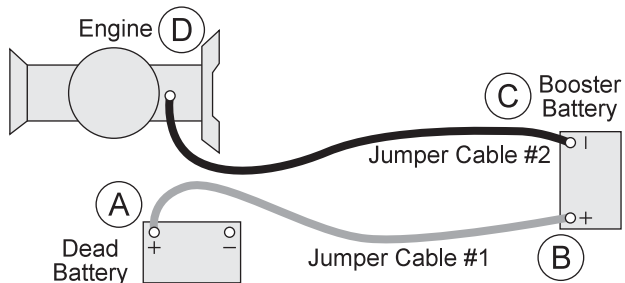
**Battery Electrolyte is an acidic solution and should be handled with care. If electrolyte is splashed on any part of your body, flush all contact areas immediately with liberal amounts of water. Get medical attention immediately.**

**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.



## STORAGE

If the engine will be out of service for two or more months, use the following storage procedure.

1. Clean the exterior surfaces of the engine.
2. Change the oil and filter while the engine is still warm from operation.
3. The fuel system must be completely emptied, or the gasoline must be treated with a stabilizer to prevent deterioration.

If you choose to use a stabilizer, follow manufacturers recommendations, and add the correct amount for the capacity of fuel system. Fill fuel tank with clean, fresh gasoline. Run engine for 2-3 minutes to get stabilized fuel into carburetor. Close fuel shut-off valve when unit is being stored or transported.

To empty the system, drain fuel tank and carburetor, or run engine until tank and system are empty.

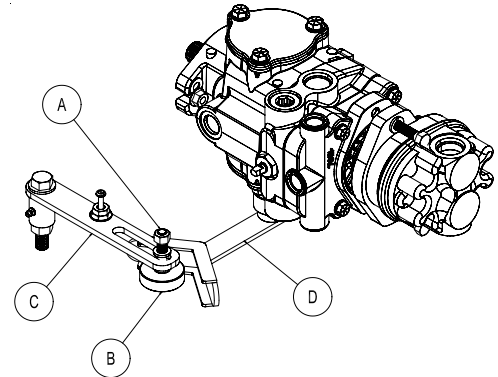
4. Remove the spark plugs. Add one tablespoon of engine oil into each spark plug hole. Install plugs, but do not connect the plug leads. Crank the engine two or three revolutions.
5. Store machine in a clean, dry place.



## WHEEL CREEP

"Creep" is when the engine is running and hydrostatic transmission is in neutral, but due to inadequate alignment, wheels still move. Do the following procedure to stop this motion.

1. Lift up and support machine so rear wheels are off the ground and can turn freely.
2. In the engine compartment, the hydrostatic transmission is on the left side. The shift arm (D) is under the pump and comes out the side. The idler arm (B) has a bearing that runs in the notch of the shift arm. Loosen bolt (A).
3. With engine running, move bearing (B) so it centers on the shift arm (D) and 'wheel creep' stops.
4. Tighten all fasteners and test by using foot pedal linkage to see that 'creep' is removed.
5. Turn engine off and lower machine.



## SPRAY PUMP WITH BELT

Located to the right of the engine. The belt should have approximately 1/2" (13mm) of deflection in the center of the top strand. Loosen and tighten the 3/8 -16 x 1 1/4 bolts located on the foot of the pump mount.

## MASTER BOOM SWITCH (FOOT SWITCH)

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 440 System* the Master Switch on the computer **must be off** for the master boom control switch to work.

## GROUND SPEED CONTROL (FOOT SWITCH)

The ground speed control does not work the same as an automotive type cruise. The ground speed control is located on the center floorboard and is used to lock forward speed.

## TO ENGAGE:

1. Flip rocker switch 'On' (green light).
2. Obtain desired speed with foot pedal.
3. Step on foot switch to lock speed.
4. Push foot switch again to disengage.

## SPEED CALIBRATION NUMBERS

The speed calibration numbers for the Spray Star 2000 is 785.

## SPRAY BOSS CONTROL

Engages and disengages speed boss. Forward is engage and all the way back is disengage. When the lever is engaged it sets a stop for the accelerator. The accelerator pedal must be used to maintain this speed. To adjust speed use the knob on the end of the lever, counter clockwise increases speed and clockwise decreases speed. Disengage the lever and you will have full accelerator pedal range.



Before servicing or making adjustments to the machine, stop engine, block wheels and remove key from ignition.



Follow all procedures and **ONLY** use parts prescribed by the manufacturer. Read the engine manual before maintenance.

The suggested maintenance checklist is not offered as a replacement for the manufacturer's engine manual but as a supplement. You must adhere to the guidelines established by the manufacturer for warranty coverage. In adverse conditions such as dirt, mud or extreme temperatures, maintenance should be more frequent.

Maintenance Service Interval	Maintenance Procedure
After the first 5 operating hours	Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))
	Change the engine and oil filter.
	Grease pivot points on boom.
After the first 20 operating hours	Replace hydraulic filter
Before each use daily	Check the engine oil.
	Check the hydraulic fluid level.
	Check the tire pressure.
	Check fuel level
	Check condition of hydraulic hoses and fittings.
	Inspect and clean the machine.
	Flush spray system tank.
Inspect cooling system.	
Every 100 hours	Change the engine oil and filter.
	Check hydraulic filter
	Check engine for leaks or loose parts.
	Check spark plugs
	Check air cleaner.
	Check tire pressure (20 psi (1.4 bar)).
	Check the battery fluid level and cable connections.
	Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))
	Grease Machine.
Check belt tension (where needed)	
Every 200 Hours	Change oil filter
	Torque the wheel lug nuts. (64-74 ft/lb (87-100 Nm))
Every 250 hours	Check Idle Speed
	Change hydraulic filter
	Clean battery terminals
Every 400 hours	Check spark plugs
Every 500 hours or yearly	Lubricate machine
	Visual inspection of machine and hydraulic hoses
	Change oil.
	Torque lug nuts.
	Check battery terminals and electrolyte level.
	Change all filters.

# END USER SERVICE CHART

**Duplicate this page for routine use**

Maintenance Check Item	For the week of:						
	Mon	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
Check the Safety Seat Switch							
Check Steering Operation							
Check the fuel level							
Check the engine oil level.							
Check the condition of the air filter							
Clean the engine cooling fins.							
Check for unusual engine noises							
Check the hydraulic oil level							
Check hydraulic hoses and fittings for damage							
Check for fluid leaks.							
Check the tire pressure (20-30 psi)							
Check the Instrumentation							
Inspect electrical system for frayed wires							
Check seat interlock switch							
Change oil filter.							
Change oil.							
Lubricate Machine and booms							
Ensure all warning decals are intact.							

### Areas of Concern

Inspection Performed by:

Item	Date	Information

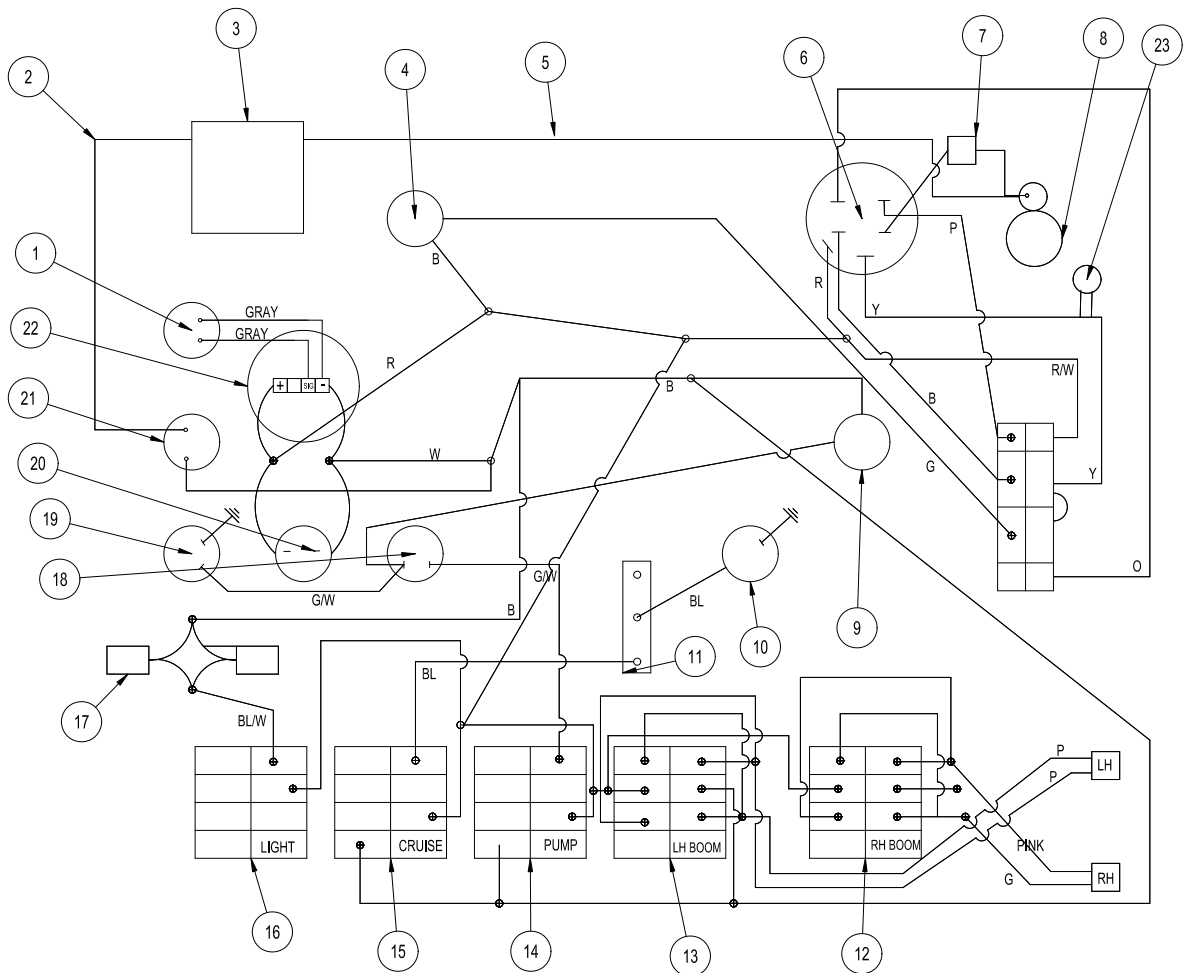
Service

# WIRING DIAGRAM

Use dielectric grease on all electrical connections.  
 To reset circuit breaker on ball valve, you must disconnect power to computer.

## Color Code Chart

Bl	Blue
Br	Brown
Y	Yellow
G	Green
O	Orange
R	Red
B	Black
P	Purple
W	White





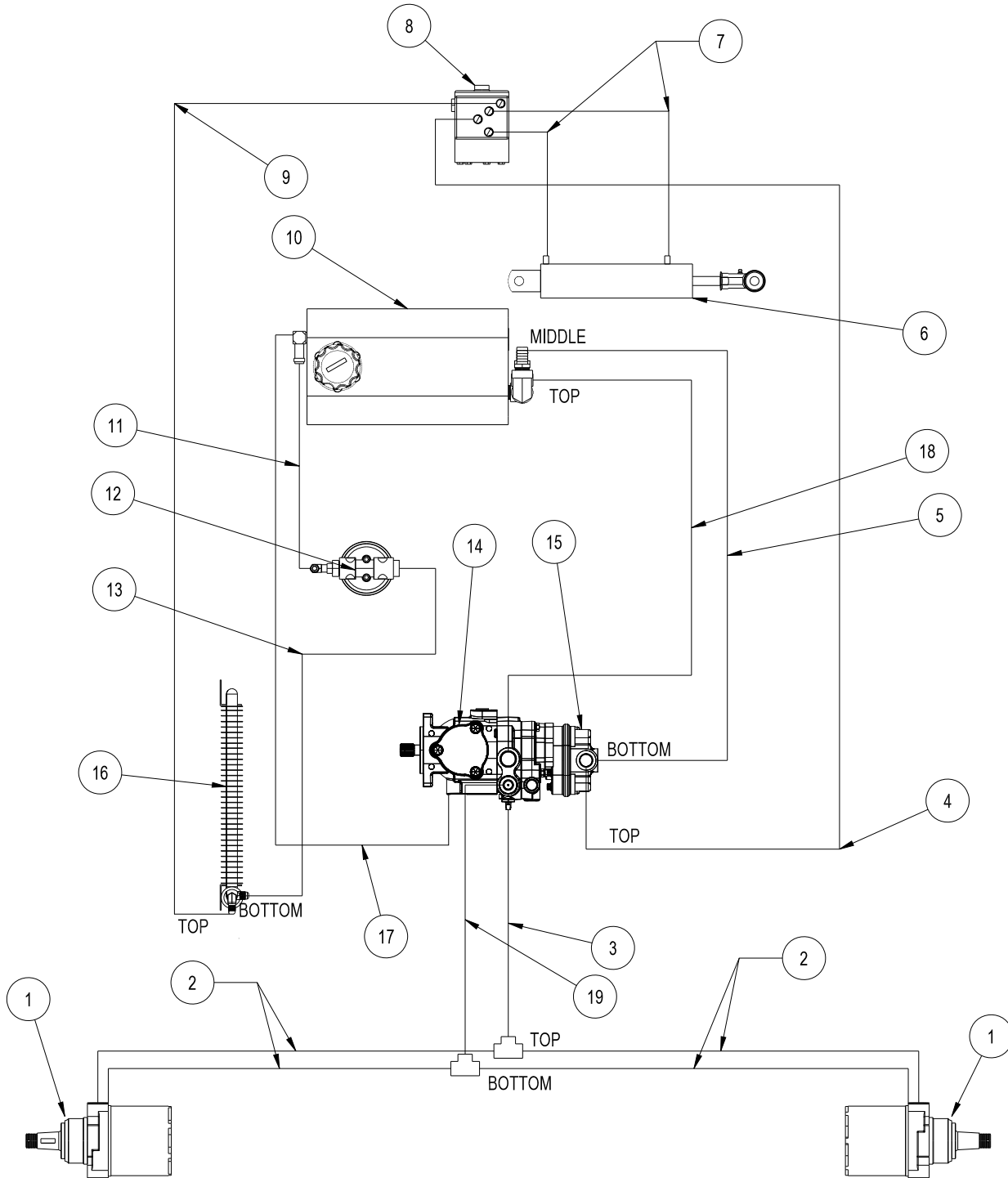
# WIRING DIAGRAM

REF#	PART#	DESCRIPTION	QUANTITY
1	16-883	Speed Sensor	1
2	48-147	Negative Battery Cable	1
3	33-216	Battery	1
4	50-359	Oil Temperature Light	1
5	50-323	Red Battery Cable	1
6	13-488	Key Switch	1
7	77-261	40 Amp Circuit Breaker	1
	8977	Red Boot	1
8		Solenoid	1
9	77-207	Buzzer	1
10	33-084	Magnetic Coil	1
11	33-509	Master Boom Switch	1
12	Right Boom		
	15-725	Mount Panel End	1
	15-727	Switch Actuator - No light	1
	15-728	Switch Body, On-Off-On	1
13	Left Boom		
	15-729	Mount Panel Middle	1
	15-728	Switch Body, On-Off-On	1
	15-727	Switch Actuator - No light	1
14	Pump		
	15-729	Mount Panel Middle	1
	15-726	Switch Body - Light	1
	15-731	Actuator Amber	1
15	Cruise		
	15-729	Mount Panel Middle	1
	15-726	Switch Body - Light	1
	15-732	Actuator Green	1
16	Lights		
	15-725	Mount Panel End	1
	15-782	Switch Body, On-Off-On	1
	15-727	Switch Actuator - No light	1
17	32-014	Lights	2
18	33-480	Pressure Switch	1
19	16-998	Spray Pump	1
20	12-017	Hour Meter	1
21		Engine Block	1
22	10-556	Speedometer	1
23	14-292	Seat Switch	1
	20-579	Wire Harness	1

# HYDRAULIC DIAGRAM

Use dielectric grease on all electrical connections.

Diagrams



## HYDRAULIC DIAGRAM PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	43-116	Wheel Motors	2
	14-080	Wheel Motor Seal Kit	2
2	15-681	Hose	4
3	20-572	Hydraulic Hose	1
4	20-574	Hydraulic Hose	1
5	8832-29	3/4 Suction Hose	1
	18-040	Hose Clamp	2
6	15-839	Hydraulic Cylinder	1
	14-531	Cylinder Seal Kit	1
7	20-575	Hydraulic Hose	2
8	15-301	Orbitrol	1
	15-301-01	Orbitrol Seal Kit	1
9	20-573	Hydraulic Hose	1
10	60-473	Oil Tank	1
11	20-564	Hydraulic Hose	1
12	20-576	Oil Filter Assembly	1
	20-576-01	Replacement Filter	1
13	20-563	Hydraulic Hose	1
14	76-482	Hydrostatic Pump	1
	77-239-22	Hydrostatic Pump Seal Kit	1
15	76-197	Gear Pump	1
	76-197-08	Gear Pump Seal Kit	1
16	15-624	Oil Cooler	1
17	20-570	Hydraulic Hose	1
18	8832-27	3/4 Suction Hose	1
	18-040	Hose Clamp	2
19	20-571	Hydraulic Hose	1

Diagrams

## PUMP DISPLACEMENT

### 76-482 Hydrostatic Pump

Displacement	Variable to 1.44 in <sup>3</sup> /R (23.6 cm <sup>3</sup> /R) 22.44 gpm (84.94 lpm) at 3600 rpm
Max Operating Speed	3600 rpm
Rated Pressure	3000 psi (206.8 bar)
Max Pressure	5000 psi (344.7 bar)
Max Inlet Vacuum	6 in Hg (.203 bar)
Max Inlet Temperature	225°F (107°C)
Max Allowable Case Pressure	25 psi (1.72 bar)

### 76-197 Gear Pump

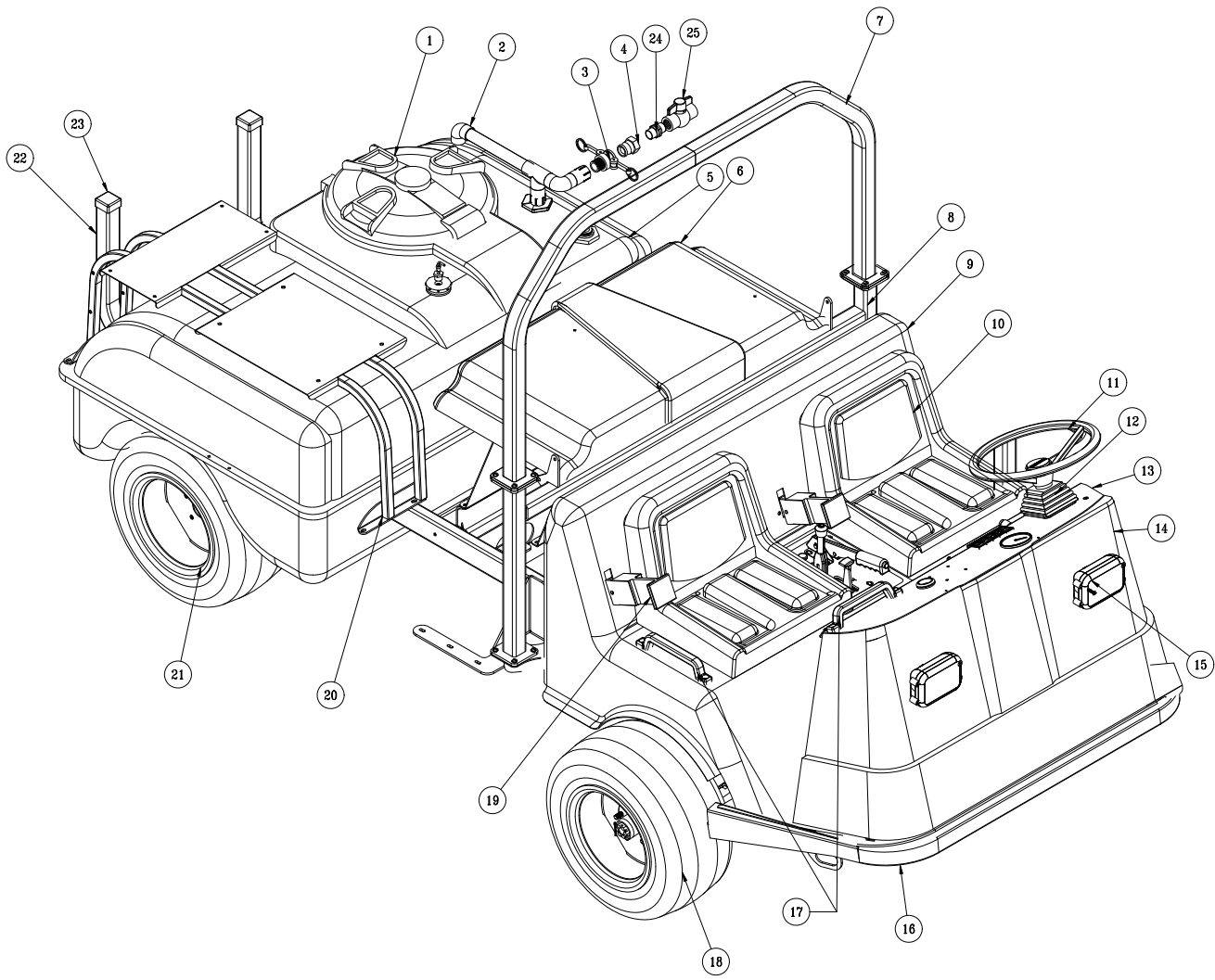
Displacement	.40 in <sup>3</sup> /R (6.6 cm <sup>3</sup> /R) 6.23 gpm (25.39 lpm)
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Over tightened fittings will result in crushing the cone which will create a leak.



# BODY & FRAME DRAWING

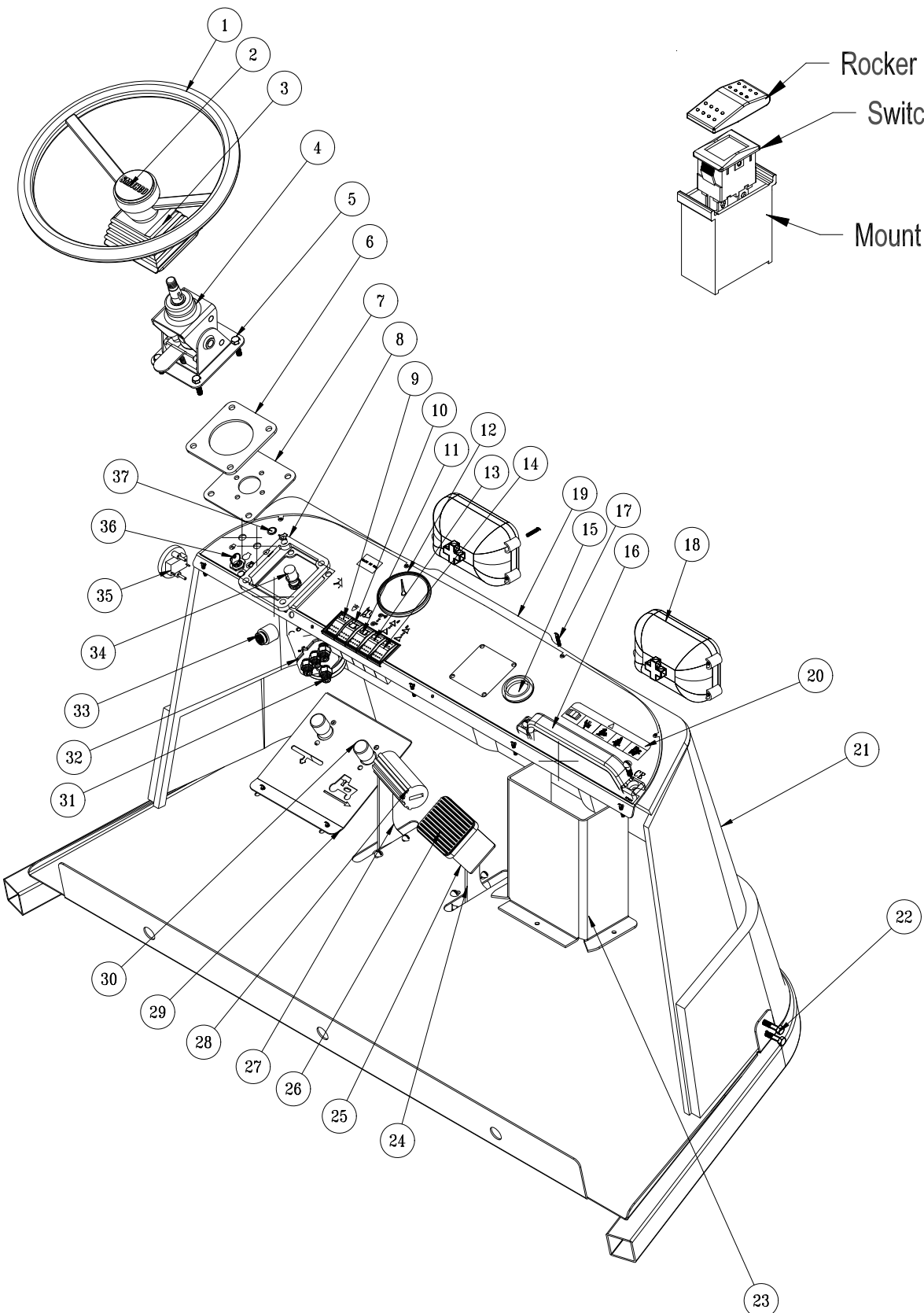
Diagrams



## BODY & FRAME PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-953	16" Lid	1
	16-953-01	Gasket for Lid	1
	16-169	Strainer Basket	1
2	14-365	Air Gap Filler	1
3	16-961	Adapter	1
4	16-962	Coupler	1
	16-962-01	Buna-N Gasket	1
5	20-592	200 Gallon Tank (Fiberglass)	1
	20-529	Decal, Spray Star 2000	2
	20-593	Decal, Site Gauge	1
6	20-556	Rear Hood (fiberglass)	1
7	20-611	Roll Bar	1
8	20-561	Roll Bar Base	1
9	31-045	Seat Assembly (Fiberglass)	1
10	14-270	Seat	2
	14-292	Seat Switch	1
11	13-718	Steering Wheel	1
	13-726	Center Cap	1
12	76-364	Square Boot	1
	76-362	Mini Tilt steering	1
13	20-596	Dash Panel	1
14	31-044	Nose Cone (fiberglass)	1
15	32-014	Head Light	2
16	20-535	Main Frame	1
17	76-443	Black Handle	3
	HSTP-516-18-100	Phillips Machine Screw $5/16$ -18 x 1	6
	HNFL-516-18	Flange Whiz Lock Nut $5/16$ -18	6
18	16-857	Front Tire and Wheel	2
	16-857-01	Tire 20 x 10.00 - 10NHS 4-ply	2
	16-857-02	Wheel	2
19	76-198-03	Seat Belt	2
20	20-552	Accessory Mount	1
21	16-225	Tire & Wheel	2
	16-225-01	Tire 24 x 13.00 - 12NHS 4 Ply	2
	16-225-02	Wheel	2
22	17-615	Boom Support Tube	2
23	16-557	Square Cap	2
24	16-851	1" Nipple	1
25	18-448	1" Ball Valve	1

# NOSE CONE DRAWING



Rocker

Switch

Mount Panel

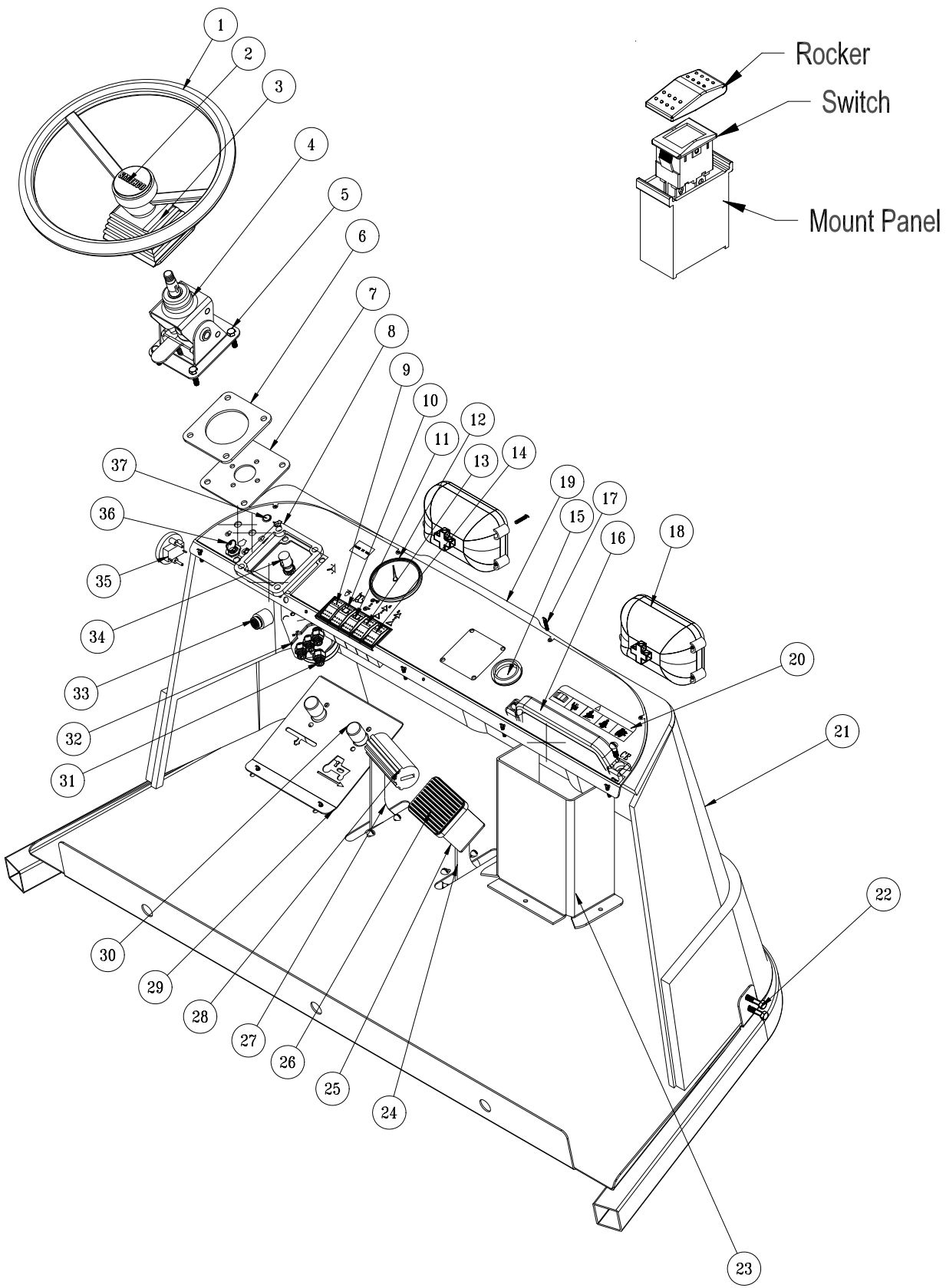
Parts

## NOSE CONE PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	13-718	15" Steering Wheel	1
2	13-726	Center Cap	1
	27-077	Decal, Smithco Round	1
3	76-364	Square Boot	1
4	76-362	Mini Tilt steering	1
5	HB-516-18-150	Bolt $5/16$ - 18 x $1\frac{1}{2}$	4
	HNFL-516-18	Flange Whiz Lock Nut $5/16$ -18	4
6	15-844	Tilt Steering Spacer	1
7	31-056	Tilt Steering Plate	1
8	31-057	Steering Spacer	1
9	LIGHTS		
	15-725	Mount Panel End	1
	15-727	Actuator, No Light	1
	15-782	Rocker Switch, Unlit	1
10	CRUISE		
	15-732	Actuator, Green	1
	15-726	Switch Body, Light	1
	15-729	Mount Panel Middle	1
11	PUMP		
	15-731	Actuator, Amber	1
	15-726	Switch Body, Light	1
	15-729	Mount Panel Middle	1
12	10-556	Speedometer	1
13	RIGHT BOOM		
	15-727	Actuator, No Light	1
	15-729	Mount Panel Middle	1
	15-728	Switch Body, Momentary On-Off-On	1
14	LEFT BOOM		
	15-725	Mount Panel End	1
	15-727	Actuator, No Light	1
	15-728	Switch Body, Momentary On-Off-On	1
15	50-400	Grommet	1
16	76-443	Black Handle	1
	HSTP-516-18-100	Phillips Machine Screw $5/16$ -18 x 1	2
	HNFL-516-18	Flange Whiz Lock Nut $5/16$ -18	2
17	HSM-10-32-100	Machine Screw #10 -32 x 1	17
	HNFL-10-32	Flange Whiz Lock Nut #10 -32	17
18	32-014	Head Light	2
19	20-596	Dash Panel	1
20	20-545	Decal, Dash Panel	1
21	31-044	Nose Cone (fiberglass)	1
22	HSTP-516-18-150	Phillips Machine Screw $5/16$ -18 x $1\frac{1}{2}$	7
	HNFL-516-18	Flange Whiz Lock Nut $5/16$ -18	7
23	31-062	Hose Guard	1
24	31-050	Reverse Pedal	1
25	16-062	Pedal Pad Plate	1
	HB-38-16-125	Bolt $3/8$ -16 x $1\frac{1}{4}$	1
	HNTL-38-16	Lock Nut $3/8$ -16	1
26	15-015	Pedal Pad	1

(Continued on next page)

# NOSE CONE DRAWING



Parts

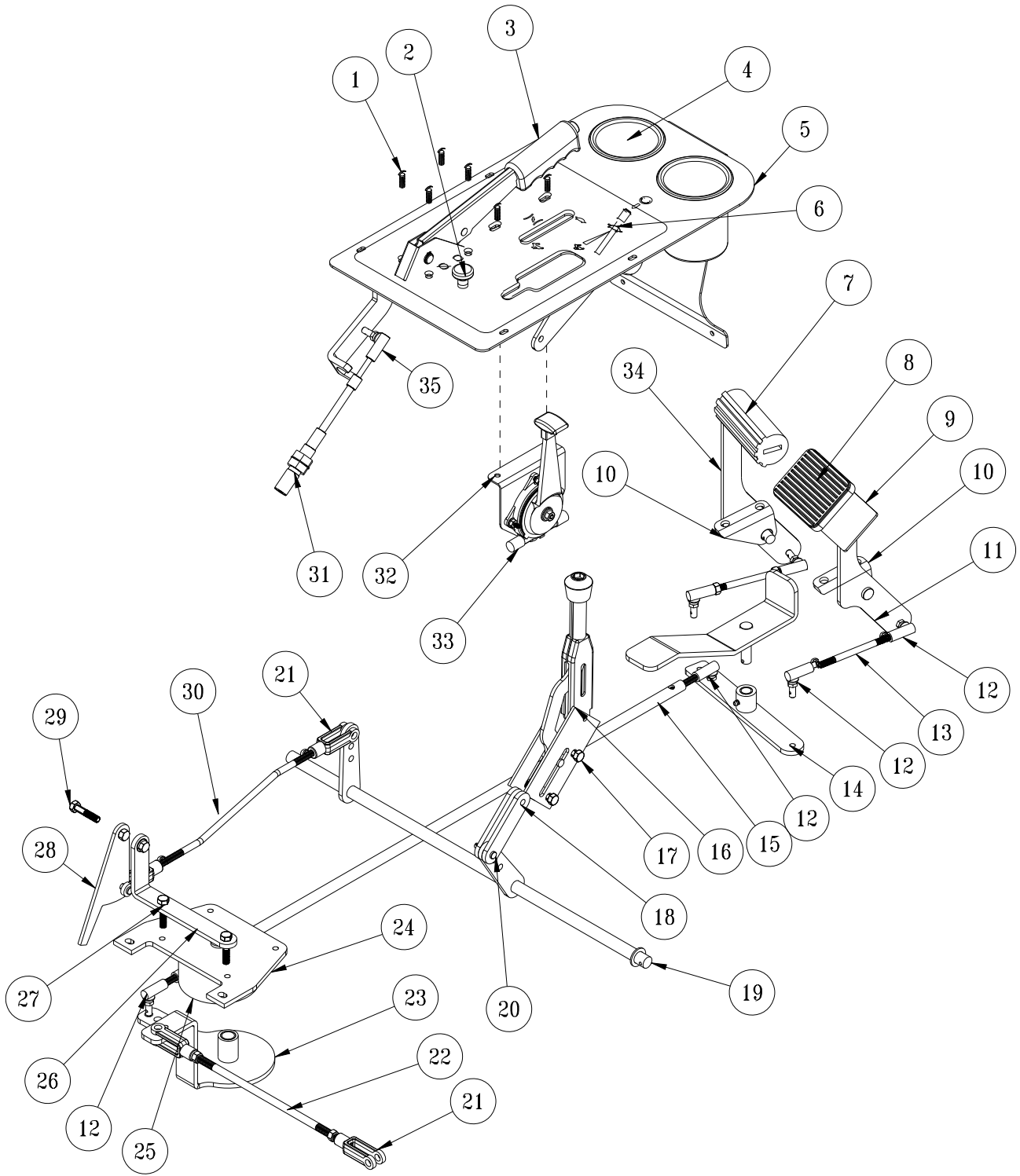


## NOSE CONE PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
27	10-163	Forward Foot Pedal	1
28	48-066	Pedal Grip	1
29	31-049	Button Plate	1
	HB-14-20-075	Bolt $\frac{1}{4}$ -20 x $\frac{3}{4}$	2
	HNFL-14-20	Flange Whiz Lock Nut $\frac{1}{4}$ - 20	2
30	33-509	Master Control Switch	2
	HSTP-14-20-075	Machine Screw $\frac{1}{4}$ -20 x $\frac{3}{4}$	4
31	18-169	Adapter	4
32	15-301	Orbitrol	1
33	77-207	Buzzer	1
34	48-187	Stub shaft	1
35	12-017	Hour Meter	1
36	13-488	Ignition	1
37	50-359	Warning Indicator Light	1

# LINKAGE DRAWING

Parts

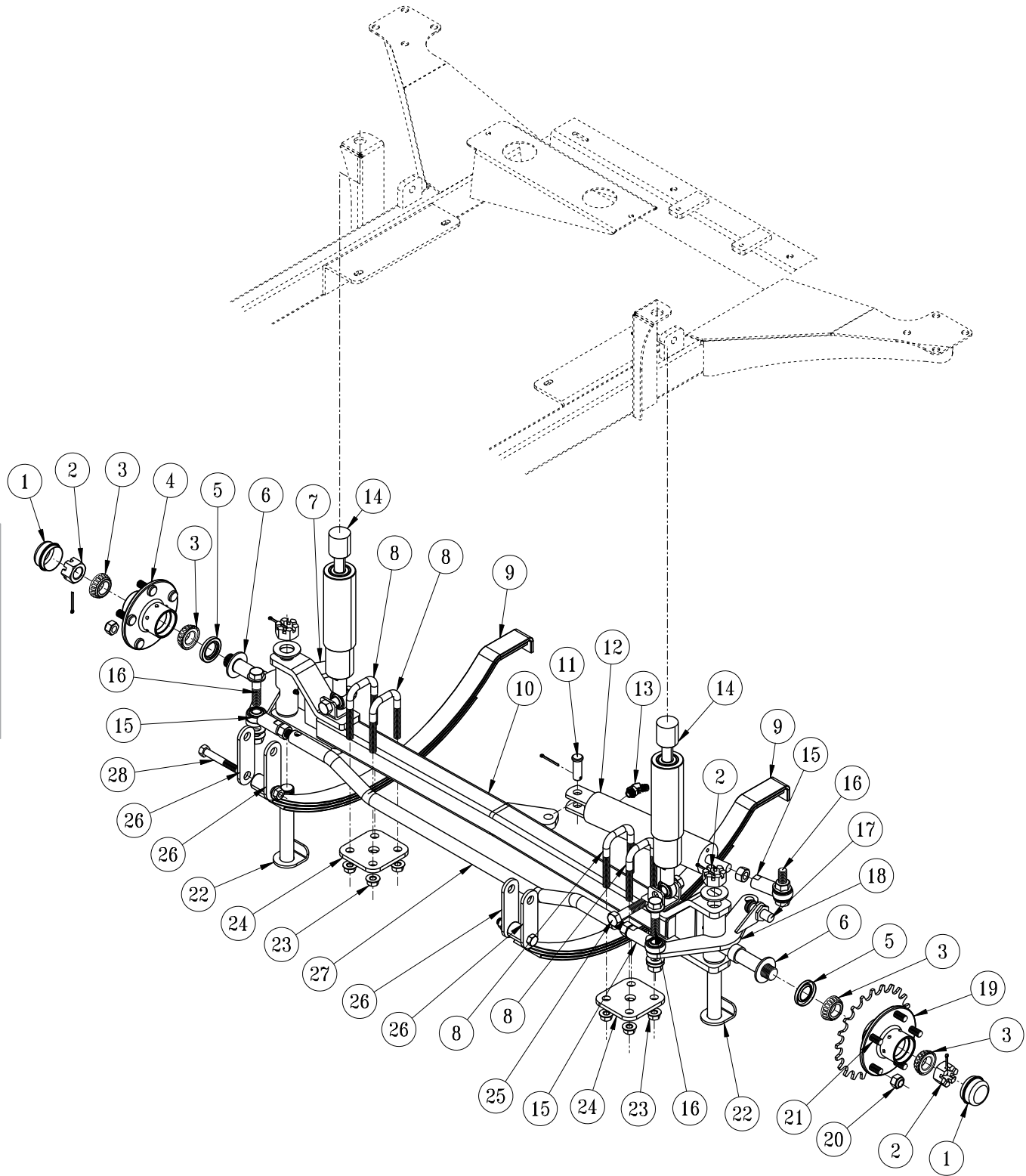


# LINKAGE PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HSTP-14-20-075	Phillips Machine Screw 1/4 -20 x 3/4	6
	HNFL-14-20	Flange Lock Nut 1/4 -20	6
2	11-086	Choke with Cable	1
3	51-088	Park Brake Handle	1
4	15-781	X-large Cup Holder	2
5	20-536	Center Console	1
6	20-553	Decal, Center Console	1
7	48-066	Pedal Grip	1
8	15-015	Pedal Pad	1
9	16-062	Pedal Pad Plate	1
	HB-38-16-125	Bolt 3/8 -16 x 1 1/4	1
	HNTL-38-16	Lock Nut 3/8 -16	1
10	76-296	Pedal Mount	2
	18-234	Bushing	4
	HG-14-28-180	Grease Zerk	2
11	31-050	Reverse Pedal	1
12	21-462	Ball Joints 5/16 - 24	6
	HWL-516	Lock Washer 5/16	6
	HN-516-24	Nut 5/16 - 24	12
13	31-054	Pedal Rod	2
14	10-178	Relay	1
	18-234	Bushing	2
	HG-14-28-180	Grease Zerk	1
	HMB-12-14	Machine Bushing 1/2 x 14GA	1
	HP-18-100	Cotter Pin	1
15	20-567	Foot Pedal Rod	1
16	60-106	Control Lever	1
17	HB-516-18-175	Bolt 5/16 -18 x 1 3/4	2
	HW-516	Washer 5/16	1
	HNFL-516-18	Flange Lock Nut 5/16 -18	2
18	20-565	Spray Boss Link	2
19	20-551	Relay Bar	1
	HP-18-100	Cotter Pin	1
20	HB-516-18-100	Bolt 5/16 -18 x 1	1
	HNFL-516-18	Flange Lock Nut 5/16 -18	1
21	21-351	Linkage Yoke 3/8 -24	4
	HN-38-24	Nut 3/8 -24	4
22	20-582	Short Shift Link	1
23	15-692	Pedal Relay	1
24	30-027	Relay Plate	1
25	33-084	Magnetic Coil	1
26	20-559	Speed Control Pivot Mount	1
27	HB-14-20-100	Bolt 1/4 -20 x 1	2
	HNFL-14-20	Flange Lock Nut 1/4 -20	2
28	15-706	Speed Boss Arm	1
29	HB-38-16-125	Bolt 3/8 -16 x 1 1/4	1
	HW-38	Washer 3/8	3
	HNTL-38-16	Lock Nut 3/8 -16	1
30	20-542	Speed Control Rod	1
31	50-108	Cable	1
32	32-093	Throttle Bracket	1
33	34-160	Throttle with Cable	1
	34-160-01	Inner Cable	
	HSM-10-32-075	Machine Screw 10 -32 x 3/4	4
	HNFL-10-32	Flange Lock Nut 10-32	4
34	10-163	Forward Foot Pedal	1
35	18-441	Ball Joint	1

# FRONT AXLE DRAWING

Parts

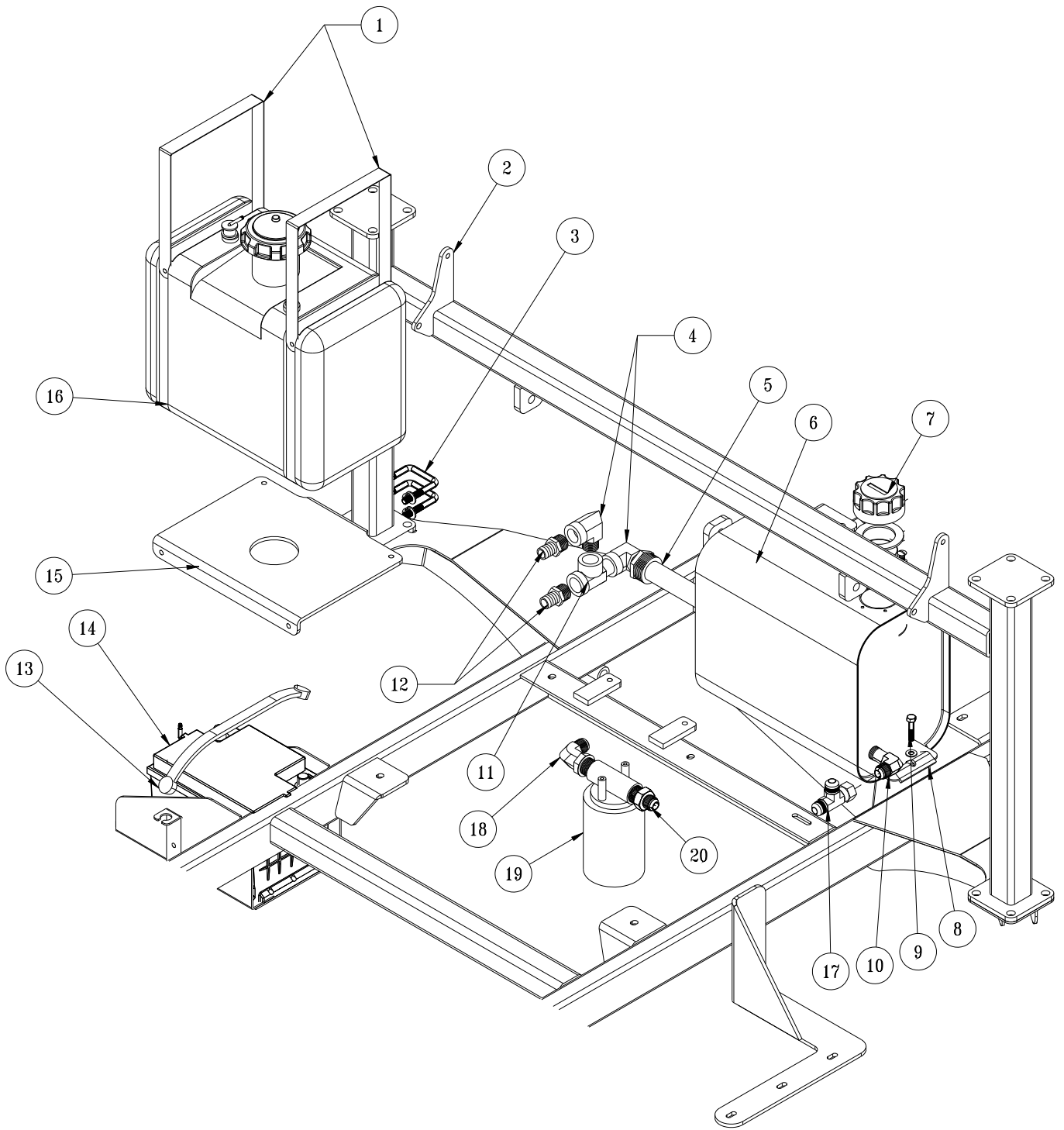


## FRONT AXLE PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1*	80-167	Dust Cap	2
2*	HNAR-100-14	Slotted Jam Nut 1 - 14	4
	HP-18-150	Cotter Pin $\frac{1}{8}$ - $1\frac{1}{2}$	4
3*	11-043	Bearing with Races	4
4	80-019	Hub (includes all * items)	1
5*	11-041	Oil Seal	2
6	HMB-100-10	Machine Bushing 1 x 10GA	2
7	15-696	Left Spindle	1
8	20-555	U-Bolt	4
9	16-042	Leaf Spring	2
10	20-530	Front Axle	1
11	HCP-58-175	Clevis Pin $\frac{5}{8}$ x $1\frac{3}{4}$	1
	HP-18-100	Cotter Pin $\frac{1}{8}$ x 1	1
12	15-839	Hydraulic Cylinder	1
	14-531	Cylinder Seal Kit	1
13	18-188	45° Elbow	2
14	20-617	Shock Absorber	2
15	18-154	Rod End	3
	HG-14-28-90	Grease Fitting $\frac{1}{4}$ - 28 x 90°	3
	HNJ-58-18	Jam Nut $\frac{5}{8}$ - 18	3
16	HB-58-11-250	Bolt $\frac{5}{8}$ - 11 x $2\frac{1}{2}$	3
	HMB-58-14	Machine Bushing $\frac{5}{8}$ x 14GA	6
	HNTL-58-11	Lock Nut $\frac{5}{8}$ - 11	3
17	16-883	Magnetic Sensor	1
18	15-695	Right Spindle	1
19	10-561	Hub & Sprocket (includes all * items)	1
20*	HNL-12-20	Lug Nut $\frac{1}{2}$ - 20	10
21*	27-022-02	Stud	10
22	16-076	King Pin	2
23	HNFL-12-13	Flange Lock Nut $\frac{1}{2}$ - 13	8
24	20-538	Spring Mount	2
25	HB-58-11-300	Bolt $\frac{5}{8}$ - 11 x 3	2
	HNTL-58-11	Lock Nut $\frac{5}{8}$ - 11	2
26	20-539	Spring Shackle	4
27	15-690	Tie Rod	1
28	HB-916-18-325	Bolt $\frac{9}{16}$ - 18 x $3\frac{1}{4}$	4
	HNTL-916-18	Lock Nut $\frac{9}{16}$ - 18	4

# OIL AND FUEL TANK DRAWING

Parts

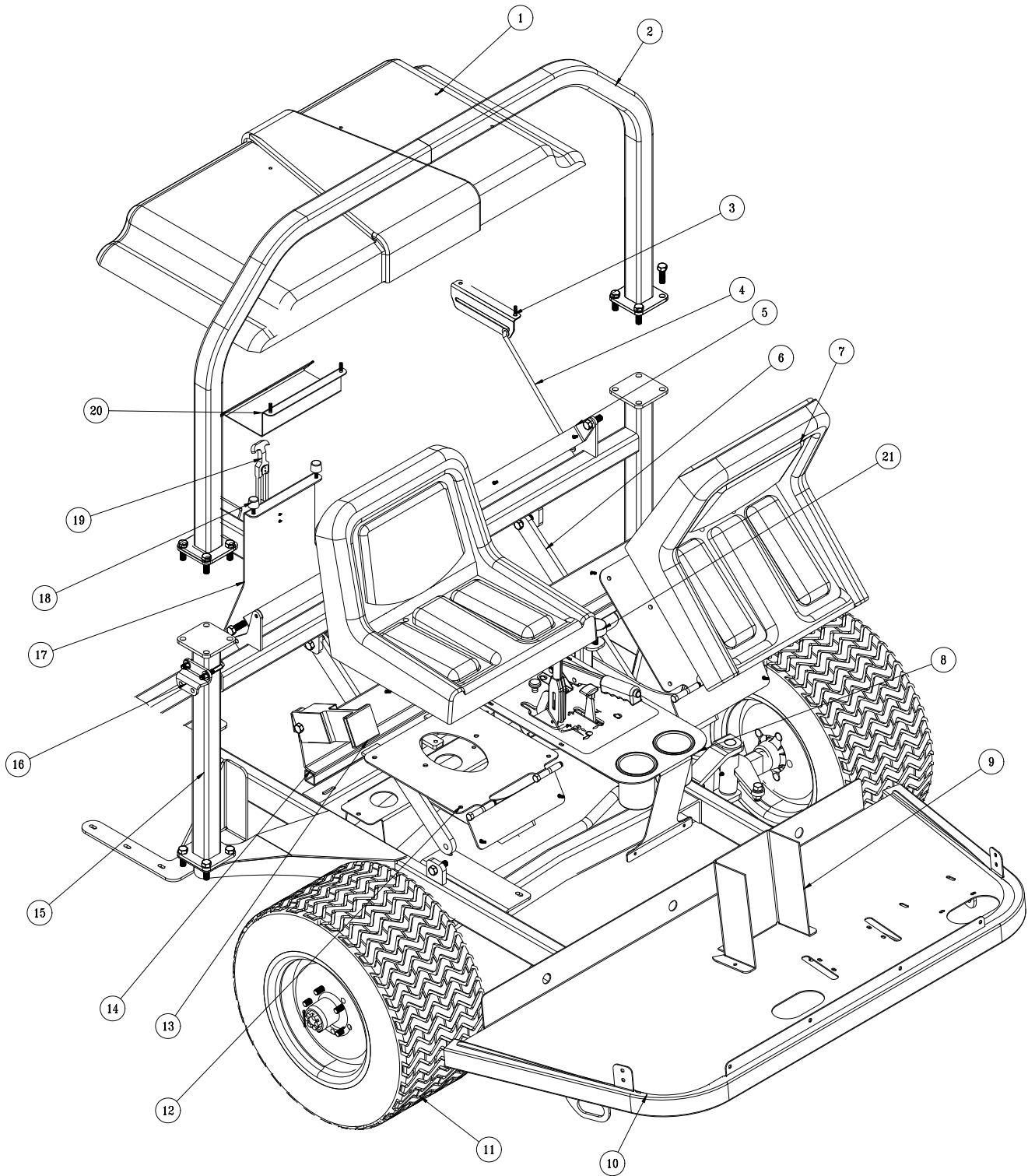


## OIL AND FUEL TANK PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	78-456	Tank Strap	2
	HB-14-20-075	Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HB-14-20-175	Bolt $\frac{1}{4}$ - 20 x $1\frac{3}{4}$	2
	HNFL-14-20	Flange Lock Nut $\frac{1}{4}$ - 20	4
2	20-561	Roll Bar Base	1
3	17-537	Square U-Bolt	2
4	18-140	Street Elbow	2
5	60-213	Strainer	1
6	60-473	Oil Tank	1
7	13-747	Filler Breather	1
	13-586-01	Cap Gasket	1
	13-586-02	Bottom gasket	1
	13-586-03	Neck	1
	HSM-10-32-063	Machine Screw 10 - 32 x $\frac{5}{8}$	6
	HWL-10	Lock Washer 10	6
8	75-792	Tank Hold Down	2
9	HB-516-18-150	Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{2}$	2
	HW-516	Washer $\frac{5}{16}$	2
	HNFL-516-18	Flange Lock Nut $\frac{5}{16}$ - 18	2
10	23-187	Male Elbow	1
11	18-093	Straight Tee	1
12	18-249	Barb Fitting	2
13	8-603	Battery Strap - Rubber	1
14	33-216	Battery	1
15	20-568	Gas Tank Plate	1
16	15-838	Gas Tank	1
	15-838-01	Fuel Gauge	1
	42-814-02	Vented Cap	1
	42-814-05	Roll Over Valve	1
17	34-058	Swivel Tee	1
18	18-204	Elbow	1
19	20-576	Oil Filter Assembly	1
20	15-702	Adapter	1
NS	8800-16	$\frac{1}{4}$ " Fuel Hose x 16"	1
NS	8800-21	$\frac{1}{4}$ " Fuel Hose x 21"	1
NS	8800-24	$\frac{1}{4}$ " Fuel Hose x 24"	1
NS	18-186	Hose Clamp	6

# SEAT PANEL DRAWING

Parts

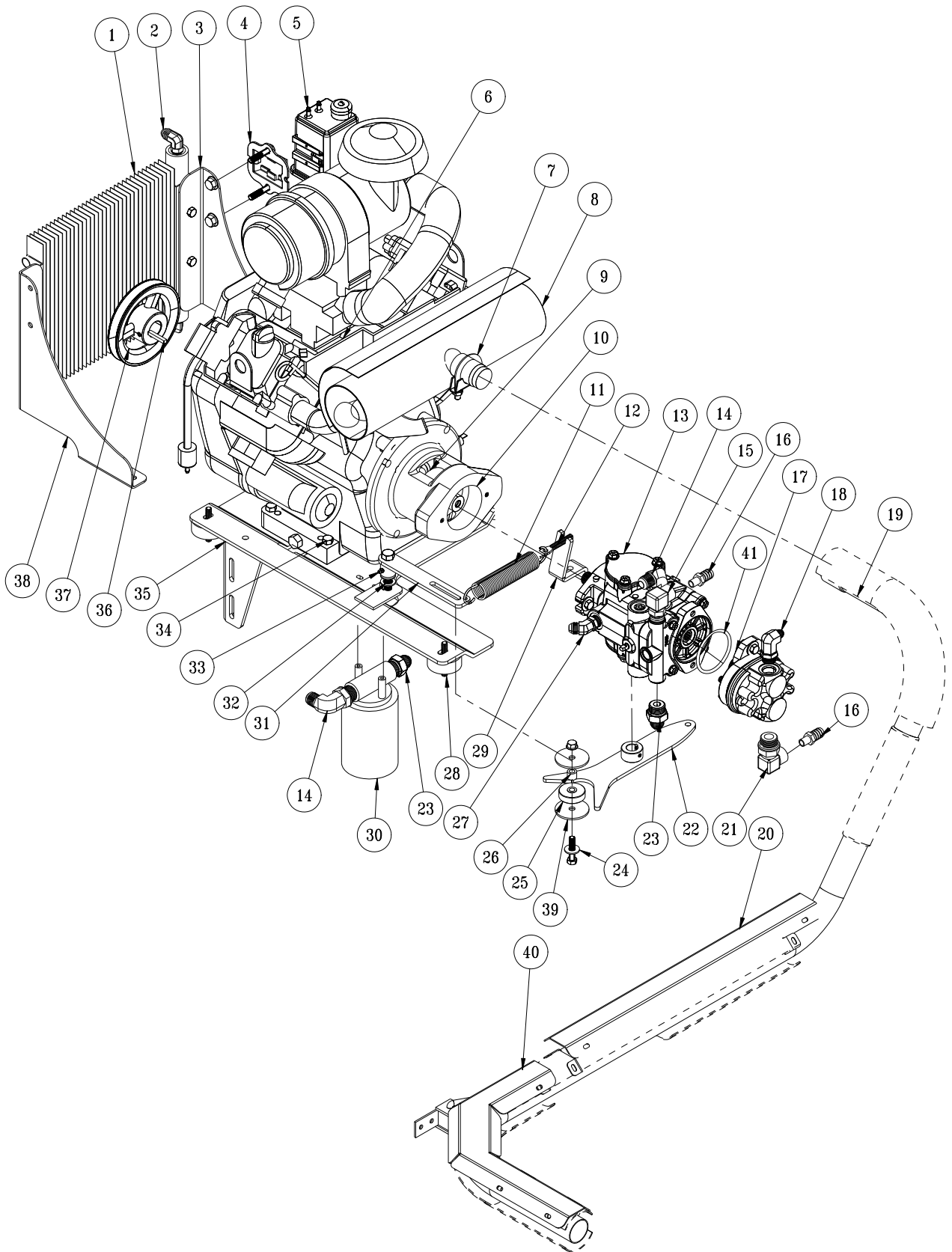




## SEAT PANEL PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	20-556	Rear Hood (fiberglass)	1
2	20-611	Roll Bar	1
	HB-12-13-150	Bolt $\frac{1}{2}$ -13 x $1\frac{1}{2}$	16
	HNFL-12-13	Flange Lock Nut $\frac{1}{2}$ -13	16
3	20-548	Hood Prop Bracket	1
4	20-558	Hood Rod	1
	HW-38	Washer $\frac{3}{8}$	2
	HP-18-100	Cotter Pin $\frac{3}{8}$ x 1	2
5	20-554	Hinge	1
6	20-580	Roll Bar Brace	2
	HB-12-13-150	Bolt $\frac{1}{2}$ -13 x $1\frac{1}{2}$	4
	HNFL-12-13	Flange Lock Nut $\frac{1}{2}$ -13	4
7	14-270	Seat	2
	14-292	Seat Switch	1
8	20-536	Center Console	1
9	31-062	Hose Guard	1
10	20-535	Main Frame	1
11	16-857	Front Tire and Wheel	2
	16-857-01	Tire 20 x 10.00 - 10NHS 4-ply	2
	16-857-02	Wheel	2
12	31-052	Seat Panel	2
13	76-198-03	Seat Belt	2
	HB-716-14-100	Bolt $\frac{7}{16}$ - 14 x 1	2
	HNTL-716-14	Lock Nut $\frac{7}{16}$ - 14	2
14	31-066	Seat Frame	1
15	20-561	Roll Bar Base	1
16	20-543	Strainer Mount	1
	17-537	Square U-Bolt	1
17	20-550	Hood Rest	1
18	15-013	Rubber Bumper	2
	HNFL-14-20	Flange Nut $\frac{1}{4}$ -20	2
19	15-437	Hold Down	1
	HSM-10-32-112	Machine Screw 10 -32 - $1\frac{1}{8}$	2
	HNFL-10-32	Flange Lock Nut 10-32	2
20	20-549	Hood Bumper Pad	1
21	50-081	Rubber Bumper	4
	HNFL-38-16	Flange Whiz Lock Nut $\frac{3}{8}$ -16	4

# ENGINE AND PUMPS DRAWING



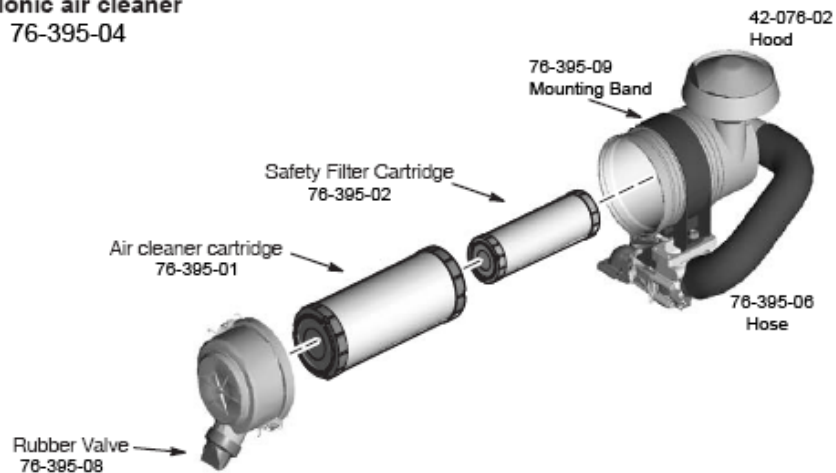
Parts

## ENGINE AND PUMPS PARTSLIST

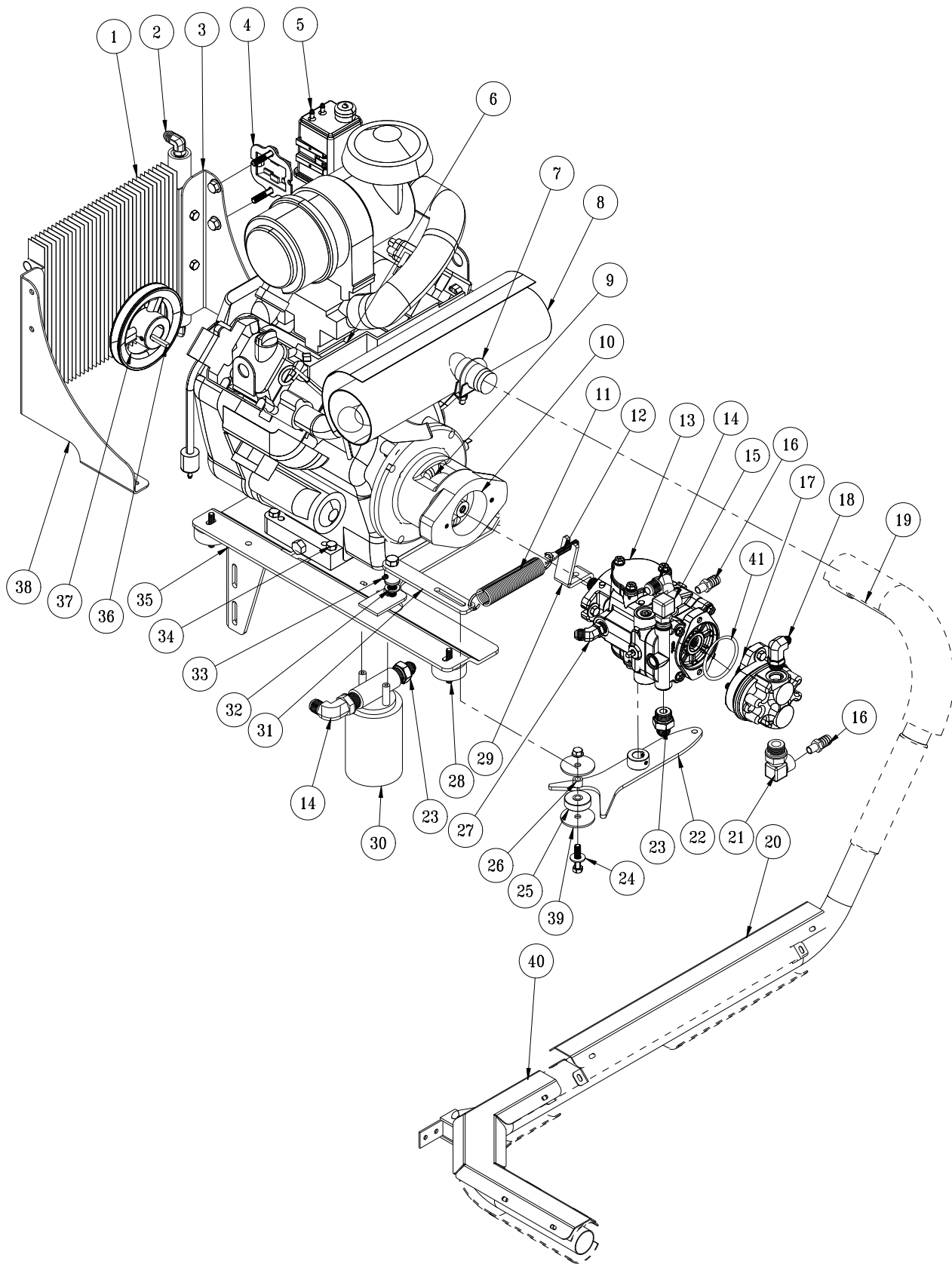
REF#	PART#	DESCRIPTION	QUANTITY
1	15-624	Oil Cooler	1
	HB-516-18-075	Bolt $\frac{5}{16}$ -18 x $\frac{3}{4}$	4
	HNFL-516-18	Flange Lock Nut $\frac{5}{16}$ -18	4
2	18-438	Fitting	2
3	20-532	Right Oil Cooler Mount	1
4	8-688	Carbon Canister Mount	1
	HB-516-18-075	Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$	2
	HNFL-516-18	Flange Lock Nut $\frac{5}{16}$	2
5	8-689	Carbon Canister Assembly	1
6	76-484	Engine, Briggs & Stratton 31 HP	1
	76-487	Engine Oil Filter	1
	76-446-01	Stub Shaft	1
	21-161	Wire Block	1
7	50-394	Muffler Clamp	1
8	76-447	Center Mount Muffler	1
9	76-465	Coupling Complete	1
	76-466	$\frac{7}{8}$ " Coupling Half	1
	76-467	$1\frac{1}{8}$ " Coupling Half	1
	76-468	Sleeve	1
	32-026	Pump Adapter	1
11	21-445	Spring	1
12	42-604	Spade Bolt	1
	HNFL-38-16	Flange Lock Nut $\frac{3}{8}$ - 16	2
13	76-482	Hydrostatic Pump	1
	HB-38-16-125	Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$	2
	HW-38	Washer $\frac{3}{8}$	2
	HWL-38	Lock Washer $\frac{3}{8}$	2
14	18-204	Elbow	2
15	23-130	Elbow	1
16	18-133	Barb Fitting	2
17	76-197	Gear Pump	1
	HB-38-16-100	Bolt $\frac{3}{8}$ -16 x 1	2
	HW-38	Washer $\frac{3}{8}$	2
	HWL-38	Lock Washer $\frac{3}{8}$	2
18	32-022	Straight Thread Elbow	1
19	20-633	Exhaust Assembly	1

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### Cyclonic air cleaner 76-395-04



# ENGINE AND PUMPS DRAWING

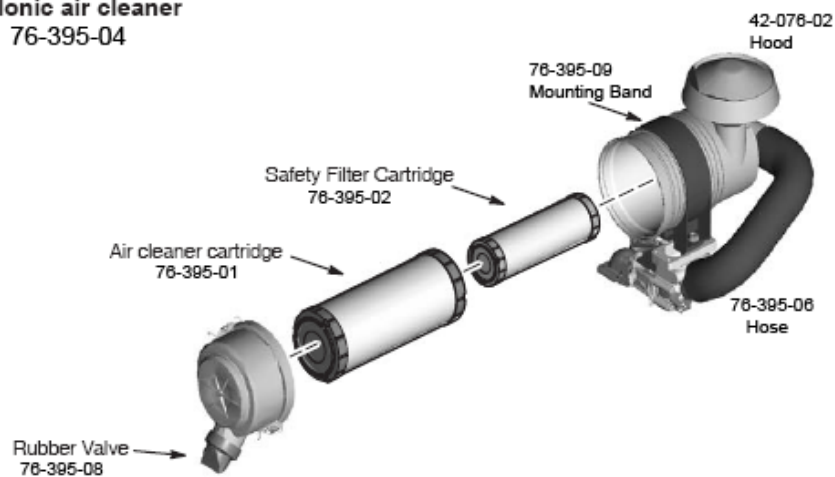


Parts

## ENGINE AND PUMPS PARTSLIST

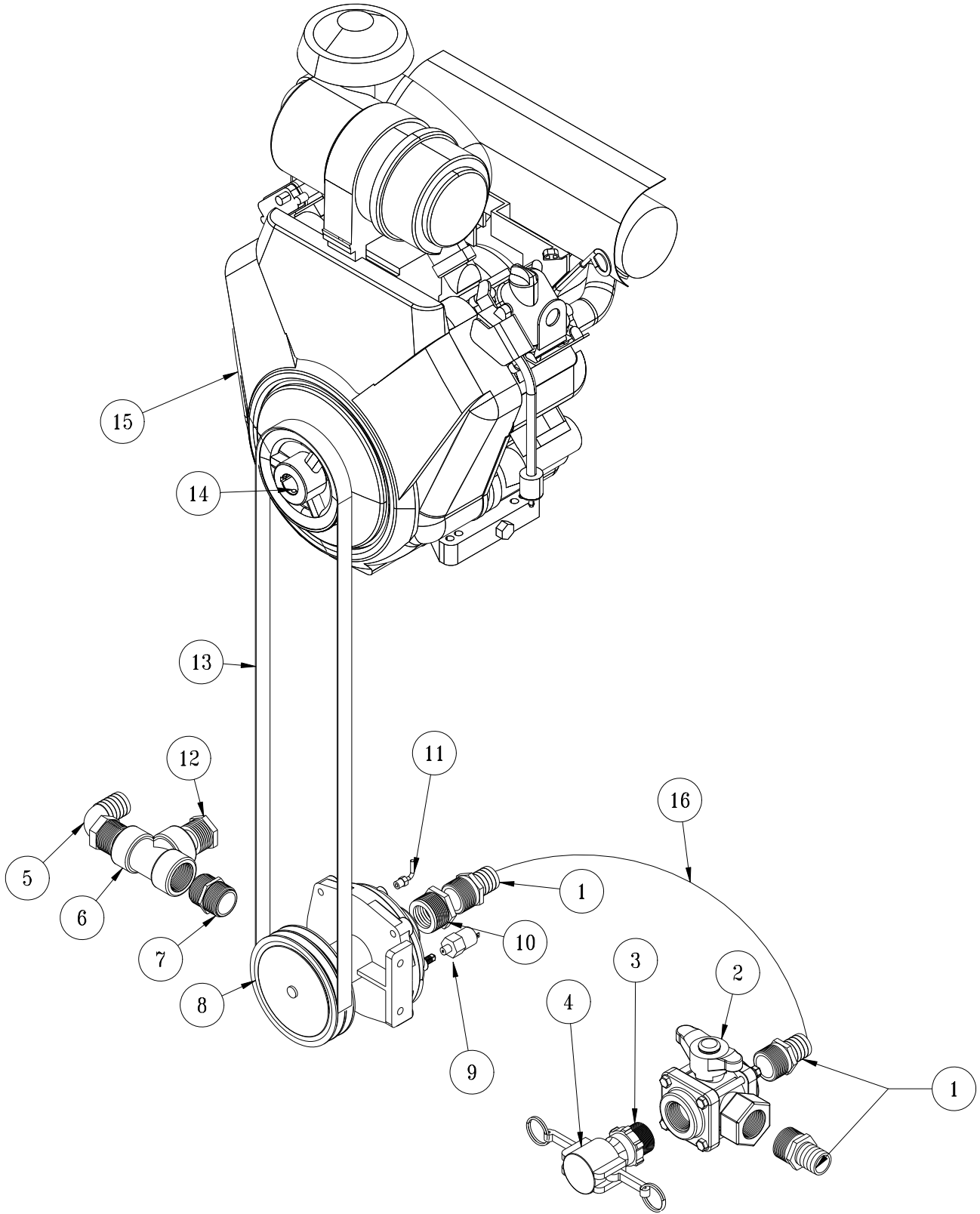
REF#	PART#	DESCRIPTION	QUANTITY
20	20-632	Long Exhaust Shield	1
21	23-133	90° Adjustable Elbow	1
22	20-569	Centering Arm	1
23	15-702	Adapter	2
24	HB-38-16-175	Bolt $\frac{3}{8}$ -16 x $1\frac{3}{4}$	1
	HW-38	Washer $\frac{3}{8}$	1
	HNTL-38-16	Lock Nut $\frac{3}{8}$ -16	1
25	14-266	Ball Bearing	1
26	18-270	Spacer	1
27	18-266	45° Elbow	1
28	11-021	Engine Mount	4
	HWL-38	Lock Washer $\frac{3}{8}$	8
	HN-38-24	Nut $\frac{3}{8}$ - 24	8
29	20-566	Spring Mount	1
30	20-576	Oil Filter Assembly	1
31	20-581	Idler Arm	1
32	HB-12-13-300	Bolt $\frac{1}{2}$ - 13 x 3	1
	HMB-12-14	Machine Bushing $\frac{1}{2}$ x 14GA	2
	HWL-12	Lock Washer $\frac{1}{2}$	1
	HN-12-13	Nut $\frac{1}{2}$ -13	1
33	HG-14-28-180	Grease Zerk $\frac{1}{4}$ -28 x 180°	1
34	HB-716-14-150	Bolt $\frac{7}{16}$ - 14 x $1\frac{1}{2}$	4
	HWL-716	Lock Washer $\frac{7}{16}$	4
35	20-541	Engine Plate	1
36	HKSQ-14-150	Square Key $\frac{1}{4}$ - $1\frac{1}{2}$	1
37	15-703	Pulley	1
38	20-533	Left Oil Cooler Mount	1
39	20-594	Guide Disk	2
40	20-636	Outlet Exhaust Shield	1
41	23-145	O-ring	1

### Cyclonic air cleaner 76-395-04



# PUMP DRAWING

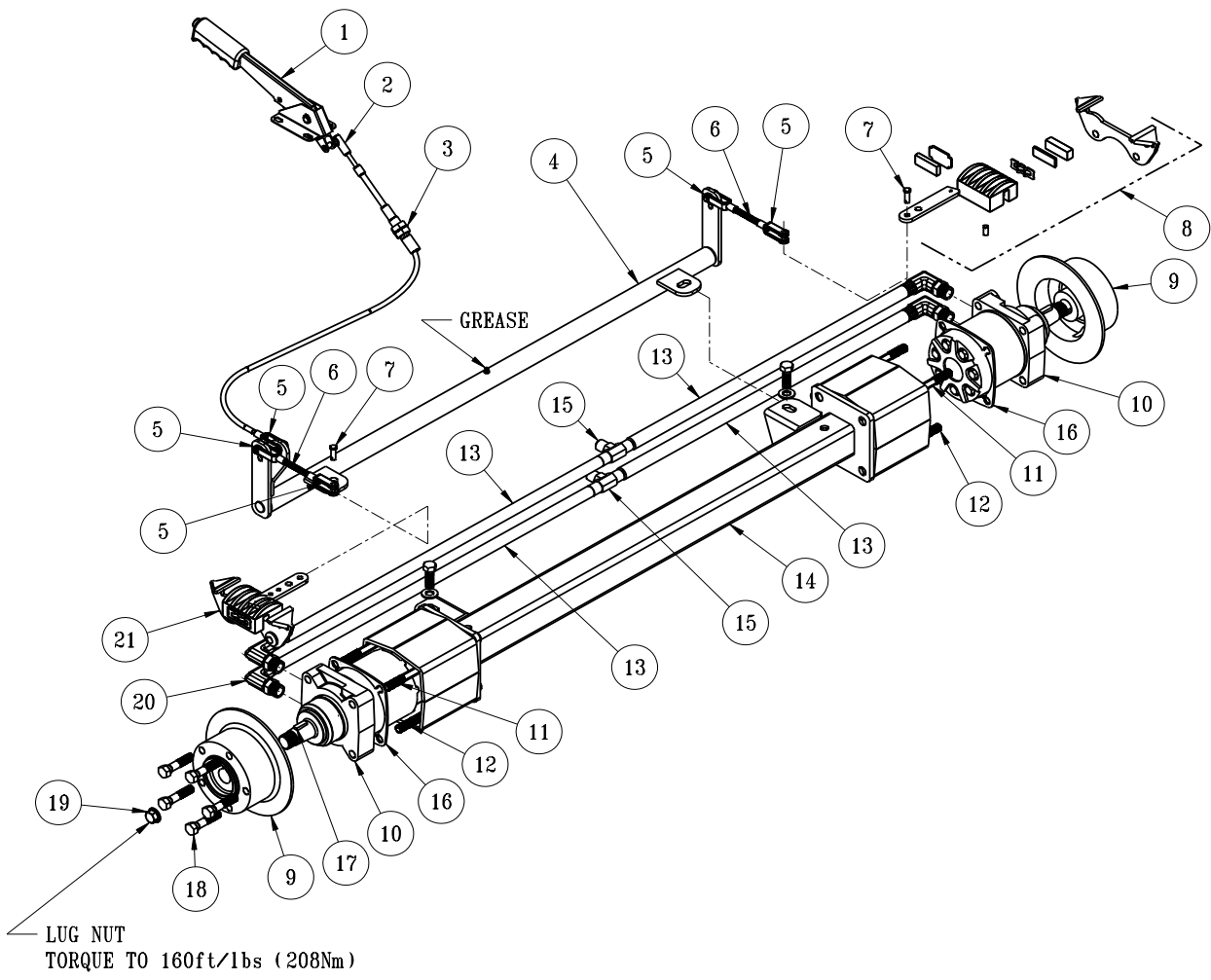
Parts



## PUMP PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-161	Fitting	3
2	18-372	3-Way Valve	1
3	16-180	Quick Coupler	1
4	16-935	Quick Coupler Cap	1
5	16-156	Elbow	1
6	18-390	Pipe Tee	1
7	16-880	Close Nipple	1
8	16-998	Hypro® Pump	1
9	33-480	Pressure Switch	1
10	16-973	Reducer	1
11	33-494	Male Elbow	1
	8954-41	<sup>3</sup> / <sub>16</sub> Clear Hose	1
12	10-389	Plug	1
13	30-137	V-Belt	1
14	15-703	Pulley	1
	HKSQ-14-150	Square Key <sup>1</sup> / <sub>4</sub> - 1 <sup>1</sup> / <sub>2</sub>	1
15	76-484	Engine, Briggs & Stratton 31 HP	1
16	8897-44	Discharge Hose	1
	18-116	Hose Clamp	2

# REAR AXLE DRAWING



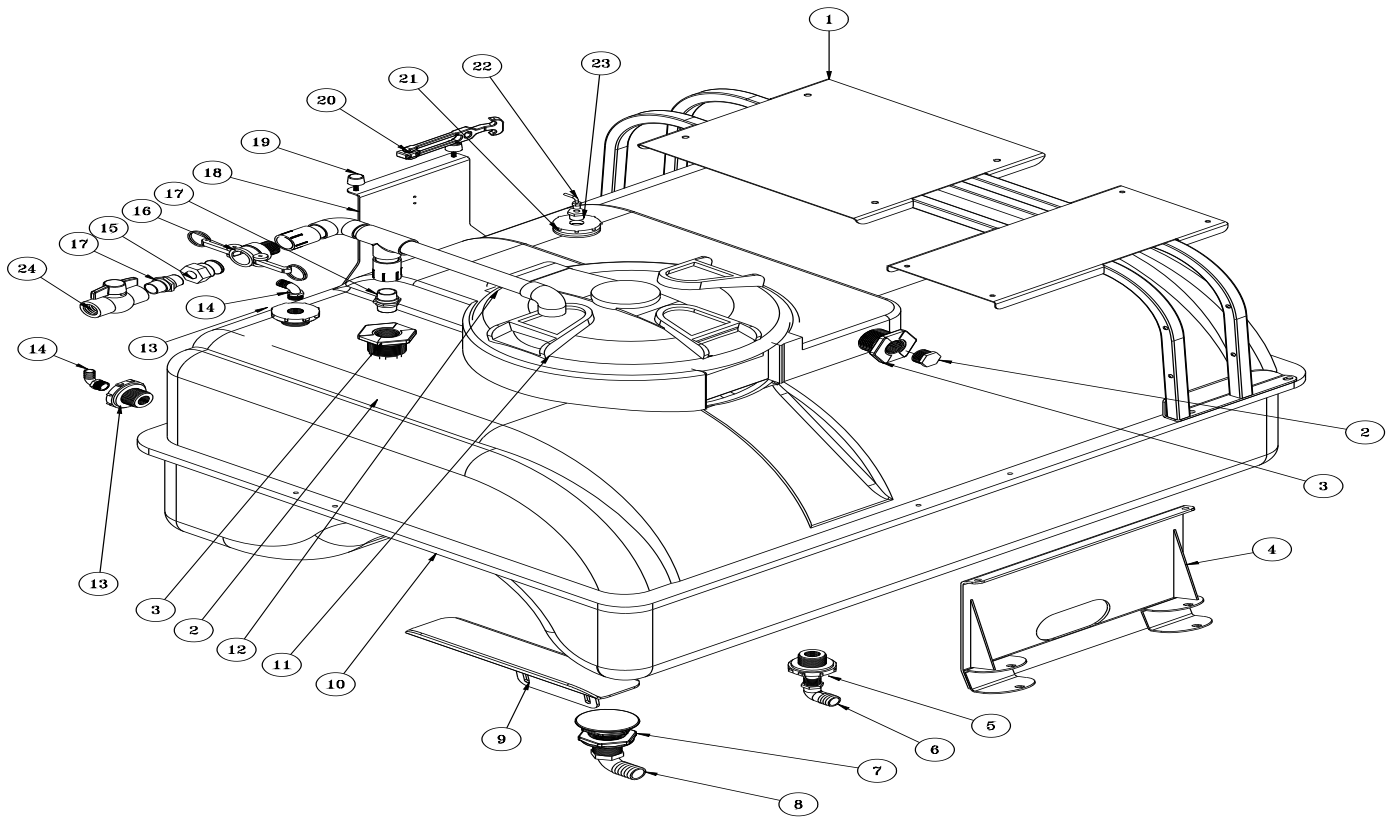
Parts



## REAR AXLE PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	51-088	Park Brake Handle	1
2	18-441	Ball Joint	1
	HN-14-20	Nut $\frac{1}{4}$ - 20	1
3	50-108	Cable	1
	60-536	Bellows	1
4	15-691	Brake Relay	1
5	11-100	Linkage Yoke $\frac{5}{16}$	4
	HN-516-24	Nut $\frac{5}{16}$ -24	4
6	34-021	Rod	2
7	HCP-516-100	Clevis Pin $\frac{5}{16}$ x 1	4
	HP-18-075	Cotter Pin $\frac{1}{8}$ x $\frac{3}{4}$	4
8	76-241	Right Caliper CW	1
	34-101-02	Pad Kit	1
9	76-239	Brake Disc 8"	2
10	43-116	Wheel Motor (includes * items)	2
	14-080	Wheel Motor Seal Kit	2
11	HB-12-13-800	Bolt $\frac{1}{2}$ - 13 x 8	4
	HNFL-12-13	Flange Whiz Lock Nut $\frac{1}{2}$ -13	4
12	HB-12-13-750	Bolt $\frac{1}{2}$ - 13 x $7\frac{1}{2}$	4
	HNFL-12-13	Flange Whiz Lock Nut $\frac{1}{2}$ -13	4
13	15-681	Hydraulic Hose	4
14	20-531	Rear Axle	1
15	34-057	Tee	2
16	20-595	Wheel Motor Spacer	2
17*	HWK-516-100	Woodruff Key $\frac{5}{16}$ x 1	2
18	60-268	Lug Bolt $\frac{1}{2}$ - 20	10
19*	14-265	Nut 1 - 20	2
20	34-122	Short Elbow	4
21	76-240	Left Caliper CCW	1

# TANK DRAWING

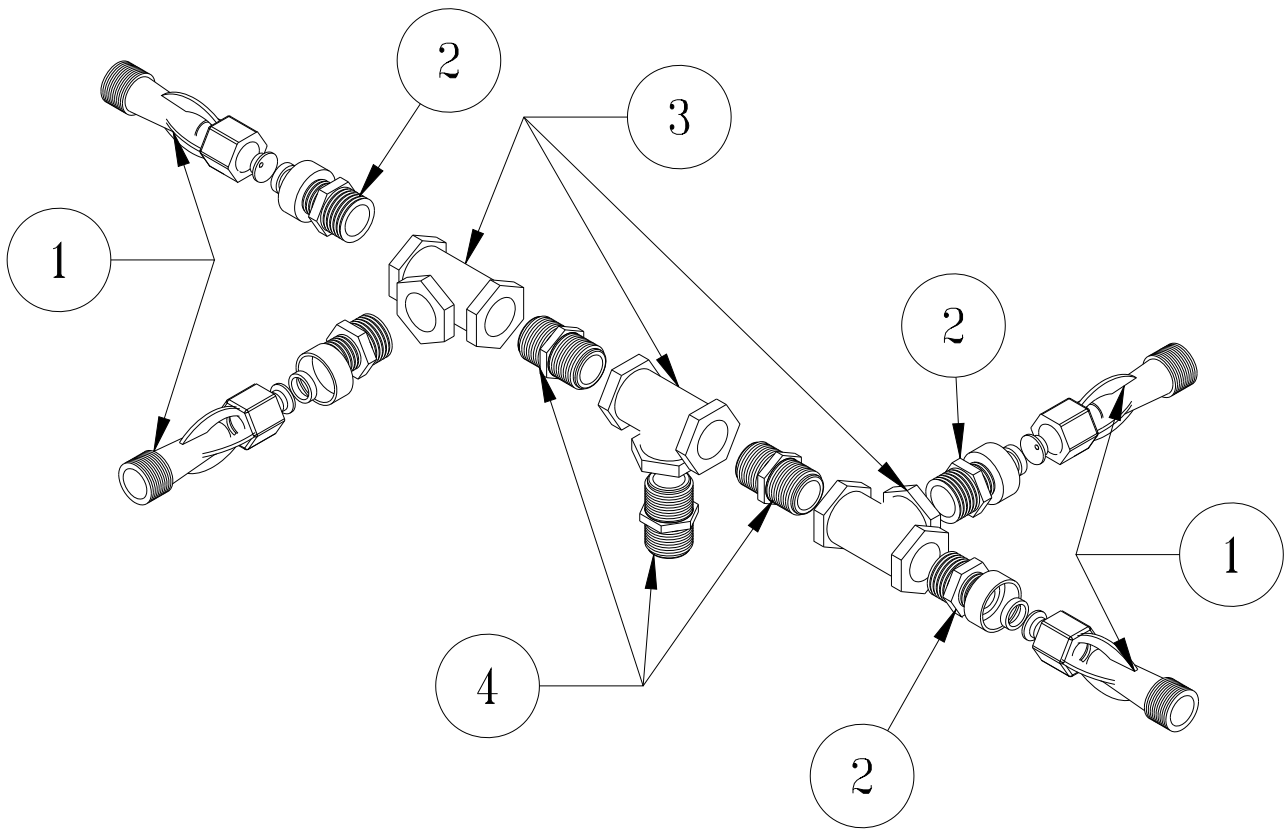


Parts

# TANK PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	20-552	Accessory Mount	1
2	16-162	Hex Plug 1"	2
3	16-945	Double Thread Fitting	2
4	20-537	Tank Support	1
5		Double Thread Fitting (part of tank)	1
6	16-155	Elbow	1
7	16-194	Anti-Vortex Fitting (part of tank)	1
8	16-156	Elbow	1
9	20-534	Tank Pad	2
10	20-592	200 Gallon Tank (Fiberglass)	1
	20-529	Decal, Spray Star 2000	2
	20-593	Decal, Site Gauge	1
11	16-953	16" Lid	1
	16-953-01	Gasket for Lid	1
	16-169	Strainer Basket	1
12	14-365	Air Gap Filler	1
13	16-150	Double Thread Fitting	2
14	16-185	Elbow	2
	8902-32	Clear Flo Tubing 32"	1
	18-224	Hose Clamps	2
15	16-961	Adapter	1
16	16-962	Coupler	1
	16-962-01	Buna-N Gasket	1
17	16-851	Close Nipple	2
18	20-550	Hood Rest	1
19	15-013	Rubber Bumper	2
	HNFL-14-20	Flange Nut 1/4 -20	2
20	15-437	Hold Down	1
	HSM-10-32-112	Machine Screw 10 -32 -1 1/8	2
	HNFL-10-32	Flange Lock Nut 10-32	2
21	33-495	Bulk Head Fitting	1
22	33-494	Male Elbow	1
	8954-41	3/16 Clear Hose	1
23	33-496	Reducer Bushing	1
24	18-448	1" Ball Valve	1

# TURBO-QUADAGITATOR DRAWING



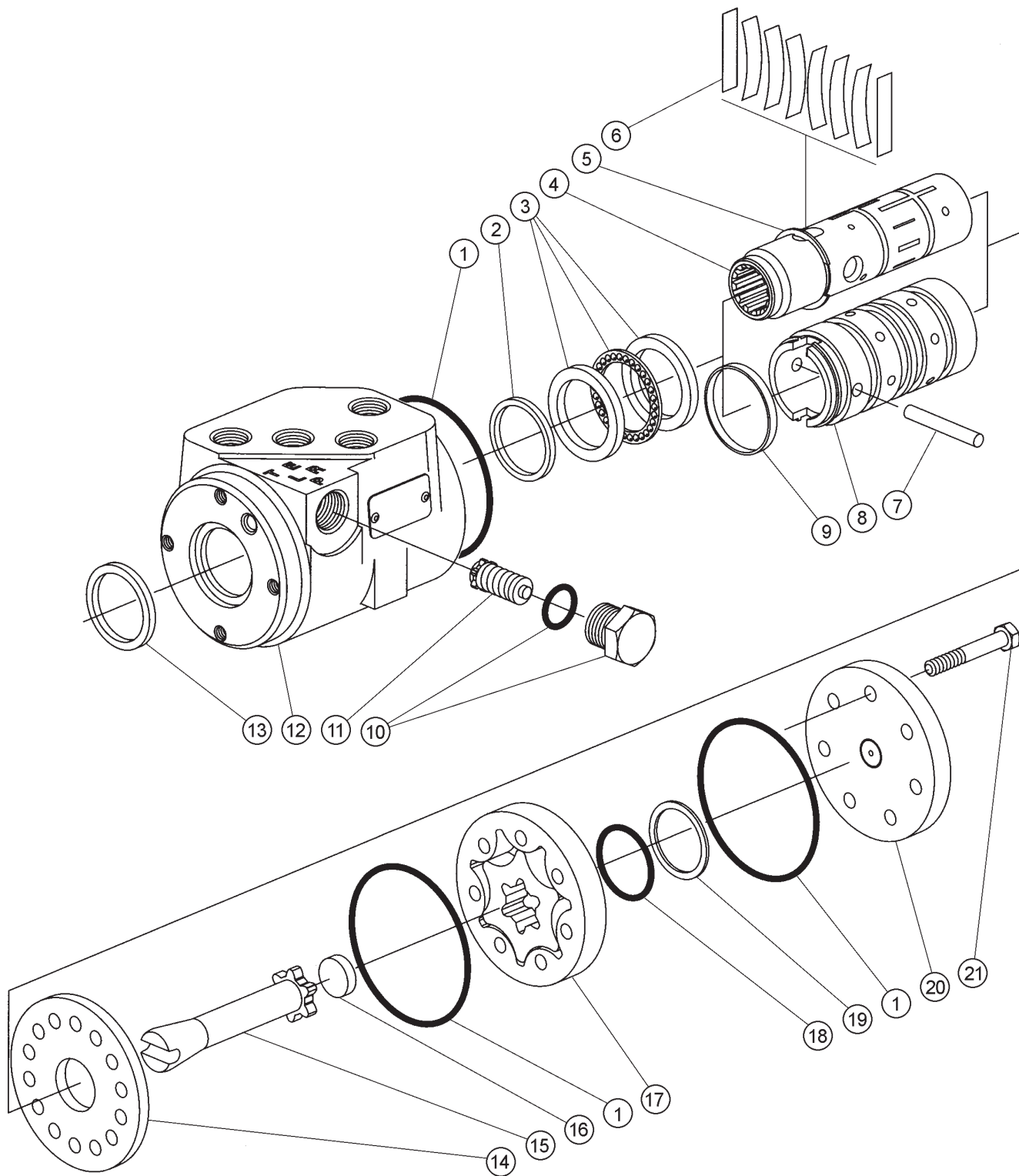
Parts

## TURBO-QUAD AGITATOR PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-036	Agitator Jet (Includes one each $\frac{1}{8}$ ", $\frac{5}{53}$ ", and $\frac{3}{16}$ " orifices)	4
2	16-173	Reducer $\frac{3}{4}$ x $\frac{1}{2}$	4
3	16-157	Female Pipe Thread Tee $\frac{3}{4}$ x $\frac{3}{4}$ x $\frac{3}{4}$	3
4	16-158	Close Nipple $\frac{3}{4}$ x $\frac{3}{4}$	3

15-301 ORBITROL DRAWING

Parts



## 15-301 ORBITROL PARTSLIST

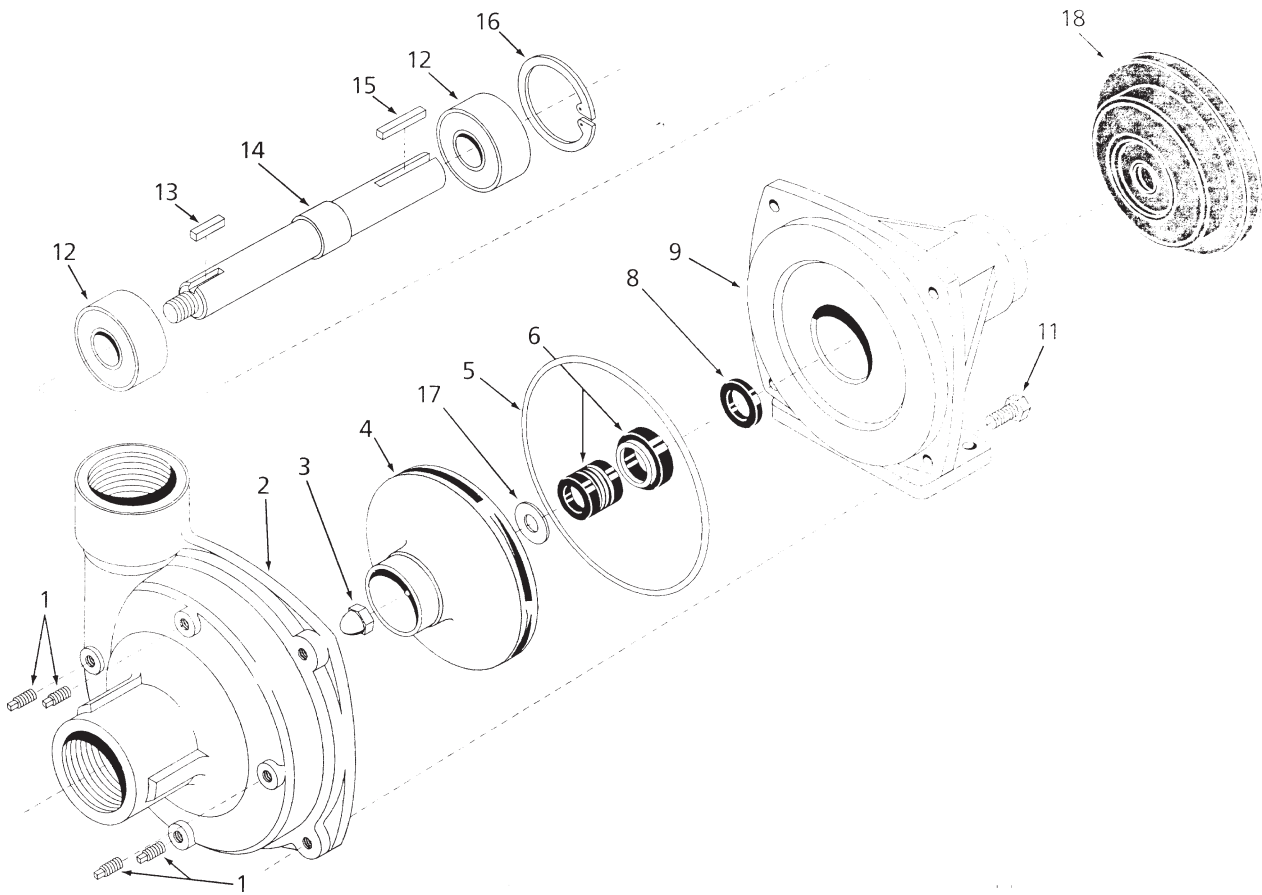
REF #	PART #	DESCRIPTION	QUANTITY
1*		O-Ring Seal	3
2*		Quad Seal	1
3	15-301-14	Bearing Kit	1
		Bearing Race	2
		Bearing	1
4		Spool	1
5	15-301-13	External Retaining Ring	1
6	15-301-15	Spring Centering Kit (Includes Ref# 9)	1
		Spring Spacer	2
		Centering Spring	6
		Spring Retaining Ring	1
7	15-301-08	Pin	1
8		Sleeve	1
9		Retainer	1
10	15-301-11	Plug and O-ring	1
*		O-Ring Seal	1
		Plug	1
11	15-301-12	Relief Valve/Check (1015 psi (70 bar))	1
12		Housing	1
13*		Dust Seal	1
14	15-301-06	Wear Plate	1
15	15-301-07	Drive	1
16	15-301-05	Spacer	1
17	15-301-04	Gerotor	1
18*		O-Ring	1
19*		Seal	1
20	15-301-03	End Cap	1
21	15-301-02	Cap Screw	7
*	15-301-01	Seal Kit	

### 15-301 ORBITROL SPECIFICATIONS

Maximum System Pressure	1015 psi (70 bar)
Maximum Back Pressure	150 psi (10 bar)
Maximum System Operating Temperature.	200°F (93°C)
Maximum Flow	4 gpm (15 lpm)
Maximum Temperature Differential between Steering Unit and System.	50°F (28°C)
Input Torque Powered	15-25 lb/in @ 100 psi tank pressure (2-3 Nm @ 7 bar)
Input Torque Maximum Non-powered	60 lb/ft (81 Nm)
Rotation Limits	None
Fluid	SAE 10W-40 API Service SJ or higher Motor Oil
Check Valve for Manual Steering	Yes
Relief Valve Setting	1015 psi (70 bar)
Ports	$\frac{9}{16}$ - 18 SAE O-Ring 4 Ports
Displacement	61 cu. in/ R (100 cu cm/R)

# 16-998 HYPRO<sup>®</sup> PUMP DRAWING

Parts





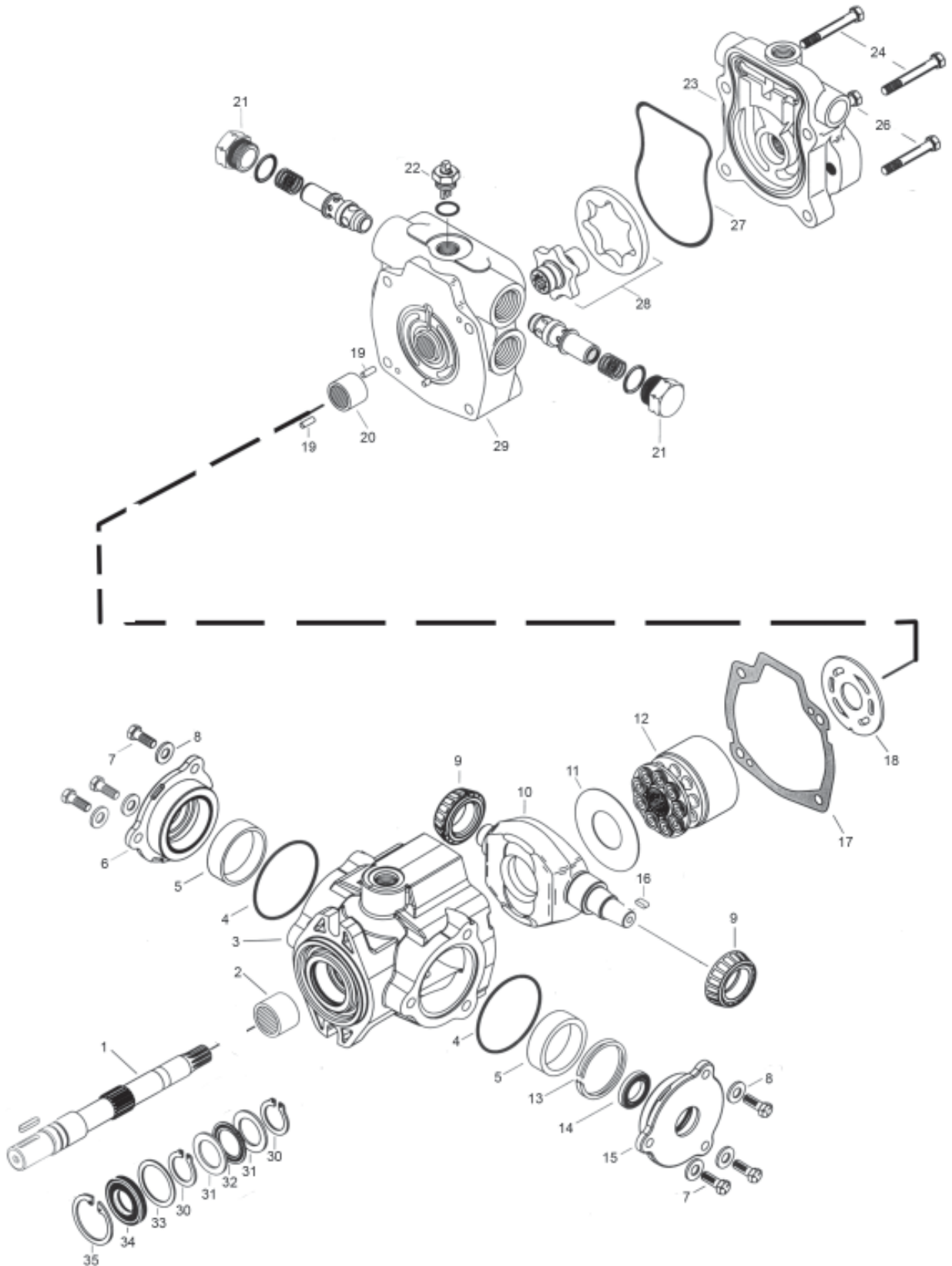
## 16-998 HYPRO® PUMP PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	16-998-01	Drain Plug	4
2	16-998-02	Pump Casing	1
3	16-998-03	Impeller Nut	1
4	16-966-16	Impeller	1
5*	16-467	O-ring	1
6*	16-998-05	Mechanical Seal (Silicon Carbide)	1
8*	16-966-06	Slinger Ring	1
9	16-998-06	Mounting Flange	1
11	16-998-07	Bolt	4
12	16-966-10	Ball Bearing	2
13	16-998-08	Key	1
14	16-998-09	Pump Shaft	1
15	16-822-20	Key	1
16	16-966-13	Bearing Retainer	1
17*	16-998-10	Gasket	1
18	16-994-01	Clutch	1
	16-998-12	Pump Only	
*	16-967	Silicone - Carbon Seal Kit	

### **NOTE:**

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

# 76-482 HYDROSTATIC PUMP DRAWING



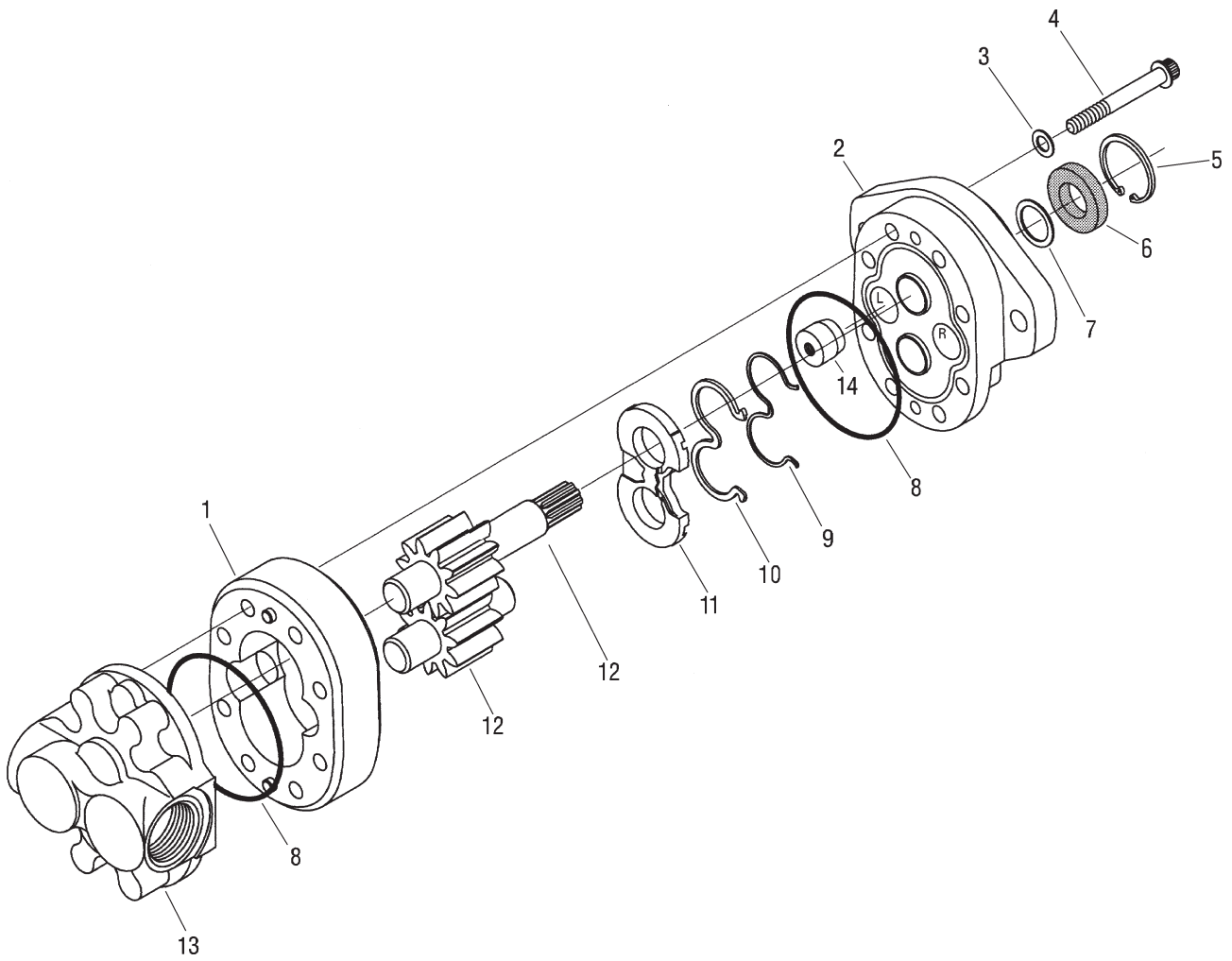
Parts

## 76-482 HYDROSTATIC PUMP PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	76-398-01	Drive Shaft (splined)	1
2	60-343-08	Needle Bearing (with housing)	1
3	77-239-01	Housing	1
4	77-239-02	O-Ring	1
5	77-239-03	Thrust Bearing	2
6	77-239-04	Trunnion Cover	1
7	77-239-05	Pan Head Screw	2
8	77-239-06	Washer	6
9	77-239-07	Cone Bearing	2
10	77-239-08	Cam Plate	1
11	77-239-09	Swash Plate Insert	1
12	60-343-21	Rotating Kit	1
13	77-239-10	Crush Ring	1
14*	60-343-12	Shaft Seal	1
15	77-239-11	Seal Cover	1
16	77-239-12	Key	1
17*	77-239-13	Gasket	1
18	76-482-01	Back Plate	1
19	33-058-27	Dowel Pin	2
20	60-343-23	Bearing	1
21	77-239-15	Relief Valve	2
22	77-239-16	Tow Valve Assembly	1
23	76-160	Charge Pump Adaptor	1
24	77-239-17	Cap Screw	2
26	77-239-18	Cap Screw	2
27*	77-239-19	O-Ring	1
28	60-343-43	Gerotor and Coupler	1
29	77-239-20	End Cover Assembly	1
30*	77-239-21	Retaining Ring	2
31	60-343-05	Bearing Race	1
32	60-343-06	Thrust Bearing	1
33	60-343-03	Washer	2
34*	60-343-02	Shaft Seal	1
35*	60-343-01	Retaining Ring	1
*	77-239-22	Seal Kit	

# 76-197 EATON GEAR PUMP DRAWING

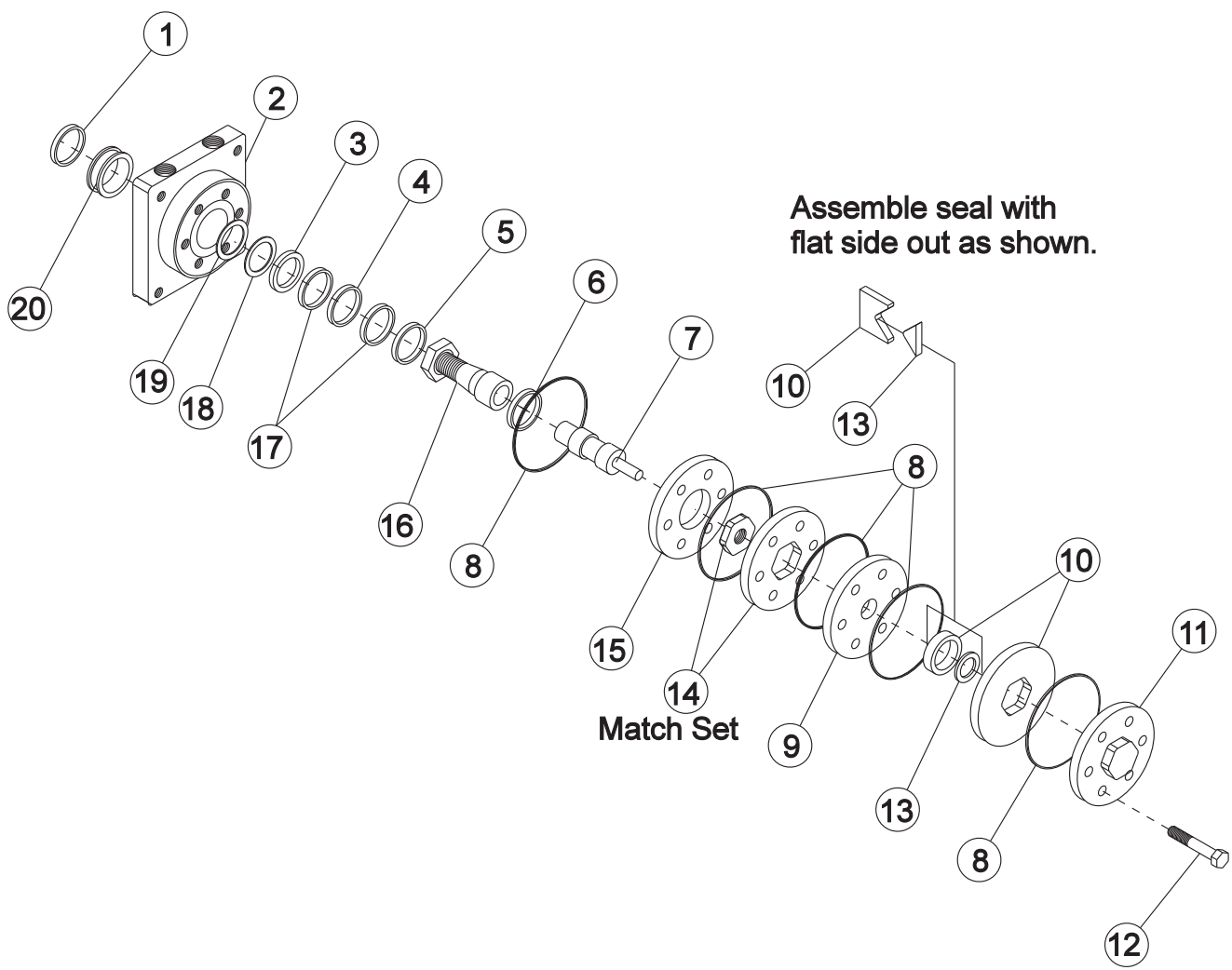
Parts



## 76-197 EATON GEAR PUMP PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1		Body	1
2	76-197-01	Front Plate	1
3*		Washer	4
4	76-197-06	Cap Screw	8
5	76-197-07	Retaining Ring	1
6*		Shaft Seal	1
7	33-061-15	Washer	1
8*		O-Ring	2
9*		Backup Gasket	1
10*		Seal	1
11*		Wear Plate	1
12	76-197-04	Shaft (comes with Idler Gear)	1
13	76-197-02	Back Plate	1
14*		Plug	1
*	76-197-08	Seal Kit	

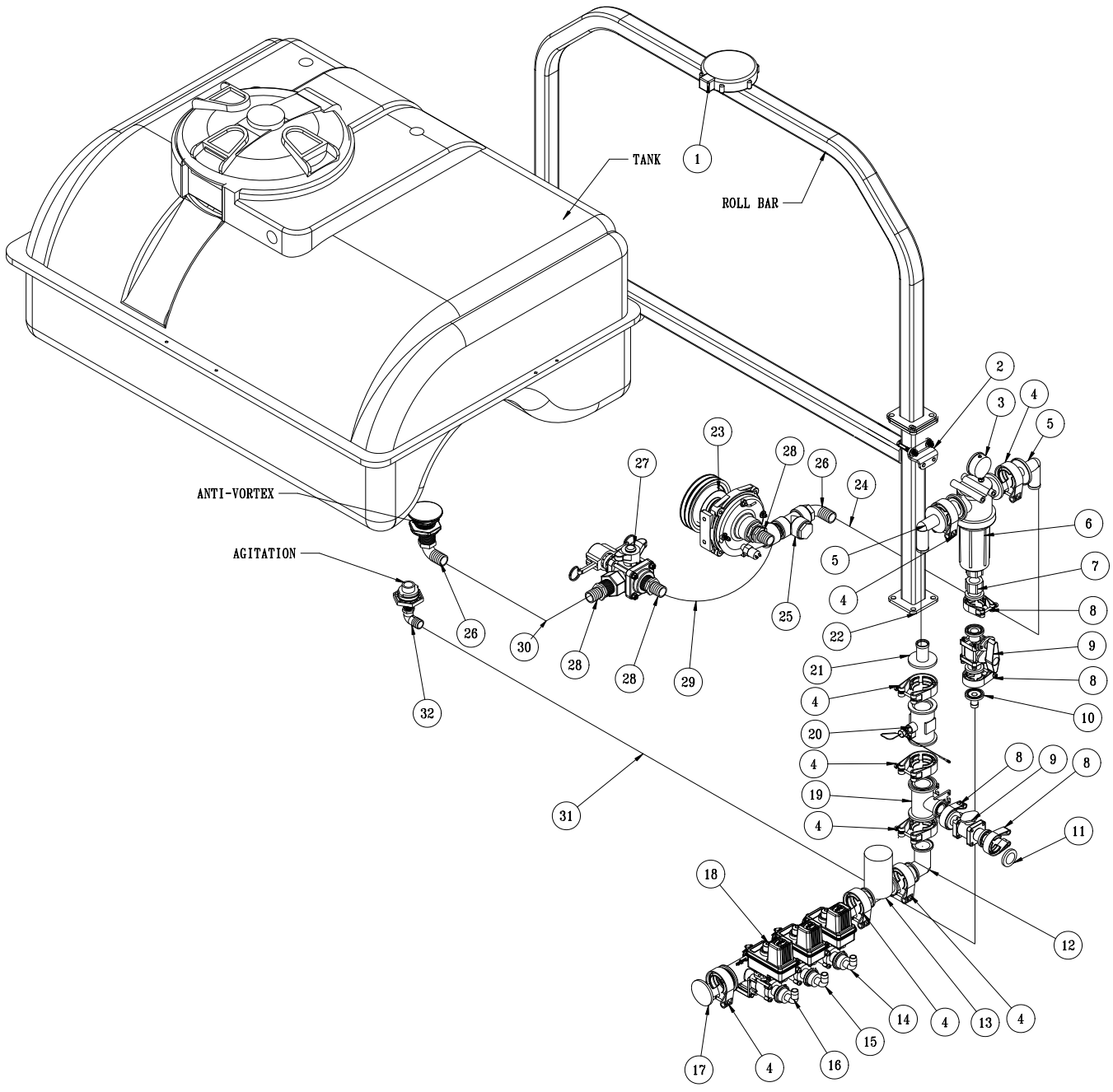
# 43-116 REAR WHEEL MOTOR DRAWING



## 43-116 REAR WHEEL MOTOR PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1*		Water & Dirt Seal	1
2†	13-615-05	Service Housing Assembly	1
3*		Inner Seal	1
4†	13-032-27	Thrust Bearing	1
5†	13-032-28	Inner Bearing	1
6	13-032-29	Thrust Bearing	1
7	43-116-01	Drive Link	1
8*		Ring Seal	5
9	13-032-31	Manifold	1
10	13-032-32	Commutator Assembly (matched set)	1
11	13-032-33	End Cover	1
12	43-116-02	Bolt	7
13*		Commutator Seal (matches with #10)	1
14	43-116-03	Rotor Set (matched set)	1
15	13-032-35	Plate Wear	1
16	13-615-04	Coupling Shaft	1
	HWK-516-100	Woodruff Key <sup>5</sup> / <sub>16</sub> X 1	1
	14-265	Nut 1 - 20	1
17†	13-032-37	Thrust Washer	2
18*		Backup Washer	1
19*		Backup Washer	1
20†	13-032-38	Outer Bearing	1
*	14-080	Seal Kit	1
†	Included in 13-615-05 Service Housing Assembly		

# 2002 PLUMBING DRAWING (RAVEN 440)



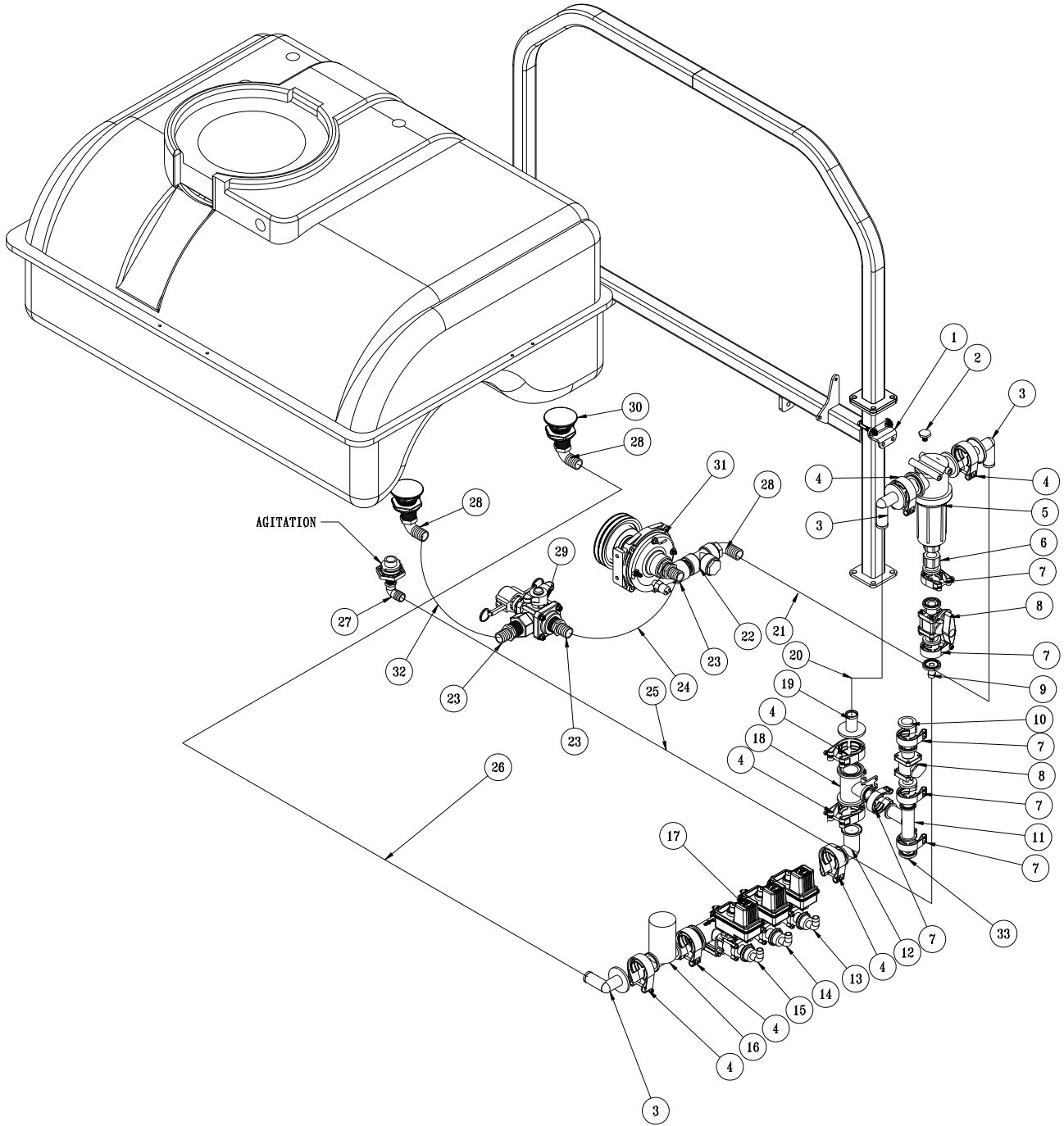
Accessories



## 2002 PLUMBING PARTS LIST (RAVEN 440)

REF#	PART#	DESCRIPTION	QUANTITY
1	10-408-01	Phoenix 10 GSP	1
2	20-543	Strainer Mount	1
	17-537	Square U-bolt	1
3	16-281	Liquid Filled Gauge	1
4	15-741	#75 Series Clamp	8
5	15-739	#75 90° Hose Barb	2
6	15-737	Flanged Strainer	1
	16-968-03	Screen (50 mesh)	1
7	15-735	#50 x 1 FTP Fitting	1
8	15-740	#50 Series Clamp	4
9	15-738	Flanged Ball Valve	2
10	15-808	Flanged Hose Barb, Straight	1
11	15-778	Blank Gauge Port Flange	1
12	15-734	#75 Elbow Coupling	1
13	16-524	Motorized Control Valve	1
14	Left Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-115	3/4 Orange PVC Hose x 115"	1
	18-040	Hose Clamp	2
15	Center Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-84	3/4 Orange PVC Hose x 84"	1
	18-040	Hose Clamp	2
16	Right Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-110	3/4 Orange PVC Hose x 110"	1
	18-040	Hose Clamp	2
17	15-742	#75 Inlet Cover	1
18	15-743	453 Manifold	1
19	15-775	Reducer Tee	1
20	18-373	Flow Meter	1
	18-373-01	Sensor	1
21	15-744	#75 Hose Barb	1
22	8897-18	1 1/4" Discharge Hose x 18"	1
	18-116	Hose Clamp	2
23	16-998	Hypro® Pump	1
24	8897-58	1 1/4" Discharge Hose x 58"	1
	18-116	Hose Clamp	2
25	18-390	Pipe Tee	1
	10-389	Plug	1
26	16-156	Elbow	2
27	18-372	3-Way Valve	1
28	16-161	Fitting	3
29	8897-44	Discharge Hose	1
	18-116	Hose Clamp	2
30	8897-28	1 1/4" Discharge Hose x 28"	1
	18-116	Hose Clamp	2
31	8897-60	1 1/4" Discharge Hose x 60"	1
	18-116	Hose Clamp	2
32	16-155	Elbow	1





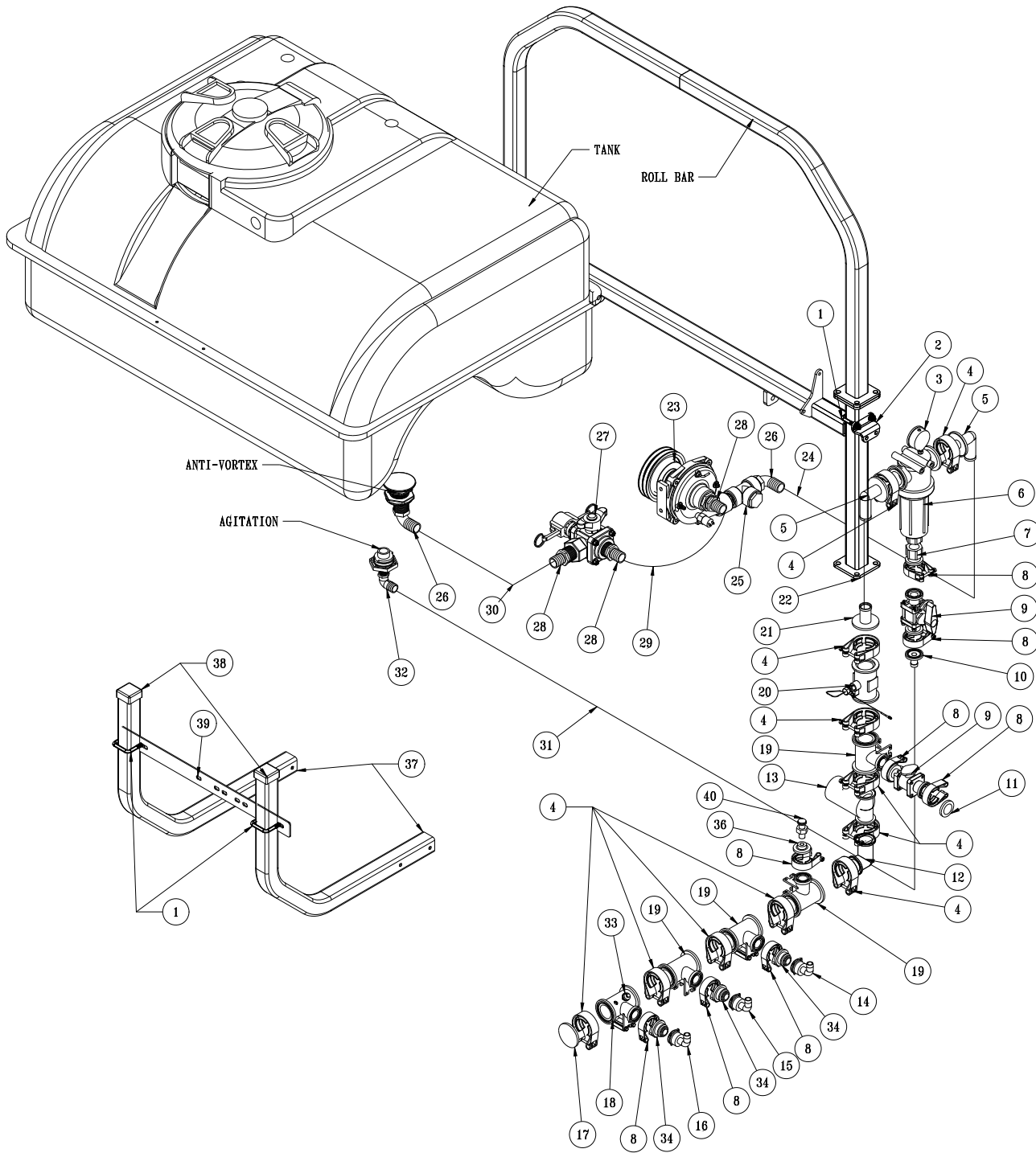
Accessories

## 2004 PLUMBING PARTS LIST (RAVEN 203)

REF#	PART#	DESCRIPTION	QUANTITY
1	20-543	Strainer Mount	1
	17-537	Square U-bolt	1
2	15-780	Poly Hex Plug	1
3	15-739	#75 90° Hose Barb	3
4	15-741	#75 Series Clamp	7
5	15-737	Flanged Strainer	1
	16-968-03	Screen (50 mesh)	1
6	15-735	#50 x 1 FTP Fitting	1
7	15-740	#50 Series Clamp	6
8	15-738	Flanged Ball Valve	2
9	15-808	Flanged Hose Barb, Straight	1
10	15-778	Blank Gauge Port Flange	1
11	15-776	#50 Tee	1
12	15-734	#75 Elbow Coupling	1
13	Left Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-115	3/4 Orange PVC Hose x 115"	1
	18-040	Hose Clamp	2
14	Center Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-84	3/4 Orange PVC Hose x 84"	1
	18-040	Hose Clamp	2
15	Right Boom		
	15-553	3/4 - 90° Hose barb	1
	8887-110	3/4 Orange PVC Hose x 110"	1
	18-040	Hose Clamp	2
16	16-524	Motorized Control Valve	1
17	15-743	453 Manifold	1
18	15-775	Reducer Tee	1
19	15-744	#75 Hose Barb	1
20	8897-22	1 1/4" Discharge Hose x 22"	1
	18-116	Hose Clamp	2
21	8897-18	1 1/4" Discharge Hose x 18"	1
	18-116	Hose Clamp	2
22	18-390	Pipe Tee	1
	10-389	Plug	1
23	16-161	Fitting	3
24	8897-44	Discharge Hose	1
	18-116	Hose Clamp	2
25	8897-60	1 1/4" Discharge Hose x 60"	1
	18-116	Hose Clamp	2
26	8897-24	1 1/4" Discharge Hose x 24"	1
	18-116	Hose Clamp	2
27	16-155	Elbow	1
28	16-156	Elbow	3
29	18-372	3-Way Valve	1
30	16-194	Anti-Vortex Fitting	1
31	16-998	Hypro® Pump	1
32	8897-28	1 1/4" Discharge Hose x 28"	1
	18-116	Hose Clamp	2
33	15-777	Gauge Port Flange	1



2005/2006 PLUMBING DRAWING (ENVIZIO PRO II + SHARP SHOOTER)

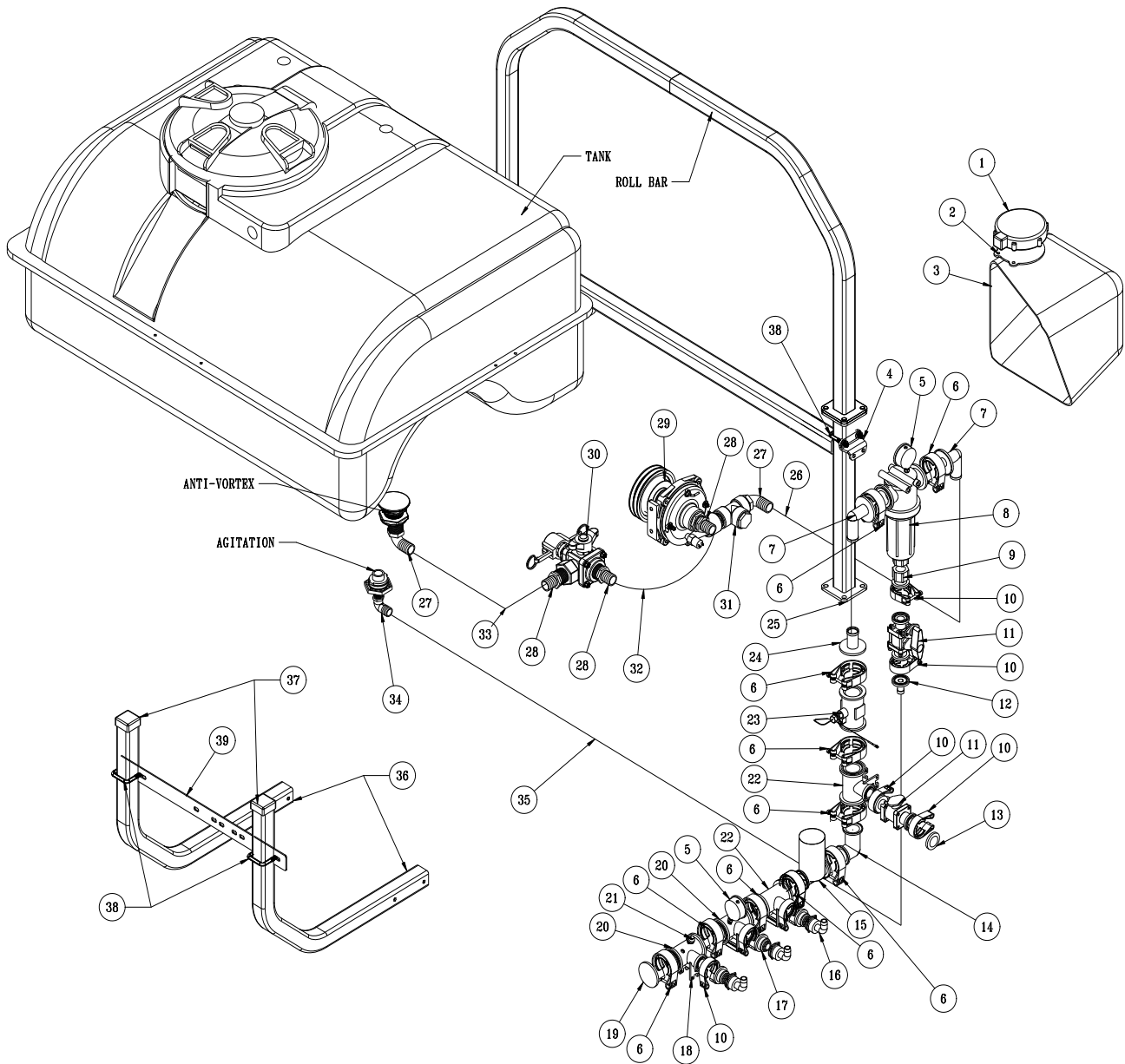


Accessories

## 2005/2006 PLUMBING PARTS LIST (ENVIZIO PRO II + SHARP SHOOTER)

REF#	PART#	DESCRIPTION	QUANTITY
1	17-537	Square U-bolt	3
2	20-543	Strainer Mount	1
3	16-281	Liquid Filled Gauge	1
4	15-741	#75 Series Clamp	11
5	15-739	#75 90° Hose Barb	2
6	15-737	Flanged Strainer	1
	16-968-05	Screen (80 mesh)	1
7	15-735	#50 x 1 FTP Fitting	1
8	15-740	#50 Series Clamp	8
9	15-738	Flanged Ball Valve	2
10	15-808	Flanged Hose Barb, Straight	1
11	15-778	Blank Gauge Port Flange	1
12	15-734	#75 Elbow Coupling	1
13	16-524	Motorized Control Valve	1
14	15-553	3/4 - 90° Hose Barb	1
	8887-121	3/4 Orange PVC Hose x 121" (Left Boom)	1
	18-040	Hose Clamp	2
15	15-553	3/4 - 90° Hose Barb	1
	8887-90	3/4 Orange PVC Hose x 90" (Center Boom)	1
	18-040	Hose Clamp	2
16	15-553	3/4 - 90° Hose Barb	1
	8887-116	3/4 Orange PVC Hose x 116" (Right Boom)	1
	18-040	Hose Clamp	2
17	15-742	#75 Inlet Cover	1
18	30-164	Tapped Reducer Tee	1
19	15-775	Reducer Tee	4
20	18-373	Flow Meter	1
	18-373-01	Sensor	1
21	15-744	#75 Hose Barb	1
22	8897-16	1 1/4" Discharge Hose x 16"	1
	18-116	Hose Clamp	2
23	16-998	Hypro® Pump	1
24	8897-58	1 1/4" Discharge Hose x 58"	1
	18-116	Hose Clamp	2
25	18-390	Pipe Tee	1
	10-389	Plug	1
26	16-156	Elbow	2
27	18-372	3-Way Valve	1
28	16-161	Fitting	3
29	8897-44	Discharge Hose	1
	18-116	Hose Clamp	2
30	8897-28	1 1/4" Discharge Hose x 28"	1
	18-116	Hose Clamp	2
31	8897-58	1 1/4" Discharge Hose x 58"	1
	18-116	Hose Clamp	2
32	16-155	Elbow	1
33	30-168-04	SharpShooter Presser Sensor Assembly	1
34	15-825	QC Flange Adapter	3
35	15-743-03	Mounting Rail	2
	15-743-06	SS Screw	8
36	15-777	Gauge Port Flange	1
37	30-163	SharpShooter Boom Support	2
38	16-557	Square Cap	2
39	30-167	Mounting Strap	1
40	30-177	Envizio Pro II® Pressure Transducer	1

2007/2008 PLUMBING DRAWING (RAVEN 440+ SHARP SHOOTER)

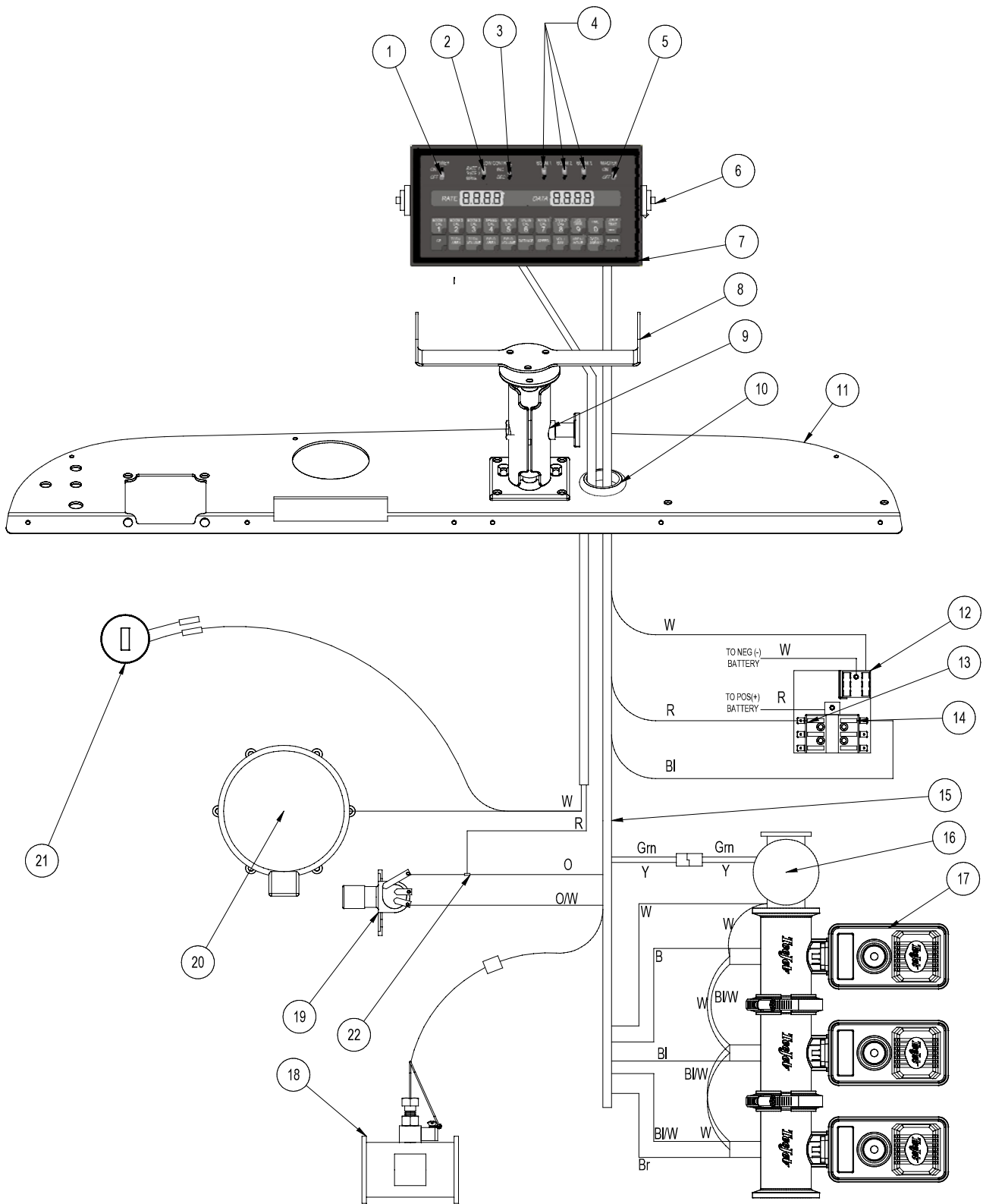


Accessories

## 2007/2008 PLUMBING PARTS LIST (RAVEN 440 + SHARP SHOOTER)

REF#	PART#	DESCRIPTION	QUANTITY
1	10-408-01	Phoenix 10 GSP	1
2	30-173	GPS Plate	1
3	3-172	Fiberglass Cover	1
4	20-543	Strainer Mount	1
5	16-281	Liquid Filled Gauge	2
6	15-741	#75 Series Clamp	10
7	15-739	#75 90° Hose Barb	2
8	15-737	Flanged Strainer	1
	16-968-05	Screen (80 mesh)	1
9	15-735	#50 x 1 FTP Fitting	1
10	15-740	#50 Series Clamp	7
11	15-738	Flanged Ball Valve	2
12	15-808	Flanged Hose Barb, Straight	1
13	15-778	Blank Gauge Port Flange	1
14	15-734	#75 Elbow Coupling	1
15	16-524	Motorized Control Valve	1
16	15-553	3/4 - 90° Hose Barb	3
	8887-115	3/4 Orange PVC Hose x 115" Left Boom	1
	8887-84	3/4 Orange PVC Hose x 84" Center Boom	1
	8887-110	3/4 Orange PVC Hose x 110" Right Boom	1
	18-040	Hose Clamp	6
17	15-825	QC Flange Adapter	3
18	15-743-03	Mounting Rail	2
	15-743-06	SS Screw	8
19	15-742	#75 Inlet Cover	1
20	30-164	Tapped Reducer Tee	2
21	30-168-04	SharpShooter Presser Sensor Assembly	1
22	15-775	Reducer Tee	1
23	18-373	Flow Meter	1
	18-373-01	Sensor	1
24	15-744	#75 Hose Barb	1
25	8897-18	1 1/4" Discharge Hose x 18"	1
	18-116	Hose Clamp	2
26	8897-58	1 1/4" Discharge Hose x 58"	1
	18-116	Hose Clamp	2
27	16-156	Elbow	2
28	16-161	Fitting	3
29	16-998	Hypro® Pump	1
30	18-372	3-Way Valve	1
31	18-390	Pipe Tee	1
	10-389	Plug	1
32	8897-44	Discharge Hose	1
	18-116	Hose Clamp	2
33	8897-28	1 1/4" Discharge Hose x 28"	1
	18-116	Hose Clamp	2
34	16-155	Elbow	1
35	8897-60	1 1/4" Discharge Hose x 60"	1
	18-116	Hose Clamp	2
36	30-163	SharpShooter Boom Support	2
37	16-557	Square Cap	2
38	17-537	Square U-bolt	4
39	30-167	Mounting Strap	1

# WIRING 2002 SYSTEM (RAVEN 440)



Accessories

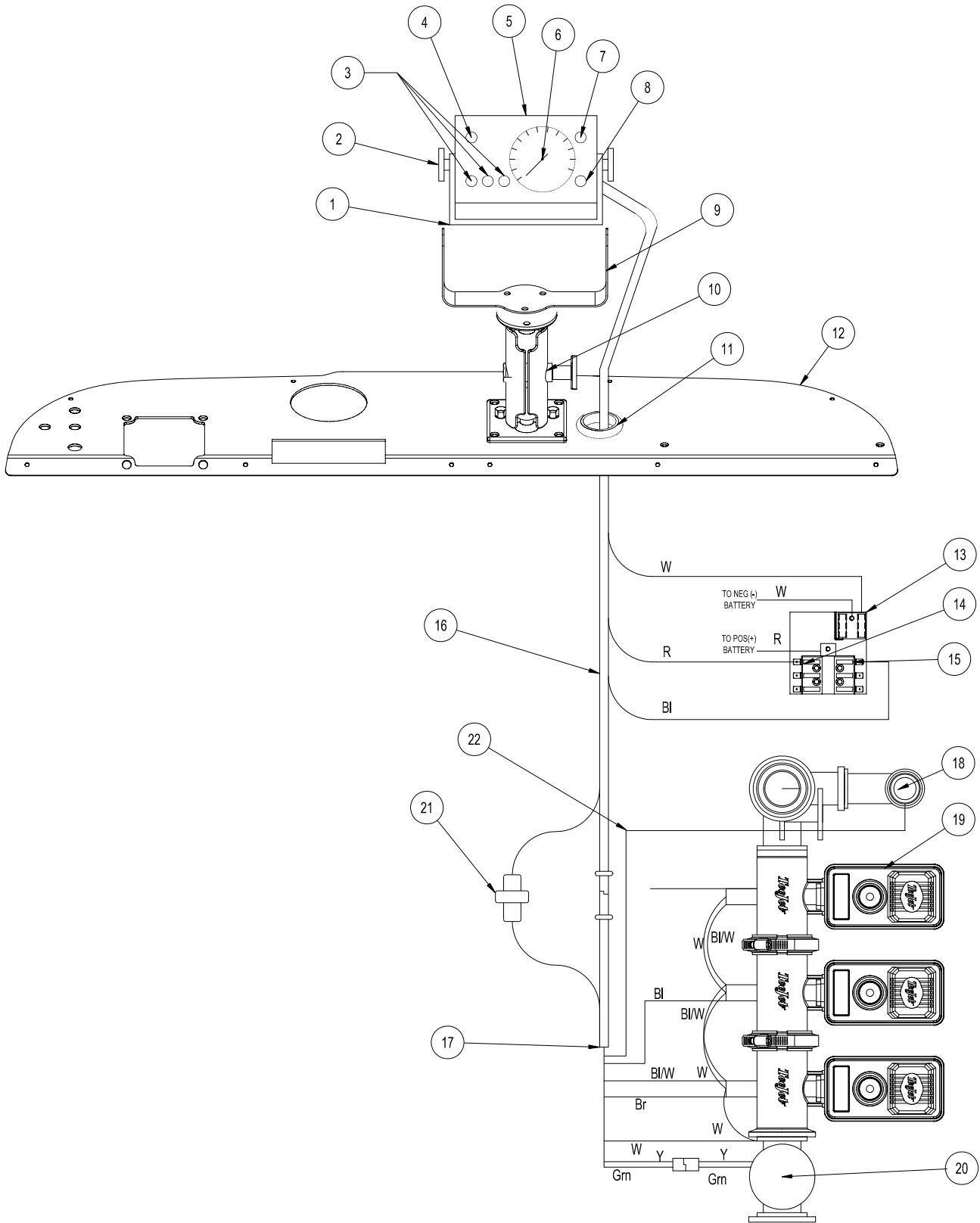


## WIRING 2002 SYSTEM (RAVEN 440)

REF#	PART#	DESCRIPTION	QUANTITY
1	16-140	Power Switch	1
2	16-525-01	Rate1/Rate2 Manual Switch	1
3	16-873	Adjustment Switch	1
4	16-141	Boom Switch	3
5	16-697	Master Switch	1
6	16-558	Mounting Knob	2
7	16-525	Console (only)	1
	16-234	Console Cover	1
8	20-557	440 Console Mount	1
9	20-540	Ram Mount	1
10	50-400	Grommet	1
11	20-596	Dash Board	1
12	33-271	Fuse Block	1
13	33-508	Auto Blade Type Fuse 15 amp	1
14	33-562	Auto Blade Type Fuse 40 amp	1
15	15-369	Console Control Cable	1
16	16-524	Motorized Control Valve	1
17	15-743	Manifold Valve	1
18	18-373	Flow Meter	1
19	33-509	Master Boom Floor Switch	1
20	10-408-01	Phoenix 10 GPS	1
21	12-017	Hour Meter	1
22	9027	Terminal T-tap	1
	8958	Male Slide on Connector	1

*Use Dielectric Grease On All Electrical Connections*

# WIRING 2004 SYSTEM (RAVEN203)



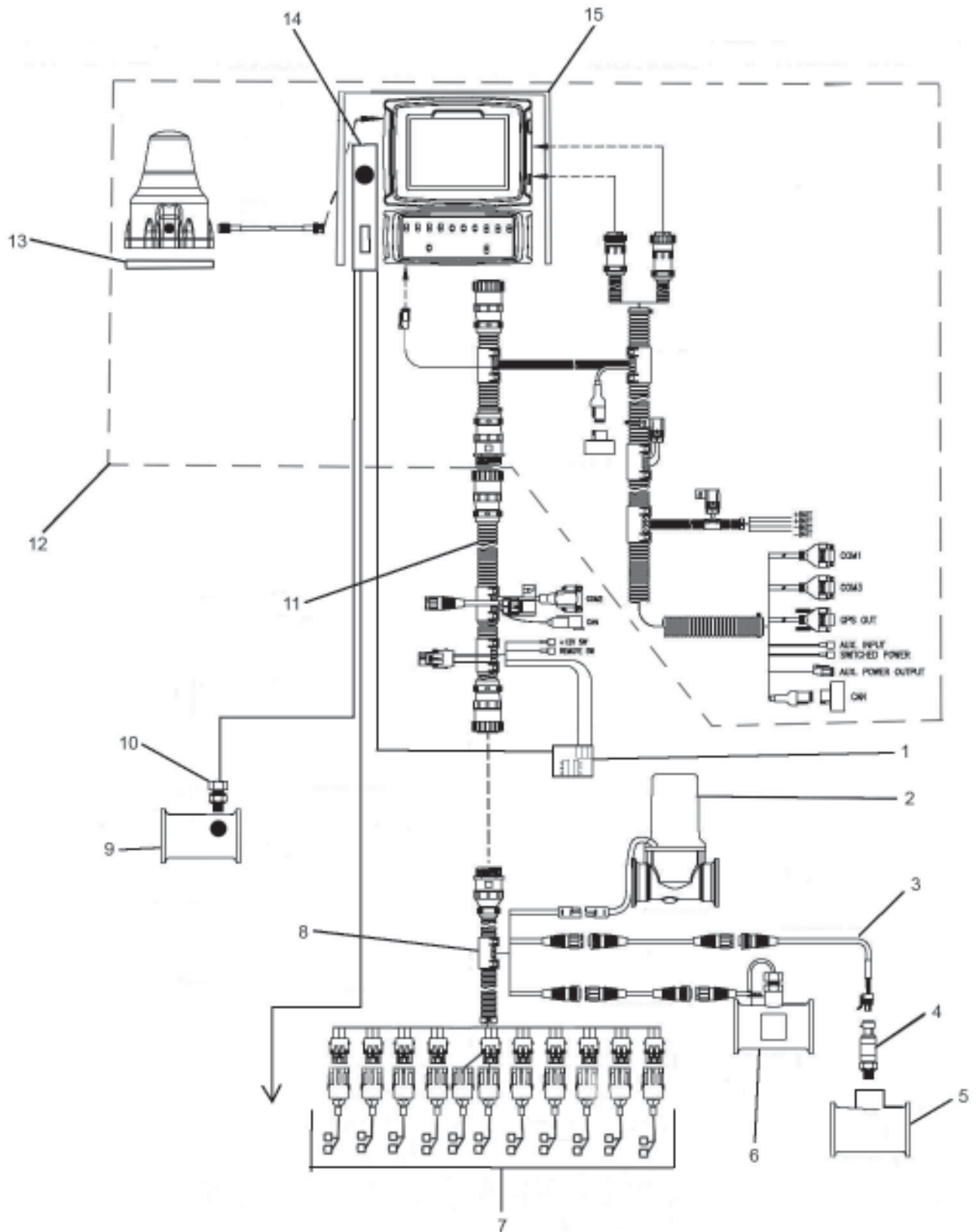
Accessories

## WIRING 2004 SYSTEM (RAVEN203)

REF#	PART#	DESCRIPTION	QUANTITY
1	16-958-01	Mounting Bracket	1
3	16-898	Boom Switch	3
2	16-900	Mounting Knob	2
4	16-899	Master Switch	1
5	18-418	Console with Liquid Filled Pressure Gauge	1
6	33-090-02	Liquid Filled Pressure Gauge	1
	33-090-04	Pressure Gauge Tube Fitting	1
7	16-958-02	Fuse Holder	1
	16-525-03	Fuse 15 AMP	1
8	16-895	Pressure Switch	1
9	20-546	Console Mount	1
10	20-540	Ram Mount	1
11	50-400	Grommet	1
12	20-596	Dash Board	1
13	33-271	Fuse Block	1
14	33-508	Auto Blade Type Fuse 15 amp	1
15	33-562	Auto Blade Type Fuse 40 Amp	1
16	16-958-04	Cable Assembly 8ft Enclosure Hook-Up	1
17	16-902	Cable Assembly 72" Solenoid Hook-Up	1
18	15-776	Tee	1
19	15-743	Manifold Valve	1
20	16-524	Motorized Control Valve	1
21	16-958-05	Union Fitting	1
22	16-955	Tubing	1
23	10-225	Wire Harness (fuse block to electric valve)	1

*Use Dielectric Grease On All Electrical Connections*

# WIRING 2005/2006 SYSTEM (ENVIZIO PRO II + SHARP SHOOTER)

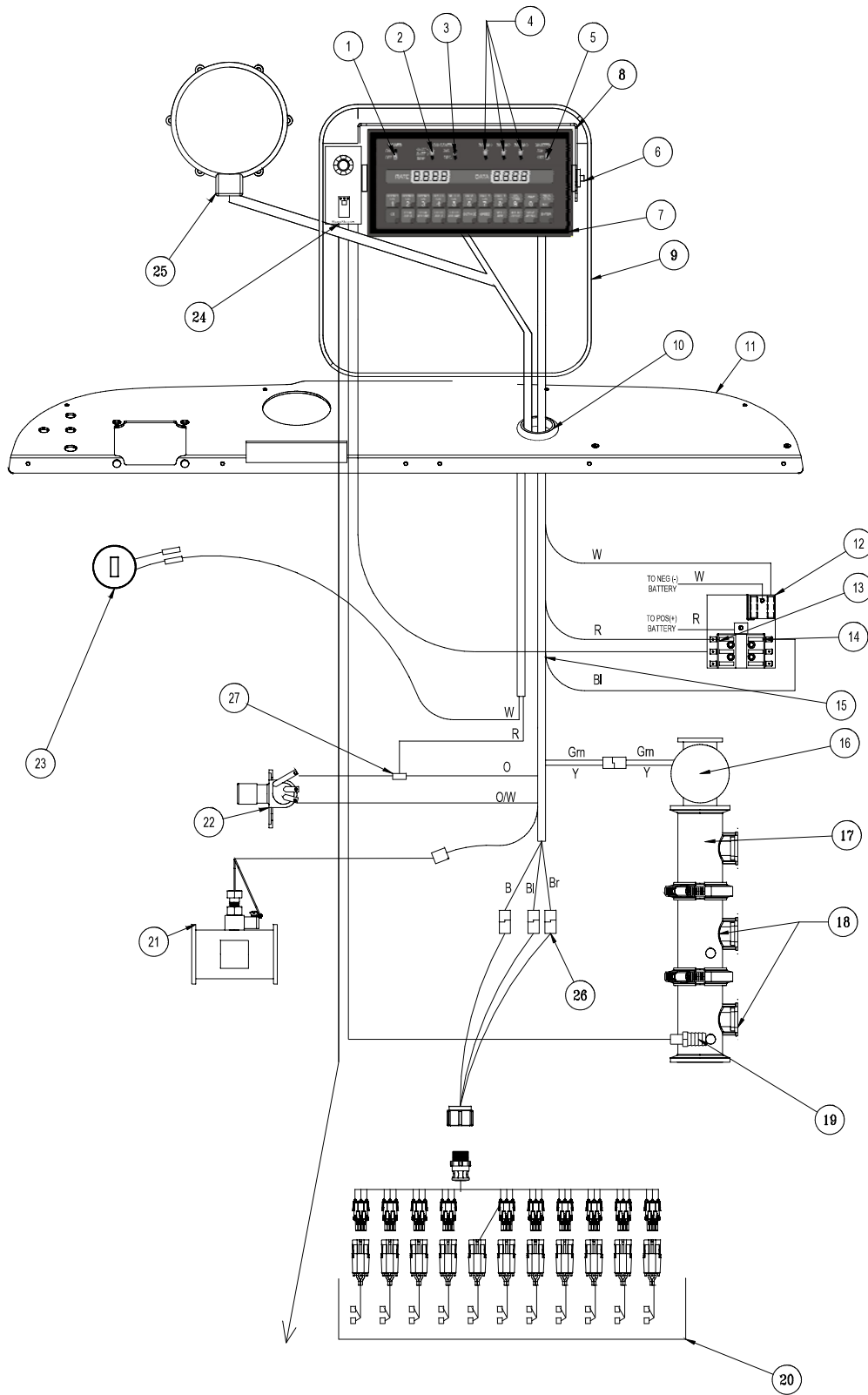


## WIRING 2005/2006 SYSTEM (ENVIZIO PRO II + SHARP SHOOTER)

REF#	PART#	DESCRIPTION	QUANTITY
1	33-271	Fuse Block	1
	33-508	Auto Blade Type Fuse 15Amp	2
	33-273	Auto Blade Type Fuse 30Amp	1
	9035	Blade Fuse 1AMP	1
2	16-524	Motorized Control Valve	1
3	30-178	6' Cable for Transducer	1
4	30-177	Pressure Transducer	1
5	15-775	Tee	1
6	18-373	Flow Meter	1
7		See Nozzle Valve Drawing	
8	30-174	12' Product Cable	1
9	30-164	Tapped Reducer Tee	1
10	30-168-04	SharpShooter Pressure Sensor	1
11	30-176	3' Console Cable	1
12	30-218	Envizio Pro II WAAS capable	1
	30-219	Combo Cable	1
	30-220	Switch Pro Kit	1
13	30-173	GPS Plate	1
14	30-168-01	SharpShooter Power Hub	1
15	30-172	Fiberglass Cover	1
	8803-48	Trim 48"	1
	18-134	Grommet	1
NS	30-171-01	Envizio Pro II Console	1
	30-222-P	OmniStar Unlock Code	1
	30-228	GLONAS Unlock Code	1

*Use Dielectric Grease On All Electrical Connections*

# WIRING 2007/2008 SYSTEM (RAVEN 440 + SHARP SHOOTER)

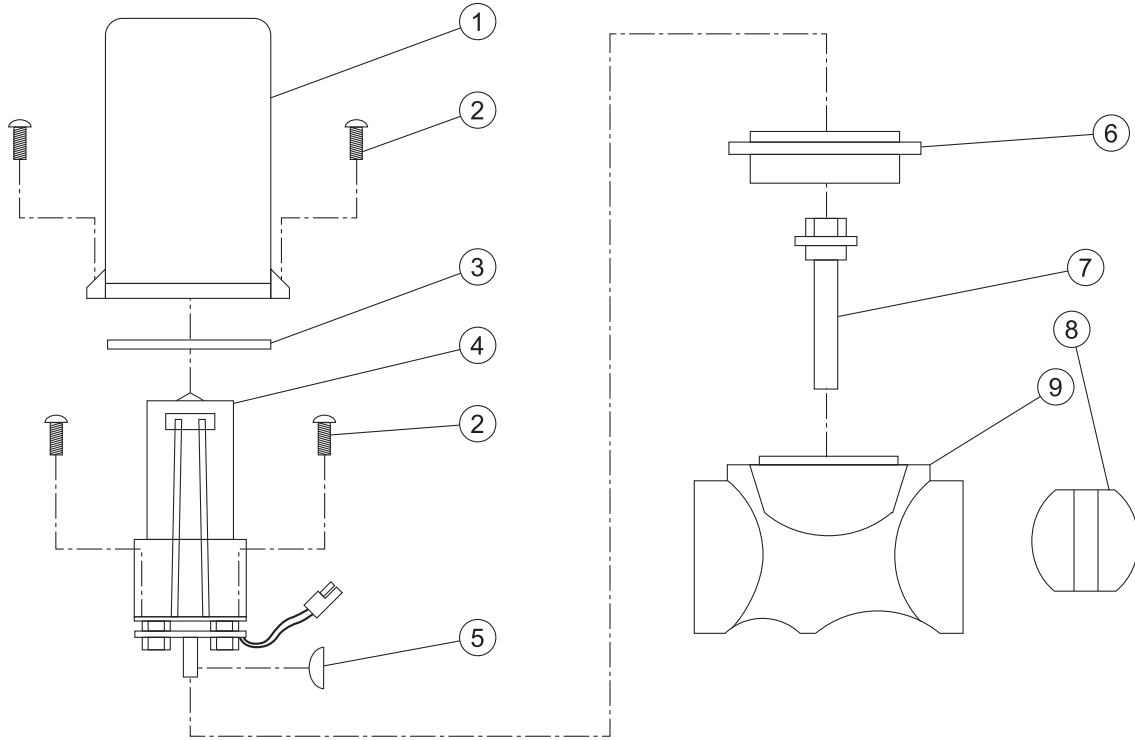


## WIRING 2007/2008 SYSTEM (RAVEN 440+ SHARP SHOOTER)

REF#	PART#	DESCRIPTION	QUANTITY
1	16-140	Power Switch	1
2	16-525-01	Rate1/Rate2 Manual Switch	1
3	16-873	Adjustment Switch	1
4	16-141	Boom Switch	3
5	16-697	Master Switch	1
6	16-558	Mounting Knob	2
7	16-525	Console (only)	1
8	20-601	440 Console Mount	1
9	30-172	Fiberglass Cover	1
	8803-48	Trim-48"	1
	18-134	Grommet <sup>5</sup> / <sub>8</sub>	1
10	50-400	Grommet	1
11	20-596	Dash Board	1
12	33-271	Fuse Block	1
	9035	Blade Fuse 1amp	1
13	33-508	Auto Blade Type Fuse 15 amp	2
14	33-273	Auto Blade Type Fuse 30 amp	1
15	15-369	Console Control Cable	1
16	16-524	Motorized Control Valve	1
17	15-775	Reducer Tee	1
18	30-164	Tapped Reducer	2
19	30-168-04	SharpShooter Pressure Sensor	1
20		See Nozzle Valve Drawing	
21	18-373	Flow Meter	1
22	33-509	Master Boom Floor Switch	1
23	12-017	Hour Meter	1
24	30-168-01	SharpShooter Power Hub	1
25	10-408-01	Phoenix 10 GPS	1
	30-173	GPS Mount Plate	1
26	20-600	440 Harness Extension	1
27	9027	Terminal T-tap	1
	8958	Male Slide on Connector	1

*Use Dielectric Grease On All Electrical Connections*

# 16-524 MOTORIZED CONTROL VALVE DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	16-870	Valve Cover	1
2*	16-524-01	#6 Self Tapping Screw 3/4" Long	6
3	16-897	Seal Tetraseal	1
4	16-875	Motor Assembly	1
5*	16-957	Woodruff Key	1
6*	16-524-04	Isolation Flange Assembly	1
7*	16-524-02	Coupler Shaft	1
8*	16-956	Butterfly	1
9*	16-524-03	Valve Body Assembly	1
*	16-524-05	1" Valve ISO-Body Kit	

**WHEN SERVICING VALVE:**

Replace valve body with ISO-Body Kit if valve has been leaking internally.

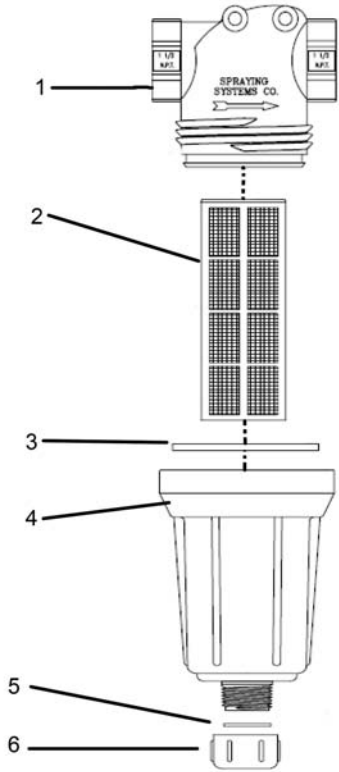
Replace motor assembly if the motor will not run or if the printed circuit board is corroded.

Before reassembling valve, remove the coupler shaft from the valve body. Apply Loctite to coupler shaft and woodruff key. Place the coupler shaft (Ref 7) and the woodruff key (Ref 5) onto the motor shaft. Plug motor into the valve connector coming from Sprayer Control Console. Check that the motor rotates in both directions. Motor must stop when coupler CAM releases printed circuit board switch button.

When reassembling valve, grease both sealing surfaces of coupler shaft. Insert coupler shaft into Iso-flange and be sure seal properly seats on shaft. Install on valve body and apply RTV 738 to mounting holes. Reassemble remaining items as shown in parts diagram on opposite side.



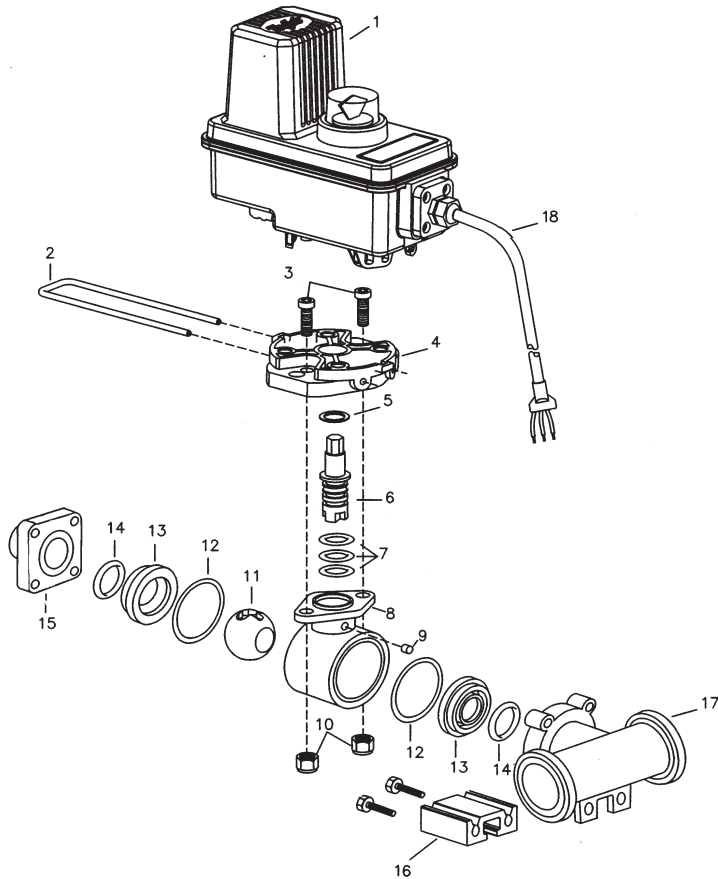
15-737 STRAINER DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	15-737-01	Strainer Head 75 Series	1
2	16-968-03	50 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

Accessories

# 15-743 MANIFOLD VALVE DRAWING

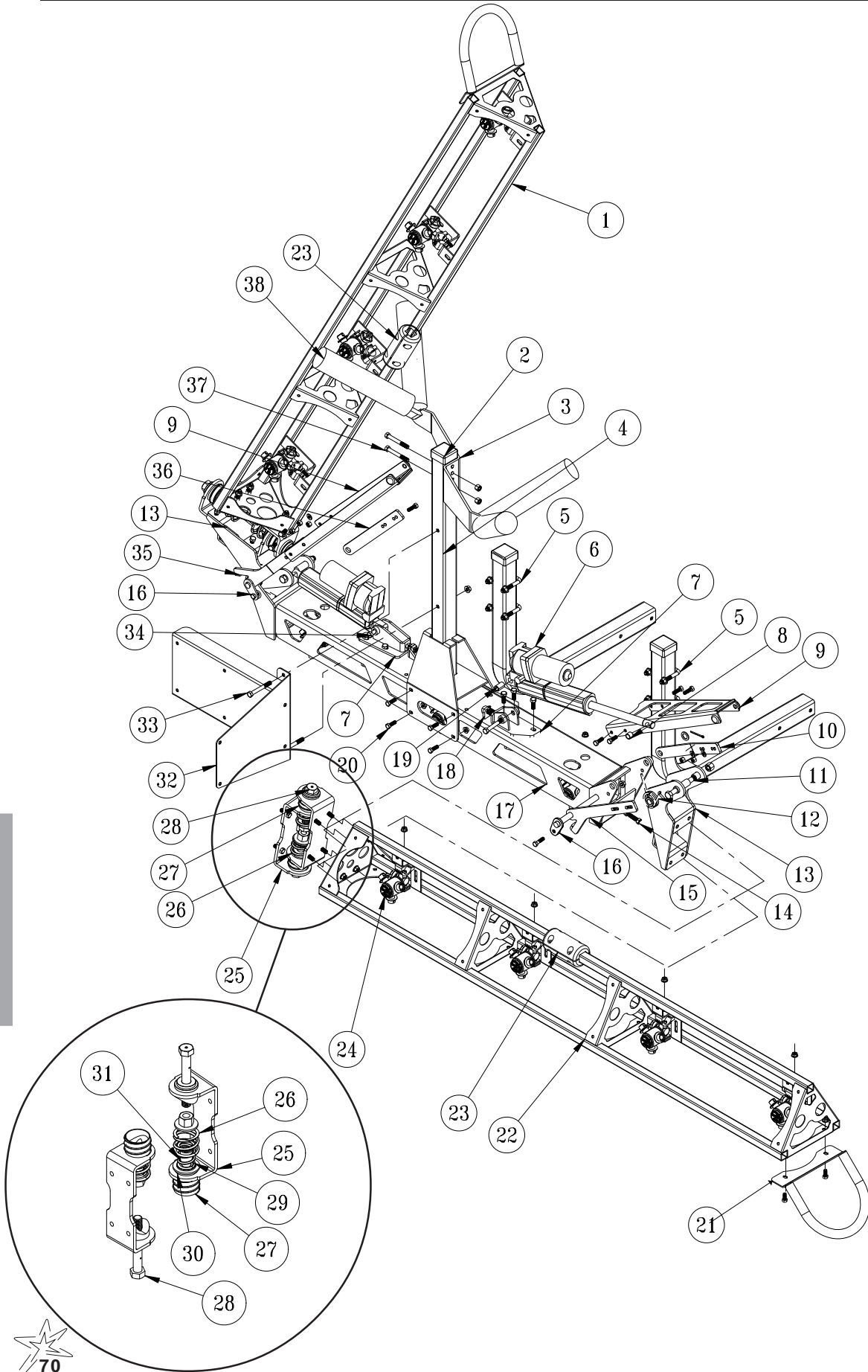


REF#	PART#	DESCRIPTION	QUANTITY
1	15-552-23	Motor	
2	15-552-24	Retaining Clip	1
3	15-552-25	Socket Head Cap Screw, Stainless Steel	2
4	15-552-26	Motor Adapter, Polypropylene	1
5*	15-517-11	Thrust Washer, Teflon	1
6	15-552-27	Stem, Stainless Steel	1
7*	15-552-05	O-ring, Viton	3
8	15-517-16	Body, Nylon	1
9*	15-517-17	Dust Plug, Felt	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	15-743-03	Mounting Rail Aluminum	1
17	15-743-02	#75Tee Body	1

\* 15-552-10 Spare Parts Kit (includes all \* items)  
 15-743-05 Single Ball Valve



# 17-585 18' HD SUPER BOOM DRAWING



Accessories

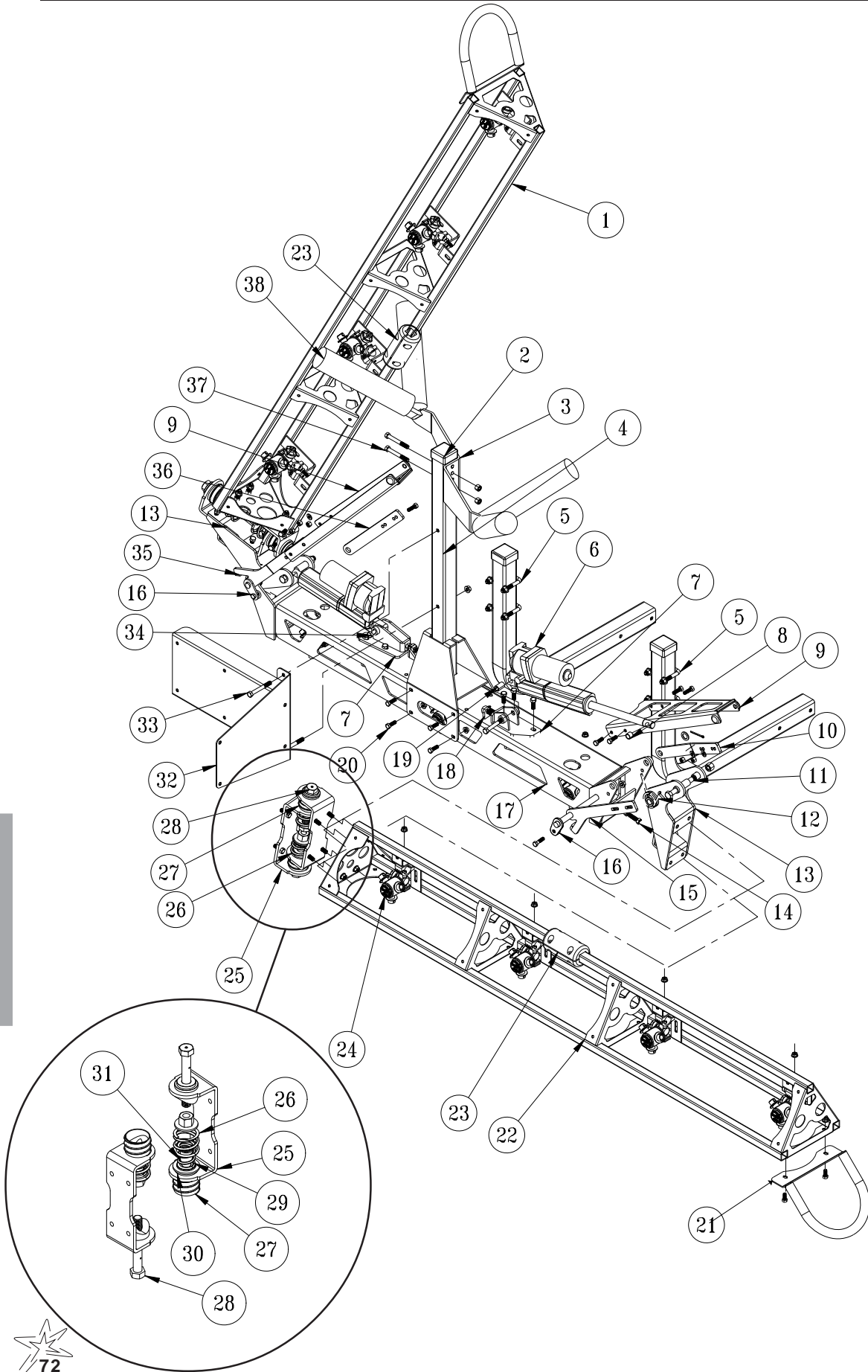
## 17-585 18' HD SUPER BOOM PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
1	17-531	Left Boom Arm	1
2	16-557	Rubber Cap	1
3	17-576	V Boom Nest	1
4	17-578	Boom Nest Post	1
5	17-537	Square U-bolt with Nut	4
6	30-214	10" Electric Hydraulic Actuator	2
7	30-184	Ram Mount	2
	HB-38-16-100	Bolt, <sup>3</sup> / <sub>8</sub> - 16 x 1	6
	HW-516	Washer, <sup>5</sup> / <sub>16</sub>	6
	HNFL-38-16	Flange Lock Nut, <sup>3</sup> / <sub>8</sub> - 16	6
8	18-036	<sup>1</sup> / <sub>2</sub> " Bushing (part of 30-214)	2
9	17-587	Boom Lock	2
	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	Bolt, <sup>1</sup> / <sub>2</sub> - 13 x 5	2
	HNTL-12-13	Lock Nut, <sup>1</sup> / <sub>2</sub> - 13	2
12	17-597	Torsion Spring, RH	1
13	30-185	Arm Pivot Hinge	2
	76-128	Bushing	4
14	HB-38-16-300	Bolt, <sup>3</sup> / <sub>8</sub> - 16 x 3	2
	HNTL-38-16	Lock Nut, <sup>3</sup> / <sub>8</sub> - 16	2
15	17-589	Limit Hinge, Rh	1
16	17-596	Hinge Pin w/ Spacer	2
	HMB-58-14	Machine Bushing	2
	HP-18-100	Cotter Pin <sup>1</sup> / <sub>8</sub> x 1	2
	HB-516-18-075	Bolt, <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	2
17	17-528	Boom Center	1
18	HSSQS-38-16-150	Square Head Set Screw, <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>2</sub>	2
19	18-234	1" Bushing (part of 30-214)	2
20	HBFL-516-18-075	Bolt, <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	8
	HNFL-516-18	Flange Lock Nut, <sup>5</sup> / <sub>16</sub> - 18	8
21	17-541	Boom End Guard	2
	HBFL-516-18-075	Bolt, <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	4
	HNFL-516-18	Flange Lock Nut, <sup>5</sup> / <sub>16</sub> - 18	4
22	17-532	Right Boom Arm	1
23	17-573	Guide Block Set	2
	HB-14-20-125	Bolt <sup>1</sup> / <sub>4</sub> - 20 x 1 <sup>1</sup> / <sub>4</sub>	8
	HNTL-14-20	Lock Nut <sup>1</sup> / <sub>4</sub> - 20	8
24	33-506	Body (see nozzle drawing)	11
	HB-516-18-075	Bolt, <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	11
	HNFL-516-18	Flange Lock Nut, <sup>5</sup> / <sub>16</sub> - 18	11
25	17-527	Boom Hinge	2
	HB-38-16-100	Bolt, <sup>3</sup> / <sub>8</sub> - 16 x 1	16
	HNFL-38-16	Lock Nut, <sup>3</sup> / <sub>8</sub> - 16	16
26	17-539	Compression Spring- Outer	4
27	9026-2	Rubber Duct Hose x 2"	4
28	17-540	Tapped Bolt	4
	HW-34	Washer, <sup>3</sup> / <sub>4</sub>	4
	HNCL-34-10	Center Lock Nut, <sup>3</sup> / <sub>4</sub> - 10	4
	HG-14-28-180	Grease Fitting, <sup>1</sup> / <sub>4</sub> - 28 x 180°	4

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# 17-585 18' HD SUPER BOOM DRAWING

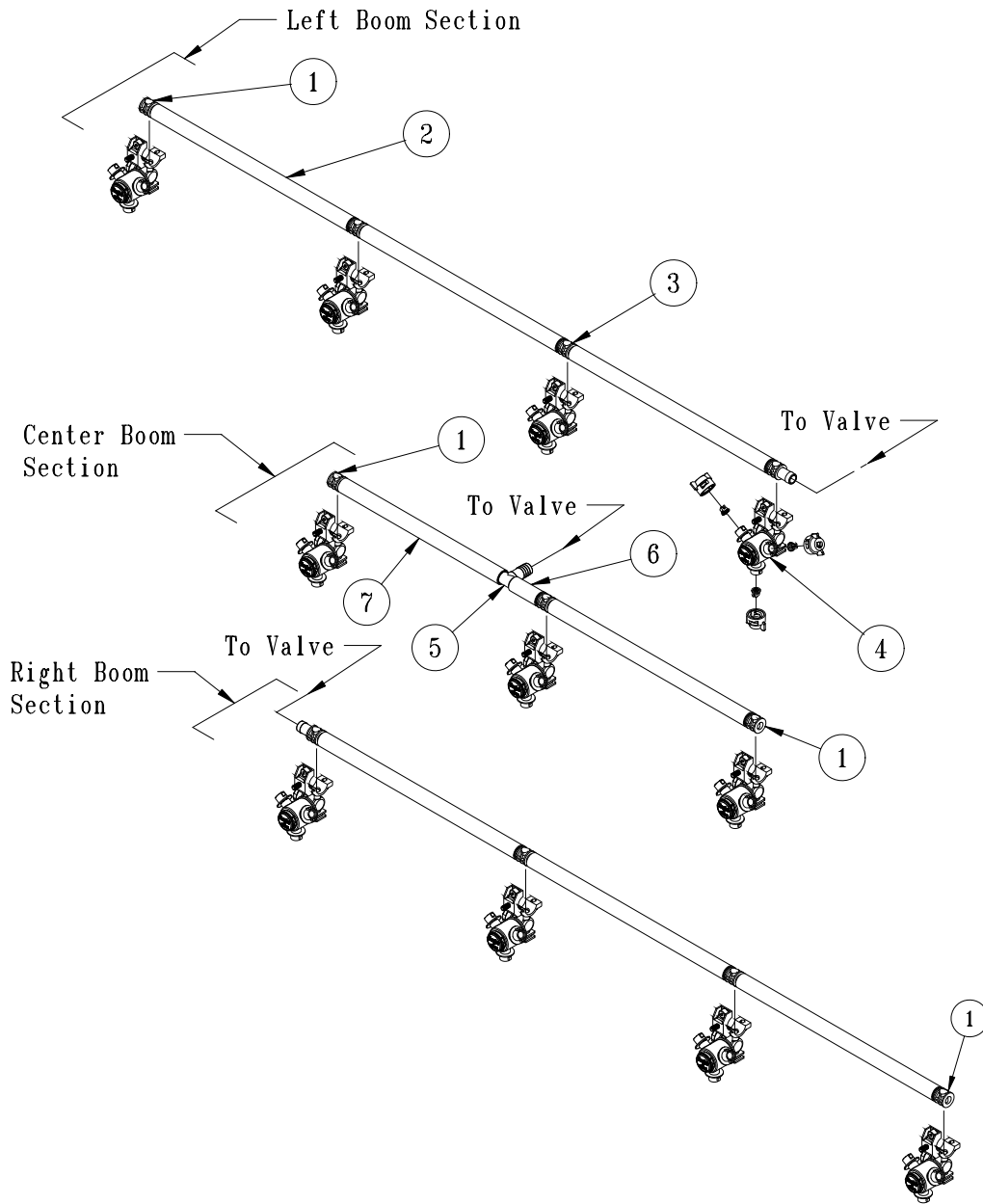


Accessories

## 17-585 18' HD SUPER BOOM PARTSLIST

REF#	PART#	DESCRIPTION	QUANTITY
29	17-591	Compression Spring - Inner	4
30	17-599	Spring Shim	4
31	17-594	Spring Sleeve	4
32	17-535	Clean Load Mount	1
33	HB-38-16-300	Bolt, <sup>3</sup> / <sub>8</sub> - 16 x 3	2
	HNTL-38-16	Lock Nut, <sup>3</sup> / <sub>8</sub> - 16	2
34	HB-12-13-300	Bolt, <sup>1</sup> / <sub>2</sub> - 13 x 3	2
	HNTL-12-13	Lock Nut, <sup>1</sup> / <sub>2</sub> - 13	2
35	17-593	Limit Hinge, LH	1
	17-598	Torsion Spring, LH	1
36	17-592	Lock Hinge, LH	1
37	HB-38-16-300	Bolt, <sup>3</sup> / <sub>8</sub> - 16 x 3	2
	HW-38	Washer, <sup>3</sup> / <sub>8</sub>	2
	HNTL-38-16	Lock Nut, <sup>3</sup> / <sub>8</sub> - 16	2
38	8897-12	Discharge Hose 1-1/4"	4

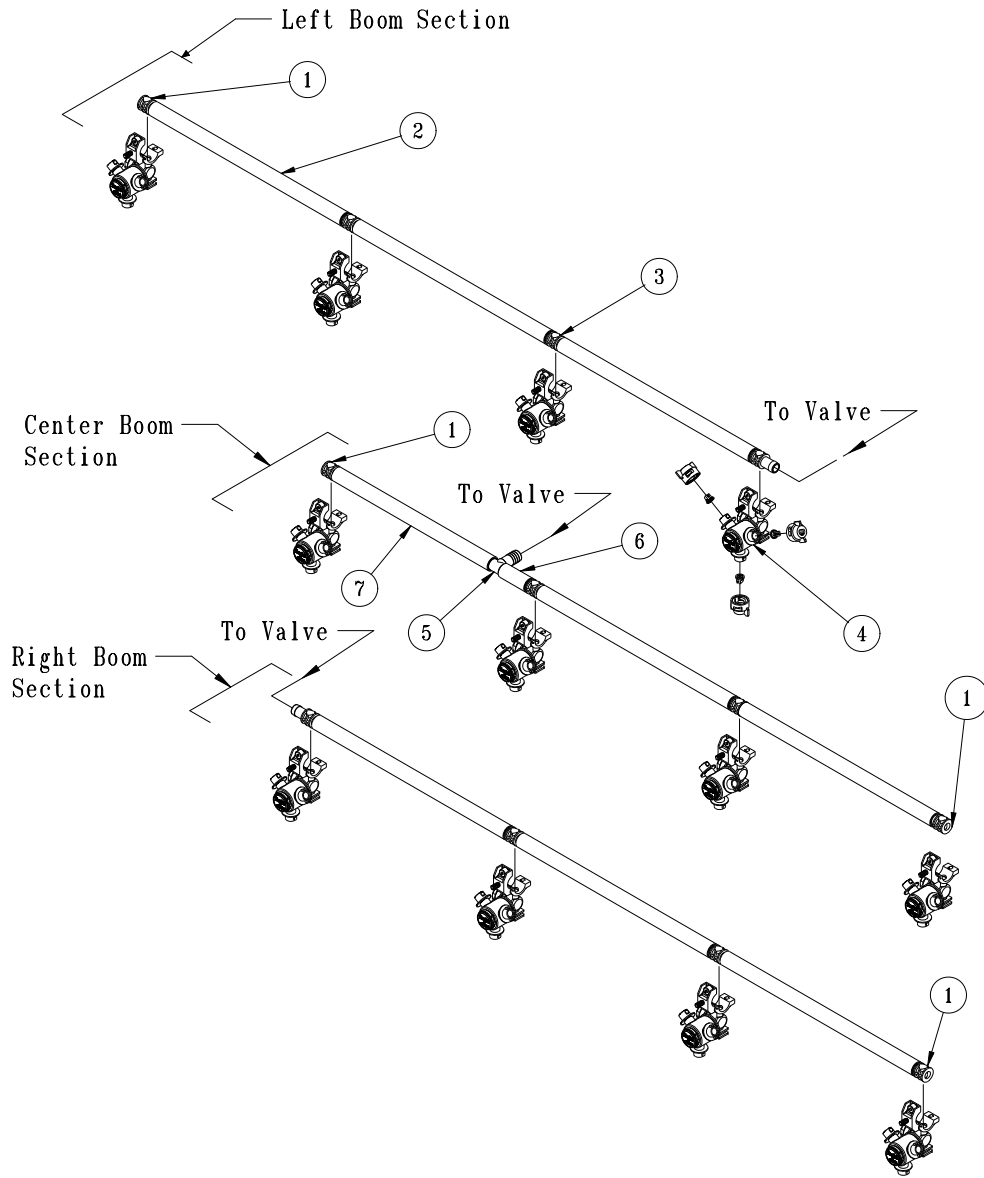
# 17-585 18' HD SUPER BOOM PLUMBING



REF#	PART#	DESCRIPTION	QUANTITY
1	18-417	Single Barb	4
	18-040	Hose Clamp	3
2	8887-19	Orange PVC Hose $3/4"$ x 19"	7
	18-040	Hose Clamp	14
3	18-416	Double Barb	7
4	33-506	Nozzle body (see nozzle drawing)	11
5	18-415	$3/4"$ Hose Barb	1
6	8887-2.5	Orange PVC Hose $3/4"$ x 2 $1/2"$	1
	18-040	Hose Clamp	2
7	8887-15.5	Orange PVC Hose $3/4"$ x 15 $1/2"$	1
	18-040	Hose Clamp	2

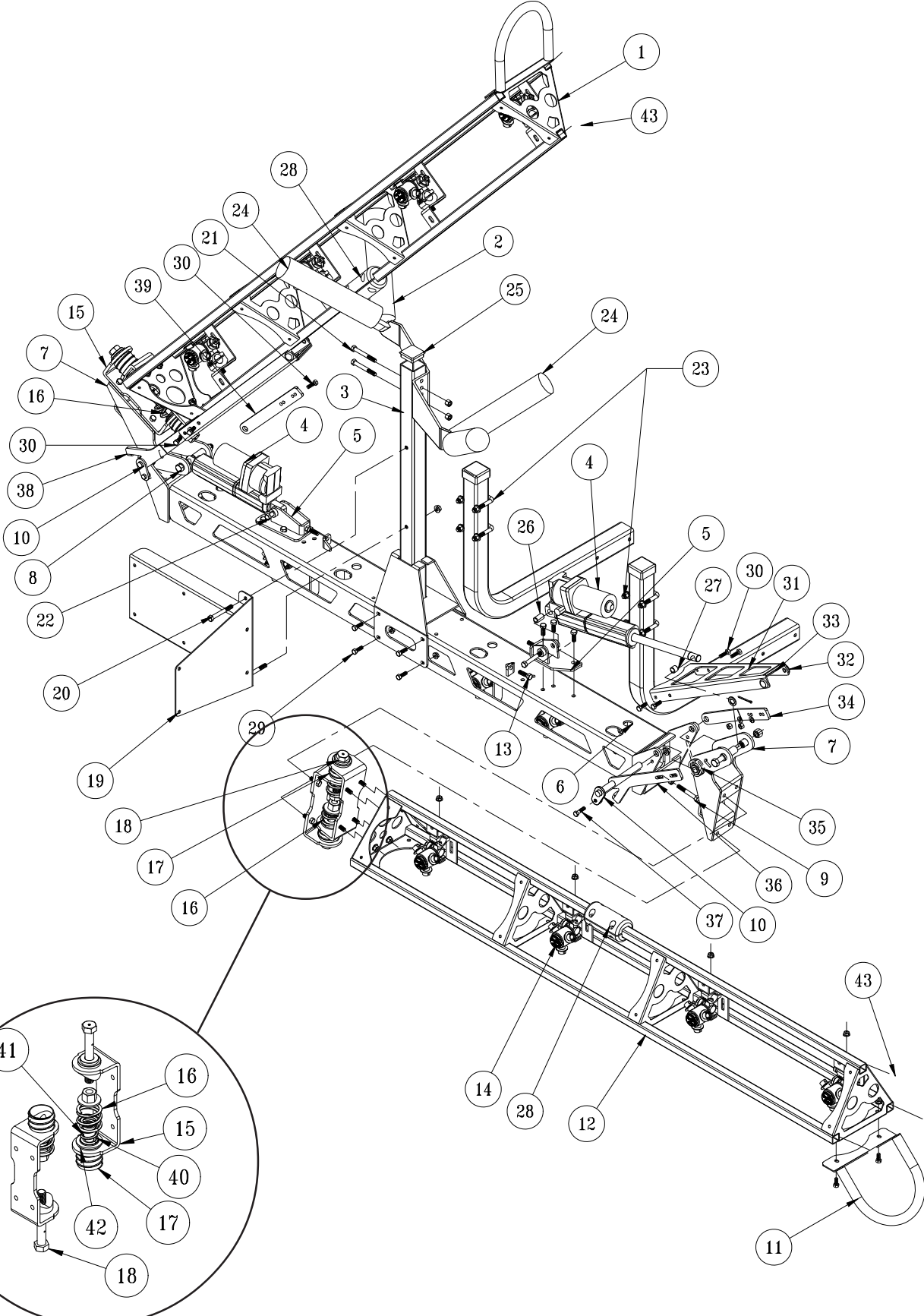


# 17-580 20' HD SUPER BOOM PLUMBING



REF#	PART#	DESCRIPTION	QUANTITY
1	18-417	Single Barb	4
	18-040	Hose Clamp	3
2	8887-19	Orange PVC Hose $\frac{3}{4}$ " x 19"	8
	18-040	Hose Clamp	16
3	18-416	Double Barb	8
4	33-506	Nozzle body (see nozzle drawing)	12
5	18-415	$\frac{3}{4}$ " Hose Barb	1
6	8887-2.5	Orange PVC Hose $\frac{3}{4}$ " x 2 $\frac{1}{2}$ "	1
	18-040	Hose Clamp	2
7	8887-15.5	Orange PVC Hose $\frac{3}{4}$ " x 15 $\frac{1}{2}$ "	1
	18-040	Hose Clamp	2

# 17-580 20' HD SUPER BOOM DRAWING



Accessories

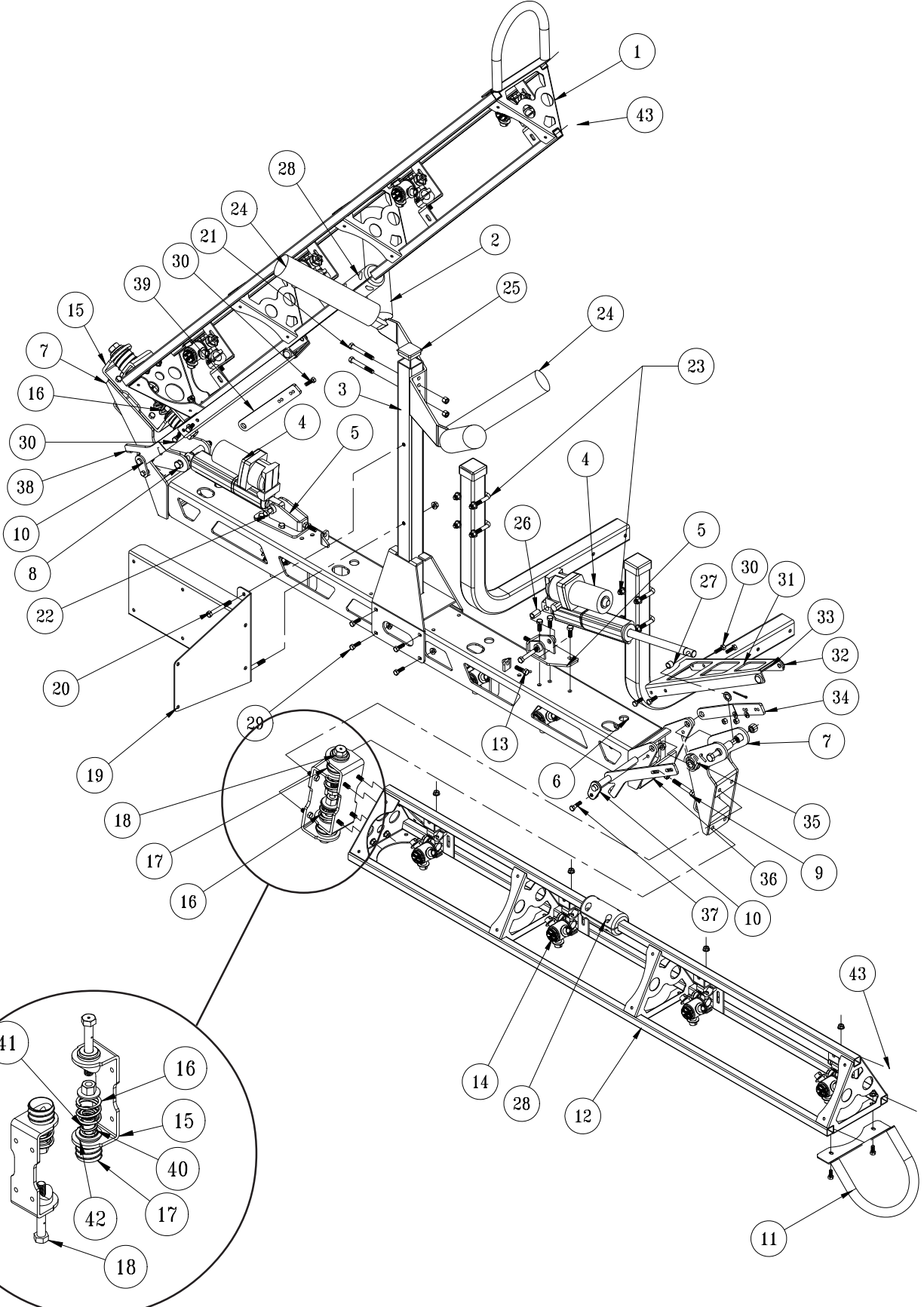
## 17-580 20' HD SUPER BOOM PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	17-531	Left Boom Arm	1
2	17-577	V-Boom Nest	1
3	17-578	Boom Nest Post	1
4	30-214	10" Electric Hydraulic Actuator	2
5	30-184	Actuator Mount	2
	HB-38-16-100	Bolt, $\frac{3}{8}$ - 16 x 1	6
	HW-516	Washer, $\frac{5}{16}$	6
	HNFL-38-16	Flange Lock Nut, $\frac{3}{8}$ -16	6
6	17-579	Boom Center	1
7	30-185	Arm Pivot Hinge	2
	76-128	Bushing	4
8	HB-12-13-500	Bolt, $\frac{1}{2}$ - 13 x 5	2
	HNTL-12-13	Lock Nut, $\frac{1}{2}$ - 13	2
9	HB-38-16-150	Bolt, $\frac{3}{8}$ - 16 x $1\frac{1}{2}$	2
	HNFL-38-16	Flange Lock Nut, $\frac{3}{8}$ -16	4
10	17-596	Hinge Pin w/Spacer	2
	HMB-58-14	Machine Bushing, $\frac{5}{8}$ x 14GA	2
	HP-18-100	Cotter Pin, $\frac{1}{8}$ x 1	2
11	17-541	Boom End Guard	2
	HBFL-516-18-075	Bolt, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	4
	HNFL-516-18	Flange Lock Nut, $\frac{5}{16}$ - 18	4
12	17-532	Right Boom Arm	1
13	HSSQS-38-16-150	Square Head Set Screw, $\frac{3}{8}$ -16 x $1\frac{1}{2}$	2
14	33-506	Body (see nozzle drawing)	12
	HB-516-18-075	Bolt, $\frac{5}{16}$ - 18 x $\frac{3}{4}$	12
	HNFL-516-18	Flange Lock Nut, $\frac{5}{16}$ -18	12
15	17-527	Boom Hinge	2
	HB-38-16-100	Bolt, $\frac{3}{8}$ - 16 x 1	16
	HNFL-38-16	Lock Nut, $\frac{3}{8}$ - 16	16
16	17-539	Compression Spring - Outer	4
17	9026-2	Rubber Duct Hose x 2"	4
18	17-540	Tapped Bolt	4
	HW-34	Washer, $\frac{3}{4}$	4
	HNCL-34-10	Center Lock Nut, $\frac{3}{4}$ -10	4
	HG-14-28-180	Grease Fitting, $\frac{1}{4}$ - 28 x 180°	4
19	17-535	Clean Load Mount	1
20	HB-38-16-300	Bolt, $\frac{3}{8}$ - 16 x 3	2
	HNTL-38-16	Lock Nut, $\frac{3}{8}$ - 16	2
21	HB-38-16-300	Bolt, $\frac{3}{8}$ - 16 x 3	2
	HW-38	Washer, $\frac{3}{8}$	2
	HNTL-38-16	Lock Nut, $\frac{3}{8}$ - 16	2
22	HB-12-13-300	Bolt, $\frac{1}{2}$ - 13 x 3	2
	HNTL-12-13	Lock Nut, $\frac{1}{2}$ - 13	2
23	17-537	Square U-bolt with Nut	4
24	8897-12	$1\frac{1}{4}$ Discharge Hose 12"	4
25	16-557	Square Rubber Cap	1
26	18-036	1" Bushing (part of 30-216)	2
27	18-234	$\frac{1}{2}$ " Bushing (part of 30-216)	2

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# 17-580 20' HD SUPER BOOM DRAWING

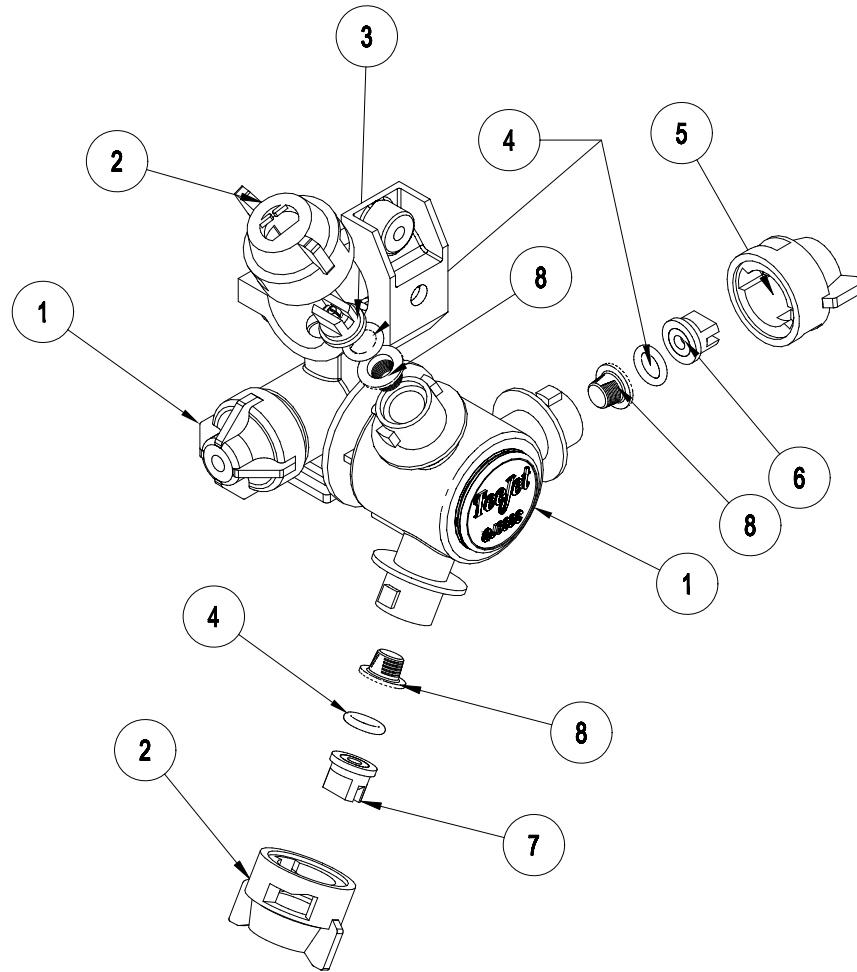


Accessories

## 17-580 20' HD SUPER BOOM PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
28	17-573	Guide Block Set	2
	HB-14-20-125	Bolt $1/4$ -20 x $1 1/4$	8
	HWL-14	Lock Washer $1/4$	8
	HNTL-14-20	Lock Nut $1/4$ - 20	8
29	HBFL-516-18-075	Bolt, $5/16$ - 18 x $3/4$	4
	HNFL-516-18	Flange Lock Nut, $5/16$ - 18	4
30	HB-516-18-100	Bolt, $5/16$ -16 x 1	8
	HW-516	Flat Washer, $5/16$	8
	HNTL-516-18	Lock Nut, $5/16$ - 18	8
31	17-587	Boom Lock	2
32	42-116	Rubber Insert	4
33	8803-2.75	Trim Lace, $2 3/4$	2
34	17-588	Lock Hinge, RH	1
35	17-597	Torsion Spring, RH	1
36	17-589	Limit Hinge, RH	1
37	HB-516-18-125	Bolt, $5/16$ -16 x $1 1/4$	2
	HNTL-516-18	Lock Nut, $5/16$ - 18	2
38	17-593	Limit Hinge, LH	1
	17-598	Torsion Spring, LH	1
39	17-592	Lock Hinge, LH	1
40	17-591	Compression Spring - Inner	4
41	17-594	Spring Sleeve	4
42	17-599	Spring Shim	4

# TRIPLE NOZZLE ASSEMBLY



REF#	PART#	DESCRIPTION	QUANTITY
1	33-506	Body	1
2	33-538	Cap - Gray	2
3	33-553	Nozzle -Gray (XR11006-VS)	1
4	16-800	Viton Gasket	3
5	33-537	Cap - Red	1
6	33-552	Nozzle - Red (XR11004-VS)	1
7	33-554	Nozzle - White (XR11008-VS)	1
8	16-802	Strainer	3

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

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

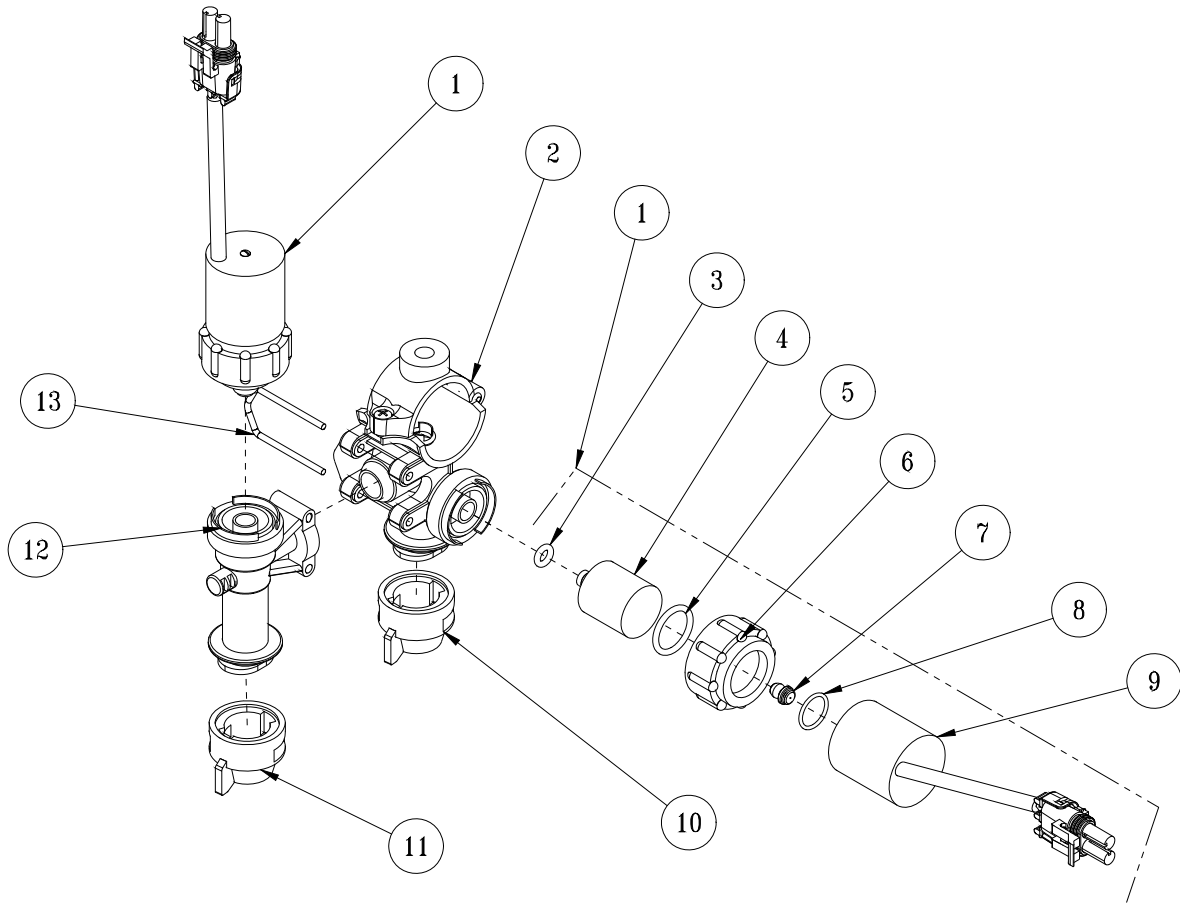
Nozzles are located 20" (51 cm) apart on the right, left, and center tubes. Nozzles are 20" high off ground.

For reordering Nozzle Kits the following numbers apply

33-540 Triple Nozzle Kit for 18' Booms

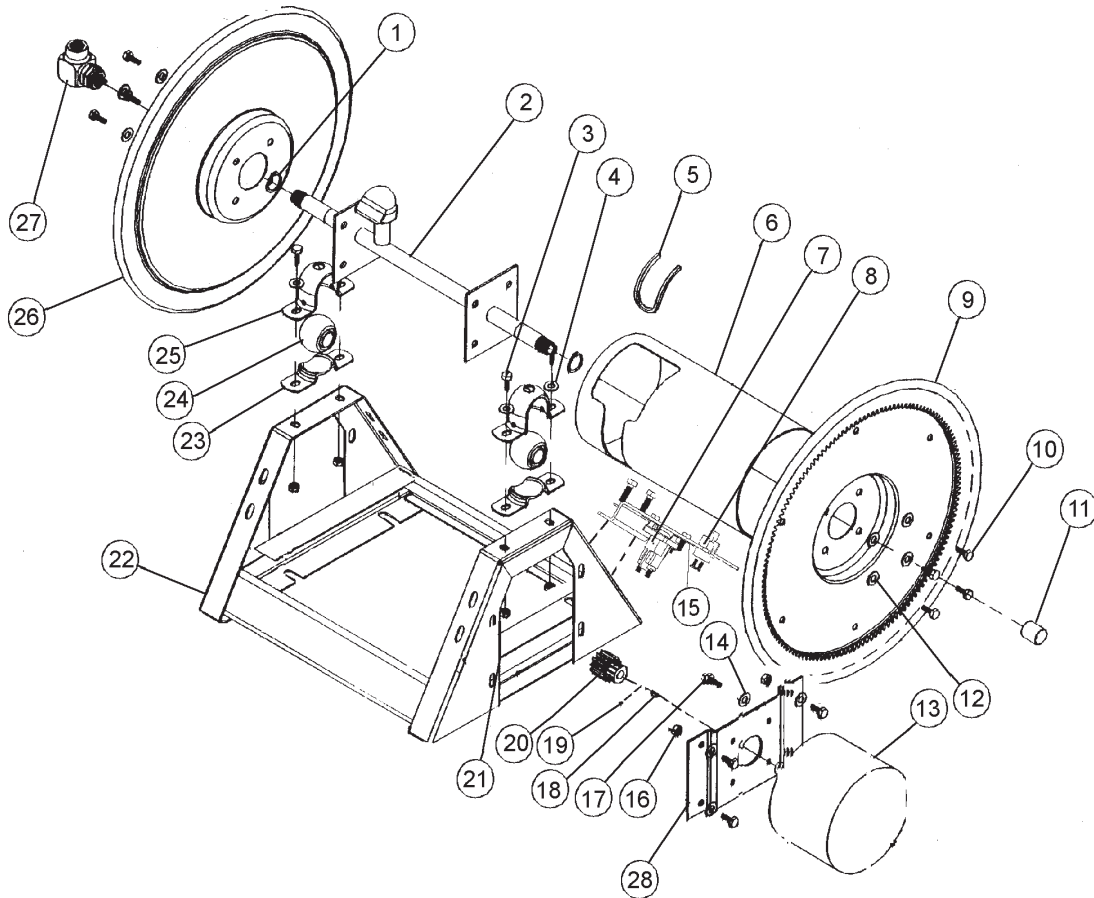
33-542 Triple Nozzle Kit for 20' Booms

# STAR COMMAND NOZZLE VALVE ASSEMBLY



REF#	PART#	DESCRIPTION	QUANTITY
1	30-168-05	Complete Nozzle Valve Assembly (includes * items)	2
2	30-168-12	CRII Saddle Assembly	1
3*	30-168-20	O-ring	1
4*	30-168-26	Valve Body	1
5*	30-168-18	O-ring	1
6*	30-168-25	Fly Nut	1
7*	30-168-17	Plunger	1
8*	30-168-19	O-ring	1
9*	30-168-21	Coil	1
10	30-168-13	Combo-Jet SR110-10	1
11	30-168-14	Combo-Jet MR110-10`	1
12	30-168-22	End Body Assembly	1
13	30-168-15	Lock U-Clip	1
	30-170	Double Barb For SharpShooter	
	30-169	Single Barb for SharpShooter	
	30-168-28	O-ring for Double or Single Barb	

# 30-010 ELECTRIC HOSE REEL DRAWING



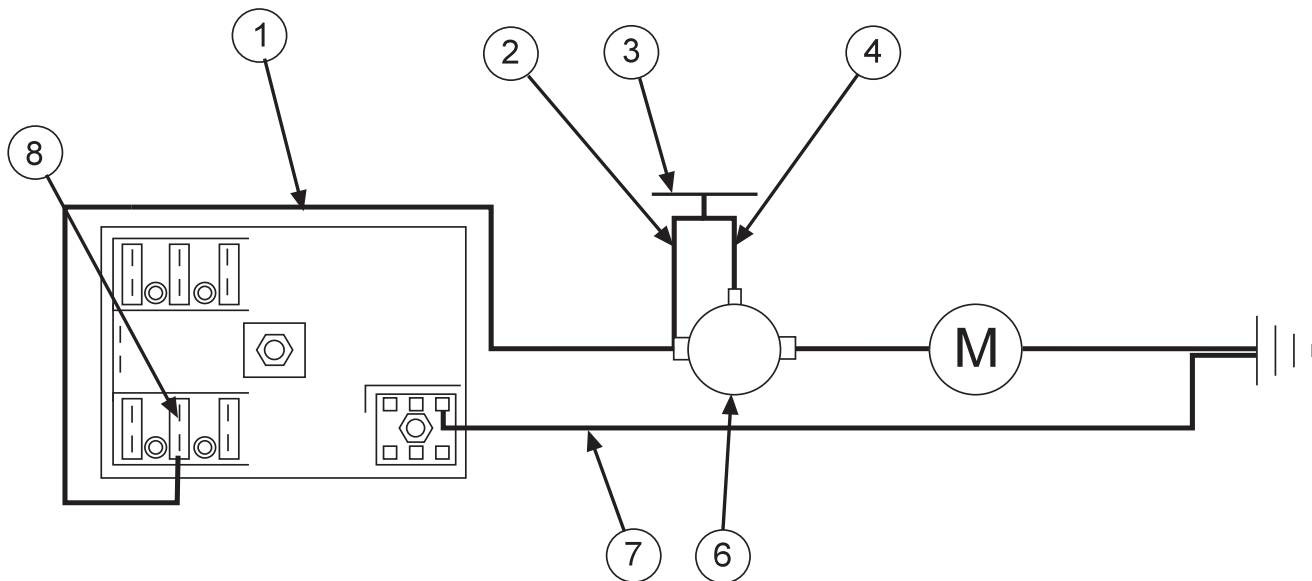
Accessories



## 30-010 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	Bolt $\frac{3}{8}$ - 16 x 1	4
4	HW-38	Washer $\frac{3}{8}$	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	Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$	2
	HWL-14	Lockwasher $\frac{1}{4}$	2
	HN-14-20	Nut $\frac{1}{4}$ - 20	2
8	33-251	Switch	1
9	16-906-19	Disc and Gear Assembly	1
10	HB-516-18-075	Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$	8
11	16-906-26	Pipe Cap $\frac{3}{4}$	1
12	HWL-516	Lockwasher $\frac{5}{16}$	8
13		Motor 12VDC	1
14	HW-516	Washer $\frac{5}{16}$	4
15	33-252	Switch and Solenoid Bracket	1
	HB-516-18-075	Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$	2
	HW-516	Washer $\frac{5}{16}$	2
	HWL-516	Lockwasher $\frac{5}{16}$	2
	HN-516-18	Nut $\frac{5}{16}$ - 18	2
16	HNTL-516-18	Lock Nut $\frac{5}{16}$ - 18	4
17	HB-516-18-100	Bolt $\frac{5}{16}$ - 18 x 1	4
18	16-906-17	Key	1
19		Set Screw	2
20	16-906-29	Pinion	1
21	HNTL-38-16	Lock Nut $\frac{3}{8}$ - 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 $\frac{1}{2}$	1
27	16-906-23	Swivel Assembly $\frac{3}{4}$	1
	16-906-30	Seal Kit (For 16-906-23)	1
28	16-906-28	Bracket 12VDC	1
29	16-980	Mount Bracket	2
	HB-516-18-175	Bolt $\frac{5}{16}$ - 18 x 1 $\frac{3}{4}$	4
	HW-516	Washer $\frac{5}{16}$	4
	HNTL-516-18	Lock Nut $\frac{5}{16}$ - 18	4
	16-982	Electric Hose Reel (only)	1

# ELECTRIC HOSE REEL WIRING DIAGRAM



REF#	PART#	DESCRIPTION	QUANTITY
1	8843-132	Flexguard 3/8 ID	1
	8919-144	10GA Red Wire 144"	1
	8901	Slide-On Connector	1
2	16-979	Wire, Switch to Solenoid Hot Terminal	1
3	33-251	Push Button Switch	1
4	16-978	Wire, Switch to Solenoid Start Terminal	1
6	13-750	Solenoid	1

### SOLENOID TERMINALS

	HN -516-24	5/16 - 24 Hex Nut	2
	HN -10-32	10 - 32 Hex Nut	1
7	8931-144	10GA White Wire 144"	1
	8901	Slide-On Connector	1
8	33-273	Auto Blade Type Fuse 30Amp	1

### CONNECTION INSTRUCTIONS

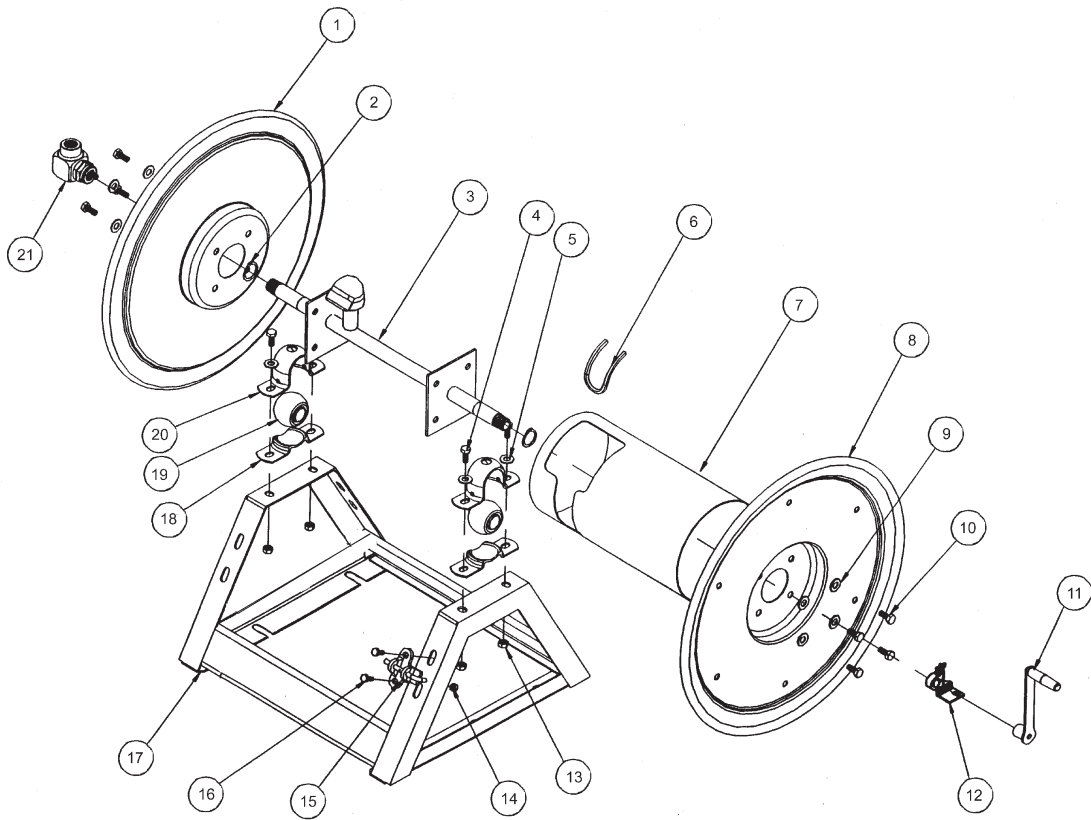
Route wire harness along side of tank and over to fuse block taking care to stay clear of moving parts or hot engine components. Cut off excess wire and strip back 3/8". Place one 8963 heat shrink (1/4 x 1 1/4) on each wire before crimping 8901 slide on connectors to the red and white wires. Connect the two wires to the fuse block first the red to the (+) positive and the white to the (-) negative. Put the 33-273 auto blade type fuse (30 amp) into fuse block.



**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.**

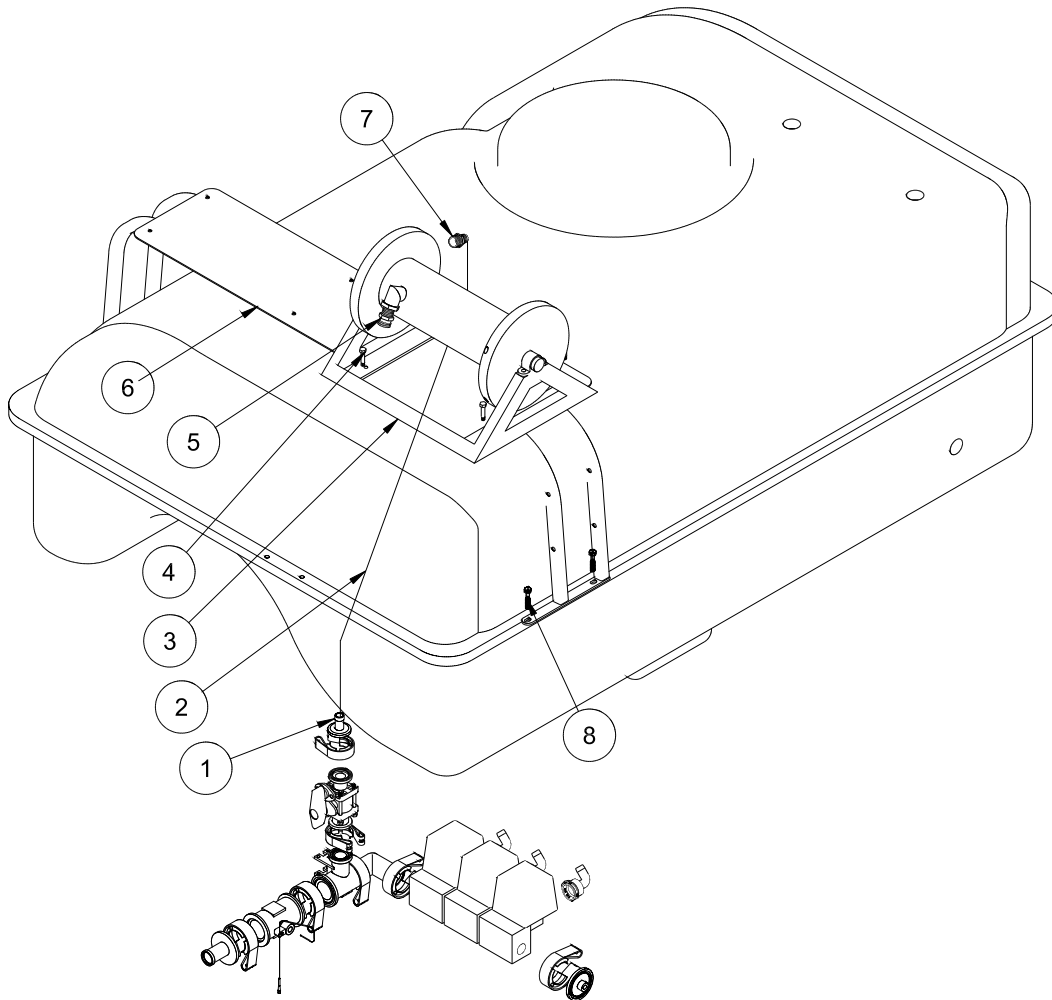
*Use Dielectric Grease On All Electrical Connections*

# 30-009 MANUAL HOSE REEL DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	16-129-11	Disc 17 <sup>1</sup> / <sub>2</sub>	1
2	16-906-25	Retaining Ring	2
3	16-906-22	Axle Assembly <sup>3</sup> / <sub>4</sub>	1
4	HB-38-16-100	Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1	4
5	HW-38	Washer <sup>3</sup> / <sub>8</sub>	4
6	16-906-27	Trim, Drum Edge	1
7	16-906-21	Drum Center	1
8	16-906-20	Disc 17 <sup>1</sup> / <sub>2</sub> , Crank Side	1
9	HWL-516	Lockwasher <sup>5</sup> / <sub>16</sub>	8
10	HB-516-18-075	Bolt <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	8
11	16-129-09	Crank Assembly <sup>3</sup> / <sub>4</sub>	1
12	16-129-10	Brake Assembly <sup>3</sup> / <sub>4</sub>	1
13	HNTL-38-16	Lock Nut <sup>3</sup> / <sub>8</sub> - 16	4
14	HNTL-516-18	Lock Nut <sup>5</sup> / <sub>16</sub> - 18	2
15	16-129-08	Lock Pin Assembly	1
16	HB-516-18-075	Bolt <sup>5</sup> / <sub>16</sub> - 18 x <sup>3</sup> / <sub>4</sub>	2
	HW-516	Washer <sup>5</sup> / <sub>16</sub>	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 <sup>3</sup> / <sub>4</sub>	1
	16-906-30	Seal Kit ( For 16-906-23 )	1
22	16-980	Mount Bracket	2
	HB-516-18-100	Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1	4
	HW-516	Washer <sup>5</sup> / <sub>16</sub>	4
	HNTL-516-18	Lock Nut <sup>5</sup> / <sub>16</sub> - 18	4

# HOSE REEL MOUNT DRAWING



## HOSE REEL MOUNT PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	15-749	Hose Barb $\frac{3}{4}$ "	1
2	8887-110	$\frac{3}{4}$ " Orange PVC Hose 110"	1
	18-040	Hose Clamp	2
3	16-129	Manual Rewind Hose Reel	1
4	HB-516-18-100	Bolt $\frac{5}{16}$ - 18 x 1	4
	HW-516	Washer $\frac{5}{16}$	4
	HNTL-516-18	Lock Nut $\frac{5}{16}$ - 18	4
5	16-295	Hose Fitting $\frac{3}{4}$ "	1
6	30-110	Hose Reel Mount bracket (part of 30-005-K)	1
7	18-249	Barb Fitting	1
8	HB-516-18-175	Bolt, $\frac{5}{16}$ - 18 x $1\frac{3}{4}$ (part of 30-005-K)	4
	HNFL-516-18	Flange Lock Nut, $\frac{5}{16}$ - 18 (part of 30-005-K)	4

1. Wear protective clothing when draining the tank and taking apart the lines.
2. Drain tank and spray system in a safe and approved method insuring that no chemical or water remain in tank as you will be taking apart lines.
3. Remove key from ignition, set park brake and block wheels.
4. Put hose reel on hose reel bracket with fitting to the rear of machine. Use four bolts  $\frac{5}{16}$  - 18 x 1 and four  $\frac{5}{16}$  - 18 lock nuts to hold in place. Tighten bolts.
5. Put 18-249 barb fitting into hose reel side.
6. Place the 16-295 Hose Fitting into the Hose reel center.
7. Remove the blank cover from the ball valve by the manifold valve and place the 15-749 Hose Barb. Tighten clamp.
8. Route hose from the hose barb on the ball valve to the barb fitting on the side of the hose reel. Hold in place with the two 18-040 clamps.
9. Be sure all clamps and hardware are tight before using.

## HOSE REEL ADJUSTMENTS

### OPERATIONAL CHECK:

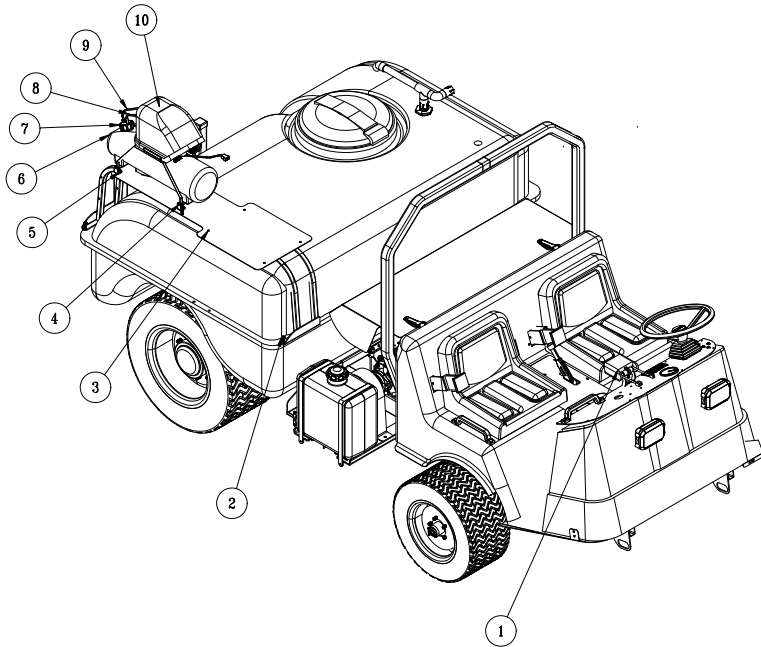
1. Pull hose off drum at least one full revolution. A clicking noise should be heard from locking mechanism.
2. Let the hose retract.
3. Pull the hose off until the first click is heard. Drum should lock when the hose tension is removed.
4. Continue pulling the hose, no more than one revolution, until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

### HOSE REPLACEMENT PROCEDURE:

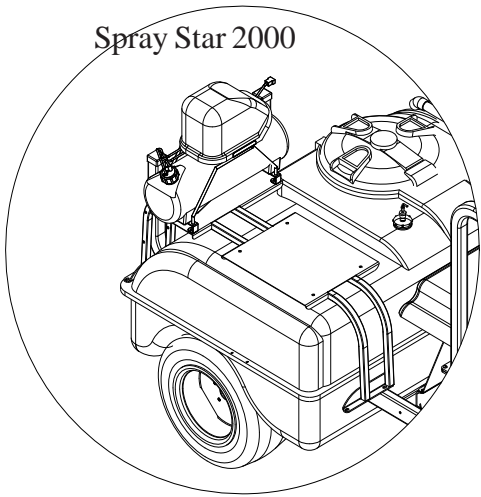
1. Facing swivel, turn the hose drum clockwise until all of the hose is removed from the drum and the drum is held by locking mechanism. Make sure spring is locked.
2. Remove hose clamps and disconnect hose from swivel. Remove old hose.
3. Insert new hose through roller guide, connect to swivel and reinstall 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.

# 30-004 FOAM MARKER DRAWING

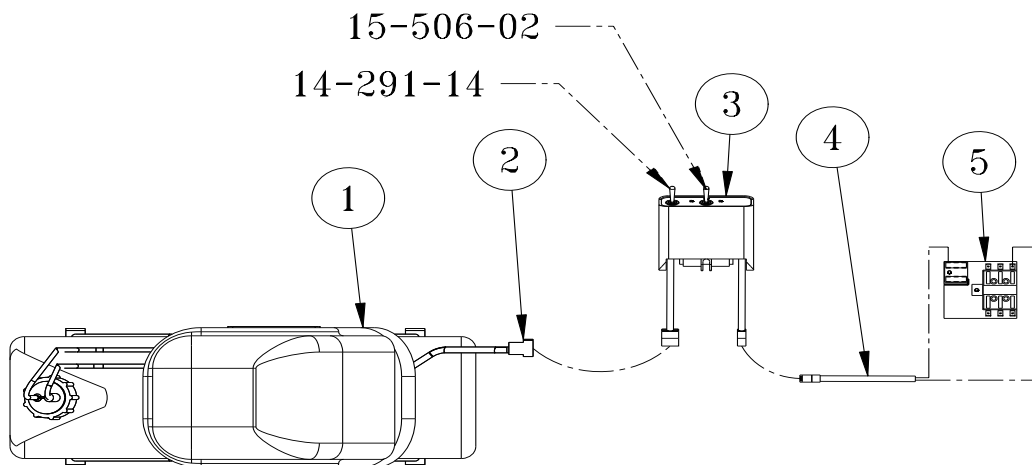
Spray Star 3180



Spray Star 2000



# WIRING DRAWING



Accessories

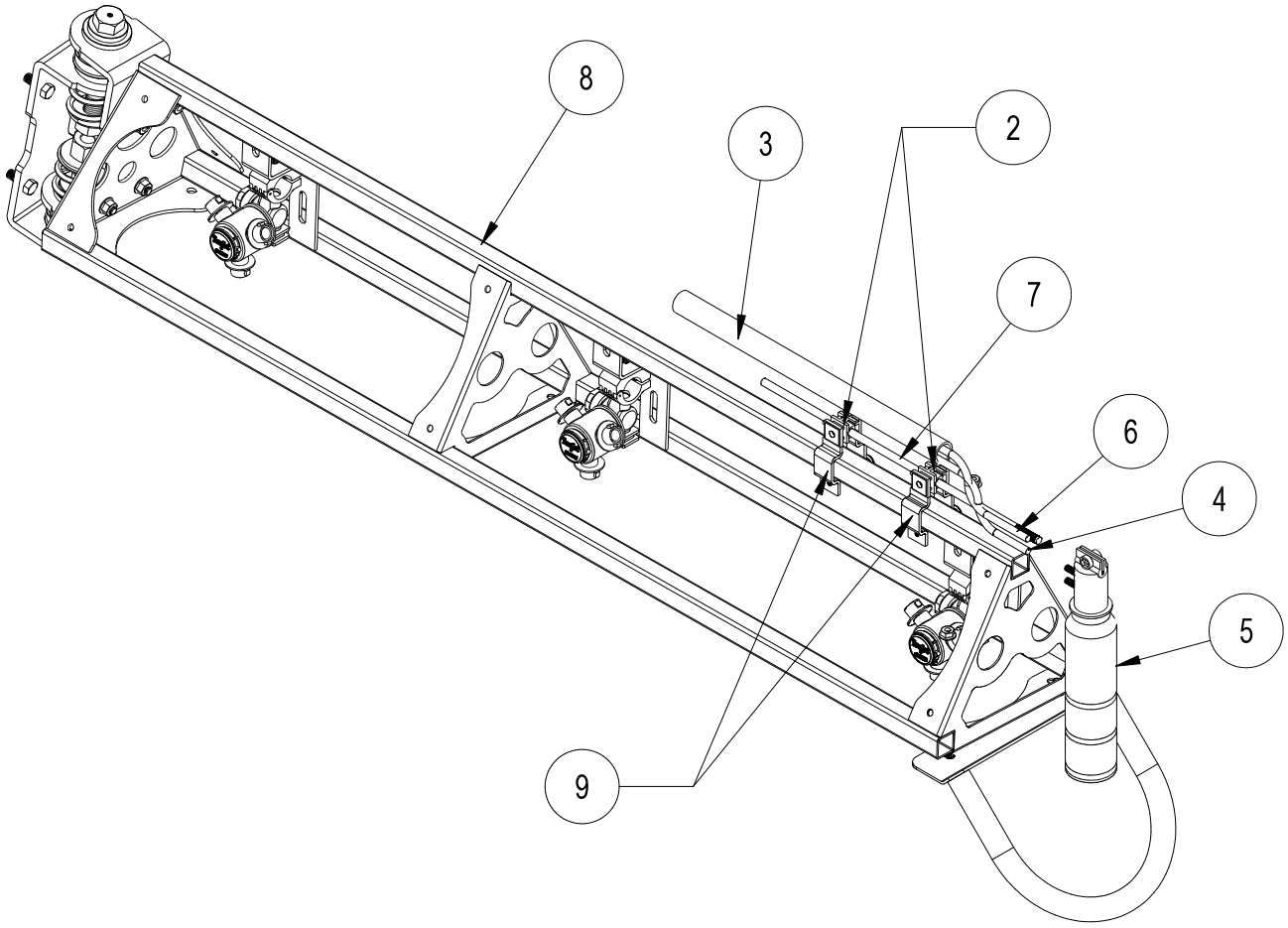
## 30-004 FOAM MARKER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1*	14-291-05	Double Switch Box	1
	33-508	Fuse	1
	15-506-02	Center Switch	1
	14-291-14	Switch	1
2	HB-516-18-175	Bolt, $\frac{5}{16}$ -18 x $1\frac{3}{4}$ (part of machine)	4
	HNFL-516-18	Flange Lock Nut, $\frac{5}{16}$ -18 (part of machine)	4
3		Mount Bracket (part of machine)	1
4*	14-291-04	Tank Bracket	2
5	HN-14-20-075	Hex Bolt, $\frac{1}{4}$ -20 x $\frac{3}{4}$	2
	HBFL-14-20	Flange Lock Nut, $\frac{1}{4}$ -20	2
6*	14-291-02	Foamer Tank	1
7*	14-284-02	Cap Assembly	1
8*		Blue Tube	1
9*		Clear Tube	1
10*	14-291-03	Compressor Only	1
	14-291-01	Black Cover	1
*	14-291	Foamer (includes * parts)	1

## 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
	33-508	Fuse	1
	15-506-02	Center Switch	1
	14-291-14	Outside Switch	1
4	15-509	Power Cable	1
5	33-271	Fuse Block (part of machine)	1
	33-293	Auto Blade Type Fuse 30 amp	1

**FOAMER NOZZLE MOUNT & HOSE GUARD MOUNT DRAWING**



Accessories



## 30-004 FOAM MARKER PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
2	16-987	Foam Nozzle Mounting Kit	1 per boom
3	15-507	Foamer Tubing	1
4		Clear Tubing	
5	15-511	Foam Nozzle	2
6		Blue Tubing	
7	15-510-01	Nozzle Mounting Rod	2
8		Boom	
9	16-795	Square Clamp	4

1. Slide hose clamp onto drop tube of foam nozzle and attach restrictor bell.
2. Place splined end of Nozzle mounting rod (Ref 7) into top of foam nozzle (Ref 5). Tighten screw.
3. Slide two foam nozzle mounts (Ref 2) onto the rod. Place square clamps (Ref 9) on foam nozzle mounts and mount the square clamps to the boom (Ref 8). Adjust foam nozzle mounts and clamps so nozzle assembly will clear end of boom. Tighten foam nozzle mounts and square clamps to prevent side to side movement. Do the same to the other side.
4. Being careful not to cut the tubing (Ref 3), cut the oversleeve back approximately 2" (5 cm) to expose blue (Ref 6) and clear tubing (Ref 4).
5. 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.
6. Route the tubing along underside of main frame using tie downs as necessary.
7. 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 (Ref A) on the right side of compressor as far as possible.
8. 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.
9. Hose's must be routed on bottom of the boom square tubing.
10. Install hose guard using 2 drill screws (you may want to drill a  $\frac{3}{16}$  pilot hole first).
11. Place another hose guard against first and install in same manner.
12. Repeat process for other boom side.
13. Connect small plastic electrical plug under compressor to electrical extension cable.
14. Cut cable and strip casing, allowing enough length to connect to fuse block.
15. Strip and connect slide on connectors to each wire and use the heat shrink.
16. Connect black negative (-) wire to the ground and connect red wire to the positive (+).
17. Insert 10 amp fuse into slot which red wire was attached to.

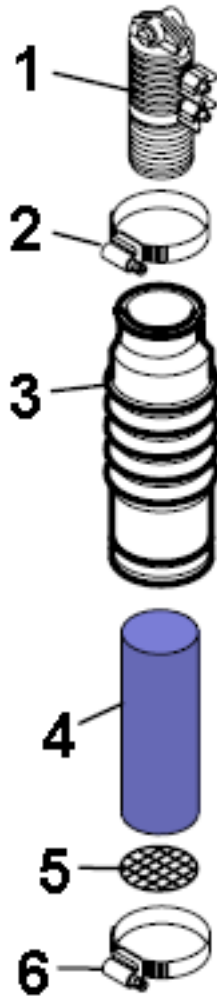
# FOAM MARKER DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1	15-507	Foamer Tubing	1
2	14-291-02	Tank	1
3	14-291-01	Black Cover	1
	14-291-03	Compressor Complete	1
4	14-284-02	Cap Assembly	1
5	14-291-04	Tank Bracket	1
6	14-291-05	Double Switch Box	1
7	15-511	Foam Nozzle	1
8	15-510-01	Nozzle Mounting Rod	1
9	16-987	Foam Nozzle Mounting Kit	1
	14-536	Compressor Subassembly	



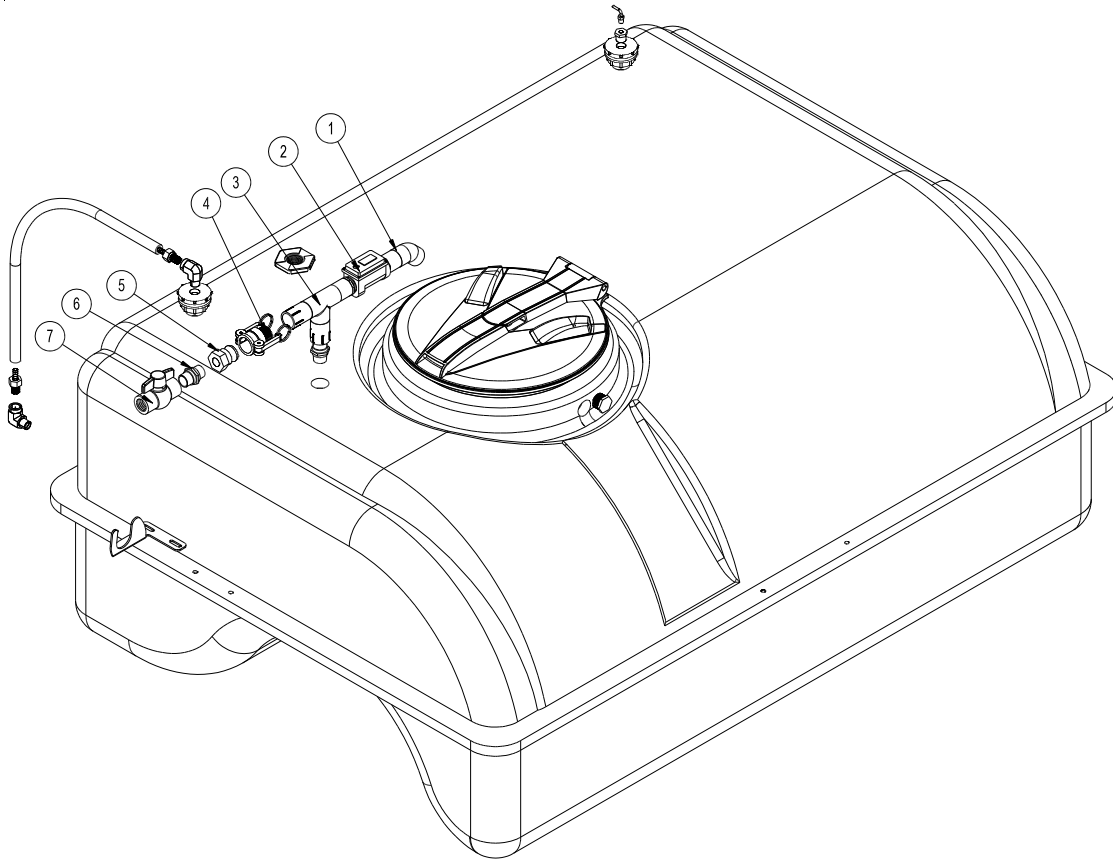
# 15-511 FOAM NOZZLE SUB ASSEMBLY DRAWING



REF#	PART#	DESCRIPTION	QUANTITY
1*	15-511-01	Foam Nozzle Inlet Body	1
	15-511-02	Foam Sponge	1
	15-511-10	Plastic Screen	1
2*		Hose Clamp	1
3*		Drop Tube	1
4	15-511-08	Long Foam Sponge	1
5	15-511-09	Stainless Steel Screen	1
6		Hose Clamp	1
NS	15-510-01	Nozzle Mounting Rods	2
*	15-511-07	Foam Nozzle Sub Assembly	

## 14-515 WATER METER KIT (GALLONS)

## 15-618 WATER METER KIT (LITERS)



REF #	PART #	DESCRIPTION	QUANTITY
1	14-524	Filler Outlet	1
2	14-514	Water Meter (Gallons)	1
	14-527	Water Meter (Liters)	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	1
7	18-448	1" Ball Valve	1

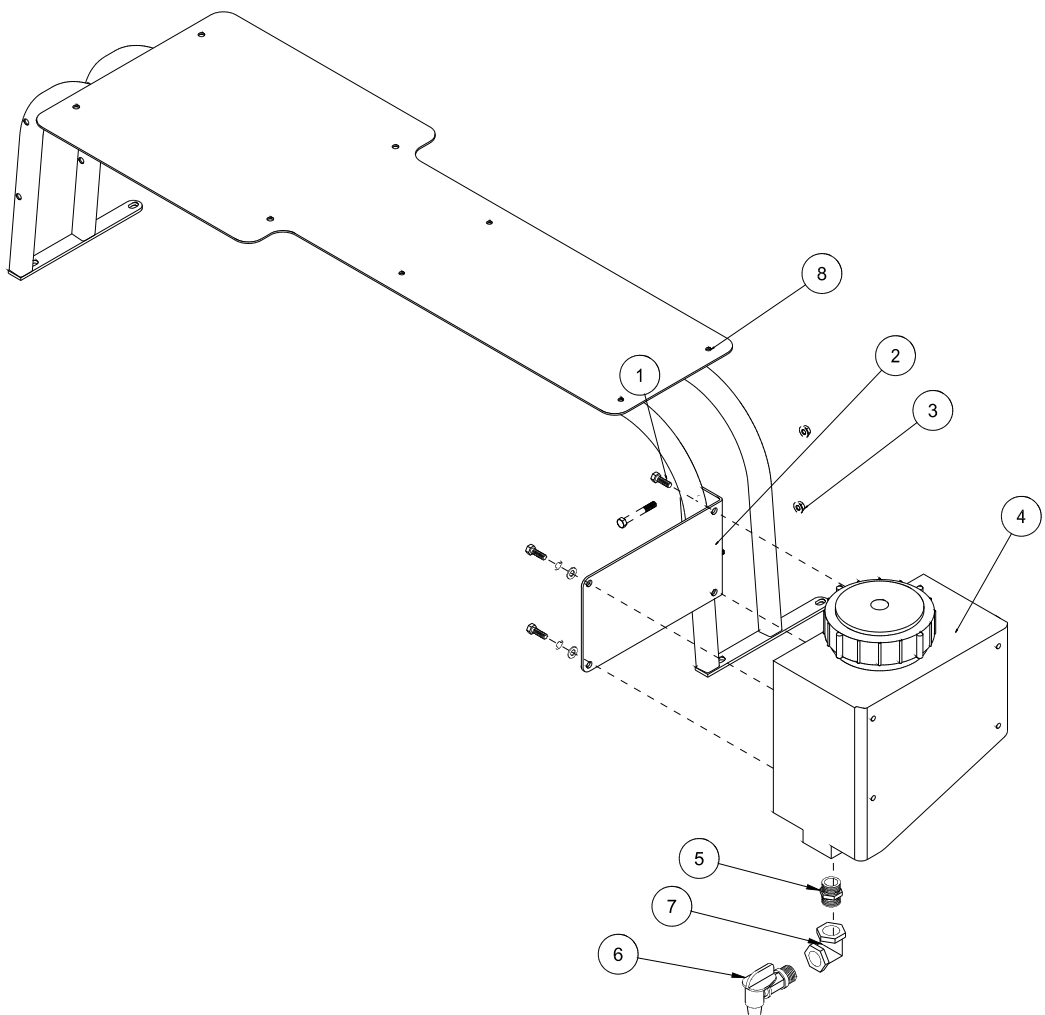
1. Thoroughly flush the service line upstream of the meter to remove dirt and debris.
2. The DLJ Meter is for use **only** with **COLD WATER** up to 122°F (50°C)
3. Slowly open any upstream valves to prevent damage to the meter.

### **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 DRAWING



Accessories



## 30-006 FRESH WATER TANK PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	HB-516-18-075	Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$	4
	HW-516	Washer $\frac{5}{16}$	4
	HWL-516	Lock Washer $\frac{5}{16}$	4
2	30-111	Tank Mount Bracket	1
3	HB-516-18-150	Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{2}$	2
	HNFL-516-18	Flange Lock Nut $\frac{5}{16}$ - 18	2
4	10-234	3 Gallon Rectangular Tank	1
	10-234-01	Lid	
5	16-158	Close Nipple $\frac{3}{4}$ x $\frac{3}{4}$	1
6	16-960	Spigot $\frac{3}{4}$ NPT	1
7	16-151	Elbow FPT $\frac{3}{4}$ x $\frac{3}{4}$	1
8	30-110	Mount Bracket (part of machine)	1

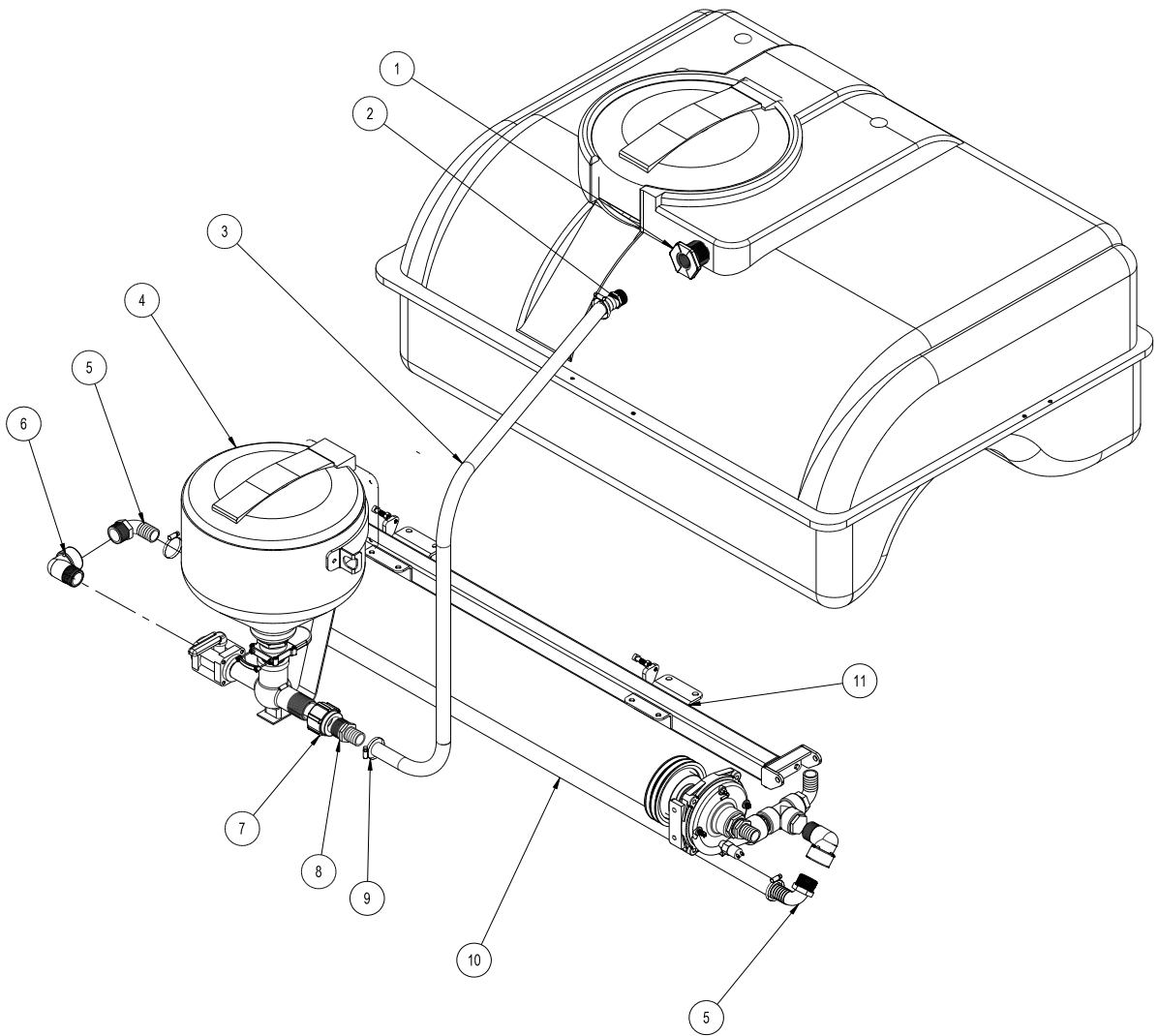
## INSTALLATION INSTRUCTIONS

1. Fresh Water Wash Tank mounts on the rear of the machine.
2. Clamp the mount bracket to the Mount Bracket and mark the holes onto the tube with a center punch. Drill the two holes using a  $\frac{3}{8}$  drill bit.
3. Secure the bracket to the post with two  $\frac{5}{16}$  x  $1\frac{1}{2}$  bolts and flange lock nuts. Then tighten.
4. Install the nipple (Ref 5), elbow (Ref 7) and spigot (Ref 6) into the bottom of wash tank (Ref 4). Use thread tape on all threads.
5. Mount the tank onto the mount bracket (Ref 2) using four  $\frac{5}{16}$  x  $\frac{3}{4}$  bolts, washers and lockwashers. Tighten.
6. 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.**

# 20-503 CHEMICAL CLEANLOAD DRAWING



REF#	PART #	DESCRIPTION	QUANTITY
1	16-945	Fitting (part of tank)	1
2	16-159	Fitting	1
3	8897-38	1 1/4" Discharge Hose 38"	1
4	15-620	Cleanload Assembly	1
5	16-156	Elbow	2
6	16-972	90° Elbow	1
7	18-391	Coupling	1
8	16-161	Fitting	1
9	18-116	Hose Clamp	4
10	8897-116	1 1/4" Discharge Hose 116"	1
11		Center Boom	



# OPERATING INSTRUCTION

## START-UP

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. Divert pump flow to Cleanload inlet line. A pressure of 30 PSI minimum and 150 PSI maximum must be used. Highest pressures increase education rate and available wand suction.
5. Turn inlet ball valve on (yellow handle).
6. Open knife valve, located on the bottom of hopper, by pushing handle in (red handle).
7. Unlock and open lid slowly by turning cover counterclockwise.

## LOADING LIQUID OR POWDERED CHEMICAL INTO HOPPER

8. Pour required amount of chemical into hopper. Avoid splashing liquids or powdered chemicals outside of hopper.
9. 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.
10. 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.
11. Open lid and inspect for chemical residue. Repeat step 10 as necessary.
12. 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.**

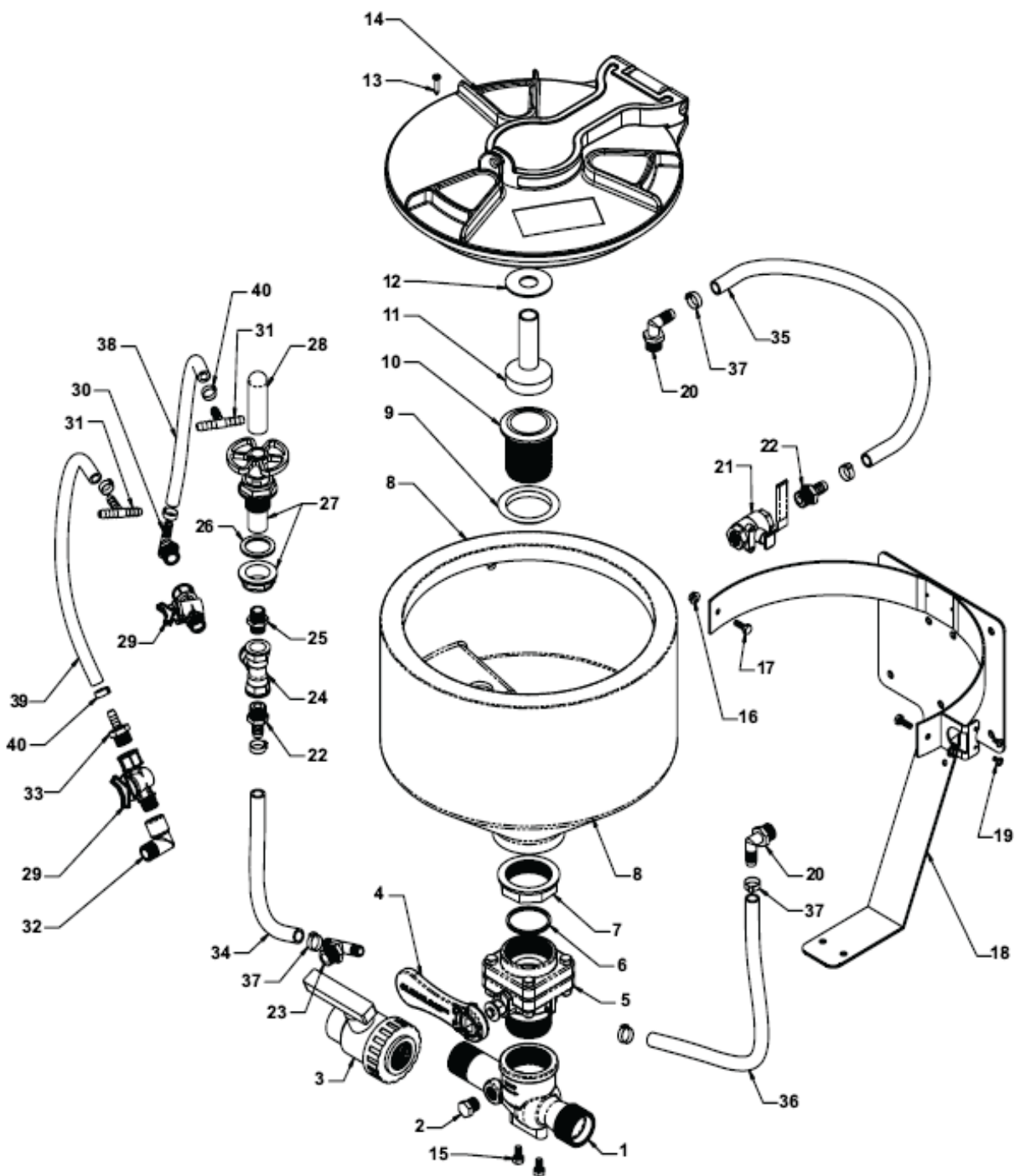
8. Insert lance body with o-ring into eductor until the o-ring is sealed.
9. Use the free end of the lance to pierce bag or container to vacuum powdered or liquid chemical.
10. Rinse lance. Place lance end into a clean container of water to rinse lance assembly.
11. Remove lance body from eductor and drain any remaining fluid into hopper.
12. 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 education rate	Check pump pressure and flow. Cleanload Eductor performance is based on flow and pressure to the system. Note requirements for high education 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® PARTS DRAWING

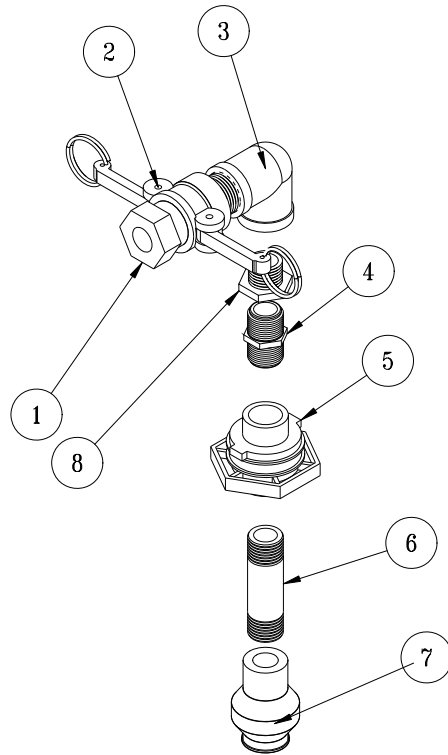


Accessories

## 15-620 CHEMICAL CLEANLOAD® PARTS LIST

REF#	PART#	DESCRIPTION	QUANTITY
1	15-620-04	Cleanload Eductor	1
2		Plug, 1/2"	1
3	15-620-14	Ball Valve, 1 1/4 Single Union	1
4	15-620-13	Handle, Cleanload	1
5	15-620-12	Ball Valve	1
6	15-620-15	Gasket: 2"	1
7	15-620-16	Locking Ring, 2"	1
8	15-620-21	Tank, 5.8 gallon	1
9	15-620-17	Gasket: 2", Tapered	1
10	15-620-18	Drain Head, 2"	1
11	15-620-19	Tank Rinse	1
12		Slinger Ring	1
13		Screw, #6 x 1"	8
14	15-620-02	Tank Lid	1
15		Bolt, 5/16-18 x 5/8	2
16		Nut, Flanged 1/4 - 20	2
17		Bolt, 1/4 - 20 x 3/4 SS	2
18	15-620-01	Frame, Back Mount	1
19		Screw, 10-24 x .375	2
20	15-620-11	Elbow 1/2"	2
21	15-620-10	Valve, SS Tank Rinse	1
22	15-620-09	HB, 1/2 MNPT x 1/2 HB	2
23	15-620-05	HB Tee, 1/2 MNPT to 1/2 HB	1
24		Tee, 1/2 FNPT	1
25		Nipple, 1/2"	1
26	15-620-20	Gasket, 1"	1
27		Valve, Bottle Rinse Base Assy.	1
28		Bottle Rinse Head	1
29		Valve, 1/2"	1
30		HB Elbow, 1/2" MNPT x 3/8" HB	1
31		HB Tee, 3/8"	1
32		1/2" Street Elbow	1
33		HB, 1/2 MNPT x 3/8 HB	1
34	15-620-07	Hose, Bottle Rinse, 1/2" EPDM	1
35	15-620-08	Hose, Tank Rinse, 1/2" EPDM	1
36	15-620-06	Hose, Valve Feeder, 1/2" EPDM	1
37		Hose Clamp, 1/2"	6
38		Hose Tank Rinse, 3/8" EPDM	1
39		Hose Tank Rinse, 3/8" EPDM	1
40		Hose Clamp, 3/8"	2

# 15-835 TANK RINSING SYSTEM



REF#	PART#	DESCRIPTION	QUANTITY
1	16-961	1" Adapter	1
2	16-962	1" Coupler	1
3	16-864	1" FTP Elbow	1
4	16-158	Close Nipple	1
5	16-150	Double Thread Fitting	1
6	16-172	4" Nipple	1
7	15-834	Tank Rinsing Nozzle	1
8	16-163	Reducer Bushing	1

Drill 1-3/4" hole 5" from outside edge of cover.

Install Tank Rinsing kit as shown, with the Double Thread Fitting (Ref 5) going into the cover.

Basket Must be removed During Use.



This is a list of decals located on the Spray Star 2000. Part number, description and location will help in reordering decals.

15-463	Decal, Spray Pump	Right Side Panel
20-529	Decal, Spray Star 2000	Tank Sides
20-545	Decal, Dashboard	Dash
20-553	Decal, Center Console	Between Seats
20-593	Decal, Site Gauge	Tank
25-277	Decal, Battery Warning	Battery
25-286	Decal, Pinch Point	Both Sides of Seat Panel
25-298	Decal, Warning Hot	Cooler Guard, Above Muffler on Tank Side, Panel Behind Seat
25-355	Decal, Tire Pressure 18psi	Rear Tires
25-356	Decal, Tire Pressure 20psi	Front Tires
25-372	Decal, 4" Star	Rear Tank, Computer Cover
25-375	Decal, 94 dBA	Panel Behind Seat
27-077	Decal Smithco	Steering Wheel
27-093	Decal, Hydraulic Oil Level	Oil Tank
34-147	Decal, Smithco Logo	Nose Cone

## QUICK REFERENCE REPLACEMENT PARTS

### REPLACEMENT FILTERS

20-576	Hydraulic Oil Filter Assembly	
20-576-01	Oil Filter Replacement Element	
13-488	Key Switch	
76-310	Key Set	
76-487	Engine Oil Filter	Briggs # 842921

### REPLACEMENT BELTS

30-137	Spray Pump V-Belt
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### SEAL KITS

15-301	Power Steering Orbital Motor
15-301-01	Seal Kit
15-839	Hydraulic Cylinder
14-531	Seal Kit
43-116	Wheel Motors
14-080	Seal Kit
76-482	Hydrostatic Pump
77-239-22	Seal Kit
76-197	Gear Pump
76-197-08	Seal Kit

### FLUIDS

Engine Oil	SAE 10W-40 API Service SJ or higher Motor Oil
Hydraulic Fluid	SAE 10W-40 API Service SJ or higher Motor Oil

### OTHER PARTS

16-953	Hinged Cover On Tank with Gasket
16-953-01	Gasket For Cover
16-169	Strainer Basket
15-818	#75 Fitting O-ring
15-817	#50 Fitting O-ring

# The Smithco Commercial Products Two-Year Limited Warranty

## 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](mailto: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.

