

**SMITHCO**

Wayne, Pennsylvania 19087

# **PARTS & SERVICE MANUAL**

**Spray Star  
Model 1600P**

**PRIME MOVER**

**Starting Serial # 979**

**May, 2001**

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

Read this manual and all other manuals pertaining to the Spray Star 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 is located on the front left side of the 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>   |                      |                                   |       |
| WAYNE, PENNSYLVANIA 19087 USA<br>610-688-4009 Fax 610-688-6069 |                      |                                   |       |
| ○  |                      | <input type="text"/> YEAR OF MFG. | ○     |
| SERIAL NO.   | <input type="text"/> | <input type="text"/>              | kW/hp |
| MODEL NO.  | <input type="text"/> | <input type="text"/>              | kg/lb |



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.

## GENERAL 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. Never carry passengers.
18. Stop engine before making repairs/adjustments or checking/adding oil to the crankcase.
19. Use parts and materials supplied by **SMITHCO** only. Do not modify any function or part.
20. Use caution when booms are down as they extend out beyond the center line of the machine approximately 10 ft. (3 m).
21. The tank is a confined space, take precaution.

***This machine is intended for turf maintenance. Other use is forbidden.***



## WEIGHTS AND DIMENSIONS

|              |                  |                       |                   |
|--------------|------------------|-----------------------|-------------------|
| Length       | 112" (285 cm)    |                       |                   |
| Width        | 61" (155 cm)     | Width With Booms Down | 230" (584 cm)     |
| Height       | 50" (127 cm)     | Height With Booms Up  | 126" (320 cm)     |
| Wheel Base   | 60" (152 cm)     |                       |                   |
| Weight Empty | 1200 lb (544 kg) | Weight Loaded         | 2500 lb (1134 kg) |

## SOUND LEVEL AT 3400 RPM

|                        |       |
|------------------------|-------|
| At ear level           | 84 dB |
| At 3 ft. (0.914 m)     | 82 dB |
| At 30 ft (9.14 m)      | 68 dB |
| At 23 ft (7 m) pass by | 70 dB |

## ENGINE

|                    |                                     |
|--------------------|-------------------------------------|
| Make               | Kohler                              |
| Model#             | Command CH20S                       |
| Type / Spec#       | 64558                               |
| Horsepower         | 20 hp (15 kW)                       |
| Fuel               | Unleaded 87 Octane Gasoline Minimum |
| Cooling System     | Air cooled                          |
| Lubrication System | Full pressure                       |
| Alternator         | 25 Amp                              |

## WHEELS & TIRE

Front (2) 20 x 1000 x 10 Multi-rib 20 psi (1.4 bar)  
 Rear (2) 24 x 1300 x 12 Super Soft 18 psi (1.3 bar)  
 Ground Pressure: 8.2 psi with 160 gallons

## SPEED

|                 |   |
|-----------------|---|
| Working Speed   | 1st gear 0-3 m.p.h. (0-5 kph)<br>2nd gear 2-6 m.p.h. (3-10 kph) |
| Transport Speed | 3rd gear 4-10 m.p.h. (6-16 kph)                                 |
| Reverse Speed   | 0-3 m.p.h. (0-5 kph)  |

## BATTERY

|                          |                             |
|--------------------------|-----------------------------|
|                          | Automotive type 24F-12 volt |
| BCI Group                | Size 24                     |
| Cold Cranking Amps       | 575 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   | 2.1 quart (2 liters) with filter              |
| Fuel            | 5 gallon (19 liters)                          |
| Hydraulic Fluid | 1 gallon (3.785 liters)                       |
| Grade of Fluid  | SAE 10W-40 API Service SJ or higher motor oil |

## OPTIONAL SPRAY EQUIPMENT

|        |  |        |  |
|--------|--|--------|--|
| 33-216 | Battery 24F-12 Volt  | 10-300 | 18' Terrain Following Boom             |
| 15-363 | Fresh Water Wash Tank  | 14-100 | Super Boom 20' (6 m) Long              |
| 14-311 | Hose Reel Mounting Kit   | 15-493 | Auto-Boom 18' (5.5 m) Long             |
| 15-571 | 15' Tri-Section Electric Lift Star Shield Boom                                     | 15-577 | 18' Manual Lift Boom                   |
| 15-572 | 15' Dual Section Electric Lift Star Shield Boom                                    | 14-301 | 440 Spray System (1602P)               |
| 15-573 | 15' Manual Lift Star Shield Boom   | 14-302 | 203 Spray System (1604P)               |
| 16-856 | Tank Rinsing System  | 14-303 | Manual Spray System (1610P)            |
| 16-129 | Manual Hose Reel 200' (61 m)<br>capacity(to be used with 14-311)                   | 14-304 | 844 Spray System (1607P)               |
| 16-906 | Hose Reel 12 volt electric rewind 200' (61 m)<br>capacity (to be used with 14-311) | 14-305 | Operator Protection Enclosure          |
| 13-210 | Battery  | 15-501 | Foam Marker System (Factory Installed) |
|        |  | 15-499 | Foam Marker System (Dealer Installed)  |

## MAINTENANCE



Before servicing or making adjustments to machine, stop engine and remove key from ignition. When servicing the spray pump or filter all control valves must be shut off if there is liquid in the tank.



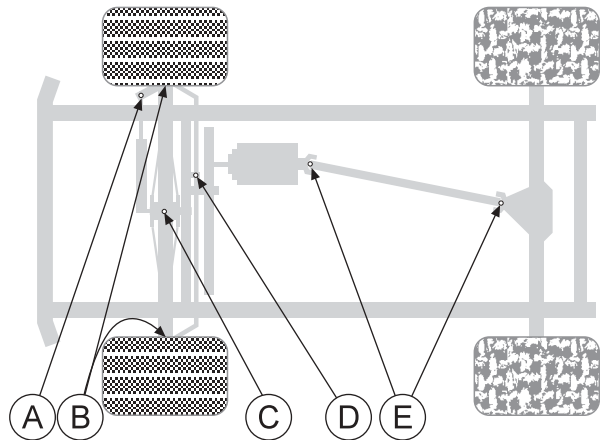
Use all procedures and parts prescribed by the manufacturer's. Read the engine manual before operation.

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

### LUBRICATION

Use No. 2 General purpose Lithium Base Grease and lubricate every 100 hours. The Spray Star 1600P has 7 grease fittings.

- A. One on the rod end of hydraulic cylinder.
- B. One on each the right and left spindles.
- C. One on the front axle.
- D. One on clutch idler arm.
- E. One on each end of the drive line.

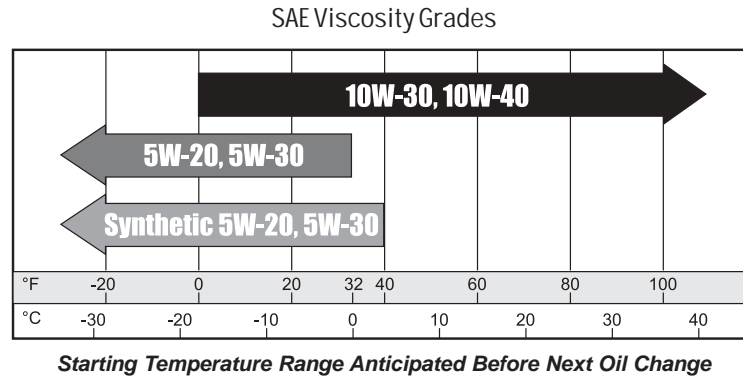


### AIR CLEANER

1. Loosen cover retaining knob and remove cover.
2. Remove precleaner from paper element.
3. Check paper element. Replace element as necessary.
4. Wash precleaner in warm water with detergent. Rinse precleaner thoroughly until all traces of detergent are eliminated. Squeeze out excess water (do not wring). Allow precleaner to air dry.
5. Saturate precleaner with new engine oil. Squeeze out all excess oil.
6. Reinstall precleaner over paper element.
7. Reinstall air cleaner cover. Secure cover with cover retaining knob.

## 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, which ever is first.
3. Oil level should be 1.5" (4 cm) from top of 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 SJ or higher 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.

## DIRECTO VALVES

Directo Valves should be disassembled, cleaned, inspected, and a service kit installed annually. More often depending on the chemicals being used and the frequency of use. In most cases this can be done without removing the valve from the sprayer.

## MAINTENANCE (CONTINUED)

### 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 (1.4 bar) 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 (87-100 Nm) using a cross pattern. Torque again after first 10 hours and every 200 hours thereafter.
7. Lower machine to ground and remove blocks and jack.

### BATTERY

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

Battery cable should be disconnected before using "Fast Charge".

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

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

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



**WARNING**

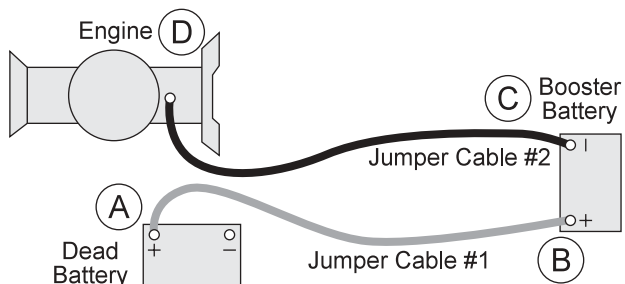
**Battery Electrolyte is an acidic solution and should be handled with care. If electrolyte is splashed on any part of your body, flush all contact areas immediately with liberal amounts of water. Get medical attention immediately.**

### JUMP STARTING

To jump start (negative grounded battery):

1. Shield eyes.
2. Disconnect computer supply leads.
3. Connect ends of one cable to positive (+) terminals of each battery, first (A) then (B).
4. Connect one end of other cable to negative (-) terminal of "good" battery (C).
5. 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.



**WARNING**

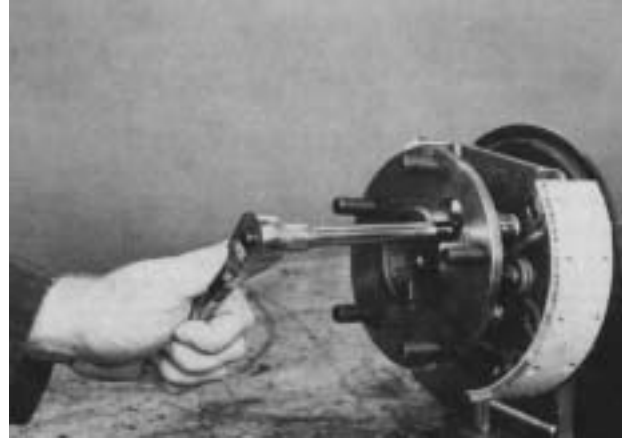
**Use of booster battery and jumper cables. Particular care should be used when connecting a booster battery. Use proper polarity in order to prevent sparks.**



## AXLE SHAFT DISASSEMBLY



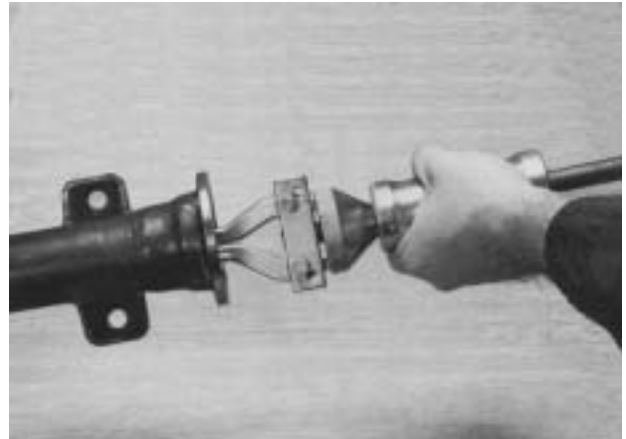
1. After the wheel is removed, remove the brake drum.



2. Using a  $\frac{1}{2}$ " socket, line up the hole in the axle shaft flange to remove the backing plate nuts which hold the axle shaft assembly to the axle.



3. To remove the axle shaft assembly, grasp the axle shaft assembly with both hands (the assembly includes axle shaft, oil seal, brake assembly, gasket, bearing, and retainer) and pull the axle shaft free.



4. Remove inner Axle shaft seal using puller as shown. Discard Seal and replace with new one at time of assembly.

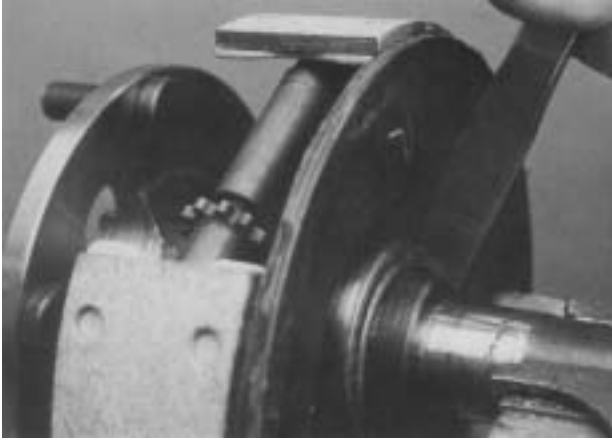


5. Place Axle shaft assembly in a vise. Center punch the outside of the retaining ring.

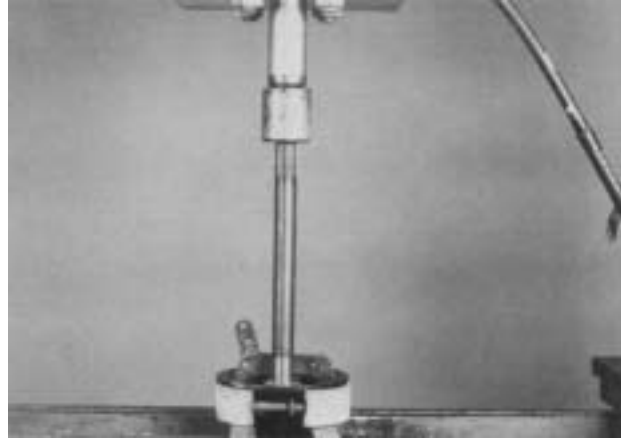


6. Drill a  $\frac{1}{4}$ " hole in the outside of the retainer ring to a depth approximately  $\frac{3}{4}$  the thickness of the ring. Drilling Completely through retainer ring will damage the shaft.

## AXLE SHAFT DISASSEMBLY (CONTINUED)



7. After drilling, position a chisel across the hole and strike sharply to break the ring. Replace with a new retaining ring when reassembly.



8. Support the axle shaft assembly in a suitable press. Press on the end of the axle shaft until the wheel bearing and brake assembly is removed.

## AXLE SHAFT ASSEMBLY



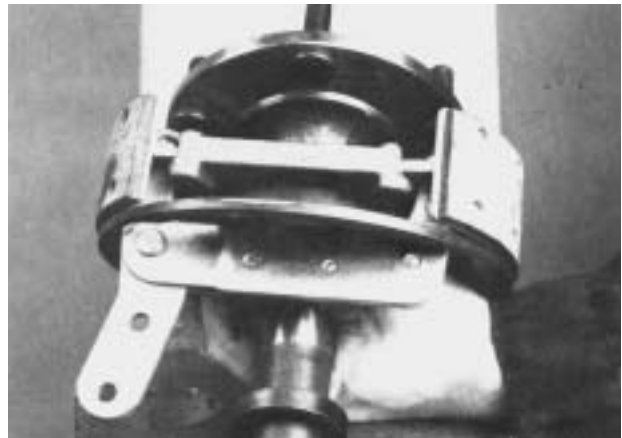
1. Inspect the shaft for possible damage. In the following order, place new oil seal, brake assembly, new grease packed bearing assembly (with unit bearing rib ring toward fanged end of shaft) on the axle shaft. The retaining ring will be placed on the shaft later.



2. Support the bearing assembly in a suitable press.



3. Press assembly until bearing is firmly seated against axle shaft shoulder.



4. Slide new retaining ring on the axle shaft and support the shaft in suitable press.

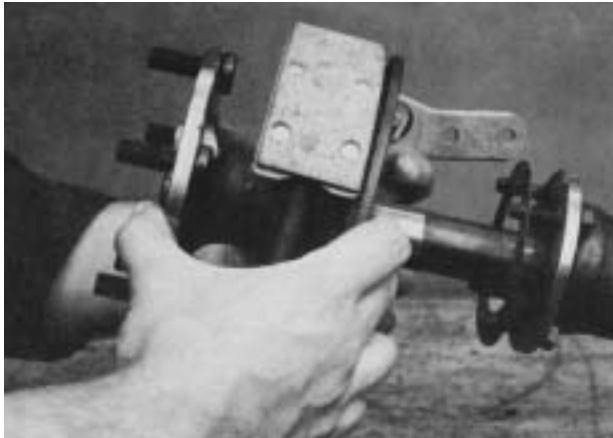
## AXLE SHAFT ASSEMBLY (CONTINUED)



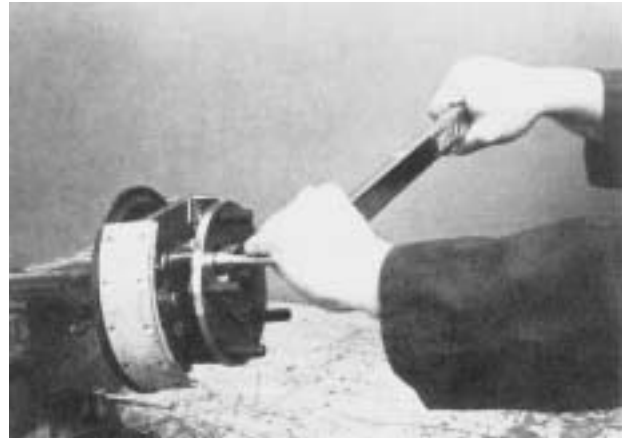
5. Press the retaining ring firmly against bearing.



6. Assemble new grease seal into housing to original depth. After seal has been assembled, grease lip of seal.



7. Assemble bearing retainer bolts and new gasket on axle housing. Then install axle shaft assembly into axle housing. Care should be taken not to damage gasket, oil seal, and bearing. Line up holes of brake assembly and oil seal. Push axle shaft as far as possible into axle housing.



8. Start nuts on bolts by hand. Tighten nuts in a manner that assures the seal and bearing assembly are drawn evenly into axle housing. Use a torque wrench and torque nuts to 16-20 ft/lb (21-27Nm)

# SERVICE CHART



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



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

|  | Daily | As Required | 100 Hours | 200 Hours | 250 Hours | 300 Hours | 400 Hours | Every 500 Hours/Yearly |
|--|-------|-------------|-----------|-----------|-----------|-----------|-----------|------------------------|
| § Engine Oil                               | C     |             | R         | R         |           | R         | R         | R                      |
| § Engine Oil Filter                        |       |             |           | R         |           |           | R         | R                      |
| Engine for Leaks and Loose Parts           | C     |             | C         | C         |           | C         | C         | C                      |
| ¤ Air Cleaner (Paper Element)              |       | C           | C         | C         |           | C         | C         | R                      |
| ¤ Pre-Cleaner (Every 25 hours)             |       | C           | C         | C         | C         | C         | C         | R                      |
| ‡ Spark Plugs                              |       | R           |           | C         |           |           | C         | R                      |
| Idle Speed                                 |       |             |           |           | C         |           |           | C                      |
| £ Air Cooling System                       |       | C           | C         | C         |           | C         | C         | C                      |
| Belts and Hoses                            | C     |             |           |           | C         |           |           | C                      |
| * Tire Pressure                            | C     |             | C         | C         |           | C         | C         | C                      |
| Fuel Level                                 | C     | C           |           |           |           |           |           |                        |
| Fuel Filter                                |       | R           |           |           |           |           |           | R                      |
| Hydraulic Oil                              | C     |             | C         | C         |           | C         | C         | R                      |
| Hydraulic Oil Filter                       |       |             |           |           | R         |           |           | R                      |
| Hydraulic System for Leaks and Loose Parts | C     |             | C         | C         |           | C         | C         | C                      |
| Battery Electrolyte Level                  |       |             | C         | C         |           | C         | C         | C                      |
| Clean Battery Terminals                    |       |             |           |           | C         |           |           | C                      |
| † Torque Lug Nuts                          |       |             |           | C         |           |           | C         | C                      |
| Rear Axle Gear Lube                        |       |             | C         | C         |           | C         | C         | C                      |
| Lubricate                                  |       |             | C         | C         |           | C         | C         | C                      |
| Flush Spray Systems Water/Chemical Tanks   | C     | C           |           |           |           |           |           |                        |

C=Check or Clean at specified intervals

R=Replace at specified intervals

\* Tire pressure: Front 20 psi (1.4 bar), Rear 18 psi (1.3 bar)

† Torque tire nuts after the first 10 hours and every 200 hours there after (64 to 74 ft/lb (87-100 Nm))

§ Change oil after first 5 hours.

¤ Clean more often under dusty conditions or when airborne debris is present, replace air cleaner parts, if very dirty.

£ Remove cooling shrouds and clean cooling areas more frequently under extremely dusty, dirty conditions.

‡ Gap 0.40 (1.02 mm) Torque to 18-22 ft/lb (24.4-29.8 Nm)

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.

|  | Daily | As Required | 100 Hours | 200 Hours | 250 Hours | 300 Hours | 400 Hours | Every 500 Hours/Yearly |
|--|-------|-------------|-----------|-----------|-----------|-----------|-----------|------------------------|
| § Engine Oil                               |       |             |           |           |           |           |           |                        |
| § Engine Oil Filter                        |       |             |           |           |           |           |           |                        |
| Engine for Leaks and Loose Parts           |       |             |           |           |           |           |           |                        |
| α Air Cleaner (Paper Element)              |       |             |           |           |           |           |           |                        |
| α Pre-Cleaner (Every 25 hours)             |       |             |           |           |           |           |           |                        |
| ‡ Spark Plugs                              |       |             |           |           |           |           |           |                        |
| Idle Speed                                 |       |             |           |           |           |           |           |                        |
| £ Air Cooling System                       |       |             |           |           |           |           |           |                        |
| Belts and Hoses                            |       |             |           |           |           |           |           |                        |
| * Tire Pressure                            |       |             |           |           |           |           |           |                        |
| Fuel Level                                 |       |             |           |           |           |           |           |                        |
| Fuel Filter                                |       |             |           |           |           |           |           |                        |
| Hydraulic Oil                              |       |             |           |           |           |           |           |                        |
| Hydraulic Oil Filter                       |       |             |           |           |           |           |           |                        |
| Hydraulic System for Leaks and Loose Parts |       |             |           |           |           |           |           |                        |
| Battery Electrolyte Level                  |       |             |           |           |           |           |           |                        |
| Clean Battery Terminals                    |       |             |           |           |           |           |           |                        |
| † Torque Lug Nuts                          |       |             |           |           |           |           |           |                        |
| Rear Axle Gear Lube                        |       |             |           |           |           |           |           |                        |
| Lubricate                                  |       |             |           |           |           |           |           |                        |
| Flush Spray Systems Water/Chemical Tanks   |       |             |           |           |           |           |           |                        |

C=Check or Clean at specified intervals

R=Replace at specified intervals

\* Tire pressure: Front 20 psi (1.4 bar), Rear 18 psi (1.3 bar)

† Torque tire nuts after the first 10 hours and every 200 hours there after (64 to 74 ft/lb (87-100 Nm))

§ Change oil after first 5 hours.

α Clean more often under dusty conditions or when airborne debris is present, replace air cleaner parts, if very dirty.

£ Remove cooling shrouds and clean cooling areas more frequently under extremely dusty, dirty conditions.

‡ Gap 0.40 (1.02 mm) Torque to 18-22 ft/lb (24.4-29.8 Nm)

## ADJUSTMENTS

### INTERLOCK SWITCH

Located on the front, below the floorboard and behind the clutch. The Interlock Switch is in the electrical circuit between the starter solenoid and the starter on the ignition switch. When the clutch pedal is depressed, it pushes the plunger on the interlock switch in, which creates a circuit. Thus allowing the engine to start. When the clutch pedal is released the plunger on the interlock switch comes out, which breaks the circuit. To adjust, loosen the two nuts holding the interlock switch and move the interlock switch towards or away from the clutch pedal as needed.

### HYDRAULIC POWER UNIT BELT

Located to the rear and left of the engine. Should have approximately  $\frac{1}{4}$ " (6.5 mm) of deflection in the center of the top strand. To adjust, loosen the bolt holding the hydraulic power unit bracket to the frame and adjust the belt tension as required. Retighten the bolt after the adjustments made.

### FOOT CLUTCH BELT

See belt and pulley drawing in this book. Belt retainer should be adjusted so that there is  $\frac{1}{8}$ " to  $\frac{1}{4}$ " (3.25 to 6.5 mm) clearance between the belt and retainer with the clutch fully engaged. This is just a starting point. Start the engine with the transmission in neutral and the park brake set. Engage and disengage the clutch, check to see if the belt has stopped and is against the retainers. If not shut engine off and readjust the retainers. Adjust the clutch rods as required to shorten, turn the ball joints in and out to lengthen.

### SPRAY PUMP WITH ELECTRIC CLUTCH BELT

Located to the rear and left of the engine. Should have approximately  $\frac{1}{2}$ " (13 mm) of deflection in the center of the top strand. Loosen and tighten the  $\frac{3}{8}$  - x  $2\frac{1}{2}$  set screw located on the frame pushing against the pump arm.

### PARK BRAKE

Adjust on lever. Adjust on clevis.

### BRAKES

Can be adjusted from outside of brake drum with a brake tool.

### SPEED CALIBRATION NUMBERS

The speed calibration number for the Spray Star 1602 is 114. This is measured off the drive shaft.

The speed calibration number for the Spray Star 1607 is 621. This is measured off the drive shaft.

## 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.







## HYDRAULIC DIAGRAM PARTS LIST

| REF# | PART#     | DESCRIPTION                             | QUANTITY |
|------|-----------|---|----------|
| 1    | 14-352    | Hydraulic Hose 54"                      | 1        |
| 2    | 14-351    | Hydraulic Hose 46"                      | 1        |
| 3    | 50-456    | Hydraulic Cylinder 1 1/2 x 7            | 1        |
|      | 14-267    | Seal Kit                                |          |
| 4    | 18-171    | 1 1/16 X 9/16 90° Straight Thread Elbow | 3        |
| 5    | 14-355    | Hydraulic Hose 81"                      | 1        |
| 6    | 14-354    | Hydraulic Hose 84"                      | 1        |
| 7    | 18-306    | 1 1/16 X 9/16 Straight Thread Connector | 5        |
| 8    | 15-315    | Hydraulic Power Unit                    | 1        |
|      | 15-315-01 | Repair Kit                              |          |
| 9    | 27-059    | Filler Breather (part of 15-315)        | 1        |
|      | 18-314    | 3/8 Pipe Coupler                        | 1        |
|      | 18-287    | 3/8 Pipe Nipple x 2                     | 1        |
| 10   | HBM-6-16  | Metric Bolt M6 - 1 x 16                 | 4        |
|      | HWLM-6    | Lockwasher M6                           | 4        |
| 11   | 15-301    | Orbitor                                 | 1        |
|      | 15-301-01 | Seal Kit                                |          |
| 12   | 18-309    | Swivel Nut                              | 1        |

## FITTING TORQUE CHARTS

| Seal-Lok Straight and Adjustable Fitting<br>(Steel) Torque Ratings |                      |           |          |           |
|--|----------------------|-----------|----------|-----------|
| Fitting Size   | SAE Tube Thread Size | Tube Side |          | Port Side |
|  |                      | in. lbs.  | ft. lbs. | ft. lbs.  |
| 4  | 9/16 - 18            | 220       | 18       | 15        |
| 6  | 1 1/16 - 16          | 360       | 30       | 35        |
| 8  | 1 3/16 - 16          | 480       | 40       | 60        |
| 10   | 1-14                 |           | 60       | 100       |
| 12   | 1 3/16 - 12          |           | 85       | 135       |
| 14   | 1 5/16 - 12          |           | 95       | 175       |
| 16   | 1 7/16 - 12          |           | 110      | 200       |
| 20   | 1 11/16 - 12         |           | 140      | 250       |
| 24   | 2 - 12               |           | 180      | 305       |
| 32   | 2 1/2 - 12           |           | 360      | 375       |

**Over tightened fittings will result in crushing the cone which will create a leak.**

**Charts Developed by Parker Hennipin**



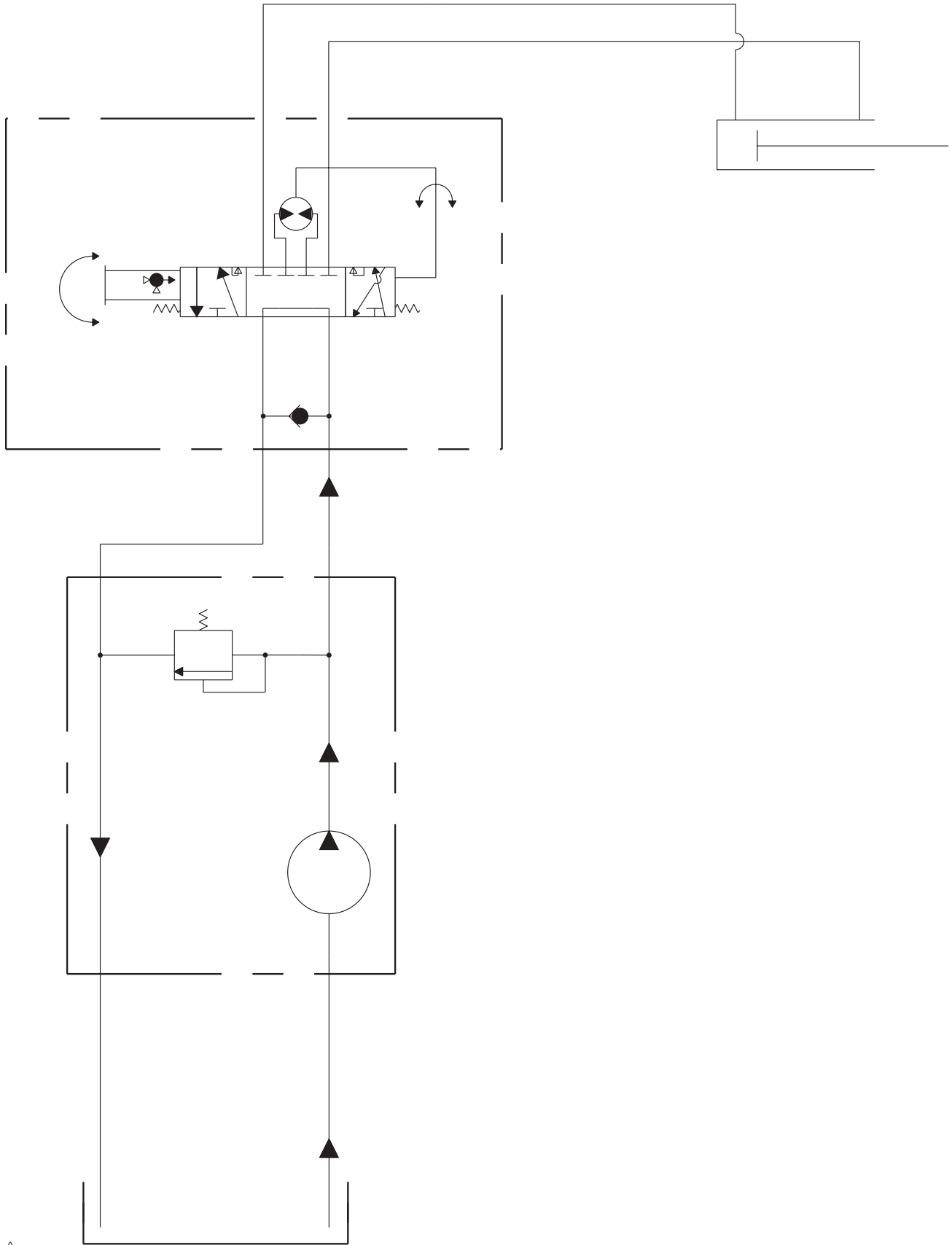
# WIRING DIAGRAM PARTS LIST

| REF# | PART#   | DESCRIPTION   | QUANTITY |
|------|---------|---|----------|
| 1    | 34-146  | Panel Mounted Circuit Breaker                       | 1        |
|      | 34-145  | Circuit Breaker Boot                                | 1        |
| 2    | 8935    | Buss Bar (-)  | 1        |
| 3    | 13-288  | Ignition Switch (Kohler 25 099 04)(part of engine)  | 1        |
|      | 76-310  | Key Set   | 1        |
| 4    | 16-882  | Speedometer   | 1        |
|      | 8854    | Fork Terminal                                       | 2        |
|      | 8962    | Heat Shrink   | 2        |
| 5    | 14-332  | Speedometer Ground Wire                             | 1        |
| 6    | 16-883  | Magnetic Sensor                                     | 1        |
| 7    | 14-333  | Speedometer B+ Wire                                 | 1        |
| 8    | 8935    | Buss Bar(+)   | 1        |
| 9    | 14-331  | Hour / Voltmeter Ground Wire                        | 1        |
| 10   | 42-064  | Hour / Voltmeter Combo                              | 1        |
| 11   | 14-330  | Hour / Voltmeter B+ Wire                            | 1        |
| 12   |         | Oil Sender (part of engine)                         |          |
| 13   |         | Ignition Module (part of engine)                    |          |
| 14   |         | Fuel Shut-Off Solenoid (part of engine)             |          |
| 15   |         | Rectifier (part of engine)                          |          |
| 16   |         | Starter (part of engine)                            |          |
| 17   | 50-323  | Red Battery Cable                                   | 1        |
| 18   | 33-216  | Battery (optional)                                  | 1        |
| 19   | 22-054  | Ground Battery Cable                                | 1        |
| 20   | 15-484  | Wire Assembly Fuse Block To + Bat. (on solenoid)    | 1        |
| 21   | 15-485  | Wire Assembly Fuse Block To Ground                  | 1        |
| 22   | 33-271  | Fuse Block  | 1        |
| 23   |         | Wire With Fuse (part of engine)                     |          |
|      |         | Fuse AGC 30   |          |
| 24   | 22-002  | Interlock Switch                                    | 1        |
| 25   | 14-334  | Ignition Switch Ground Wire                         | 1        |
| 26   | 33-480  | Pressure Switch                                     | 1        |
| 27   | 16-989  | Hypro Pump With Electric Clutch                     | 1        |
|      | 8958    | Male Slide on Terminal                              | 1        |
|      | 8962    | Heat Shrink <sup>3</sup> / <sub>16</sub>            | 1        |
| 28   | 15-457  | Ground Wire   | 1        |
| 29   | 77-207  | Buzzer  | 1        |
|      | 8849-3  | Black Wire  | 1        |
|      | 8860    | String Connector                                    | 1        |
|      | 8859    | Ring Terminal <sup>3</sup> / <sub>16</sub>          | 1        |
|      | 8853    | Slide On Connector                                  | 1        |
|      | 8962    | Heat Shrink   | 2        |
|      | 8963    | Heat Shrink   | 1        |
| 30   | 14-335  | Spray Pump Switch B+ Wire                           | 1        |
| 31   | 15-314  | Toggle Switch                                       | 1        |
|      | 15-472  | Switch Boot   | 1        |
| 32   | 50-359  | Oil Warning Light                                   | 1        |
|      | 8850-12 | Red Wire  | 1        |
|      | 8860    | String Connector                                    | 1        |
|      | 8859    | Ring Terminal <sup>3</sup> / <sub>16</sub>          | 1        |
|      | 8958    | Male Slide On Terminal                              | 1        |
|      | 8962    | Heat Shrink <sup>3</sup> / <sub>16</sub>            | 2        |
|      | 8963    | Heat Shrink <sup>1</sup> / <sub>4</sub>             | 1        |
| N.S. | 22-017  | Cable Black (transmission to frame)                 | 1        |
|      | 14-336  | Main Wire Harness (Includes all wire colors with *) | 1        |



# HYDRAULIC SCHEMATIC

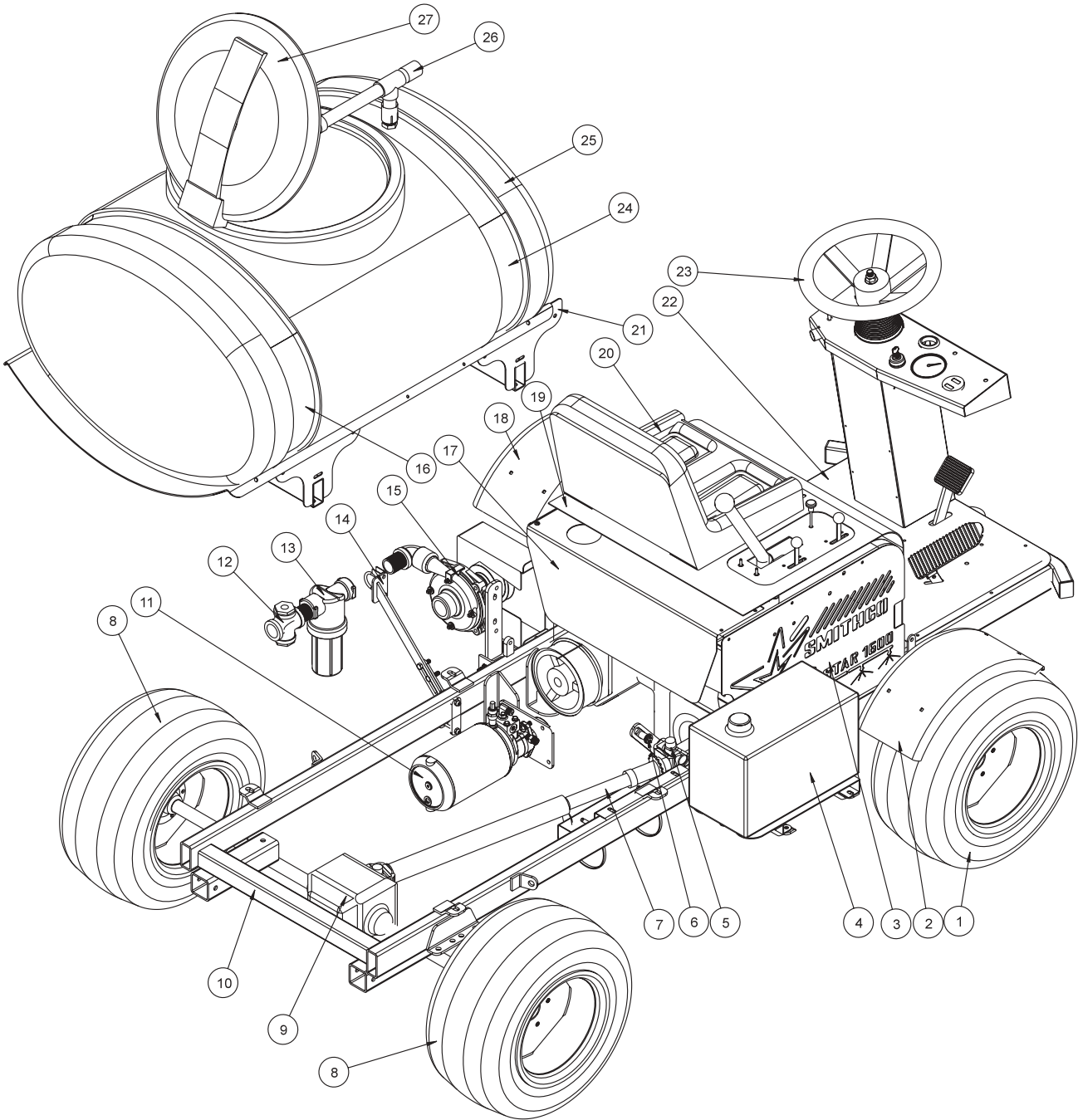
Diagrams





# BODY & FRAME DRAWING

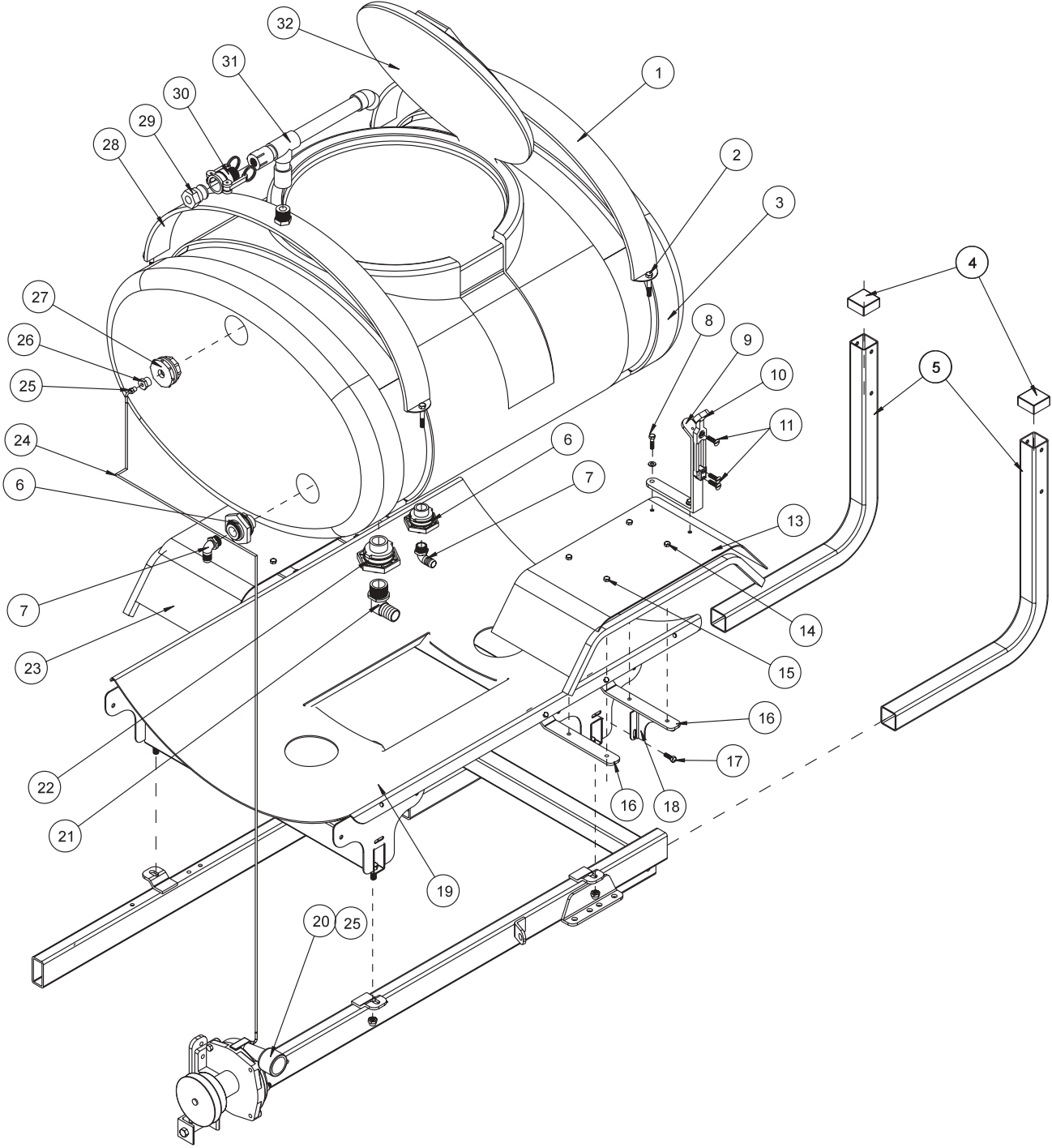
Parts



## BODY & FRAME PARTS LIST

| REF# | PART#      | DESCRIPTION                                    | QUANTITY |
|------|------------|--|----------|
| 1    | 16-857     | Front Tire & Wheel                             | 2        |
|      | 16-857-01  | Tire 20 x 10.00 - 10NHS 4 Ply                  | 2        |
|      | 16-857-02  | Wheel  | 2        |
|      | HNL-12-20  | Lug Nut $\frac{1}{2}$ - 20                     | 10       |
| 2    | 10-159     | Right Front Fender                             | 1        |
| 3    | 14-350     | Right Side Panel                               | 1        |
|      | 14-349     | Left Side panel                                | 1        |
| 4    | 15-491     | 5 Gallon Gas Tank                              | 1        |
|      | 15-492     | Cap with Gauge                                 | 1        |
| 5    | 15-182     | Cross (part of 14-370)                         | 2        |
|      | 16-024     | U-Bolt Kit                                     | 4        |
|      | HWL-516    | Lockwasher $\frac{5}{16}$ (part of 16-024)     | 8        |
|      | HN-516-24  | Nut $\frac{5}{16}$ - 24 (part of 16-024)       | 8        |
| 6    | 16-883     | Magnetic Sensor                                | 1        |
| 7    | 14-370     | Driveline (complete)                           | 1        |
| 8    | 16-225     | Rear Tire & Wheel                              | 2        |
|      | 16-225-01  | Tire 24 x 13.00 - 12NHS 4 Ply                  | 2        |
|      | 16-225-02  | Wheel  | 2        |
|      | HNL-716-20 | Lug Nut $\frac{7}{16}$ - 20                    | 10       |
| 9    | 16-037     | Axle with Brakes                               | 1        |
| 10   | 14-353     | Main Frame                                     | 1        |
| 11   | 15-315     | Hydraulic Power Unit                           | 1        |
| 12   | 18-259     | Cross $1\frac{1}{4}$                           | 1        |
| 13   | 14-371     | Strainer                                       | 1        |
| 14   | 15-521     | Top Filter Bracket                             | 1        |
| 15   | 16-989     | Hypro® Pump                                    | 1        |
| 16   | 14-322     | Rear Tank Strap                                | 1        |
| 17   | 14-326     | Rear Engine Cover                              | 1        |
| 18   | 10-180     | Left Front Fender                              | 1        |
| 19   | 15-356     | Engine Cover/Seat                              | 1        |
| 20   | 14-270     | Seat with Adjusters                            | 1        |
| 21   | 14-321     | Tank Carrier                                   | 1        |
| 22   | 14-328     | Floorboard                                     | 1        |
| 23   | 15-030     | Steering Wheel                                 | 1        |
|      | 15-031     | Steering Wheel Cap (replacement only)          | 1        |
| 24   | 14-327     | Front Tank Strap                               | 1        |
| 25   | 14-451     | 160 Gallon Poly Tank                           | 1        |
| 26   | 14-365     | Air Gap Filler                                 | 1        |
| 27   | 16-953     | 16" Hinged Lid/Well with Gasket (part of tank) | 1        |
|      | 16-953-01  | Gasket (for 16-953)                            | 1        |
|      | 16-169     | Strainer Basket 16"                            | 1        |

# TANK AND REAR FENDER DRAWING



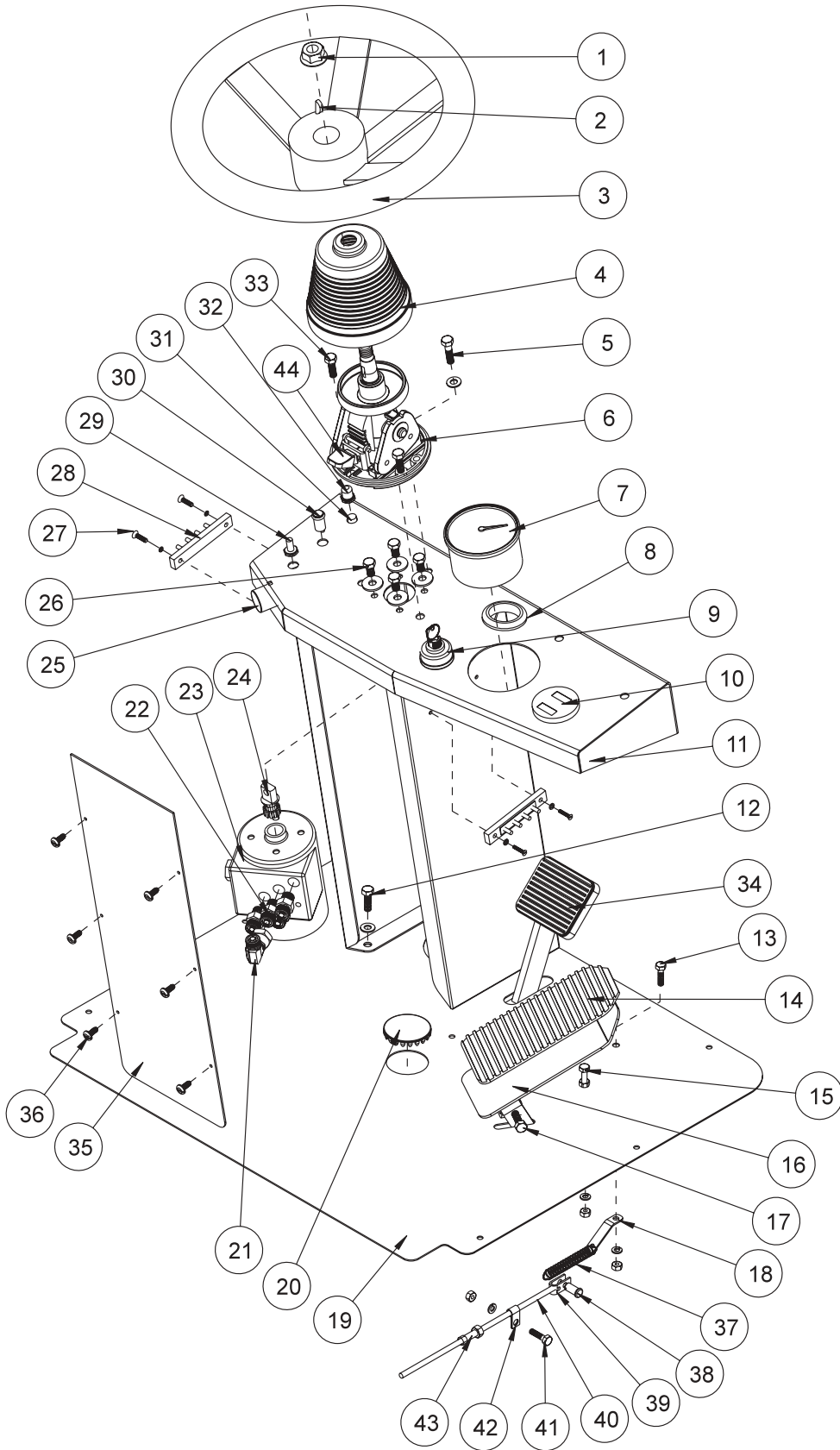
Parts



## TANK AND REAR FENDER PARTS LIST

| REF# | PART#         | DESCRIPTION  | QUANTITY  |
|------|---------------|--|-----------|
| 1    | 14-322        | Rear Tank Strap  | 1         |
| 2    | HB-38-16-250  | Bolt $\frac{3}{8}$ - 16 x $2\frac{1}{2}$                                 | 4         |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16  | 4         |
| 3    | 14-451        | 160 Gallon Poly Tank   | 1         |
| 4    | 16-557        | Square Cap   | 2         |
| 5    | 14-325        | Boom Carrier   | 2         |
| 6    | 16-150        | Double Threaded Fitting $\frac{3}{4}$ (bottom fitting only part of tank) | 2         |
| 7    | 16-155        | Elbow $\frac{3}{4}$ MPT x 1 HB   | 2         |
| 8    | HB-516-18-125 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{4}$                                | 4         |
|      | HW-516        | Washer $\frac{5}{16}$  | 4         |
|      | HWL-516       | Lockwasher $\frac{5}{16}$  | 4         |
|      | HN-516-18     | Nut $\frac{5}{16}$ -18   | 4         |
| 9    | 15-328        | Boom Carrier   | 2         |
| 10   | 15-437        | Latch  | 2         |
| 11   | HSM-8-32-150  | Machine Screw #8 - 32 x $1\frac{1}{2}$                                   | 6         |
|      | HWL-8         | Lockwasher #8  | 6         |
|      | HN-8-32       | Nut #8 -32   | 6         |
| 13   | 15-447        | Left Fender  | 1         |
| 14   | HB-516-18-075 | Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$                                 | 6         |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18   | 6         |
| 15   | HB-516-18-100 | Bolt $\frac{5}{16}$ - 18 x 1   | 2         |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ -18  | 2         |
| 16   | 14-324        | Fender Mount   | 4         |
|      | HB-14-20-075  | Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$                                  | 4         |
|      | HNTL-14-20    | Lock Nut $\frac{1}{4}$ - 20  | 4         |
| 17   | HB-516-18-100 | Bolt $\frac{5}{16}$ - 18 x 1   | 2         |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18   | 2         |
|      | HW-516        | Washer $\frac{5}{16}$  | as needed |
| 18   | 14-341        | Left Fender Brace  | 1         |
|      | 14-340        | Right Fender Brace   | 1         |
| 19   | 14-321        | Tank Carrier   | 1         |
| 20   | 16-989        | Hypro® Pump  | 1         |
| 21   | 16-156        | Elbow $1\frac{1}{4}$ MPT x $1\frac{1}{4}$ HB                             | 1         |
| 22   | 16-194        | Anti Vortex Fitting $1\frac{1}{4}$ (part of tank)                        | 1         |
| 23   | 15-446        | Right Fender   | 1         |
| 24   | 8954-26       | Clear Hose $\frac{3}{16}$ ID   | 1         |
| 25   | 33-494        | Elbow $\frac{1}{8}$ MPT x $\frac{3}{16}$ HB                              | 2         |
| 26   | 33-496        | Reducer Bushing $\frac{1}{2}$ MPT x $\frac{1}{8}$ FPT                    | 1         |
| 27   | 33-495        | Bulkhead Fitting   | 1         |
| 28   | 14-327        | Front Tank Strap   | 1         |
| 29   | 16-961        | Aluminum Adapter 1" Female thread  | 1         |
| 30   | 16-962        | Aluminum Coupler 1" Male Thread  | 1         |
|      | 16-962-01     | 1" Buna-N Gasket (part of 16-962)  | 1         |
| 31   | 14-365        | Air Gap Filler   | 1         |
| 32   | 16-953        | 16" Hinged Lid/Well with Gasket (part of tank)                           | 1         |
|      | 16-953-01     | Gasket (for 16-953)  | 1         |
|      | 16-169        | Strainer Basket (not included with tank)                                 | 1         |

# NOSE CONE DRAWING



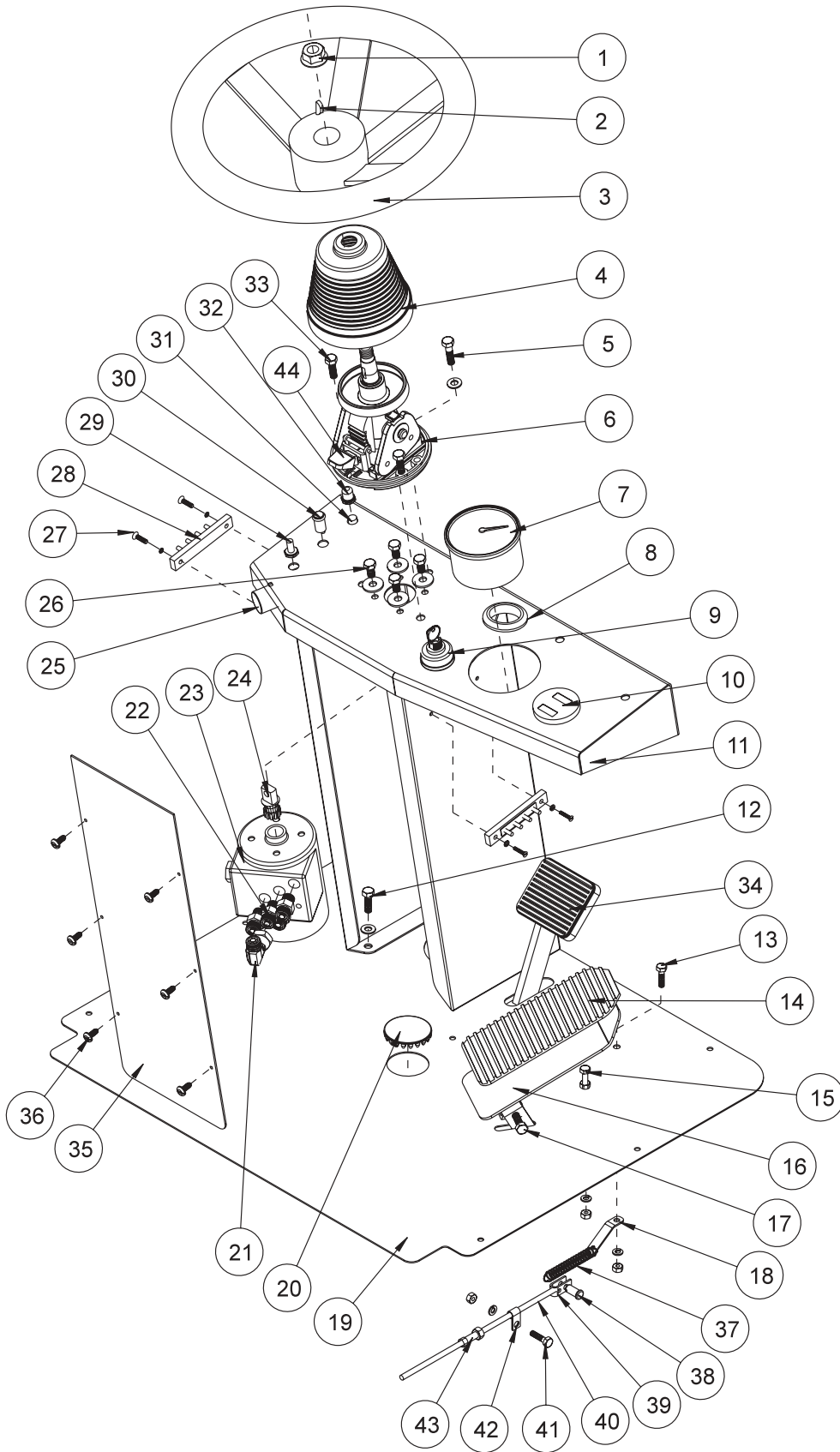
Parts

## NOSE CONE PARTS LIST

| REF# | PART#         | DESCRIPTION                                    | QUANTITY |
|------|---------------|--|----------|
| 1    | HNJ-58-18     | Jam Nut $\frac{5}{8}$ - 18                     | 1        |
| 2    | HWK-316-075   | Woodruff Key $\frac{3}{16} \times \frac{3}{4}$ | 1        |
| 3    | 15-030        | Steering Wheel with Cap                        | 1        |
|      | 15-031        | Steering Wheel Cap (replacement only)          |          |
| 4    | 76-294        | 90° Black Boot                                 | 1        |
| 5    | HB-516-18-125 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{4}$      | 1        |
|      | HWL-516       | Lockwasher $\frac{5}{16}$                      | 1        |
|      | HN-516-18     | Nut $\frac{5}{16}$ - 18                        | 1        |
| 6    | 76-293        | Tilt Steering                                  | 1        |
| 7    | 16-882        | Speedometer (see wiring for terminals)         | 1        |
| 8    | 50-400        | Rubber Grommet                                 | 1        |
| 9    | 13-288        | Key Switch (Kohler 25 099 04)(part of engine)  | 1        |
|      | 76-310        | Set of Keys                                    | 1        |
| 10   | 42-064        | Hour/Voltmeter                                 | 1        |
| 11   | 14-329        | Console  | 1        |
|      | 14-346        | Decal, Console                                 | 1        |
|      | 8803-8        | Black Trim with Lace                           | 2        |
| 12   | HB-516-18-100 | Bolt $\frac{5}{16}$ - 18 x 1                   | 4        |
|      | HW-516        | Washer $\frac{5}{16}$                          | 4        |
|      | HWL-516       | Lockwasher $\frac{5}{16}$                      | 4        |
|      | HN-516-18     | Nut $\frac{5}{16}$ - 18                        | 4        |
| 13   | HB-14-20-100  | Bolt $\frac{1}{4}$ - 20 x 1                    | 1        |
|      | HWL-14        | Lockwasher $\frac{1}{4}$                       | 1        |
|      | HN-14-20      | Nut $\frac{1}{4}$ - 20                         | 1        |
| 14   | 15-459        | Pedal Pad                                      | 1        |
| 15   | HB-14-20-250  | Bolt $\frac{1}{4}$ - 20 x $2\frac{1}{2}$       | 1        |
|      | HWL-14        | Lockwasher $\frac{1}{4}$                       | 1        |
|      | HN-14-20      | Nut $\frac{1}{4}$ - 20                         | 2        |
| 16   | 15-336        | Foot Pedal                                     | 1        |
| 17   | HB-516-18-100 | Bolt $\frac{5}{16}$ -18 x 1                    | 2        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ -18                    | 2        |
| 18   | 15-353        | Foot Pedal Spring Bracket                      | 1        |
| 19   | 14-328        | Floor Board                                    | 1        |
|      | 8803-16       | Black Trim                                     | 1        |
| 20   | 25-199        | 2" Plug Button                                 | 1        |
| 21   | 18-309        | $\frac{3}{8}$ - 90° Swivel Nut Elbow           | 1        |
| 22   | 18-306        | Straight Thread Connector                      | 4        |
| 23   | 15-301        | Orbital  | 1        |
| 24   | 34-167        | Stub Shaft                                     | 1        |
| 25   | 77-207        | Buzzer (see wiring for terminals)              | 1        |
| 26   | HBM-6-1-16    | Metric Bolt M6 -1 x 16                         | 4        |
|      | HWLM-6        | Metric Lockwasher M6                           | 4        |
| 27   | HSM-10-32-063 | Machine Screw #10 - 32 x $\frac{5}{8}$         | 4        |
|      | HWL-10        | Lockwasher #10                                 | 4        |
|      | HN-10-32      | Nut #10 - 32                                   | 4        |
| 28   | 8935          | Buss Bar                                       | 2        |
| 29   | 15-314        | Toggle Switch                                  | 1        |
|      | 15-472        | Switch Boot                                    | 1        |

(Continued on next page)

# NOSE CONE DRAWING

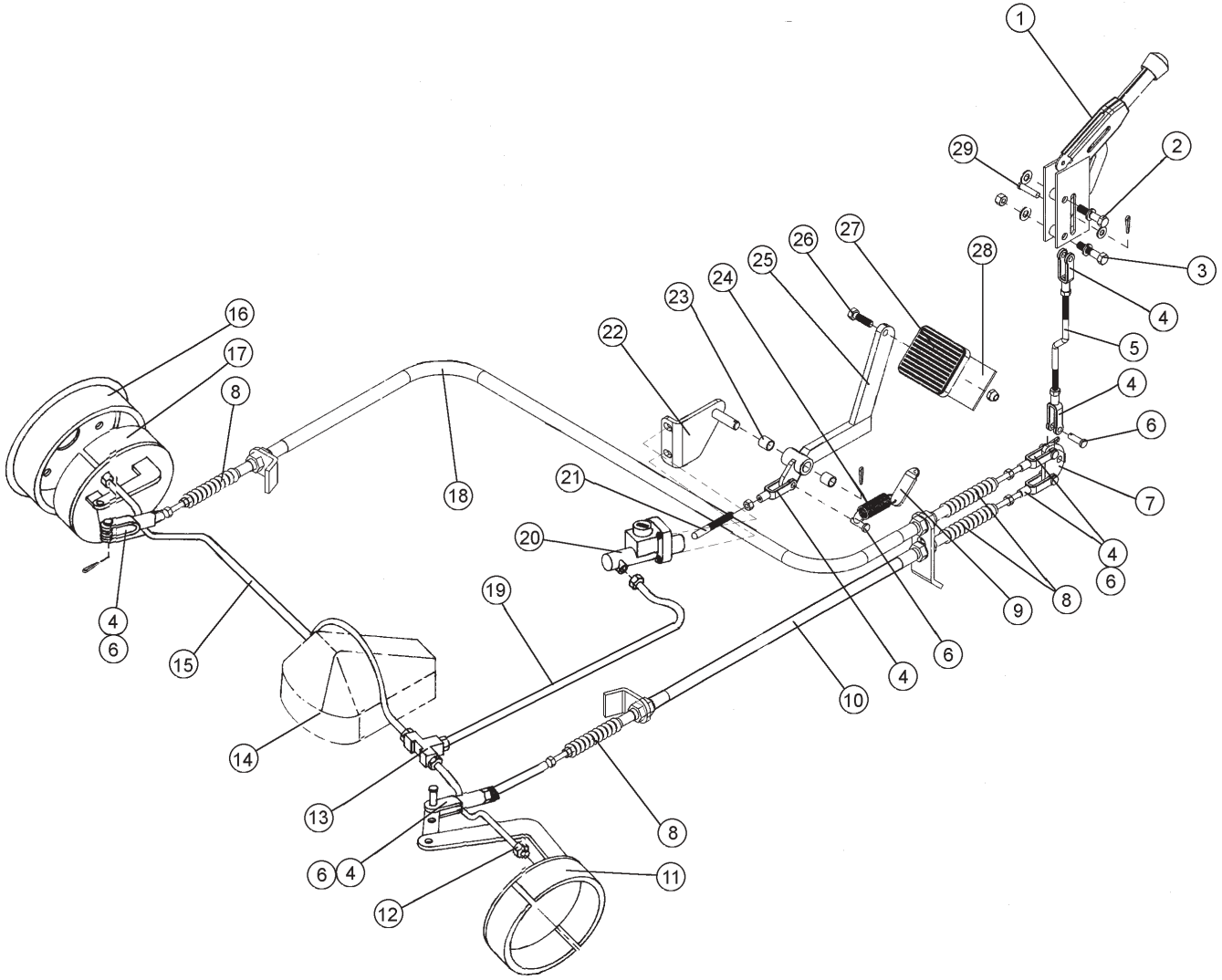


Parts

## NOSE CONE PARTS LIST

| REF# | PART#         | DESCRIPTION  | QUANTITY |
|------|---------------|--|----------|
| 30   | 50-359        | Warning Light (see wiring for terminals)                             | 1        |
| 31   | 34-146        | Circuit Breaker 30 Amp   | 1        |
| 32   | 34-145        | Circuit Breaker Boot   | 1        |
| 33   | HB-516-18-100 | Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1                           | 2        |
|      | HW-516        | Washer <sup>5</sup> / <sub>16</sub>                                  | 2        |
|      | HNTL-516-18   | Lock Nut <sup>5</sup> / <sub>16</sub> - 18                           | 2        |
| 34   | 15-496        | Brake Pedal  | 1        |
|      | 16-062        | Pedal  | 1        |
|      | 15-015        | Pedal Pad  | 1        |
| 35   | 10-200        | Tower Plate  | 1        |
| 36   | HSA-8-075     | Tapping Screw #8 x <sup>3</sup> / <sub>4</sub>                       | 6        |
| 37   | 16-046        | Extension Spring   | 1        |
| 38   | HCP-14-075    | Clevis Pin <sup>1</sup> / <sub>4</sub> x <sup>3</sup> / <sub>4</sub> | 1        |
| 39   | 17-153        | Clevis   | 1        |
| 40   | 15-310        | Throttle Cable   | 1        |
| 41   | HB-14-20-100  | Bolt <sup>1</sup> / <sub>4</sub> - 20 x 1                            | 1        |
|      | HWL-14        | Lockwasher <sup>1</sup> / <sub>4</sub>                               | 1        |
|      | HN-14-20      | Nut <sup>1</sup> / <sub>4</sub> - 20                                 | 1        |
| 42   | 17-154        | Cable Clamp  | 1        |
| 43   | 17-155        | Retainer   | 1        |
|      | HN-516-24     | Nut <sup>5</sup> / <sub>16</sub> - 24                                | 2        |
| 44   | 76-293-01     | Release Lever (part of 76-293)                                       | 1        |

# BRAKE DRAWING

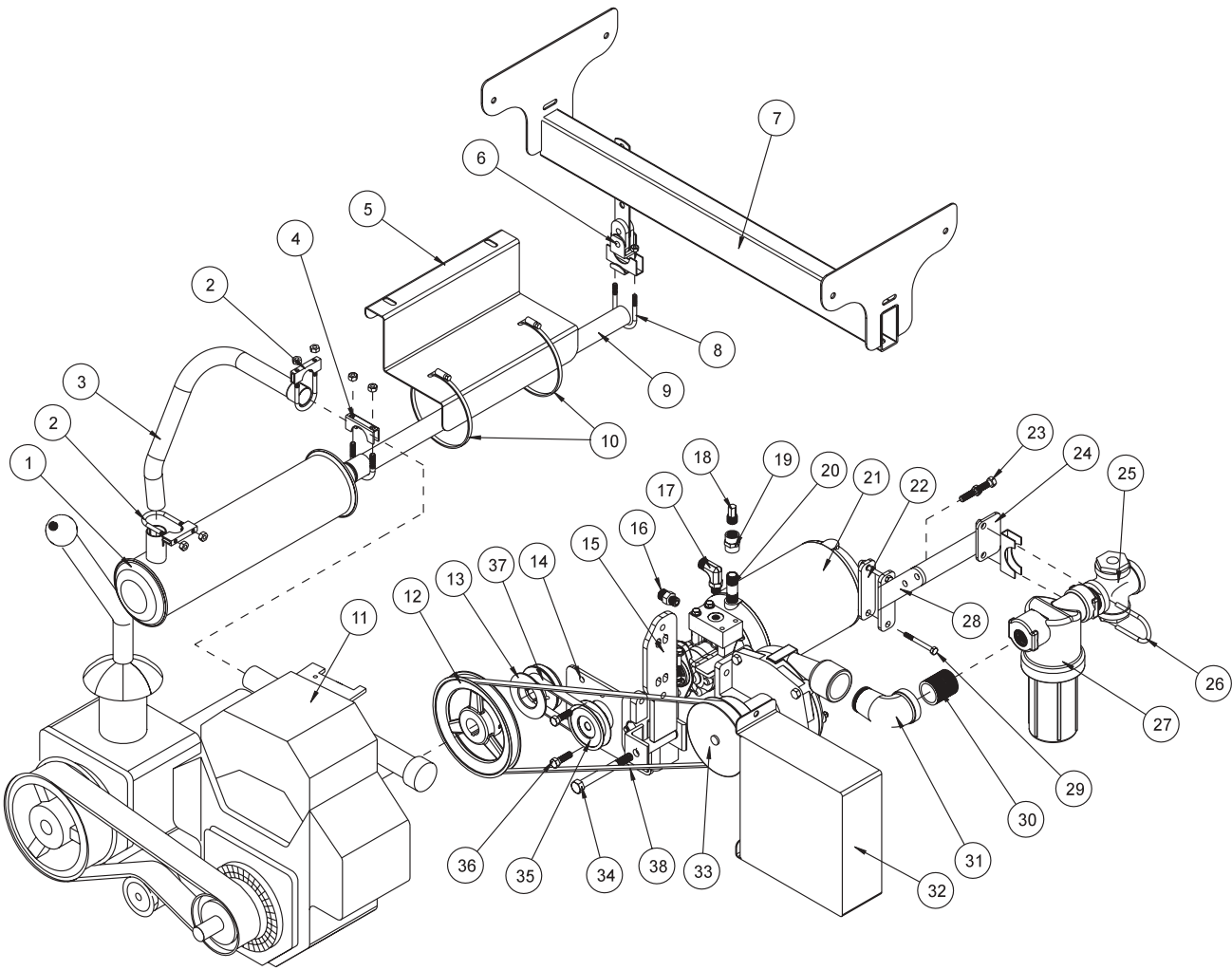


Parts

# BRAKE PARTSLIST

| REF# | PART#        | DESCRIPTION   | QUANTITY |
|------|--------------|---|----------|
| 1    | 60-106       | Brake Lever   | 1        |
| 2    | HB-38-16-175 | Bolt $\frac{3}{8}$ - 16 x $1\frac{3}{4}$                  | 1        |
|      | HW-38        | Washer $\frac{3}{8}$                                      | 1        |
|      | HWL-38       | Lockwasher $\frac{3}{8}$                                  | 1        |
| 3    | HB-38-16-175 | Bolt $\frac{3}{8}$ - 16 x $1\frac{3}{4}$                  | 1        |
|      | HW-38        | Washer $\frac{3}{8}$                                      | 1        |
|      | HWL-38       | Lockwasher $\frac{3}{8}$                                  | 1        |
|      | HN-38-16     | Nut $\frac{3}{8}$ - 16                                    | 1        |
| 4    | 11-100       | Yoke  | 7        |
|      | HN-516-24    | Nut $\frac{5}{16}$ - 24                                   | 7        |
| 5    | 15-347       | Brake Rod   | 1        |
| 6    | HCP-516-100  | Clevis Pin $\frac{5}{16}$ x 1                             | 6        |
|      | HP-18-100    | Cotter Pin $\frac{1}{8}$ x 1                              | 6        |
| 7    | 15-331       | Park Brake relay  | 1        |
| 8    | 60-536       | Bellows   | 4        |
| 9    | 15-354       | Brake Pedal Spring Bracket                                | 1        |
| 10   | 14-338       | Right Brake Cable   | 1        |
| 11   | 16-554       | Right Brake Assembly (comes with 16-037)                  | 1        |
| 12   | 16-187       | Brake Line $\frac{3}{16}$ x 12 (steel)                    | 1        |
| 13   | 18-089       | Tee   | 1        |
| 14   | 16-037       | Rear Axle   | 1        |
| 15   | 16-188       | Brake Line $\frac{3}{16}$ x 34 (steel)                    | 1        |
| 16   | 16-559       | Brake Drum (comes with 16-037)                            | 2        |
| 17   | 16-514       | Left Brake Assembly (comes with 16-037)                   | 1        |
| 18   | 14-339       | Left Brake Cable  | 1        |
| 19   | 15-312       | Brake Line $\frac{3}{16}$ x 84                            | 1        |
| 20   | 50-123       | Brake Cylinder  | 1        |
|      | 50-123-01    | Cap Master Cylinder                                       | 1        |
|      | 50-123-02    | Brake Master Cylinder Kit                                 | 1        |
|      | HB-38-16-125 | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                  | 2        |
|      | HNTL-38-16   | Lock Nut $\frac{3}{8}$ - 16                               | 2        |
| 21   | 16-060       | Brake Rod   | 1        |
| 22   | 15-497       | Brake Bracket   | 1        |
|      | HB-38-16-150 | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{2}$                  | 2        |
|      | HNTL-38-16   | Lock Nut $\frac{3}{8}$ - 16                               | 2        |
|      | HP-18-100    | Cotter Pin $\frac{1}{8}$ x 1                              | 1        |
| 23   | 20-019       | Bushing (comes with 15-496)                               | 2        |
| 24   | 11-050       | Extension Spring  | 1        |
| 25   | 15-496       | Brake Pedal   | 1        |
| 26   | HB-38-16-100 | Bolt $\frac{3}{8}$ - 16 x 1                               | 1        |
|      | HNTL-38-16   | Lock Nut $\frac{3}{8}$ - 16                               | 1        |
| 27   | 15-015       | Pedal Pad   | 1        |
| 28   | 16-062       | Pedal   | 1        |
| 29   | HCP-516-125  | Clevis Pin $\frac{5}{16}$ x $1\frac{1}{4}$ (comes 60-106) | 1        |
|      | HP-18-100    | Cotter Pin $\frac{1}{8}$ x 1                              | 1        |
|      | HW-516       | Washer $\frac{5}{16}$                                     | 1        |

# PUMPS AND EXHAUST DRAWING



Parts



## PUMPS AND EXHAUST PARTS LIST

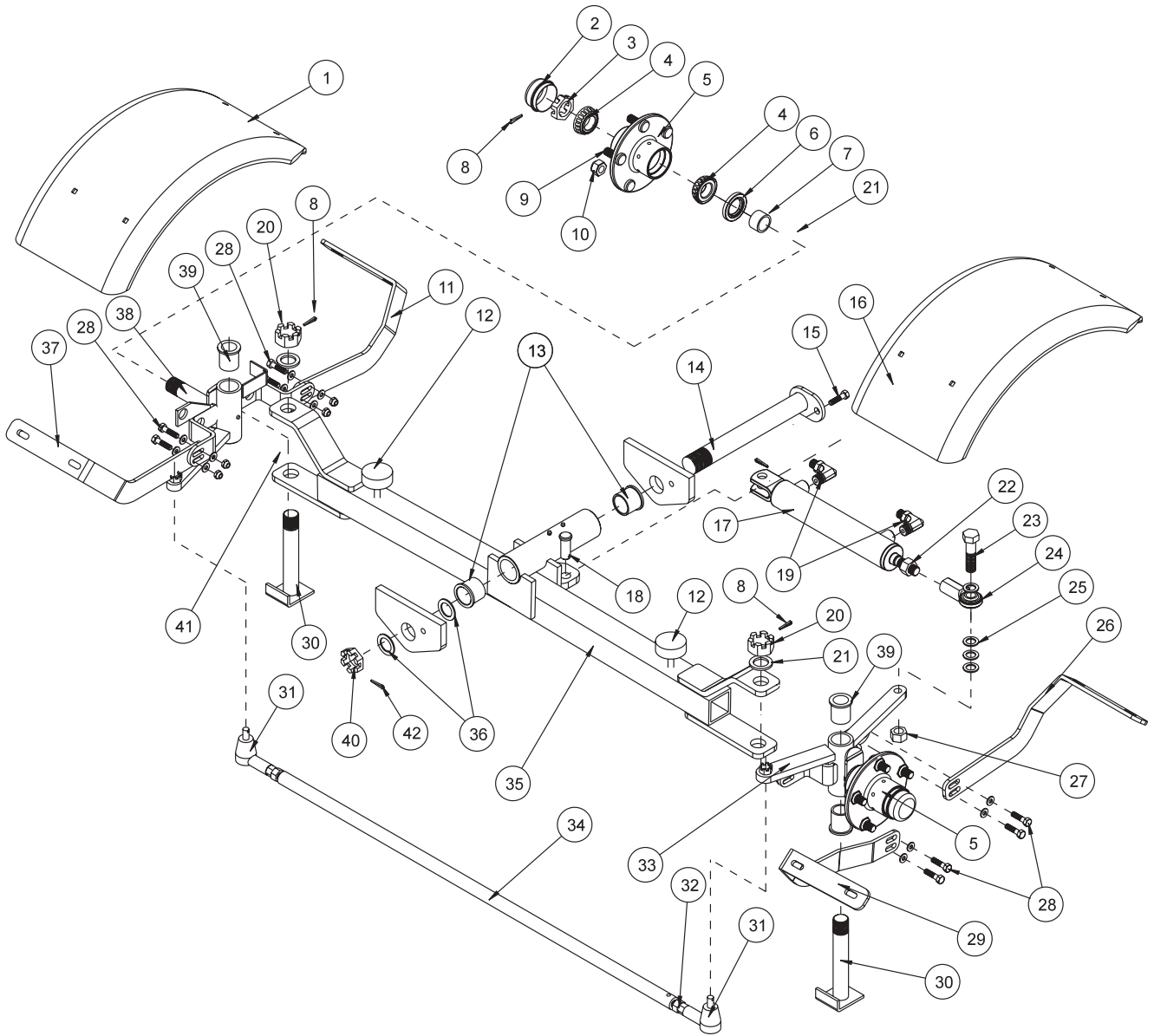
| REF# | PART#            | DESCRIPTION   | QUANTITY |
|------|------------------|---|----------|
| 1    | 15-371           | Muffler   | 1        |
| 2    | 13-498           | Muffler Clamp 1 <sup>1</sup> / <sub>8</sub>   | 2        |
| 3    | 15-379           | Exhaust Pipe  | 1        |
| 4    | 18-220           | Muffler Clamp 1 <sup>1</sup> / <sub>4</sub>   | 1        |
| 5    | 15-386           | Muffler Bracket   | 1        |
| 6    | 33-159           | Universal Exhaust Hanger  | 1        |
|      | HSDPS-14-100     | Pan Head Drill Screw SS 1 <sup>1</sup> / <sub>4</sub> x 1   | 1        |
| 7    | 14-321           | Tank Carrier  | 1        |
| 8    | 50-111           | Muffler Clamp 1 <sup>1</sup> / <sub>2</sub>   | 1        |
| 9    | 15-387           | Tail Pipe   | 1        |
| 10   | 18-147           | Hose Clamps   | 2        |
| 11   | 15-373           | Engine Kohler Command 20 hp   | 1        |
|      | 15-373-01        | Exhaust Manifold (Kohler 24 164 11)   | 1        |
| 12   | 15-316           | Pulley BH72 x 1 <sup>1</sup> / <sub>8</sub>   | 1        |
|      | HSSHS-516-50     | Socket Head Set Screw 5 <sup>1</sup> / <sub>16</sub> x 1 <sup>1</sup> / <sub>2</sub>                      | 2        |
|      | HKSQ-14-150      | Machine Key 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>2</sub> | 1        |
| 13   | 15-318           | Pulley with Hub BK30H 1 <sup>1</sup> / <sub>8</sub>   | 1        |
|      | HKSQ-14-150      | Machine Key 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>2</sub> | 1        |
|      | HB-14-20-075     | Bolt 1 <sup>1</sup> / <sub>4</sub> - 20 x 3 <sup>3</sup> / <sub>4</sub>                                   | 2        |
| 14   | 15-344           | Pump Mount Plate  | 1        |
|      | HBC-38-16-100    | Carriage Bolt 3 <sup>3</sup> / <sub>8</sub> - 16 x 1  | 2        |
|      | HWL-38           | Lockwasher 3 <sup>3</sup> / <sub>8</sub>  | 2        |
|      | HN-38-16         | Nut 3 <sup>3</sup> / <sub>8</sub> - 16  | 2        |
| 15   | 15-580           | Pump Arm  | 1        |
| 16   | 18-306           | 1 <sup>1</sup> / <sub>16</sub> x 9 <sup>9</sup> / <sub>16</sub> Straight Thread Connector                 | 1        |
| 17   | 18-171           | 1 <sup>1</sup> / <sub>16</sub> x 9 <sup>9</sup> / <sub>16</sub> 90° Straight Thread Elbow                 | 1        |
| 18   | 27-059           | Filler Breather (part of 15-315)  | 1        |
| 19   | 18-314           | 3 <sup>3</sup> / <sub>8</sub> Coupler   | 1        |
| 20   | 18-287           | 3 <sup>3</sup> / <sub>8</sub> Pipe Nipple x 2   | 1        |
| 21   | 15-315           | Hydraulic Power Unit  | 1        |
|      | HWK-18-063       | Woodruff Key 1 <sup>1</sup> / <sub>8</sub> x 5 <sup>5</sup> / <sub>8</sub>                                | 1        |
| 22   | 15-465           | Rear Mount Plate  | 1        |
| 23   | HB-38-16-125     | Bolt 3 <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                                   | 2        |
|      | HW-38            | Washer 3 <sup>3</sup> / <sub>8</sub>  | 2        |
|      | HNTL-38-16       | Lock Nut 3 <sup>3</sup> / <sub>8</sub> - 16   | 2        |
| 24   | 15-521           | Top Filter Bracket  | 1        |
| 25   | 18-259           | Cross 1 <sup>1</sup> / <sub>4</sub>   | 1        |
| 26   | 50-394           | Muffler Clamp   | 1        |
| 27   | 14-371           | Strainer  | 1        |
| 28   | 15-522           | Bottom Filter Bracket   | 1        |
| 29   | HB-38-16-250     | Bolt 3 <sup>3</sup> / <sub>8</sub> - 16 x 2 <sup>1</sup> / <sub>2</sub>                                   | 2        |
|      | HNTL-38-16       | Lock Nut 3 <sup>3</sup> / <sub>8</sub> - 16   | 2        |
| 30   | 18-160           | Close Nipple 1 <sup>1</sup> / <sub>4</sub>  | 1        |
| 31   | 15-385           | Elbow 1 <sup>1</sup> / <sub>4</sub>   | 1        |
| 32   | 15-345           | Belt Guard  | 1        |
| 33   | 16-989           | Hypro® Pump   | 1        |
| 34   | HB-12-13-450     | Bolt 1 <sup>1</sup> / <sub>2</sub> - 13 x 4 <sup>1</sup> / <sub>2</sub>                                   | 1        |
|      | HNCL-12-13       | Center Lock Nut 1 <sup>1</sup> / <sub>2</sub> - 13  | 1        |
|      | HMB-12-14        | Machine Bushing 1 <sup>1</sup> / <sub>2</sub> x 14GA  | 6        |
| 35   | 15-414           | Pulley BK30 x 1 <sup>1</sup> / <sub>2</sub>   | 1        |
|      | HSSHS-516-18-050 | Socket Head Set Screw 5 <sup>1</sup> / <sub>16</sub> - 18 x 1 <sup>1</sup> / <sub>2</sub>                 | 1        |
| 36   | HB-38-16-125     | Bolt 3 <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                                   | 2        |
|      | HNTL-38-16       | Lock Nut 3 <sup>3</sup> / <sub>8</sub> - 16   | 2        |
| 37   | 15-320           | Belt 5L230  | 1        |
| 38   | 16-869           | Belt L447   | 1        |



## SPRAY PUMP PARTS LIST

| REF# | PART#          | DESCRIPTION   | QUANTITY |
|------|----------------|---|----------|
| 1    | 15-580         | Pump Arm  | 1        |
| 2    | HB-38-16-150   | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{2}$                  | 2        |
|      | HW-38          | Washer $\frac{3}{8}$                                      | 2        |
|      | HNTL-38-16     | Lock Nut $\frac{3}{8}$ - 16                               | 2        |
| 3    | 14-353         | Main Frame  | 1        |
| 4    | HNCL-12-13     | Center Lock Nut $\frac{1}{2}$ - 13                        | 1        |
| 5    | 33-480         | Pressure Switch   | 1        |
| 6    | 18-260         | Bushing $1\frac{1}{4}$ x $\frac{3}{4}$                    | 2        |
| 7    | 16-825         | Reducer Bushing $1\frac{1}{2}$ x $1\frac{1}{4}$           | 1        |
| 8    | 15-385         | Elbow $1\frac{1}{4}$                                      | 2        |
| 9    | 18-160         | Close Nipple $1\frac{1}{4}$                               | 3        |
| 10   | 16-170         | Gate Valve $1\frac{1}{4}$                                 | 1        |
| 11   | 18-236         | Nipple $1\frac{1}{4}$ x 4                                 | 1        |
| 12   | 16-161         | Fitting $1\frac{1}{4}$ MPT x $1\frac{1}{4}$ HB            | 1        |
| 13   | 18-219         | Tee $1\frac{1}{4}$  | 1        |
| 14   | 16-180         | Quick Coupler $1\frac{1}{4}$ Male                         | 1        |
| 15   | 16-935         | Quick Coupler Cap   | 1        |
| 16   | 16-155         | Elbow $\frac{3}{4}$ MPT x 1HB                             | 1        |
| 17   | 16-859         | Ball Valve $\frac{3}{4}$                                  | 1        |
| 18   | 18-073         | Close Nipple $\frac{3}{4}$                                | 1        |
| 19   | 14-371         | Strainer  | 1        |
| 20   | 16-989         | Hypro® Pump   | 1        |
|      | 8859           | Male Slide on Terminal                                    | 1        |
|      | 8962           | Heat Shrink $\frac{3}{16}$ X $1\frac{1}{4}$               | 1        |
| 21   | 33-494         | Elbow $\frac{1}{8}$ MPT x $\frac{3}{16}$ HB               | 1        |
| 22   | HB-12-13-450   | Bolt $\frac{1}{2}$ - 13 x $4\frac{1}{2}$                  | 1        |
| 23   | HMB-12-14      | Machine Bushing $\frac{1}{2}$ x 14GA                      | 6        |
| 24   | 18-259         | Cross $1\frac{1}{4}$                                      | 1        |
| 25   | HSSQ-38-16-250 | Square Head Set Screw $\frac{3}{8}$ - 16 x $2\frac{1}{2}$ | 1        |
|      | HN-38-16       | Nut $\frac{3}{8}$ - 16                                    | 1        |
| 26   | 15-457         | Ground Wire   | 1        |

# FRONT AXLE DRAWING

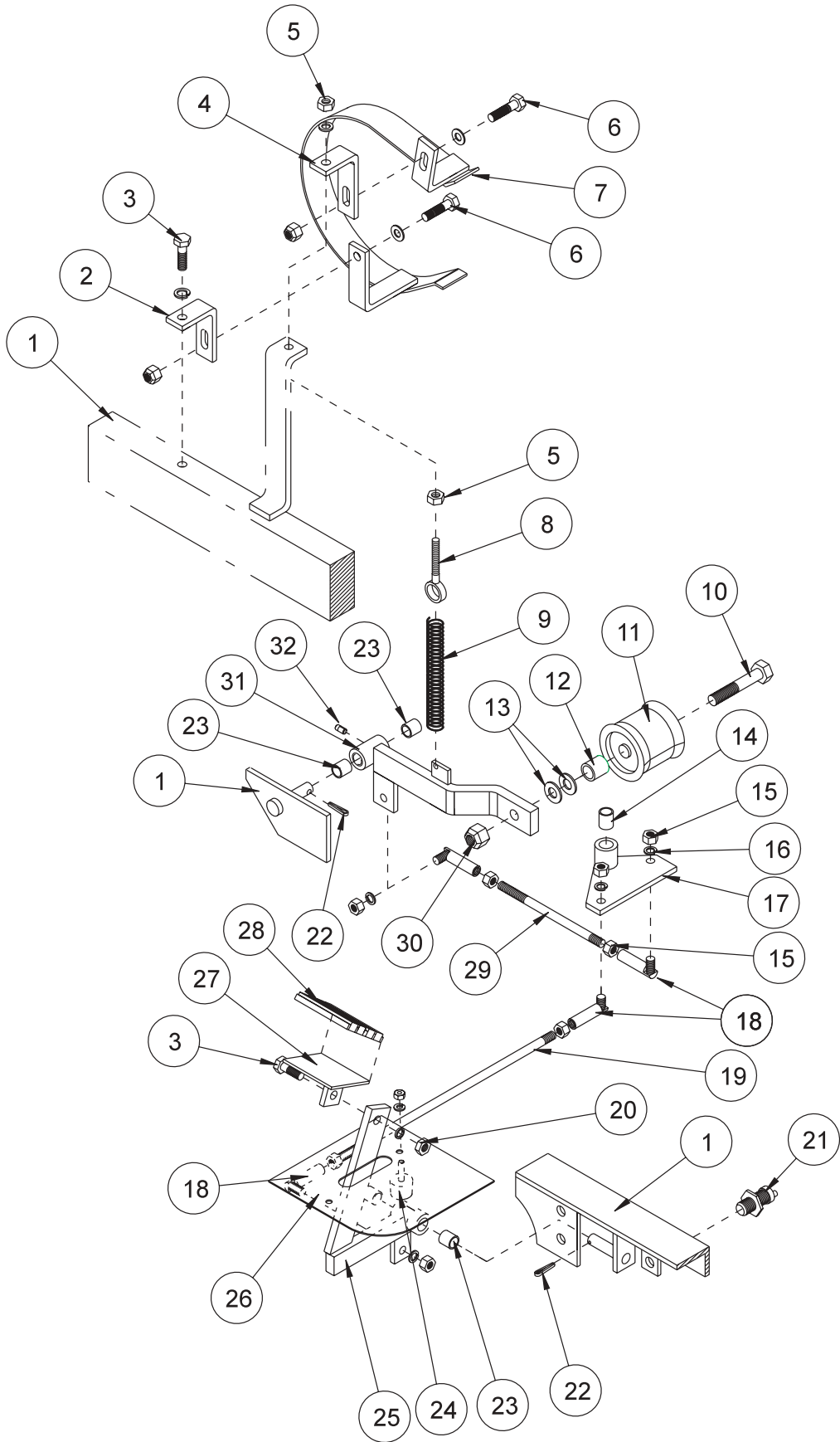


Parts

## FRONT AXLE PARTSLIST

| REF# | PART#          | DESCRIPTION  | QUANTITY |
|------|----------------|--|----------|
| 1    | 10-180         | Left Front Fender  | 1        |
|      | HBC-516-18-100 | Carriage Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1                                    | 4        |
|      | HW-516         | Washer <sup>5</sup> / <sub>16</sub>  | 4        |
|      | HWL-516        | Lock Washer <sup>5</sup> / <sub>16</sub>   | 4        |
|      | HN-516-18      | Nut <sup>5</sup> / <sub>16</sub> - 18  | 4        |
| 2    | 80-167         | Dust Cap   | 2        |
| 3    | HNAR-100-14    | Slotted Jam Nut 1 - 14   | 2        |
| 4    | 11-043         | Bearing  | 4        |
| 5    | 80-019         | Hub (includes Ref 2, 4, 6, 9, 10)  | 2        |
| 6    | 11-041         | Oil Seal   | 2        |
| 7    | 11-042         | Spacer   | 2        |
| 8    | HP-18-150      | Cotter Pin <sup>1</sup> / <sub>8</sub> x 1 <sup>1</sup> / <sub>2</sub>                 | 4        |
| 9    | 27-022-02      | Stud <sup>1</sup> / <sub>2</sub> - 20  | 10       |
| 10   | HNL-12-20      | Lug Nut <sup>1</sup> / <sub>2</sub> - 20   | 10       |
| 11   | 14-368         | Left Front Fender Bracket - Front  | 1        |
| 12   | 50-081         | Rubber Bumper  | 2        |
| 13   | 18-153         | Bushing (part of 14-343)   | 2        |
| 14   | 14-344         | Axle Pin   | 1        |
| 15   | HB-516-18-125  | Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1 <sup>1</sup> / <sub>4</sub>                 | 1        |
|      | HNTL-516-18    | Lock Nut <sup>5</sup> / <sub>16</sub> - 18   | 1        |
| 16   | 10-159         | Right Front Fender   | 1        |
|      | HBC-516-18-100 | Carriage Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1                                    | 4        |
|      | HW-516         | Washer <sup>5</sup> / <sub>16</sub>  | 4        |
|      | HWL-516        | Lockwasher <sup>5</sup> / <sub>16</sub>  | 4        |
|      | HN-516-18      | Nut <sup>5</sup> / <sub>16</sub> - 18  | 4        |
| 17   | 50-456         | Hydraulic Cylinder   | 1        |
|      | 14-267         | Seal Kit   | 1        |
| 18   | HCP-58-150     | Clevis Pin <sup>5</sup> / <sub>8</sub> x 1 <sup>1</sup> / <sub>2</sub>                 | 1        |
|      | HP-18-100      | Cotter Pin <sup>1</sup> / <sub>8</sub> x 1   | 1        |
| 19   | 18-171         | <sup>11</sup> / <sub>16</sub> x <sup>9</sup> / <sub>16</sub> 90° Straight Thread Elbow | 2        |
| 20   | HNA-100-14     | Slotted Axle Nut 1 - 14  | 2        |
| 21   | HMB-100-10     | Machine Bushing 1 x 10GA   | 4        |
| 22   | HNJ-58-18      | Jam Nut <sup>5</sup> / <sub>8</sub> - 18   | 1        |
| 23   | HB-58-11-250   | Bolt <sup>5</sup> / <sub>8</sub> - 11 x 2 <sup>1</sup> / <sub>2</sub>                  | 1        |
| 24   | 18-154         | Rod End  | 1        |
| 25   | HMB-58-14      | Machine Bushing <sup>5</sup> / <sub>8</sub> - 14                                       | 6        |
| 26   | 14-367         | Right Front Fender Bracket - Front   | 1        |
| 27   | HNTL-58-11     | Lock Nut <sup>5</sup> / <sub>8</sub> - 11  | 1        |
| 28   | HB-516-18-125  | Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1 <sup>1</sup> / <sub>4</sub>                 | 8        |
|      | HW-14          | Washer <sup>1</sup> / <sub>4</sub>   | 16       |
|      | HNTL-516-18    | Lock Nut <sup>5</sup> / <sub>16</sub> - 18   | 8        |
| 29   | 14-356         | Right Front Fender Bracket - Rear  | 1        |
| 30   | 16-076         | King Pin   | 2        |
| 31   | 16-565         | Rod End  | 2        |
| 32   | HNM-12-125     | Metric Nut M12 x 1.25  | 2        |
| 33   | 10-295         | Right Spindle  | 1        |
|      | HG-14-28-180   | Grease Fitting <sup>1</sup> / <sub>4</sub> - 28 x 180°                                 | 1        |
| 34   | 14-345         | Tie Rod  | 1        |
| 35   | 14-457         | Front Axle   | 1        |
|      | HG-14-28-180   | Grease Fitting <sup>1</sup> / <sub>4</sub> - 28 x 180°                                 | 1        |
| 36   | HMB-114-10     | Machine Bushing 1 <sup>1</sup> / <sub>4</sub> x 10GA                                   | 2        |
| 37   | 14-357         | Left Front Fender Bracket - Rear   | 1        |
| 38   | 10-294         | Left Spindle   | 1        |
|      | HG-14-28-180   | Grease Fitting <sup>1</sup> / <sub>4</sub> - 28 x 180°                                 | 1        |
| 39   | 33-086         | Bushing (part of 10-294 & 10-295)  | 4        |
| 40   | HNA-114-12     | Axle Nut 1 <sup>1</sup> / <sub>4</sub> - 12  | 1        |
| 41   | HMB-100-14     | Machine Bushing 1 x 14GA   | 4        |
| 42   | HP-18-200      | Cotter Pin <sup>1</sup> / <sub>8</sub> x 2   | 1        |

# CLUTCH LINKAGE DRAWING

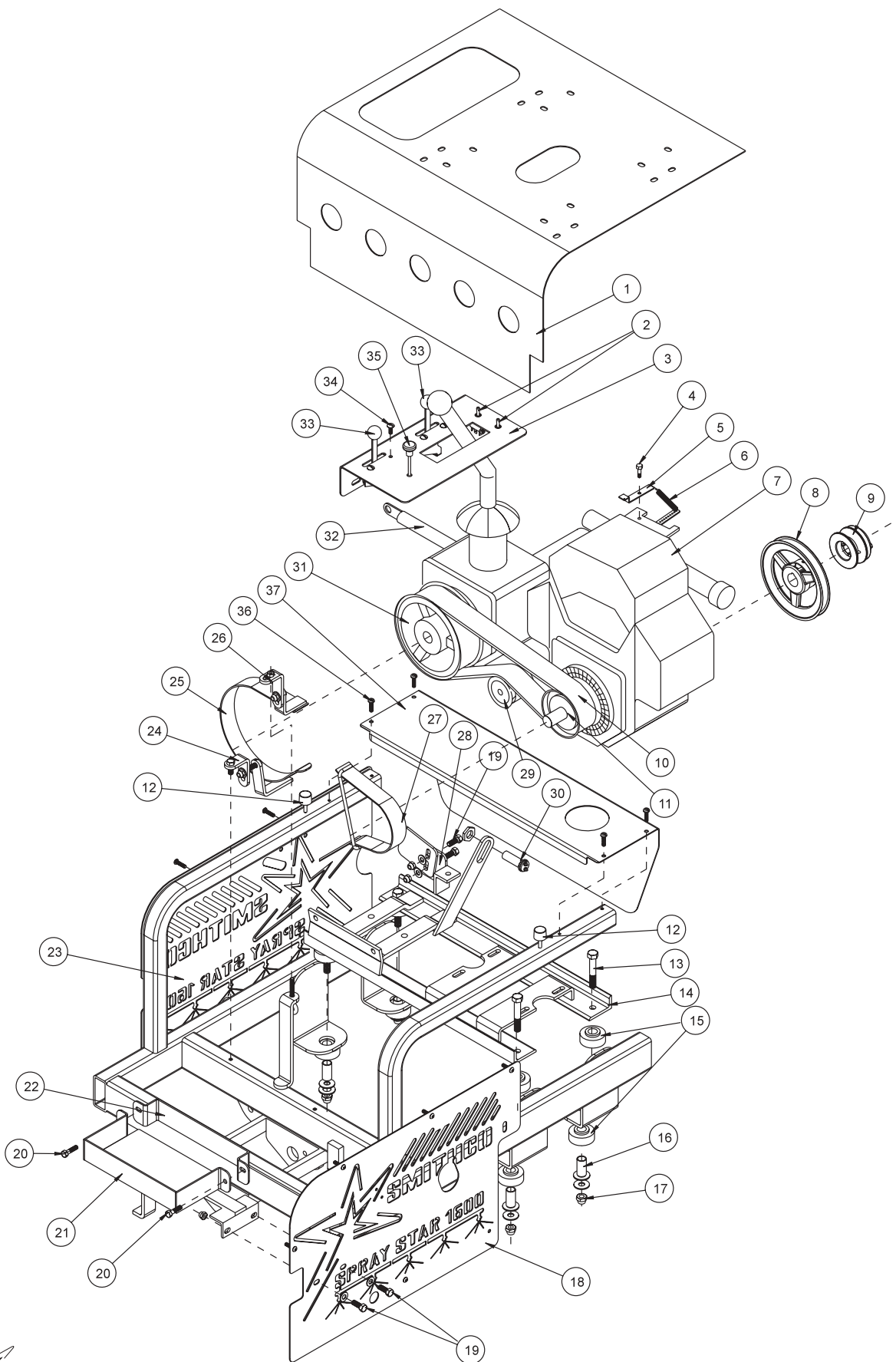


Parts

## CLUTCH LINKAGE PARTS LIST

| REF# | PART#        | DESCRIPTION                              | QUANTITY    |
|------|--------------|--|-------------|
| 1    |              | Part of Main Frame                       |             |
| 2    | 15-482       | Bottom Mount Bracket                     | 1           |
| 3    | HB-38-16-100 | Bolt $\frac{3}{8}$ - 16 x 1              | 2           |
|      | HWL-38       | Lockwasher $\frac{3}{8}$                 | 2           |
| 4    | 15-483       | Top Mount Bracket                        | 1           |
| 5    | HN-516-18    | Nut $\frac{5}{16}$ - 18                  | 2           |
|      | HW-516       | Washer $\frac{5}{16}$                    | 1           |
| 6    | HB-38-16-125 | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$ | 2           |
|      | HW-38        | Washer $\frac{3}{8}$                     | 2           |
|      | HNTL-38-16   | Lock Nut $\frac{3}{8}$ - 16              | 2           |
| 7    | 15-481       | Belt Guard                               | 1           |
| 8    | 20-008       | Eye Bolt $\frac{5}{16}$ - 18             | 1           |
| 9    | 16-830       | Spring                                   | 1           |
| 10   | HB-12-13-300 | Bolt $\frac{1}{2}$ - 13 x 3              | 1           |
| 11   | 16-013       | Idler Pulley                             | 1           |
| 12   | 15-376       | Clutch Arm Spacer                        | 1           |
| 13   | HMB-12-14    | Machine Bushing $\frac{1}{2}$ x 14GA     | As Required |
| 14   | 10-007       | Oilite Bushing (part of 15-337)          | 1           |
| 15   | HN-38-24     | Nut $\frac{3}{8}$ - 24                   | 8           |
| 16   | HWL-38       | Lockwasher $\frac{3}{8}$                 | 4           |
| 17   | 15-337       | Clutch Relay                             | 1           |
|      | HB-12-13-275 | Bolt $\frac{1}{2}$ - 13 x $2\frac{3}{4}$ | 1           |
|      | HNTL-12-13   | Lock Nut $\frac{1}{2}$ - 13              | 1           |
| 18   | 21-173       | Ball Joint $\frac{3}{8}$ - 24            | 4           |
| 19   | 15-348       | Long Clutch Rod                          | 1           |
| 20   | HN-38-16     | Nut $\frac{3}{8}$ - 16                   | 1           |
| 21   | 22-002       | Interlock Switch                         | 1           |
| 22   | HP-18-100    | Cotter Pin $\frac{1}{8}$ x 1             | 2           |
| 23   | 20-019       | Bushing (part of 15-360 & 15-341)        | 4           |
| 24   | 15-013       | Rubber Bumper                            | 1           |
|      | HWL-14       | Lockwasher $\frac{1}{4}$                 | 1           |
|      | HN-14-20     | Nut $\frac{1}{4}$ - 20                   | 1           |
| 25   | 15-360       | Clutch Pedal                             | 1           |
| 26   | 14-328       | Floor Board                              | 1           |
| 27   | 16-062       | Pedal                                    | 1           |
| 28   | 15-015       | Pedal Pad                                | 1           |
| 29   | 15-349       | Short Clutch Rod                         | 1           |
| 30   | HNTL-12-13   | Lock Nut $\frac{1}{2}$ - 13              | 1           |
| 31   | 15-341       | Clutch Arm                               | 1           |
| 32   | HG-14-28-180 | Grease Fitting $\frac{1}{4}$ - 28 x 180° | 1           |

# ENGINE AND CONTROL PANEL DRAWING



Parts

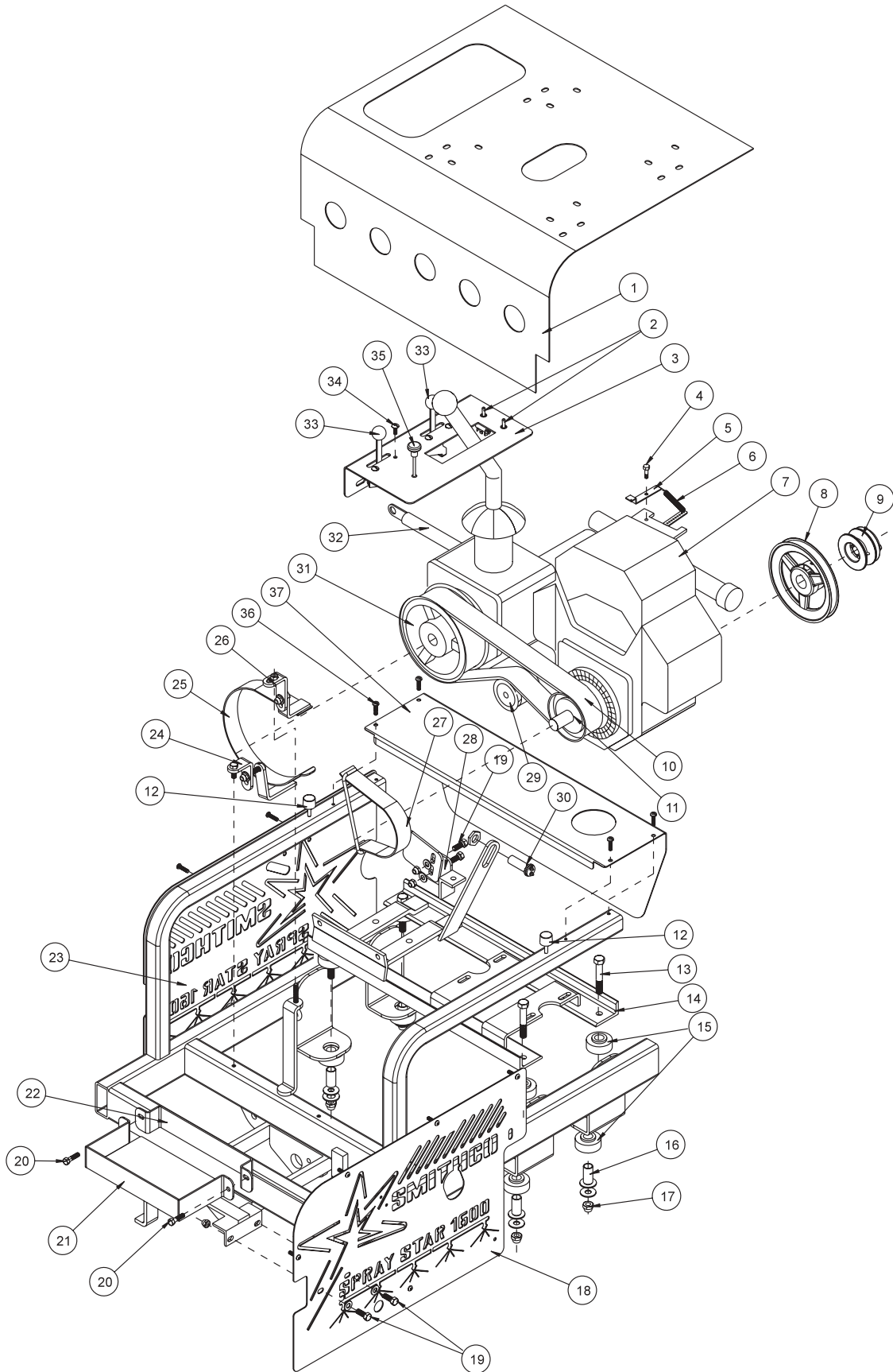


## ENGINE AND CONTROL PANEL PARTS LIST

| REF# | PART#         | DESCRIPTION  | QUANTITY |
|------|---------------|--|----------|
| 1    | 15-356        | Engine/Seat Cover  | 1        |
|      | 8803-41       | Trim   | 1        |
| 2    | 16-755        | Boom Control Switch  | 2        |
|      | 15-472        | Switch Boot  | 2        |
| 3    | 15-329        | Control Panel  | 1        |
|      | 14-366        | Decal, Control Panel                                       | 1        |
| 4    | HB-14-20-075  | Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$                    | 1        |
|      | HW-14         | Washer $\frac{1}{4}$                                       | 1        |
|      | HNTL-14-20    | Lock Nut $\frac{1}{4}$ - 20                                | 1        |
| 5    | 15-335        | Governor Linkage Arm                                       | 1        |
| 6    | 16-046        | Extension Spring   | 1        |
| 7    | 15-373        | Kohler 20 hp Command Engine                                | 1        |
|      | 8800-9        | Fuel Hose  | 1        |
|      | 18-186        | Hose Clamp   | 2        |
|      | 50-403        | Fuel Filter  | 1        |
|      | HB-38-16-175  | Bolt $\frac{3}{8}$ - 16 x $1\frac{3}{4}$                   | 4        |
|      | HW-38         | Washer $\frac{3}{8}$                                       | 4        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                | 4        |
| 8    | 15-316        | Pulley BK72 x $1\frac{1}{8}$                               | 1        |
|      | HKSQ-14-150   | Machine Key $\frac{1}{4}$ x $\frac{1}{4}$ x $1\frac{1}{2}$ | 1        |
| 9    | 15-318        | Pulley BK30H with Hub $1\frac{1}{8}$                       | 1        |
|      | HKSQ-14-150   | Machine Key $\frac{1}{4}$ x $\frac{1}{4}$ x $1\frac{1}{2}$ | 1        |
| 10   | 16-827        | Belt   | 1        |
| 11   | 16-820        | Pulley $4\frac{1}{4}$ OD with Hub                          | 1        |
|      | HKSQ-14-150   | Machine Key $\frac{1}{4}$ x $\frac{1}{4}$ x $1\frac{1}{2}$ | 1        |
| 12   | 15-013        | Rubber Bumper  | 2        |
| 13   | HB-12-13-300  | Bolt $\frac{1}{2}$ - 13 x 3                                | 4        |
| 14   | 15-357        | Engine Frame   | 1        |
| 15   | 60-107        | Rubber Bushing   | 8        |
| 16   | 60-168        | Spacer   | 4        |
| 17   | HNFL-12-13    | Flange Whiz Lock Nut $\frac{1}{2}$ - 13                    | 4        |
|      | HW-58         | Washer $\frac{5}{8}$                                       | 4        |
|      | HW-716        | Washer $\frac{7}{16}$                                      | 4        |
| 18   | 14-349        | Left Side Panel  | 1        |
|      | HSDPS-14-100  | Pan Head Drill Screw SS $\frac{1}{4}$ x 1                  | 5        |
| 19   | HB-38-16-100  | Bolt $\frac{3}{8}$ - 16 x 1                                | 4        |
|      | HW-38         | Washer $\frac{3}{8}$                                       | 8        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                | 4        |
| 20   | HB-516-18-125 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{4}$                  | 2        |
|      | HWL-516       | Lockwasher $\frac{5}{16}$                                  | 2        |
|      | HN-516-18     | Nut $\frac{5}{16}$ - 18                                    | 2        |
| 21   | 15-330        | Battery Box  | 1        |
|      | 33-216        | Battery  | 1        |
|      | 22-054        | Black Battery Cable  | 1        |
| 22   | 15-388        | Battery Box Front  | 1        |
| 23   | 14-350        | Right Side Panel   | 1        |
|      | HSDPS-14-100  | Pan Head Drill Screw SS $\frac{1}{4}$ x 1                  | 6        |
| 24   | 15-482        | Bottom Mount Bracket                                       | 1        |

(Continued on next page)

# ENGINE AND CONTROL PANEL DRAWING



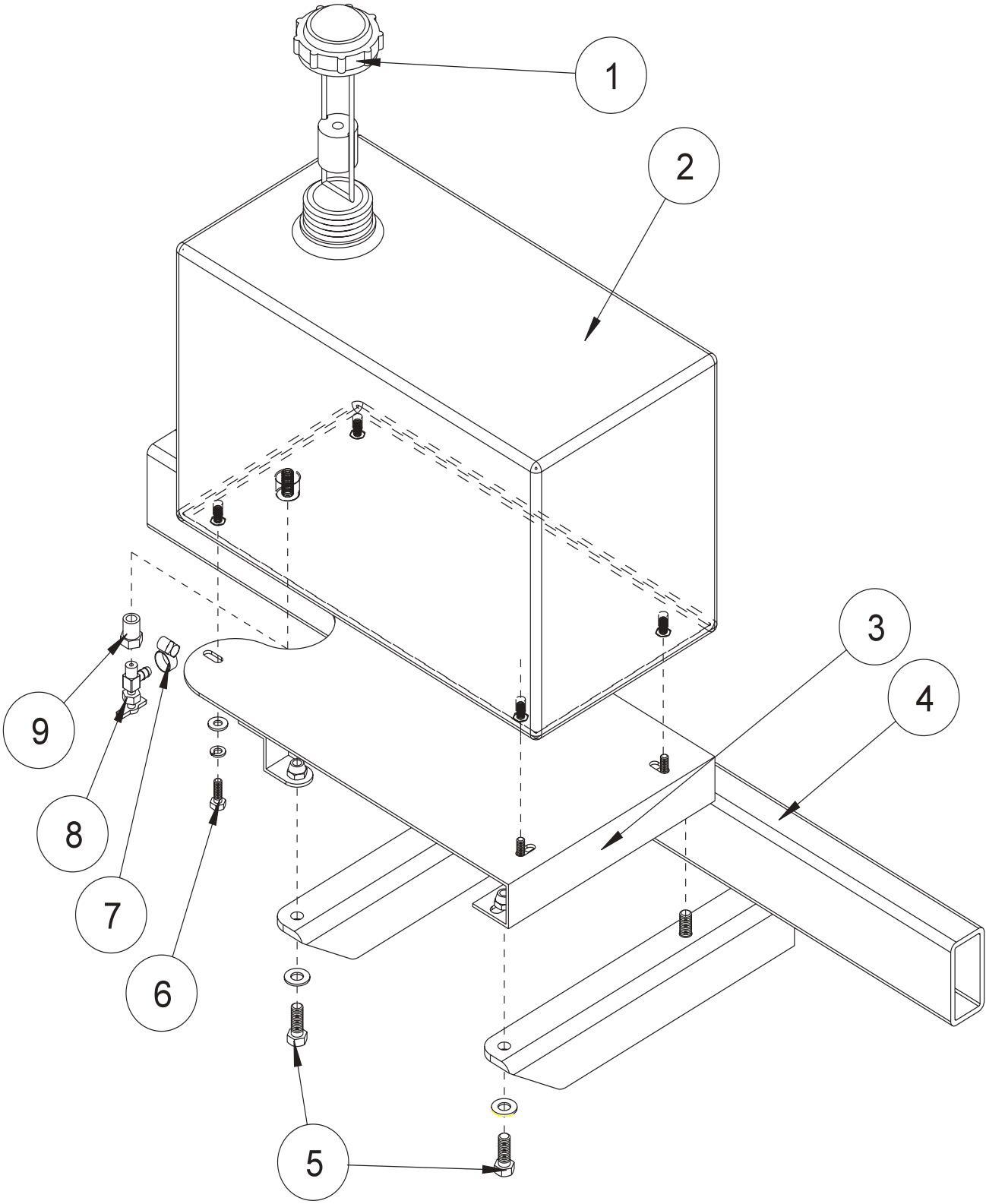
Parts

## ENGINE AND CONTROL PANEL PARTSLIST

| REF# | PART#          | DESCRIPTION                                      | QUANTITY |
|------|----------------|--|----------|
| 25   | 15-481         | Belt Guard                                       | 1        |
| 26   | 15-483         | Top Mounting Bracket                             | 1        |
| 27   | 15-555         | Left Belt Guard                                  | 1        |
| 28   | 15-556         | Guard Mount                                      | 1        |
| 29   | 16-013         | Idler Pulley                                     | 1        |
| 30   | 16-883         | Magnetic Sensor                                  | 1        |
| 31   | 16-821         | Pulley 7 <sup>1</sup> / <sub>2</sub> OD with Hub | 1        |
|      | HWK-14-1125    | Woodruff Key 1/4 x 1 <sup>1</sup> / <sub>8</sub> | 1        |
| 32   | 50-323         | Red Battery Cable                                | 1        |
| 33   | 13-568         | Throttle Cable                                   | 2        |
| 34   | HSTP-14-20-075 | Phillips Truss Head Machine Screw 1/4 - 20 x 3/4 | 4        |
|      | HW-14          | Washer 1/4                                       | 4        |
|      | HWL-14         | Lockwasher 1/4                                   | 4        |
|      | HN-14-20       | Nut 1/4 - 20                                     | 4        |
| 35   | 11-086         | Choke Cable                                      | 1        |
| 36   | HSDPS-14-100   | Pan Head Drill Screw SS 1/4 x 1                  | 4        |
| 37   | 14-326         | Rear Engine Cover                                | 1        |
| NS   | 17-154         | Cable Clamp                                      | 1        |
| NS   | 21-161         | Wire Block                                       | 4        |

# GAS TANK DRAWING

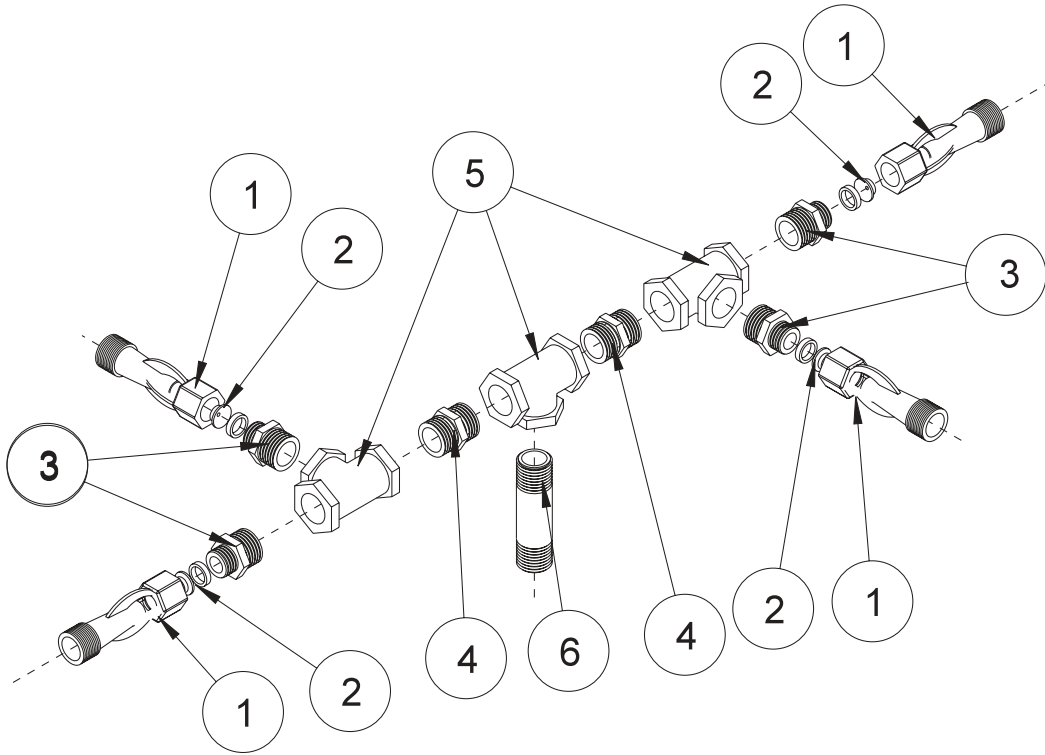
Parts



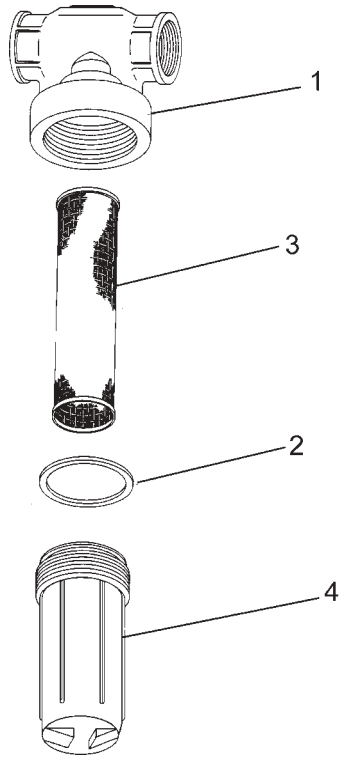
## GAS TANK PARTS LIST

| REF# | PART#        | DESCRIPTION                                   | QUANTITY |
|------|--------------|---|----------|
| 1    | 15-492       | Cap with Gauge                                | 1        |
| 2    | 15-491       | 5 Gallon gas Tank                             | 1        |
| 3    | 14-337       | Gas Tank Bracket                              | 1        |
| 4    |              | Main Frame                                    |          |
| 5    | HB-38-16-100 | Bolt $\frac{3}{8}$ - 16 x 1                   | 4        |
|      | HW-38        | Washer $\frac{3}{8}$                          | 4        |
|      | HNTL-38-16   | Lock Nut $\frac{3}{8}$ - 16                   | 4        |
| 6    | HB-14-20-075 | Bolt $\frac{1}{4}$ - 20 x $\frac{3}{4}$       | 4        |
|      | HW-14        | Washer $\frac{1}{4}$                          | 4        |
|      | HWL-14       | Lockwasher $\frac{1}{4}$                      | 4        |
| 7    | 18-186       | Hose Clamp                                    | 2        |
|      | 8800-25      | Fuel Hose $\frac{1}{4}$ " x 25"               | 1        |
| 8    | 15-039       | Fuel Valve                                    | 1        |
| 9    | 18-042       | Reducer Bushing $\frac{1}{4}$ x $\frac{1}{8}$ | 1        |

# TURBO QUAD AGITATOR DRAWING



# 14-371 STRAINER DRAWING



Parts

## TURBO QUAD AGITATOR PARTS LIST

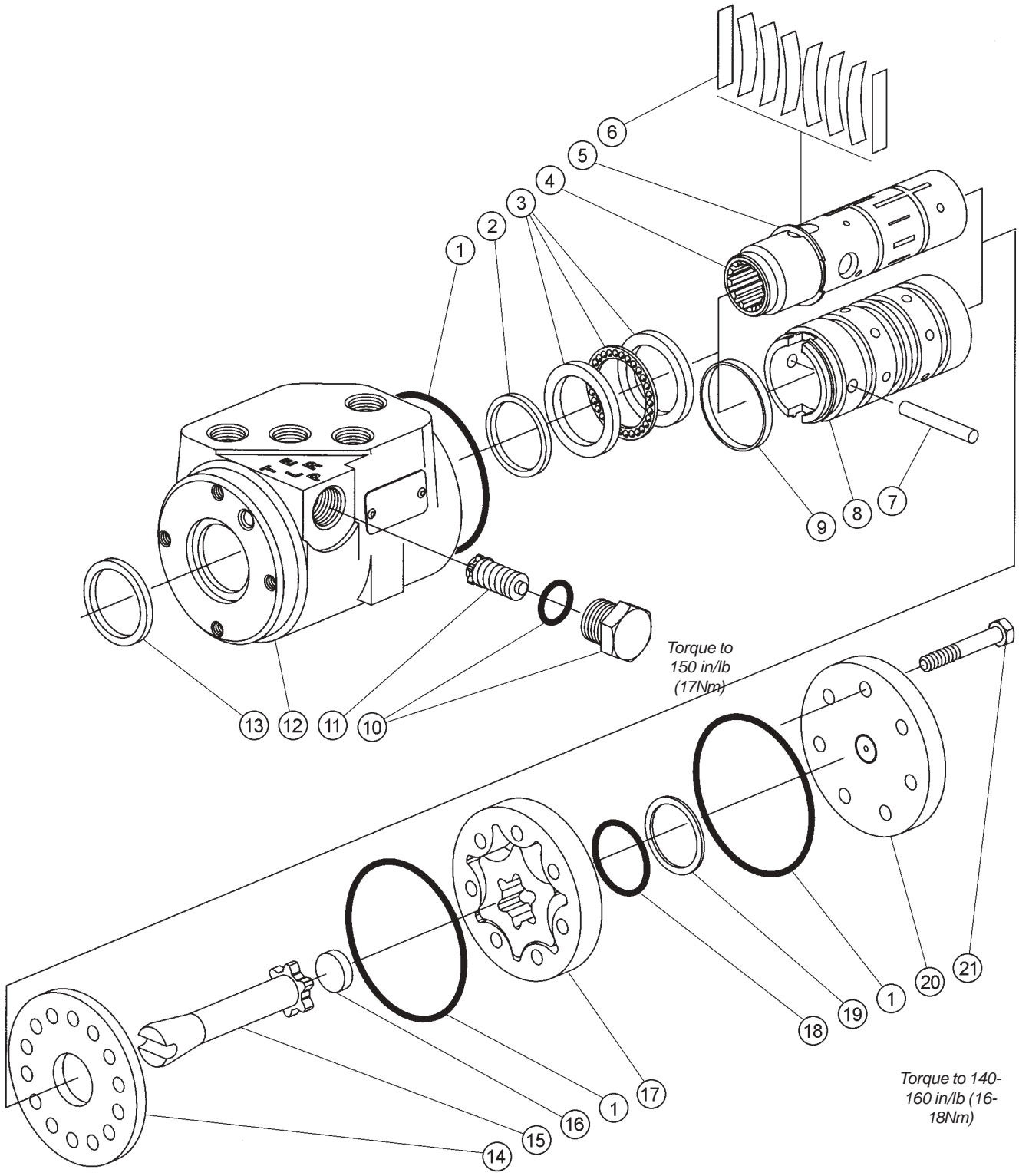
| REF# | PART#  | DESCRIPTION   | QUANTITY |
|------|--------|---|----------|
| 1    | 16-036 | Agitator Jets (includes one each 1/8", 5/32", and 3/16" orifices) | 4        |
| 2    |        | Interchangeable Nozzles 3/16" (factory installed)                 | 4        |
| 3    | 16-173 | Reducer 3/4 x 1/2   | 4        |
| 4    | 16-158 | Close Nipple 3/4  | 2        |
| 5    | 16-157 | Tee Female Pipe Thread 3/4 x 3/4 x 3/4                            | 3        |
| 6    | 16-172 | Nylon Nipple 3/4 NPT x 3 1/2                                      | 1        |
|      | *      | One each comes with 16-036 Agitator Jet.                          |          |

## 14-371 STRAINER PARTS LIST

| REF# | PART#     | DESCRIPTION       | QUANTITY |
|------|-----------|-------------------|----------|
| 1    | 14-371-01 | Head 1 1/4 (Poly) | 1        |
| 2    | 16-968-02 | Gasket            | 1        |
| 3    | 16-968-03 | Screen            | 1        |
| 4    | 16-968-04 | Bowl              | 1        |

# 15-301 ORBITOR DRAWING

Parts





## 15-301 ORBITOR PARTS LIST

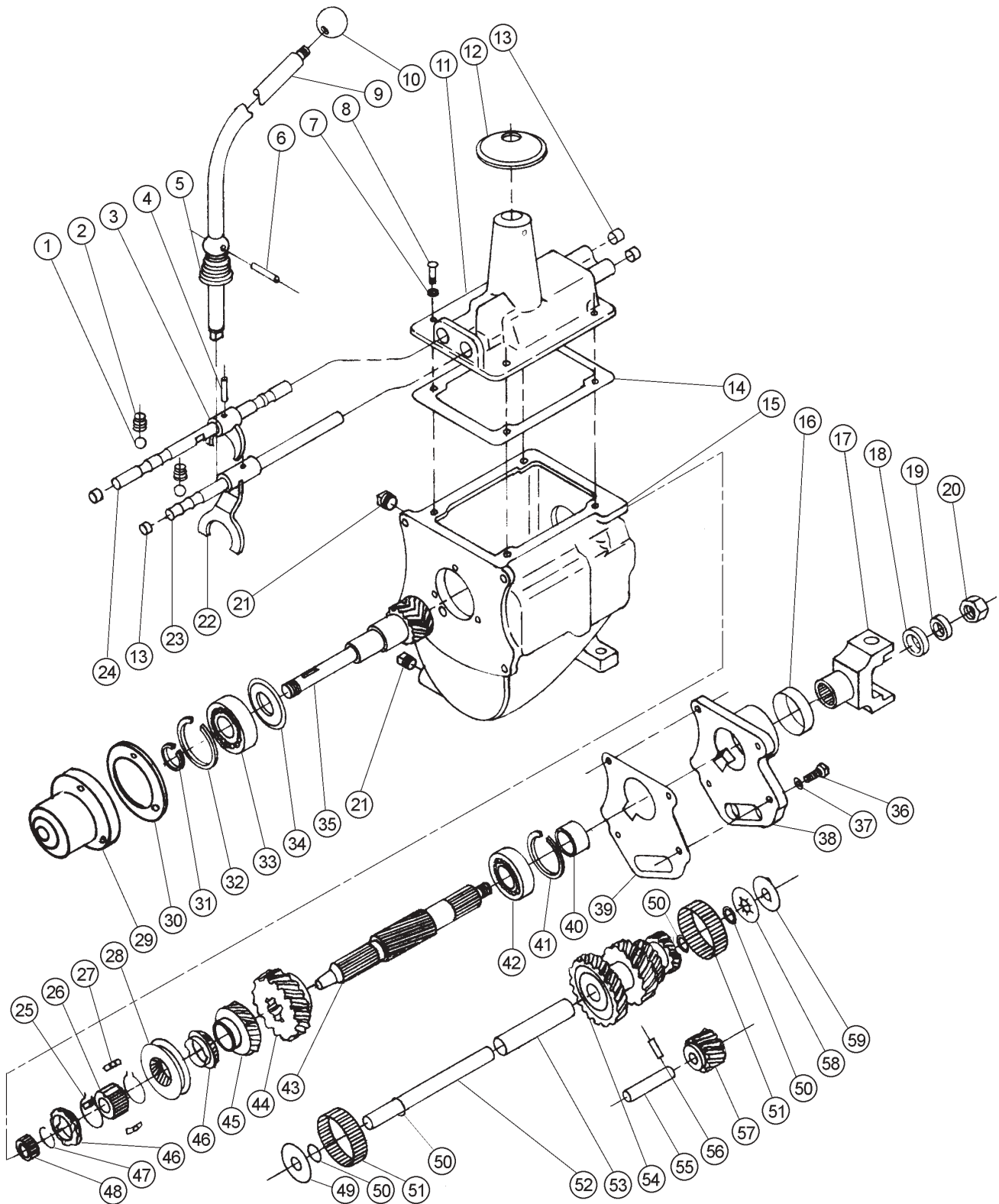
| REF# | PART#     | DESCRIPTION                            | QUANTITY |
|------|-----------|--|----------|
| 1*   |           | O-Ring Seal                            | 3        |
| 2*   |           | Quad Seal                              | 1        |
| 3    | 15-301-14 | Bearing Kit                            | 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 ORBITOR 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)                           |



# 15-409 3-SPEED TRANSMISSION DRAWING



Parts

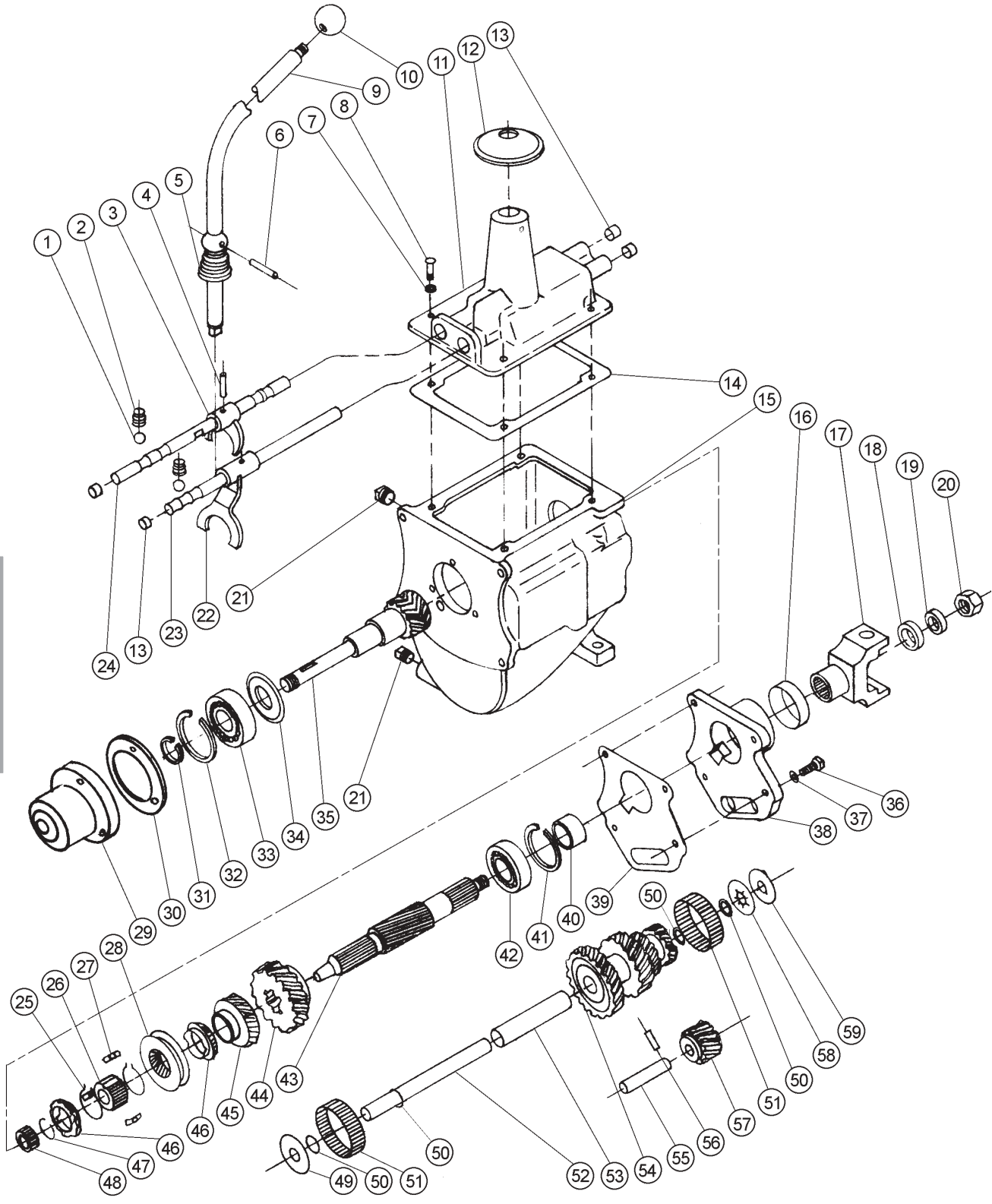
## 15-409 3-SPEED TRANSMISSION PARTS LIST

| REF# | PART#         | DESCRIPTION                                      | QUANTITY |
|------|---------------|--|----------|
| 1    | 16-341        | Ball $\frac{3}{8}$ detent                        | 2        |
| 2    | 16-342        | Poppet Spring                                    | 2        |
| 3    | 16-348        | Low & Reverse Shift Fork                         | 1        |
| 4    | 16-343        | Rail Pin   | 2        |
| 5    | 16-344        | Shift Spring                                     | 1        |
| 6    | 16-308        | Pin  | 1        |
| 7    | HWL-516       | Lockwasher $\frac{5}{16}$                        | 7        |
| 8    | HB-516-18-075 | Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$         | 7        |
| 9    | 15-458        | Shift Lever                                      | 1        |
| 10   | 16-259        | Shift Knob (not included with 15-409)            | 1        |
|      | 16-011        | Decal Shift (not included with 15-409)           | 1        |
| 11   | 16-301        | Transmission Housing Cover                       | 1        |
| 12   | 16-039        | Rubber Rain/Dust Boot (not included with 15-409) | 1        |
| 13   | 16-340        | Plug Cap   | 4        |
| 14   | 16-302        | Housing Cover Gasket                             | 1        |
| 15   | 16-330        | Top Shift type Case                              | 1        |
| 16   | 16-313        | Seal M/S (rear)                                  | 1        |
| 17   | 16-004        | Yoke   | 1        |
| 18   | 16-306        | Washer M/S                                       | 1        |
| 19   | HWL-34        | Lockwasher $\frac{3}{4}$                         | 1        |
| 20   | 16-307        | Nut  | 1        |
| 21   | 16-336        | Drain/Fill Plug                                  | 2        |
| 22   | 16-337        | High & Inter. Shift Fork                         | 1        |
| 23   | 16-338        | High & Inter. Shift Rail                         | 1        |
| 24   | 16-339        | Low & Reverse Shift Rail                         | 1        |
| 25*  | 16-351        | Syncro Snap Ring                                 | 2        |
| 26*  | 16-352        | Syncro Hub                                       | 1        |
| 27*  | 16-350        | Shift Plate                                      | 3        |
| 28*  | 16-908        | Sleeve   | 1        |
| 29   | 16-054        | Tran. Bearing Housing (not included with 15-409) | 1        |
|      | 16-008        | Bearing (part of 16-054)                         | 1        |
|      | HB-38-16-125  | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$         | 3        |
|      | HW-38         | Washer $\frac{3}{8}$                             | 3        |
| W    | 30            | 16-218 Gasket (not included with 15-409)         | 1        |
|      | 31            | 16-335 Snap Ring (small)                         | 1        |
|      | 32            | 16-334 Snap Ring (large)                         | 1        |
|      | 33            | 16-333 Bearing M/D Gear                          | 1        |
|      | 34            | 16-332 Oil Baffle                                | 1        |
|      | 35            | 16-331 Gear M/D keyed (input shaft)              | 1        |
|      | 36            | 16-347 Bolt $\frac{7}{16}$ - 14 x 1 (black)      | 4        |
|      | 37            | Washer $\frac{7}{16}$ (star burst)               | 4        |
|      | 38            | 16-314 Rear Bearing Retainer                     | 1        |
|      | 39            | 16-326 Gasket M/D retainer                       | 1        |
|      | *             | 16-328 Synchronized Assembly with BR Rings       | 1        |

(Continued on next page)

# 15-409 3-SPEED TRANSMISSION DRAWING

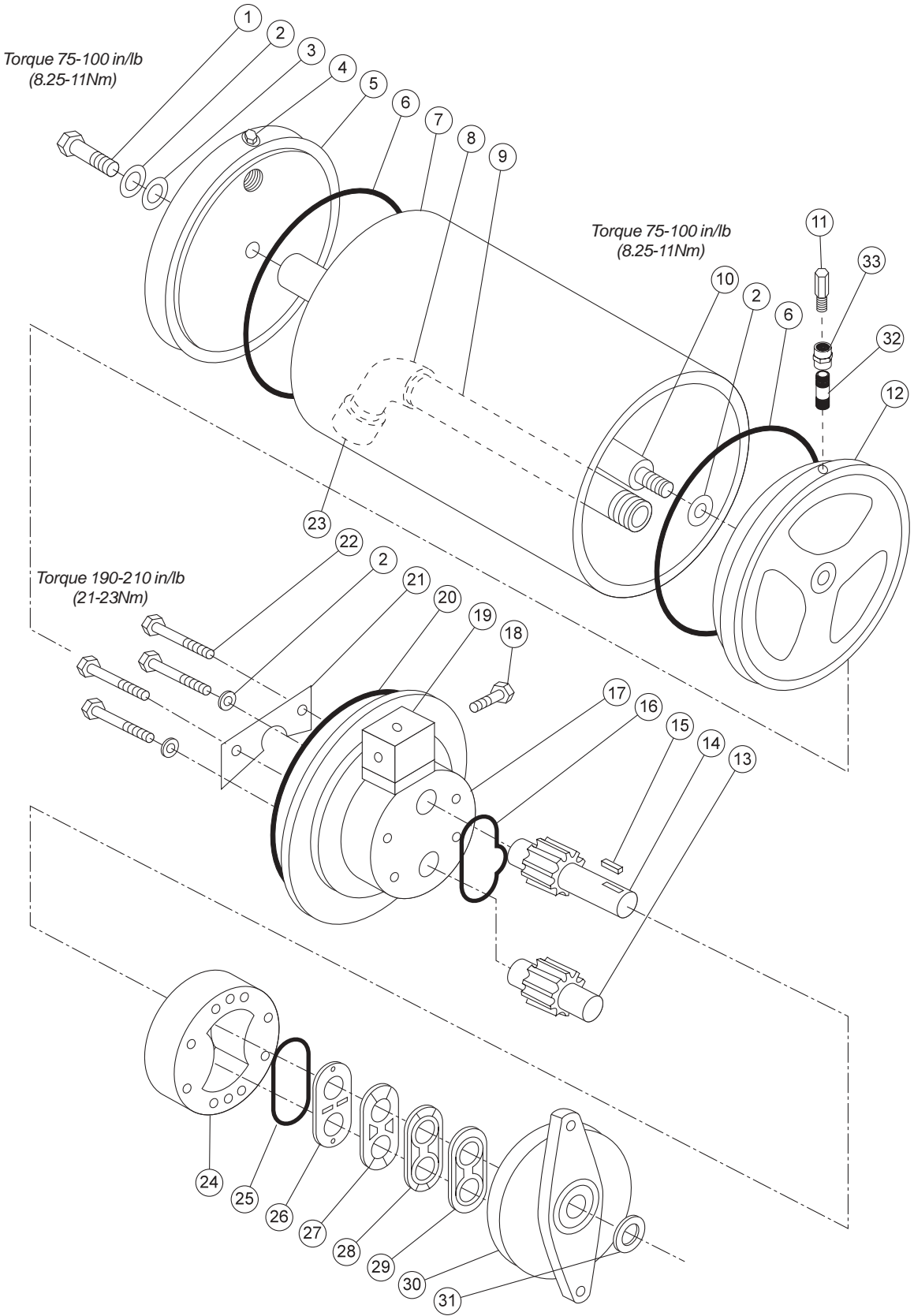
Parts



## 15-409 3-SPEED TRANSMISSION PARTS LIST

|     |        |  |        |
|-----|--------|--|--------|
| 40  | 16-309 | Spacer (speedometer)                     | 1      |
| 41  | 16-305 | Snap Ring                                | 1      |
| 42  | 16-304 | Rear Bearing                             | 1      |
| 43  | 16-303 | Main Shaft                               | 1      |
| 44  | 16-310 | Gear M/S (low & reverse)                 | 1      |
| 45  | 16-311 | Gear M/S (2nd)                           | 1      |
| 46* | 16-312 | Syncro Ring M/S 2nd & 3rd                | 2      |
| 47  | 16-329 | Snap Ring                                | 1      |
| 48  | 16-327 | Needle Bearing (13 rollers per set)      | 1 set  |
| 49  | 16-325 | Steel Washer                             | 1      |
| 50  | 16-317 | Thrust Washer                            | 4      |
| 51  | 16-318 | Main Needle Bearing (20 rollers per set) | 2 sets |
| 52  | 16-324 | Cluster Gear Shaft C/S                   | 1      |
| 53  | 16-323 | Cluster Spacer Tube                      | 1      |
| 54  | 16-322 | Gear C/S (cluster)                       | 1      |
| 55  | 16-321 | Reverse Gear Shaft                       | 1      |
| 56  | 16-320 | Lockplate                                | 1      |
| 57  | 16-319 | Reverse Idler Gear                       | 1      |
| 58  | 16-316 | Thrust Washer                            | 1      |
| 59  | 16-315 | Thrust Washer                            | 1      |
|     |        |  |        |
| *   | 16-328 | Synchronized Assembly with BR Rings      | 1      |

# 15-315 HYDRAULIC PUMP DRAWING



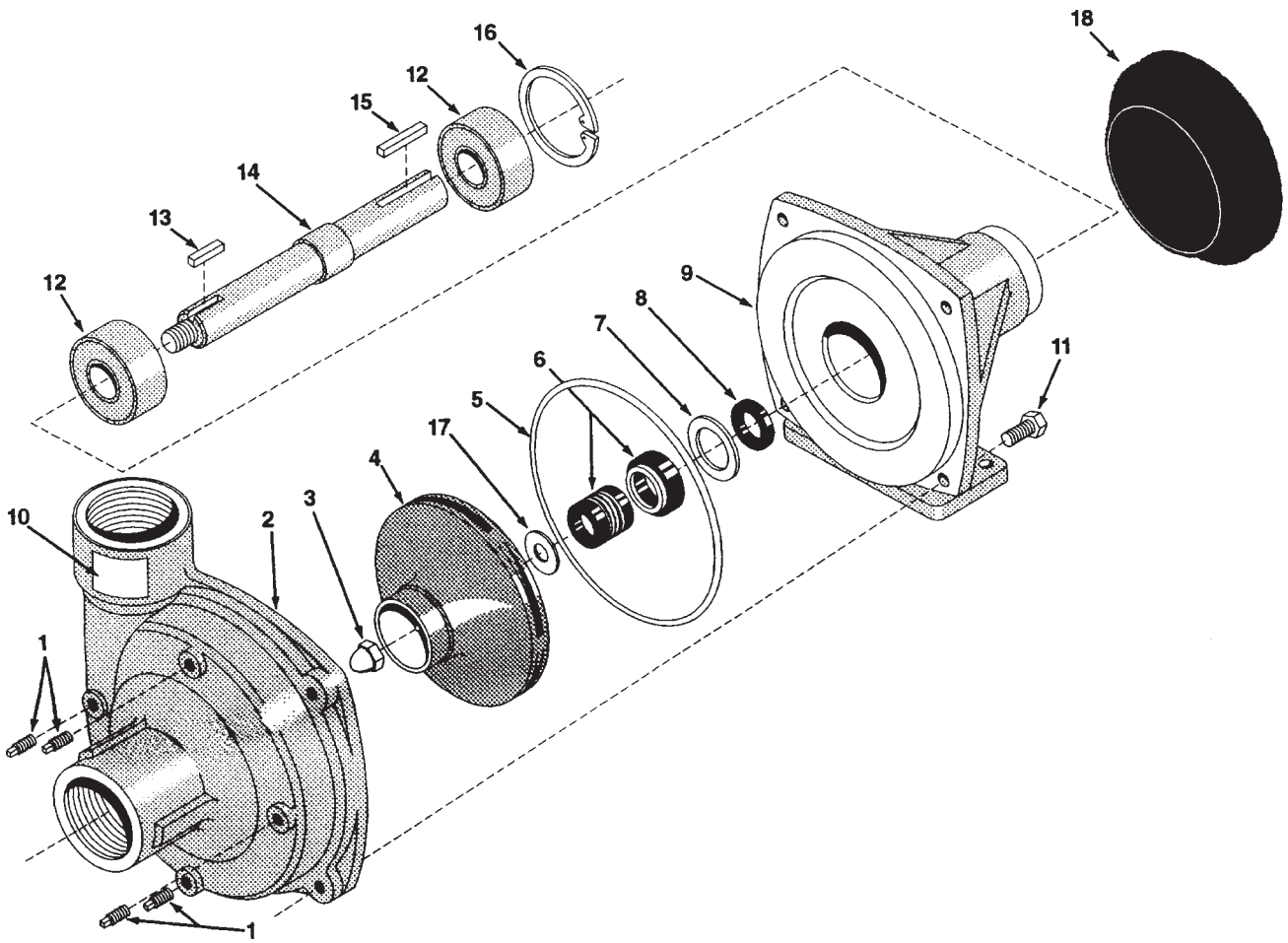
Parts

## 15-315 HYDRAULIC PUMP PARTS LIST

| REF# | PART#      | DESCRIPTION   | QUANTITY |
|------|------------|---|----------|
| 1    | 15-315-18  | Cap Screw   | 1        |
| 2    | 15-315-17  | Washer  | 4        |
| 3*   |            | Stato-Seal  | 1        |
| 4    | 18-060     | Pipe Plug $\frac{3}{8}$ NPT   | 2        |
| 5    | 15-315-10  | Tank End  | 1        |
| 6*   | 15-315-20  | O-Ring  | 2        |
| 7    | 15-315-11  | Tube (Tank)   | 1        |
| 8    | 15-315-13  | Elbow   | 1        |
| 9    | 15-315-12  | Nipple  | 1        |
| 10   | 15-315-15  | Spacer Assembly   | 1        |
| 11   | 27-059     | Filler Breather   | 1        |
| 12   | 15-315-09  | Tank End/Tank Pump  | 1        |
| 13   | 15-315-05  | Driven Gear Assembly  | 1        |
| 14   | 15-315-04  | Drive Gear Assembly   | 1        |
| 15   | HWK-18-063 | Woodruff Key $\frac{1}{8} \times \frac{5}{8}$                           | 1        |
| 16*  |            | Molded O-Ring   | 1        |
| 17   | 15-315-07  | Back Cover  | 1        |
| 18   | 15-315-06  | Relief Valve  | 1        |
| 19   | 15-315-16  | Sub-Plate(Includes 1-Sub-Plate, 4-Mounting Bolts, 3-O-Rings and 1-Plug) | 1        |
| 20*  | 15-315-21  | Tank/Pump Gasket  | 1        |
| 21   | 15-315-08  | Baffle  | 1        |
| 22   | 15-315-19  | Cap Screw   | 4        |
| 23   | 15-315-14  | Strainer  | 1        |
| 24   | 15-315-03  | Center Section  | 1        |
| 25*  |            | O-Ring  | 1        |
| 26*  |            | Wear Plate  | 1        |
| 27*  |            | Heat Shield   | 1        |
| 28*  |            | Gasket  | 1        |
| 29*  |            | V-seal  | 1        |
| 30   | 15-315-02  | Front Cover   | 1        |
| 31*  | 15-315-22  | Shaft Seal  | 1        |
| 32   | 18-287     | $\frac{3}{8}$ " Pipe Nipple x 2"  | 1        |
| 33   | 18-314     | $\frac{3}{8}$ " Pipe Coupler  | 1        |
| *    | 15-315-01  | Repair Kit (For Pump and Tank)  |          |

# 16-989 HYPRO PUMP DRAWING

Parts





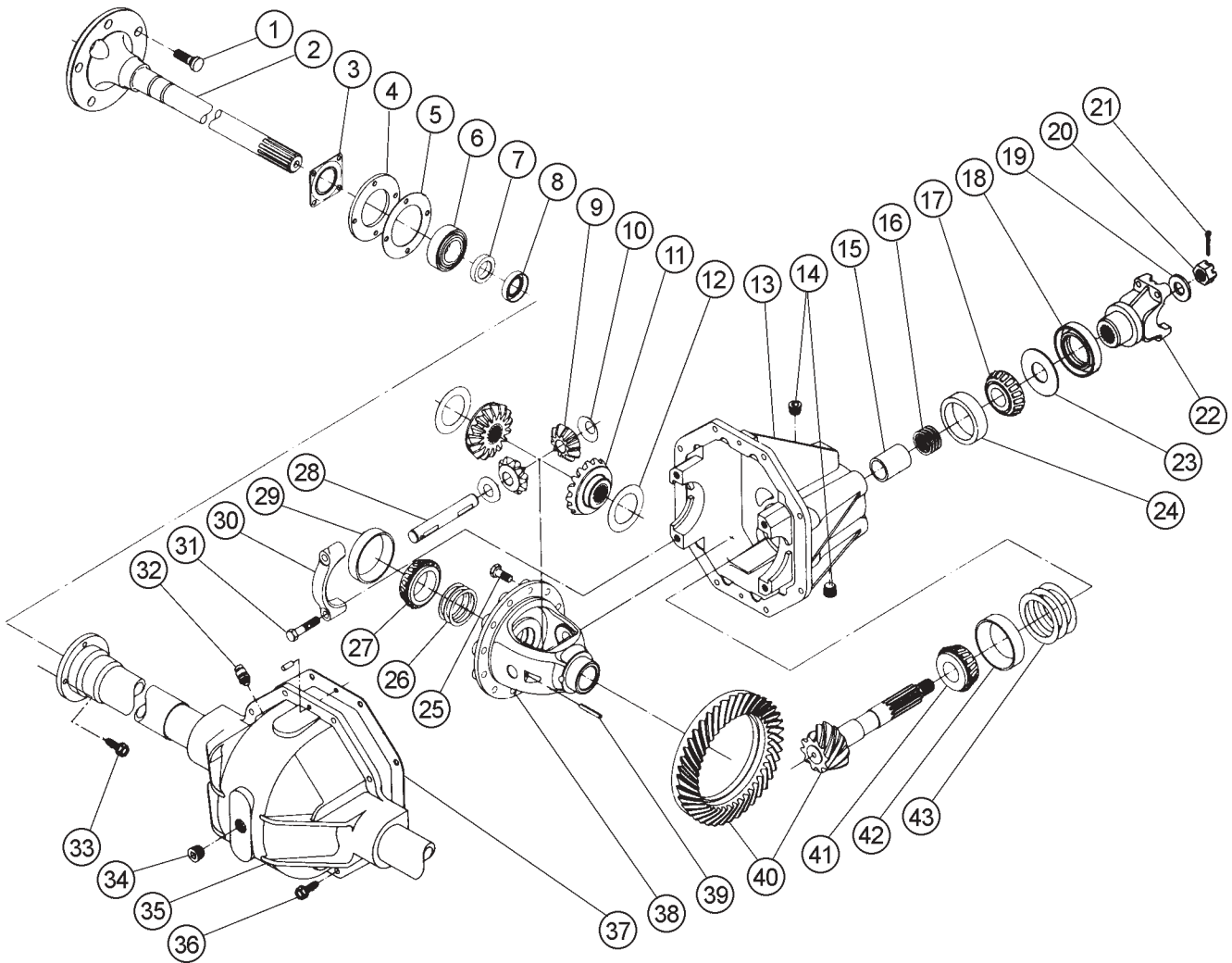
## 16-989 HYPRO® PUMP PARTSLIST

| REF# | PART#      | DESCRIPTION                       | QUANTITY |
|------|------------|-----------------------------------|----------|
| 1    | 16-966-01  | Drain Plug                        | 4        |
| 2    | 16-966-02  | Pump Casing                       | 1        |
| 3    | 16-966-03  | Impeller Nut                      | 1        |
| 4    | 16-966-16  | Impeller                          | 1        |
| 5    | *          | O-Ring                            | 1        |
| 6    | *          | Mechanical Seal (Silicon Carbide) | 1        |
| 7    | 16-966-05  | Seal Retainer                     | 1        |
| 8    | *16-966-06 | Slinger Ring                      | 1        |
| 9    | 16-966-07  | Mounting Flange                   | 1        |
| 10   | 16-966-08  | Name Plate                        | 1        |
| 11   | 16-966-09  | Bolt                              | 4        |
| 12   | 16-966-10  | Ball Bearing                      | 2        |
| 13   | 16-966-11  | Key                               | 1        |
| 14   | 16-966-12  | Pump Shaft                        | 1        |
| 15   | 16-822-20  | Key                               | 1        |
| 16   | 16-966-13  | Bearing Retainer                  | 1        |
| 17   | *          | Gasket                            | 1        |
| 18   | 16-989-01  | Clutch                            | 1        |
| *    | 16-967     | Silicone - Carbon Seal Kit        |          |
|      | 16-966-15  | Pump Only                         |          |

### **NOTE:**

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

# 16-037 REAR AXLE DRAWING



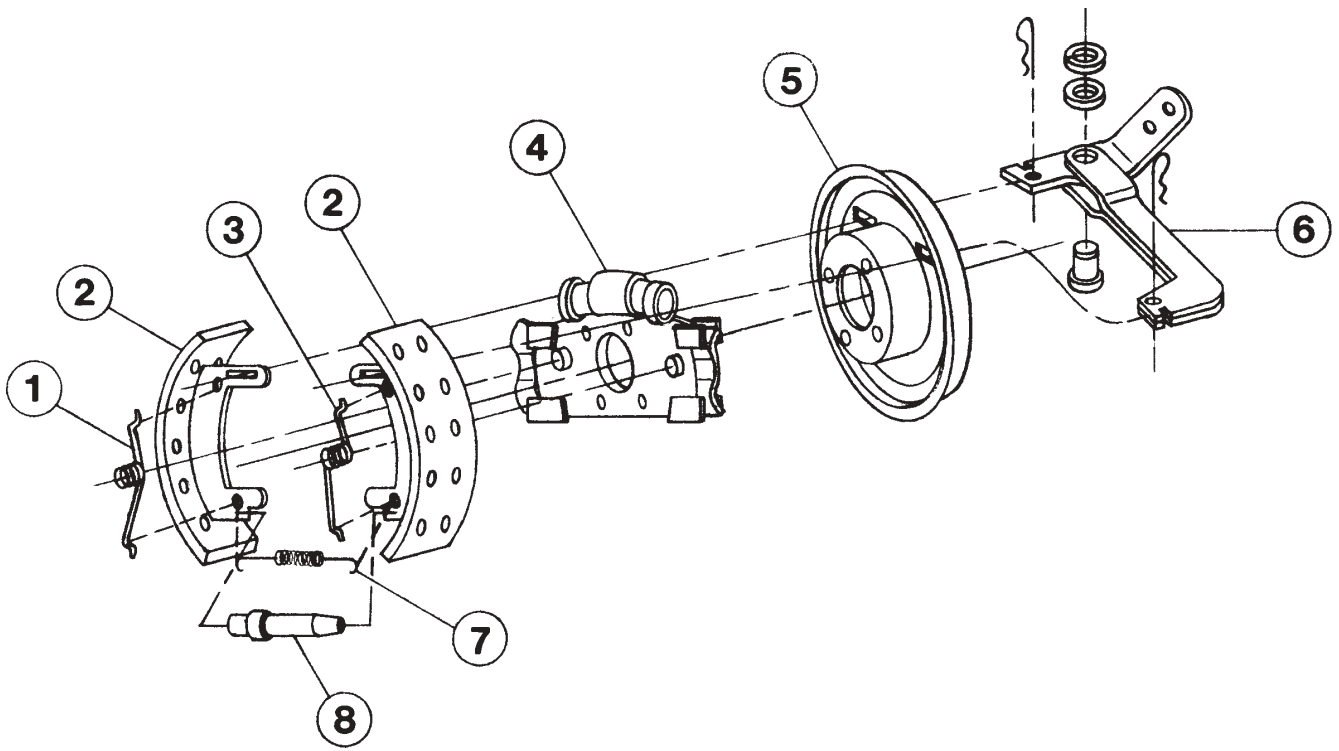
Parts

## 16-037 REAR AXLE PARTS LIST

| REF# | PART#     | DESCRIPTION   | QUANTITY    |
|------|-----------|---|-------------|
| 1    | 16-510    | Wheel Bolt  | 10          |
|      | 16-562    | Lock Nut  | 2           |
| 2    | 16-511    | Axle Shaft (Left and Right)   | 2           |
| 3    | 16-513    | Oil Seal  | 2           |
| 4    |           | Part of Brake Dust Shield   |             |
| 5    | 16-518    | RTV Gasket Eliminator (Loctite Brand)   | As Required |
| 6    | 16-515    | Bearing   | 2           |
| 7    | 16-516    | Wheel Bearing Retainer Ring   | 2           |
| 8    | 16-519    | Oil Seal  | 2           |
| 9    | 16-495    | Pinion Mate   | 2           |
| 10   | 16-496    | Thrust Washer   | 2           |
| 11   | 16-494    | Side Gear   | 2           |
| 12   | 16-493    | Thrust Washer   | 2           |
| 13   | 16-501    | Carrier   | 1           |
| 14   | 16-502    | Oil Plug  | 2           |
| 15   | 16-503    | Sleeve Spacer   | 1           |
| 16   | 16-504    | Shim (Set of 4)   | 2-4         |
| 17   | 16-506    | Bearing Cone  | 1           |
| 18   | 16-508    | Oil Seal  | 1           |
| 19   | 16-816    | Flat Washer   | 1           |
| 20   | HNA-58-18 | Axle Nut $\frac{5}{8}$ - 18   | 1           |
| 21   | HP-18-150 | Cotter Pin $\frac{1}{8}$ x $1\frac{1}{2}$                                       | 1           |
| 22   | 16-509    | End Yoke  | 1           |
| 23   | 16-507    | Shim  | 1           |
| 24   | 16-505    | Bearing Cup   | 1           |
| 25   | 16-489    | Drive Gear Screw  | 14          |
| 26   | 16-488    | Shim (Set of 4)   | 4-6         |
| 27   | 16-487    | Bearing Cone  | 2           |
| 28   | 16-492    | Pinion Mate Shaft   | 1           |
| 29   | 16-486    | Bearing Cup   | 2           |
| 30   |           | Bearing Cap   |             |
| 31   | 16-484    | Bearing Cup Screw   | 4           |
| 32   | 16-481    | Vent Assembly   | 1           |
| 33   | 16-963    | Bolt Kit<br>(Includes Bolt, Washer, and Nut (Replace all 8 when replacing one)) | 8           |
| 34   | 18-069    | Plug $\frac{1}{2}$ NPT  | 1           |
| 35   | 16-480    | Rear Axle Housing   | 1           |
| 36   | 16-815    | Housing Bolt  | 8           |
|      | 16-561    | Hex Nut   | 8           |
|      | 16-563    | Lockwasher  | 8           |
| 37   | 16-482    | RTV Sealant   | As Required |
| 38   | 16-490    | Differential Case   | 1           |
| 39   | 16-491    | Pinion Lock Pin   | 1           |
| 40   | 16-497    | Gear and Pinion Assembly 12.25:1 Ratio (Matched Set)                            | 1           |
| 41   | 16-498    | Bearing Cone  | 1           |
| 42   | 16-499    | Bearing Cup   | 1           |
| 43   | 16-500    | Spacer (Set of 3)   | 2-4         |

*16-037 Includes Brakes and Drums*

# BRAKE ASSEMBLY DRAWING



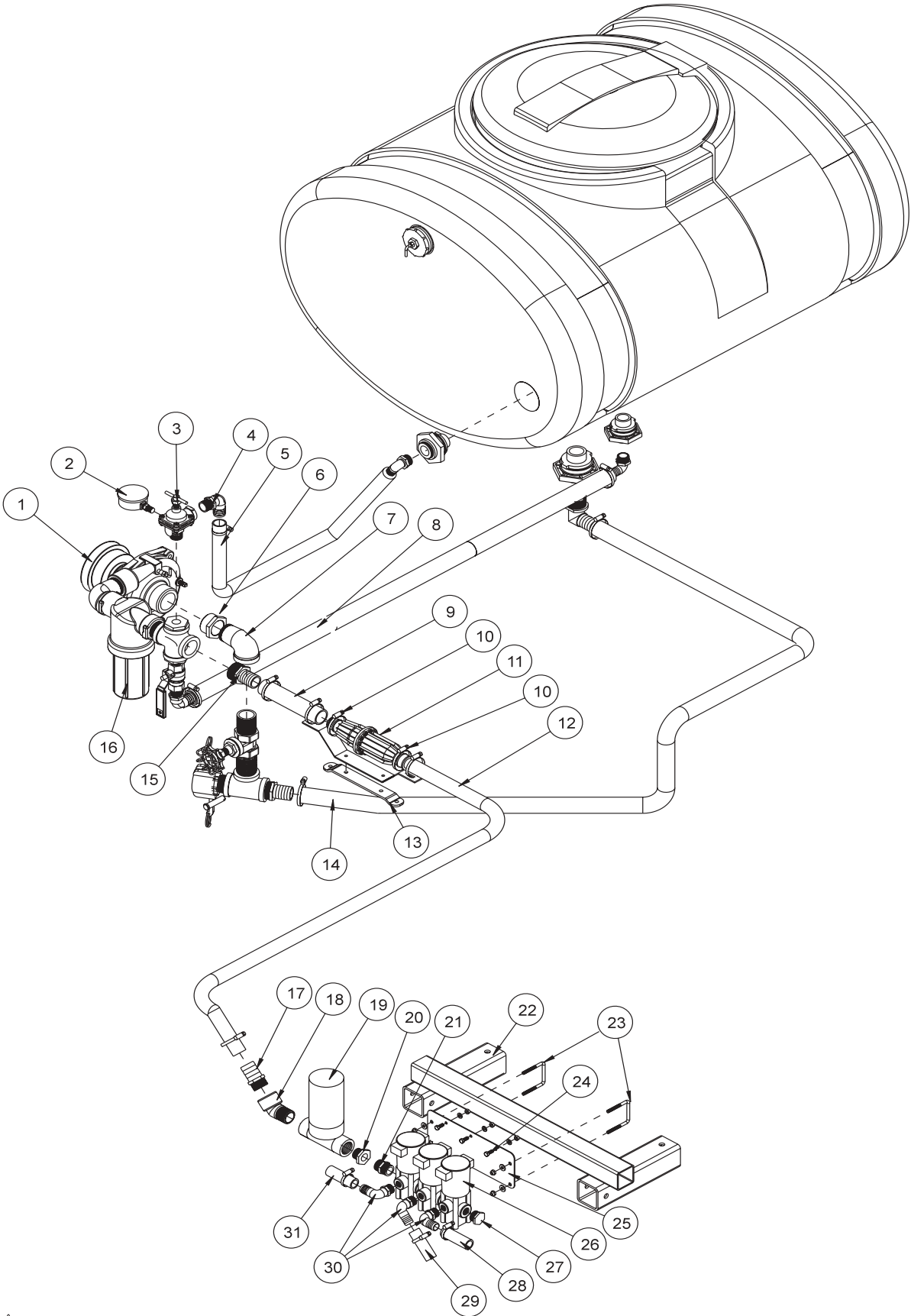
Parts

## BRAKE ASSEMBLY PARTS LIST

| REF# | PART#     | DESCRIPTION                           | QUANTITY        |
|------|-----------|---------------------------------------|-----------------|
| 1    | 16-704    | Shoe Return Spring (Green)            | 1               |
| 2    | 16-725    | Shoe and Lining Kit                   | 2 sets required |
| 3    | 16-705    | Shoe Return Spring (Red)              | 1               |
| 4    | 16-723    | Spider Torque Kit                     | 1               |
| 5    | 16-709    | Dust Shield and Bearing Retainer      | 1               |
| 6    | 16-713    | Brake Lever Kit (Right or Left)       | 1               |
| 7    | 16-719    | Adjusting Spring                      | 1               |
| 8    | 16-720    | Adjusting Screw Kit                   | 1               |
|      | 16-514    | Left Brake Assembly (part of 16-037)  | 1               |
|      | 16-554    | Right Brake Assembly (part of 16-037) | 1               |
|      | 16-559    | Brake Drum (part of 16-037)           | 2               |
|      | 16-723-01 | Cylinder Kit (Includes Boot and Cup)  | 2 per side      |

1. For Left brake, assembly with star wheel of adjusting screw (Ref# 8) towards the front of the brake (as shown), opposite for Right brake.
2. Red Spring- Assemble to front of brake on right side assembly, opposite for left.
3. Green Spring - Assemble to rear of brake on right side assembly, opposite for left.
4. Brake actuating lever (Ref# 6) shown for right assembly, reverse for left assembly. Bent arm stays up, double arm switches to forward.

1602P PLUMBING DRAWING(RAVEN 440)

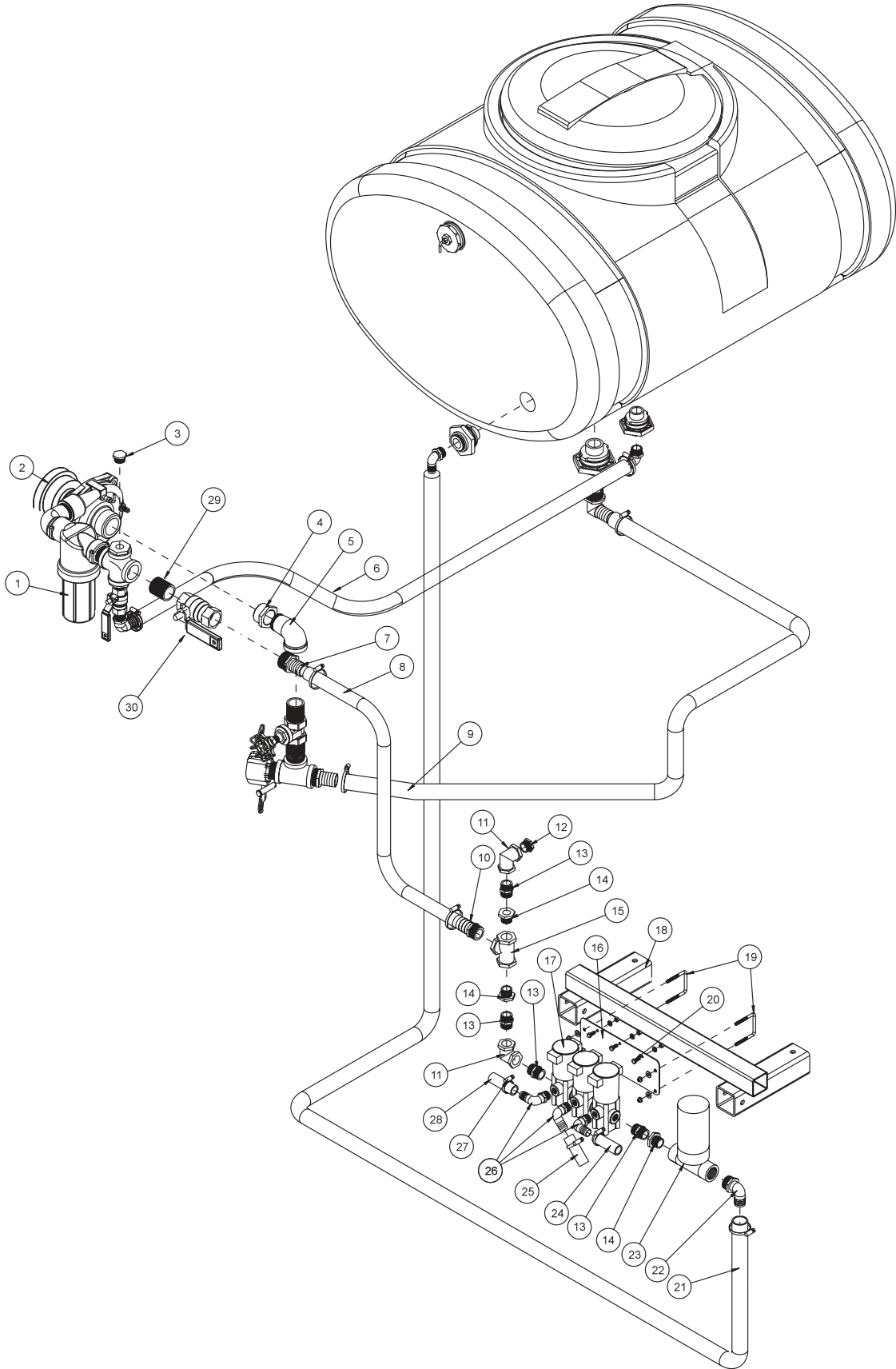


Accessories

## 1602P PLUMBING PARTS LIST

| REF# | PART#         | DESCRIPTION  | QUANTITY |
|------|---------------|--|----------|
| 1    | 16-989        | Hypro® Pump  | 1        |
| 2    | 16-281        | Liquid Filled Gauge  | 1        |
| 3    | 16-034        | Throttling Valve   | 1        |
|      | 16-034-01     | Spare Parts Kit (for 16-034)   | 1        |
| 4    | 16-155        | Elbow 3/4 MPT x 1 HB   | 1        |
| 5    | 8896-33       | Discharge Hose 1"  | 1        |
|      | 18-222        | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 <sup>1</sup> / <sub>2</sub>                       | 2        |
| 6    | 16-825        | Reducer Bushing 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>4</sub>                  | 1        |
| 7    | 15-385        | Elbow 1 <sup>1</sup> / <sub>4</sub>  | 2        |
| 8    | 8896-42       | Discharge Hose 1"  | 1        |
|      | 18-222        | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 <sup>1</sup> / <sub>2</sub>                       | 2        |
| 9    | 8897-15       | Discharge Hose 1 <sup>1</sup> / <sub>4</sub> "   | 1        |
|      | 18-116        | Hose Clamp HS-24   | 2        |
| 10   | 18-116        | Hose Clamp HS-24   | 2        |
| 11*  | 16-456        | Flow Meter   | 1        |
|      | 16-456-08     | Mounting Bracket   | 1        |
| 12   | 8897-30       | Discharge Hose 1 <sup>1</sup> / <sub>4</sub>   | 1        |
|      | 18-116        | Hose Clamp HS-24   | 2        |
| 13   | 15-327        | Flow Meter Mount   | 1        |
|      | HB-516-18-100 | Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1   | 2        |
|      | HNTL-516-18   | Lock Nut <sup>5</sup> / <sub>16</sub> - 18   | 2        |
| 14   | 8889-22       | Suction Hose 1 <sup>1</sup> / <sub>4</sub>   | 1        |
|      | 18-116        | Hose Clamp HS-24   | 2        |
| 15   | 16-161        | Fitting 1 <sup>1</sup> / <sub>4</sub> MPT x 1 <sup>1</sup> / <sub>4</sub> HB                   | 1        |
| 16   | 14-371        | Strainer   | 1        |
| 17   | 16-159        | Fitting 1 MPT X 1 <sup>1</sup> / <sub>4</sub> HB   | 1        |
| 18   | 16-971        | 45° Elbow 1 FPT x 1 MPT  | 1        |
| 19*  | 16-524        | Motorized Control Valve  | 1        |
| 20   | 16-163        | Reducer <sup>3</sup> / <sub>4</sub> FPT x 1 MPT  | 1        |
| 21   | 16-158        | Close Nipple <sup>3</sup> / <sub>4</sub> MPT x <sup>3</sup> / <sub>4</sub> MPT                 | 1        |
| 22   |               | Main Frame   |          |
| 23   | 10-194        | U-Bolt   | 2        |
|      | HNTL-14-20    | Lock Nut <sup>1</sup> / <sub>4</sub> -20   | 4        |
|      | HW-14         | Washer <sup>1</sup> / <sub>4</sub>   | 4        |
| 24   | HBM-6-1-16    | Metric Bolt M6 - 1.00 x 16   | 3        |
|      | HNM-6         | Metric Nut M6  | 3        |
|      | HWLM-6        | Metric Lockwasher M6   | 3        |
| 25   | 14-342        | Solenoid Mount   | 1        |
| 26   | 14-348        | Solenoid Valve   | 1        |
| 27   | 16-166        | Hex Plug <sup>3</sup> / <sub>4</sub> MPT   | 1        |
| 28   | 8887-36.5     | Orange PVC Hose <sup>3</sup> / <sub>4</sub> x 34 <sup>1</sup> / <sub>2</sub> " (to right boom) | 1        |
|      | 18-040        | Hose Clamp HS-12   | 1        |
| 29   | 8887-28       | Orange PVC Hose <sup>3</sup> / <sub>4</sub> x 28" (to center boom)                             | 1        |
|      | 18-040        | Hose Clamp HS-12   | 1        |
| 30   | 16-186        | Elbow <sup>1</sup> / <sub>2</sub> MPT x <sup>3</sup> / <sub>4</sub> HB                         | 3        |
| 31   | 8887-42       | Orange PVC Hose <sup>3</sup> / <sub>4</sub> x 42" (to left boom)                               | 1        |
|      | 18-040        | Hose Clamp HS-12   | 1        |
| *    | 15-365        | Raven 440 Computer with Accessories (includes all * items)                                     |          |

1604P PLUMBING DRAWING (RAVEN 203)



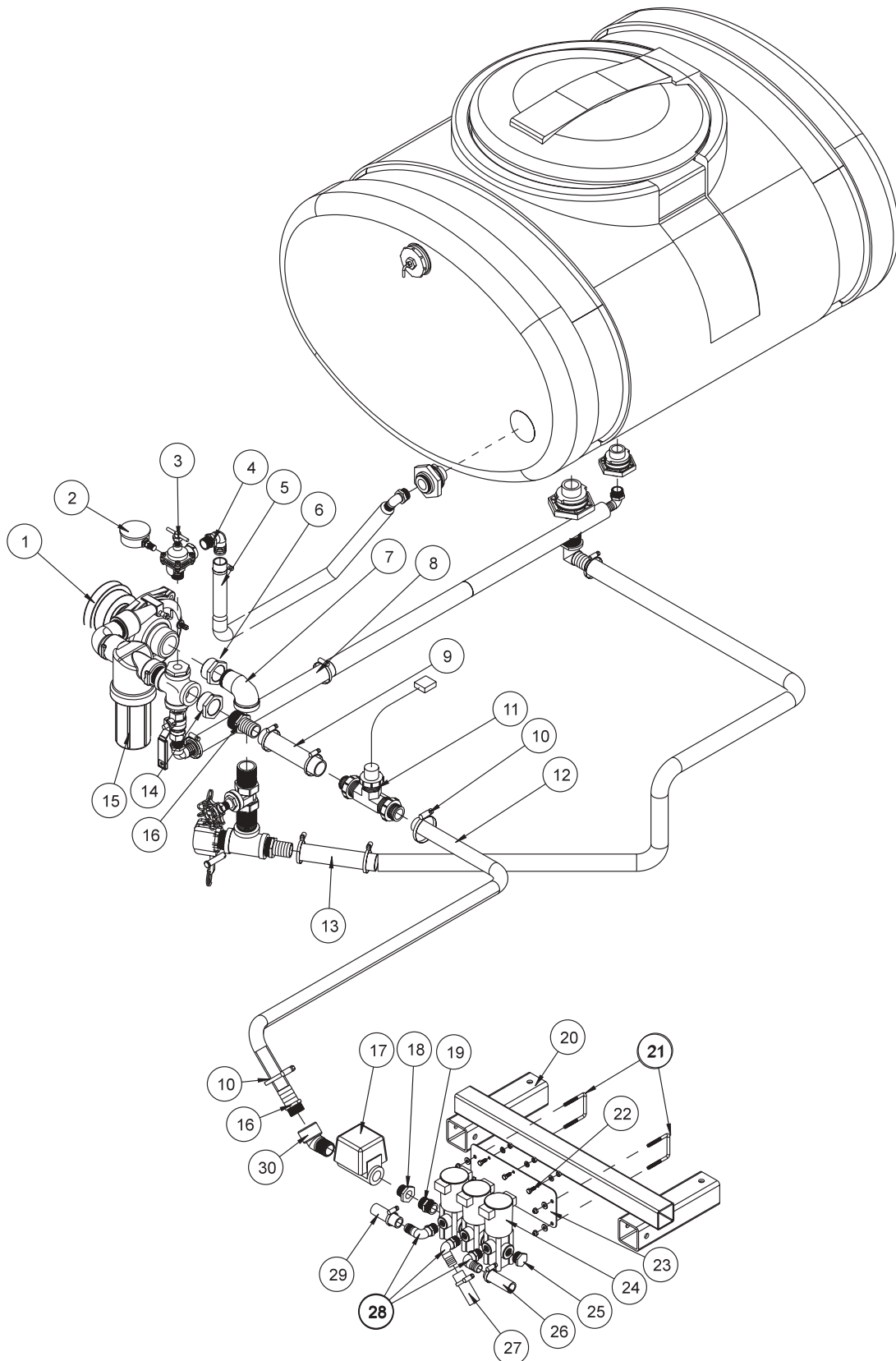
Accessories



# 1604P PLUMBING PARTS LIST

| REF# | PART#      | DESCRIPTION                                       | QUANTITY |
|------|------------|---|----------|
| 1    | 14-371     | Strainer  | 1        |
| 2    | 16-989     | Hypro® Pump                                       | 1        |
| 3    | 16-166     | Hex Plug 3/4 MPT                                  | 1        |
| 4    | 16-825     | Reducer Bushing 1 1/2 x 1 1/4                     | 1        |
| 5    | 15-385     | Elbow 1 1/4                                       | 1        |
| 6    | 8896-42    | Discharge Hose 1" x 42"                           | 1        |
|      | 18-222     | Hose Clamp 13/16 x 1 1/2                          | 2        |
| 7    | 16-161     | Fitting 1 1/4 MPT x 1 1/4 HB                      | 1        |
| 8    | 8897-50    | Discharge Hose 1 1/4" x 50"                       | 1        |
|      | 18-116     | Hose Clamp HS-24                                  | 2        |
| 9    | 8889-22    | Suction Hose 1 1/4 x 22"                          | 1        |
|      | 18-116     | Hose Clamp HS-24                                  | 2        |
| 10   | 16-159     | Fitting 1 MPT x 1 1/4 HB                          | 1        |
| 11   | 16-151     | 90° Elbow 3/4 FPT                                 | 2        |
| 12   | 16-288     | Reducer Bushing 3/4 x 1/4                         | 1        |
| 13   | 16-158     | Close Nipple 3/4                                  | 4        |
| 14   | 16-163     | Reducer Bushing 1 x 3/4                           | 3        |
| 15   | 16-183     | Tee FPT 1 x 1 x 1                                 | 1        |
| 16   | 14-342     | Solenoid Mount                                    | 1        |
| 17   | 14-348     | Solenoid Valve                                    | 1        |
| 18   |            | Main Frame  |          |
| 19   | 10-194     | U- Bolt   | 2        |
|      | HW-14      | Washer 1/4  | 4        |
|      | HNTL-14-20 | Lock Nut 1/4 - 20                                 | 4        |
| 20   | HBM-6-1-16 | Metric Bolt M6 - 1 x 16                           | 3        |
|      | HWLM-6     | Metric Lockwasher M6                              | 3        |
|      | HNM-6      | Metric Nut M6                                     | 3        |
| 21   | 8896-70    | Discharge Hose 1" x 70"                           | 1        |
|      | 18-222     | Hose Clamp 13/16 x 1 1/4                          | 2        |
| 22   | 16-164     | Elbow 1 MPT x 1 HB                                | 1        |
| 23*  | 16-866     | Motorized Control Valve                           | 1        |
| 24   | 8887-36.5  | Orange PVC Hose 3/4" x 36 1/2" (to right boom)    | 1        |
| 25   | 8887-28    | Orange PVC Hose 3/4" x 28" (to center boom)       | 1        |
| 26   | 16-186     | Elbow 1/2 MPT x 3/4 HB                            | 3        |
| 27   | 18-040     | Hose Clamp HS-12                                  | 3        |
| 28   | 8887-42    | Orange PVC Hose 3/4" x 42" (to left Boom)         | 1        |
| 29   | 18-160     | Close Nipple 1 1/4"                               | 1        |
| 30   | 18-279     | Ball Valve 1 1/4"                                 | 1        |
| *    | 16-852     | Raven 203 Computer with Accessories (all * items) |          |

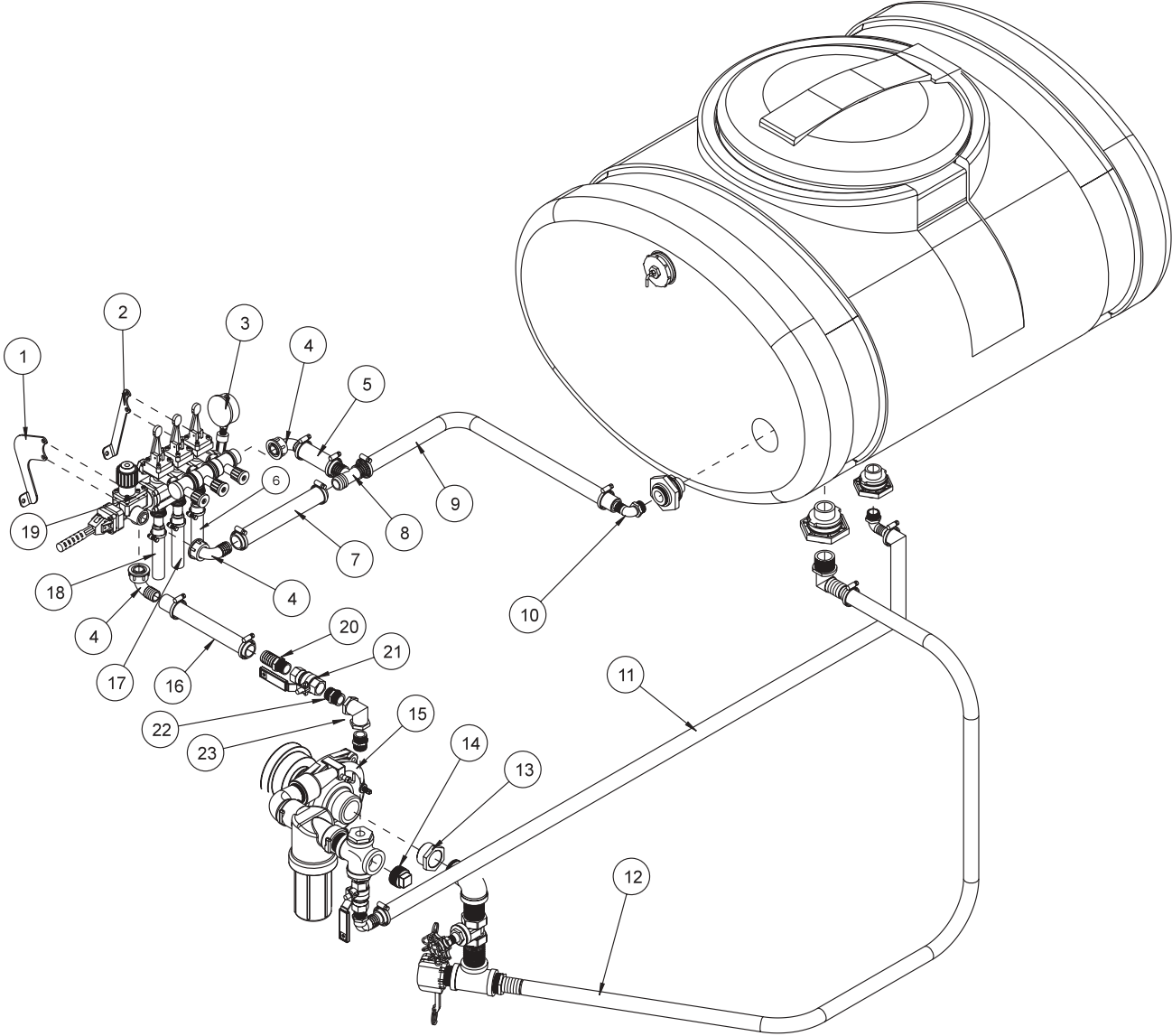
# 1607P PLUMBING DRAWING (TEE JET 844)



Accessories

# 1607P PLUMBING PARTS LIST

| REF# | PART#      | DESCRIPTION  | QUANTITY |
|------|------------|--|----------|
| 1    | 16-989     | Hypro® Pump  | 1        |
| 2    | 16-281     | Liquid Filled Gauge  | 1        |
| 3    | 16-034     | Throttling Valve   | 1        |
|      | 16-034-01  | Spare Parts Kit (for 16-034)                                       | 1        |
| 4    | 16-155     | Elbow 3/4 MPT x 1 HB   | 1        |
| 5    | 8896-33    | Discharge Hose 1"  | 1        |
|      | 18-222     | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 6    | 16-825     | Reducer Bushing 1 1/2 x 1 1/4                                      | 1        |
| 7    | 15-385     | Elbow 1 1/4  | 2        |
| 8    | 8896-42    | Discharge Hose 1"  | 1        |
|      | 18-222     | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 9    | 8896-16    | Discharge Hose 1"  | 1        |
|      | 18-116     | Hose Clamp HS-24   | 2        |
| 10   | 18-116     | Hose Clamp HS-24   | 2        |
| 11*  | 15-515     | Flow Meter   | 1        |
|      | HLC-A-200  | Loom Clamp   | 2        |
| 12   | 8896-30    | Discharge Hose 1"  | 1        |
| 13   | 8889-22    | Suction Hose 1 1/4   | 1        |
|      | 18-116     | Hose Clamp HS-24   | 2        |
| 14   | 16-824     | Reducer 1 1/4 MPT x 1  | 1        |
| 15   | 14-371     | Strainer   | 1        |
| 16   | 16-828     | Fitting 1 MPT X 1 HB   | 2        |
| 17*  | 16-986     | Pressure Regulating Valve  | 1        |
| 18   | 16-163     | Reducer 3/4 FPT x 1 MPT  | 1        |
| 19   | 16-158     | Close Nipple 3/4 MPT x 3/4 MPT                                     | 1        |
| 20   |            | Main Frame   |          |
| 21   | 10-194     | U-Bolt   | 2        |
|      | HNTL-14-20 | Lock Nut 1/4 - 20  | 4        |
|      | HW-14      | Washer 1/4   | 4        |
| 22   | HBM-6-1-16 | Metric Bolt M6 - 1.00 x 16   | 3        |
|      | HNM-6      | Metric Nut M6  | 3        |
|      | HWLM-6     | Metric Lockwasher M6   | 3        |
| 23   | 14-342     | Solenoid Mount   | 1        |
| 24   | 14-348     | Solenoid Valve   | 1        |
| 25   | 16-166     | Hex Plug 3/4 MPT   | 1        |
| 26   | 8887-36.5  | Orange PVC Hose 3/4 x 34 1/2" (to right boom)                      | 1        |
|      | 18-040     | Hose Clamp HS-12   | 1        |
| 27   | 8887-28    | Orange PVC Hose 3/4 x 28" (to center boom)                         | 1        |
|      | 18-040     | Hose Clamp HS-12   | 1        |
| 28   | 16-186     | Elbow 1/2 MPT x 3/4 HB   | 3        |
| 29   | 8887-42    | Orange PVC Hose 3/4 x 42" (to left boom)                           | 1        |
|      | 18-040     | Hose Clamp HS-12   | 1        |
| 30   | 16-971     | 45° Elbow  | 1        |
| *    | 16-984     | Spray Systems 844 Computer with Accessories (includes all * items) |          |

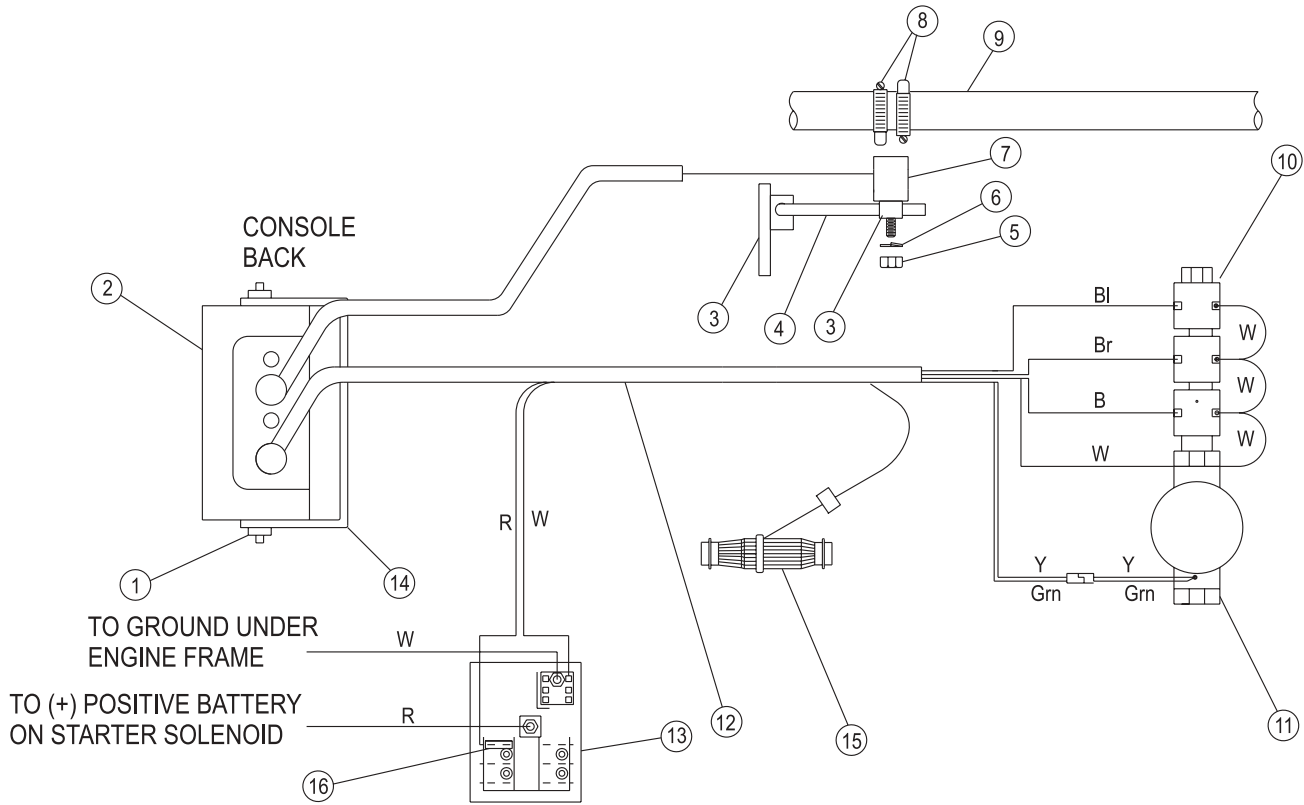


Accessories

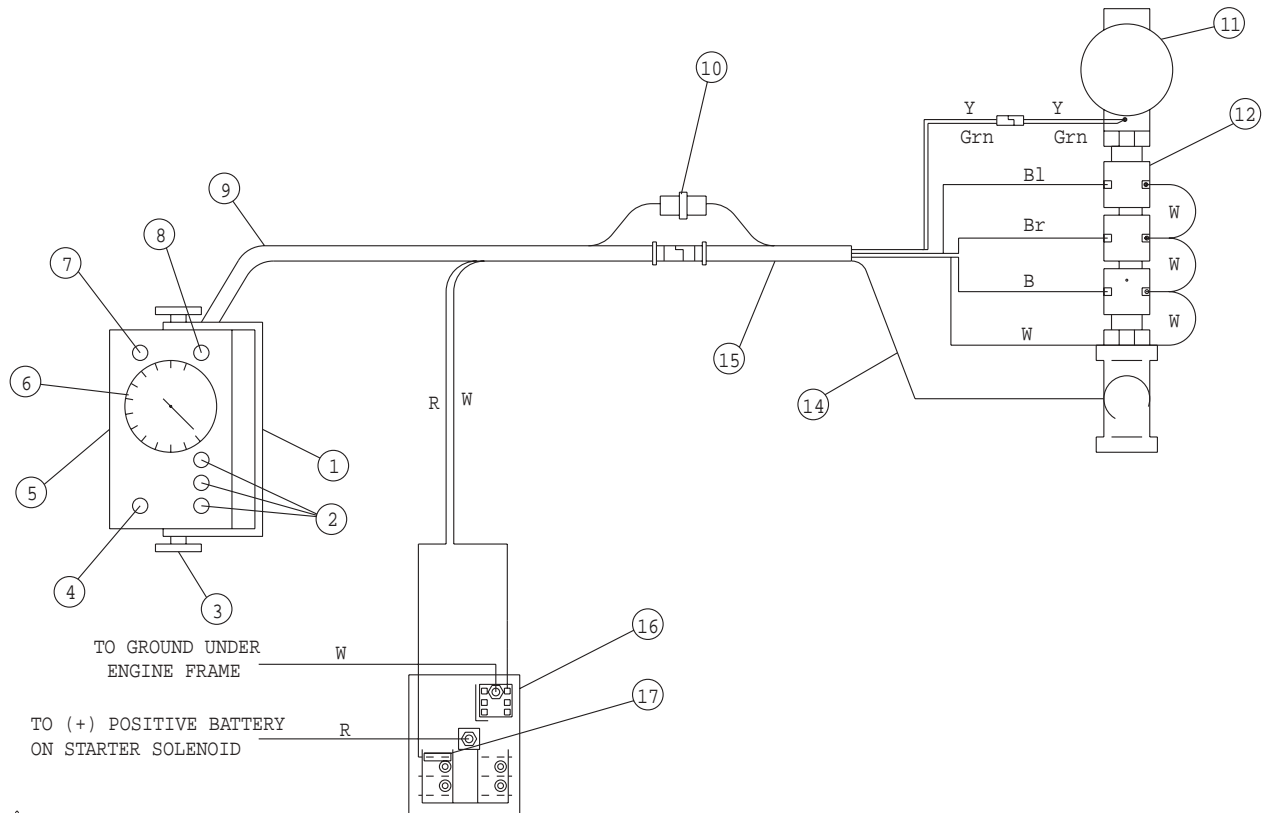
## 1610P PLUMBING PARTS LIST

| REF# | PART#     | DESCRIPTION  | QUANTITY |
|------|-----------|--|----------|
| 1    | 10-263    | Front Valve Bracket  | 1        |
| 2    | 10-264    | Rear Valve Bracket   | 1        |
| 3    | 16-281    | Liquid Filled Gauge  | 1        |
| 4    | 16-268-13 | 90° Elbo x 1HB with Nut (comes with 10-268 Valve)                  | 3        |
| 5    | 8896-4    | Discharge Hose 1" x 4"   | 1        |
|      | 18-222    | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 6    | 8887-122  | Orange PVC Hose <sup>3</sup> / <sub>4</sub> " x 122" (right boom)  | 1        |
|      | 18-040    | Hose Clamp HS-12   | 1        |
| 7    | 8896-10   | Discharge Hose 1" x 10"  | 1        |
|      | 18-222    | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 8    | 10-269    | Plastic Tee 1 x 1 x 1HB  | 1        |
| 9    | 8896-20   | Discharge Hose 1" x 20"  | 1        |
|      | 18-222    | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 10   | 16-155    | Elbow <sup>3</sup> / <sub>4</sub> MPT x 1 HB                       | 1        |
| 11   | 8896-42   | Discharge Hose 1" x 42"  | 1        |
|      | 18-222    | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 12   | 8889-22   | Suction Hose 1 1/4" x 22"  | 1        |
|      | 18-116    | Hose Clamp HS-24   | 2        |
| 13   | 16-825    | Reducer Bushing 1 1/2 x 1 1/4                                      | 1        |
| 14   | 18-098    | Pipe Plug  | 1        |
| 15   | 16-989    | Hypro® Pump  | 1        |
| 16   | 8896-32.5 | Discharge Hose 1" x 32 1/2"  | 1        |
|      | 18-222    | Hose Clamp <sup>13</sup> / <sub>16</sub> x 1 1/2                   | 2        |
| 17   | 8887-109  | Orange PVC Hose <sup>3</sup> / <sub>4</sub> " x 109" (center boom) | 1        |
|      | 18-040    | Hose Clamp HS-12   | 1        |
| 18   | 8887-130  | Orange PVC Hose <sup>3</sup> / <sub>4</sub> " x 130" (left boom)   | 1        |
|      | 18-040    | Hose Clamp HS-12   | 1        |
| 19   | 10-268    | 3 Way Manual Valve   | 1        |
| 20   | 16-196    | Hose Barb <sup>3</sup> / <sub>4</sub> MPT x 1 HB                   | 1        |
| 21   | 16-859    | Ball Valve <sup>3</sup> / <sub>4</sub> Brass                       | 1        |
| 22   | 16-158    | Close Nipple <sup>3</sup> / <sub>4</sub>                           | 2        |
| 23   | 16-151    | Elbow FPT <sup>3</sup> / <sub>4</sub>                              | 1        |

# CONTROLS 1602P SYSTEM DRAWING (RAVEN 440)



# CONTROL 1604P SYSTEM DRAWING (RAVEN 203)



Accessories

## CONTROLS 1602P SYSTEM PARTS LIST

| REF# | PART#     | DESCRIPTION                                 | QUANTITY |
|------|-----------|---|----------|
| 1    | 16-558    | Mounting Knob                               | 2        |
| 2    | 16-525    | Console (only)                              | 1        |
|      | 16-234    | Computer Cover                              | 1        |
| 3*   | 15-370-03 | Turret Assembly                             | 2        |
| 4*   | 15-370-04 | Speed Sensor Rod                            | 1        |
| 5*   | HN-14-20  | Nut 1/4 - 20                                | 2        |
| 6*   | HWL-14    | Lockwasher 1/4                              | 2        |
| 7    | 16-883    | Magnetic Sensor                             | 1        |
| 8*   | 15-370-01 | Red Magnet Assembly north                   | 1        |
| *    | 15-370-02 | Black Magnet Assembly south                 | 1        |
| *    | 15-370-07 | Small Band Clamp                            | 2        |
| 9    | 14-370    | Drive Line (Spray Star)                     | 1        |
| 10   | 14-348    | Solenoid Valve                              | 1        |
| 11   | 16-524    | Motorized Control Valve                     | 1        |
| 12   | 15-369    | Console Control Cable                       | 1        |
| 13   | 33-271    | Fuse Block                                  | 1        |
| 14   | 10-237    | Mounting Bracket                            | 1        |
| 15   | 16-456    | Flow Meter                                  | 1        |
| 16   | 33-508    | Auto Blade Type Fuse 15 amp                 | 1        |
| *    | 15-370-08 | Drive Shaft Hardware Kit (for speed sensor) |          |

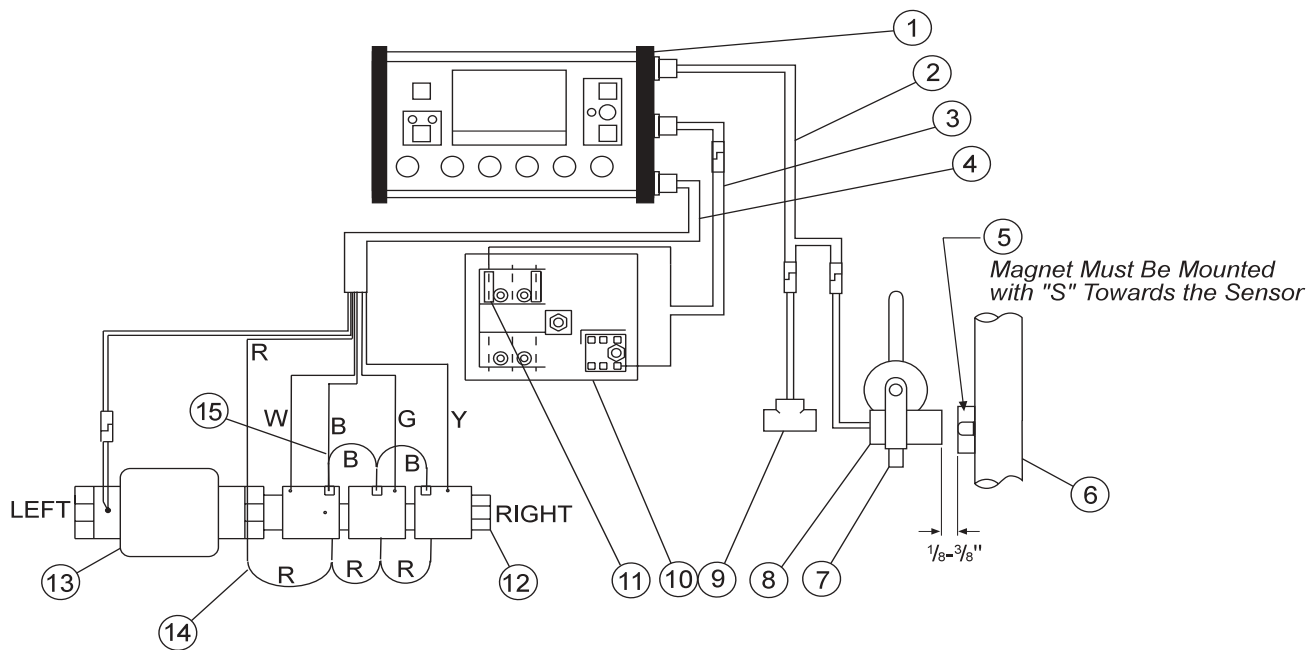
*Use Dielectric Grease On All Electrical Connections*

## CONTROL 1604P SYSTEM PARTS LIST

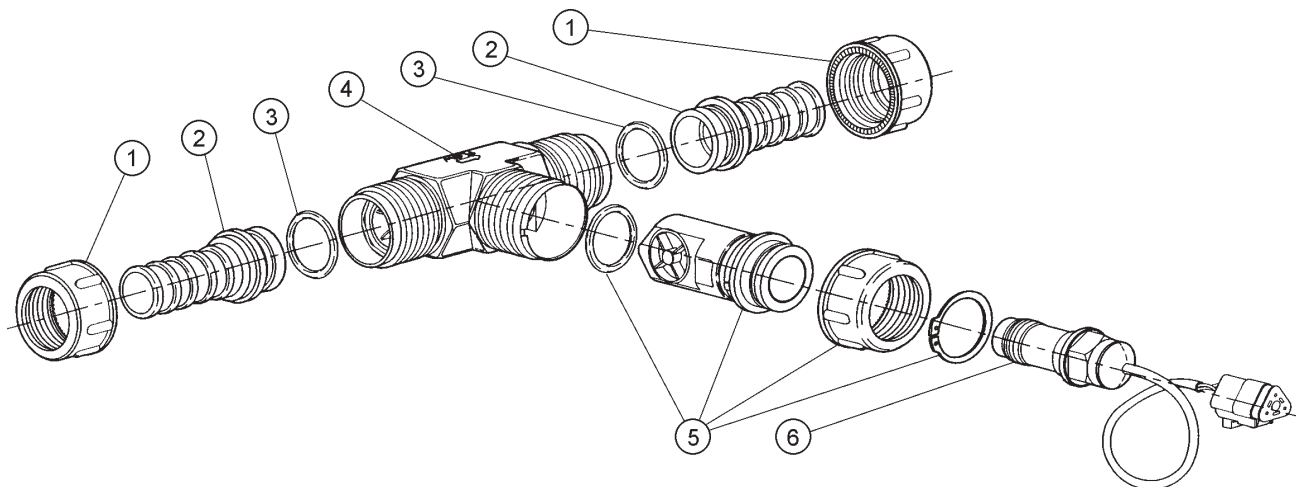
| REF# | PART#      | DESCRIPTION                                    | QUANTITY |
|------|------------|--|----------|
| 1    | *16-958-01 | Mounting Bracket                               | 1        |
| 2    | *16-898    | Boom Switch                                    | 3        |
| 3    | *16-900    | Mounting Knob                                  | 2        |
| 4    | *16-899    | Master Switch                                  | 1        |
| 5    | *16-958    | Console (only)                                 | 1        |
|      | *16-234    | Computer Cover                                 | 1        |
| 6    | *33-090-02 | Liquid Filled Pressure Gage                    | 1        |
| 7    | *16-958-02 | Fuse Holder                                    | 1        |
|      | *16-525-03 | Fuse 15 AMP                                    | 1        |
| 8    | *16-895    | Pressure Switch                                | 1        |
| 9    | *16-958-04 | Cable Assembly 8ft Enclosure Hook-Up           | 1        |
| 10   | *16-958-05 | Union Fitting                                  | 1        |
| 11   | 16-866     | Motorized Control Valve                        | 1        |
| 12   | 14-348     | Solenoid Valve                                 | 1        |
| 14   | 16-955     | Tubing   | 1        |
|      | 16-958-07  | Male Fitting                                   | 1        |
| 15   | 16-902     | Cable Assembly 72" Solenoid Hook-Up            | 1        |
| 16   | 33-271     | Fuse Block                                     | 1        |
| 17   | 33-508     | Auto Blade Type Fuse 15 amp                    | 1        |
| *    | 16-852     | 203 Sprayer Control Kit (includes all * items) | 1        |

*Use Dielectric Grease On All Electrical Connections*

# CONTROL 1607P SYSTEM DRAWING (TEE JET 844)



# 15-515 FLOW METER DRAWING



Accessories



## CONTROL 1607P SYSTEM PART LIST

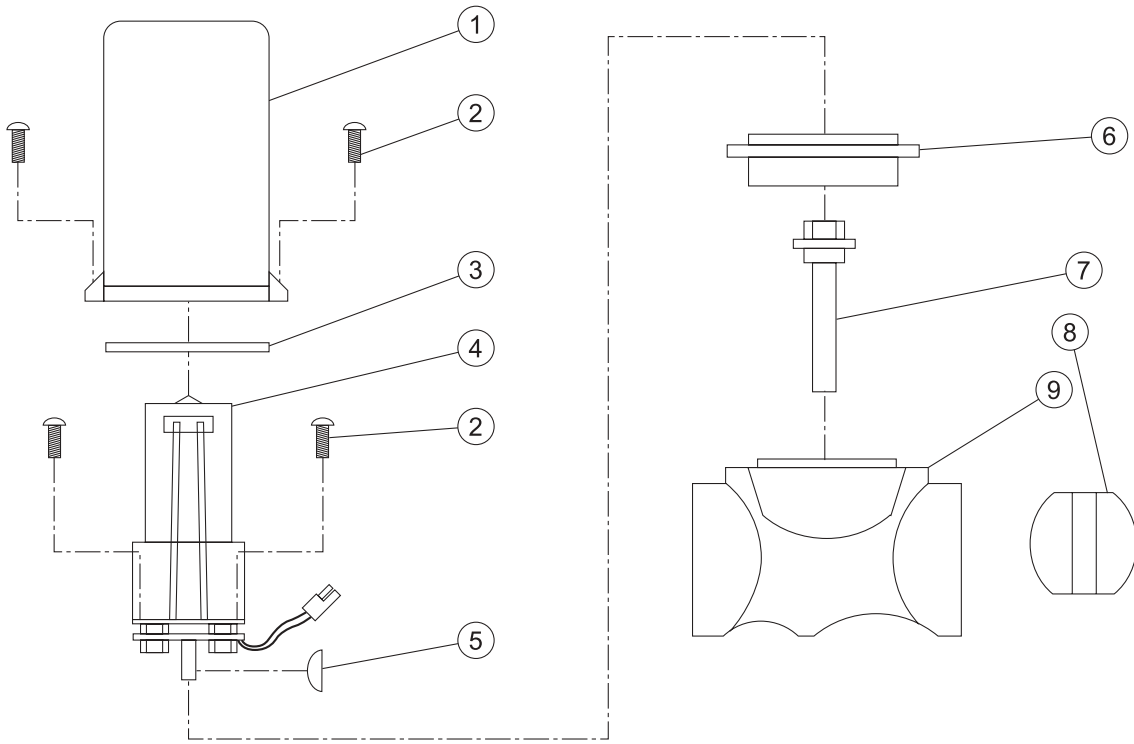
| REF# | PART#     | DESCRIPTION                                    | QUANTITY |
|------|-----------|--|----------|
| 1*   | 16-985    | Computer Console (Only)                        | 1        |
|      | 16-234    | Computer Cover                                 | 1        |
| 2*   | 10-286    | Direct Wiring Cable                            | 1        |
| 3    | 14-370    | Drive Line (Spray Star 1600P)                  | 1        |
| 4*   | 15-528-01 | Speed Sensor                                   | 1        |
| 5*   | 15-515    | Flow Meter                                     | 1        |
| 6    | 33-271    | Fuse Block                                     | 1        |
| 7    | 33-508    | Auto Blade Type Fuse 15Amp                     | 1        |
|      | 33-284    | Auto Blade Type Fuse 5 Amp                     | 1        |
| 8    | 14-348    | Solenoid Valve                                 | 1        |
| 9*   | 16-986    | Pressure Regulating Valve                      | 1        |
| 10   | 33-271    | Fuse Block                                     | 1        |
| 11   | 33-508    | Auto Blade Type Fuse, 5 Amp                    | 1        |
| 12*  | 14-348    | Solenoid Valve                                 | 1        |
| 13*  | 16-986    | Pressure Regulating Valve                      | 1        |
| 14   | 16-992    | Red Jumper Wire                                | 1        |
| 15   | 16-991    | Black Jumper Wire                              | 1        |
| *    | 16-984    | 844 Sprayer Control Kit (includes all * items) |          |

*Use Dielectric Grease On All Electrical Connections  
To reset circuit breaker on ball valve, you must disconnect power to the computer.*

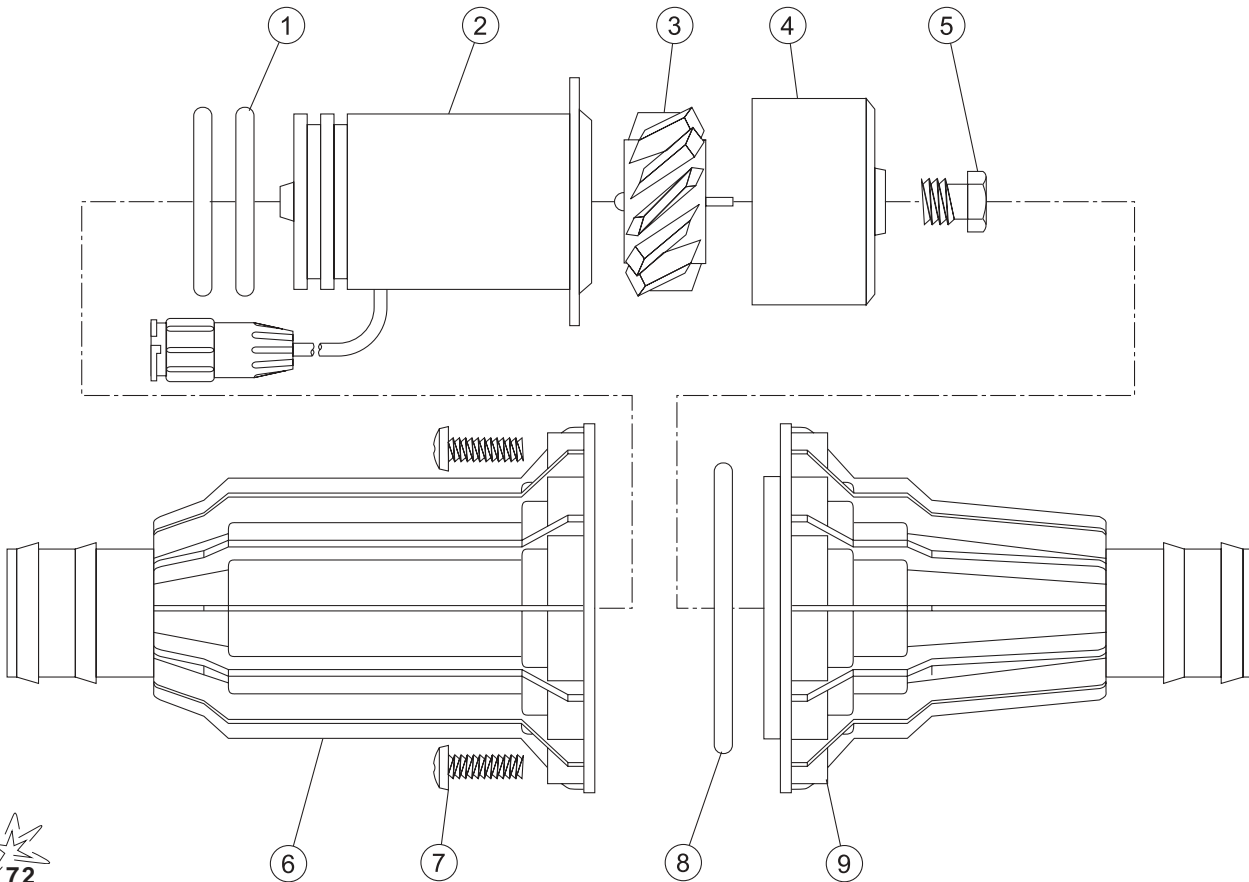
## 15-515 FLOWMETER PARTS LIST

| REF# | PART#     | DESCRIPTION             | QUANTITY |
|------|-----------|-------------------------|----------|
| 1*   | 15-515-02 | Nylon Ring Nut          | 2        |
| 2*   | 15-515-03 | Nylon Hose Barb         | 2        |
| 3*   | 15-515-04 | Viton O-ring            | 2        |
| 4    | 15-515-05 | Flow Meter Body         | 1        |
| 5    | 15-515-06 | Turbine Insert Assembly | 1        |
| 6    | 15-515-07 | Flow Meter Pickup       | 1        |
| *    | 15-515-01 | Hose Barb Assembly      |          |

# 16-524 AND 16-866 MOTORIZED CONTROL VALVE DRAWING



# 16-456 FLOWMETER DRAWING



Accessories

## 16-524 AND 16-866 MOTORIZED CONTROL VALVE PARTS LIST

| 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 (For 16-524 on 1602P) | 1        |
| 4*   | 16-866-01 | Motor Assembly (For 16-866 on 1604P) | 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 Mod.                      | 1        |
| *    | 16-524-05 | 1" Valve ISO-Body Kit                |          |

**WHEN SERVICING VALVE:**

Replace valve body with iso-body kit (16-524-05) if valve has been leaking internally.

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

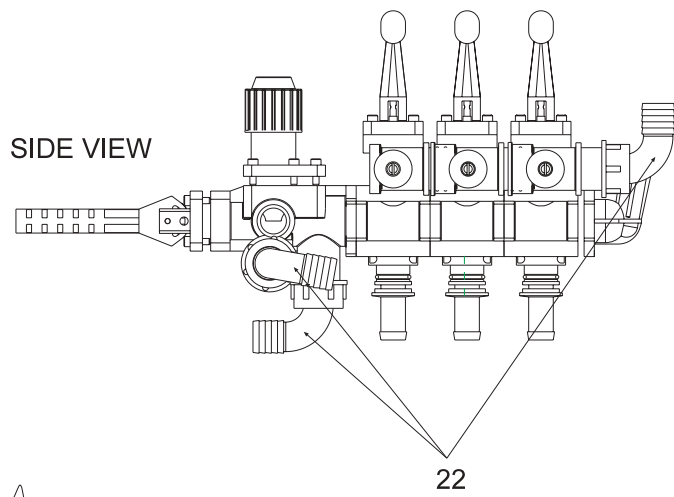
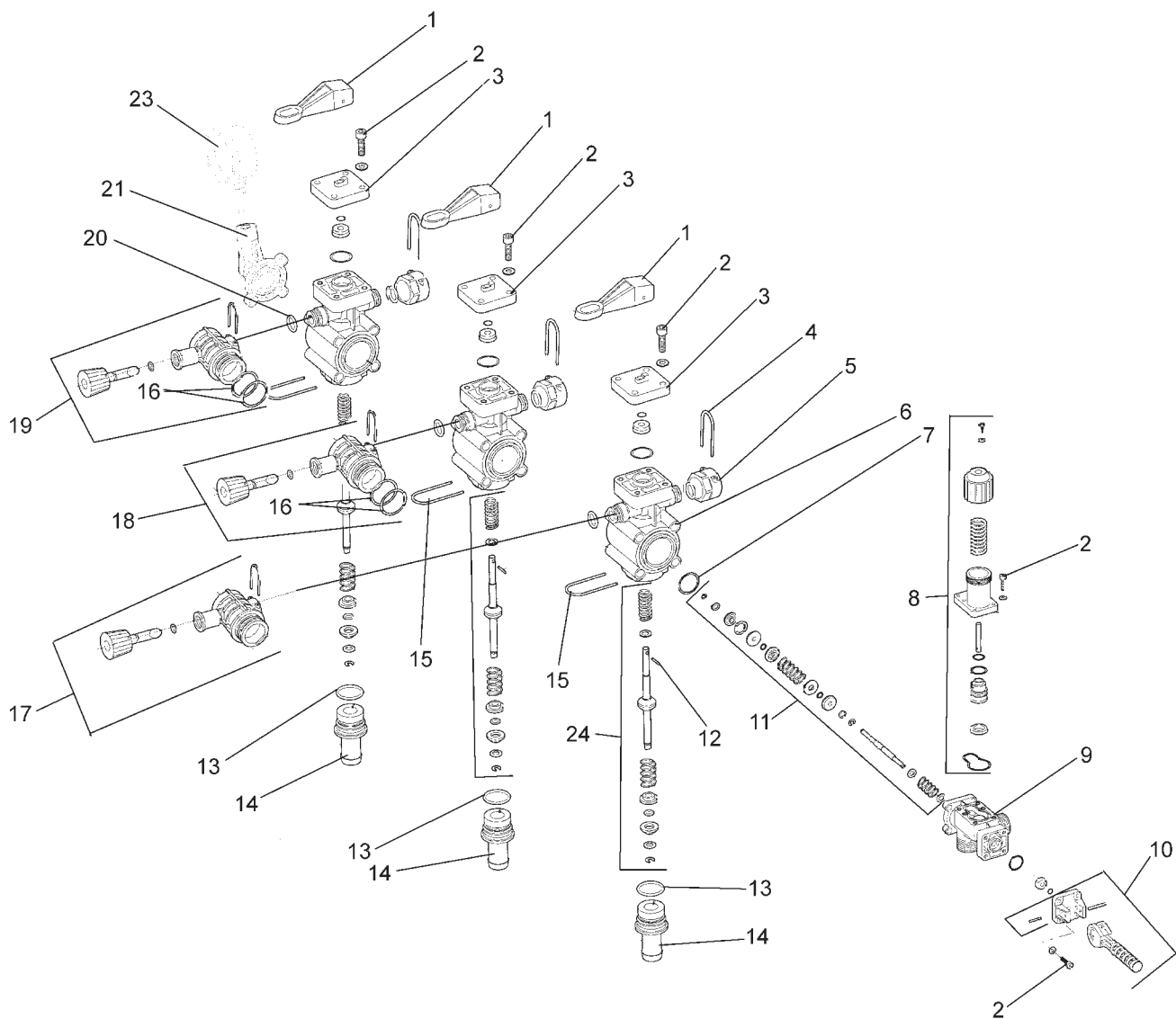
Before reassembling valve, remove the coupler shaft from the valve body. Apply Loctite to coupler shaft and woodruff key. Place the coupler shaft (Ref# 7) and the woodruff key (Ref# 5) onto the motor shaft. Plug motor into the valve connector coming from Sprayer Control Console. Check that the motor 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.

## 16-456 FLOW METER PARTS LIST

| REF# | PART#     | DESCRIPTION                        | QUANTITY |
|------|-----------|------------------------------------|----------|
| 1*   | 16-456-03 | O-Ring Viton                       | 2        |
| 2*   | 16-456-04 | RFM55 dual O-Ring XDCR assembly    | 1        |
| 3    | 16-456-05 | RFM55 turbine                      | 1        |
| 4    | 16-456-06 | Turbine hub/bearing assembly       | 1        |
| 5    | 16-143    | Turbine stud assembly              | 1        |
| 6    | 16-456-01 | Sensor housing                     | 1        |
| 7    | 16-456-02 | #10-32 x 3/4 stainless steel screw | 12       |
| 8    | 16-144    | O-Ring Viton                       | 1        |
| 9    | 16-456-07 | Hub housing with inserts           | 1        |
|      | 16-456-08 | Mounting bracket RFM 55            | 1        |
|      | 16-456-09 | Thread sealer                      | 1        |
| *    | 16-456-10 | O-Ring Transducer Kit              |          |

# 10-268 3-WAY MANUAL VALVE DRAWING

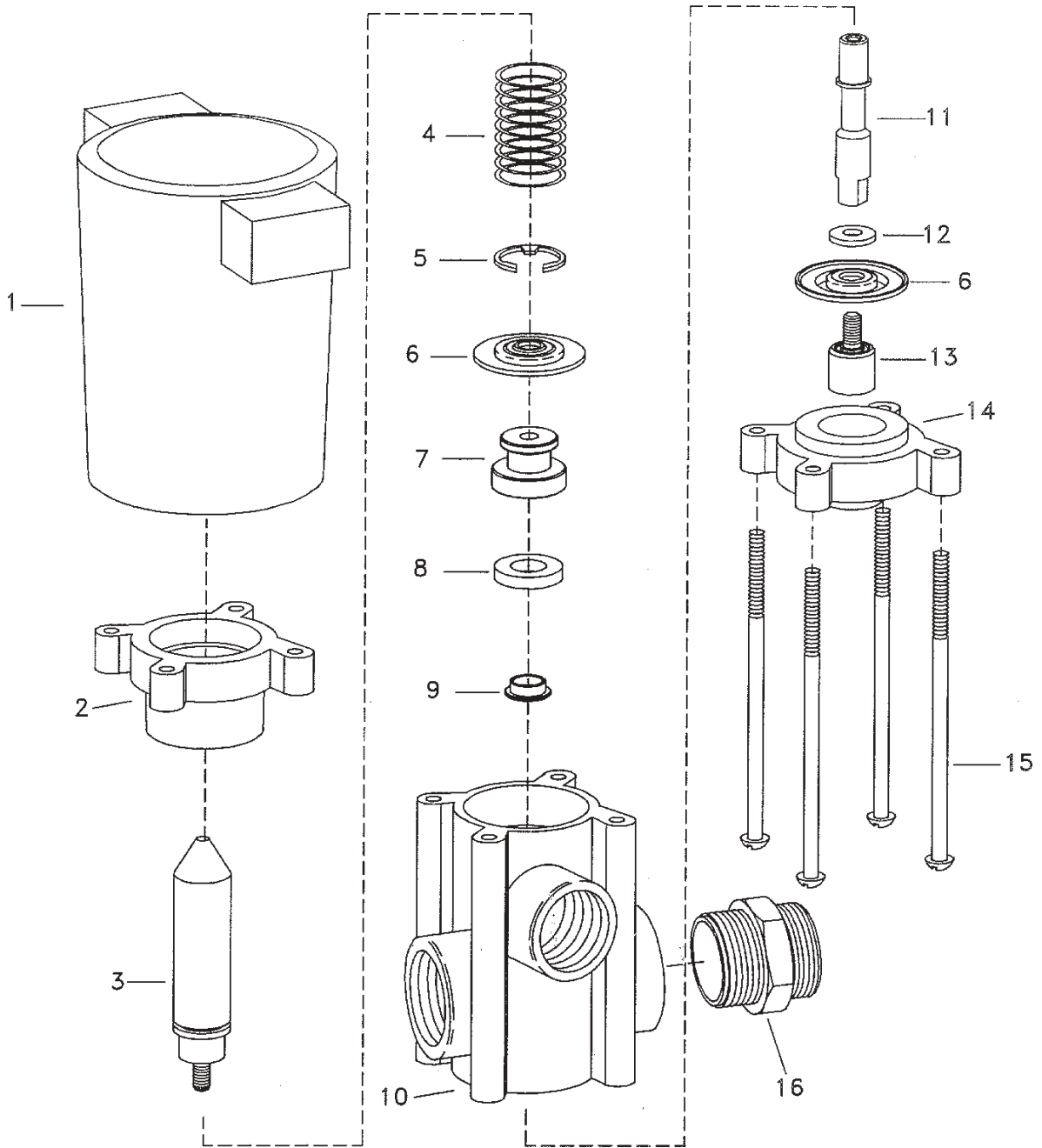


Accessories

## 10-268 3-WAY MANUAL VALVE PARTS LIST

| REF#      | PART#     | DESCRIPTION   | QUANTITY   |
|-----------|-----------|---|------------|
| 1         | 10-268-07 | Boom Lever  | 3          |
| 2         | 10-268-16 | Bolt and Washer                                     | 22         |
| 3         | 10-268-17 | Boom Lever Plate                                    | 3          |
| 4         | 10-268-06 | Spring Clip <sup>5/8</sup>                          | 6          |
| 5         | 10-268-05 | Cap   | 3          |
|           | 10-268-21 | O-Ring(included with 10-268-19 Seal Kit)            | 3          |
| 6         | 10-268-02 | Main Body   | 3          |
|           | 10-268-19 | Seal Kit  | 1 per body |
| 7         | 10-268-24 | O-Ring for Main Body                                | 3          |
| 8         | 10-268-08 | Main Pressure Adjust                                | 1          |
|           | 10-268-20 | Seal Kit  | 1          |
| 9         | 10-268-10 | Pressure Adjust Body                                | 1          |
| 10        | 10-268-09 | Main Boom Lever                                     | 1          |
| 11        | 10-268-18 | Master Boom Lever Guts                              | 1          |
| 12        | 10-268-25 | Boom Lever Pin                                      | 3          |
| 13        | 10-268-22 | O-Ring(included with 10-268-19 Seal Kit)            | 3          |
| 14        | 10-268-03 | Hose Barb <sup>3/4</sup>                            | 3          |
| 15        | 10-268-04 | Spring Clip <sup>7/8</sup>                          | 3          |
| 16        | 10-268-23 | O-Ring(included with 10-268-12 and 10-268-14)       | 4          |
| 17        | 10-268-11 | Boom Pressure Adjust(threaded end)                  | 1          |
| 18        | 10-268-12 | Boom Pressure Adjust(middle)                        | 1          |
| 19        | 10-268-14 | Boom Pressure Adjust(capped)                        | 1          |
| 20        | 10-268-21 | O-Ring  | 3          |
| 21        | 10-268-01 | Gage Elbow  | 1          |
| 22        | 10-268-13 | Elbow 90° 1" Hose Barb w/ Nut                       | 3          |
| 23        | 16-281    | Liquid Filled Gauge(not included with 10-268 valve) | 1          |
| 24        | 10-268-26 | Boom Lever Guts                                     | 3          |
| Not Shown | 10-268-15 | Tie Rod with Nuts and Washer                        | 4          |

# 14-348 SOLENOID VALVE DRAWING

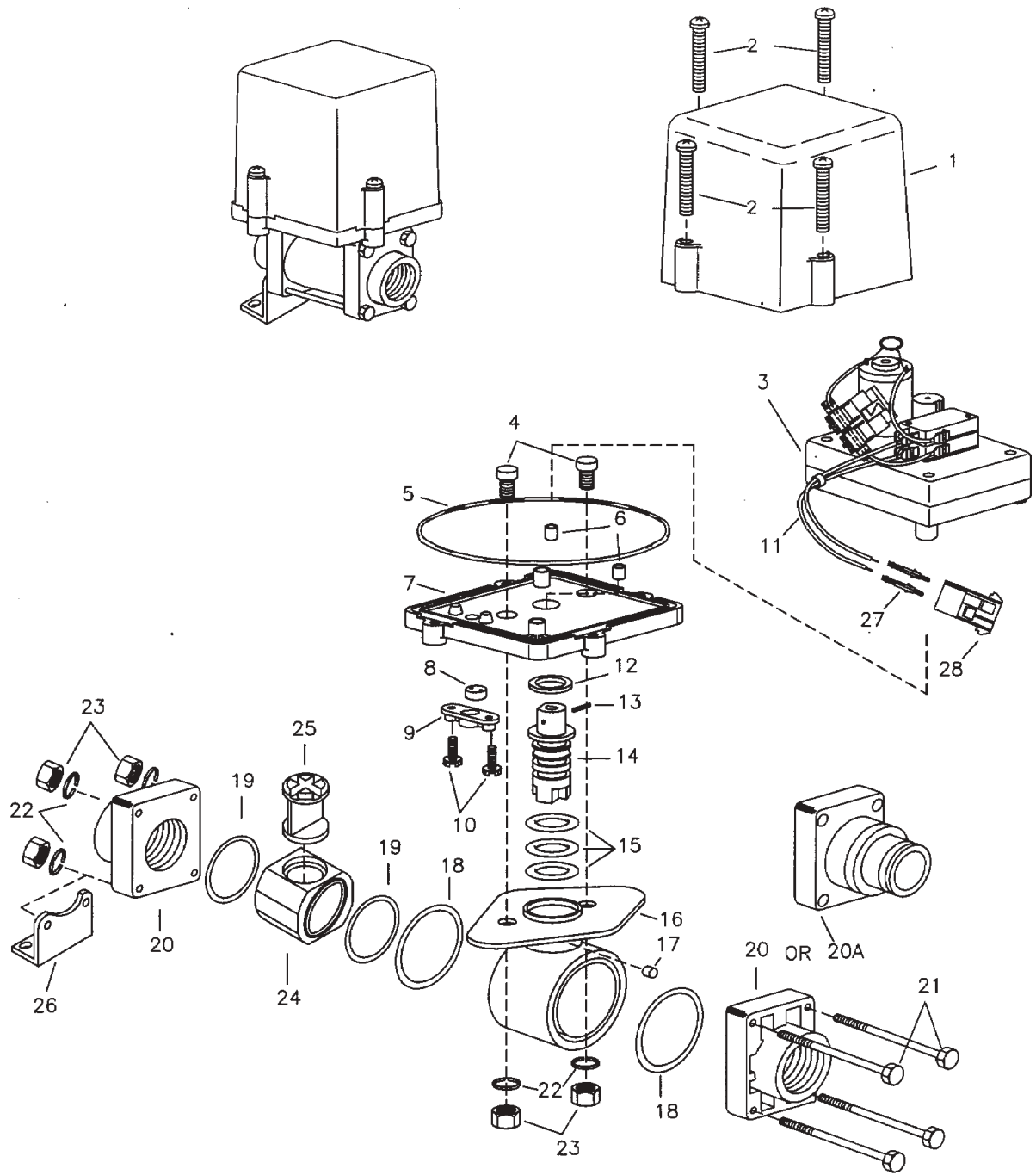


Accessories

## 14-348 SOLENOID PARTSLIST

| REF# | PART#     | DESCRIPTION                             | QUANTITY |
|------|-----------|---|----------|
| 1    | 14-348-02 | Coil Assembly                           | 1        |
| 2    | 16-879-07 | Upper Diaphragm Housing                 | 1        |
| 3    | 14-348-03 | Armature, Type 430fr Stainless Steel    | 1        |
| 4*   | 14-348-04 | Spring, Type 302 Stainless Steel        | 1        |
| 5    | 14-348-05 | Retaining Ring, Steel                   | 1        |
| 6*   | 16-879-11 | Diaphragm, Viton Rubber                 | 1        |
| 7    | 14-348-06 | Seat Washer Retainer, Stainless Steel   | 1        |
| 8*   | 14-348-07 | Seat Washer, Viton Rubber               | 2        |
| 9    | 14-348-08 | Spacer, Stainless Steel                 | 1        |
| 10   | 14-348-09 | Body, Polypropylene (Black)             | 1        |
| 11   | 14-348-10 | Stem, Stainless Steel                   | 1        |
| 12   | 14-348-11 | Washer, Stainless Steel                 | 1        |
| 13   | 16-879-12 | Lower Diaphragm Piston, Stainless Steel | 1        |
| 14   | 16-879-13 | Lower Diaphragm Housing                 | 1        |
| 15   | 14-348-12 | Screw, Stainless Steel                  | 4        |
| 16   | 16-879-14 | Connecting Nipple, Nylon (Black)        | 1        |
|      | 14-348-01 | Single Unit                             | 3        |
| *    | 14-348-18 | Spare Parts Kit                         | 1        |

# 16-986 REGULATING BUTTERFLY VALVE DRAWING

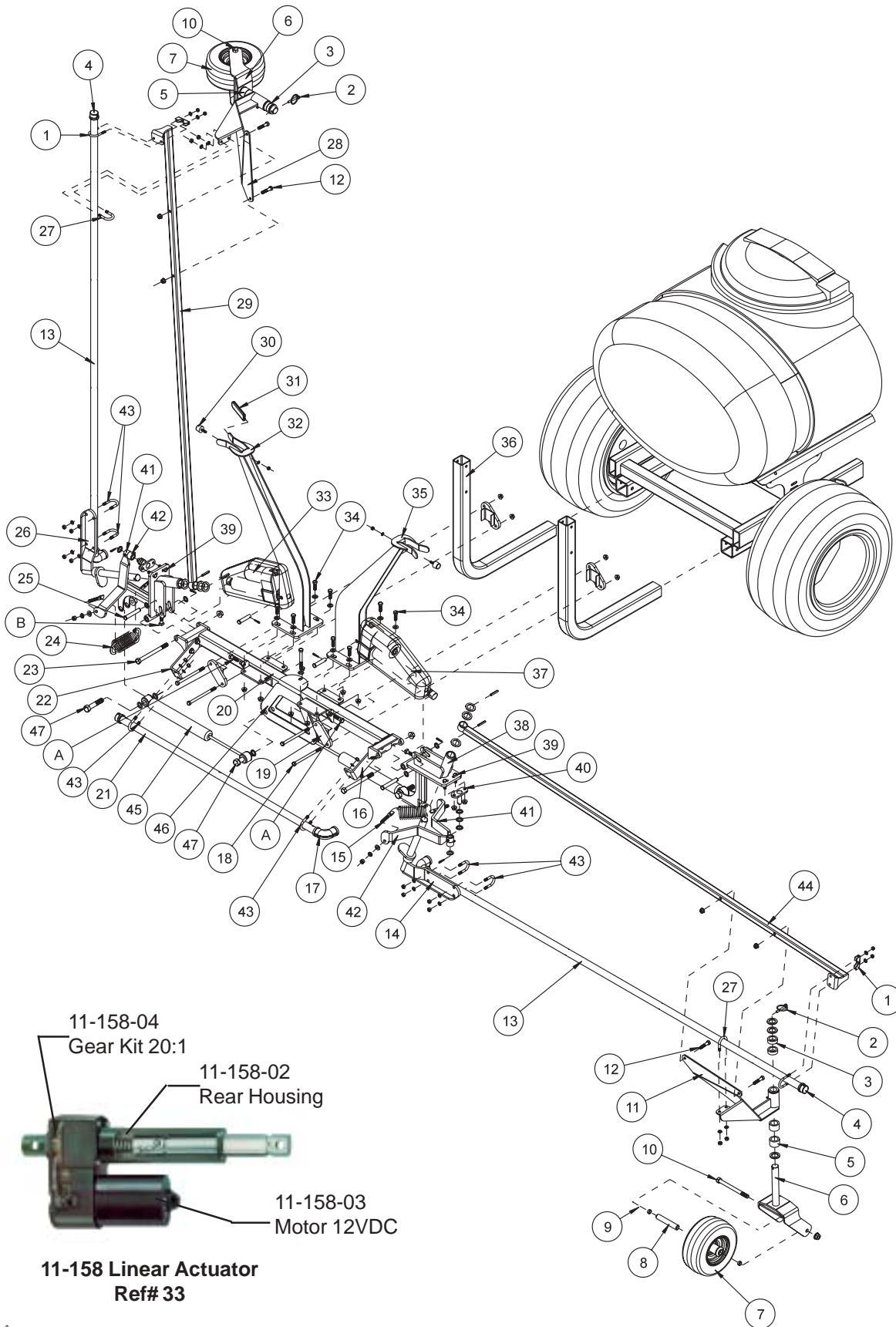




## 16-986 REGULATING BUTTERFLY VALVE PARTSLIST

| REF# | PART#     | DESCRIPTION                                    | QUANTITY |
|------|-----------|--|----------|
| 1    | 15-531-06 | Polypropylene Cover                            | 1        |
| 2    | 15-552-12 | Stainless Steel Phillips/Square Pan Head Screw | 4        |
| 3    | 16-986-01 | Motor Sub Assembly                             | 1        |
| 4    | 15-517-04 | Stainless Steel Self Cinching Stud             | 2        |
| 5    | 16-986-02 | EPDM Rubber O-ring                             | 1        |
| 6    | 15-517-06 | Neoprene Motor Mount                           | 2        |
| 7    | 15-517-07 | Nylon Mounting Plate                           | 1        |
| 8    | 15-517-08 | EPDM Rubber Grommet                            | 1        |
| 9    | 16-986-03 | Nylon Grommet Retainer                         | 1        |
| 10   | 15-517-10 | Stainless Steel Slotted Hex Washer Screw       | 2        |
| 11   | 16-986-04 | Control Harness Subassembly                    | 1        |
| 12*  | 15-517-11 | Teflon Thrust Washer                           | 1        |
| 13   | 15-517-13 | Stainless Steel Spring Pin                     | 1        |
| 14*  | 15-552-04 | Nylon Ball Valve Stem                          | 1        |
| 15*  | 15-552-05 | Teflon Coated Viton O-ring                     | 1        |
| 16   | 15-517-16 | Nylon Body                                     | 1        |
| 17*  | 15-517-17 | Dense Felt Dust Plug                           | 1        |
| 18*  | 15-552-13 | Viton Gasket                                   | 2        |
| 19*  | 16-986-05 | Viton O-ring                                   | 2        |
| 20   | 15-531-03 | Nylon End Cap                                  | 1        |
| 21   | 16-986-06 | Quick Connector End Cap                        | 1        |
| 22   | 15-517-22 | Stainless Steel Hex Head Cap Screw             | 4        |
| 23   | 15-517-24 | Stainless Steel Lockwasher                     | 2        |
| 24   | 15-517-23 | Stainless Steel Hex Nut                        | 6        |
| 25*  | 16-986-07 | Nylon Body Insert                              | 1        |
| 26*  | 16-986-08 | Nylon Butterfly                                | 1        |
| 27   | 16-986-09 | Steel Mounting Bracket                         | 1        |
| 28   | 16-986-10 | Pin Contact                                    | 2        |
| 29   | 16-986-11 | Connector Cap                                  | 1        |
|      | 16-986-12 | Spare Parts Kit (includes all * items)         |          |

# 10-300 18' TERRAIN FOLLOWING BOOM DRAWING



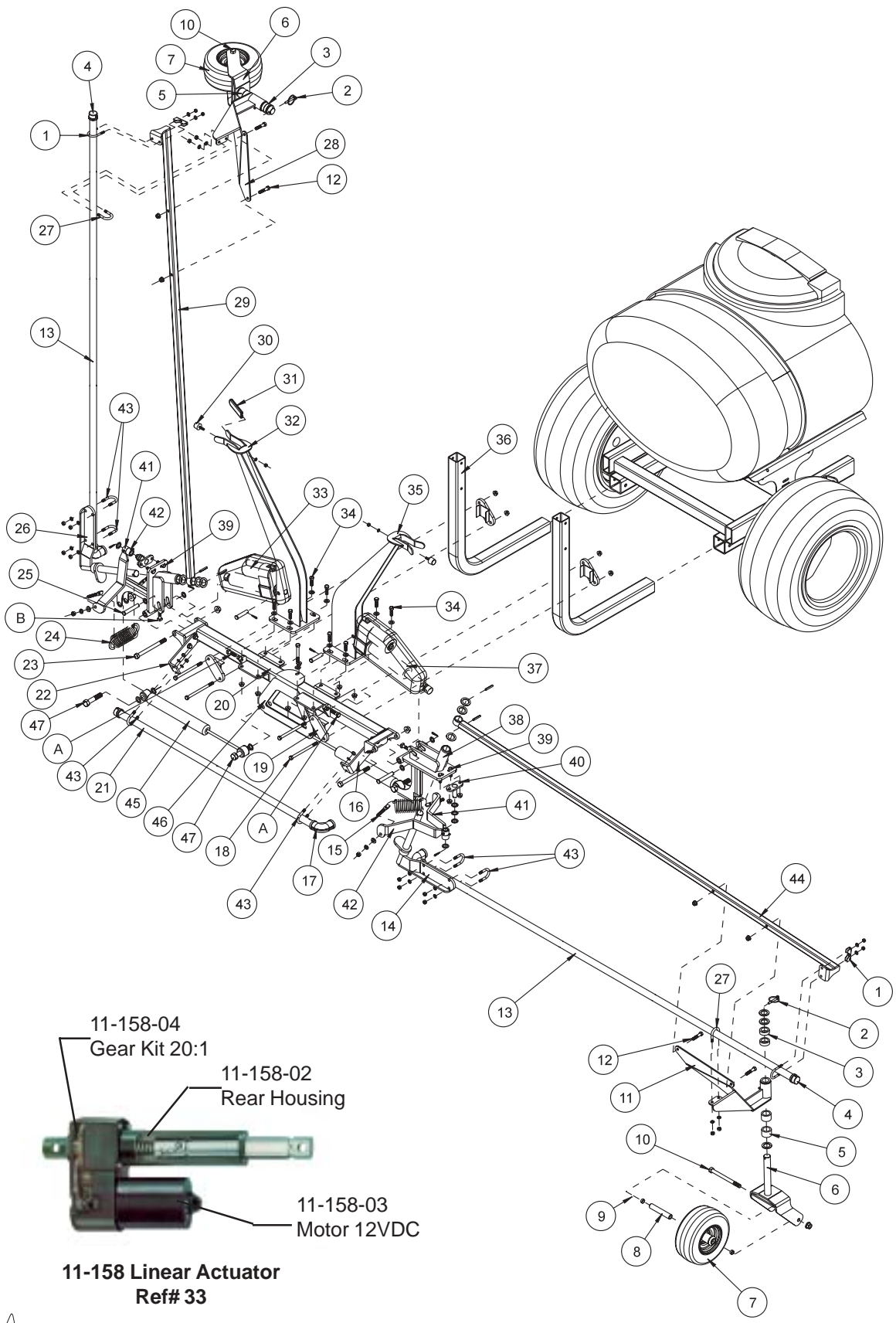
Accessories

## 10-300 18' TERRAIN FOLLOWING BOOM PARTS LIST

| REF# | PART#           | DESCRIPTION  | QUANTITY |
|------|-----------------|--|----------|
| 1    | 13-498          | Muffler Clamp 1 <sup>1/8</sup>   | 2        |
|      | HWL-516         | Lockwasher 5/16  | 4        |
|      | HN-516-18       | Nut 5/16 - 18 (part of 13-498)   | 4        |
| 2    | 42-539          | Lynch Pin 1/4  | 2        |
| 3    | 29-584          | 1/2" Spacer  | 4        |
| 4    | 16-926          | Stainless Steel Cap  | 3        |
| 5    | 29-585          | 1" Spacer  | 4        |
| 6    | 10-312          | Castor Fork  | 2        |
|      | HMB-100-10      | Machine Bushing 1 x 10GA (3 per fork)                                  | 6        |
| 7    | 42-202          | Tire and Wheel   | 2        |
|      | 42-202-01       | Tire   | 2        |
|      | 42-202-02       | Wheel  | 2        |
| 8    | 42-213          | Axle Bearing   | 2        |
| 9    | 42-212          | Castor Wheel Spacer  | 4        |
| 10   | HBS-12-13-600   | Stainless Steel Bolt 1/2 - 13 x 6                                      | 2        |
|      | HNTL-12-13      | Lock Nut 1/2 - 13  | 2        |
| 11   | 10-310          | Right Castor Wheel Bracket   | 1        |
|      | 18-035          | Bushing (part of 10-310)   | 2        |
|      | HG-14-28-180    | Grease Fitting 1/4 - 28 x 180° (part of 10-310)                        | 1        |
| 12   | HBS-38-16-175   | Stainless Steel Bolt 3/8 - 16 x 1 <sup>3/4</sup>                       | 4        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16  | 4        |
| 13   | 16-928          | Right and Left Tube  | 2        |
| 14   | 33-301          | Right Pivot Bracket  | 1        |
|      | HMBS-100-10     | Stainless Steel Machine Bushing 1 x 10GA                               | 1        |
|      | HMBS-100-14     | Stainless Steel Machine Bushing 1 x 14GA                               | 2        |
|      | HRPS-14-150     | Stainless Steel Roll Pin 1/4 x 1 <sup>1/2</sup>                        | 2        |
|      | 42-537          | Spade Bolt 3/8 - 16  | 4        |
| 15   | HW-38           | Washer 3/8   | 4        |
|      | HWL-38          | Lockwasher 3/8   | 4        |
|      | HN-38-16        | Nut 3/8 - 16   | 4        |
|      | 33-308          | Right Center Tube Mount  | 1        |
| 16   | HBS-38-16-125   | Stainless Steel Bolt 3/8 - 16 x 1 <sup>1/4</sup>                       | 2        |
|      | HWS-38          | Stainless Steel Washer 3/8   | 2        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16  | 2        |
| 17   | 16-925          | Stainless Steel Pipe Elbow 3/4 x 90°                                   | 3        |
|      | 18-249          | Barb Fitting   | 3        |
|      | 18-040          | Hose Clamp HS-12   | 3        |
| 18   | HBS-38-16-550   | Stainless Steel Bolt 3/8 - 16 x 5 <sup>1/2</sup>                       | 4        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16  | 4        |
| 19   | 10-304          | Boom Bracket   | 4        |
| 20   | 10-305          | Center Boom Mount  | 1        |
| 21   | 16-927          | Center Tube  | 1        |
| A    | HSSQS-38-16-150 | Stainless Steel Set Screw 3/8 - 16 x 1 <sup>1/2</sup> (part of 10-305) | 2        |
|      | HN-38-16        | Nut 3/8 - 16 (part of 10-305)  | 2        |
| 22   | 33-309          | Left Center Tube Mount   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt 3/8 - 16 x 1 <sup>1/4</sup>                       | 2        |
|      | HWS-38          | Stainless Steel Washer 3/8   | 2        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16  | 2        |
| 23   | HBS-12-13-600   | Stainless Steel Bolt 1/2 - 13 x 6                                      | 2        |
|      | HNTL-12-13      | Lock Nut 1/2 - 13  | 2        |
| 24   | 10-313          | Extension Spring   | 2        |
| 25   | HCPS-12-275     | Stainless Steel Clevis Pin 1/2 x 2 <sup>3/4</sup>                      | 2        |
|      | HMB-12-14       | Machine Bushing 1/2 x 14GA   | 4        |
|      | HPS-18-100      | Stainless Steel Cotter Pin 1/8 x 1                                     | 2        |

(Continue on Next Page)

# 10-300 18' TERRAIN FOLLOWING BOOM DRAWING



11-158-04  
 Gear Kit 20:1  
 11-158-02  
 Rear Housing  
 11-158-03  
 Motor 12VDC  
**11-158 Linear Actuator**  
 Ref# 33

Accessories

## 10-300 18' TERRAIN FOLLOWING BOOM PARTS LIST

| REF# | PART#           | DESCRIPTION   | QUANTITY |
|------|-----------------|---|----------|
| 26   | 33-302          | Left Pivot Bracket  | 1        |
|      | HMBS-100-10     | Stainless Steel Machine Bushing 1 x 10GA                  | 1        |
|      | HMBS-100-14     | Stainless Steel Machine Bushing 1 x 14GA                  | 2        |
|      | HRPS-14-150     | Stainless Steel Roll Pin 1/4 x 1 1/2                      | 2        |
| 27   | 16-024          | U-Bolt 5/16 - 24  | 2        |
|      | HWLS-516        | Stainless Steel Lockwasher 5/16                           | 4        |
|      | HNS-516-24      | Stainless Steel Nut 5/16 - 24                             | 4        |
| 28   | 10-311          | Left Castor Wheel Bracket                                 | 1        |
|      | 18-035          | Bushing (part of 10-311)                                  | 2        |
|      | HG-14-28-180    | Grease Fitting 1/4 - 2 8 x 180° (part of 10-311)          | 1        |
| 29   | 10-307          | Left Brush Guard  | 1        |
| 30   | 15-013          | Rubber Bumper   | 2        |
|      | HWL-14          | Lockwasher 1/4  | 2        |
|      | HN-14-20        | Nut 1/4 - 20  | 2        |
| 31   | 10-318          | Grip Pad  | 4        |
| 32   | 10-316          | Left Boom Holder  | 1        |
| 33   | 11-158          | Linear Actuator   | 2        |
|      | HCPS-12-200     | Stainless Steel Clevis Pin 1/2 x 2                        | 2        |
|      | HPS-18-100      | Stainless Steel Cotter Pin 1/8 x 1                        | 2        |
| 34   | HBS-38-16-125   | Stainless Steel Bolt 3/8 - 16 x 1 1/4                     | 8        |
|      | HWS-38          | Stainless Steel Washer 3/8                                | 8        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16   | 8        |
| 35   | 10-317          | Right Boom Holder   | 1        |
| 36   |                 | Boom Carrier (part of machine)                            |          |
| 37   | 10-319          | Actuator Cover  | 2        |
| 38   | 10-330          | Pivot Bracket   | 2        |
|      | 15-494          | Nylon Flange Bushing 1" ID (2 per 10-330)                 | 4        |
|      | 18-036          | Oilite Bushing 1/2 ID (2 per 10-330)                      | 4        |
|      | HG-14-28-180    | Grease Fitting 1/4 - 28 x 180° (2 per 10-330)             | 4        |
|      | HN-38-16        | Nut 3/8 - 16 (1 per 10-330)                               | 2        |
| B    | HSSQS-38-16-150 | Stainless Steel Set Screw 3/8 - 16 x 1 1/2 (1 per 10-330) | 2        |
| 39   | HBS-38-16-125   | Stainless Steel Bolt 3/8 - 16 x 1 1/4                     | 4        |
|      | HWS-38          | Stainless Steel Washer 3/8                                | 4        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16   | 4        |
| 40   | 10-303          | Pivot   | 2        |
|      | HMBS-58-14      | Stainless Steel Machine Bushing 5/8 x 14GA                | 8        |
|      | HPS-18-100      | Stainless Steel Cotter Pin 1/8 x 1                        | 2        |
| 41   | 10-309          | Left Cam Stop (must also order 10-308)                    | 2        |
|      | 18-268          | Oilite Bushing (part of 10-309)                           | 2        |
|      | HG-14-28-180    | Grease Fitting 1/4 - 28 x 180° (part of 10-309)           | 2        |
| 42   | 10-308          | Right Cam Stop (must also order 10-309)                   | 2        |
|      | 18-268          | Oilite Bushing (part of 10-308)                           | 2        |
|      | HG-14-28-180    | Grease Fitting 1/4 - 28 x 180° (part of 10-308)           | 2        |
| 43   | 16-024          | U-Bolt 5/16 - 24  | 6        |
|      | HWLS-516        | Stainless Steel Lockwasher 5/16                           | 12       |
|      | HNS-516-24      | Stainless Steel Nut 5/16 - 24                             | 12       |
| 44   | 10-306          | Right Brush Guard   | 1        |
| 45   | 10-332          | Stabilizer  | 2        |
| 46   | 10-331          | Center Stabilizer Mount                                   | 1        |
|      | HB-38-16-300    | Bolt 3/8 - 16 x 3   | 1        |
|      | HW-38           | Washer 3/8  | 2        |
|      | HNTL-38-16      | Lock Nut 3/8 - 16   | 1        |
| 47   | HB-58-11-300    | Bolt 5/8 - 11 x 3   | 4        |
|      | HMB-58-14       | Machine Bushing 5/8 x 14GA                                | 8        |
|      | HNTL-58-11      | Lock Nut 5/8 - 11   | 4        |





For best results use Teflon® Tape on all fittings.

1. The three boom assemblies are not on the packing list but are in carton. You can NOT order these boom assemblies as one unit. Please refer to parts drawing for individual parts. The long boom assemblies are the right and left booms. The labels are located on right and left pivot brackets (Ref 14 and 26). The small boom assembly is the center boom. Each assembly is shipped with the nozzle bodies (16-920). The remainder parts of the nozzles need to be installed.
2. Mount small boom assembly to the boom carriers on sprayer, using the four boom brackets (Ref 19), four  $\frac{3}{8}$  - 16 x 5 $\frac{1}{2}$  bolts and lock nuts (Ref 18). One boom bracket should go on boom assembly and one on boom carrier. Do the same for right and left side. Place boom at desired level (approximately 20" (51 cm) and be sure it is centered. Tighten bolts.
3. Put the boom holders (Ref 32 and 35) on the center mount (Ref 20) using  $\frac{3}{8}$  - 16 x 1 $\frac{1}{4}$  bolts, washers and lock nuts (Ref 34), with washers next to slots. Center the bolts in the slots and tighten. The set screws (Ref A) on the center mount should be tightened to the stop. It is used to set the up and down movement of the boom at the castor wheel. **The range of the boom is approximately 32" total (16" up and 16" down).** This can be adjusted by moving the boom holders. In will increase the up range. Out will increase the down range.
4. Take right boom and slide pivot bracket (Ref 38) in the center mount (Ref 20) and hold in place with  $\frac{1}{2}$  - 13 x 6 bolt and lock nut (Ref 23). Do not over tighten, boom must be able to move up and down. Repeat for left boom. Yu may need to loosen the pivot (Ref 40) to install  $\frac{1}{2}$  - 13 x 6 bolt due to interference with the cam stops (Ref 41 and 42).
5. Actuator cover (Ref 37) has a velcro opening on the bottom. Place each actuator (Ref 33) into the actuator covers with both rod ends coming out the holes in the cover. Fasten velcro in place.
6. Mount the actuator (Ref 33) with the fixed end to the right and left boom holders (Ref 35 and 32) using  $\frac{1}{2}$  x 2 clevis pin and cotter pin. Mount the ram end to the pivot brackets (Ref 38) using  $\frac{1}{2}$  x 2 $\frac{3}{4}$  clevis pin and cotter pin (Ref 25) with the  $\frac{1}{2}$  x 14GA machine bushing on the outside of the pivot brackets.
7. Hook hoses to the respective fittings using hose clamps (18-040). The hose coming from the right side of the sprayer goes to the straight fitting on the right boom. The center hose from the sprayer goes to the straight fitting on the center boom. The left hose from the sprayer goes to the straight fitting on the left boom. Be sure all hose clamps are tight.
8. Now install the wiring harness. Refer to the wiring diagram.
9. Lower the booms so that the ends are at a height that you can work at.
10. Put the left castor wheel bracket (Ref 28) onto the left boom as shown. Using two  $\frac{3}{8}$  - 16 x 1 $\frac{3}{4}$  bolts and lock nuts (Ref 12) and one u-bolt, two  $\frac{5}{16}$  stainless steel lockwashers and stainless steel  $\frac{5}{16}$  - 24 nuts (Ref 27). Repeat for the right boom with the right castor wheel bracket (Ref 11) using the same hardware.
11. Put the assembled castor forks into the castor wheel brackets, adjusting the spacers to get the boom height you desire.
12. Make certain set screws (Ref B) on both sides are completely screwed in. Raise booms with boom switches all the way up. Adjust set screws (Ref B) so they contact the stop and lock.

## NOTE:

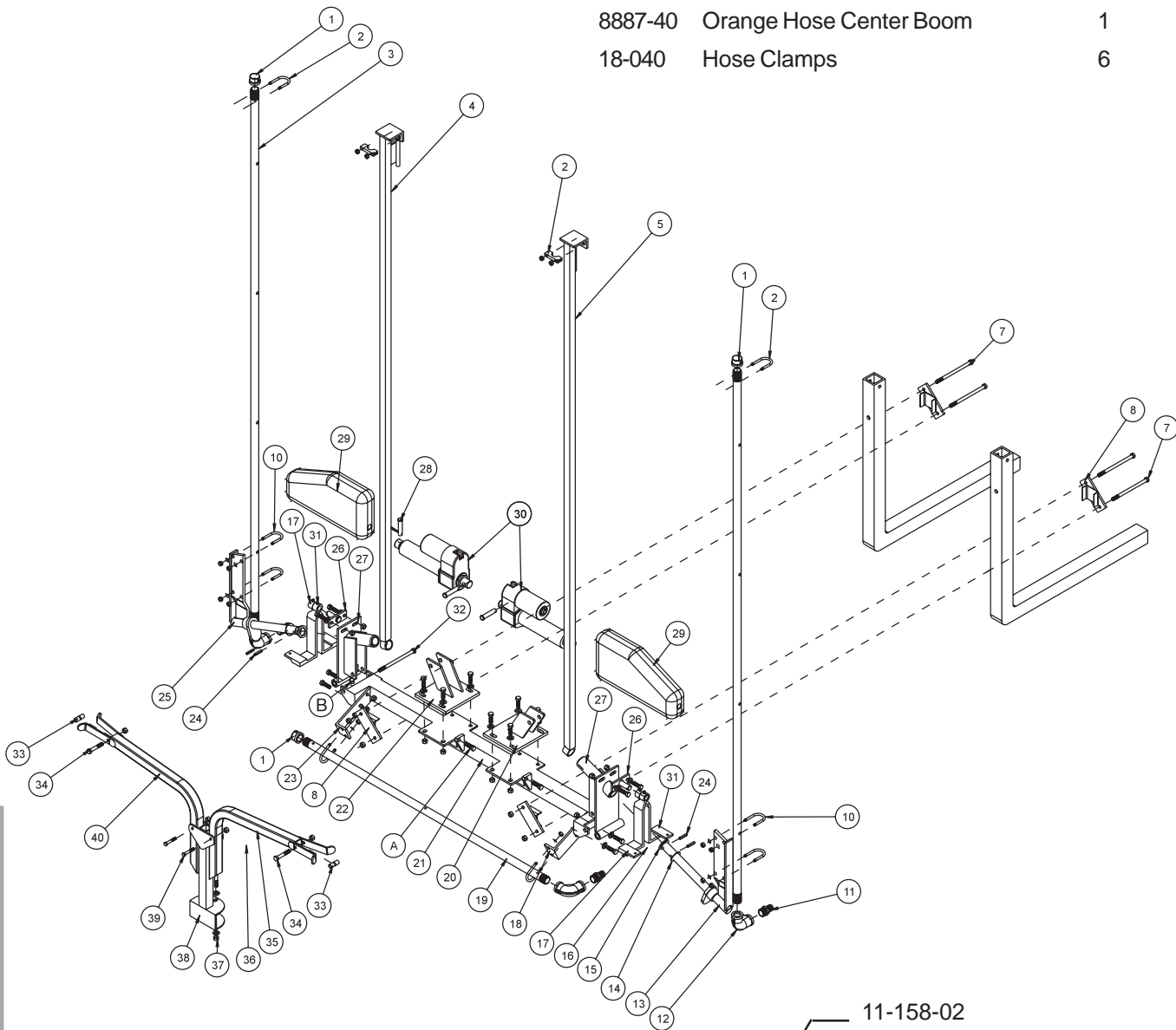
13. Install center stabilizer mount (Ref 45) onto center boom (Ref 20) with the  $\frac{3}{8}$  - 16 x 3 bolt, washers and lock nuts.

14. Place stabilizers (Ref 46) into pivot brackets (Ref 38) with  $\frac{5}{8}$  - 11 x 3 bolts, machine bushings and lock nuts (Ref 47). Place rod end of stabilizers into center stabilizer mount. Make sure all bolts are tight.

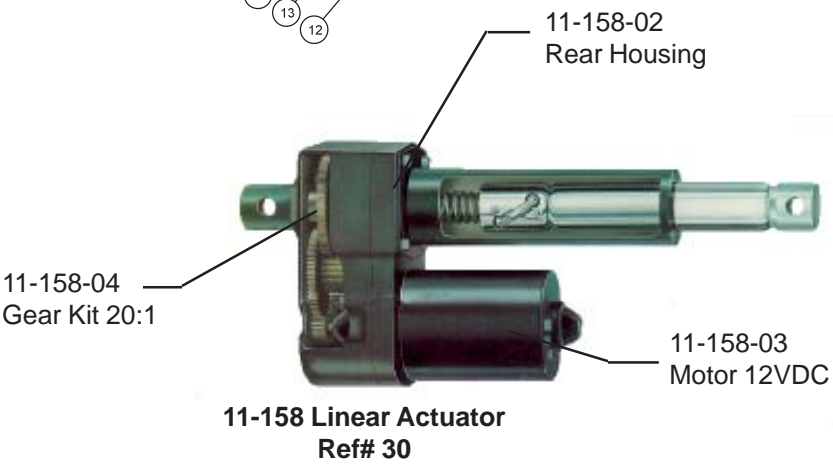
**We do not recommend putting these booms into the forward position.**

# 15-493 STAINLESS STEEL 18' AUTO BOOM DRAWING

|         |                                  |   |
|---------|----------------------------------|---|
| 8887-55 | Orange Hose (Right & Left Booms) | 2 |
| 8887-40 | Orange Hose Center Boom          | 1 |
| 18-040  | Hose Clamps                      | 6 |



Accessories





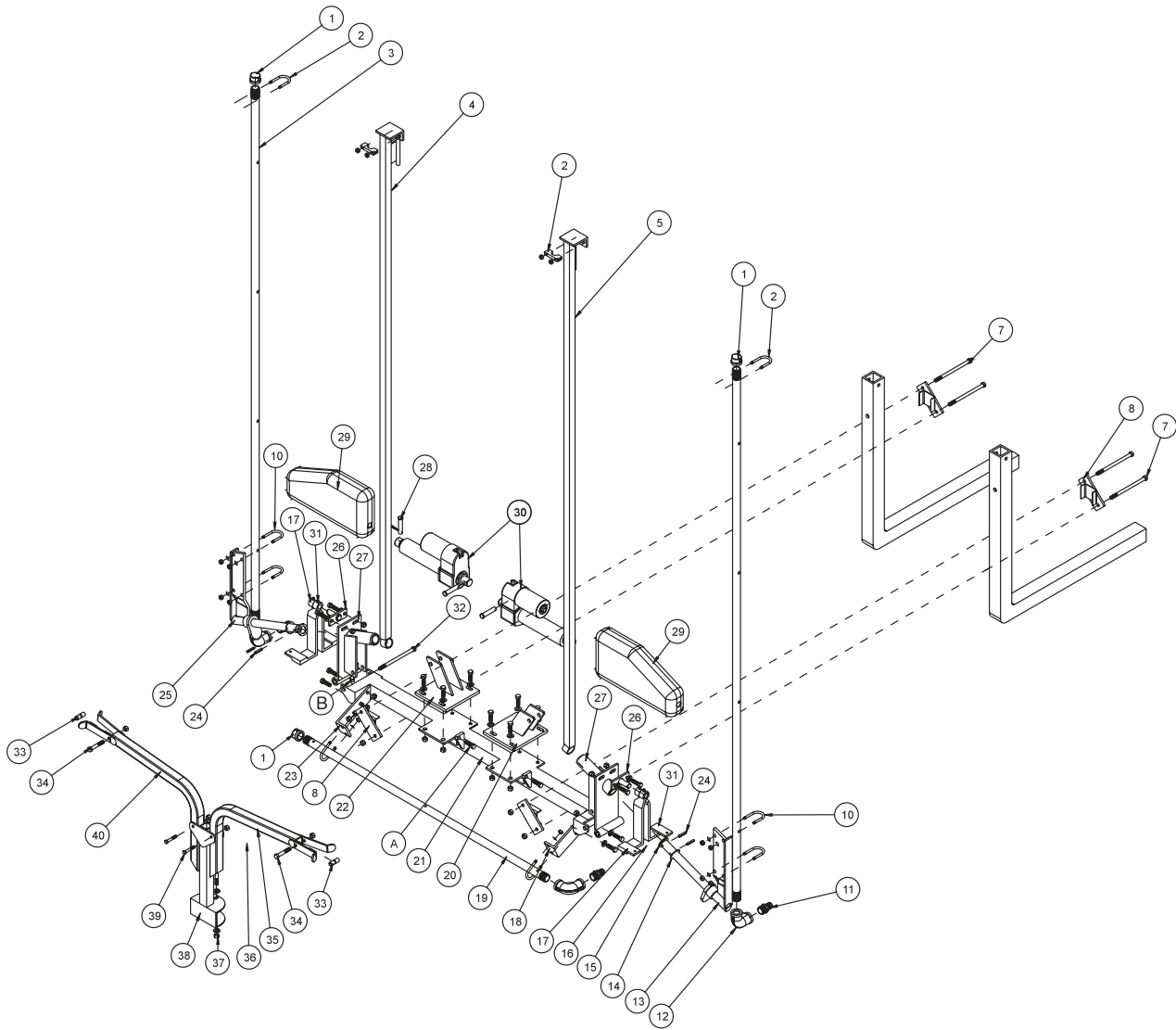
## 15-493 STAINLESS STEEL 18' AUTO BOOM PARTS LIST

| REF# | PART#           | DESCRIPTION   | QUANTITY |
|------|-----------------|---|----------|
| 1    | 16-926          | Stainless Steel Cap <sup>3</sup> / <sub>4</sub>   | 3        |
| 2    | 13-498          | U-Bolt Kit 1 <sup>1</sup> / <sub>8</sub>  | 2        |
| 3    | 16-928          | Right and Left Tube   | 2        |
| 4    | 33-333          | Left Brush Guard  | 1        |
| 5    | 33-332          | Right Brush Guard   | 1        |
| 7    | HBS-38-16-550   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 5 <sup>1</sup> / <sub>2</sub>                       | 4        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 4        |
| 8    | 16-761          | Boom Brackets   | 4        |
| 10   | 16-024          | U-Bolt <sup>5</sup> / <sub>16</sub> - 24  | 6        |
|      | HWLS-516        | Stainless Steel Lockwasher <sup>5</sup> / <sub>16</sub>   | 12       |
|      | HNS-516-24      | Stainless Steel Nut <sup>5</sup> / <sub>16</sub> - 24   | 6        |
| 11   | 18-249          | Barb Fitting  | 3        |
| 12   | 16-925          | Stainless Steel Pipe Elbow <sup>3</sup> / <sub>4</sub> x 90°  | 3        |
| 13   | 33-301          | Right Pivot Bracket   | 1        |
| 14   | HMB-100-14      | Machine Bushing 1 x 14GA  | 4        |
| 15   | HMB-100-10      | Machine Bushing 1 x 10GA  | 2        |
| 16   | 15-495          | Extension Spring  | 2        |
| 17   | 33-306          | Right Cam Stop (must also order 33-307)   | 2        |
| 18   | 33-308          | Right Center Tube Bracket   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                       | 2        |
|      | HWS-38          | Stainless Steel Washer <sup>3</sup> / <sub>8</sub>  | 2        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 2        |
| 19   | 16-927          | Center Tube   | 1        |
| 20   | 33-330          | Right Actuator Bracket  | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                       | 4        |
|      | HWS-38          | Stainless Steel Washer <sup>3</sup> / <sub>8</sub>  | 4        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 4        |
| 21   | 33-329          | Center Mount  | 1        |
| A    | HSSQS-38-16-150 | Stainless Steel Set Screw <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>2</sub> (part of 33-329) | 2        |
|      | HN-38-16        | Nut <sup>3</sup> / <sub>8</sub> - 16 (part of 33-329)   | 2        |
| 22   | 33-331          | Left Actuator Bracket   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                       | 4        |
|      | HWS-38          | Stainless Steel Washer <sup>3</sup> / <sub>8</sub>  | 4        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 4        |
| 23   | 33-309          | Left Center Tube Bracket  | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                       | 2        |
|      | HWS-38          | Stainless Steel Washer <sup>3</sup> / <sub>8</sub>  | 2        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 2        |
| 24   | HRPS-14-150     | Stainless Steel Roll Pin <sup>1</sup> / <sub>4</sub> x 1 <sup>1</sup> / <sub>2</sub>                        | 4        |
| 25   | 33-302          | Left Pivot Bracket  | 1        |
| 26   | 33-305          | Pivot   | 2        |
|      | HMBS-58-14      | Stainless Steel Machine Bushing <sup>5</sup> / <sub>8</sub> - 14  | 8        |
|      | HPS-18-100      | Stainless Steel Cotter Pin <sup>1</sup> / <sub>8</sub> x 1  | 2        |
|      | HBS-38-16-125   | Stainless Steel Bolt <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>4</sub>                       | 4        |
|      | HWS-38          | Stainless Steel Washer <sup>3</sup> / <sub>8</sub>  | 4        |
|      | HNTL-38-16      | Lock Nut <sup>3</sup> / <sub>8</sub> - 16   | 4        |
| 27   | 33-295          | Pivot Bracket   | 2        |
|      | 15-494          | Nylon Flange Bushing (part of 33-295)   | 4        |
|      | 18-036          | Oilite Bushing (part of 33-295)   | 4        |
| B    | HSSQS-38-16-150 | Stainless Steel Set Screw <sup>3</sup> / <sub>8</sub> - 16 x 1 <sup>1</sup> / <sub>2</sub>                  | 2        |
|      | HN-38-16        | Nut <sup>3</sup> / <sub>8</sub> - 16  | 2        |
| 28   | HCPS-12-225     | Stainless Steel Clevis Pin <sup>1</sup> / <sub>2</sub> x 2 <sup>1</sup> / <sub>4</sub>                      | 4        |
|      | HPS-18-100      | Stainless Steel Cotter Pin <sup>1</sup> / <sub>8</sub> x 1  | 4        |
| 29   | 10-319          | Actuator Cover  | 2        |

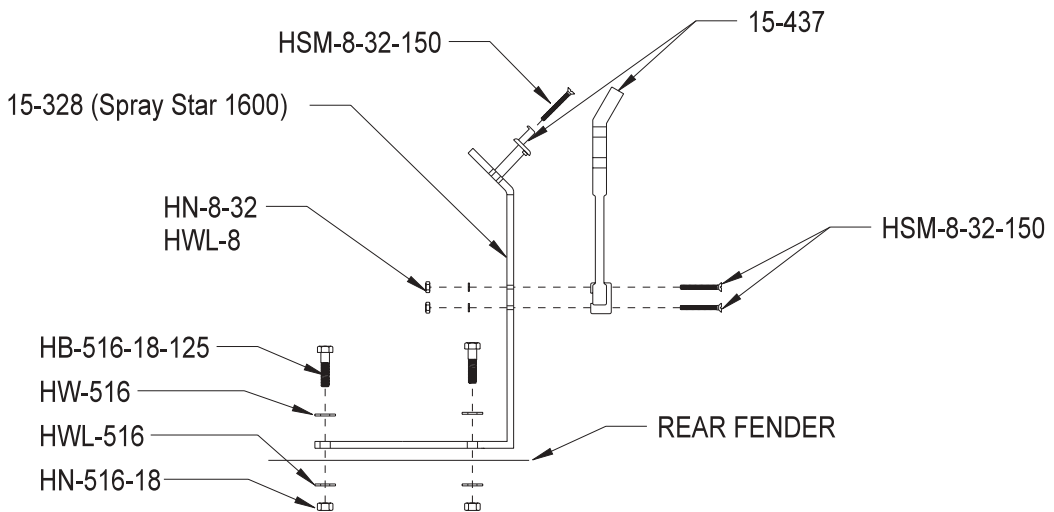
(Continued on next page)



# 15-493 STAINLESS STEEL 18' AUTO BOOM DRAWING



## BOOM CARRIER DRAWING



## 15-493 STAINLESS STEEL 18' AUTO BOOM PARTS LIST

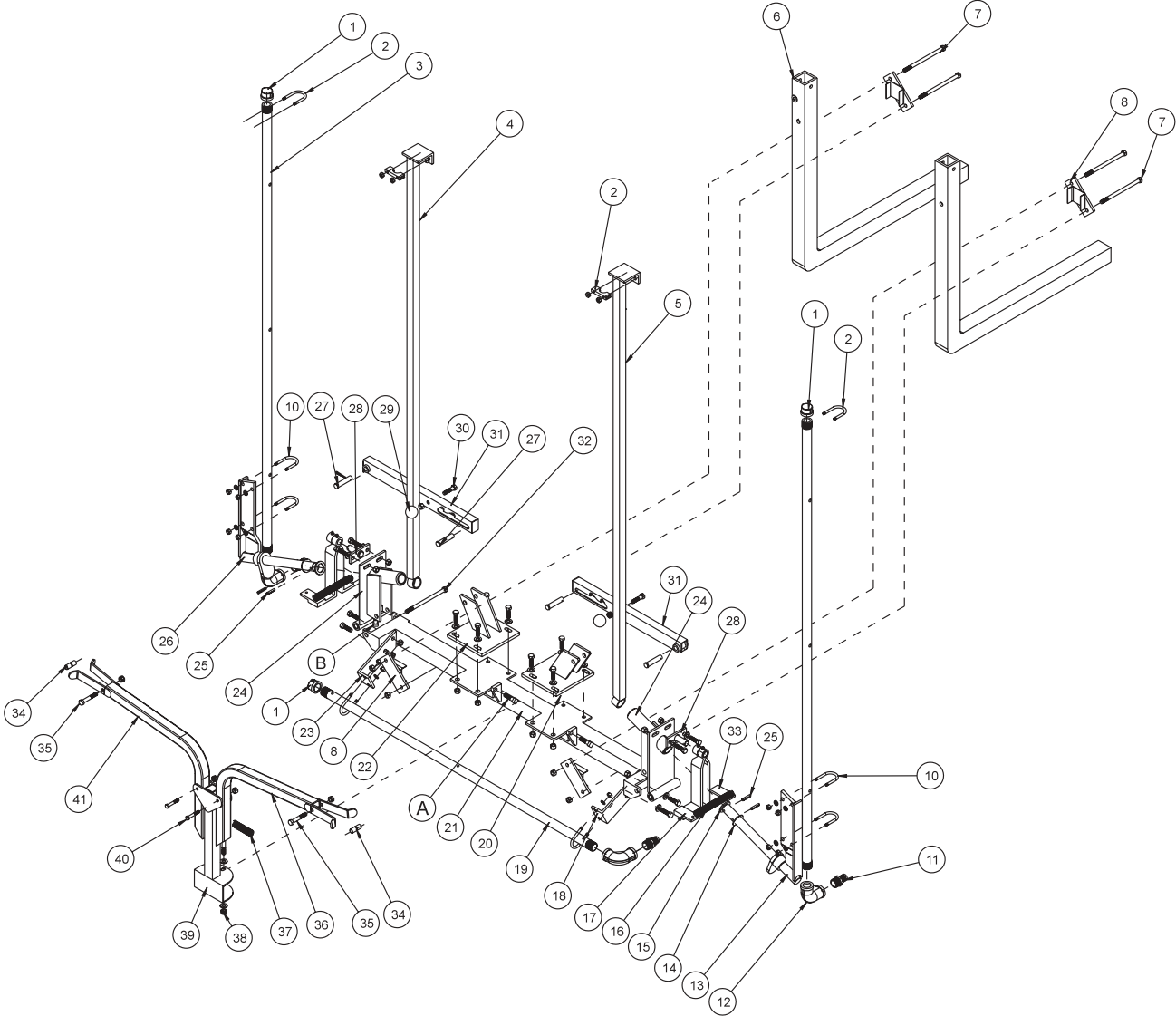
| REF# | PART#         | DESCRIPTION   | QUANTITY |
|------|---------------|---|----------|
| 30   | 11-158        | Linear Actuator with 4" Stroke                              | 2        |
| 31   | 33-307        | Left Cam Stop (must also order 33-306)                      | 2        |
|      | 18-268        | Oilite Bushing (part of 33-307)                             | 2        |
| 32   | HBS-12-13-550 | Stainless Steel Bolt $\frac{1}{2}$ - 13 x $5\frac{1}{2}$    | 2        |
|      | HNCL-12-13    | Center Lock Nut $\frac{1}{2}$ - 13                          | 2        |
| 33   | 18-289        | Bushing $\frac{3}{8}$ ID - $\frac{1}{2}$ OD x $\frac{5}{8}$ | 4        |
| 34   | HB-38-16-225  | Bolt $\frac{3}{8}$ - 16 x $2\frac{1}{4}$                    | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                 | 2        |
| 35   | 10-247        | Right Boom Stabilizer                                       | 1        |
| 36   | 21-212        | Extension Spring  | 1        |
| 37   | HB-38-16-300  | Bolt $\frac{3}{8}$ - 16 x 3                                 | 1        |
|      | HW-38         | Washer $\frac{3}{8}$  | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                 | 1        |
| 38   | 10-162        | Boom Support  | 1        |
| 39   | HB-516-18-225 | Bolt $\frac{5}{16}$ - 18 x $2\frac{1}{4}$                   | 2        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18                                | 2        |
| 40   | 10-246        | Left Boom Stabilizer  | 1        |

## INSTALLATION INSTRUCTIONS

For best results use teflon tape on all fittings.

- The three boom assemblies are not on the packing list but are in carton. The long boom assemblies are the right and left booms. The labels are located on right and left pivot brackets (Ref 13 and 25). The small boom assembly is the center boom. You can NOT order these boom assemblies as one unit. Please refer to parts drawing for individual parts.
- Mount small boom assembly to rear upright support on sprayer using four boom brackets (Ref 8), four bolts,  $\frac{3}{8}$  - 16 x  $5\frac{1}{2}$  and four lock nuts,  $\frac{3}{8}$  - 16 (Ref 7). One boom bracket should go on boom assembly and one on upright support of sprayer. Do the same for right and left side. Place boom at desired level (approximately 20" (51cm) nozzle height) and center. Tighten bolts.
- Put the actuator brackets (Ref 20 and 22) on the center mount (Ref 21) using  $\frac{3}{8}$  - 16 x  $1\frac{1}{4}$  bolts, washers and lock nuts, with washers over the slots. Snug up the bolts so that you can adjust actuator brackets with the set screws (Ref A) on the center mount after booms have been mounted.
- Take right boom and slide pivot bracket (Ref 27) in center mount (Ref 21) and hold in place with  $\frac{1}{2}$  - 13 x  $5\frac{1}{2}$  bolt and  $\frac{1}{2}$  - 13 center lock nut (Ref 32). Do not over tighten, boom must be able to move up and down.
- Actuator cover (Ref 29) has a velcro opening on the bottom. Place each actuator (Ref 30) into the actuator covers with both rod ends coming out the holes in the cover. Fasten velcro in place.
- Mount actuator (Ref 30) fixed end to actuator bracket and ram end to pivot bracket using  $\frac{1}{2}$  x  $2\frac{1}{4}$  clevis pins and  $\frac{1}{8}$  x 1 cotter pins (Ref 28). It may be necessary to lift boom slightly for proper fit. Repeat process for other boom.
- Hook hoses to respective fittings using hose clamps (18-040). The hose coming from right side of sprayer goes to straight fitting on right boom. Center hose from sprayer goes to straight fitting on center boom. The left hose from sprayer goes to straight fitting on left boom. Be sure all clamps are tight.
- Connect wire harness to actuator. Use two nylon ties (22-075) to hold wire to fixed end of actuators.
- Use boom switches to completely extend actuator and lower booms.
- Using set screws (Ref A) adjust actuator brackets so nozzles of booms are at same height with nozzles of center section. Tighten bolts holding actuator brackets to center mount and locknuts on set screws.
- Make certain set screws (B) on both sides are completely screwed in. Raise booms with boom switches all the way up, adjust set screws (A) so they contact the stop.
- To install boom carriers (15-328) and latch (15-437) see diagram. The boom holders should point upward and latch pointing outward. Use 8 - 32 x  $1\frac{1}{2}$  machine screws, nuts and washers to install latch to boom carriers.
- To put booms into boom carriers, booms must be down. Push booms towards front of machine and lift boom slightly to clear fenders. Disconnect latch and put it over brush guard and reconnect.

# 15-577 STAINLESS STEEL 18' MANUAL BOOM DRAWING



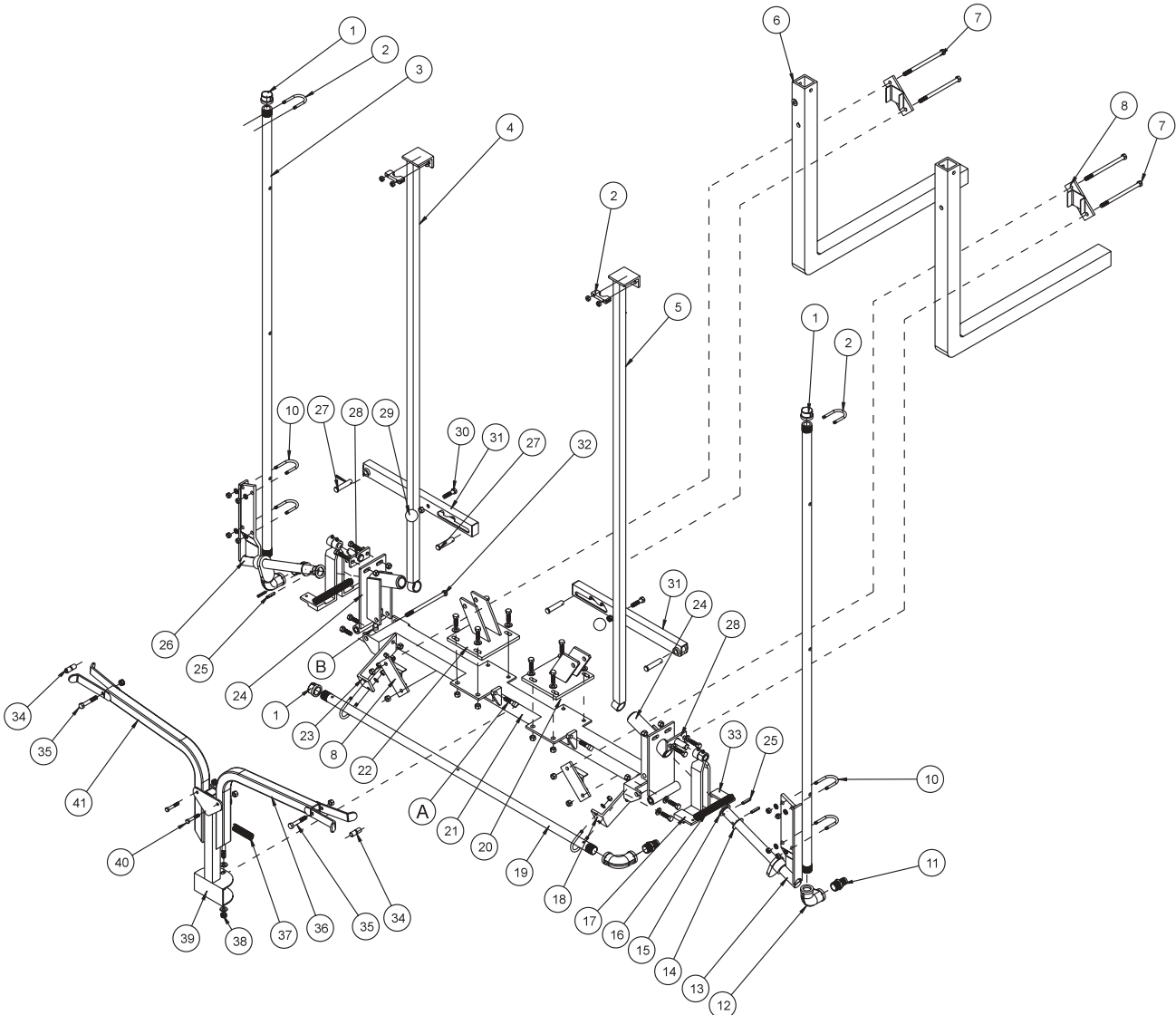
Accessories

# 15-577 STAINLESS STEEL 18' MANUAL BOOM PARTS LIST

| REF# | PART#           | DESCRIPTION  | QUANTITY |
|------|-----------------|--|----------|
| 1    | 16-926          | Stainless Steel Cap $\frac{3}{4}$  | 3        |
| 2    | 13-498          | U-Bolt Kit $1\frac{1}{8}$  | 2        |
| 3    | 16-928          | Right and Left Boom Tube   | 2        |
| 4    | 33-333          | Left Brush Guard   | 1        |
| 5    | 33-332          | Right Brush Guard  | 1        |
| 6    |                 | Boom Carrier (part of the truck)   |          |
| 7    | HBS-38-16-550   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $5\frac{1}{2}$                       | 4        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 4        |
| 8    | 16-761          | Boom Brackets  | 4        |
| 10   | 16-024          | U-Bolt $\frac{5}{16}$ - 24   | 6        |
|      | HWLS-516        | Stainless Steel Lockwasher $\frac{5}{16}$                                      | 12       |
|      | HNS-516-24      | Stainless Steel Nut $\frac{5}{16}$ - 24  | 12       |
| 11   | 18-249          | Barb Fitting   | 3        |
|      | 18-040          | Hose Clamp   | 3        |
| 12   | 16-925          | Stainless Steel Pipe Elbow $\frac{3}{4}$ x $90^\circ$                          | 3        |
| 13   | 33-301          | Right Pivot Bracket  | 1        |
| 14   | HMB-100-14      | Machine Bushing 1 x 14GA   | 4        |
| 15   | HMB-100-10      | Machine Bushing 1 x 10GA   | 2        |
| 16   | 15-495          | Extension Spring   | 2        |
| 17   | 33-306          | Right Cam Stop (must also order 33-307)  | 2        |
|      | 18-268          | Oilite Bushing (part of 33-306)  | 2        |
| 18   | 33-308          | Right, Center Tube Bracket   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                       | 2        |
|      | HWS-38          | Stainless Steel Washer $\frac{3}{8}$   | 2        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 2        |
| 19   | 16-927          | Center Tube  | 1        |
| 20   | 33-330          | Right Actuator Bracket   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                       | 4        |
|      | HWS-38          | Stainless Steel Washer $\frac{3}{8}$   | 4        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 4        |
| 21   | 33-329          | Center Mount   | 1        |
| A    | HSSQS-38-16-150 | Stainless Steel Set Screw $\frac{3}{8}$ - 16 x $1\frac{1}{2}$ (part of 33-329) | 2        |
|      | HN-38-16        | Nut $\frac{3}{8}$ - 16 (part of 33-329)  | 2        |
| 22   | 33-331          | Left Actuator Bracket  | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                       | 4        |
|      | HWS-38          | Stainless Steel Washer $\frac{3}{8}$   | 4        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 4        |
| 23   | 33-309          | Left Center Tube Bracket   | 1        |
|      | HBS-38-16-125   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                       | 2        |
|      | HWS-38          | Stainless Steel Washer $\frac{3}{8}$   | 2        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 2        |
| 24   | 33-295          | Pivot Bracket  | 2        |
|      | 15-494          | Nylon Flange Bushing (part of 33-295)  | 4        |
|      | 18-036          | Oilite Bushing (part of 33-295)  | 4        |
| B    | HSSQS-38-16-150 | Stainless Steel Set Screw $\frac{3}{8}$ - 16 x $1\frac{1}{2}$                  | 2        |
|      | HN-38-16        | Nut $\frac{3}{8}$ - 16   | 2        |
| 25   | HRPS-14-150     | Stainless Steel Roll Pin $\frac{1}{4}$ x $1\frac{1}{2}$                        | 4        |
| 26   | 33-302          | Left Pivot Bracket   | 1        |
| 27   | HCPS-12-225     | Stainless Steel Clevis Pin $\frac{1}{2}$ x $2\frac{1}{4}$                      | 4        |
|      | HPS-18-100      | Stainless Steel Cotter Pin $\frac{1}{8}$ x 1                                   | 4        |
| 28   | 33-305          | Pivot  | 2        |
|      | HMB-58-14       | Machine Bushing $\frac{5}{8}$ x 14GA   | 8        |
|      | HPS-18-100      | Stainless Steel Cotter Pin $\frac{1}{8}$ x 1                                   | 2        |
|      | HBS-38-16-125   | Stainless Steel Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$                       | 4        |
|      | HWS-38          | Stainless Steel Washer $\frac{3}{8}$   | 4        |
|      | HNTL-38-16      | Lock Nut $\frac{3}{8}$ - 16  | 4        |

(Continued on next page)

# 15-577 STAINLESS STEEL 18' MANUAL BOOM DRAWING



Accessories

## 15-577 STAINLESS STEEL 18' MANUAL BOOM PARTS LIST

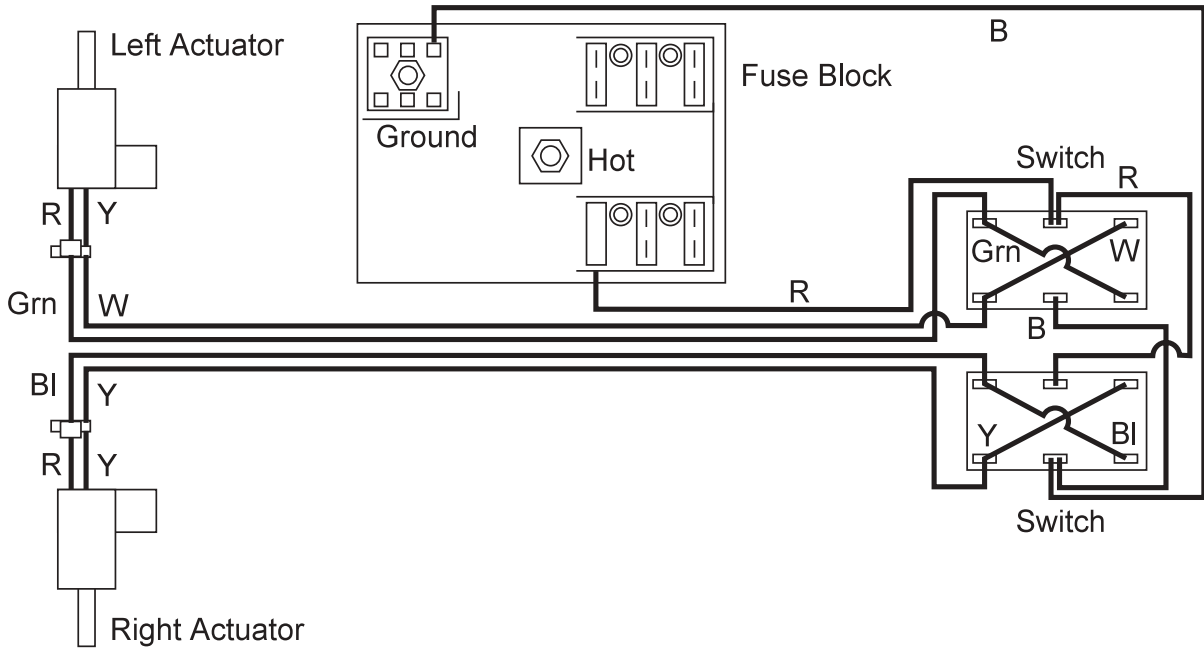
| REF# | PART#         | DESCRIPTION   | QUANTITY |
|------|---------------|---|----------|
| 29   | 15-014        | Shift Knob  | 2        |
| 30   | HB-38-16-175  | Bolt $\frac{3}{8}$ - 16 x $1\frac{3}{4}$                    | 2        |
|      | HN-38-16      | Nut $\frac{3}{8}$ - 16                                      | 2        |
| 31   | 15-561        | Boom Lift   | 2        |
| 32   | HBS-12-13-550 | Stainless Steel Bolt $\frac{1}{2}$ - 13 x $5\frac{1}{2}$    | 2        |
|      | HNCL-12-13    | Center Lock Nut $\frac{1}{2}$ - 13                          | 2        |
| 33   | 33-307        | Left Cam Stop (must also order 33-306)                      | 2        |
|      | 18-268        | Oilite Bushing (part of 33-307)                             | 2        |
| 34   | 18-289        | Bushing $\frac{3}{8}$ ID - $\frac{1}{2}$ OD x $\frac{5}{8}$ | 4        |
| 35   | HB-38-16-225  | Bolt $\frac{3}{8}$ - 16 x $2\frac{1}{4}$                    | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                 | 2        |
| 36   | 10-247        | Right Boom Stabilizer                                       | 1        |
| 37   | 21-212        | Extension Spring  | 1        |
| 38   | HB-38-16-300  | Bolt $\frac{3}{8}$ - 16 x 3                                 | 1        |
|      | HW-38         | Washer $\frac{3}{8}$  | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                                 | 1        |
| 39   | 10-162        | Boom Support  | 1        |
| 40   | HB-516-18-225 | Bolt $\frac{5}{16}$ - 18 x $2\frac{1}{4}$                   | 2        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18                                | 2        |
| 41   | 10-246        | Left Boom Stabilizer  | 1        |

## INSTALLATION INSTRUCTIONS

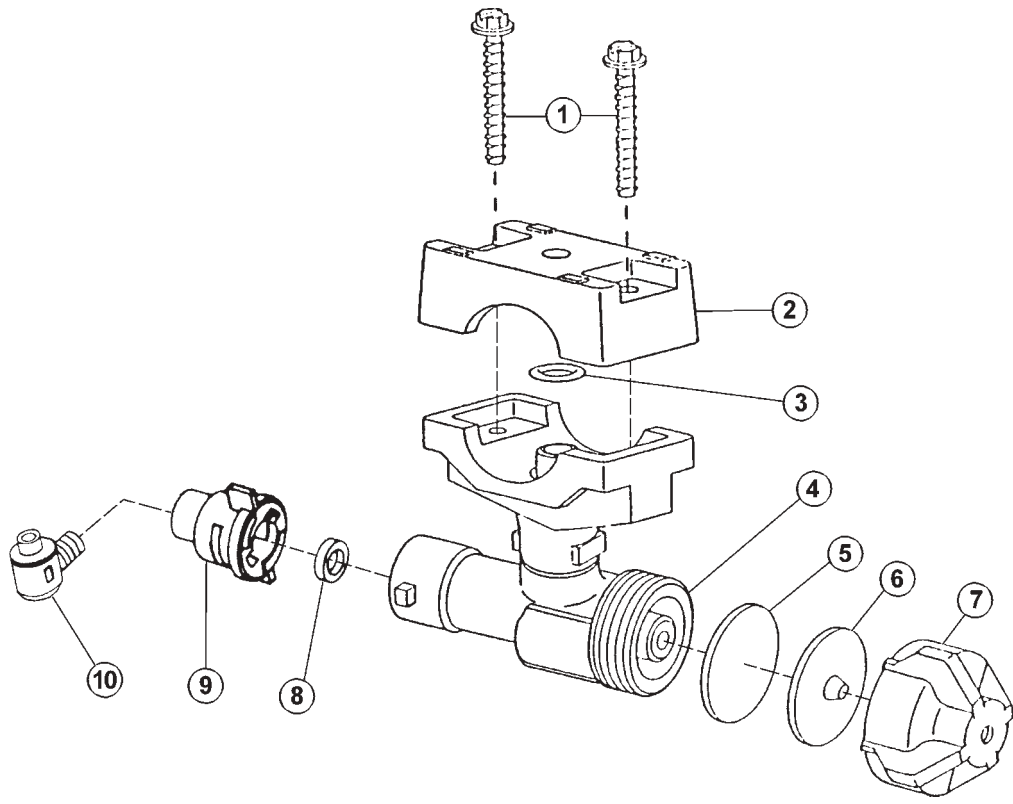
For best result use Teflon<sup>®</sup> tape on all fittings.

- The three boom assemblies are not on the packing list but are in the carton. The long boom assemblies are the right and left booms. The labels are located on the pivot brackets (Ref 13 and 26). The small boom assembly is the center boom. Each assembly is shipped with the nozzle bodies (16-920) attached. The remainder part of the nozzles need to be installed. You can NOT order these boom assemblies as one unit. Please refer to parts drawing for individual parts.
- Mount small boom assembly to the boom carriers on sprayer using four boom brackets (Ref 8), four bolts,  $\frac{3}{8}$  - 16 x  $5\frac{1}{2}$  and four lock nuts,  $\frac{3}{8}$  - 16 (Ref 7). One boom bracket should go on boom assembly and one on boom carrier. Do the same for right and left side. Place boom at desired level (approximately 20" (51 cm) nozzle height) and center. Tighten bolts.
- Put the actuator brackets (Ref 20 and 22) on the center mount (Ref 21) using  $\frac{3}{8}$  - 16 x  $1\frac{1}{4}$  bolts, washers and lock nuts, with washers over the slots. Snug up the bolts so that you can adjust actuator brackets with the set screws (Ref A) on the center mount after booms have been mounted.
- Take right boom and slide pivot bracket (Ref 24) in center mount (Ref 21) and hold in place with  $\frac{1}{2}$  - 13 x  $5\frac{1}{2}$  bolt and  $\frac{1}{2}$  - 13 center lock nut (Ref 32). Do not over tighten, boom must be able to move up and down. Repeat for left boom.
- Install boom lifts (Ref 31) using clevis pin and cotter pin (Ref 27) so the bushing end hooks to the pivot bracket (Ref 24) and the slotted end hooks to the actuator bracket (Ref 20 and 22).
- Hook hoses to respective fittings using hose clamps (18-040). The hose coming from right side of sprayer goes to straight fitting on right boom. Center hose from sprayer goes to straight fitting on center boom. The left hose from sprayer goes to straight fitting on left boom. Be sure all clamps are tight.
- Use the adjustment slots on the boom lifts to completely lift and lower booms.
- Using set screws (Ref A) adjust actuator brackets so nozzles of booms are at same height with nozzles of center section. Tighten bolts holding actuator brackets to center mount and locknuts on set screws.
- To install boom carriers (15-328) and latch (15-437) see drawing. The boom holders should point upward and latch pointing outward. Use 8 - 32 x  $1\frac{1}{2}$  machine screws, nuts and washers to install latch to boom carriers.
- To put booms into boom carriers, booms must be down. Push booms towards front of machine and lift boom slightly to clear fenders. Disconnect latch and put it over brush guard and reconnect.
- Put the viton gaskets (16-800), Raindrop tips (16-805) and quick TeeJet caps (16-921) on the nozzle bodies (16-920) on the three boom sections.
- Make certain set screws (B) on both sides are completely screwed in and locked with the lock nut.

**BOOM WIRING DIAGRAM (for 10-300/15-493 Booms)**



**NOZZLE ASSEMBLY DRAWING**



Accessories



## (for 10-300/15-493 Booms) BOOM WIRING PARTS LIST

| PART#  | DESCRIPTION                          | QUANTITY |
|--------|--------------------------------------|----------|
| 8853   | Female Spade Connectors              | 2        |
| 15-472 | Switch Boot                          | 2        |
| 11-158 | Linear Actuator with 4" stroke       | 2        |
| 16-755 | Switch                               | 2        |
| 16-810 | Wiring Harness (for Spray Star 1600) | 1        |
| 33-190 | Wiring Harness (for Spray Star 3000) | 1        |
| 22-075 | Nylon Tie                            | 10       |
| 33-272 | Fuse 20 amp                          | 1        |

*Use Dielectric Grease On All Electrical Connections*

## NOZZLE ASSEMBLY PARTS LIST

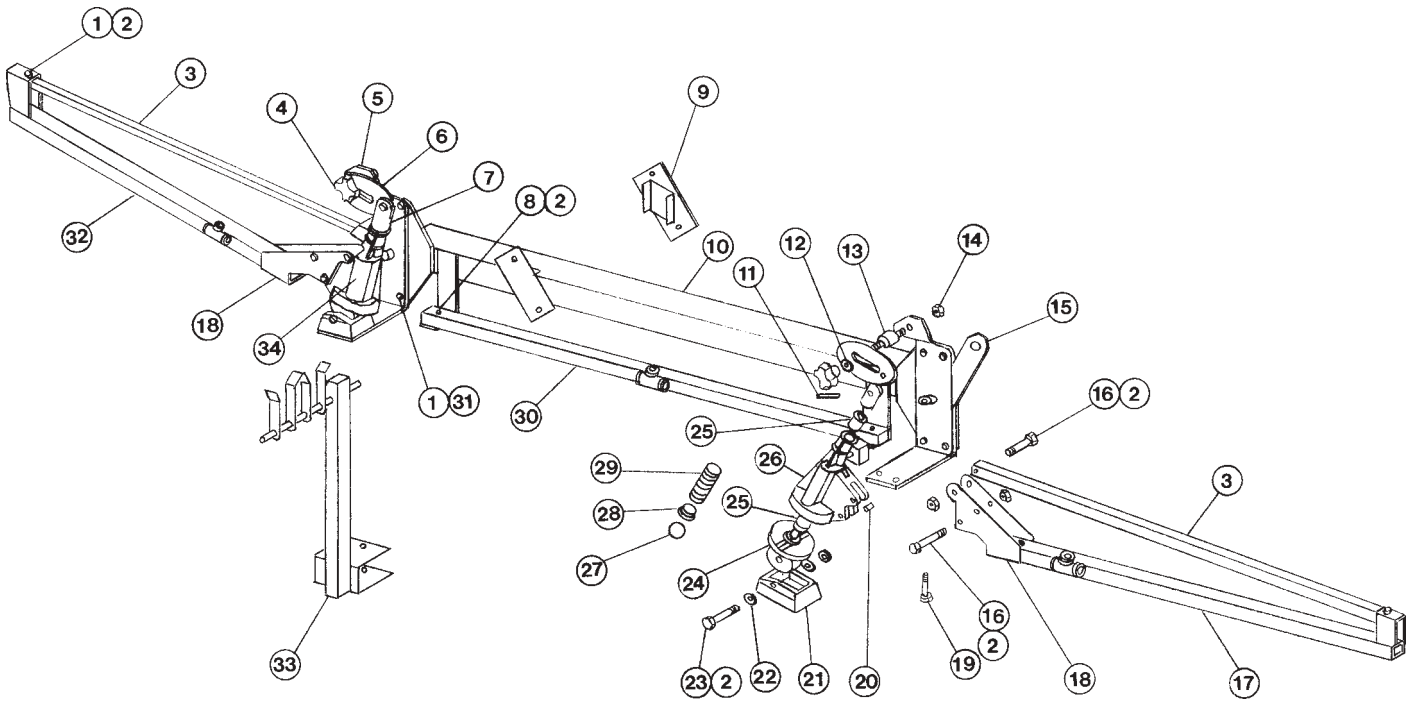
| REF# | PART#     | DESCRIPTION                      | QUANTITY |
|------|-----------|----------------------------------|----------|
| 1*   | 16-920-01 | Screw                            | 2        |
| 2*   | 16-920-02 | Upper Clamp                      | 1        |
| 3*   | 16-920-03 | O-Ring                           | 1        |
| 4*   | 16-920-04 | Body with Lower Clamp            | 1        |
| 5*   | 16-920-05 | Diaphragm Teflon (Optional)      | 1        |
| 6*   | 16-920-06 | Diaphragm EPDM Rubber (Standard) | 1        |
| *    | 16-920-07 | Diaphragm Viton (Optional)       | 1        |
| 7*   | 16-798    | Chemsaver End Cap                | 1        |
| 8    | 16-800    | Gasket Viton                     | 1        |
| 9    | 16-921    | Cap                              | 1        |
| 10   | 16-805    | Raindrop Tip 1/4 RA8             | 1        |
| *    | 16-920    | Body                             | 1        |

**NOTE:** When the 16-920-05 Teflon Diaphragm is used, it is placed in the assembly in front of the 16-920-06 EPDM Rubber Diaphragm. Nozzles are located 20" (51cm) apart on the right, left, and center tubes (15-562, 16-927 and 16-928). There are predrilled holes in all tubes. The Nozzle should be at a 45° angle to the ground for proper application. 9 Nozzles are used on the 10-300 and 15-493 15' Booms. 11 nozzles are used on the 10-301 18' Boom.

**NOTE:** For all 18' Booms: The eleven 16-920 bodies are installed on the boom sections. The eleven 16-800 viton gasket, 16-805 Raindrop tip and 16-921 cap are in the small parts bag.

**NOTE:** For all 15' Booms: The nine 16-920 bodies are installed on the boom sections. The nine 16-800 viton gasket, 16-805 Raindrop tip and 16-921 cap are in the small parts bag.

# 14-100 BOOMDRAWING



Accessories

## 14-100 BOOM PARTSLIST

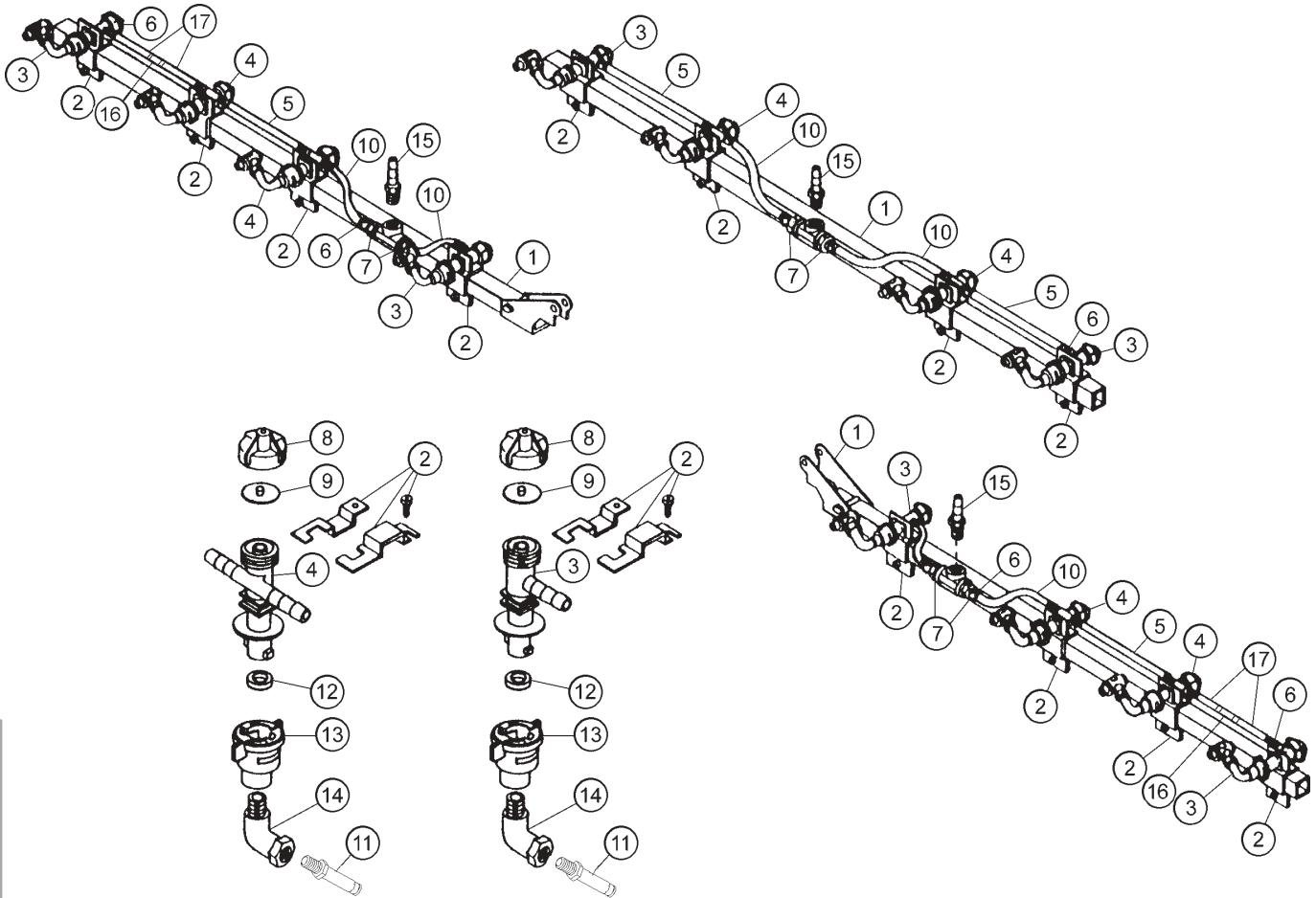
| REF# | PART#        | DESCRIPTION   | QUANTITY |
|------|--------------|---|----------|
| 1    | HBM-8-25     | Bolt M8 x 25  | 10       |
| 2    | HNM-8        | Nut M8  | 18       |
| 3    | 16-770       | Arm Tie Bar   | 2        |
| 4    | 16-775       | Knob  | 2        |
| 5    | 16-790       | Left Hinge Bracket  | 1        |
|      | 10-025       | Flange Bushing <sup>3</sup> / <sub>4</sub>                            | 1        |
| 6    | 16-774       | Plate   | 2        |
| 7    | 16-782       | Yoke  | 2        |
| 8    | HBM-8-45     | Bolt M8 x 45  | 2        |
| 9    | 16-761       | Boom Bracket  | 4        |
|      | HB-38-16-550 | Bolt <sup>3</sup> / <sub>8</sub> - 16 x 5 <sup>1</sup> / <sub>2</sub> | 4        |
|      | HWL-38       | Lockwasher <sup>3</sup> / <sub>8</sub>                                | 4        |
|      | HN-38-16     | Nut <sup>3</sup> / <sub>8</sub> - 16                                  | 4        |
| 10   | 16-791       | Boom Frame  | 1        |
| 11   | 16-784       | Pin D10 x 35  | 2        |
| 12   | HW-12        | Flat Washer, <sup>1</sup> / <sub>2</sub>                              | 4        |
| 13   | 16-773       | Stud M12  | 2        |
| 14   | HNTLM-1 2    | Top Lock Nut M12  | 2        |
| 15   | 16-789       | Right Hinge Bracket   | 1        |
|      | 10-025       | Flange Bushing, <sup>3</sup> / <sub>4</sub>                           | 1        |
| 16   | HBM-8-50     | Bolt M8 x 50  | 12       |
| 17   | 16-793       | Right Side Boom   | 1        |
| 18   | 16-788       | Boom Arm Yoke   | 2        |
| 19   | HBM-10-25    | Bolt M10 x 25   | 4        |
| 20   | 16-787       | Spacer  | 2        |
| 21   | 16-786       | Hinge Base  | 4        |
| 22   | HW-516       | Flat Washer <sup>5</sup> / <sub>16</sub>                              | 8        |
| 23   | HBM-8-60     | Bolt M8 x 60  | 2        |
| 24   | 16-785       | Aluminum Ball Bearing   | 2        |
| 25   | 16-781       | Boom Washer   | 4        |
| 26   | 16-783       | Yoke Support  | 2        |
| 27   | 16-780       | 1" Hinge Ball D 25.4  | 2        |
| 28   | 16-779       | Spring/Ball Retainer  | 2        |
| 29   | 16-778       | Spring  | 2        |
| 30   | 16-792       | Center Boom   | 1        |
| 31   | HNTLM-8      | Top Lock Nut M8   | 8        |
| 32   | 16-794       | Left Side Boom  | 1        |
| 33   | 16-212       | Boom Arm Support Bracket  | 1        |
|      | HB-38-16-350 | Bolt <sup>3</sup> / <sub>8</sub> - 16 x 3 <sup>1</sup> / <sub>2</sub> | 1        |
|      | HNCL-38-16   | Center Lock Nut <sup>3</sup> / <sub>8</sub> - 16                      | 1        |
| 34   | 16-914       | Hinge Assembly  | 2        |

14-100 6 Meter Boom includes the 16-807 Nozzle Kit (Raindrop Tips)

14-101 6 Meter Boom includes the 16-806 Nozzle Kit (TeeJet Tips)



# 14-100 PLUMBING & 709-422 NOZZLE KIT DRAWING (RAINDROP TIPS)



Accessories

- |         |                                  |   |
|---------|----------------------------------|---|
| 8887-92 | Orange Hose (Right & Left Booms) | 2 |
| 8887-14 | Orange Hose (Center Boom)        | 1 |
| 18-040  | Hose Clamps                      | 6 |

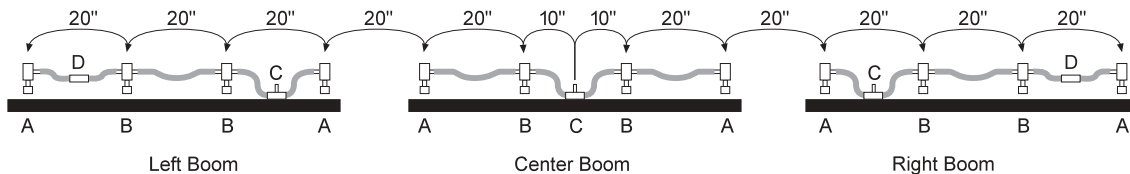
## 14-100 PLUMBING & 709-422 NOZZLE KIT PARTS LIST (RAINDROP TIPS)

| REF# | PART#     | DESCRIPTION  | QUANTITY |
|------|-----------|--|----------|
| 1    | 14-100    | Boom   | 1        |
| 2    | 16-795    | Square clamp                                       | 12       |
| 3    | 16-796    | Diaphragm Check Valve Single (complete with 8 & 9) | 6        |
| 4    | 16-797    | Diaphragm Check Valve Double (complete with 8 & 9) | 6        |
| 5    | 8888-19   | Orange PVC Hose 1/2"                               | 4        |
| 6    | 18-224    | Hose Clamp 1/2"                                    | 28       |
| 7    | 16-137    | Fitting 1/2 MPT x 1/2 HB                           | 6        |
| 8    | 16-798    | End Cap  | 12       |
| 9    | 16-920-06 | Diaphragm  | 12       |
| 10   | 8888-8    | Orange PVC Hose 1/2"                               | 6        |
| 11*  | 16-805    | Raindrop Tip 1/4" RA8 (all sizes available)        | 12       |
| 12*  | 16-800    | Gasket   | 12       |
| 13*  | 16-921    | Quick TeeJet Cap 1/4" FPT                          | 12       |
| 14*  | 16-199    | 45° Street Elbow 1/4" PT                           | 12       |
| 15   | 18-133    | Fitting 1/2 MPT x 3/4 HB                           | 3        |
|      | 18-077    | Hose Clamp   | 3        |
| 16   | 16-200    | Ball Valve 1/4 FPT                                 | 2        |
|      | 16-136    | Fitting 1/4 MPT x 1/2 HB                           | 4        |
| 17   | 8888-9    | Orange PVC Hose 1/2"                               | 4        |
| *    | 709-422   | Nozzle Kit   | 12 each  |

## PLUMBING & NOZZLE KIT INSTALLATION (RAINDROP TIPS)

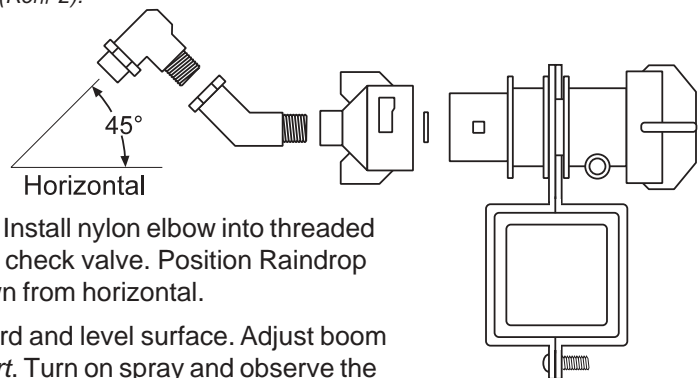
All measurements are done from the fitting on center boom with booms in-line. Nozzles are exactly 20" apart.

1. Install check valves (A and B) above the square tubing and pointing to the rear.



- A. Single Ended Check Valve (Ref# 3) and Clamp (Ref# 2), install with fitting toward middle of boom.
- B. Double Ended Check Valve (Ref# 4) and Clamp (Ref# 2).
- C. Fitting (Ref# 17)
- D. Ball Valve and Fitting (Ref# 15)

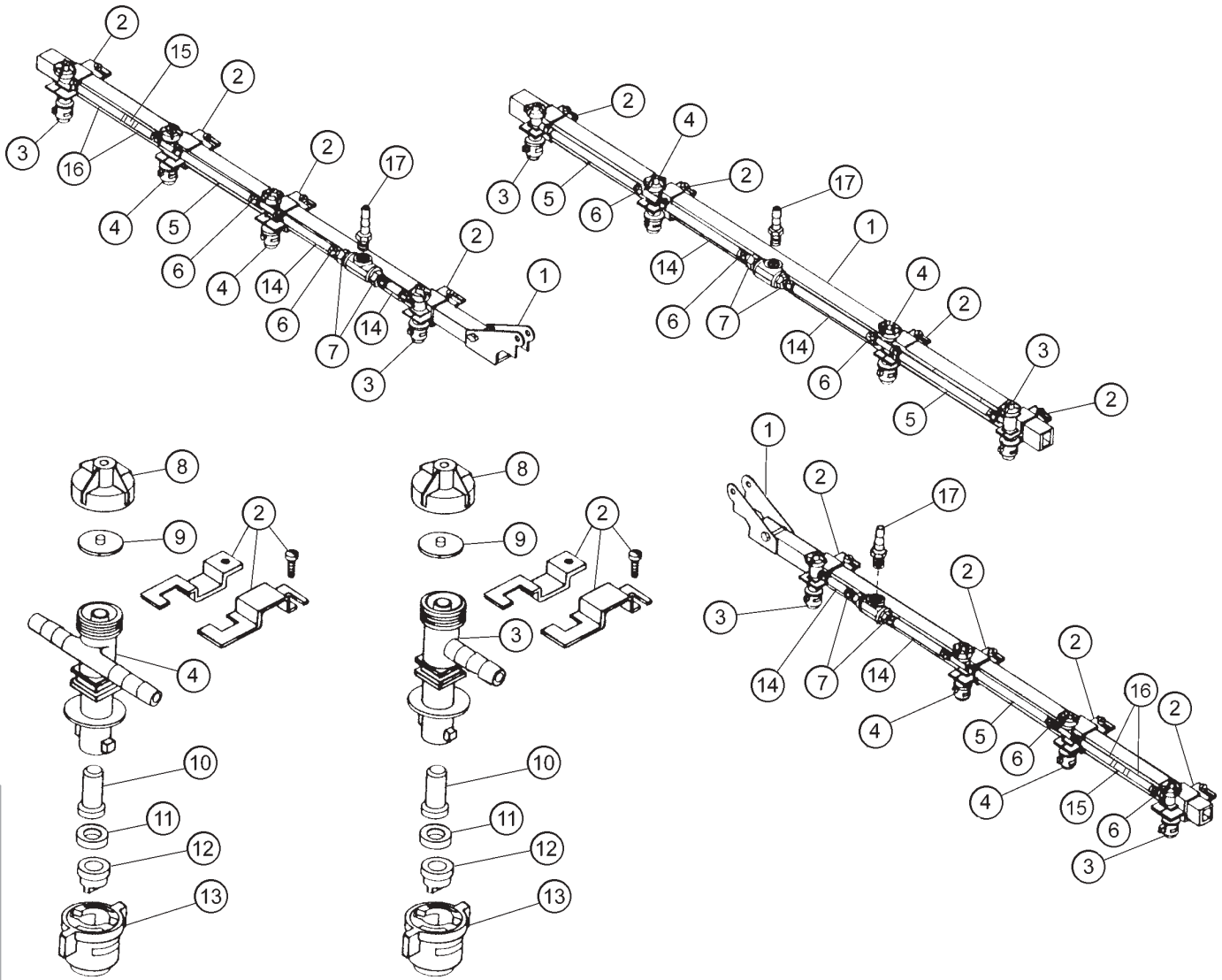
2. Place ball valve (D) between the outer check valves on both right and left booms. Connect the check valves together using the 1/2" hose and hose clamps.



3. Install Raindrop nozzles into nylon 45° elbow. Install nylon elbow into threaded quickjet caps. Attach caps and gaskets to the check valve. Position Raindrop nozzles so they point to the rear, and 45° down from horizontal.
4. Fill the tank 1/2 full of water. Place unit on a hard and level surface. Adjust boom height according to the *Nozzle Selection Chart*. Turn on spray and observe the amount of overlapping spray between adjoining nozzles. There should be 100% overlap. The edge of the spray from one nozzle should reach to the center of the adjoining nozzle. If required, adjust boom height until the correct overlap is achieved.

Strainers are not supplied with Raindrop nozzles. Use 50 mesh slotted strainers (16-802) on nozzle tips smaller than standard.

# 14-101 PLUMBING & 709-420 NOZZLE KIT PARTS DRAWING (TEEJET TIPS)



Accessories

|         |                                  |   |
|---------|----------------------------------|---|
| 8887-92 | Orange Hose (Right & Left Booms) | 2 |
| 8887-14 | Orange Hose (Center Boom)        | 1 |
| 18-040  | Hose Clamps                      | 6 |

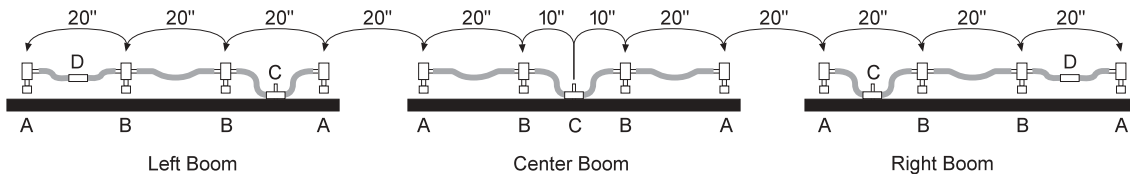
## 14-101 PLUMBING & 709-420 NOZZLE KIT PARTS LIST (TEEJET TIPS)

| REF# | PART#     | DESCRIPTION                                       | QUANTITY |
|------|-----------|---|----------|
| 1    | 14-101    | Boom  | 1        |
| 2    | 16-795    | Square Clamp 1                                    | 12       |
| 3    | 16-796    | Diaphragm Check Valve Single (includes 8 & 9)     | 6        |
| 4    | 16-797    | Diaphragm Check Valve Double (includes 8 & 9)     | 6        |
| 5    | 8888-19   | Orange PVC Hose 1/2"                              | 4        |
| 6    | 18-224    | Hose Clamp  | 28       |
| 7    | 16-137    | Fitting 1/2 MPT x 1/2 HB                          | 6        |
| 8    | 16-798    | End Cap   | 12       |
| 9    | 16-920-06 | Diaphragm   | 12       |
| 10*  | 16-802    | Strainer  | 12       |
| 11*  | 16-800    | Gasket  | 12       |
| 12*  | 16-803    | TeeJet Tip XR8004, Standard (all sizes available) | 12       |
| 13*  | 16-804    | Quick TeeJet Cap (white)                          | 12       |
| 14   | 8888-8    | Orange PVC hose, 1/2"                             | 6        |
| 15   | 16-200    | Ball Valve 1/4 FPT                                | 2        |
|      | 16-136    | Fitting 1/4 MPT x 1/2 HB                          | 4        |
| 16   | 8888-9    | Orange PVC Hose 1/2"                              | 4        |
| 17   | 16-135    | Fitting 1/2 MPT x 3/4 HB                          | 3        |
|      | 18-077    | Hose Clamp  | 3        |
| *    | 709-420   | Nozzle Kit  | 12 each  |

## PLUMBING & NOZZLE KIT INSTALLATION (TEEJET TIPS)

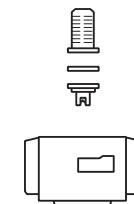
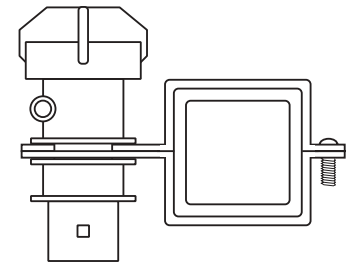
All measurements are done from the fitting on center boom with booms in-line. Nozzles are exactly 20" apart.

1. Install check valves (A and B) behind the square tubing and pointing down.



- A. Single Ended Check Valve (Ref# 3) and Clamp (Ref# 2), install with fitting toward middle of boom.
- B. Double Ended Check Valve (Ref# 4) and Clamp (Ref# 2).
- C. Fitting (Ref# 17)
- D. Ball Valve and Fitting (Ref# 15)

2. Install strainer, gasket, nozzles into cap and connect to the check valve. Strainers may be omitted if #XR8008, 8010, 8015 or 8020 nozzle tips are used.
3. Place ball valve (D) between the outer check valves on both right and left booms. Connect the check valves together using the 1/2" hose and hose clamps.
4. Fill the tank 1/2 full of water. Place unit on a hard and level surface. Adjust boom height according to the *Nozzle Selection Chart*. Turn on spray and observe the amount of overlapping spray between adjoining nozzles. There should be 30% overlap. The edge of the spray from one nozzle should reach approximate 1/3 of the way to the next nozzle. If required, adjust boom height until the correct overlap is achieved.



## RA RAINDROP® TIPS

This is a wide-angle (120°), hollow-cone, drift-reduction nozzle. Replaces conventional flooding nozzles in broadcast applications.

### FEATURES:

- Color-coding makes it easy to match nozzle flow rates for easy identification.
- Color-coding is available in sizes 1/4 RA2 - 1/4 RA15.
- Uniform spray distribution.
- A large orifice opening and passages minimize clogging.
- The Raindrop nozzle's patented design element, a secondary swirl chamber in the nozzle cap, alters the swirling action of the liquid so that the fewer driftable lines are discharged from the secondary orifice.
- Maximum recommended pressure for Nylon is 100 psi (70bar).
- Maximum recommended temperature is 120°F (50°C).

### NOZZLE TILT

Delavan's extensive research on spray patterns has proven that a tilt of about 45° for flood Nozzles or tips, RA Raindrop® and WRW Whirl-Rain® nozzles will significantly improve the spray pattern uniformity.

The nozzle tilt reduces the effect of boom height variation and allows the spray nozzle to maintain a more fully developed pattern even when the nozzle outlet is below the recommended height for the best spray pattern uniformity.

### RECOMMENDED OVERLAP AND NOZZLE HEIGHT

100% overlap of spray pattern is recommended for RA Raindrop® and WRW Whirl-Rain® Nozzles for uniform coverage. Nozzle height is determined by measuring the width of the spray pattern as it hits the ground. This width should be 100% greater or twice as wide as the nozzle spacing. Adjust nozzle height until this is achieved. If a decision to tilt the nozzle is made, do it before measuring the width of the spray on the ground and adjusting nozzle height. See example below.

### NOZZLE TYPE DROPLET SIZE COMPARISONS

(Volume median diameter in microns)

| For Nozzles with a 0.5 gpm Output   | Spraying Pressure |        |
|-------------------------------------|-------------------|--------|
|                                     | 20 psi            | 40 psi |
| RA Raindrop® Drift Reduction Nozzle | 810               | 810    |
| LF Flat Fan Tip                     | 510               | 400    |
| D Flooding Tip                      | 450               | 315    |
| WRW Whirl-Rain® Cone Spray Nozzle   | 350               | 2251   |

### DRIFTABLE FINES PRODUCED

(0.5 gpm at 40 psi)

| Nozzle<br>(.5 gpm Output)              | Percent of Spray Volume<br>less than 200 microns |
|--|--|
| RA Raindrop®<br>Drift Reduction Nozzle | <b>0.7%</b>                                      |
| LF Flat Fan Tip                        | <b>7-20%</b><br>(depending on spray angle)       |



This is an extended range flat spray tip. It is excellent for Contact Pesticides and Growth Regulators and good for Systemic Pesticides.

**Contact Pesticides and Growth Regulators** - At medium pressures (20-30 psi) provides medium size droplets for good surface coverage and less drift. At higher pressures (30-60 psi) produces smaller droplets for better coverage. Wide angle 110° tips produce slightly smaller droplets than 80° tips at equal pressures.

**Systemic Pesticides** - At lower pressures (15-20 psi) produces larger spray droplets and reduces drift while still providing uniform coverage along the boom.

#### FEATURES:

- Excellent spray distribution over a wide range of pressures (15-60 psi).
- Ideal for rigs equipped with sprayer controllers.
- Reduces drift at lower pressures, better coverage at higher pressures.
- Available in stainless steel and hardened stainless steel in 80° and 110° tip spray angles with VisiFlo color coding.

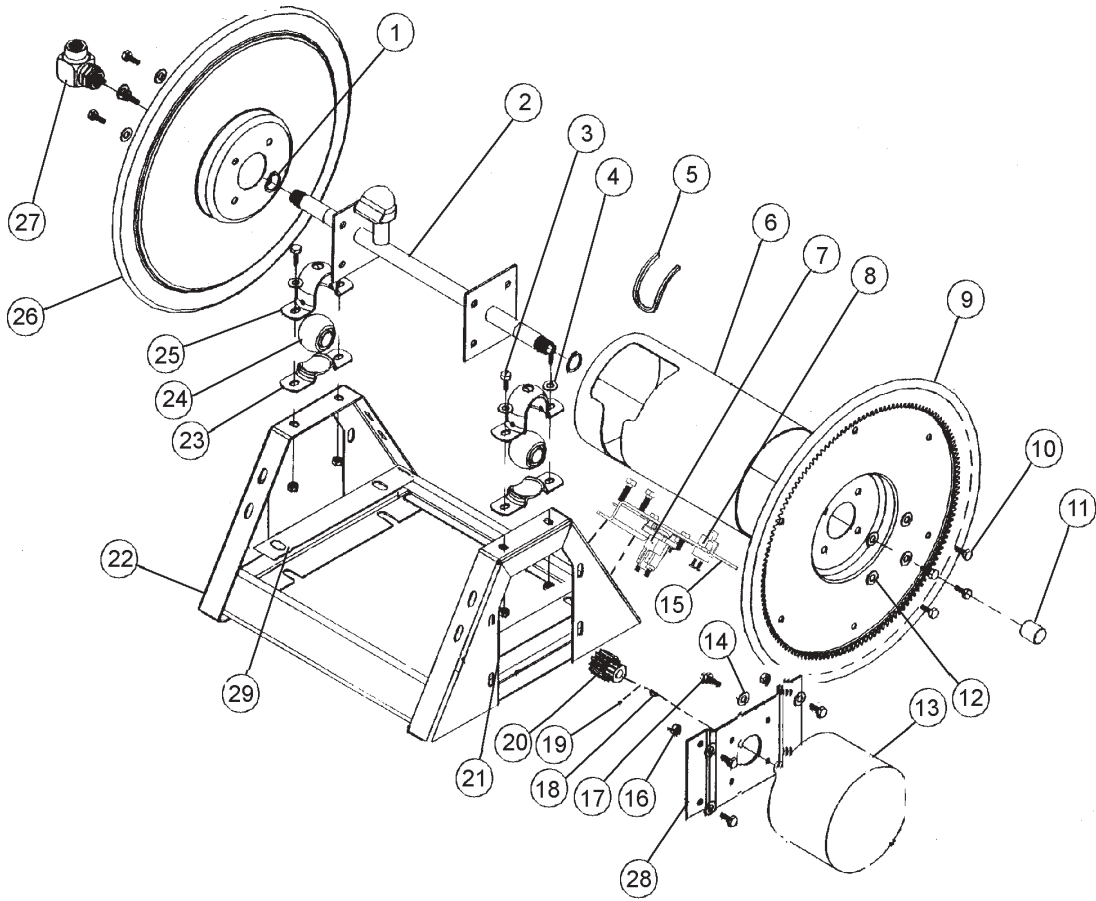
#### RECOMMENDED OVERLAP

Adjust nozzle spray height to overlap 30% of each edge of pattern.

#### NOZZLE HEIGHT

Suggested spray nozzle height with 20" spacing, tip spray angle of 80° should be 17-19", tip spray angle of 110° should be 12-14".

# 16-906 ELECTRIC HOSE REEL DRAWING

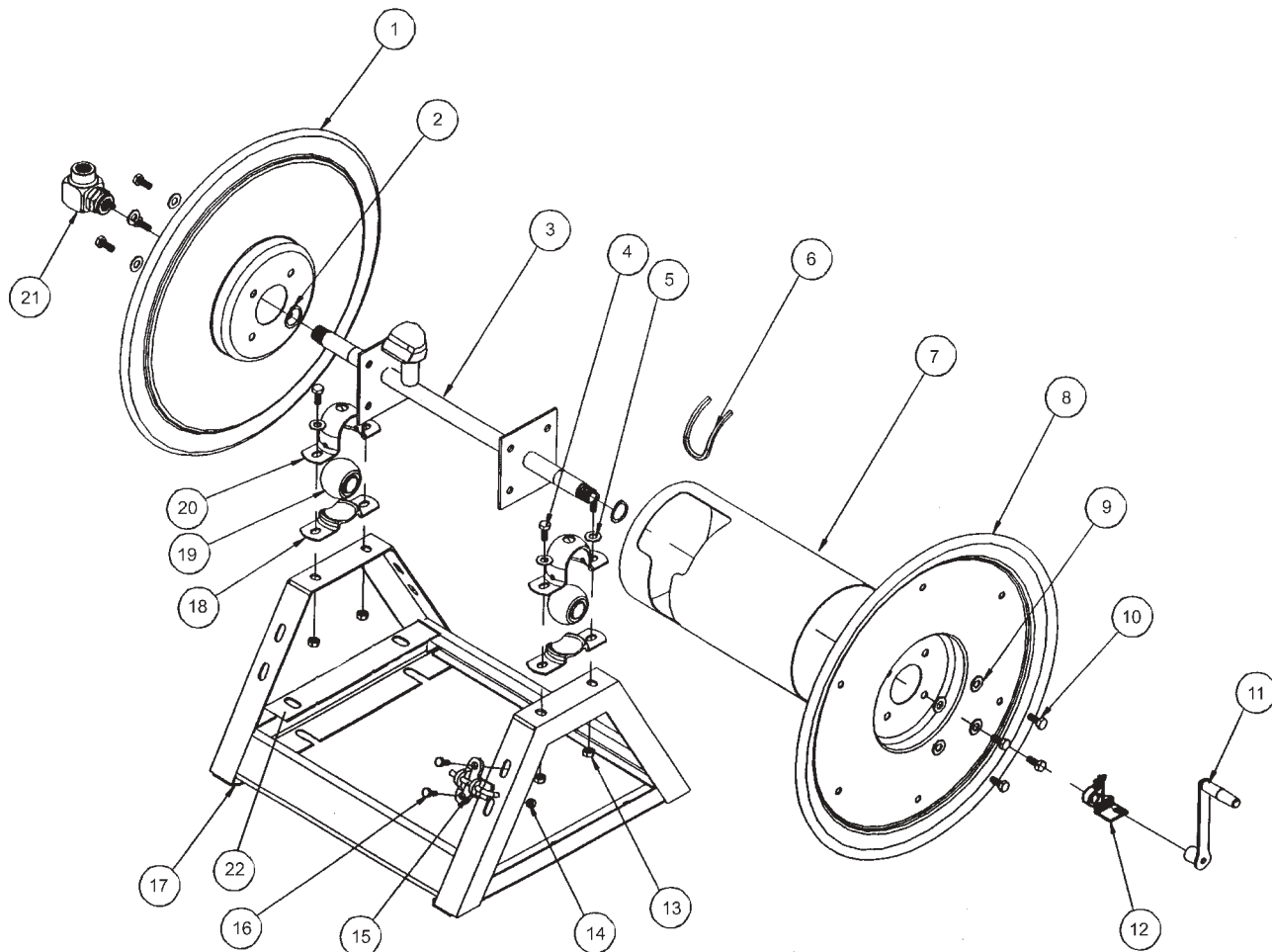


Accessories

## 16-906 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    | 12-015        | 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 Brkt                   | 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        |

# 16-129 HOSE REEL DRAWING



Accessories

## 16-129 HOSE REEL PARTS LIST

| 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-516-18-175 | Bolt <sup>5</sup> / <sub>16</sub> - 18 x 1 <sup>3</sup> / <sub>4</sub> | 4        |
|      | HW-516        | Washer <sup>5</sup> / <sub>16</sub>                                    | 4        |
|      | HNTL-516-18   | Lock Nut <sup>5</sup> / <sub>16</sub> - 18                             | 4        |

# 14-311 HOSE REEL MOUNT AND 1610 PLUMBING DRAWING

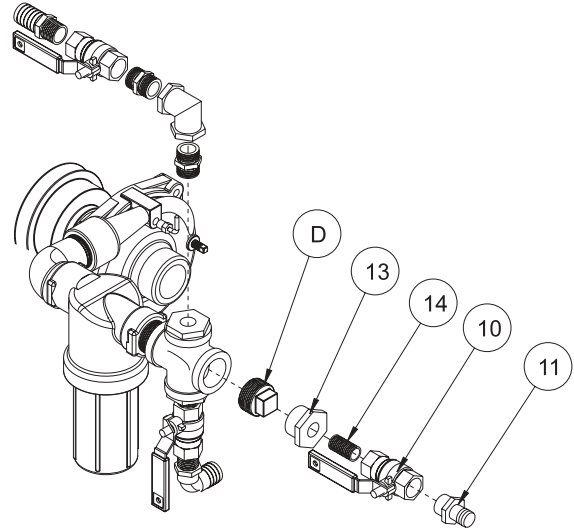
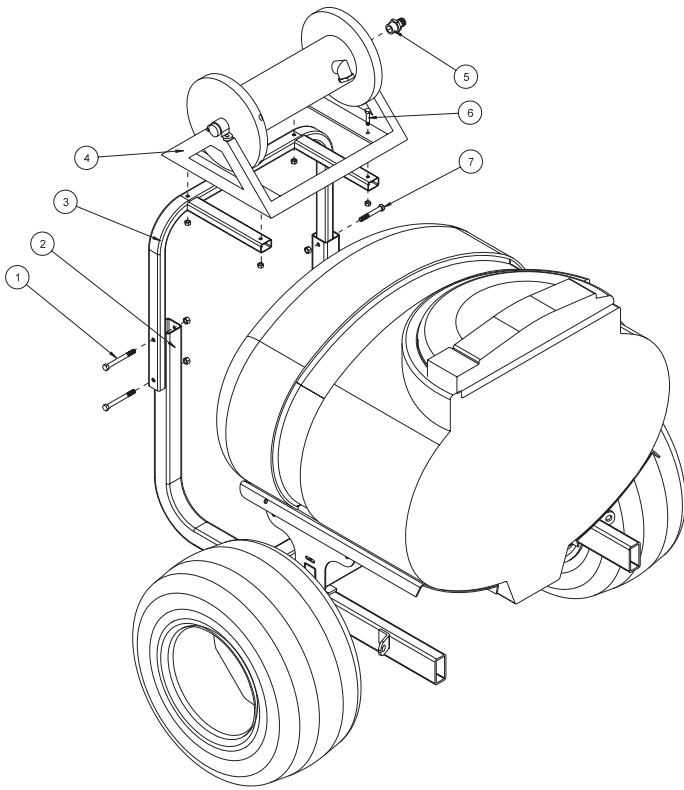


Figure 3  
1610

## HOSE REEL PLUMBING

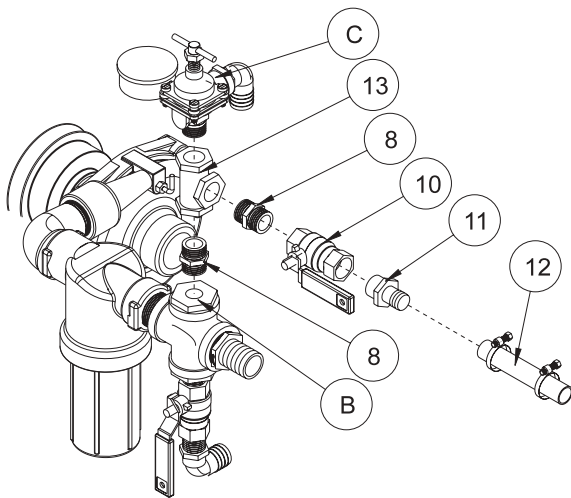


Figure 1  
1607, 1602

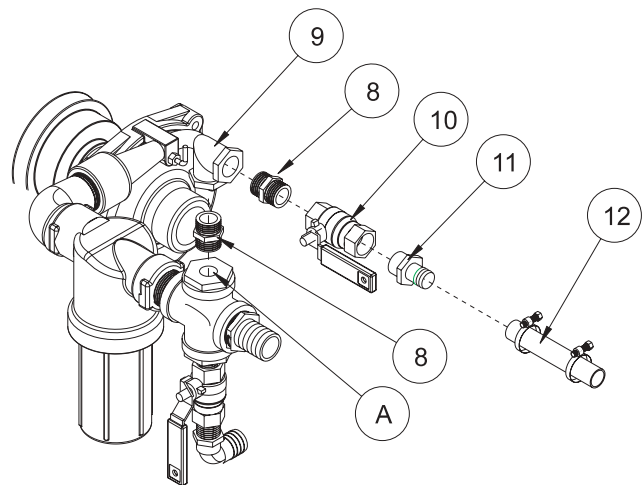


Figure 2  
1604

## 14-311 HOSE REEL PARTSLIST

| REF# | PART#         | DESCRIPTION  | QUANTITY |
|------|---------------|--|----------|
| 1    | HB-38-16-350  | Bolt $\frac{3}{8}$ - 16 x $3\frac{1}{2}$           | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                        | 2        |
| 2    | 14-325        | Boom Carrier (part of machine)                     | 2        |
| 3    | 10-221        | Hose Reel Mount                                    | 1        |
| 4    | 16-906        | Electric Hose Reel                                 | 1        |
|      | 16-129        | Manual Hose Reel                                   | 1        |
| 5    | 18-249        | Brass Fitting $\frac{3}{4}$ MPT x $\frac{3}{4}$ HB | 1        |
| 6    | HB-516-18-150 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{2}$          | 4        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18                       | 4        |
| 7    | HB-38-16-250  | Bolt $\frac{3}{8}$ - 16 x $2\frac{1}{2}$           | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                        | 2        |
| 8    | 16-158        | Close Nipple $\frac{3}{4}$                         | 2        |
| 9    | 16-151        | Elbow F.P.T. $\frac{3}{4}$ x $\frac{3}{4}$         | 1        |
| 10   | 16-859        | Ball Valve $\frac{3}{4}$ Brass                     | 1        |
| 11   | 16-154        | Fitting $\frac{3}{4}$ MPT x $\frac{3}{4}$ HB       | 1        |
| 12   | 8887-90       | Orange PVC Hose $\frac{3}{4}$                      | 1        |
|      | 18-040        | Hose Clamp   | 2        |
| 13   | 18-260        | Bushing $1\frac{1}{4}$ x $\frac{3}{4}$             | 1        |
| 14   | 18-073        | Pipe Nipple $\frac{3}{4}$                          | 1        |

## INSTALLATION INSTRUCTIONS

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. Remove square rubber covers on boom carriers.
5. Place hose reel bracket inside the boom carrier tube on left side and outside on right side with arms pointing toward front of machine.
6. Lower bracket until top hole in bracket lines up with hole in upright. Bolt as shown.
7. Put hose reel on hose reel bracket with fitting on left side of machine. Use four bolts  $\frac{5}{16}$  - 18 x  $1\frac{1}{2}$  and four  $\frac{5}{16}$  - 18 lock nuts to hold in place. Tighten bolts.
8. Put 18-249 barb fitting into hose reels side.
9. Use 8887- 90 hose to connect reel to ball valve, clamp with 18-040 hose clamps.
10. Use 22-075 nylon ties to tie hose to main feed hose.
11. **For 1610P:** Remove pipe plug "D." Insert the bushing, pipe nipple, and ball valve. Place the hose barb fitting into the ball valve and connect the hose. See Figure 3.
12. **For 1602P and 1607P:** Remove hose from elbow on throttling valve. Remove throttling valve, gauge and elbow. Re-assemble as shown in Figure 1, using parts "C". Assemble throttling valve with gauge and elbow into top of tee and reconnect the hose.
135. **For 1604P:** Remove hex plug from "A" and assemble as shown in Figure 2.

(Continued on next page)





## ELECTRIC HOSE REEL WIRING PARTS LIST

| REF#                      | PART#      | DESCRIPTION                             | QUANTITY |
|---------------------------|------------|---|----------|
|                           | 8843-132   | Flexguard $\frac{3}{8}$ ID              | 1        |
| 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                         | 12-015     | Solenoid                                | 1        |
| <b>SOLENOID TERMINALS</b> |            |   |          |
|                           | HN -516-24 | $\frac{5}{16}$ - 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

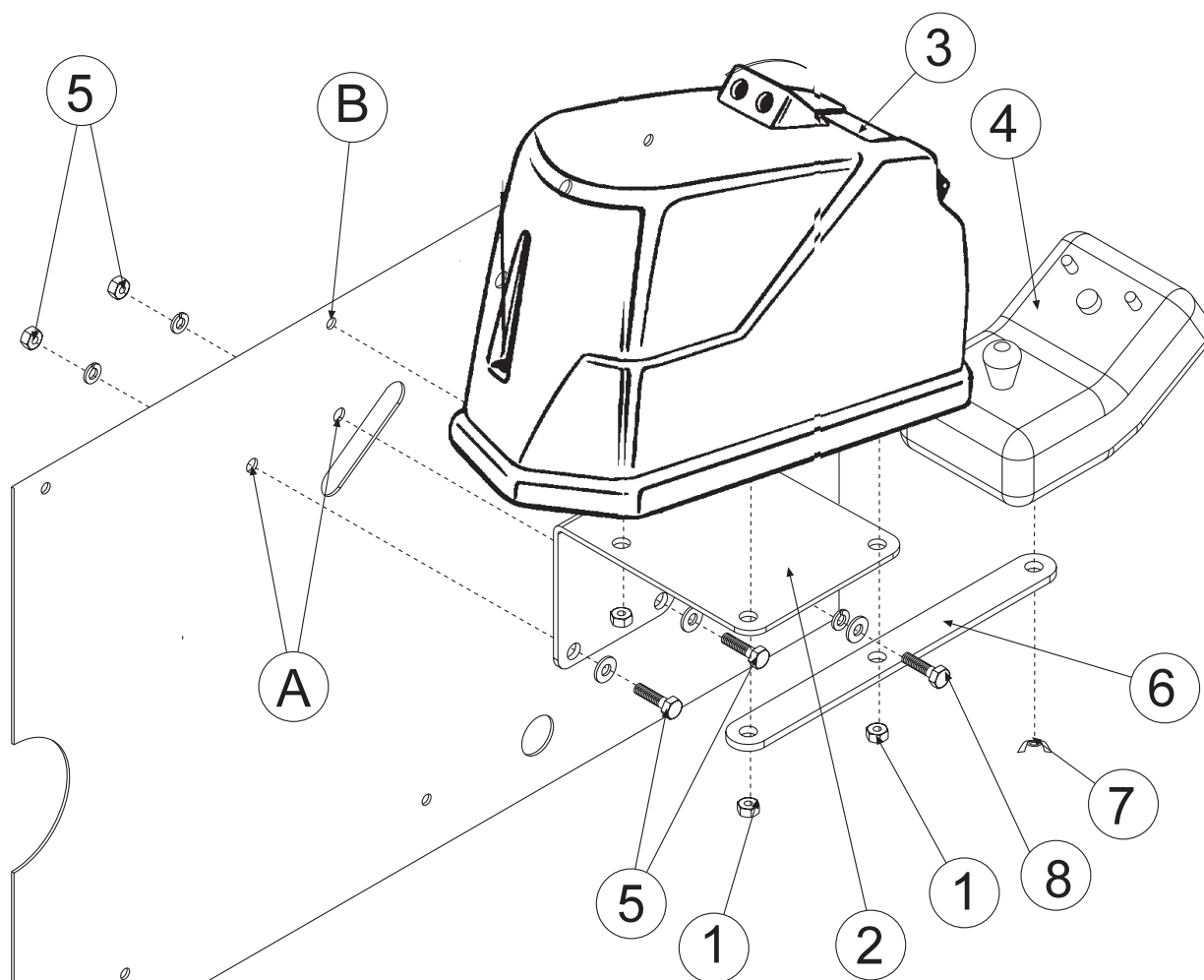
Route wire harness along side of tank and over to fuse block taking care to stay clear of moving parts or hot engine components. Cut off excess wire and strip back  $\frac{3}{8}$ ". Place one 8963 heat shrink ( $\frac{1}{4}$  x  $1\frac{1}{4}$ ) on each wire before crimping 8901 slide on connectors to 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*

# FOAM MARKER COMPRESSOR AND CONTROL BOX FOR 1600 DRAWING



## COMPRESSOR AND CONTROL BOX PARTS LIST

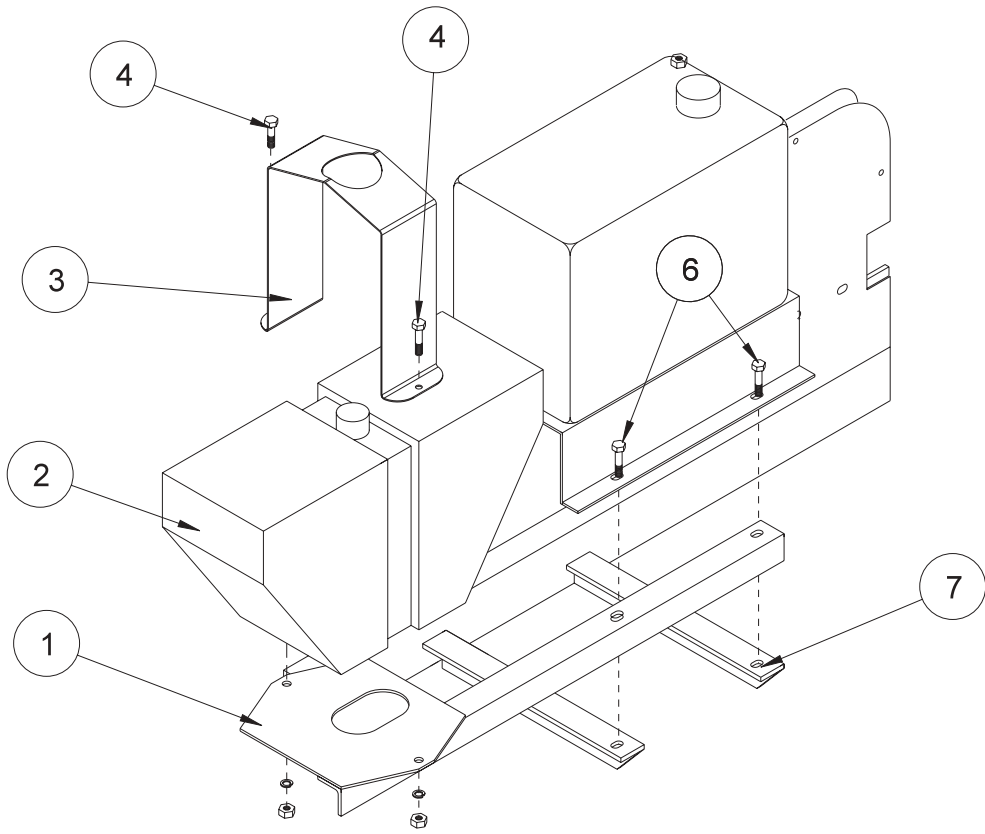
| REF# | PART#        | DESCRIPTION       | QUANTITY |
|------|--------------|-------------------|----------|
| 1*   | HN-14-20     | Nut 1/4 - 20      | 4        |
| 2    | 15-524       | Foamer Bracket    | 1        |
| 3*   | 15-504       | Compressor        | 1        |
| 4*   | 15-506       | Switch Box        | 1        |
|      | 15-506-01    | Fuse (F10A 250V)  | 1        |
|      | 15-506-02    | Switch            | 1        |
| 5    | HB-14-20-100 | Bolt 1/4 - 20 x 1 | 2        |
|      | HW-14        | Washer 1/4        | 2        |
|      | HWL-14       | Lockwasher 1/4    | 2        |
|      | HN-14-20     | Nut 1/4 - 20      | 2        |
| 6    | 15-525       | Switch Box Mount  | 1        |
| 7*   |              | Wing Nut          | 2        |
| 8    | HB-14-20-100 | Bolt 1/4 - 20 x 1 | 1        |
|      | HW-14        | Washer 1/4        | 1        |
|      | HWL-14       | Lockwasher 1/4    | 1        |
| *    | 15-500       | Foamer            | 1        |

## INSTALLATION INSTRUCTIONS

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

1. Remove original mounting bracket, if one was provided, from bottom of compressor and discard. Place compressor (Ref 3) on mounting bracket (Ref 2), with controls facing the front. Finger tighten a nylon lock nut (Ref 1) on each of the two bolts closest to the side panel.
2. Place mounting bracket (Ref 2) onto side panel as shown. Hole (B) is threaded. Insert one 1/4 - 20 x 1 bolt with lockwasher and washer (Ref 8) into hole (B). Insert the other two 1/4 - 20 x 1 bolts and washers (Ref 5) into hole (A) with lockwasher and nut on the inside panel.
3. Place switch box mount (Ref 6) on bolts furthest from side panel. Place one nylon lock nut (Ref 1) on each of the two bolts. Tighten all four nuts on compressor bottom.
4. Place control box (Ref 4) on control bracket and tighten wing nut (Ref 7).
5. Connect the large plastic electrical plugs on compressor and control box

# 1600P FOAMER TANK MOUNT DRAWING



Accessories

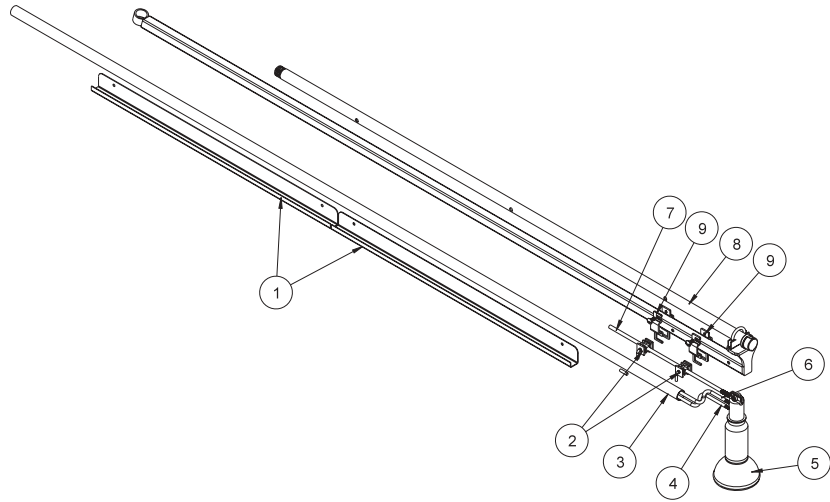
## 1600P FOAMER TANK MOUNT PARTS LIST

| REF# | PART#         | DESCRIPTION  | QUANTITY |
|------|---------------|--|----------|
| 1    | 16-938        | Tank Mount Base  | 1        |
| 2    | 21-464        | 4 Gallon Poly Tank   | 1        |
|      | 26-054        | Bushing (part of tank)                                     | 1        |
|      | 26-055        | Shut Off Valve (part of tank)                              | 1        |
| 3    | 16-939        | Foam Tank Strap  | 1        |
| 4    | HB-516-18-150 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{2}$                  | 2        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18                               | 2        |
| 6    | HB-38-16-125  | Bolt $\frac{3}{8}$ - 16 x $1\frac{1}{4}$ (part of machine) | 2        |
| 7    |               | Main Frame   |          |

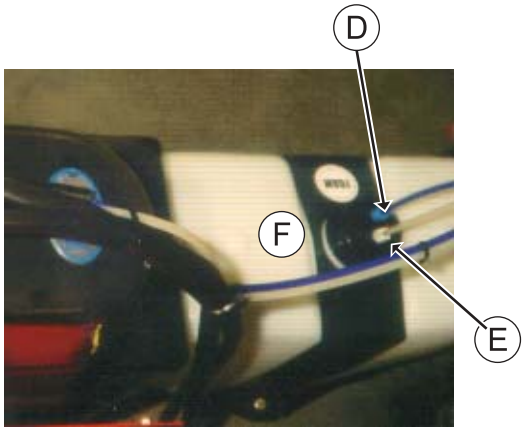
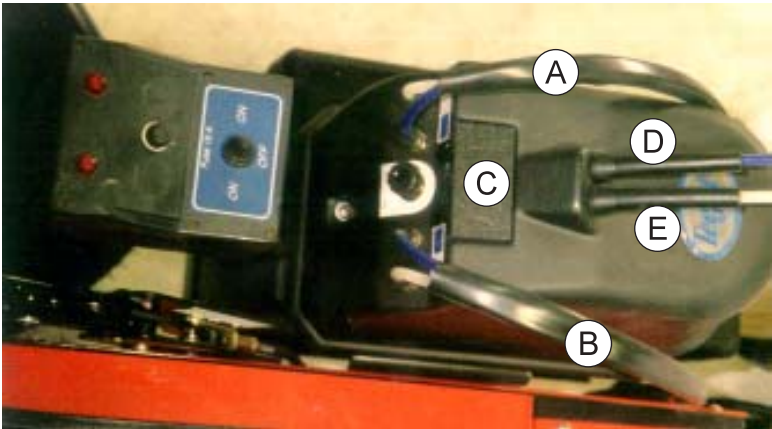
## INSTALLATION INSTRUCTIONS

1. For *Spray Star 1600*: Remove the two outside bolts (Ref 6) from the gas tank bracket angles.
2. Lift the leg from the gas tank bracket (Ref 6) and slide the arm of the tank mount base (Ref 1) between the leg of the gas tank bracket and the angle iron on the frame (Ref 7). Be sure the plate end of the foamer tank bracket is pointing to the rear of the machine and parallel with the ground.
3. Using the same bolts and lock nuts (Ref 6), re-bolt tank and foamer tank bracket to angle iron.
4. Place foamer tank (Ref 2) over plate on tank mount base (Ref 1).
5. With tank strap (Ref 3) over tank, use  $\frac{5}{16}$  - 18 x  $1\frac{1}{2}$  bolt (Ref 4) in back and lock nut on bottom of plate, just start the nut.
6. Put  $\frac{5}{16}$  - 18 x  $1\frac{1}{2}$  bolt (Ref 4) in front with lock nut on the bottom of plate, just start the nut.
7. Now completely tighten back bolt then tighten front bolt.

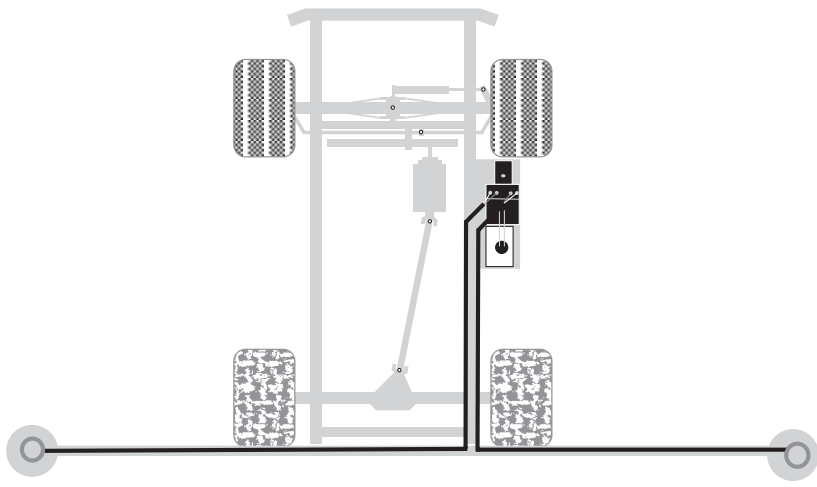
# FOAMER NOZZLE MOUNT & HOSE GUARD MOUNT DRAWING



# CONNECTING TUBING TO COMPRESSOR AND TANK



# TUBING ROUTE



Accessories

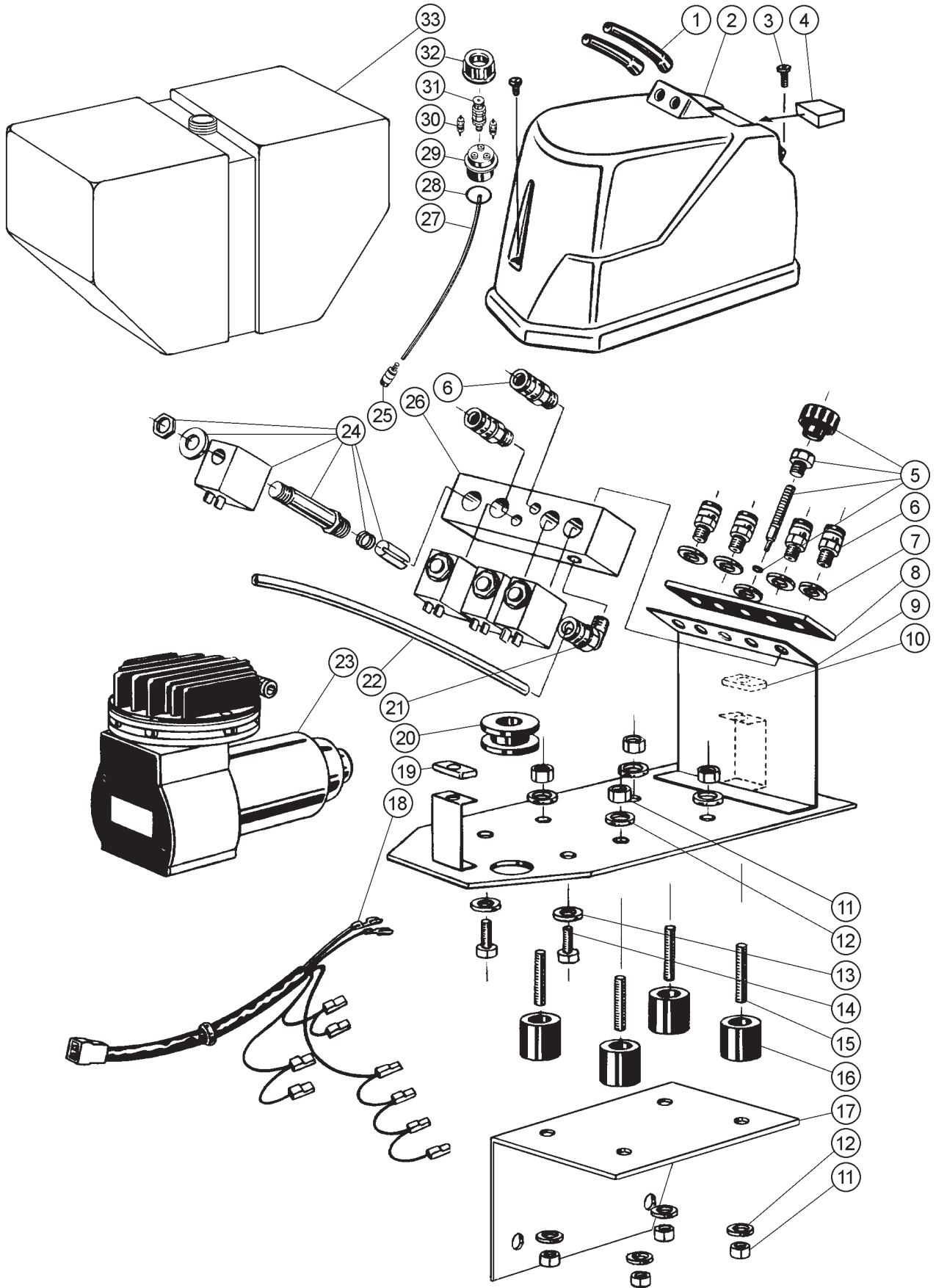
## 15-499 FOAM MARKER PARTS LIST

| REF# | PART#        | DESCRIPTION   | QUANTITY   |
|------|--------------|---|------------|
| 1    | 15-537       | Foamer Hose Guard 31"   | 2          |
|      | 10-256       | Foamer Hose Guard 16"   | 2          |
|      | HSDPS-14-075 | Stainless Steel Pan Head Drill Screw $\frac{1}{4} \times \frac{3}{4}$ | 8          |
| 2    | 16-987       | Foam Nozzle Mounting Kit  | 1 per boom |
| 3    | 15-507       | Foamer Tubing   | 2          |
| 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          |

## INSTALLATION INSTRUCTIONS

- Slide hose clamp onto drop tube of foam nozzle and attach restrictor bell.
- Place splined end of Nozzle mounting rod (Ref 7) into top of foam nozzle (Ref 5). Tighten screw.
- 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.
- Being careful not to cut the tubing (Ref 3), cut the oversleeve back approximately 2" (5cm) to expose blue (Ref 6) and clear tubing (Ref 4).
- Remove blue wing nut from top connector of foam nozzle and slide it on the blue tube with the threads facing toward end of tube. Slide blue tube all the way over the top of the small tube on foam nozzle. Slide wing nut back to the threads and hand tighten. Follow the same steps for the clear tube and tube nut.
- Route the tubing along underside of main frame using tie downs as necessary.
- Install opposite ends of air-liquid tubes to compressor, again cutting back the oversleeve approximately 2" (5cm) 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.
- Follow the same steps for the right boom tubing. Notice the right boom is inserted into left side (Ref B) of compressor (Ref C). To release tubing from compressor, hold black ring around tubing, and pull tube out.
- Hose's must be routed on bottom of the boom square tubing.
- Mark 6 inches in from inside edge of foamer nozzle mounting bracket on square boom tubing.
- Screw hose guard (Ref 1) flush with top of square tubing with edge on previous mark. The channel covers hoses on the bottom of the square tubing.
- Install hose guard using 3 drill screws (you may want to drill a  $\frac{3}{16}$  pilot hole first).
- Place another hose guard against first and install in same manner.
- Repeat process for other boom side.
- Connect the blue tube (Ref D) to the tank cap connector (Ref F) which is also connected to the large blue tube which hangs below the cap. This is the soap outlet tube.
- Connect the clear tube (Ref E) to the other connector on the tank cap. This is the air input tube. Tighten connectors hand tight, assembly tank cap onto tank.
- Connect small plastic electrical plug under compressor to electrical extension cable.
- For *Spray Star 1600* route extension cable under engine along the mainframe cross bar, using tie downs as necessary.
- Cut cable and strip casing, allowing enough length to connect to fuse block.
- Strip and connect spade type terminals to each wire and use the heat shrink.
- Connect black negative (-) wire to the ground and connect red wire to the positive (+).
- Insert 20 amp fuse into slot which red wire was attached to.

# 15-504 COMPRESSOR SUB ASSEMBLY DRAWING



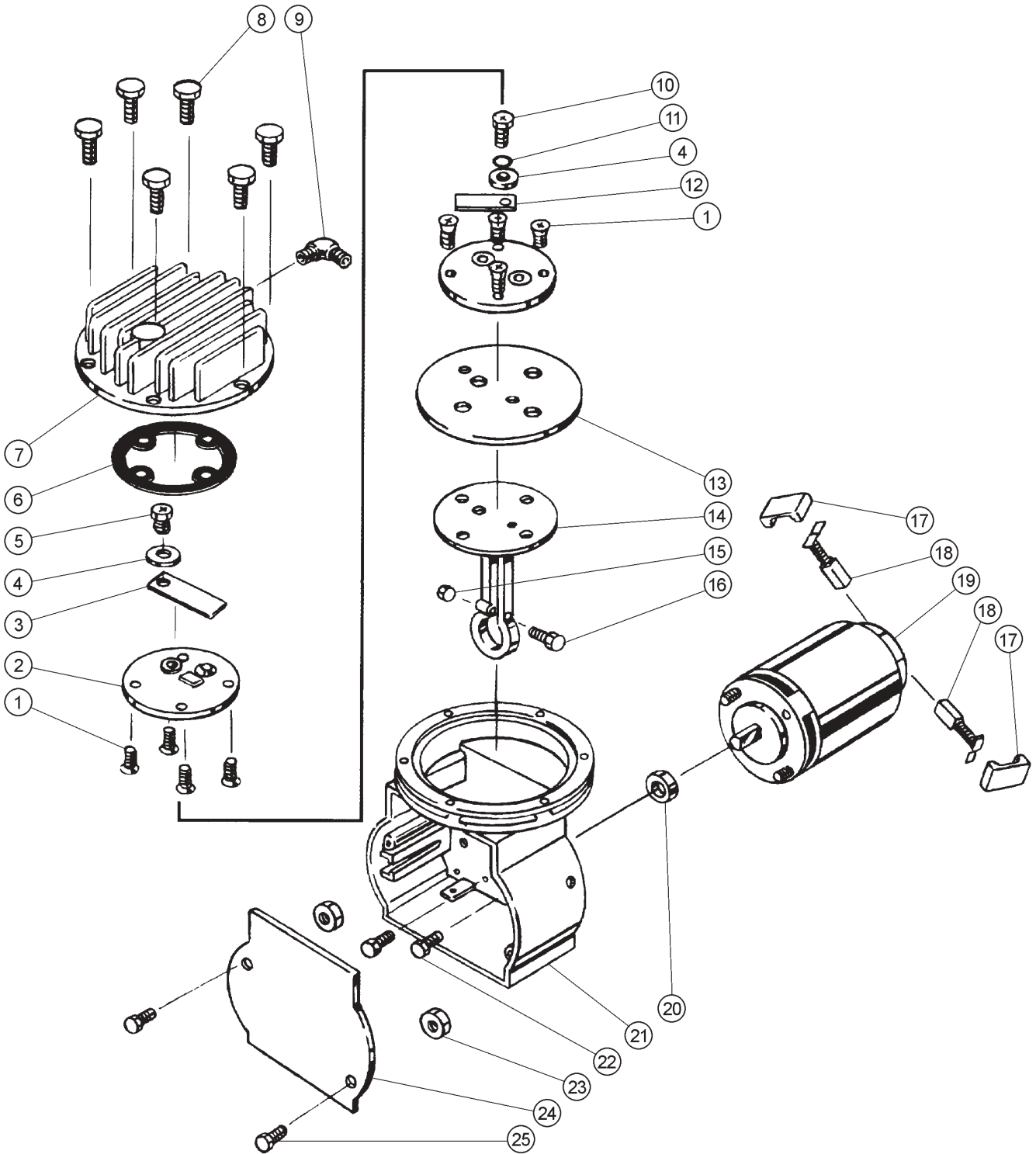
Accessories



## 15-504 COMPRESSOR SUBASSEMBLY PARTSLIST

| REF# | PART#     | DESCRIPTION   | QUANTITY |
|------|-----------|---|----------|
| 1*   |           | Tubing Cover Seal   | 2        |
| 2*   | 15-504-01 | Compressor Cover  | 1        |
| 3*   |           | Cover Screw   | 2        |
| 4*   | 15-504-03 | Air Filter  | 1        |
| 5†   | 15-504-07 | Needle Valve Sub Assembly   | 1        |
| 6†   | 15-504-11 | Tubing Connectors   | 6        |
| 7    |           | Gasket  | 4        |
| 8    |           | Manifold Cover Gasket   | 1        |
| 9    |           | Mounting Plate  | 1        |
| 10   |           | Front Foam Pad  | 1        |
| 11   |           | Nut   | 8        |
| 12   |           | Washer  | 8        |
| 13   |           | Washer  | 2        |
| 14   |           | Bolt  | 2        |
| 15   |           | Threaded Rod  | 4        |
| 16   |           | Bushing   | 4        |
| 17   |           | Bracket (Discard Original Bracket Use 15-524)   | 1        |
|      | 15-525    | Switch Box Mount  | 1        |
| 18   | 15-504-04 | Wiring Harness  | 1        |
| 19   |           | Rear Foam Pad   | 1        |
| 20   |           | Grommet   | 1        |
| 21†  |           | L-Tubing Connector  | 1        |
| 22†  |           | Tube 4"   | 1        |
| 23   | 15-505    | Motor Sub Assembly  | 1        |
| 24†  | 15-504-06 | Solenoid Valve Sub Assembly   | 4        |
| 25   | 15-512-02 | Strainer  | 1        |
| 26†  |           | Manifold Block  | 1        |
| 27   |           | Tube  | 1        |
| 28   | 15-512-01 | O-ring EPR Rubber   | 1        |
| 29   | 15-504-10 | Body  | 1        |
| 30   | 15-504-09 | Tubing Connector  | 2        |
| 31   | 15-504-08 | Pressure Relief Valve   | 1        |
| 32   | 15-512    | Cap   | 1        |
| 33   | 21-464    | Tank (Includes 26-054 bushing & 26-055 shut off valve)  | 1        |
|      | 15-506    | Switch Box  |          |
|      | 15-506-01 | Fuse (F10A 20V)   |          |
|      | 15-506-02 | Switch  |          |
|      | 15-507    | Tubing  |          |
|      | 15-508    | Compressor Extension Cable (Optional)   |          |
|      | 15-509    | Power Cable (Also Order Two 8853 Female Connectors)   |          |
|      | 15-510    | Boom Mounting Bracket Accessories (Includes Two 15-510-01<br>Nozzle Mounting Rods and Four Lock Collars with Bolts) |          |
| *    | 15-504-01 | Cover Sub Assembly  |          |
| †    | 15-504-05 | Valve Manifold Sub Assembly   |          |

# 15-505 MOTOR SUB ASSEMBLY DRAWING

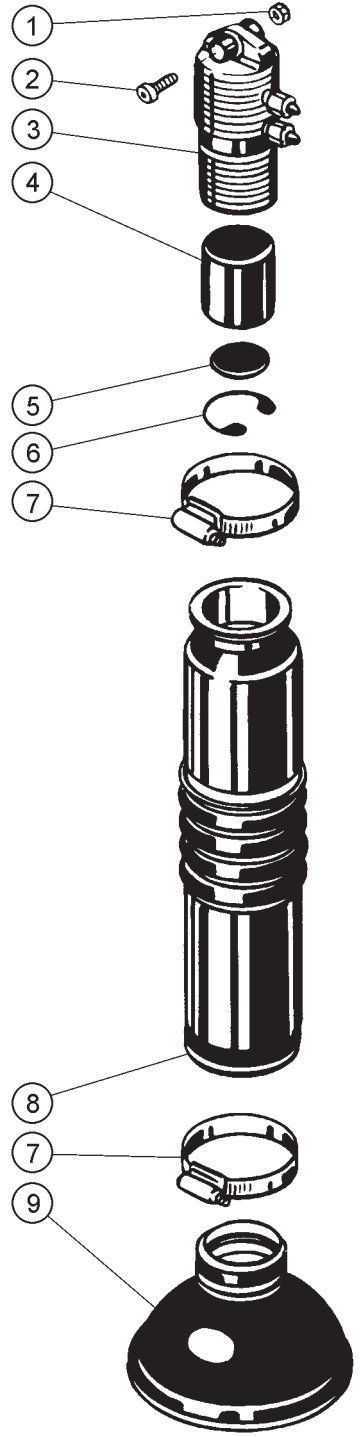


Accessories

## 15-505 MOTOR SUB ASSEMBLY PARTS LIST

| REF# | PART#     | DESCRIPTION                       | QUANTITY |
|------|-----------|-----------------------------------|----------|
| 1†   |           | Manifold Screw                    | 8        |
| 2    |           | Exhaust Manifold                  | 1        |
| 3*   |           | Exhaust Reed Valve                | 1        |
| 4*†  |           | Washer                            | 2        |
| 5*   |           | Exhaust Valve Screw               | 1        |
| 6    | 15-505-01 | Exhaust Manifold Gasket           | 1        |
| 7    |           | Head                              | 1        |
| 8    |           | Bolt                              | 6        |
| 9    |           | L-Tubing Connector                | 1        |
| 10*† |           | Intake Valve Screw                | 1        |
| 11*† |           | Split Lockwasher                  | 1        |
| 12*† |           | Intake Reed Valve                 | 1        |
| 13†  | 15-505-03 | Diaphragm                         | 1        |
| 14†  |           | Piston                            | 1        |
| 15†  |           | Connecting Rod Nut                | 1        |
| 16†  |           | Connecting Rod Bolt               | 1        |
| 17   |           | Brush Retainer                    | 2        |
| 18   | 15-505-06 | Brush                             | 2        |
| 19   |           | 12 Volt Electric Motor            | 1        |
| 20   | 15-505-05 | Stainless Steel Bearing           | 1        |
| 21   |           | Block                             | 1        |
| 22   |           | Motor Bolt                        | 2        |
| 23   |           | Motor Nut                         | 2        |
| 24   |           | Cover                             | 1        |
| 25   |           | Cover Screw                       | 2        |
| *    | 15-505-02 | Intake Exhaust Valve Sub Assembly |          |
| †    | 15-505-04 | Intake Piston Sub Assembly        |          |

15-511 FOAM NOZZLE SUB ASSEMBLY DRAWING



Accessories

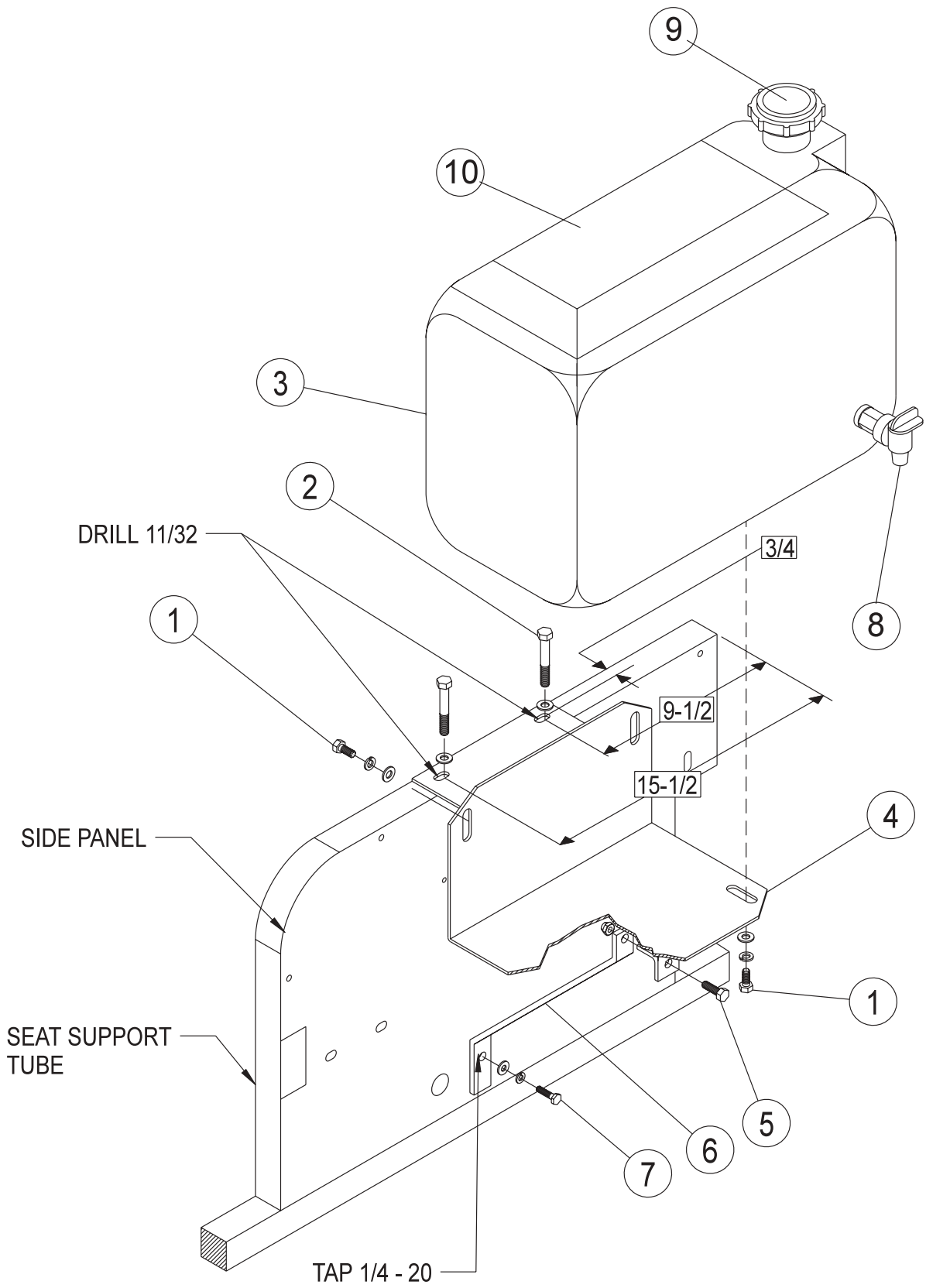
## 15-511 FOAM NOZZLE SUB ASSEMBLY PARTS LIST

| REF# | PART#     | DESCRIPTION                        | QUANTITY |
|------|-----------|------------------------------------|----------|
| 1†   |           | Nut                                | 1        |
| 2†   |           | Screw                              | 1        |
| 3†   |           | Foam Nozzle Inlet Body             | 1        |
|      | 15-510-01 | Nozzle Mounting Rods               | 2        |
| 4*†  | 15-511-02 | Foam Sponge                        | 1        |
| 5*†  |           | Stainless Steel Screen             | 1        |
| 6*†  | 15-511-04 | Stainless Steel Snap Ring          | 1        |
| 7    | 18-123    | Hose Clamp                         | 2        |
| 8    |           | Drop Tube                          | 1        |
| 9    | 15-511-05 | Restrictor Bell                    | 1        |
| †    | 15-511-01 | Foam Nozzle Inlet Sub Assembly     |          |
| *    | 15-511-06 | Foam Kit (includes 2 each * items) |          |

### **NOTE:**

When using the Star Shield you will need to leave the drop tube (Ref 8) the full length. For all other booms the drop tube will need to be shortened to half its length.

# 15-363 FRESH WATER TANK DRAWING



Accessories

## 15-363 FRESH WATER TANK PARTSLIST

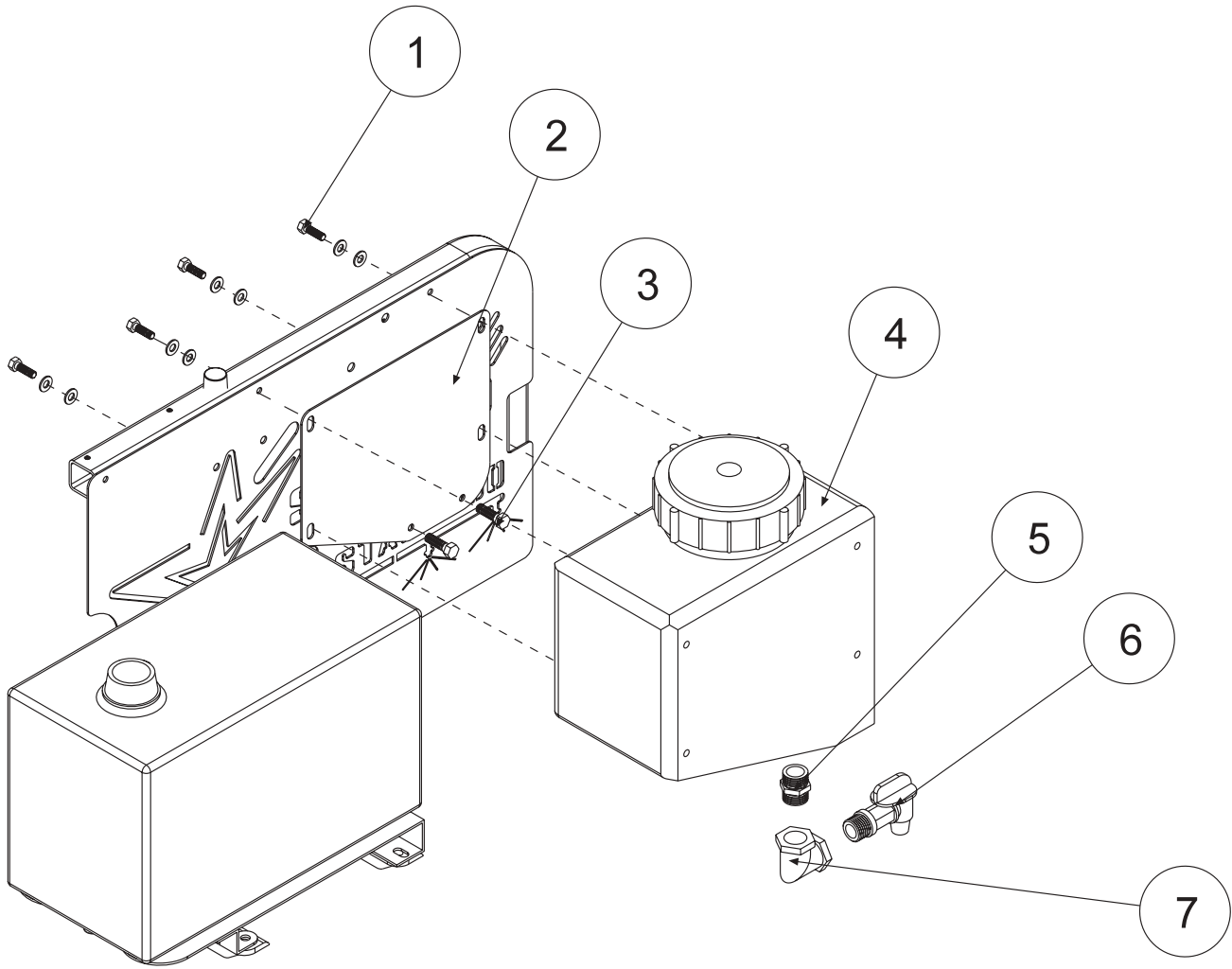
### TO BE USED WITH 1602P, 1604P AND 1607P

| REF# | PART#         | DESCRIPTION                               | QUANTITY |
|------|---------------|---|----------|
| 1    | HB-516-18-075 | Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$  | 4        |
|      | HWL-516       | Lockwasher $\frac{5}{16}$                 | 4        |
|      | HW-516        | Washer $\frac{5}{16}$                     | 4        |
| 2    | HB-516-18-225 | Bolt $\frac{5}{16}$ - 18 x $2\frac{1}{4}$ | 2        |
|      | HW-516        | Washer $\frac{5}{16}$                     | 2        |
|      | HNTL-516-18   | Lock Nut $\frac{5}{16}$ - 18              | 2        |
| 3    | 15-488        | Wash Tank (includes all * items)          | 1        |
|      | 16-166        | Hex Plug $\frac{3}{4}$                    | 2        |
| 4    | 15-486        | Tank Bracket                              | 1        |
| 5    | HB-14-20-100  | Bolt $\frac{1}{4}$ - 20 x 1               | 1        |
|      | HNTL-14-20    | Lock Nut $\frac{1}{4}$ - 20               | 1        |
| 6    | 15-487        | Support Brace                             | 1        |
| 7    | HB-14-20-100  | Bolt $\frac{1}{4}$ - 20 x 1               | 1        |
|      | HWL-14        | Lockwasher $\frac{1}{4}$                  | 1        |
|      | HW-14         | Washer $\frac{1}{4}$                      | 1        |
| 8*   | 16-960        | Spigot (part of 15-488)                   | 1        |
| 9*   | 15-488-01     | Cap(part of 15-488)                       | 1        |
| 10*  | 15-488-02     | Cover Assembly (part of 15-488)           | 1        |

## INSTALLATION INSTRUCTIONS

1. Drill two  $\frac{11}{32}$  holes through both walls of left side panel and seat support tube as shown in drawing.
2. Remove drill screw from bottom edge, in middle of side panel. Run a  $\frac{1}{4}$  - 20 tap through this hole.
3. Bolt tank to tank bracket using four  $\frac{5}{16}$  - 18 x  $\frac{3}{4}$  bolts,  $\frac{5}{16}$  lockwasher and  $\frac{5}{16}$  washers.
4. Use Teflon<sup>®</sup> tape on each of the  $\frac{3}{4}$  hex plugs and install into tank.
5. Bolt tank bracket to seat support tube where you drilled the two  $\frac{11}{32}$  holes.
6. Bolt up support brace to tank bracket and side panel, as shown.

**O-106 FRESH WATER WASH TANK DRAWING**



Accessories



## 10-106 FRESH WATER WASH TANK PARTSLIST

### TO BE USED WITH 1610P

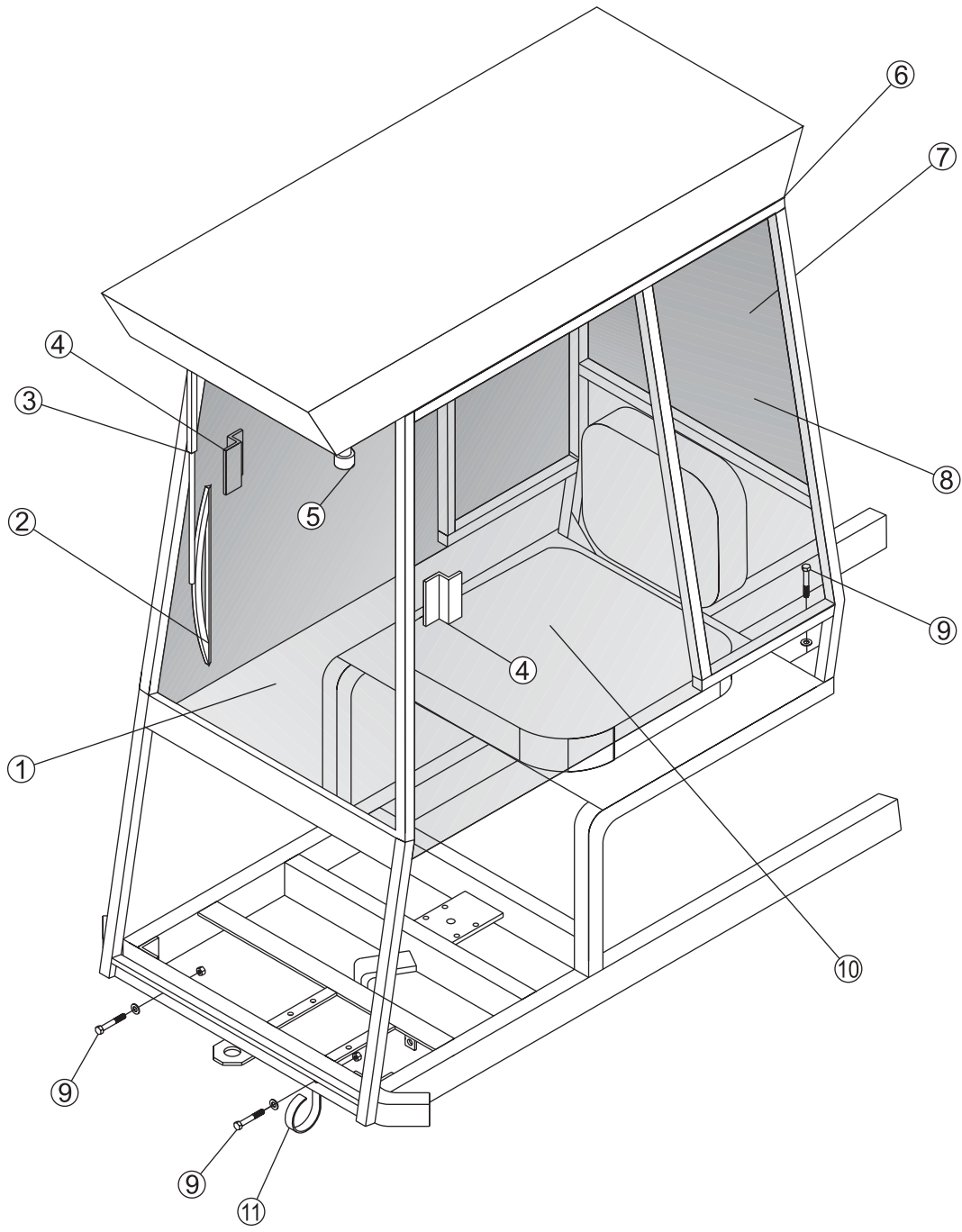
| REF# | PART#         | DESCRIPTION                                | QUANTITY |
|------|---------------|--|----------|
| 1    | HB-516-18-075 | Bolt $\frac{5}{16}$ - 18 x $\frac{3}{4}$   | 4        |
|      | HWL-516       | Lock Washer $\frac{5}{16}$                 | 4        |
|      | HW-516        | Washer $\frac{5}{16}$                      | 4        |
| 2    | 10-216        | Fresh Water Tank Bracket                   | 1        |
| 3    | HB-38-16-200  | Bolt $\frac{3}{8}$ -16 x 2                 | 2        |
|      | HNTL-38-16    | Lock Nut $\frac{3}{8}$ -16                 | 2        |
| 4    | 10-234        | 3 Gallon Rectangular Tank                  | 1        |
| 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        |

## INSTALLATION INSTRUCTIONS

1. Fresh Water Wash Tank mounts on the right side of the machine.
2. Insert the close nipple into the bottom of the tank. Then place the elbow on the close nipple so it is pointing away from the machine. Place the spigot into the elbow. For best results use plumbers tape on all fittings.
3. Place the mount bracket onto the right side panel using the two  $\frac{3}{8}$  bolts and lock nuts.
4. Line holes on the tank with holes on the mount bracket and use the  $\frac{5}{16}$  bolts to fasten tank to mount bracket.
5. Rinse tank with clear water and check for leaks around fittings.

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

14-305 OPERATOR'S PROTECTIVE ENCLOSURE DRAWING



Accessories

## 14-305 OPERATOR'S PROTECTIVE ENCLOSURE PARTS LIST

| REF# | PART#        | DESCRIPTION   | QUANTITY    |   |
|------|--------------|---|-------------|---|
| 1    | 15-429-17    | Windshield  | 1           |   |
|      | 15-429-23    | Clamp   | 1           |   |
| 2    | 15-429-03    | Wiper Blade   | 1           |   |
| 3    | 15-429-01    | Wiper Motor   | 1           |   |
|      | 15-429-02    | Wiper Arm   | 1           |   |
| 4    | 15-429-20    | Door Handle   | 4           |   |
| 5    | 15-429-07    | Black Plastic Knob                                    | 2           |   |
| 6    | 15-429-24    | Roof  | 1           |   |
|      | 15-429-25    | Fan Panel   | 1           |   |
|      | 15-429-04    | Louver  | 3           |   |
|      | 15-429-05    | 3-Speed Rotary Switch                                 | 1           |   |
|      | 15-429-06    | Blower Knob   | 1           |   |
|      | 15-429-08    | Inside Top 1/4" Black Poly                            | 1           |   |
|      | 15-429-13    | Grommet Snap Bushing                                  | 4           |   |
|      | 15-429-14    | Filter Retainer Assembly                              | 2           |   |
|      | 15-429-15    | Blower  | 1           |   |
|      | 7            | 15-429-19   | Rear Window | 1 |
|      |              | 15-429-23   | Clamp       | 1 |
| 8    | 15-429-18    | Rear Side Window                                      | 2           |   |
|      | 15-429-22    | Top Rear Side Retainer                                | 2           |   |
| 9    | HB-38-16-250 | Bolt 3/8 - 16 x 2 1/2                                 | 4           |   |
|      | HW-38        | Washer 3/8  | 4           |   |
|      | HNTL-38-16   | Lock Nut 3/8-16                                       | 4           |   |
| 10   | 15-429-16    | Door  | 2           |   |
|      | 15-429-09    | Self Adhesive Velcro Hook on Frame                    | 1           |   |
|      | 15-429-10    | Self Adhesive Velcro Loop on Door                     | 1           |   |
|      | 15-429-21    | Door Hinge  | 2           |   |
| 11   | HLC-A58      | Loom Clamp  | 1           |   |
|      | 8857         | Ring Terminal 5/16                                    | 1           |   |
|      | 16-909       | Filter Element Complete                               | 1           |   |
|      | 15-429-11    | Bubble Trim Seal (19 1/4' on Edges of All Windows)    | 1           |   |
|      | 15-429-12    | Channel Window Single (14' Inside of Window Channels) | 1           |   |
|      | 33-262-05    | Clip on Rubber Trim (25' on Window Sides)             | 1           |   |

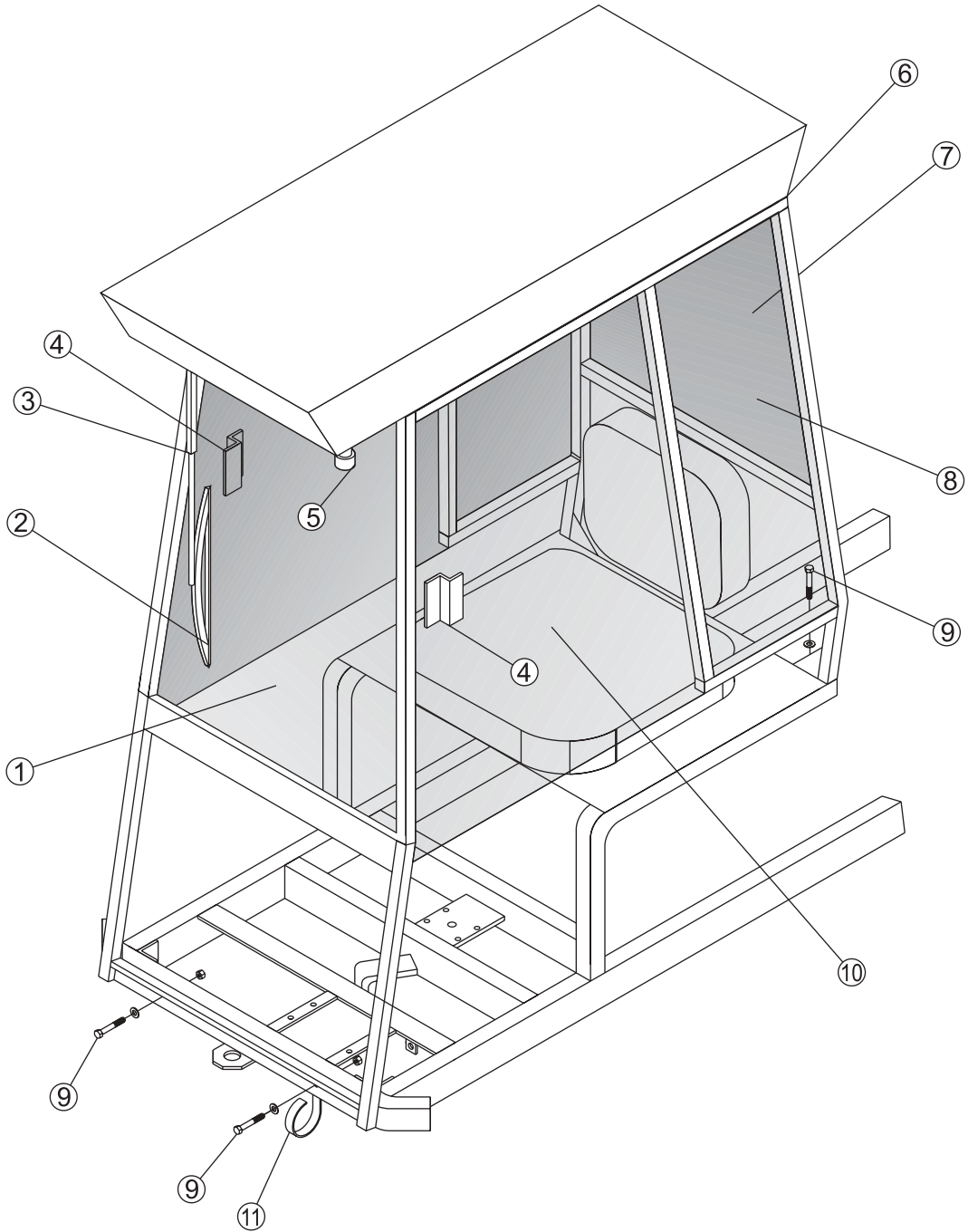
FOR MACHINES SERIAL NUMBER 562 AND UP

**Locate the end of the wire harness with the inline fuse and ring terminals. Remove fuse holder and ring terminals. Replace with the two(2) female spade connectors. Insert fuse into fuse panel and connect the lead wire from the accessories. Red to positive (+) and black too negative (-)**

### SPECIFICATIONS

|                  |   |
|------------------|---|
| Windshield       | <b>Gray Safety Glass</b>  |
|                  | <b>Large Rear Window Made of Lexan</b>  |
| Windshield Wiper | <b>12 Volt Single Speed</b>   |
| Filter           | <b>Front Intake Fresh Air Induction With Replaceable Charcoal Filter</b>                          |
| Blower           | <b>3 Speed Blower, Dual Wheel 235 CFM, 12 Volt Directional Air Flow Control</b>                   |
| Doors            | <b>2 Large Easy Access Doors Made Of 1/4" Lexan</b>   |
| Frame            | <b>Tubular Steel<br/>Satin Black Finish<br/>Foam Rubber Head Liner<br/>In Line Fuse Protected</b> |
| Overall Height   | <b>78" On Machine</b>   |

# 14-305 OPERATOR'S PROTECTIVE ENCLOSURE DRAWING



Accessories

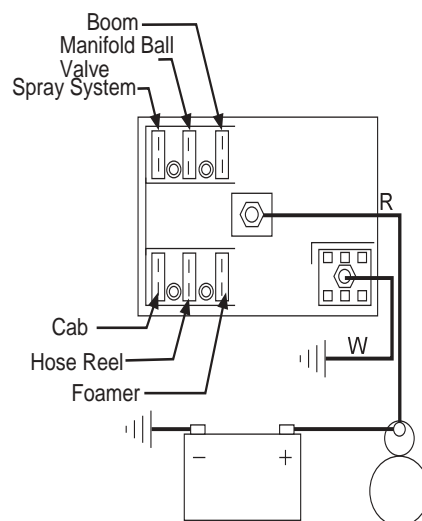
## OPERATOR'S PROTECTIVE ENCLOSURE INSTALLATION

1. Remove cab from shipping pallet. Carefully remove band holding doors closed and save. Bands must be used to keep doors closed when in transport.
2. Park Spray Star on a level surface, set park brake and remove key.
3. Remove two screws from rear of engine cover, furthest from seat.
4. With three to four people, lift cab over front of machine and move it to rear, until lower cross member of cab comes into contact with front bumper. Lower cab until front rests on tow hook and back on the rear engine cover.
5. Center cab left to right. Clamp cab to front bumper of Spray Star. Make sure that it is still centered. Using mount holes in cab as guides drill two  $1\frac{3}{32}$ " holes through both walls of bumper.
6. Bolt cab to bumper. On left side of Spray Star place loom clamp with loop pointing down and a  $\frac{3}{8}$ " washer toward outside, put a  $\frac{3}{8}$  - 16 x 2 $\frac{1}{2}$  bolt through with lock nut on inside. Do the same without loom clamp on right side.
7. Use holes in rear of cab as a guide and drill a  $1\frac{3}{32}$ " hole through rear engine cover and both walls of tubing each side. Make sure cab is still centered before drilling.
8. Put washers on top and run bolts down through with lock nuts under tubing. Tighten all four bolts.
9. Find red wire that comes out bottom of left front support tube on cab. Place a 8853 slide-on connector on the end of wire. Route wire through loom clamp, under the floorboard, in with wire harness and hoses up to the fuse block.
10. Plug wire into fuse block on an empty terminal and place a 30 Amp auto blade type fuse 33-273 into same position in fuse block.
11. Check to see that both the wiper and blower work. If not check ground and fuse.



**When handling the filter, to insure safety of yourself and others follow all accepted practices of chemicals that the filter has been exposed to.**

12. The filter element is located in front and above the driver. It is serviced from the outside of cab. To service filter, remove from cab.
13. The filter can be taken apart for cleaning and washed in soap and water.
14. To reassemble filter, place orange and white 1 $\frac{1}{2}$ " dust lock pad into case first with orange side next to the screen, then place polysord carbon and retainer.
15. Place filter back into cab with polysord carbon facing up and screen down, tighten clamps.



## ALTERNATOR PARTS LIST

| PART#         | DESCRIPTION                                      | QUANTITY |
|---------------|--|----------|
| 15-473        | Alternator 63Amp                                 | 1        |
| 15-475        | Alternator Adjustment Bracket                    | 1        |
| 15-344        | Pump Mount Plate                                 | 1        |
| 15-478        | Wire Harness (Voltmeter to Alternator)           | 1        |
| 15-479        | Wire (Battery on Starter Solenoid to Alternator) | 1        |
| 40-019        | Belt   | 1        |
| 22-069        | Nylon Ties 8"                                    | 8        |
| HB-38-16-275  | Bolt $\frac{3}{8}$ - 16 x $2\frac{3}{4}$         | 1        |
| HB-516-18-125 | Bolt $\frac{5}{16}$ - 18 x $1\frac{1}{4}$        | 2        |
| HN-10-32      | Nut 10 - 32                                      | 1        |
| HN-516-18     | Nut $\frac{5}{16}$ - 18                          | 2        |
| HNTL-38-16    | Lock Nut $\frac{3}{8}$ - 16                      | 1        |
| HSM-10-32-100 | Machine Screw 10 - 32 x 1                        | 1        |
| HW-516        | Washer $\frac{5}{16}$                            | 1        |
| HWL-10        | Lockwasher 10                                    | 1        |
| HWL-516       | Lockwasher $\frac{5}{16}$                        | 2        |

## INSTALLATION INSTRUCTIONS

1. Remove key, set park brake and block rear wheels.
2. Disconnect negative (-) battery cable at battery.
3. If you jack up machine be sure to use jack stands before you go under machine.
4. On left side of machine is the spray pump. Remove guard.
5. Place a drain pan under hydraulic pump and disconnect both hydraulic hoses from pump.



**WARNING**

**Do Not Drain Hydraulic Fluid When Hot.**

6. Loosen both bolts holding pump mount plate to frame. Raise pump to loosen belt and remove belt. Remove both bolts and take pump and plate out from under machine.
7. Place pump mount plate on bench. Loosen both set screws in pulley and remove pulley from pump. Be careful not to loosen the woodruff key.
8. Remove both bolts that hold pump to pump mount plate and remove plate.
9. Stand pump on end with shaft pointing up and elbow and fill plug facing you. Set new pump mount plate on pump with the both slots to the left and the slot on the end, away from you.
10. Bolt pump mount plate to pump with heads of the bolts up (against plate).
11. Put pulley on pump shaft, be sure the woodruff key is in place. With hub away from pump mount plate and  $\frac{1}{16}$  inch of clearance between pulley and heads of bolts. Tighten set screws.
12. Put  $\frac{3}{8}$  - 16 x  $2\frac{3}{4}$  bolt in hole on right side furthest from you, with head on same side of pump mount plate that the pump pulley is on. Place alternator long boss part on bolt, using  $\frac{3}{8}$  - 16 top lock nut to snug it up.
13. Place alternator adjustment bracket on pump mount plate, on same side as alternator. Use one  $\frac{5}{16}$  - 18 x  $1\frac{1}{4}$  bolt,  $\frac{5}{16}$  lockwasher and  $\frac{5}{16}$  - 18 nut with head of bolt on pump mount plate. Just snug up.
14. Use the other  $\frac{5}{16}$  - 18 x  $1\frac{1}{4}$  bolt with a  $\frac{5}{16}$  washer over slot to bolt alternator adjustment bracket to alternator with a  $\frac{5}{16}$  lockwasher and  $\frac{5}{16}$  - 18 nut. Just snug up.

## INSTALLATION INSTRUCTIONS (CONTINUED)

15. Bolt pump mount bracket with pump and alternator to back side of angle on frame that the old one came off of. Center slots and tighten.
16. Place new belt around pulleys on engine, pump, and alternator. Adjust belt tension by pivoting alternator so there is  $\frac{1}{2}$  inch deflection on belt in middle of longest span. Tighten all bolts. Check belt tension after 10 hours of use.
17. Connect both hydraulic hoses back up to pump.
18. Locate red wire coming from rectifier on lower right front of engine. Disconnect wire at coupler.
19. Remove jack stands and lower machine if you have raised it.
20. Route wire harness (voltmeter to alternator) over to steering column and under floorboard back to alternator. Be sure harness is not touching any moving or hot parts. Plug both connectors on to terminals on bottom of alternator.
21. Connect remaining wire to terminal on back of alternator and other end to battery cable terminal on starter solenoid. Be sure wires are not touching any moving or hot parts.
22. Use nylon ties to tie wiring up and out of way.
23. Put spray pump guard back on.
24. Connect negative (-) battery cable back up.



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

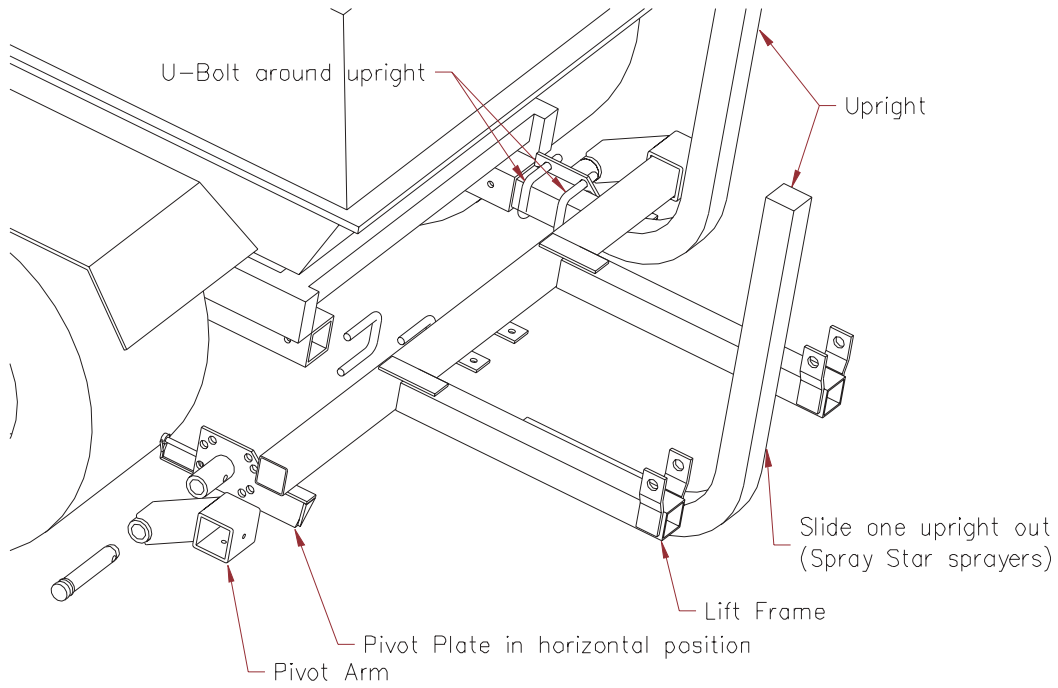
25. Turn key on. Look at voltmeter, it should read 12 volts. Turn key to start, with engine cranking voltmeter should read 10 volts. With engine running above idle voltmeter should read around 14 volts.
26. With engine running, park brake set, and transmission in neutral, check for hydraulic fluid leaks at pump hose fittings. Correct if needed with engine off.



**Do not check for leaks with our hand. Use a narrow flat piece of wood to locate leaks. Serious injury can occur from pressurized hydraulic fluid breaking through the skin.**

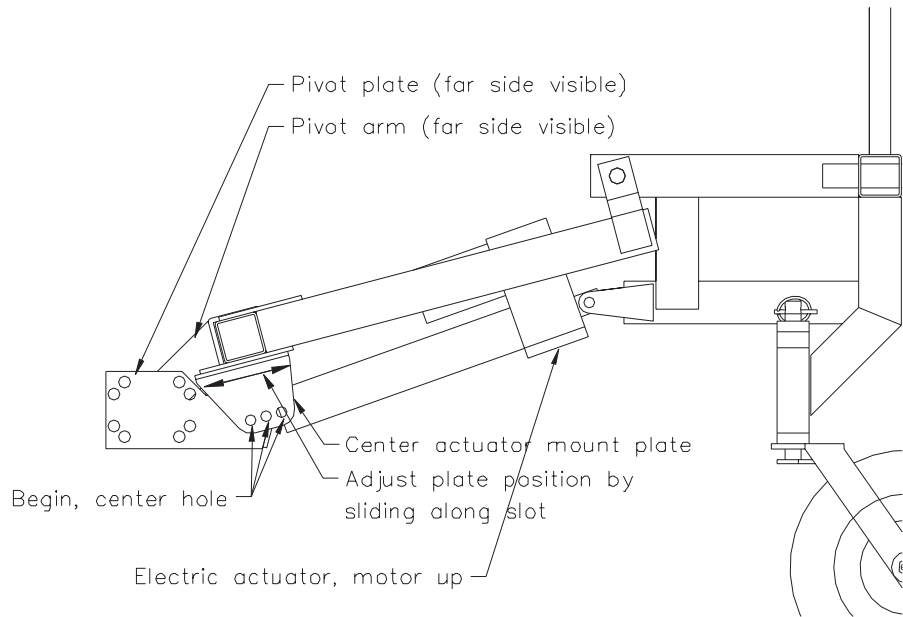
27. Check oil level in hydraulic pump reservoir, remove fill plug on top and fluid level should be about  $1\frac{1}{2}$  inch from the top when fluid is cold. If fluid is needed add SAE 10W-40 API Service SJ or higher motor oil.
28. Remove blocks from wheels.

# STAR SHIELD ASSEMBLY DRAWING



**Figure 2: Lift frame attachment on Spray Star 1600 vehicle.**

Accessories



**Figure 10: Center actuator position and level adjustment.**



1. Locate the pivot plate. The pivot plate is shipped attached with two U-bolts and is pinned to the pivot arm with a 1" top link pin.
2. The mount the plate horizontal. The center of the pin should be about **11 ½ inches** from the ground and as close to the rear wheels of the utility vehicle as possible.
3. The pivot plate may be mounted higher or lower than suggested. By mounting the pivot plate higher than suggested increases how tight the sprayer folds into the transport position. Placing the plate lower increases the amount of down float for the sprayer.
4. Locating the sprayer closer to the vehicle's rear wheels increases sprayer float but you must make sure that there is enough clearance for the sprayer to float up i.e. avoid frame, tank, solenoids or other installed attachments.
5. The plate may be mounted to the utility vehicle by U-bolting around 2 inch tubing uprights.
6. Adjust the pivot arm position by loosening the two lock bolts and sliding over the tubing of the main lift frame. Lock the pivot arm into place by tightening the bolts and locking with the jam nut.
7. Attach center actuator. For this step it will help to have someone to hold the main frame level or support the boom with blocks so the actuator can be pinned easily.
8. Begin by pinning the rod end of the actuator to the center actuator mount plates on the lift frame. Use the center hole.  
**NOTE:** Make sure there is a spacer on each side of the center actuator shaft otherwise severe damage could occur to the actuator.
9. Pin the motor end of the actuator to the main frame. Locate the motor above the rod of the actuator for clearance.

### LEVEL SPRAYER

1. When all three booms are in the spray position, adjust the booms to be level with the ground. Loosen the four nuts holding the center actuator pin plates and adjust position by sliding plates on slot and tighten securely.  
**NOTE:** Center actuator should be fully retracted while adjusting.
2. If you require more range than sliding the plates can give use the next hole in the plate. If further adjustment is required the right and left plates may be swapped giving further range.

### PLUMBING

1. Attach flow meter columns.
2. The center column assembly attaches on the solenoid bar at the rear the vehicle. (The center flow indicator has the necessary nut and bolt in the backing plate.)

### WING FLOW METERS

1. The flow indicator for each wing attaches to the wing lift frame for that wing. On the back of each wing lift frame will be two ¼" bolts and lock washers to mount the columns with.
2. Attach and route the ¾" hose from the flow monitor to the appropriate sprayer solenoid. Secure hoses with the plastic quick clamps. Tie the hose in place along the lift frame with the supplied cable ties to avoid pinching or getting caught during folding.
3. Attach and route ½" hose from flow monitor to spray nozzle. Take care to ensure that each column is routed to the appropriate spray nozzle.
4. Test folding of all sections of the sprayer for possible problems in the routing of the sprayer hose.

(Continued on next page)

## INSTALLATION INSTRUCTIONS

### ELECTRICAL LIFT OPTION

1. Attach electric actuators.
2. If the spray vehicle has the appropriate electric controls you may use these otherwise continue from step number 4. Hook these control up so that each switch moves the appropriate section and up and down in the direction indicated by the switch.
3. If a boom section moves in the wrong direction, the electrical connector for that section will require swapping the incoming wires.
4. Mount the control box in an accessible spot near the operators seat.
5. Route the wires with the fuse link to the battery of the vehicle. Place the red wire on the positive terminal and the blue wire on the negative battery terminal. Tie wires securely in place away from excessive sources of heat or pinch points.
6. Route the three sets of wire from the control box to the electric actuators.
7. The red and black pair of wires go to the right wing. The green and black wires go to the center actuator. The Yellow and black wires go to the left wing.

### CURTAIN INSTALLATION

1. Attach curtains to booms while in the transport position. Use generous amounts of lubricant on the rope end, or top of the curtain. (Spray silicone recommended.)
2. Start by placing one end of the curtain into the slot at the middle rear of the shield. Slide the curtain through the slot. Take care to keep feeding curtain into the slot from the start point otherwise the curtain will come out at the start point.
3. Pull curtain until the start of the curtain meets and overlaps with the end of the curtain by 1-2".
4. If the curtain has excess length double check that the curtain has not been pulled too tight and is putting extreme stress on the curtain and shield. If the curtain is too tight keep feeding curtain either forwards or backwards to release tension so the curtain hangs straight.
5. Turn curtain support straps on underside of boom down so they are pointing at the ground. These give the curtain extra support in the event of severe wind conditions.
6. Repeat for the remaining boom sections.

This is a list of decals located on the Spray Star 1600P. Part number, description and location will help in re-ordering decals.

|        |                     |  |
|--------|---------------------|--|
| 13-063 | Multiple Warning    | Right Side of Seat in Front of Controls Facing Operator          |
| 14-346 | Sprayer Dash        | Dashboard  |
| 14-366 | Control Panel       | Control Panel  |
| 15-462 | Hang Tag            | Hang From Steering Wheel   |
| 15-463 | Spray Pump          | Seat Panel   |
| 14-454 | Spray Star 1600     | Tank Sides   |
| 16-011 | Shift Knob          | Shift Knob   |
| 16-088 | Moving Parts Hot    | Pump Guard   |
| 16-090 | Bowl & Screen       | Strainer Bracket   |
| 16-227 | Tank Flush          | Left Front Tank  |
| 16-228 | Not a Motor Vehicle | In Front of seat Left Side                                       |
| 16-858 | Caution Steering    | Dashboard by Steering Column                                     |
| 25-279 | Safety Warning      | Under Seat Cover   |
| 25-286 | Pinch Point         | Left and Right Side Panel  |
| 25-298 | Warning Hot         | Right Exhaust Guard/ Right Side of Frame Next to Muffler         |
| 25-307 | Gas Refuel          | Below Gas Tank   |
| 25-308 | Engine Speed        | Engine Side  |
| 25-355 | Tire Pressure 18PSI | Front Tires  |
| 25-356 | Tire Pressure 20PSI | Rear Tires   |
| 27-077 | Smithco - Round     | Steering Wheel   |
| 27-093 | Hydraulic Oil       | Left Exhaust Guard by Dipstick/ Left Side Frame by Oil Reservoir |
| 25-358 | Smithco             | Front Nose Cone  |

## QUICK REFERENCE REPLACEMENT PARTS

### REPLACEMENT FILTERS

|        |             |                    |
|--------|-------------|--------------------|
| 78-090 | Oil Filter  | Kohler # 12 050 01 |
| 78-088 | Air Cleaner | Kohler # 47 083 03 |
| 78-089 | Pre-Cleaner | Kohler # 24 083 02 |
| 50-403 | Fuel Filter |                    |
| 13-288 | Key Switch  | Kohler # 25 099 04 |
| 76-310 | Key Set     |                    |

### REPLACEMENT BELTS

|        |                     |
|--------|---------------------|
| 16-827 | Foot Clutch Belt    |
| 16-869 | Spray Pump Belt     |
| 15-320 | Hydraulic Pump Belt |

### SEAL KITS

|                   |                                  |
|-------------------|----------------------------------|
| 15-315            | Hydraulic Power Unit             |
| 15-315-01         | Repair Kit                       |
| 15-301            | Power Steering Orbital Motor     |
| 15-301-01         | Seal Kit                         |
| 50-456            | Hydraulic Cylinder               |
| 14-267            | Seal Kit                         |
| 11-158 and 16-754 | Linear Actuators                 |
| 11-158-01         | Seal Kit                         |
| 50-123            | Brake Master Cylinder            |
| 50-123-02         | Brake Master Cylinder Repair Kit |

### FLUIDS

|                 |   |
|-----------------|---|
| Brake Fluid     | Dot 3   |
| Engine Oil      | SAE 10W-40 API Service SJ or higher Motor Oil |
| Hydraulic Fluid | SAE 10W-40 API Service SJ or higher Motor Oil |
| Rear Axle Fluid | SAE 80W-90 Gear Lube API Service GL-5, GL-4   |

### OTHER PARTS

|           |                                  |  |
|-----------|----------------------------------|--|
| 16-953    | Hinged Cover On Tank with Gasket |  |
| 16-953-01 | Gasket For Cover                 |  |
|           | Spark Plugs                      | Champion type RC12YC (Gap 0.040 inch (1.02mm)) |

## LIMITED WARRANTY

SMITHCO warrants this product to be free from defects in material and workmanship under normal use for one year from the date of purchase by the original user. (60 days if product is used for rental purposes.) All warranty claims must be handled through a SMITHCO authorized dealer or by SMITHCO, INC. All transportation charges must be paid by the purchaser.

There is no further express warranty. All implied warranties, including those of merchantability and fitness for a particular purpose, are limited to one year, (60 days if product is used for rental purposes) from the date of purchase by the original user, and to the extent permitted by law any and all implied warranties are excluded and disclaimed after the expiration of such period.

All incidental and consequential damages, including pickup and delivery of the unit, communication, mileage charges and/or rental of a replacement unit during repair, are not covered under this warranty, nor is any loss of income and/or other loss resulting from the failure of the product to function due to a warranty defect.

The following items are not covered under the SMITHCO warranty, and are warranted by their respective manufacturer.

- (a) Engine and engine parts, including starters, generators, alternators and filters.
- (b) Transaxle, differentials, gear boxes and mechanical pumps.
- (c) Hydrostatic transmissions, hydraulic pumps and motors.
- (d) Batteries.
- (e) Wheels and tires.

A copy of the warranty for the above items is furnished if necessary with each SMITHCO product.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitations of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which may vary from state to state.

Federal law now requires disclosure of the warranty which applies to this product prior to the sale to a customer. Please leave this statement attached to the product and allow the buyer to remove it after purchase.

**SMITHCO**

Wayne, Pennsylvania 19087

