



Boxxer 323HP Owner's Manual

*HydraMaster North America, Inc.
11015 47th Avenue West, Mukilteo, Washington 98275*

MAN-44134 Rev. 0, July 30, 2010
(182-501-D)

No part of this manual may be reproduced or used in any form or by any means (i.e. graphic, electronic, photocopying or electronic retrieval systems) without the express written permission of HydraMaster North America, Inc.
All rights reserved. © 2010 HydraMaster North America, Inc.

Table of Contents

GENERAL INFORMATION.....	SECTION 1
System Concept.....	1-3
Contact Information.....	1-4
Warnings, Cautions and Notices.....	1-5
Responsibilities.....	1-9
Machine Specifications.....	1-12
High Altitude Operation.....	1-14
Local Water Precautions.....	1-14
INSTALLATION INFORMATION.....	SECTION 2
Operating the Boxxer 323HP in Hot Weather.....	2-2
Setting Up the Boxxer 323HP.....	2-5
Orientation of Fuel Pump.....	2-6
CLEANING INFORMATION.....	SECTION 3
Precautions.....	3-2
Preparing the Carpet for Extraction.....	3-2
Rinse and Recover.....	3-3
Overwetting.....	3-3
Streaking.....	3-3
Cleaning Tool Tips.....	3-4
OPERATING INSTRUCTIONS.....	SECTION 4
Setting the Temperature.....	4-4
Start-up Procedure.....	4-4
Setting the Pressure for Cleaning operations.....	4-5
Setting the Pressure for High Pressure Washing Operations.....	4-6
Shut Down Procedure.....	4-7
MACHINE MAINTENANCE.....	SECTION 5
Operational Maintenance.....	5-2
Overall Machine Maintenance.....	5-3
Engine Maintenance.....	5-4
High Pressure Pump Maintenance.....	5-6
Vacuum System Maintenance.....	5-15
Descaling Procedure (Required).....	5-16
Freeze Guarding.....	5-17
Tensioning the Pump Drive Belt.....	5-19
WATER AND CHEMICAL SYSTEM.....	SECTION 6

ELECTRICAL SYSTEM.....	SECTION 7
SYSTEMS TROUBLESHOOTING	SECTION 8
Heating System.....	8-2
Chemical System	8-3
Engine	8-4
High Pressure System	8-8
Vacuum System	8-10
ASSEMBLIES AND PARTS LIST	SECTION 9
Machine Assembly Parts List	9-4
Frame Assembly Parts List	9-9
Engine Assembly Parts List.....	9-12
Pump Assembly Parts List	9-14
Dash Assembly Parts List	9-17
Electrical Panel Assembly Parts List.....	9-19
Blower Heat Exchanger Assembly Parts List.....	9-20
Blower Assembly Parts List.....	9-21
Silencer Assembly Parts List.....	9-22
Water Box Assembly Parts List	9-24
Exhaust Assembly Parts List.....	9-25
Idle Pulley Assembly Parts List.....	9-26
Hi Pressure Manifold Assembly Parts List	9-27
By-Pass Valve Assembly Parts List.....	9-28
Dura-Flow APO Assembly Parts List.....	9-30
70 gallon Universal Recovery Tank Assembly Parts List	9-32
Machine Hose Routings.....	9-33
HOW TO ORDER PARTS	SECTION 10
Warranty Parts Orders	10-1
Parts Orders.....	10-1
Emergencies	10-1

WARRANTY INFORMATION	SECTION 11
Blower	11-1
High Pressure Water Pump	11-1
Vacuum Tank	11-1
Chemical System	11-1
Control Panel	11-1
Vacuum and Solution Hoses	11-2
Cleaning Wand and Tool	11-2
Water Heating System	11-2
Hard Water Deposits	11-2
Warranty Procedure	11-2
ACCESSORIES AND CHEMICAL SOLUTIONS	SECTION 12

List of Figures

Figure 1-1. Hard Water Map of Mainland United States	1-15
Figure 2-1. Location of Roof Vents in Vehicle	2-1
Figure 2-2. Recommended Location of Boxxer 323HP in Van.....	2-3
Figure 2-3. Install Fuel Pump, Outlet Side Up.....	2-6
Figure 2-4. Fuel Pump Must Be in Vertical Position.....	2-6
Figure 4-1. Boxxer 323HP Dash Assembly - View 1 of 2.....	4-1
Figure 4-2. Boxxer 323HP Dash Assembly - View 2 of 2.....	4-2
Figure 4-3. Location of Chemical Pump Shutoff Valve.....	4-3
Figure 4-4. Chemical Pump Shutoff Valve Is On When Valve Handle Is In Line with Chemical Pump.....	4-5
Figure 4-5. Chemical Pump Shutoff Valve Is Off When Valve Handle Is Perpendicular to Pump.....	4-6
Figure 5-1. Remove Valve Cap and Valve Assembly	5-7
Figure 5-2. Inspect Manifold and Old Valves	5-7
Figure 5-3. Replace Center Inlet Check Valve With Modified Check Valve	5-8
Figure 5-4. Apply Grease and Install Valves	5-8
Figure 5-5. Replace Valve Cap and Torque to 95 ft. lbs. (13 m kgs).....	5-8
Figure 5-6. Separate Manifold from Crankcase	5-9
Figure 5-7. Seal Assemblies May Come Off with Manifold	5-9
Figure 5-8. Examine Ceramic Plungers	5-9
Figure 5-9. Remove Stainless Steel Plunger Bolt and Ceramic Plunger	5-10
Figure 5-10. Install O-ring, Apply Sealant and Slide Plunger over Plunger Guide	5-10
Figure 5-11. Extract Retainers and Seals	5-11
Figure 5-12. Seal Kit and Insertion Tool for Seal Installation	5-12
Figure 5-13. Install Seal Assembly Using O-Ring Grease	5-12
Figure 5-14. Install Retainers into Cavities	5-13
Figure 5-15. Press Low Pressure Seal Assembly into Cavity	5-13
Figure 5-16. Re-install Manifold and Torque Fasteners	5-14
Figure 5-17. Torque Sequence in "X" Pattern	5-14
Figure 5-18. Torque Bolts to 22 ft. lbs (3 m kgs)	5-14
Figure 5-19. Recirculation Fitting	5-16

Figure 6-1. Annotated Water, Chemical and Solution Flow Diagram - View 1 of 2	6-3
Figure 6-2. Annotated Water, Chemical and Solution Flow Diagram - View 2 of 2	6-4
Figure 6-3. Chemical Flow Diagram - Larger View	6-5
Figure 6-4. Exhaust Flow Diagram.....	6-6
Figure 7-1. Electrical Schematic	7-2
Figure 7-2. Wiring Diagram - View 1 of 3.....	7-3
Figure 7-3. Wiring Diagram - View 2 of 3.....	7-4
Figure 7-4. Wiring Diagram - View 3 of 3.....	7-5
Figure 9-1. Machine Assembly - View of 1 of 2.....	9-2
Figure 9-2. Machine Assembly - View of 2 of 2.....	9-3
Figure 9-3. Frame Assembly - View 1 of 4.....	9-5
Figure 9-4. Frame Assembly - View 2 of 4.....	9-6
Figure 9-5. Frame Assembly - View 3 of 4.....	9-7
Figure 9-6. Frame Assembly - View 4 of 4.....	9-8
Figure 9-7. Engine Assembly - View 1 of 2.....	9-10
Figure 9-8. Engine Assembly - View 2 of 2.....	9-11
Figure 9-9. Pump Assembly - View 1 of 2.....	9-13
Figure 9-10. Pump Assembly - View 2 of 2.....	9-14
Figure 9-11. Dash Assembly - View 1 of 2	9-15
Figure 9-12. Dash Assembly - View 1 of 2.....	9-16
Figure 9-13. Electrical Panel Assembly.....	9-19
Figure 9-14. Heat Exchanger Assembly.....	9-20
Figure 9-15. Blower Assembly	9-21
Figure 9-16. Silencer Assembly	9-22
Figure 9-17. Water Box Assembly.....	9-23
Figure 9-18. Exhaust Assembly	9-25
Figure 9-19. Idler Pulley Assembly.....	9-26
Figure 9-20. Hi Pressure Manifold Assembly	9-27
Figure 9-21. By-Pass Valve Assembly	9-28
Figure 9-22. Dura-Flow APO Assembly	9-29
Figure 9-23. 70 gallon Universal Recovery Tank Assembly	9-31

BOXXER
323HP

1- General Information

The compact but powerful Boxxer 323HP is a carefully engineered truckmount multi-surface cleaning machine designed and manufactured by HydraMaster North America, Inc.



A 23 Hp Briggs and Stratton engine powers the Boxxer 323HP's Tuthill 3006 vacuum blower and the high pressure water pump, which is rated at 4 gpm (15 litres/minute).

The Boxxer 323HP's innovative design features a stainless steel heat exchanger which allows for heated, high pressure cleaning up to 2,500 psi (17,237 kPa).

Other features of the Boxxer 323HP include:

- Dual oil bath and sight glasses for enhanced blower reliability
- 0 - 2,500 psi (0 - 17,237 kPa) heated, without chemical
- 0 - 1,200 psi (0 - 8,274 kPa) heated, with chemical
- A.D.C temperature control with instant heat up to 265° F (129.4° C)
- Optional Dura-Flow Automatic Pump Out (APO)



The Boxxer 323HP can be mounted onto a HydraMaster 85 gallon (322 litre) rotomolded fresh water tank. The HydraMaster 70 gallon (265 litre) recovery tank, which comes in the standard equipment package, or the 100 gallon (379 litre) recovery tank, offered as an option, can be used with the 85 gallon fresh water tank installation.

This Owner's Manual contains installation and operation instructions as well as information required for proper maintenance, adjustment and repair of the Boxxer 323HP. Component troubleshooting guides have also been included for your convenience.

It is the purpose of this manual to help you properly understand, maintain and service your Boxxer 323HP. Follow the directions carefully and you will be rewarded with years of profitable, trouble-free operation.

It is imperative that no section of this manual be overlooked when preparing for operation of the Boxxer 323HP. Please read the manual to familiarize yourself with the operation of your Boxxer 323HP, paying special attention to all ***Warnings and Cautions***.

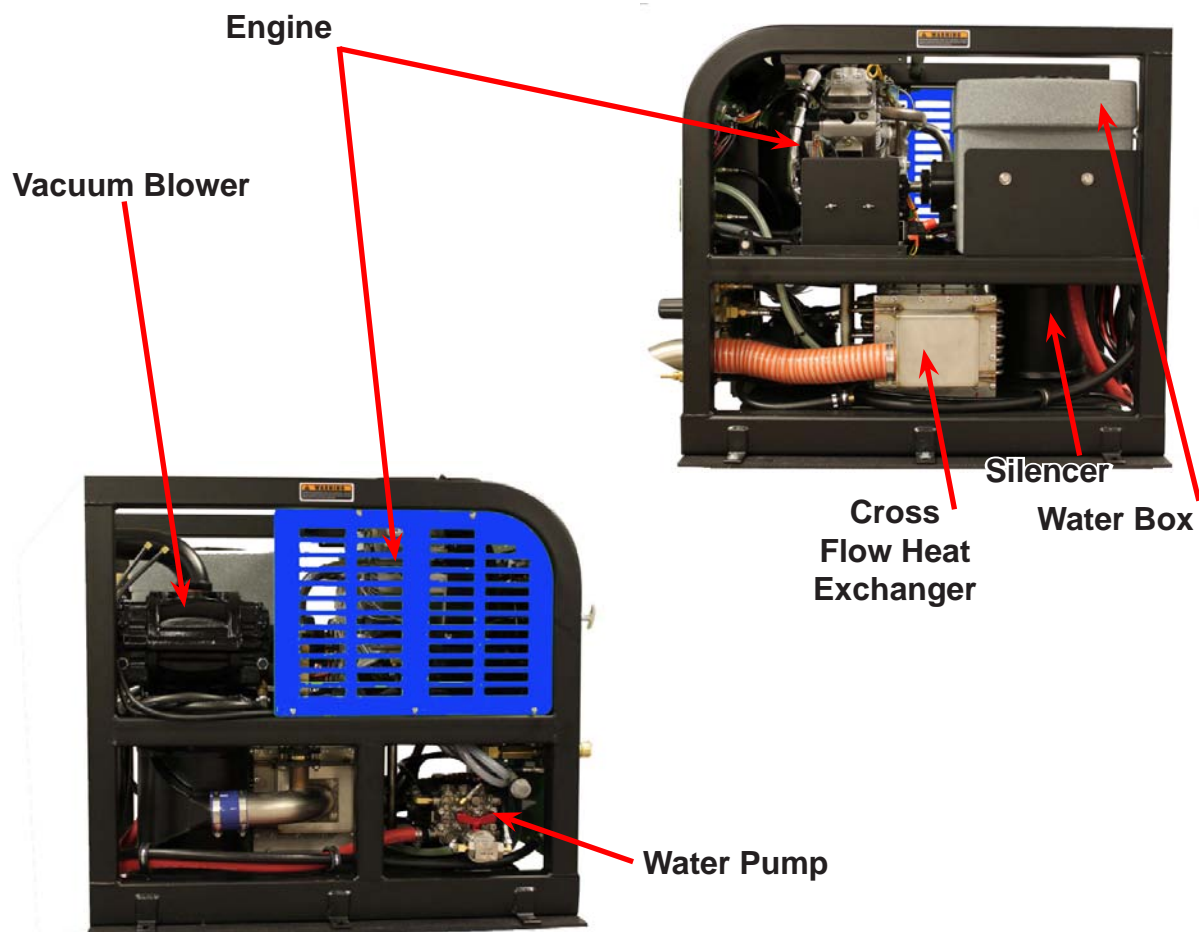
This section of the manual contains the following information:

- Contact Information
- Warnings, Cautions and Notices
- Machine Specifications
- Responsibilities
- Local Water Precautions

SYSTEM CONCEPT

This is how the Boxxer 323HP works:

1. Incoming water enters the water box and is pressurized by the high pressure water pump. The water is heated by the engine and blower exhaust in the cross flow heat exchanger.
2. Cleaning solution is then injected into the pressurized water stream and the heated solution is delivered to the cleaning tool.
3. The solution is recovered by the vacuum generated by the vacuum pump and is collected in the recovery tank for proper disposal.



NOTICE

Photographs and illustrations included in this document can represent optional equipment as well as standard equipment.



CONTACT INFORMATION

If you have any questions regarding the operation, maintenance or repair of this machine, please contact your local distributor.

To find a local distributor, please visit our website at <http://www.hydramaster.com/owners/locate/index.asp>.

If your question cannot be resolved by your distributor or by the information within this manual, you may contact HydraMaster Customer Service direct using the following phone numbers.

<u>Hours</u>	<u>Telephone Numbers</u>	<u>E-mail Addresses</u>
Monday-Friday	(425) 775-7275 Service	Tech Support: techsupport@hydramaster.com
7:00 a.m. to 5:00 p.m.	(425) 775-7276 Parts	Parts Support: parts@hydramaster.com
Pacific Standard Time	(800) 426-4225 Parts / Service FAX	

When calling your distributor, be sure to reference the serial number and date of purchase.

FOR YOUR REFERENCE:

Serial No. _____

Date of Purchase: _____

Purchased From (Distributor): _____

WARNINGS, CAUTIONS AND NOTICES

⚠ WARNING

HydraMaster uses this WARNING symbol throughout the manual to warn of possible injury or death.

CAUTION

This CAUTION symbol is used to warn of possible equipment damage.

NOTICE

This NOTICE symbol indicates that federal or state regulatory laws may apply, and also emphasizes supplemental information.

Warnings and Cautions specific to the Boxxer 323HP include the following:

⚠ WARNING

During the operation of the truckmount many components are in motion. Never touch any part of the truckmount that is in motion. Serious injury may result.

⚠ WARNING

During the operation of the truckmount many surfaces will become extremely hot. Never touch hot surfaces. Serious injury may result.

⚠ WARNING

The operation of this truckmount can produce noise levels exceeding 85 decibels to a distance of 10 ft (3.05 m). The Occupational Safety and Health Administration (OSHA) recommends the use of hearing protective equipment if a person is exposed to an average of 85 decibels over an 8-hour period. Check with local and state agencies concerning hearing conservation rules.

⚠ WARNING

During the operation of the truckmount carbon monoxide and other toxic fumes are produced. Position the vehicle so that any fumes produced will be directed away from inhabited areas and any points of building entry (doors, windows, air conditioning units, fans, etc.). Do not occupy the vehicle while the truckmount is in operation. Serious injury may result.

⚠ WARNING

During the operation of the truckmount, chemicals known to the State of California to cause cancer, birth defects and other reproductive harm are produced by the engine exhaust.

⚠ WARNING

Never operate the truckmount with a portable gas container inside the vehicle. Doing so will increase the risk of fire and explosion. Serious injury or death may result. See page 1-10 of this Owner's Manual for more information.

Transporting a vented fuel container that presently contains, or has ever contained in the past, a flammable liquid is strictly forbidden by HydraMaster and by federal and state regulations. Doing so will increase the risk of fire and explosion. Serious injury or death may result.

⚠ WARNING

Never smoke in or around the truckmount. Doing so will increase the risk of fire and explosion. Serious injury or death may result.

⚠ WARNING

During the operation of the truckmount the exhaust system will become extremely hot. Keep all flammable materials away from the truckmount exhaust system. Failure to do so will increase the risk of fire and explosion. Serious property damage may result.

⚠ WARNING

Do not use a high pressure solution hose that is rated below the specifications of the Boxxer 323HP. Serious injury may result.

CAUTION

Never operate the truckmount when the vehicle is tilted more than 10 degrees in any direction. Doing so will result in improper lubrication of the internal components, and will increase the risk of serious component or engine damage.

CAUTION

Never perform cleaning operations when the truckmount engine is running at the IDLE throttle position. Failure to do so will increase the risk of serious component or engine damage. Refer to Section 4 of this Owner's Manual for more information.

CAUTION

Never operate the truckmount with the vehicle doors closed. Doing so results in extremely high temperatures inside the vehicle and will lead to serious component or engine damage. Refer to page 2-2 of this Owner's Manual for more information.

CAUTION

Never use concentrated acids or solvents (including d-limonene) in the truckmount water system or chemical system. Use of these products will cause serious component damage.

CAUTION

Never operate the truckmount with a water hardness reading measuring 3.0 grains per gallon (3.79 litres) or higher. Using water with a reading of 3.0 grains per gallon or higher will cause scale to build up inside the truckmount water system. Scale build up causes serious component damage. Test all water prior to use and use water softening equipment if necessary. For water hardness details, refer to pages 1-14 through 1-17, and for descaling procedures, refer to page 5-16 of this Owner's Manual.

CAUTION

Never allow water to freeze inside the truckmount. Serious component damage will occur. Perform all freeze guarding procedures as outlined on page 5-17 of this Owner's Manual.

CAUTION

Many vehicles have critical components mounted directly below the floor that can easily be damaged. Before drilling holes in the floor of the vehicle inspect the underside of the vehicle for critical components. Failure to do so may result in damage to the vehicle.

RESPONSIBILITIES

Purchaser's Responsibilities

- Prior to purchasing a van or trailer, ensure that the payload is suitable for all of the equipment that will be installed and transported. This includes and is not limited to: the truckmount, recovery tanks, fresh water tanks, on-board water, hose reels, hoses, cleaning tools, chemicals and drying equipment. Payload capacity information is available through the auto dealer, the manufacturer's web site, and is also located on the door pillar of the driver's side door.
- Purchase a heavy duty Group 24 (500+ CC Amps) battery for this truckmount. This is normally available from the installation dealer.
- Prior to dropping your van off at the distributor for the truckmount to be installed, have a spray-on bed liner applied to the floor such as Rhino Lining® or Line-X®.

NOTICE

Plywood and carpet are not recommended.

- Prior to operating the truckmount, read this manual in its entirety and familiarize yourself with the information contained here. Special attention should be paid to all ***Warnings and Cautions***.
- The distributor is responsible for the correct installation of the truckmount. The distributor is also responsible to train you in the correct and proper operation and maintenance of the truckmount.

NOTICE

Any modification of the truckmount may void the warranty.



Distributor's Responsibility

Acceptance of Shipment

Before accepting the truckmount, check the following:

1. The truckmount should be free from any damage during shipping. Do not sign the delivery receipt until you have closely inspected the truckmount and noted any damage on the delivery receipt. Hidden damage may be present even if the box looks okay. It is recommended that the box be opened before you sign for the shipment.
2. Check the packing list and verify that all items are accounted for.

Installation Responsibilities

- Ensure proper payload capacity. It is the distributor's responsibility to verify that the equipment package does not exceed the vehicle's or trailer's capacity.
- Ensure installation of a safe fuel tap system and through-floor fittings as provided by HydraMaster.
- Ensure proper placement of the truckmount, recovery tank, fresh water tank, and accessories in the vehicle or trailer, and check that they are secured with bolts and back up plates. The distributor should verify that the owner is in agreement with the layout.
- Ensure proper connection of the fuel lines. Verify that the fuel pump is in accordance with HydraMaster's recommendation.
- Ensure proper connection and installation of the battery. Verify that the battery is in accordance with HydraMaster's recommendation.
- Check the pump, vacuum blower and engine oil levels prior to starting the truckmount.
- Start and run the truckmount and check that all systems function properly.
- Test all hoses, wands and other accessories for correct operation. Verify that the hoses meet or exceed HydraMaster's specifications.
- Ensure timely return of the document package.
- Ensure that all aftermarket fuel cells meet or exceed Federal Motor Vehicle Safety Standards (FMVSS) and Department of Transportation (DOT) certifications.

Training

The distributor should provide a thorough review of the operation manual with the purchaser along with instruction and familiarization in:

1. How all the truckmount's systems function.
2. All safety precautions and their importance.
3. How to correctly start and shut down the truckmount.
4. How to correctly clean with the truckmount.
5. Where and how often to check and change component oil levels.
6. Freezing damage and how to avoid it. This includes explaining proper freeze guarding procedures.
7. How to do basic troubleshooting of the truckmount.
8. Hard water damage and how to avoid it. This includes how to determine if hard water exists in your area and the installation and use of water softening systems.
9. The truckmount's warranty and warranty procedures.

MACHINE SPECIFICATIONS

Frame Dimensions	24.0" W x 35" D x 31.5" H (61 cm x 89 cm x 80 cm)	
Weight	500 lbs (227 kg)	
Engine - Briggs and Stratton 23 Hp	Oil Type	5W-30 Synthetic
	Capacity	Approx. 1 1/2 quarts, or 48 oz (1.42 litres) when changing oil and filter
	Engine rpm	High - 3,000 rpm (12" Hg / 2,500 psi)
		Idle - 1,500 rpm
	Fuel Consumption @ 12" Hg/1,200 psi	High - 1.0 gph (3.79 litres/hr)
Ignition	Key	
Vacuum Blower - Tuthill 3006 Competitor (Dual Splash Lubrication)	Max. Vac.	12" Hg (304.8 mm Hg)
	Oil Type	PneuLube or other ISO 100 rating
	Gear End Capacity	Approx. 7.0 oz (207 ml)
	Drive End Capacity	Approx. 5 oz (148 ml)
	Blower rpm	3,200 rpm
Water Pump - General Pump	Oil Type	15W-40
	Capacity	14 oz (414 ml)
	Pump Rate	4.0 gpm (15 litres/minute)
	Pump rpm	1,700 rpm
Operating Pressure	0 - 1,200 psi (Heated) (0 - 8,274 kPa) with Chemical	0 - 2,500 psi (Heated) (0 - 17,237 kPa) without Chemical

Chemical System	Last Step Chemical Injection with High Pressure Shutoff Valve	
Heating System	Stainless Steel	Cross Flow Heat Exchanger
Standard Equipment	Recovery Hose	10 ft (3.05 m).
	Water Box	Rotomolded 3 - 4 gallon (11.4 -15 litres) capacity
	Recovery Tank	70 gallon Universal Tank (265 litre Universal Tank)
	Cleaning Wand/Tool	Stainless Steel S-bend
		Replaceable Grip
		Rebuildable Solution Valve
	100 ft (30.5 m) Vacuum Hose	
	100 ft (30.5 m) Solution Hose	
	Garden Hose Connector	
	Chemical Jug	5 gallon (19 litres)
	Battery Box	
	Van Installation Kit	
	Owner's Manual (on CD) Owner's Guide (printed)	
Optional Equipment	85 gallon (322 litre) Rotomolded Tank	
	Automatic Pump-Out (APO)	
	2.5" (6.35 cm) Exhaust Tough Floor Kit	

HIGH ALTITUDE OPERATION

Elevation plays a key role in how the truckmount will operate. Operation at high altitude (above 5,000 ft [1,524 m]) may require a high-altitude carburetor jet. Use of this jet at high altitude will improve power, reduce fuel consumption and help reduce excessive carbon build-up in the exhaust and heat exchanger systems.

Contact the local Briggs and Stratton dealer or HydraMaster to obtain the proper jet size. Find your local Briggs and Stratton dealer at <http://vanguardengines.via.infonow.net/locator>.

LOCAL WATER PRECAUTIONS

The quality of water varies greatly. Many areas have an excess of minerals in the water which results in what is commonly called “hard water.” These minerals tend to adhere to the insides of heater coils and other parts of the machines causing damage and a loss of cleaning effectiveness. This influences the reliability and efficiency of equipment in direct proportion to the level of hardness.

Hard Water Advisory

HydraMaster recognizes that any hard water deposits which might occur within the water system of our truckmounts is a serious problem. The precision technology of truckmount heat exchanger systems is intolerant of any foreign material. Hard water deposits will ultimately decrease the performance of the system and are expected to seriously lower the reliability of the machine.

To validate a machine’s warranty, HydraMaster requires that all machines operating in designated “Hard Water Areas” (3.0 grains or more per gallon [3.79 litres]) be fitted with a water softening system, or a properly installed magnetic-type descaler must be used and maintained. Periodic descaling or acid-rinsing alone is not adequate in these areas. HydraMaster does not recommend any particular type or brand; however, the relative effectiveness of some types of magnetic descalers or softeners may require additional periodic use of descaling agents.

HydraMaster also recommends, in the strongest possible terms, that machines in all areas be fitted with a water softening system for improved operation and reliability.

CAUTION

Failure to take appropriate measures to prevent scale build up can result in system failure and loss of warranty on affected parts.

Hard Water Area Map

The hard water map, shown in Figure 1-1, defines hard water areas in the continental United States which compromise fluid related components such as hoses, fittings, heaters, pumps, valves and water-cooled engines. For other countries, hard water area maps can be obtained from geological societies.

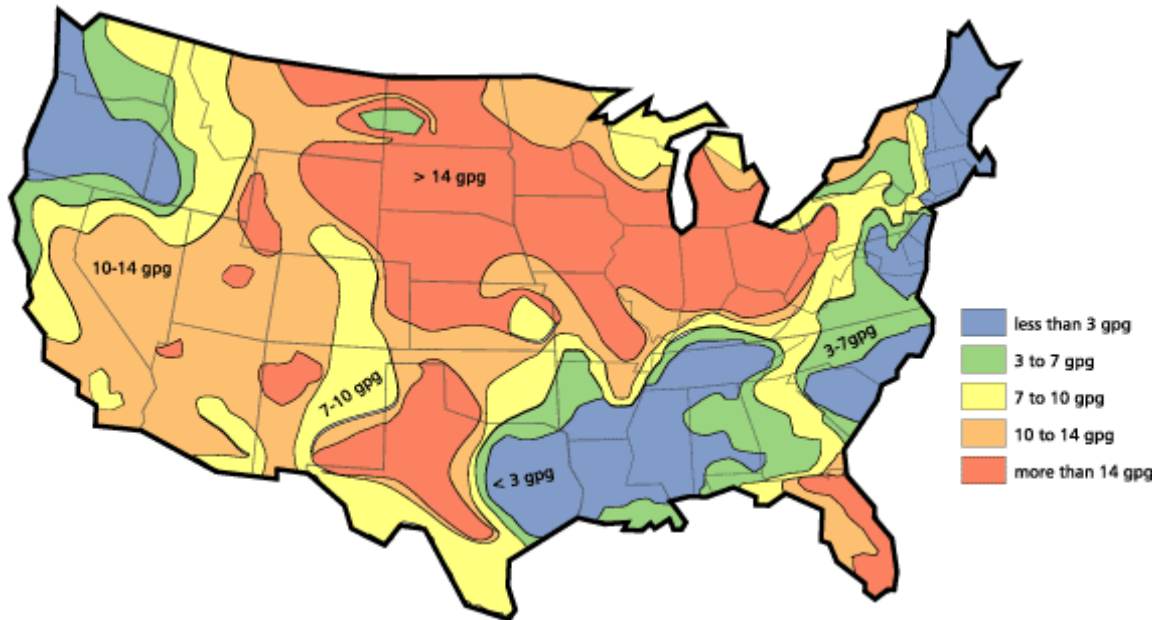


Figure 1-1. Hard Water Map of Mainland United States

NOTICE

The map shown in Figure 1-1 is provided for general reference only. Water hardness in your geographical location should be confirmed by testing.



Water Softener

Cleaning efficiency and equipment life is increased, chemical use decreased, and the appearance of cleaned carpets enhanced when water softeners are incorporated in hard water areas. HydraMaster strongly urges the use of water softener units with the Boxxer 323HP in areas exceeding 3.0 grains per gallon.

Failure to use a water softener in these areas will invalidate the machine's warranty. Referring to the hard water area map shown Figure 1-1, determine the quality of water in your area and take immediate action if the water hardness exceeds 3.0 grains per gallon.

The relatively low cost of a water softener service is more than made up for by an increased life of machine parts, reduced chemical costs and continued cleaning efficiency. The water softener will also increase the effectiveness of the cleaning chemicals, therefore less chemical will be needed.

Contact a water softener distributor in your area for information on the rental of a simple water treatment unit to carry in your truck. Be sure to charge the water softener in accordance with the capability of the softener.

For example: If the softener will treat 900 gallons (3,406 litres) of water and the machine uses an average of 30 gallons/hour (113.5 litres/hour), for an average of 5 hours a day, this equals 150 gallons per day (568 litres/day). In 6 days the machine would use 900 gallons (3,406 litres) of water. Therefore, the softener would need to be charged every 6 working days for maximum softening.

Waste Water Disposal Advisory

There are laws in most communities prohibiting the dumping of recovered “gray” water from carpet cleaning in any place but a sanitary treatment system.

The cleaning rinse water, recovered into your unit’s vacuum tank, contains materials such as detergents, and must be safely processed before entering streams, rivers and reservoirs.

In most cases, an acceptable method of waste water disposal is to discharge into a municipal sewage treatment system after first filtering out solid material such as carpet fiber. Access to the sanitary system can be obtained through a toilet, laundry drain, RV dump, etc. Permission should first be obtained from any concerned party or agency.

One disposal method which usually complies with the law is to accumulate the waste water and haul it to an appropriate dump site. Another solution to the disposal problem is to equip your Boxxer 323HP with an Automatic Pump-Out System (APO). These systems are designed to remove waste water from the extractor’s recovery system and actively pump the water through hoses to a suitable disposal drain.

HydraMaster makes an APO System which can be ordered with new equipment or installed later.

When properly configured, the systems will continuously monitor the level of waste water and pump it out simultaneously with the cleaning operation. The hidden benefit of this process is that the technician does not have to stop his/her cleaning to empty the recovery tank.

NOTICE

IN ACCORDANCE WITH EPA, STATE AND LOCAL LAWS, DO NOT DISPOSE OF WASTE WATER INTO GUTTERS, STORM DRAINS, STREAMS, RESERVOIRS, ETC.

The penalties for non-compliance can be serious. Always check local laws and regulations to be sure you are in compliance.

BOXXER
323HP

2 - Installation Information

Although there are many different heavy duty vehicles and trailers used for carpet cleaning equipment, the preferable vehicle for a Boxxer 323HP installation is a tandem axle trailer with a heavy-duty suspension package equivalent to a 3/4 ton capacity or a 3/4 ton HD van. If a fresh water tank is added, a one ton or larger capacity van is required.

Prior to installation of the Boxxer 323HP, HydraMaster recommends installing a spray-on bed liner in the vehicle. This provides 'metal to cushion' mounting rather than 'metal to metal' and makes for an attractive van interior.

HydraMaster also recommends installing roof vents in vehicles operated in hot weather locations. Roof vent positions are shown in Figure 2-1. Consult your local RV distributor about selection and/or installation of powered roof vents.

For best results, the fan should draw air into the vehicle which will supply cooler air to the air cleaner intake.

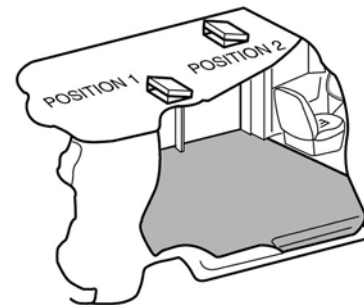


Figure 2-1. Location of Roof Vents in Vehicle

CAUTION

HydraMaster requires a powered roof vent above the air cleaner intake. Failure to install a powered roof vent in such a manner may result in serious component or engine damage.



OPERATING THE BOXXER 323HP IN HOT WEATHER

HydraMaster recommends the following steps when operating the Boxxer 323HP during periods of hot weather (95° F [35° C] or higher). This will help ensure that your Boxxer 323HP continues to run at 100% capacity during even the hottest days.

1. A minimum of 9" (22.9 cm) of clearance is required on both sides of the Boxxer 323HP, when installed. Ensure that additional equipment or other materials are not stored at the sides or on top of the machine. Unobstructed airflow around the unit is critical for cooling the engine and other components.
2. For side-door vans with "barn doors", open the doors as wide as their construction will allow. Be sure to open the doors beyond their standard "straight-out" position, if possible, by releasing the stops and putting the doors in their fully extended position.
3. Provide cross-ventilation. When possible, keeping the rear doors open while the machine is running will substantially reduce the temperature inside the van or trailer and will provide a path for cooling air flow. For rear-mount installations, open up the other doors in the van.
4. Consider adding powered roof vents to the vehicle (if not already installed). These vents can significantly reduce interior temperatures and will result in much cooler operation. A powered roof vent is required when the Boxxer 323HP is mounted on the optional 85 Gallon Fresh Water Tank.

CAUTION

Use caution when drilling any holes through the van floor. Many vans have critical components mounted directly below the vehicle floor that could be damaged by a misplaced drill bit.

LOCATING THE BOXXER 323HP IN VEHICLE

There are two recommended entry points on the vehicle for the Boxxer 323HP installation: the side door or the rear doors.

Most installations are through the side door. This provides rear access for accessories and hoses as well as unobstructed access to the component/working side of the machine, thus making it a bit easier to perform maintenance and/or repair without removing the unit from the truck.

Rear mounting requires the unit to be slid to the right side as far as possible. Although installing the Boxxer 323HP through the rear door partly limits working access, it does direct the noise away from the cleaning site.

In addition, rear mounting not only provides adequate working space on the component side of the unit but also improves weight distribution inside the van (engine and component weight line up over drive shaft). Some cleaners in colder geographical areas prefer this placement for better traction in ice and snow. Also, it is physically easier to load the unit into the rear door due to the height of the vehicle bed.

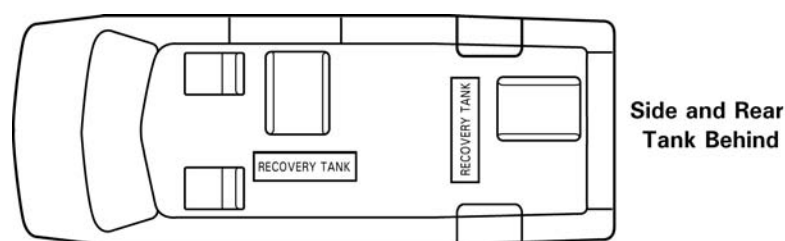


Figure 2-2. Recommended Location of Boxxer 323HP in Van

Secure Installation

No matter how the unit is installed, check to see if the Boxxer 323HP is properly secured to the floor of the van with the hardware provided. This safety measure will ensure that the machine will not slide inside the van. See Figure 2-2 for the correct installation.

⚠ WARNING

A sudden or crash stop will cause the machine to rocket forward if not properly secured. To prevent serious personal injury, ensure that the Boxxer 323HP is well secured to the floor of the vehicle with the hardware supplied. Protect yourself and the machine.

⚠ WARNING

HydraMaster strongly recommends that the exhaust from the front of the machine be vented down under the truck to prevent carbon monoxide from entering the job site. **Always park the truck so the exhaust is blowing away from the job site.**

⚠ WARNING

Never operate this machine with a portable gas can inside the truck. Doing so increases the risk of a fire or explosion.

⚠ WARNING

Mount a fire extinguisher just inside the rear or side door for emergencies.

⚠ WARNING

Do not use a portable propane tank inside of the truck or van. It is dangerous and illegal in most states.

⚠ WARNING

Transporting any vented fuel container that presently holds or has ever held a flammable liquid in a vehicle containing the Boxxer 323HP is strictly forbidden by HydraMaster Corporation and by federal and state regulation.

⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

SETTING UP THE BOXXER 323HP

Prior to operating the Boxxer 323HP, follow these steps:

1. Adjust the vacuum relief located on the recovery tank by capping all the vacuum inlets. The machine should be set to 12" Hg maximum.

CAUTION

Setting the vacuum level higher than the recommended value can result in an increased risk of serious component damage.

The Boxxer 323HP is shipped from the factory with antifreeze added to the solution system.

Recover this antifreeze and dispose of the recovered antifreeze as stated in the local laws and regulations.

⚠ WARNING

KEEP ANTIFREEZE OUT OF REACH OF CHILDREN AND ANIMALS. Drinking antifreeze can cause death.

If required, dispose of antifreeze at facilities licensed to accept household hazardous waste. If permitted, dispose of antifreeze in sanitary sewer systems. Do not pour antifreeze into storm sewers, septic systems, or onto the ground. Doing so causes health and environmental dangers.

CAUTION

Ensure the antifreeze is completely drained from the solution system. If any antifreeze remains in the system, it could damage machine components and damage fabric.

ORIENTATION OF FUEL PUMP

For proper fuel pump operation and fuel flow, the vehicle's fuel pump must be installed in a lower position with respect to the fuel tank and in as vertical a position as possible (outlet side up - see Figure 2-3 and Figure 2-4).

Mount the fuel pump away from sources of heat

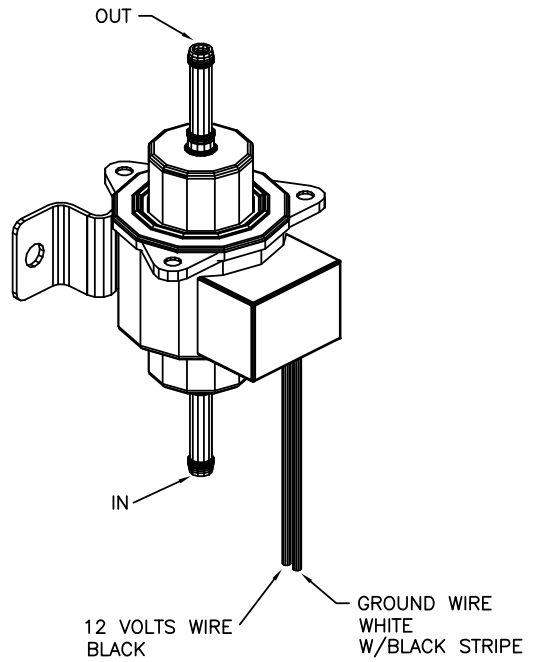


Figure 2-3. Install Fuel Pump, Outlet Side Up

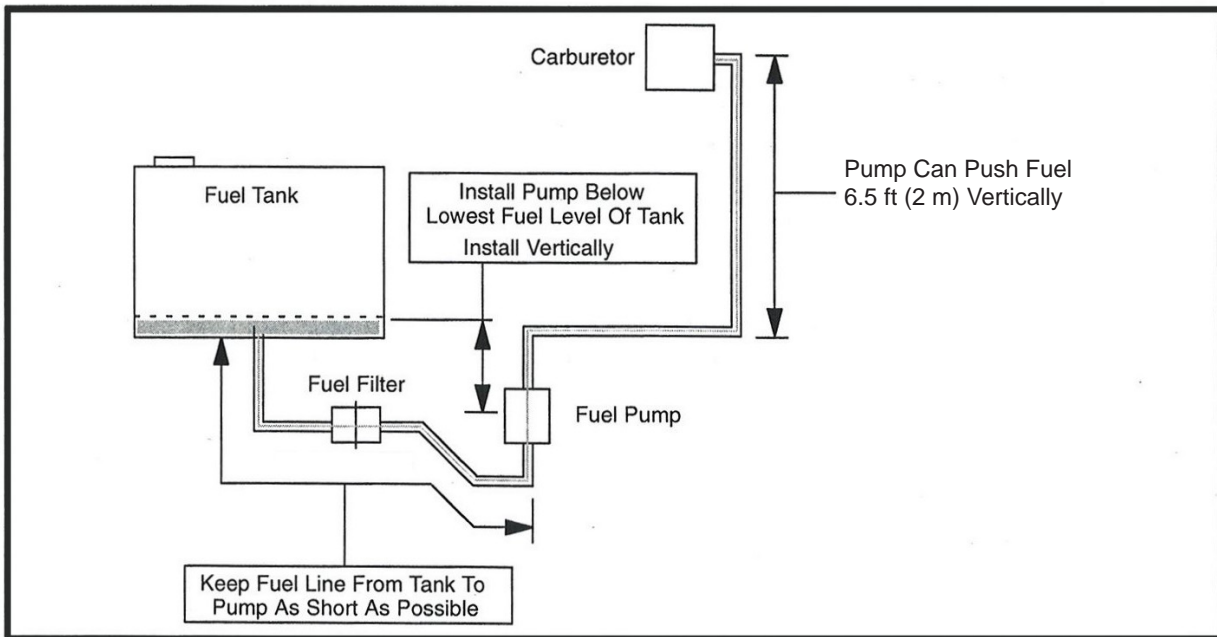


Figure 2-4. Fuel Pump Must Be in Vertical Position

3 - Cleaning Information

The Boxxer 323HP has been engineered using the latest and most sophisticated technology available to produce the finest carpet cleaning results possible. Despite this, it remains only a tool of the carpet cleaning trade and can produce only as good a job as the person operating it.

HydraMaster strongly recommends attending an Institute of Inspection, Cleaning and Restoration Certification (IICRC) approved school as soon as possible and to always follow the IICRC guidelines when cleaning carpets or hard surfaces.

This section describes the carpet cleaning procedure in the following areas:

- Precautions
- Preparing the Carpet for Extraction
- Rinse and Recover
- Overwetting
- Streaking
- Cleaning Tool Tips



PRECAUTIONS

The use of some chemicals (such as concentrated acids and/or solvents) in your truckmount can seriously damage the internal plumbing and high pressure pump.

HydraMaster strongly recommends purchasing a water softener system to prevent the buildup of scale and hard water deposits in your truckmount.

HydraMaster recommends only the use of chemicals containing rust and corrosion inhibitors and water softening agents to prevent chemical buildup which may lead to component failure and warranty invalidation.

Increased demand for a neutralizing rinse results in the need for special care when using these acid based chemicals in your truckmount. The negative side of these products is the corrosive effects the acid can have on metals, including fittings, pumps, heat exchangers, etc.

HydraMaster's **ClearWater Rinse™** has been formulated to protect vital components. HydraMaster will not warranty parts that have been damaged from using acid products that have obviously caused failures.

PREPARING THE CARPET FOR EXTRACTION

Pre-vacuum the carpet

Whether you instruct the customer to pre-vacuum or you offer it as part of your service, proper vacuuming will make your job easier with superior end results. The more time spent removing loose particulate soil, the easier it will be to remove the oily soil stuck to the fibers.

Pretreat the carpet

This process of applying traffic lane type chemicals to the carpet (whether by sprayer or rotary scrubber) is essential prior to extraction with your truckmount.

By applying cleaning agents to the carpet and letting them dwell 10-20 minutes prior to rinsing, you allow the product to dissolve and emulsify the oily, sticky binders holding the soil to the fiber. This will allow more soil to be removed in one or two cleaning passes and help prevent over-wetting.

Remember the solution coming out of your cleaning tool is only in contact with the carpet fiber for a few seconds. Relying on the rinse detergent to do the majority of the cleaning will result in overly long dry times and excess detergent residue left in the carpet.

HydraMaster recommends the use of our pre-sprays: **Fastbreak™** for residential carpet and **Blitz™** for commercial carpet needs.

RINSE AND RECOVER

Whether you are using a wand or an RX-20™, you should clean an area approximately 3 ft. x 3 ft. (92 cm x 92 cm) with the solution valve open then immediately go over that area with vacuum only to remove any excess moisture.

Olefin fiber is becoming more popular, particularly in commercial installations. The process mentioned above can leave excessive residual moisture because olefin fibers will not absorb any of the cleaning solution. You must only apply solution during the backward stroke of the wand so it can be immediately captured by the vacuum head. RX-20™ users should follow each pass with a dry pass. Failure to follow this procedure will cause solution to flow to the back of the carpet along with some of the soil. This, along with any soil imbedded in the backing, will be wicked to the surface of the fibers as the carpet dries.

HydraMaster recommends the following rinse aids: Alkaline - **Hydra-Dri Powder™** or **Hydra-Clean™**. Acid - **ClearWater Rinse™**.

OVERWETTING

Overwetting is an annoyance to all concerned. Extended drying times will leave the customer with a negative impression of both the cleaning company and the process used.

Several factors that will cause overwetting include:

1. Too few vacuum strokes.
2. Clogged vacuum blower filter or vacuum tank lid not sealing properly.
3. Vacuum tank drain valve left partially open.
4. Obstructed, cut or kinked vacuum hoses.
5. Obstructed vacuum hoses while cleaning a heavily foam-saturated carpet (it is recommended to use a crystal type defoamer distributed evenly over the carpet).

STREAKING

Streaks in the carpet can appear in both clean or dirty areas and normally appear in heavily soiled, light colored carpets.

Possible reasons of streaking may include:

1. Clogged or improperly angled spray nozzles.
2. Spray nozzles that overlap, concentrating the solution.
3. A partially clogged vacuum head.
4. Inconsistent solution temperature.



CLEANING TOOL TIPS

Wands

With a wand, keep cleaning strokes short, front to back, and run a “dry pass”.

After pulling the wand for a strip of 3 or 4 ft (0.9 m or 1.2 m) long with the solution trigger activated, go back up to the top of the stroke, and make a “dry “ pass [i.e. no solution flowing]. This gives the wand a second chance to pick up the solution on the carpet.

If you do not run a dry pass, the carpet can take longer to dry, and, possibly, the pad under the carpet can become saturated.

Be aware of the carpet seams; try to use strokes that are parallel with the seam. Avoid pulling the wand across the seam. Every stroke can peel the seam connection and pull the carpet off the floor.

Also, tilt the wand handle down [head up] to move the tool forward, and away from you, on the carpet. This means less pull on the carpet and less work for you.



**1 1/2" HydraHoe
Carpet Cleaning Wand**

Glides over carpet without chattering!
12" wide head increases production. High temperature, high pressure, stainless steel fabrication, stainless valve, quick coupler and assist handle.

Item #163-020

2" S-Bend Wand

This 12" wide wand has two jets. It uses a 1 3/4" tube for improved airflow and comes with an expanded 2" vacuum hose connection.

Item #163-104

**1 1/2" S-Bend
Two Jet Wand**

This 12" wide S-Bend wand has two jets. It uses a 1 1/2" tube and glides over the carpet for easy operation.

Item #100-011-106

**UT-14 Truckmount
Stair Tool**

The best stair tool on the market today. This tough stainless steel hand tool is 14" long with 6" wide cleaning head and stainless steel valve with quick coupler, assist handle.

Item #163-009

**UT-40 Utility
Cleaning Tool**

An all purpose tool for cleaning carpeted divider panels, under restaurant booths, landings, stairs and hard to reach carpeted areas. All stainless construction, 9" wide head and 40" long shaft allows operator to "stand-up" when cleaning stairs.

Item #163-008

Rotary Tool: RX-20

Rotary tools are easier to move on the carpet, but harder to control at first. With a rotary tool, remember to keep strokes short and side-to-side.

Before turning on the RX-20, adjust the handle; it should rest right below or even with the bottom of your pants' front pockets, with the tool resting flat on the floor. Take your time in adjusting the tool's height; make sure the head of the tool is flat with the floor while you are holding the handle. Relax your posture; the more difficult it is to hold the tool's head flat on the floor surface, the more quickly you will tire.

While the tool is running, control the left and right movements of the tool by tilting the head to the front and back, and lifting the handles up and pushing the handles down. The tool can be driven to the forward and backward by tilting the head of the unit to the left and right. The head must be turning to use the self driving feature of the tool, and only requires a slight bit of pressure to handles to get the head to move the tool across the floor.

As with the wand, drying times will be improved if you run a dry pass between wet passes. Hold down the solution trigger and move the unit left or right across the floor 3 or 4 ft, then immediately back across the same pass, without the solution flowing, to make the dry pass. Make the next pass half-overlapping the previous pass.

Use the RX-20 in very heavily trafficked areas or if it has been a long time since the carpet has been cleaned. Beware of the seam edges of carpets and transition edges between floor surfaces. Use extreme caution when cleaning these areas.

Sometimes it is necessary to use an edge tool or wand to run the perimeter of the room on in difficult-to-reach areas where the circular head of the rotary units will not reach.

For Truckmount & Portable Carpet Cleaning Systems

- Aggressive Restorative Extraction Tool for Residential and Commercial Jobs
- Clean Carpet, Tile, and Grout with the RX-20 HE Total Floor Care System
- Works great on stains and heavily soiled, matted carpet.
- For truckmounts or portable carpet cleaning systems
- Optional "tall man" handle
- Length 27", Height 45", Base Width 15", 88 lbs.





The five vacuum heads and three spray jets rotate at 130 RPM creating 650 complete clearing passes per minute.

Upholstery Tool: DriMaster

Use the upholstery tool on small rugs and furniture. When you clean rugs, be sure that the temperature and chemicals are safe for that particular type of rug.

As with the larger tools, do not leave the surface of the upholstery too wet. Adjust the volume of water on the tool without it touching any surface: the water should just barely come out of the tool before the vacuum pulls it back in. The water will only just spray the top layer of the furniture and the vacuum will pull the dirty water back into the tool.

If you find it necessary to do a dry pass, keep strokes short to limit the amount of water that comes into contact with the fabric surface.

DriMaster Upholstery Tool cleans faster, drier and better...all with less operator fatigue.

- Ergonomically designed
- High flow/low residual moisture - super cleaning shears away soil
- No heat loss from atomizing solution
- Never needs a dry pass
- No overwetting or overspray to clean up - solution does not reach foam backing
- Fabrics are left 50% drier than conventional upholstery tools
- Durable - virtually unbreakable
- Lightweight with comfortable handgrip
- No trigger valve for less hand strain
- Cool to the touch
- Low profile design fits in tight spots

Combine the high performance cleaning of the DriMaster Tool with optional Comfort Grip and HydraMaster's state-of-the-art cleaning chemistry, and you're ready to treat most cleanable fabrics with fantastic results!

**Grip
Part #061-144**



**Upholstery Tool
Part #163-010**



BOXXER
323HP

4 - Operating Instructions

This section describes how to operate the Boxxer 323HP, starting with a description of the dash assembly (see Figure 4-1).

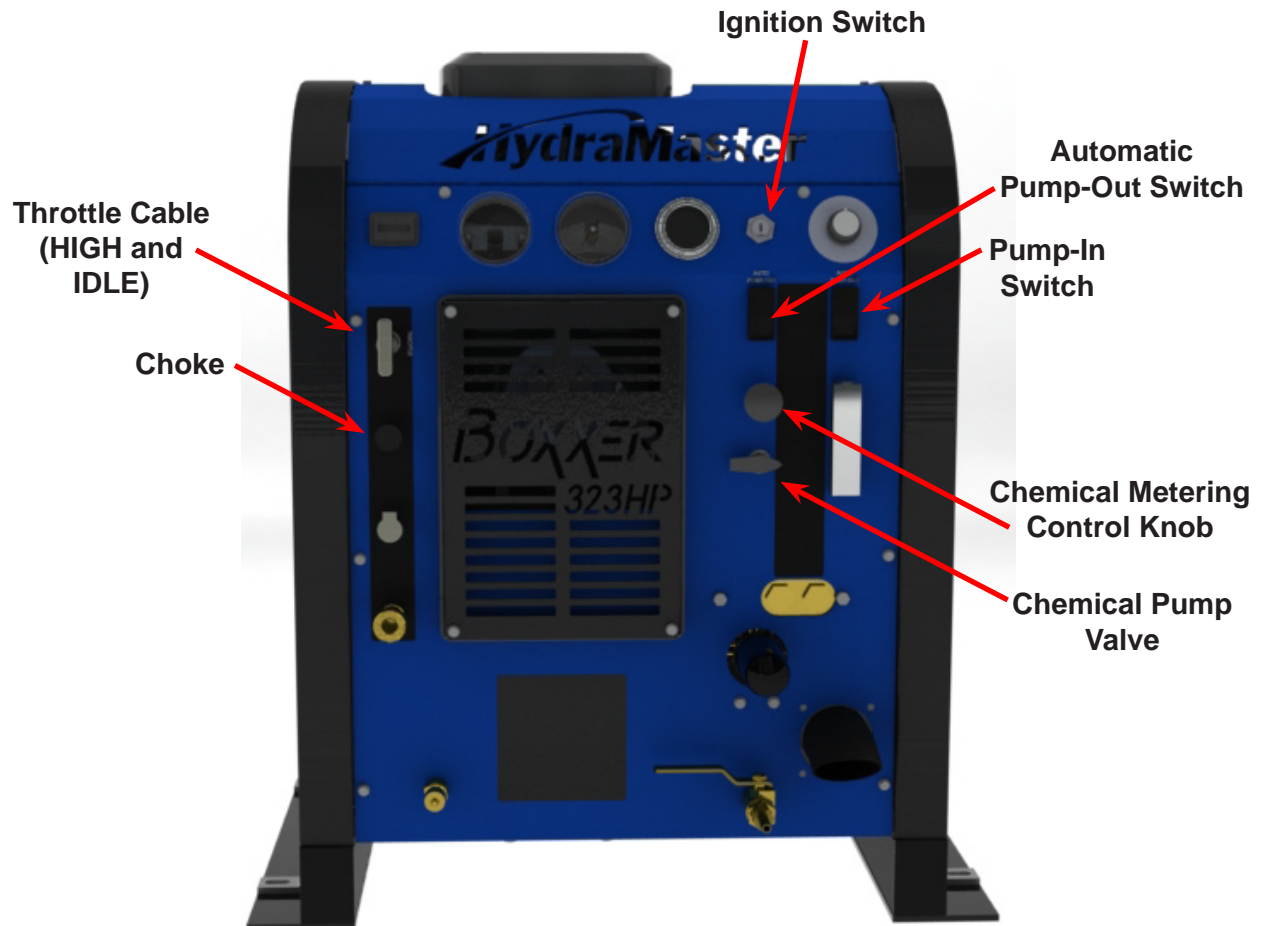


Figure 4-1. Boxxer 323HP Dash Assembly - View 1 of 2

The dash assembly controls the:

- System's ignition switch and the engine throttle speed cable
- Automatic Pump-Out (APO) if included in the configuration
- Pump-In system if included in the configuration
- Water pressure
- Chemical metering
- Water box drain

The dash assembly includes the solution temperature control dial; the temperature, vacuum and pressure gauges; and the hour meter (see Figure 4-2).

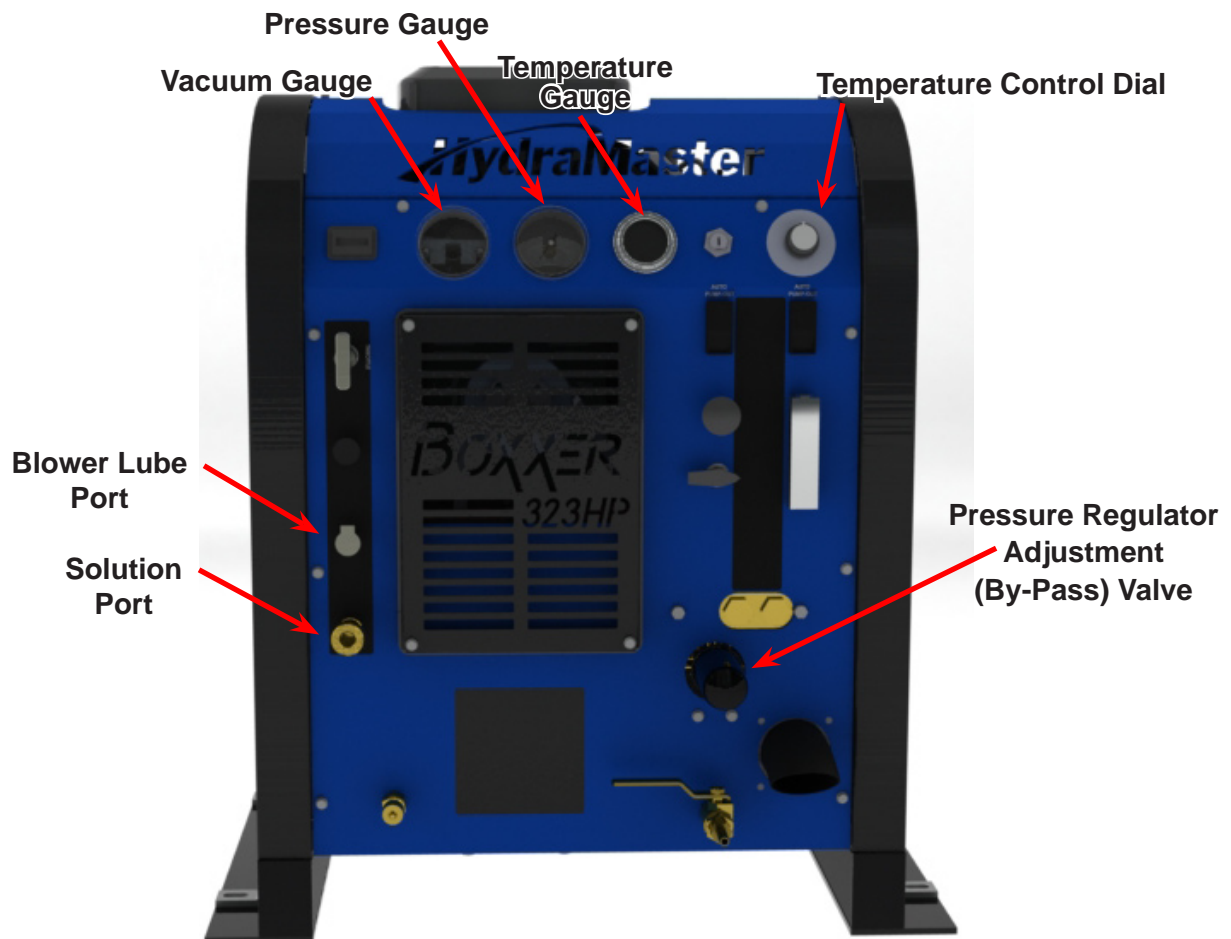


Figure 4-2. Boxxer 323HP Dash Assembly - View 2 of 2

The dash assembly also houses the blower lube port and the high pressure cleaning solution port where the wand/tool connects to the Boxxer 323HP.

NOTICE

Photographs and illustrations included in this document can represent optional equipment as well as standard equipment.

To help achieve a high psi rating for high pressure washing, HydraMaster has added a chemical pump shutoff valve into the Boxxer 323HP's pump system. The shutoff valve can be accessed from the side of the machine (see Figure 4-3).

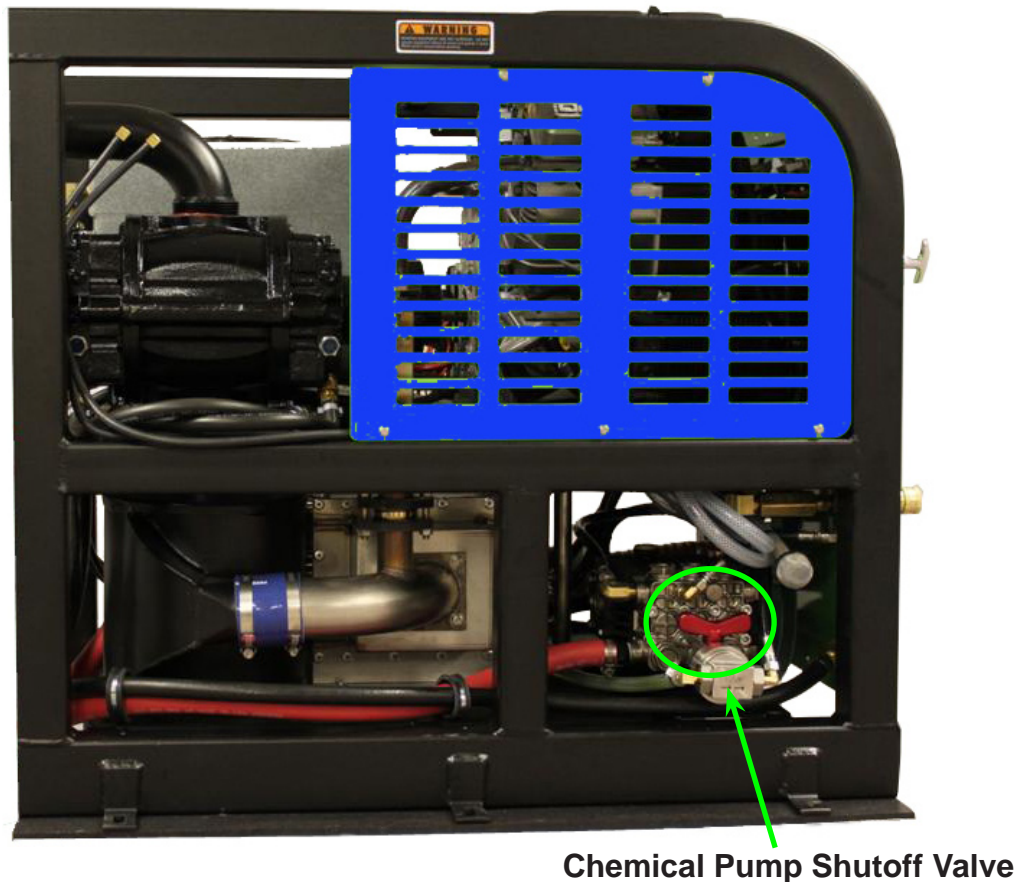


Figure 4-3. Location of Chemical Pump Shutoff Valve

CAUTION

Operating the Boxxer 323HP at pressure levels higher than 1,200 psi with the chemical pump shutoff valve turned on can result in serious component damage.

Before adjusting the pressure for high pressure washing operations, turn off the chemical pump shutoff valve by turning the handle, shown in Figure 4-3, so that it is perpendicular with the pump. See pages 4-5 and 4-6 for details.

NOTICE

Note that there is a "CHEMICAL PUMP" valve located on the dash assembly (see Figure 4-1). This is not to be confused with the chemical pump shutoff valve shown in Figure 4-3.

SETTING THE TEMPERATURE

Depending upon the type of cleaning jobs you need to do, there will be times where you will not need the maximum heat available. To adjust the temperature, the thermostat dial can be rotated counterclockwise to reduce the temperature and rotated clockwise to increase the temperature.

START-UP PROCEDURE

1. Perform all daily periodic maintenance as specified in this Owner's Manual.
2. Connect a garden hose to supply water to the truckmount. If the pump-in feature is used on your system, push the "PUMP-IN" switch to the "ON" position.
3. Connect the cleaning wand or tool to the length of hose required to perform the cleaning job.
4. Start the truckmount with:
 - a. The throttle cable in the "IDLE" position.
 - b. The pressure regulator adjustment (by-pass) valve loosened, turned all the way to the left.
5. Turn the ignition switch to "ON". After you start the engine, allow the truckmount to run in "IDLE" for 2 - 3 minutes to warm up.

CAUTION

Never clean when the machine is in the "IDLE" mode. Failure to follow this caution may result in serious component or engine damage.

6. Pull the throttle cable all the way out and lock it into place.
7. Set the thermostat valve to the desired position.
8. If the Automatic Pump-Out is included in your system's configuration, press the "AUTO PUMP-OUT" switch to the "ON" position.

SETTING THE PRESSURE FOR CLEANING OPERATIONS

Adjust the “PRESSURE REGULATOR” to the desired level as follows:

- Carpet Cleaning: 300 to 400 psi
- Hard Surface Cleaning: up to 1,200 psi (or as indicated on tool)

The chemical pump shutoff valve can be turned on for cleaning operations at 1,200 psi or lower.

The chemical pump shutoff valve is on when the handle of the integrated valve is in line with the pump (see Figure 4-4).

NOTICE

To protect the heat exchange system, the Boxxer 323HP is designed to open the pressure relief valve if the system registers more than 2,500 psi.

1. Turn the chemical pump shutoff valve to the on position (see Figure 4-4).
2. Turn the “CHEMICAL PUMP” valve, located on the dash assembly, to the “PRIME” position to purge any air from the system (see Figure 4-1 on page 4-1).
3. With the truckmount running at “HIGH”, block off the vacuum intake to the recovery tank. The vacuum gauge should read 12” Hg. This will assist in priming the chemical system
4. Allow the chemical to flow through the chemical meter at full flow for 30 seconds.
5. Turn the “CHEMICAL PUMP” valve to “ON.” The restriction can now be removed from the vacuum inlet.
6. While spraying solution from the cleaning tool, adjust the chemical flow by turning the “CHEMICAL METERING CONTROL” knob (see Figure 4-1 on page 4-1).
7. Begin cleaning.

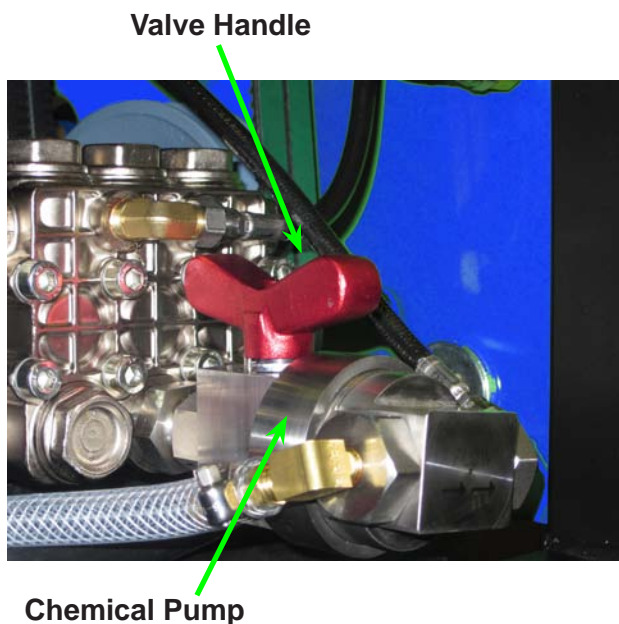


Figure 4-4. Chemical Pump Shutoff Valve Is On When Valve Handle Is In Line with Chemical Pump

SETTING THE PRESSURE FOR HIGH PRESSURE WASHING OPERATIONS

The chemical pump shutoff valve must be turned off during high pressure washing operations.

The chemical pump shutoff valve is off when the handle of the integrated valve is perpendicular to the pump (see Figure 4-5).

1. Turn the chemical pump shutoff valve to the off position.
2. Adjust the “PRESSURE REGULATOR” up to 2,500 psi (or as indicated on the tool).

NOTICE

To protect the heat exchange system, the Boxxer 318 HP is designed to open the pressure relief valve if the system registers more than 2,500 psi.

CAUTION

Operating at pressure levels higher than 1,200 psi with the chemical pump shutoff valve turned on can result in serious component damage. Turn off the chemical pump shutoff valve by turning the handle of the integrated valve so that it is perpendicular with the pump.

CAUTION

Setting the pressure level higher than the recommended value can result in an increased risk of serious component damage.

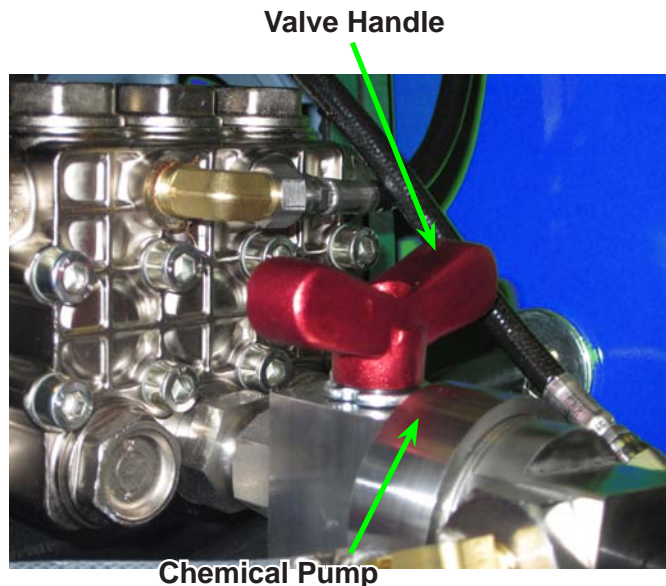


Figure 4-5. Chemical Pump Shutoff Valve Is Off When Valve Handle Is Perpendicular to Pump

SHUT DOWN PROCEDURE

1. Flush clean water through the chemical system for 10 seconds. Turn the “CHEMICAL PUMP” valve” to “OFF.”
2. Cool the truckmount down by spraying the cleaning wand into the vacuum hose for 3 - 5 minutes. The chemical should now be flushed from the truckmount, hoses and cleaning tool.
3. Remove the vacuum hose.
4. Lubricate the blower to prevent it from rusting internally.
 - a. Allow the unit to run for a few minutes with the vacuum hose disconnected in order to remove moisture from the blower.
 - b. Cap off the inlet(s) to the vacuum tank.
 - c. Spray a HydraMaster-recommended spray lubricant into the “BLOWER LUBE PORT” for about 5 to 10 seconds while the unit is running.
 - d. Uncap the inlet(s) and run the unit for another minute to allow the blower to cool down.
5. If freeze guarding is necessary, perform the procedure at this time. See the Freeze Guarding section of this Owner’s Manual (page 5-17).
6. Push the engine throttle cable to the “IDLE” position.
7. Turn the ignition switch to “OFF.”
8. Drain the water box using the valve.
9. Drain the vacuum tank in an appropriate location.

NOTICE

In accordance with EPA, state and local laws, do not dispose of water into gutters, storm drains, streams, or reservoirs.

10. Perform daily maintenance as specified in Section 5 of this Owner’s Manual.

BOXXER
323HP

5 - Machine Maintenance

To avoid costly repairs and downtime, it is imperative to develop and practice good maintenance procedures. These procedures fall into daily, weekly, monthly and quarterly increments and are outlined below. All maintenance must be performed by qualified service personnel.

A maintenance log, provided in the Owner's Guide, must be correctly and completely filled out. HydraMaster may request to inspect the logs before a warranty claim is honored. It is recommended that the log be affixed to the vehicle door near the truckmount for convenience and to serve as a maintenance reminder.

This section describes how to properly maintain the truckmount in the following areas:

- Operational Maintenance
- Overall Machine Maintenance
- High Pressure Pump Maintenance
- Vacuum System Maintenance
- Descaling Procedure (Required)
- Freeze Guarding

OPERATIONAL MAINTENANCE

Daily Maintenance

- Check the engine oil level. Add oil if needed.
- Check the high pressure pump oil. Add oil if needed.
- Check the oil level in the blower. Add oil if needed.
- Inspect and clean orifice and filters.
- Inspect and clean the recovery tank filters.
- Inspect and clean the garden hose screen.
- Inspect the truckmount for water and oil leaks, loose electrical connections, etc. and repair as needed.
- Lubricate the blower with a HydraMaster-recommended lubricant.

Weekly Maintenance

- Inspect the recovery tank filters for tears, holes, etc. Repair or replace as needed.
- Inspect the vacuum relief valve. Clean and lubricate as necessary.
- Clean the recovery tank thoroughly with pressure washer.
- Check the pump drive for wear and proper tension. Adjust as needed.
- Check all the hoses and wiring for wear and chafing. Secure as needed.
- Flush the water and chemical systems with solution of equal parts white vinegar and water.
- Check all the nuts and bolts. Tighten as needed.
- One time change of the high pressure pump oil after 50 hours of operation. (Every 500 hours thereafter.)
- One time change of the engine oil after 25 hours of operation.
- Change the engine oil every 50 hours. (Every 25 hours if operating in high ambient temperatures.) Change oil filter every oil change.

Monthly Maintenance

- Check the engine air filter. Clean or replace as necessary.
- Check the water level in battery. Fill as needed.
- Clean the battery terminals as needed.

Quarterly Maintenance

- Check the fuel lines. Repair or replace as needed.
- Clean and gap the spark plugs to 0.031 - 0.035" (0.8 - 0.9 mm). Replace if excessive carbon buildup is visible or every 250 hours.
- Change the blower oil after first 100 hours of use (every 500 hours thereafter).

500 Hours

- Change the blower oil.
- Change the high pressure pump oil.
- Check the engine valve clearance (intake and exhaust 0.012" [0.30 mm])
- Change primary fuel filter

1,000 Hours

- Change primary air filter
- Check the fuel tank to ensure it is secure, and check that all components such as the fill cap and vent are working properly.

OVERALL MACHINE MAINTENANCE

Maintenance, troubleshooting and repair are much easier tasks to accomplish on a clean truckmount. Regular cleaning of the truckmount offers the user an opportunity to visually inspect all facets of the truckmount and spot potential problems before they occur. In addition to the operational maintenance the following "housekeeping" duties should be performed.

After each job

- Check the recovery tank and the recovery tank filters. Empty and clean as necessary.

Daily

- Wipe the truckmount down thoroughly with a damp cloth.
- Wipe down the vacuum and high pressure hoses as needed.
- Inspect and clean the vacuum slot on the cleaning wand.
- Check the wand head for sharp edges that could tear carpet. File down as needed.
- Clean the wand to maintain original appearance.
- Visually inspect the hoses for abrasions, cuts, etc. Repair or replace as needed.

Weekly

- Empty the chemical container. Wash out thoroughly to remove any chemical buildup.
- Inspect the chemical feed line strainer and use solution of equal parts white vinegar and water to remove any chemical buildup.
- Thoroughly clean the wand and inspect for clogged jets, debris in vacuum slot and leaking fittings at valve.
- Thoroughly clean the vacuum and high pressure hoses including quick releases and cuffs.

ENGINE MAINTENANCE

Engine Oil Level Check

The engine oil level should be checked daily. It is recommended that the oil be checked just before the engine is started for the first time for that day. The oil level should be between the 'Add' and the 'Full' marks on the dipstick.

CAUTION

Do not operate the engine with the oil level below the bottom of the 'Add' mark on the dipstick, or above the top of the 'Full' mark.

Adding Engine Oil

It is normal to add some oil in the period of time between oil changes. The amount will vary with the severity of operation. When adding or replacing engine oil, be sure the oil meets or exceeds the recommended specification.

Changing Engine Oil and Filter

The engine oil and filter must be changed every 50 hours or every 3 months whichever occurs first. The oil and filter should be changed every 25 hours if the engine is operating in dusty or extremely dirty areas, or during cold weather.

Engine Oil Quality

To achieve proper engine performance and durability, it is important that you use only engine lubricating oils of the correct quality in your engine. Proper quality oils also provide maximum efficiency for crankcase ventilation systems, which reduces pollution.

CAUTION

Use only engine oils displaying the American Petroleum Institute (API) "starburst" certification mark 'FOR GASOLINE ENGINES' on the container.

Engine Oil Recommendation

While multi-viscosity oils are generally recommended, SAE 5W-30 synthetic is specifically recommended year round for your Boxxer 323HP engine.

Oil Filter

Briggs and Stratton engines use a Briggs and Stratton filter. An equivalent or better oil filter must be used when servicing the engine.

To replace the filter, use a proper filter wrench to remove the filter.

Clean the filter mounting base and lightly coat the gasket surface of the new filter with engine oil. Hand tighten the filter until the gasket contacts the base, then tighten another ½ turn. Fill the engine with the correct amount of oil, run the engine and check for oil leaks at the drain plug and oil filter gasket.

Spark Plugs

Always use the recommended spark plugs for your engine. Hotter or colder plugs, or similar plugs that are not exact equivalents to the recommended plugs, can cause permanent engine damage, reduce the engines useful life, and cause many other problems such as hard starting, spark knock and run-on. Installing new spark plugs regularly is one of the best ways to keep your engine at peak performance.

Fuel Filter

The fuel filter is located between the fuel pump and the fuel tank underneath the vehicle.

HIGH PRESSURE PUMP MAINTENANCE

Daily

Check the oil level and the condition of the oil. The oil level should be up to the center of the sight glass on the side or rear of the pump or between the “MIN” and “MAX” lines on the dipstick. The dipstick may be found by removing the oil cap.

Periodically

Change the oil after the initial 50 hours of operation and every 500 hours after that. It may be necessary to replace the pump seals and check valves at 500 hours if the truckmount has been running in high ambient temperatures.

Refer to the Pump Servicing Section on the following page for more information.

CAUTION

If the oil becomes discolored or contaminated one of the oil seals may be damaged. Do not operate the pump if the crankcase oil has become contaminated. Do not rotate the drive shaft without oil in the crankcase reservoir.

The pump should never be run dry. Running the pump dry will cause premature wear on the seals, packing and plungers. Running the pump dry for a prolonged period of time may cause damage that cannot be repaired and voids warranty.

Do not run the pump with frozen water in the manifold. If there is a risk of freezing, freeze guard the truckmount. See the Freeze Guarding section on page 5-17 of this manual.

Servicing Valves on the High Pressure Pump

Removing a Valve

1. Remove the valve cap (30 mm) and extract the valve assembly (see Figure 5-1).



Figure 5-1. Remove Valve Cap and Valve Assembly

2. Remove the valve assembly (retainer, spring, valve plate, valve seat) from the valve cavity.
3. Remove the O-ring and support from the valve cavity.
4. Examine the O-ring and replace if there is any evidence of cuts, abrasion, or distortion.
5. Inspect the manifold for wear or damage (see Figure 5-2).
6. Inspect the old valves for wear or damage. Only one valve kit (P/N 000-078-519) is necessary to repair all the valves in the pump. (The kit includes new supports, O-rings, valve seat, valve poppet, spring and retainer; all are pre-assembled.)



Figure 5-2. Inspect Manifold and Old Valves

7. Replace the center inlet check valve with a modified check valve (P/N 000-169-212 - Figure 5-3).

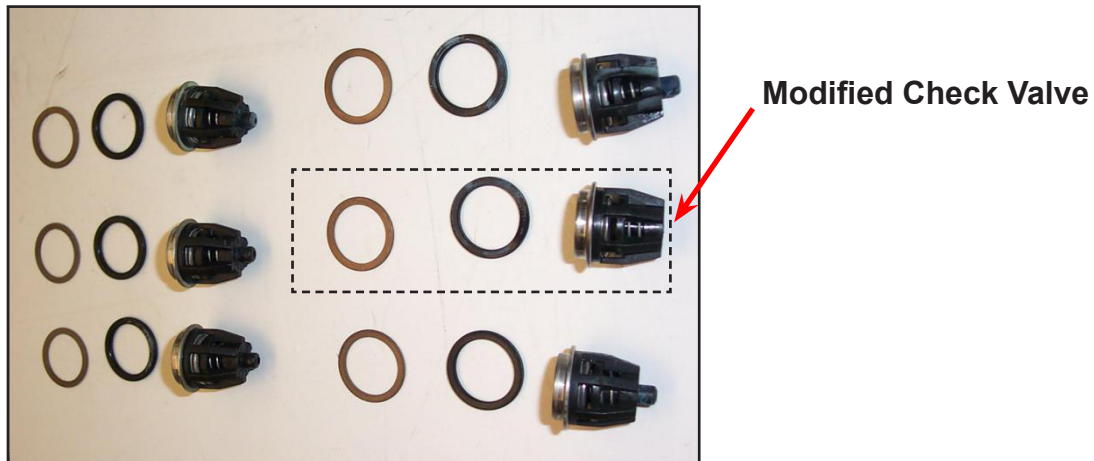


Figure 5-3. Replace Center Inlet Check Valve With Modified Check Valve

8. Apply O-ring grease to O-rings and install valves (Figure 5-4).
9. Replace valve cap and torque to 95 ft. lbs.(13 m kgs) see Figure 5-5).

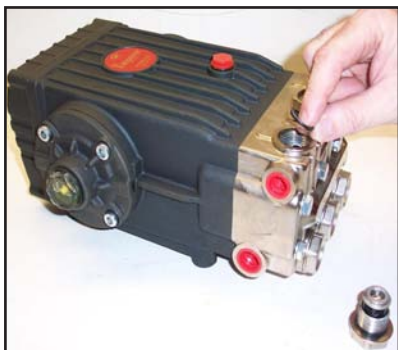


Figure 5-4. Apply Grease and Install Valves



Figure 5-5. Replace Valve Cap and Torque to 95 ft. lbs. (13 m kgs)

10. Remove the fasteners retaining the manifold
11. Separate manifold from crankcase (see Figure 5-6).

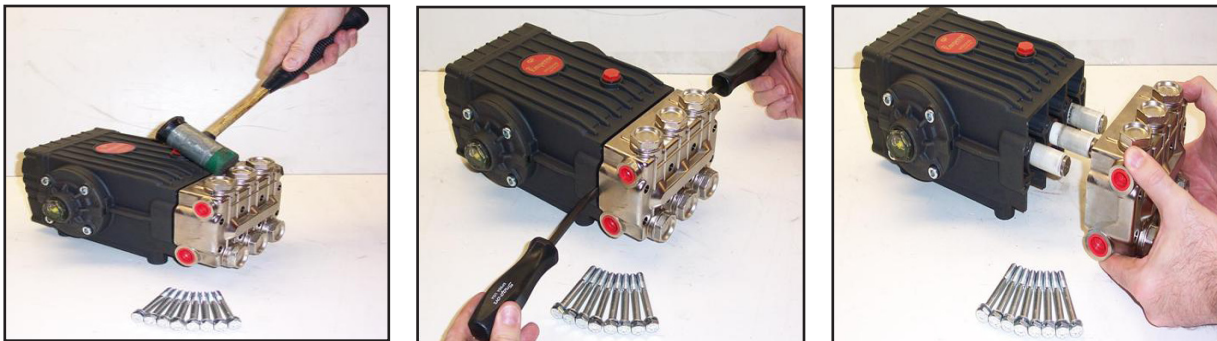


Figure 5-6. Separate Manifold from Crankcase

NOTICE

It may be necessary to rotate crankshaft or tap manifold with rawhide or plastic mallet to loosen.

CAUTION

When sliding manifold from crankcase, use caution not to damage ceramic plungers.

12. The seal assemblies may come off with the manifold (see Figure 5-7)

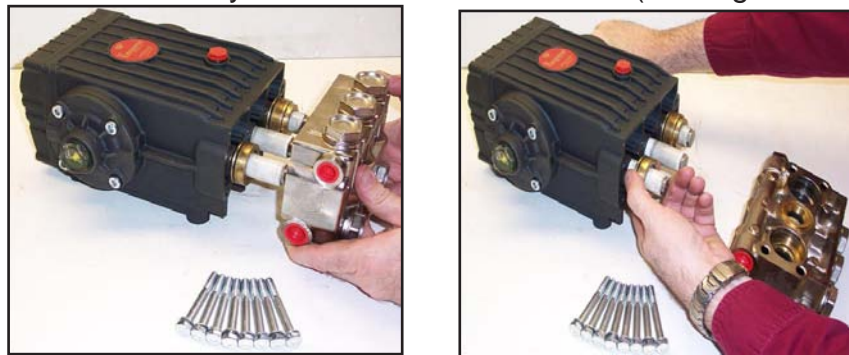


Figure 5-7. Seal Assemblies May Come Off with Manifold

13. Examine the ceramic plungers. The surface should be smooth and free from scoring, pitting or cracks (see Figure 5-8); if not, replace.
14. Loosen the stainless steel plunger bolt.



Figure 5-8. Examine Ceramic Plungers

15. Remove the stainless steel plunger bolt and ceramic plunger from the plunger guide (see Figure 5-9).
16. If the slinger washer is removed, be certain it is re-installed or replaced.
17. Separate plunger bolt from ceramic plunger (see Figure 5-9).

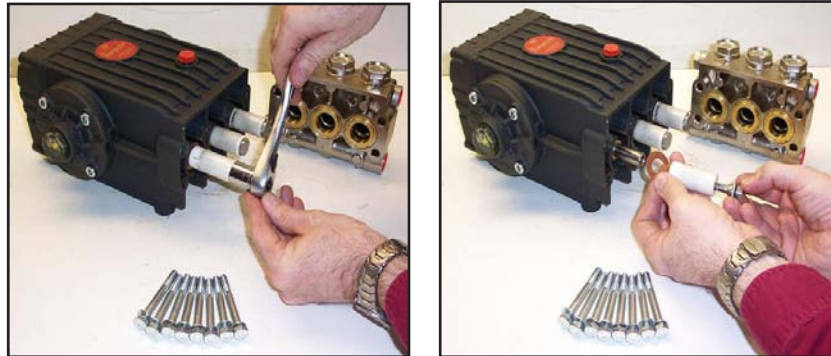


Figure 5-9. Remove Stainless Steel Plunger Bolt and Ceramic Plunger

18. Install new Teflon® back-up ring and O-ring on the plunger bolt. Apply a film of O-ring grease on the outside of the O-ring (see Figure 5-10).
19. Apply removable anaerobic thread sealant (Loctite® 542) to the threads of the plunger bolt, carefully pressing the plunger bolt into ceramic plunger (see Figure 5-10).
20. Slide new ceramic plunger over the plunger guide (see Figure 5-10).

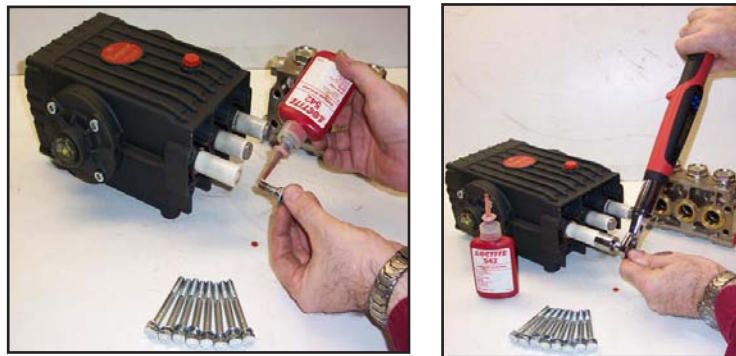


Figure 5-10. Install O-ring, Apply Sealant and Slide Plunger over Plunger Guide

21. Torque plunger to 14.5 ft. lbs (2 m kgs).

Extracting Seals

With manifold removed from crankcase:

1. Insert proper extractor collet through main seal retainer (see Figure 5-11).
2. Tighten collet and extract retainers and seals.

NOTICE

The Teflon seals of the HT series will be damaged during disassembly so new ones will have to be installed.

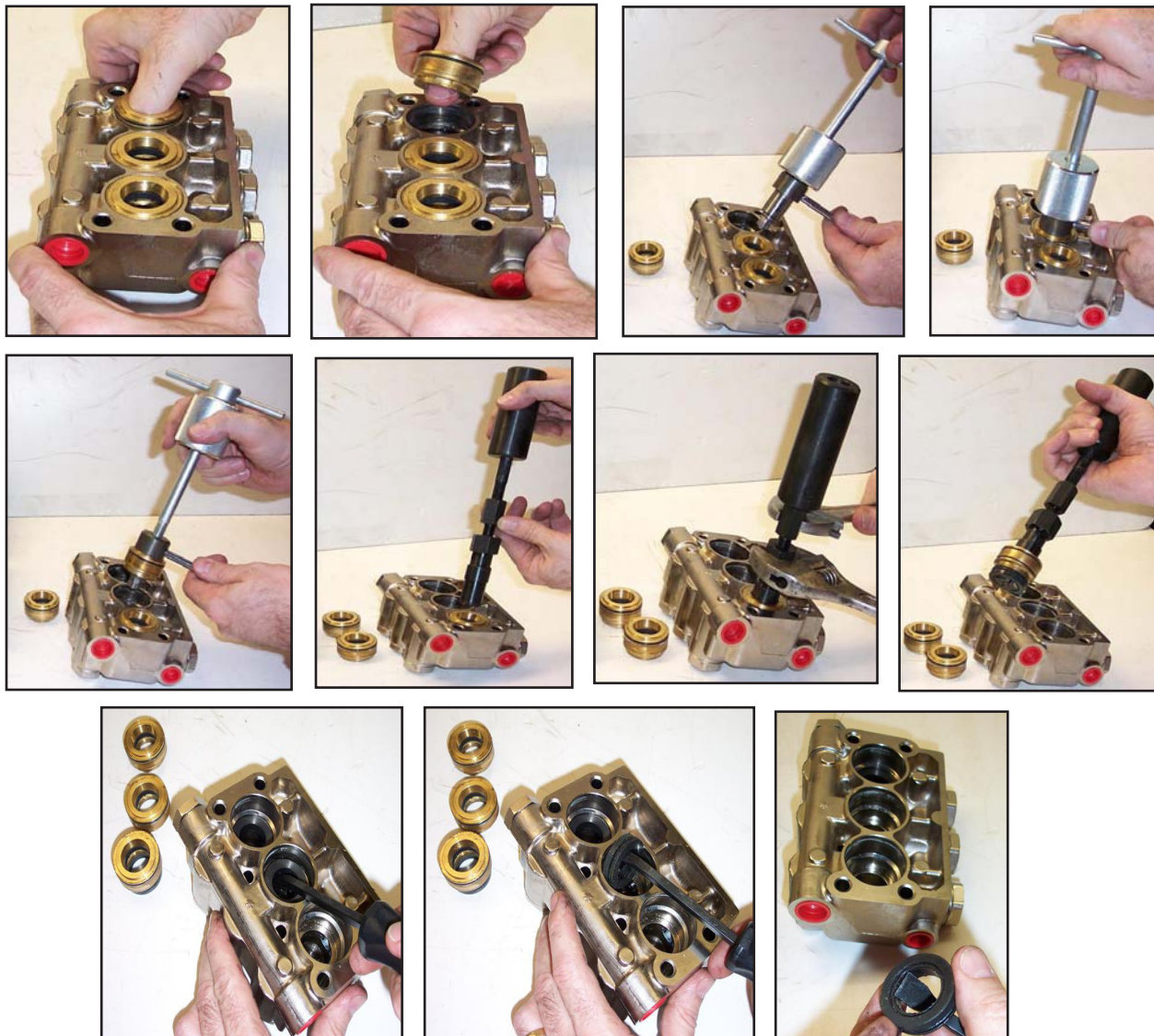


Figure 5-11. Extract Retainers and Seals

Replacing the Seal Assemblies

Only one seal kit (P/N 078-518) is necessary to repair all the seals in the pump (see Figure 5-12). Use an insertion tool for seal installation

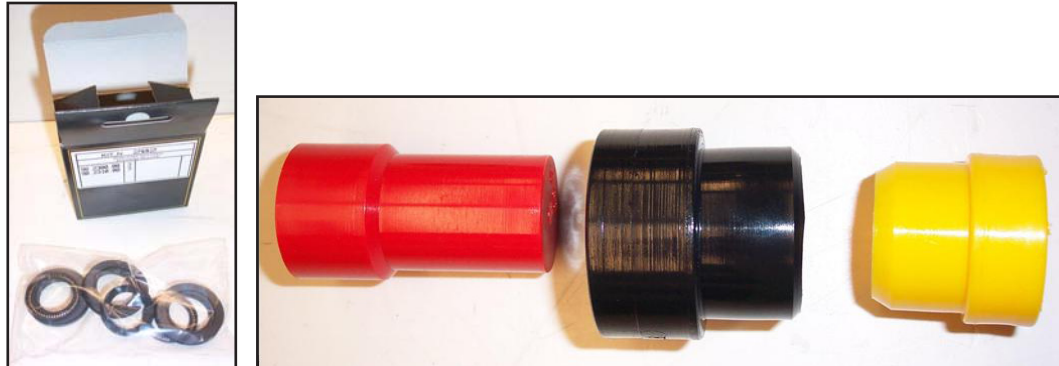


Figure 5-12. Seal Kit and Insertion Tool for Seal Installation

To install a seal assembly:

1. Apply a film of O-ring grease on the O-ring on the outside of the new high pressure seal.
2. Insert the high pressure seal into the cavity with the “U” shape down.
3. Press high pressure seal into place.
4. Apply a film of grease on the O-ring on the brass retainer (see Figure 5-13).

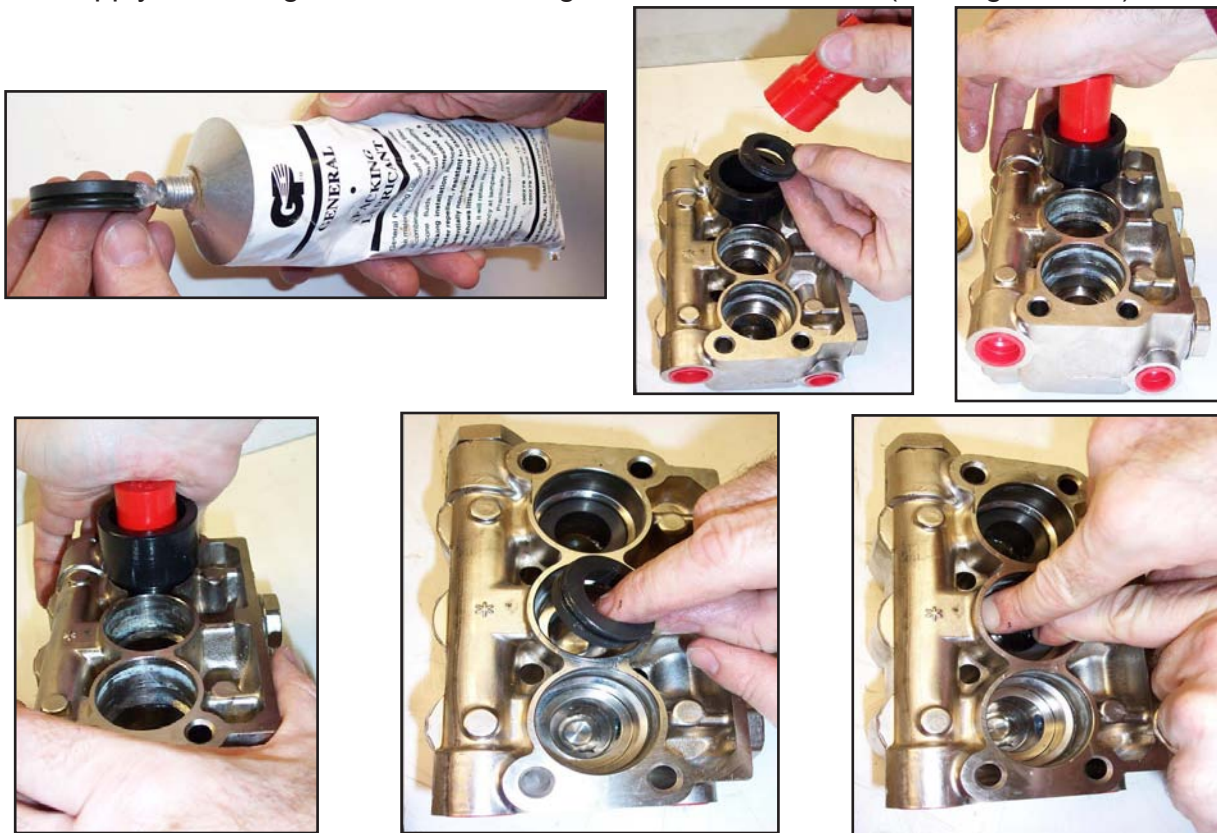


Figure 5-13. Install Seal Assembly Using O-Ring Grease

To install the intermediate retainers and the low pressure seals:

1. Insert the brass intermediate retainer into the cavity.
2. Press the new low pressure seal into the brass low pressure seal retainer and install a new O-ring on the outside (see Figure 5-14).

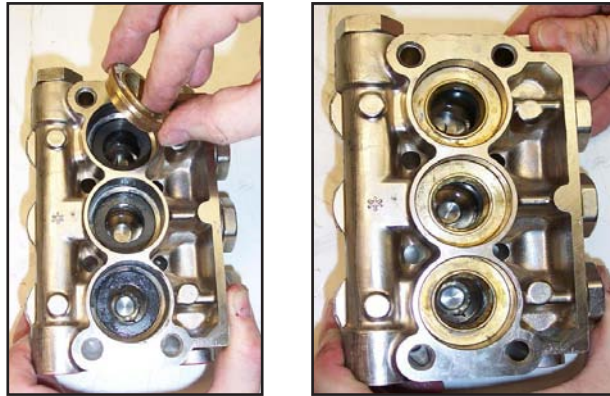


Figure 5-14. Install Retainers into Cavities

3. Press the low pressure seal assembly into the cavity (see Figure 5-15).

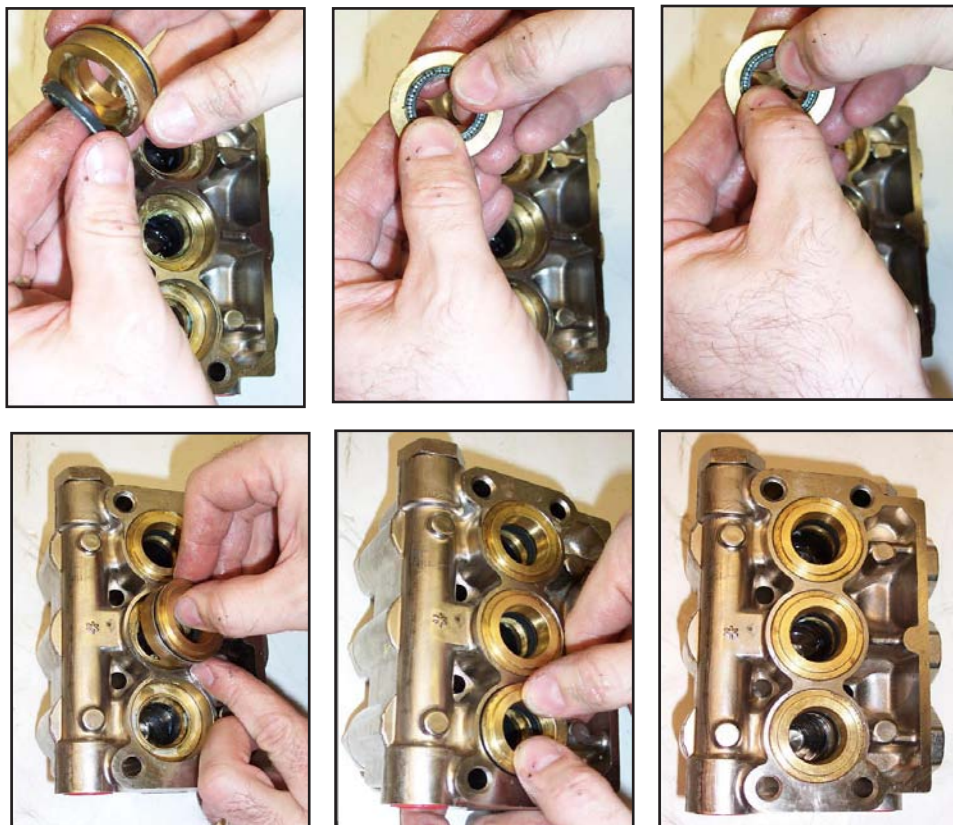


Figure 5-15. Press Low Pressure Seal Assembly into Cavity

Re-Installing Manifold

1. Position the outer plungers at the same position (see Figure 5-16).
2. Re-install manifold and torque the fasteners in an "X" pattern to 50% of specification and then retorque to 100% specification (see Figure 5-17 and Figure 5-18).

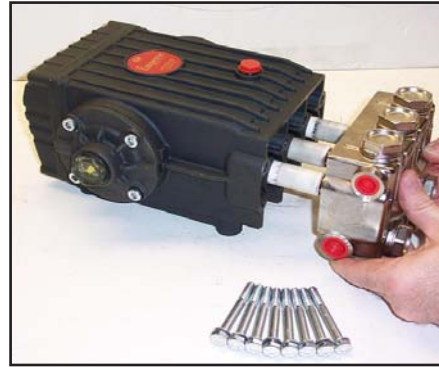


Figure 5-16. Re-install Manifold and Torque Fasteners

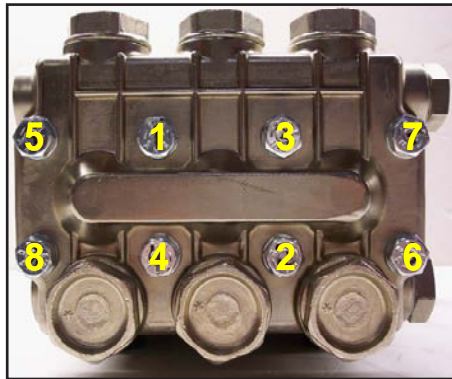


Figure 5-17. Torque Sequence in "X" Pattern

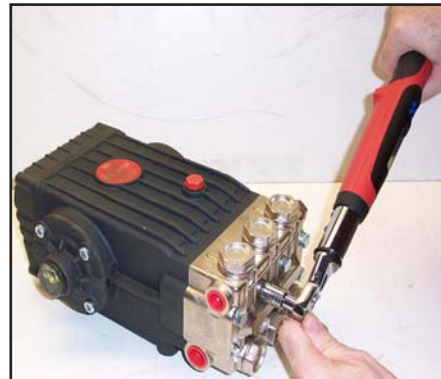


Figure 5-18. Torque Bolts to 22 ft. lbs (3 m kgs)

VACUUM SYSTEM MAINTENANCE

The vacuum pump in this machine is commonly referred to as a “rotary positive displacement blower” or “blower” for short. The performance and life of the truckmount is greatly dependent on the care and proper maintenance it receives. The manual for the blower has been included. Review the manual for a better understanding of this piece of machinery.

CAUTION

To protect the blower from overloading and damaging itself, there is a vacuum relief system installed on the vacuum tank. When the vacuum tank inlet is completely sealed off a maximum of 12” Hg will be attained.

CAUTION

Solid objects entering the blower will cause serious damage to the internal components of the blower. Extreme caution should be used when the truckmount is being run for test purposes with the inlet to the blower open to the atmosphere.

CAUTION

Foam passing through the blower can lead to serious problems with the truckmount. It is important to keep the vacuum tank free of foam. The tank is protected from overflowing by a float kill switch; however, this switch is not activated by foam.

Daily

At the end of each day the internal components of the blower need to be lubricated. This helps to prevent rust deposits and prolongs the life of the truckmount.

To lubricate the blower:

1. Allow the unit to run for a few minutes with the vacuum hose disconnected in order to remove moisture from the blower.
2. Cap off the inlet(s) to the vacuum tank.
3. Spray a HydraMaster-recommended spray lubricant into the “BLOWER LUBE PORT” for about 5 to 10 seconds while the unit is running.
4. Uncap the inlet(s) and run the unit for another minute to allow the blower to cool down.

Periodically

Change the oil in both ends of the blower after the initial 100 hours of use. The oil is to be changed each 500 hours of use thereafter.

DESCALING PROCEDURE (REQUIRED)

Scale deposits on the interior of the heating system can cause a noticeable loss in heating performance. Deposits of this kind result from hard water. The frequency with which descaling procedures are required will vary. If the area has particularly hard water, you may have to descale often.

To descale the system, add an appropriate descaler chemical to the water box. Circulate it through the system. Let it stand. Flush and repeat as necessary. Clean all screens and strainers, and check them frequently following descaling.

NOTICE

If using TM DeScaler™ through the flow meter, make sure to run clean water through the flow meter after this procedure.

To descale using the recirculation kit (P/N 000-078-058), start with an empty water box. Fill a third of the water box with TM DeScaler™. Follow the recommendations on the TM DeScaler™ label for proportions. Verify that the float is not lying horizontal, but floats below.

Attach the recirculation fitting provided in the kit to the garden hose quick connect (see Figure 5-19) and this combination to the front of the truckmount.

Attach one section of the solution hose to the outgoing solution fitting on the front of the truckmount and the other end to the garden hose and recirculation fitting combination that is attached to the front of the truckmount. Additional hoses may be attached inline if descaling of hoses is needed.

Start the truckmount and allow it to run for 3 to 5 minutes. Do not leave the TM DeScaler™ solution in the system. Flush the system with clean water and turn the truckmount "OFF."

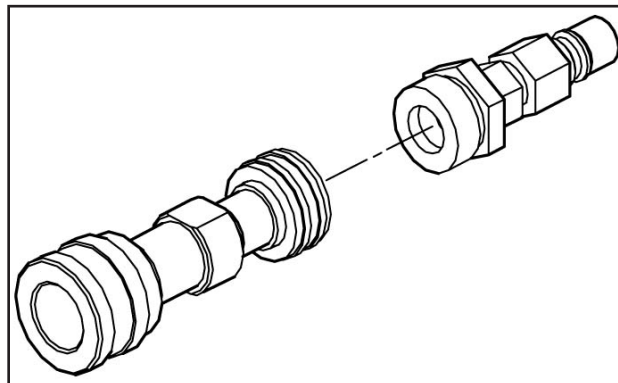


Figure 5-19. Recirculation Fitting

FREEZE GUARDING

To avoid permanent damage to the truckmount, it is imperative to follow the Freeze Guard Procedure whenever the possibility of freezing temperatures exists.

CAUTION

When disposing of antifreeze, follow local laws and regulations. Do not discard into storm sewers, septic systems or onto the ground.

⚠ WARNING

Antifreeze is harmful or fatal if swallowed. Do not store in open or unlabeled containers. Keep out of reach of children and animals.

Freeze Guard Procedure

1. With the truckmount turned off and the incoming water line disconnected, open the water box drain valve on the front of the truckmount. Allow the system to fully drain.
2. Add 2 gallons (7.57 litres) of 50/50 antifreeze and water mix to the water box.
3. Attach a section of solution hose to the outgoing solution fitting on the front of the machine. Attach the opposite end to the recirculation fitting. (If more sections of hose are to be freeze guarded attach those inline.)
4. Start the truckmount and allow it to run for 2 to 3 minutes. This will distribute antifreeze solution throughout the truckmount.
5. Remove the chemical feed line from the chemical jug. Turn the SELECTOR VALVE to "PRIME." This will vacuum the chemical remaining in the lines to the recovery tank.
6. Remove the quick connect from the truckmount.
7. Spray the antifreeze and water mix out of the truckmount and into a container to reclaim the solution. Run the solution until it stops.
8. The truckmount is now freeze guarded. Remember to flush antifreeze from the system prior to carpet cleaning. See the following procedure.

NOTICE

The reclaimed antifreeze solution may be used three times before being discarded.

NOTICE

To freeze guard the hoses and wand, perform the preceding procedure with the items to be freeze guarded attached.

CAUTION

Always check the freezing level of your reclaimed antifreeze with a glycol tester before reusing. Failure to do so may result in serious component damage.

Recovering Antifreeze for Re-Use

1. Attach all hoses and wands which have been freeze guarded to the truckmount.
2. Attach the incoming water source to the front of the truckmount.
3. Start the truckmount.
4. Spray the solution through the hoses and wands into a sealable container until all signs of antifreeze are gone.

Freeze Protection of the Pump-In System

1. Drain the fresh water tank.
2. Remove the garden hose adapter from the pump-in pump hose and position the hose so it is pointing outside the van.
3. Turn on the pump-in pump and run for 1 - 2 minutes until all the water is purged from the hose.

NOTICE

The next time the truckmount is used, it may take a few minutes before the water box begins to fill.

TENSIONING THE PUMP DRIVE BELT

1. Remove the Boxxer 323HP grill to gain access to the idler pulley.
2. Remove the engine duct plate.
3. Loosen but **do not remove** the ½"-13 x 2 ¼" long bolt on the idler pulley.
4. Remove the right cover of the machine to gain access to the tensioning screw.
5. Adjust the tension of the belt by turning the ¼"-20 x 4" long screw.
6. After the proper belt tension is achieved, tighten the ½" bolt on the idler pulley.

CAUTION

Ensure there is no contact between idler assembly (including belt) and no other part of the truckmount. Contact between the parts could result in damage to the truckmount.

7. Re-install the engine duct plate.
8. Replace the right cover and grill.

BOXXER
323HP

6 - Water and Chemical System

This section describes the Boxxer 323HP's water and chemical systems, and includes the exhaust subsystem.

Parts of the text are also included in the section's annotated illustrations which are referenced in the following paragraphs (see Figure 6-1 – Figure 6-4).

1. The process starts when fresh water is brought through the front of the truckmount into the water box, as indicated in Figure 6-1. The level of water in the box is maintained by the use of a float valve. The water is then gravity-fed to the pump where it is pressurized.
2. Next, the pressurized water enters the by-pass valve. This valve allows manual adjustment of the pressure level. When the valve at the wand is closed, the water in the system is recirculated to the water box. When solution is being used at the wand, the necessary amount of high pressure water passes through the by-pass valve and to the heat exchanger (see Figure 6-1).
3. In the cross flow heat exchanger, the temperature is raised. The heat necessary to do this is provided by both the engine and blower exhausts (see Figure 6-4). The heated water then travels to the high pressure manifold (see Figure 6-1).
4. Water temperature is controlled via a temperature sensor inside the high pressure manifold. When the system achieves the maximum operating temperature, the high pressure solenoid opens and flows water into the recovery tank. This will reduce the internal temperature of the machine.
5. Water that is recirculated through the pressure regulator back to the water box travels past a thermostatic valve. This thermostatic valve monitors the water box temperature. When the thermostatic valve senses the water in the water box has reached its set point, it opens the low pressure thermostatic valve on the side of the water box and closes once the temperature drops back below the set point (see Figure 6-2).
6. The water that is being called for by the wand then exits the manifold and passes through a check valve (see Figure 6-2).

7. Finally, the water joins the chemical where the solution is created (see Figure 6-2).
8. The chemical is pressurized by the HydraMaster diaphragm chemical pump attached to the head of the water pump. This pump pulls the chemical, or soap, jug through the chemical flow meter (see Figure 6-3).
9. After being pressurized, the chemical travels through the metering valve and is injected into the high pressure stream. This solution then exits the front of the truckmount and is delivered to the cleaning tool (see Figure 6-3).

Figure 6-1. Annotated Water, Chemical and Solution Flow Diagram - View 1 of 2 8069

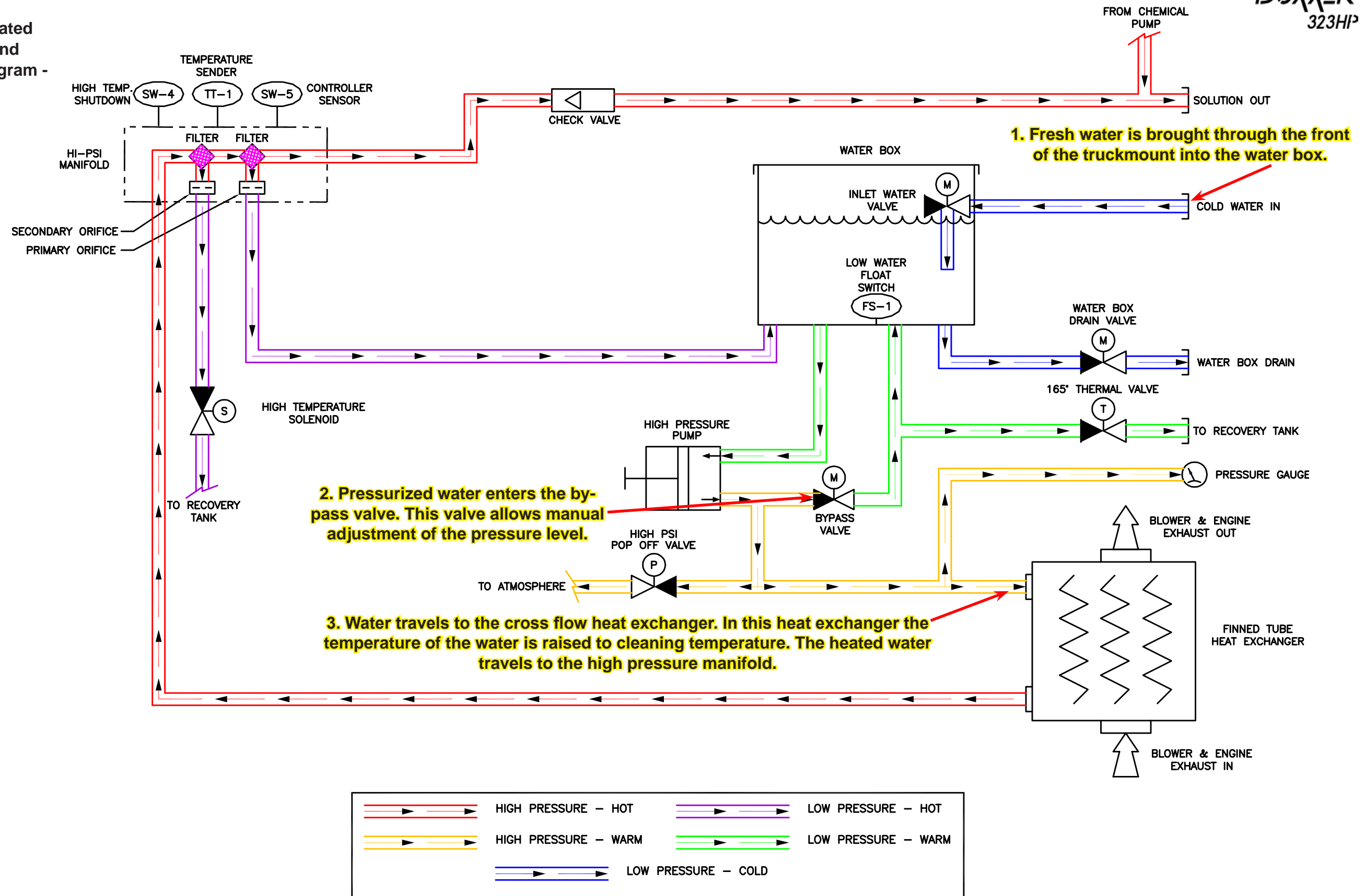
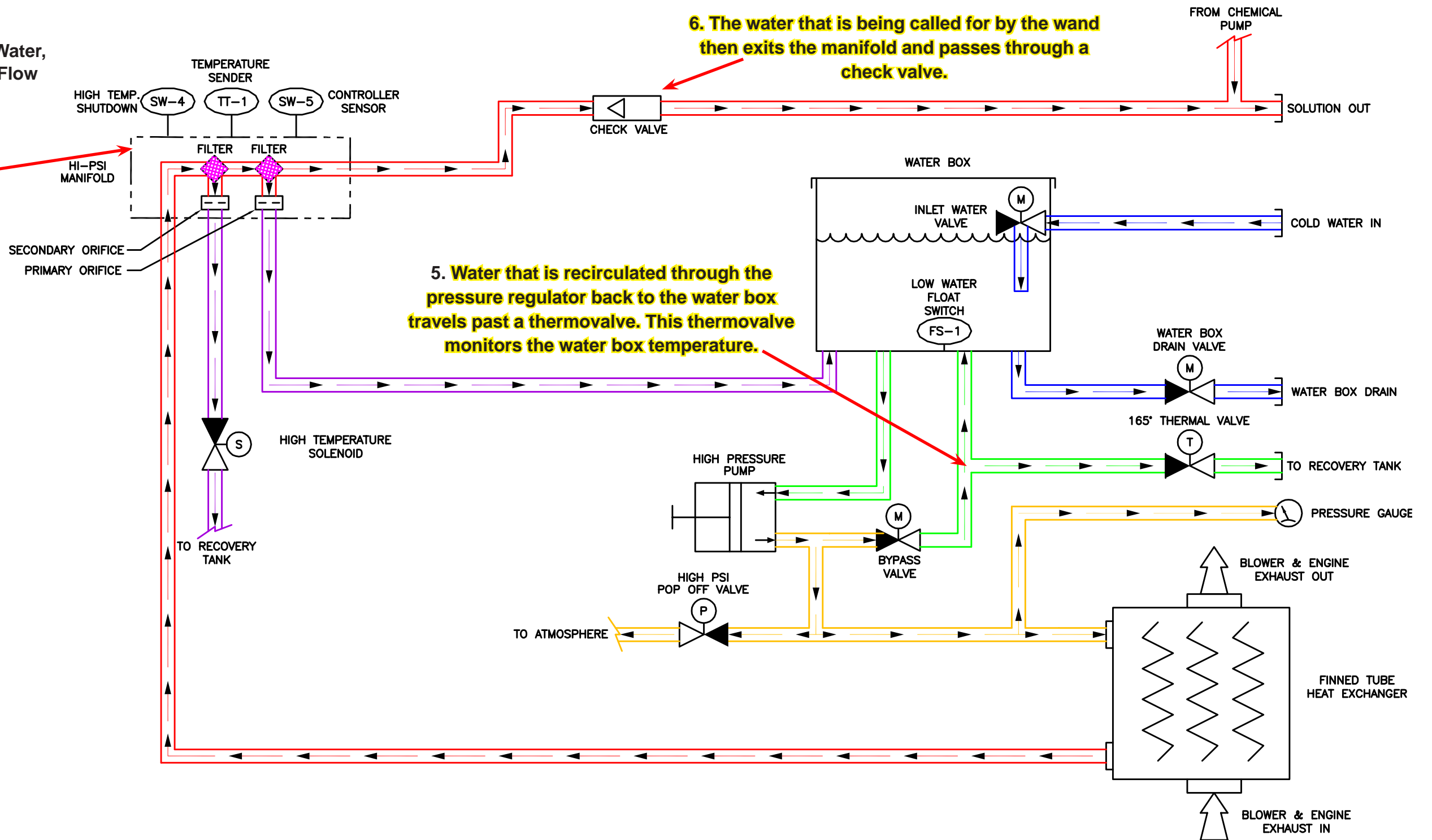


Figure 6-2. Annotated Water, Chemical and Solution Flow Diagram - View 2 of 2
8069

4. Water temperature is controlled via a temperature sensor inside the high pressure manifold. When the system achieves the maximum operating temperature, the solenoid opens and flows water into the recovery tank.



	HIGH PRESSURE - HOT		LOW PRESSURE - HOT
	HIGH PRESSURE - WARM		LOW PRESSURE - WARM
	LOW PRESSURE - COLD		

Figure 6-3. Chemical Flow Diagram - Larger View
8069

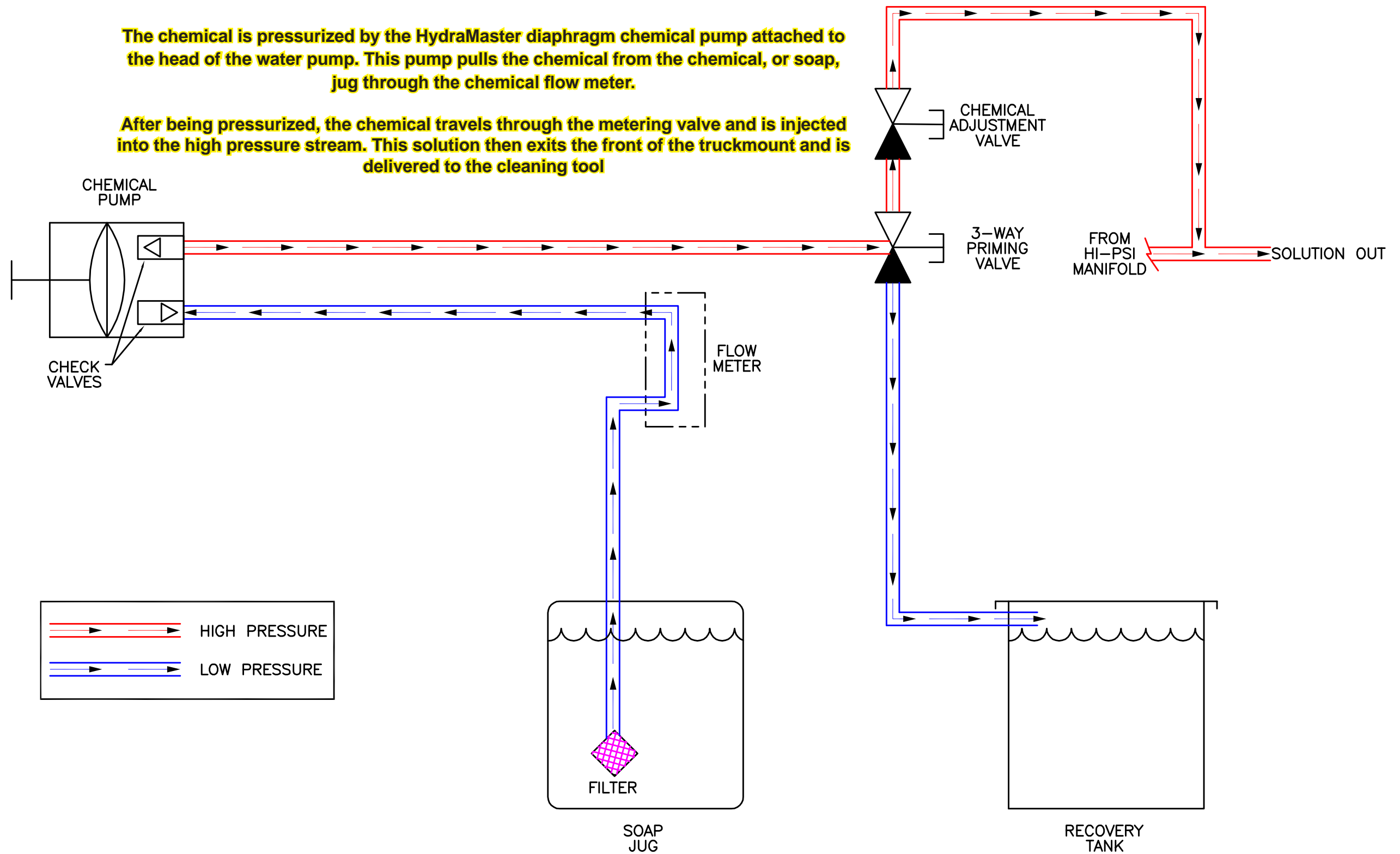
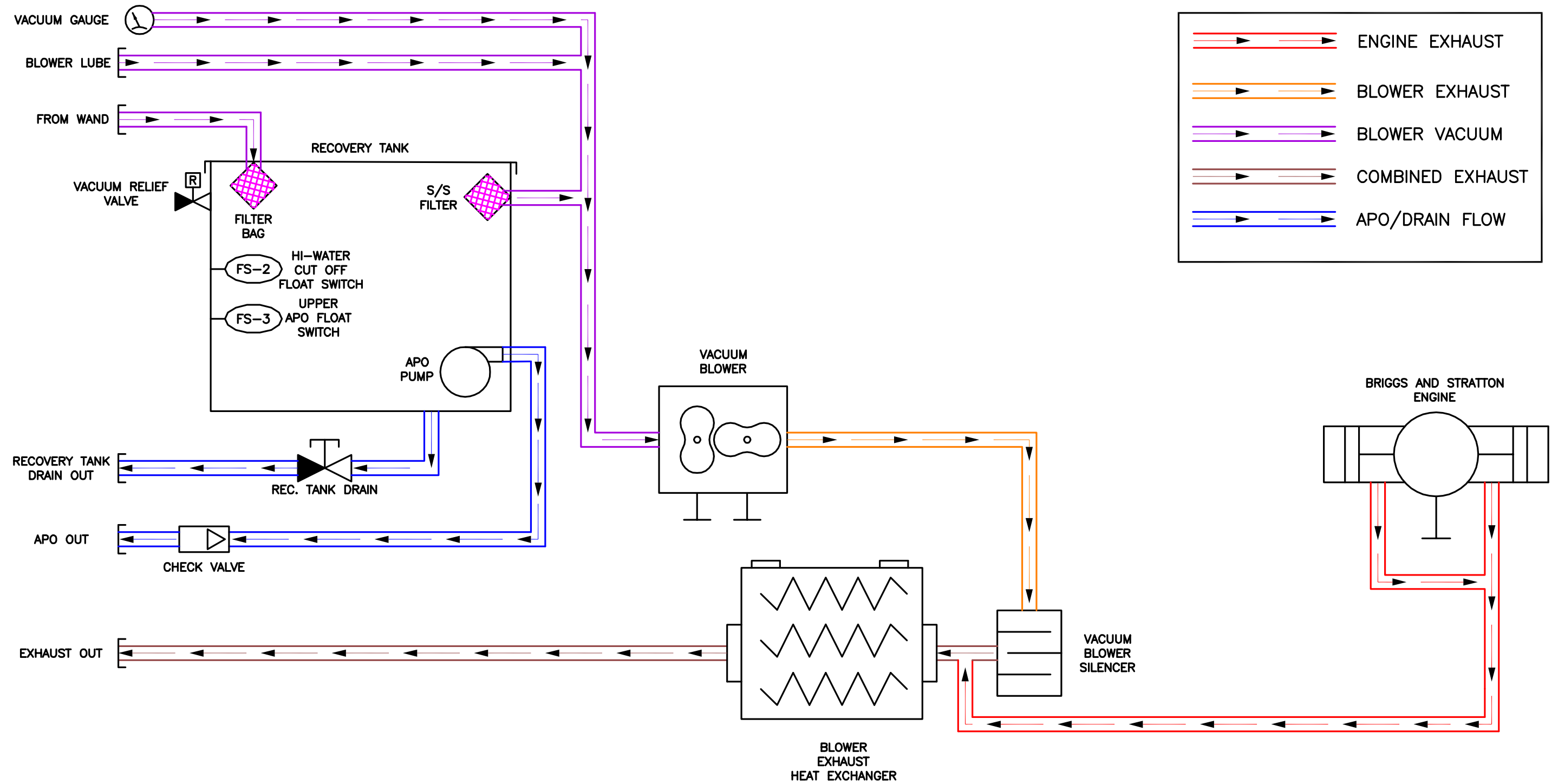


Figure 6-4. Exhaust Flow Diagram
8069



7 - Electrical System

This section includes drawings for the following:

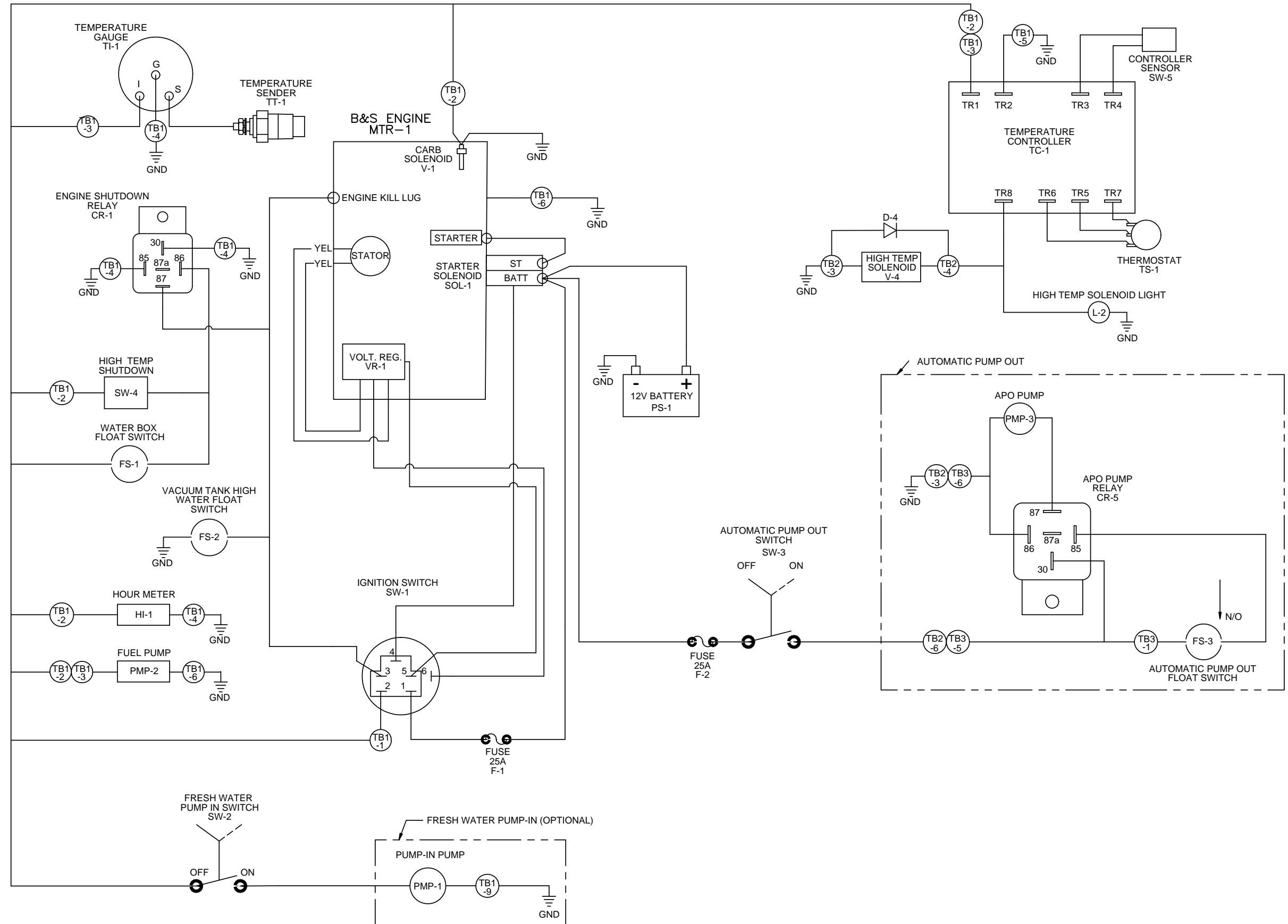
- Electrical Schematic (see Figure 7-1)
- Wiring Diagram (Figure 7-2 - Figure 7-4)

The Boxxer 323HP electrical system operates on 12 V DC which is provided by the battery. Battery levels are maintained by a 20 Amp alternator that is built into the engine.

CAUTION

When a new battery is installed, check that it is properly charged before installation or damage to the charging system may occur.

Figure 7-1. Electrical Schematic
8068



**Figure 7-2. Wiring Diagram -
View 1 of 3**

8067 B&S ENGINE

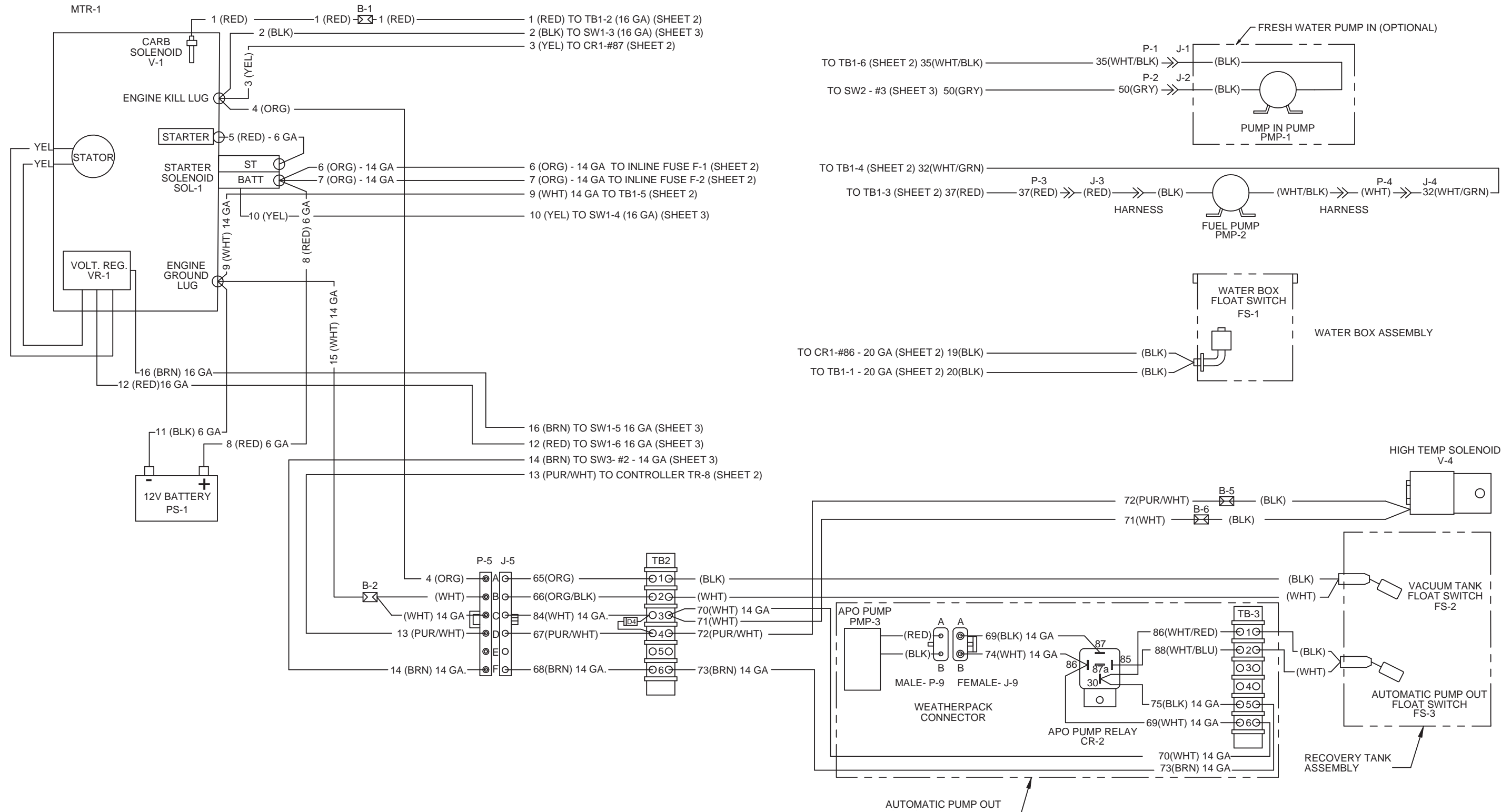


Figure 7-3. Wiring Diagram - View 2 of 3
8067

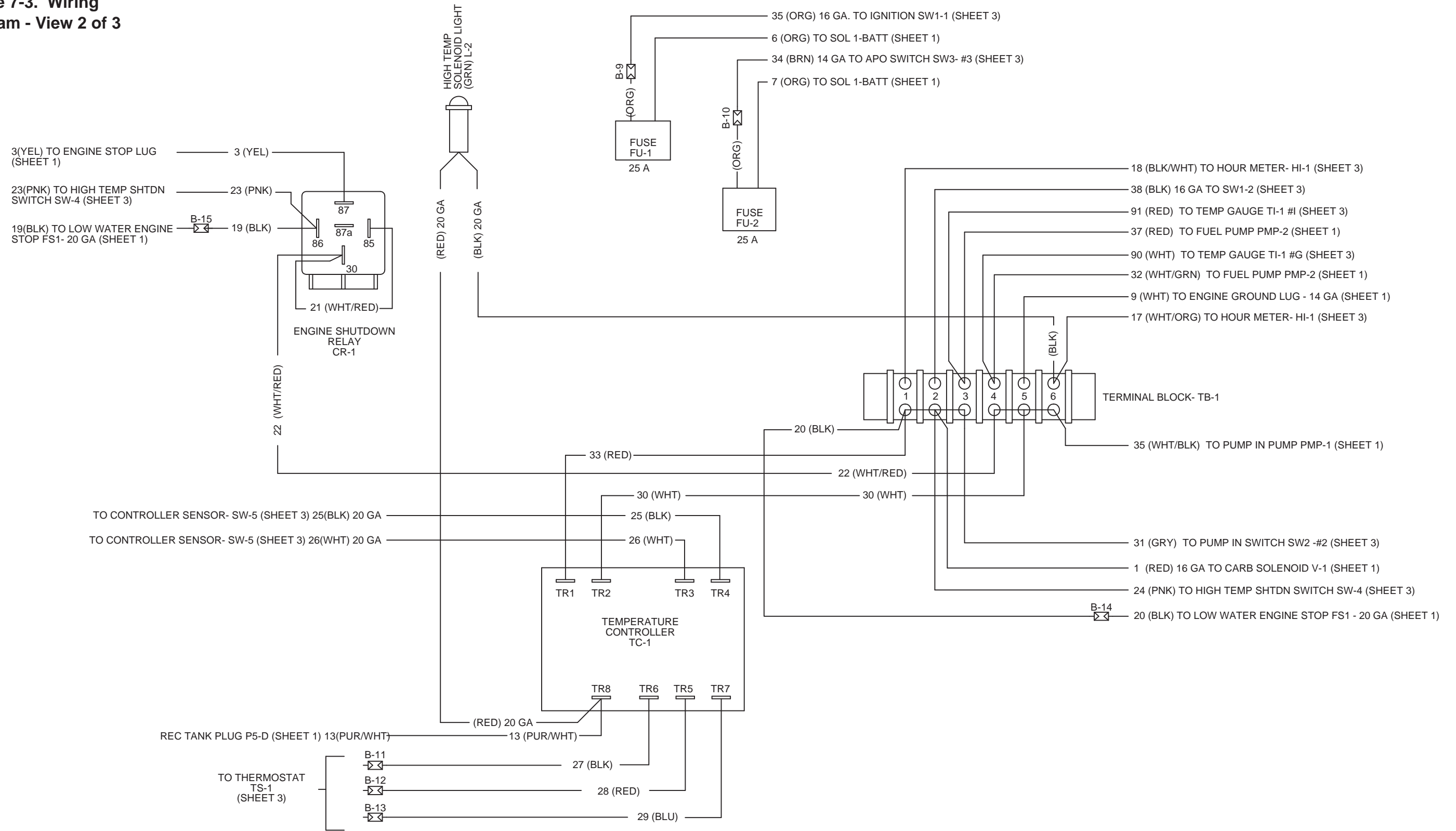
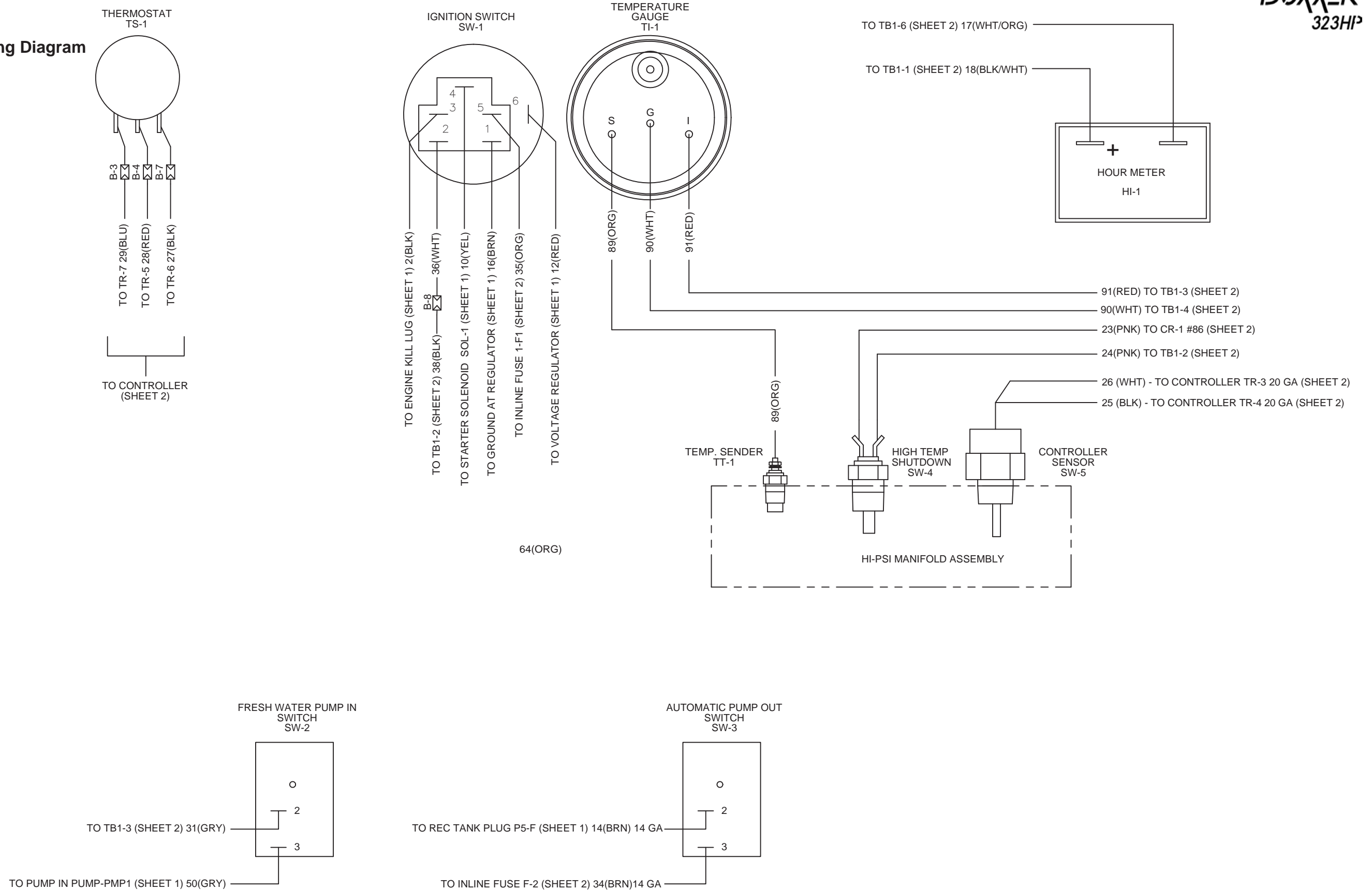


Figure 7-4. Wiring Diagram
- View 3 of 3
8067



BOXER
323HP

8 - Systems Troubleshooting

This section describes the standard troubleshooting procedures in the following areas:

- Heating System
- Chemical System
- Engine
- High Pressure System
- Vacuum System

HEATING SYSTEM

1.0 Truckmount overheats and shuts down

1.1	The orifice or filter screen are restricted.	Remove and inspect. Clean as necessary.
1.2	The dump solenoid is restricted.	Inspect the solenoid and the hose that delivers water to it. Clean or replace as necessary.
1.3	The dump solenoid is faulty.	Check the main fuse. If the fuse is blown, inspect electrical system for worn or shorted wires. Repair or replace as necessary.
		Inspect the solenoid and test for functionality. If the solenoid is operable, refer to a qualified service technician to test the temperature controller and sensor.

2.0 Unable to achieve normal cleaning solution temperature

2.1	Temperature control knob is turned down.	Inspect the knob. Adjust if necessary.
2.2	The dump solenoid is faulty.	Inspect the solenoid and test for functionality. If the solenoid is operable, refer to a qualified service technician to test the temperature controller and sensor.
2.3	Excessive solution flow at tool.	The cleaning tool jet is too large or worn. Inspect the jet. Replace if necessary.
2.4	The heat exchanger has hard water scale buildup.	Descale the system.
2.5	The heat exchanger has blockage on the exhaust side.	Inspect the interior of heat exchanger. Remove the debris and clean as necessary.

CHEMICAL SYSTEM

1.0 System will not prime

1.1	The check valves in chemical pump are faulty.	Remove the valves and inspect. Clean or replace as necessary.
1.2	The chemical pump diaphragm is faulty.	Remove and inspect. Replace as necessary.
1.3	The check valve in high pressure pump is faulty (piston which chemical pump is attached to).	Remove the valve and inspect. Clean or replace as necessary.
1.4	The filter on feed line in chemical jug is clogged.	Inspect and clean.
1.5	The feed line from chemical jug is loose, pinched or damaged.	Inspect and repair.
1.6	The chemical selector valve is faulty.	Inspect the valve for leaks between ports. Replace as necessary.

2.0 Chemical flow is unstable or low

2.1	Air is in the lines.	Check that all fittings and connections are tight and in good condition. Repair or replace as necessary.
2.2	The filter screen in the chemical jug is partially obstructed.	Inspect and clean.
2.3	The chemical selector valve is faulty.	Inspect the valve for leaks between ports. Replace as necessary.
2.4	The chemical metering valve is faulty.	Remove and inspect the valve. Clean or replace as necessary.
2.5	The high pressure check valve is faulty.	Remove and inspect the valve. Clean or replace as necessary.

3.0 Chemical is present in water box

3.1	The chemical pump diaphragm is faulty.	Remove and inspect the chemical pump diaphragm. Replace as necessary.
3.2	The high pressure check valve is faulty.	Remove and inspect the valve. Clean or replace as necessary.

ENGINE

1.0 Will not turn over

1.1	A loose or corroded battery terminal.	Clean and tighten the battery terminal connections.
1.2	The battery is dead.	Recharge or replace the battery. Test the charging system. Repair if necessary. CAUTION Do not attempt to jump start the truckmount from a running vehicle. The amperage output from an automobile will damage the charging system of the truckmount.
1.3	The main fuse is blown.	Check the main fuse.
		If the fuse is blown, inspect the electrical system for worn or shorted wires. Repair or replace as necessary.
1.4	The vacuum blower has seized.	Attempt to turn the coupler by hand. If it will not turn refer to the Vacuum System Troubleshooting Section.
1.5	The ignition switch is faulty.	Test to see if there is power both to and from the switch. Refer to the Electrical Section.
1.6	The starter solenoid is faulty.	Test to see if there is power to solenoid with ignition in "Start" position. Refer to Electrical Section.
1.7	The starter motor is faulty.	Test to see if there is power to the motor with the ignition in "Start" position. Refer to the Electrical Section.
1.8	None of the above.	Refer to a qualified service technician for further troubleshooting.

2.0 Turns over but will not start; there is no spark. (To check for spark, refer to engine manual.)

2.1	The recovery tank is full.	Drain the tank.
2.2	The recovery tank float is faulty.	Inspect the float. Repair or replace as necessary.
2.3	The engine ignition system is faulty.	Refer to a qualified service technician for further troubleshooting.
2.4	The water box is empty	Attach an inlet garden hose to fill the water box. CAUTION If too many attempts are made to start the engine prior to filling the water box, it is possible to flood the engine (see step 3.3 in the next section).

3.0 Turns over but will not start; there is spark. (To check for spark, refer to engine manual.)

3.1	Fuel is not reaching the carburetor.	Test for power to the fuel pump. Refer to Electrical Section.
		If power is present, inspect the fuel pump. Replace if necessary.
		Inspect the fuel lines between the source and the carburetor. Repair or replace as necessary.
3.2	The carburetor solenoid is faulty.	Test for power to the solenoid. Refer to Electrical Section.
		If power is present, inspect the solenoid. Replace if necessary.
3.3	The engine is flooded.	Pull the throttle cable completely and crank until the engine starts.
3.4	The spark plugs are worn or dirty.	Inspect and replace as necessary.
3.5	None of the above.	Refer to a qualified service technician for further troubleshooting.

4.0 Will not come up to normal operating rpm. Note: engine should be adjusted to run at 3,200 rpm under no vacuum load.

4.1	The throttle linkage is out of adjustment.	Inspect for broken or loose linkage. Repair or replace as necessary.
4.2	Excessive load on the engine.	Inspect and clean the recovery tank filters.
		Inspect the recovery tank to the blower hose. Repair or replace as necessary.
4.3	Excessive back pressure on the engine exhaust.	Inspect for blockage in the heat exchanger. Clean or replace as necessary.
4.4	The air filter is dirty.	Inspect and replace as necessary.

5.0 Runs rough at high speed

5.1	The spark plug(s) are faulty.	Remove and inspect the plugs. Clean or replace as necessary.
5.2	The spark plug wire(s) are faulty.	Inspect the wires and connectors for damage or loose connections. Repair or replace as necessary.
5.3	Inadequate fuel supply to the carburetor.	Check if the fuel pump is mounted in a vertical position near the fuel source. Correct if necessary.
		Check for blockage in the filter. Repair or replace as necessary.
		If operating altitudes have changed, contact your distributor to have the engine carburetor jets checked.

6.0 Runs rich. (Black smoke)

6.1	The air filter is dirty.	Inspect and replace as necessary.
6.2	The choke is partially closed.	Inspect and adjust or repair as necessary.
6.3	Excessive fuel to the carburetor.	Check to see if the proper fuel pump is installed.
		If operating altitudes have changed, contact your distributor to have the engine carburetor jets checked.

7.0 Engine overheats

7.1	Poor ventilation in the van.	Open all the van doors. Install a roof vent in the van.
		Remove any dividers or other objects impeding airflow around the truckmount.
7.2	Low oil level.	Check the level and fill as necessary. CAUTION Running the engine with a low oil level can cause severe damage to the engine. If this situation occurs, the engine should be inspected by a qualified service technician.
7.3	The engine rpm is too high.	Check the engine rpm. Adjust as necessary to run at 3,200 rpm under no vacuum load.
7.4	Excessive back pressure on the engine exhaust.	Inspect for blockage in the heat exchanger. Clean or replace as necessary.

HIGH PRESSURE SYSTEM

1.0 The pump will not come up to normal cleaning pressure

1.1	The pressure adjusting valve is faulty.	Inspect the valve. Repair or replace if necessary.
1.2	Worn seals or valves in the pump.	Test the pump output volume directly from the pump at normal running rpm. If the volume is below the manufacturer's specifications, replace the seals and inspect for defective valves.
1.3	The pump rpm is too low.	Check for a loose pump belt. Adjust or replace as necessary.
		Check the engine rpm and adjust as necessary to 3,200 rpm under no vacuum load.
1.4	The primary orifice is missing or loose.	Remove and inspect. Tighten or replace as necessary.
1.5	The primary and secondary orifices have been installed incorrectly.	Inspect and reverse if necessary. Refer to the Machine Assemblies & Parts List Section.
1.6	The primary orifice is worn.	Measure the orifice size and replace as necessary. Correct size is 0.021".

2.0 No pressure reading on gauge

2.1	The pump belts are broken.	Inspect and replace if necessary.
2.2	The gauge is faulty.	Replace the gauge.

3.0 The psi gauge reads normal; low pressure from wand

3.1	Restriction in the cleaning tool.	Inspect the tool jet(s) and clean or replace as necessary.
		Inspect any filters in the cleaning tool and clean or replace as necessary.
3.2	Faulty quick connect in the system.	Inspect each quick connect and replace as necessary.
3.3	Restriction in one of the solution hoses.	Remove the quick connects and inspect hoses. Clean or replace as necessary.
3.4	Hard water deposits restricting the system.	Descale the truckmount.

4.0 Pressure pulsation

4.1	Air leak between the water box and pump.	Check all the hoses and fittings for cuts, breaks, cracks, etc. Repair as necessary.
4.2	The check valve(s) in the pump are faulty.	Remove each valve and inspect for correct operation. See the Machine Maintenance Section.

5.0 Water box empty or fills slowly

5.1	Restriction in the water supply system.	Inspect the supply system from the source through the incoming quick connect.
5.2	The float valve in the water box is faulty.	Disassemble and inspect the valve. Repair or replace as necessary.

6.0 The water box overflows

6.1	The float valve in the water box is faulty.	Disassemble and inspect the valve. Repair or replace as necessary.
6.2	The float has absorbed water and lost buoyancy.	Detach the float and check to see if it will float to the surface. Replace as necessary.
6.3	The float has come out of adjustment.	Adjust the float as necessary.

VACUUM SYSTEM

1.0 A weak vacuum at wand. The gauge reads normal.

1.1	Blockage in the hoses or wand tube	Disconnect the hoses and check for an obstruction.
1.2	Excessive length of hose connected to the truckmount	Do not attach excessive lengths of hose.

2.0 A weak vacuum

2.1	Air leak somewhere in the vacuum system.	Check the vacuum relief valve for proper adjustment.
		Carefully check all the vacuum hoses for a cut or break.
		Check the recovery tank lid gasket.
		Make sure the recovery tank drain valve is fully closed.
2.2	The vacuum blower is turning too slowly.	Check the rpm of the engine. Adjust as necessary to 3,200 rpm under no vacuum load.
2.3	The vacuum gauge is defective.	Test the gauge and replace if necessary.

3.0 The vacuum gauge reads too high with no hoses attached

3.1	The filter in recovery tank is clogged.	Remove and clean or replace as necessary.
3.2	The hose from recovery tank to the vacuum blower is collapsed internally.	Inspect and replace as necessary.

4.0 Excessive noise produced by the blower

4.1	The blower is low on oil.	Inspect the oil levels and replenish as necessary. Note: Running the blower with low oil levels can cause severe damage. If this situation occurs the blower should be inspected by a qualified service technician.
4.2	The vacuum blower has internal damage.	Refer to a qualified service technician.

5.0 The vacuum blower is locked and will not turn

5.1	Truckmount has been inactive for a period of time and the blower was not properly lubricated prior to final shutdown. Rust has possibly built up on the internal surfaces.	Spray penetrating oil into the blower and let sit for at least 1 hour. Then very carefully use pipe wrench on the outer diameter of the pulley on the coupler to attempt to free lobes of the blower. Do not use a wrench directly on the blower shaft.
		If unable to free up the blower in this manner, refer to a qualified service technician.
5.2	There is internal damage to the blower.	Refer to a qualified service technician.

6.0 Water in truckmount exhaust

6.1	The recovery tank has been filled with foam or overfilled with water.	Inspect the recovery tank. If full, drain the tank.
		Inspect the high level shutoff switch for proper operation. Clean or replace the switch as necessary.
		If foam is in recovery tank, use defoamer on the carpet being cleaned.
6.2	Condensation in system.	This will be more common in cool weather and humid climates. If this is the cause, it should dissipate after a few minutes of running.
6.3	The heat exchanger is leaking water.	Inspect and repair or replace as necessary.

BOXXER
323HP

9 - Assemblies and Parts List

This section contains all the assemblies and parts lists associated with the Boxxer 323HP:

- Machine Assembly Parts List
- Frame Assembly Parts List
- Engine Assembly Parts List
- Pump Assembly Parts List
- Dash Assembly Parts List
- Electrical Panel Assembly Parts List
- Blower Heat Exchanger Assembly Parts List
- Blower Assembly Parts List
- Silencer Assembly Parts List
- Water Box Assembly Parts List
- Exhaust Assembly Parts List
- Idler Pulley Assembly Parts List
- Hi Pressure Manifold Assembly Parts List
- By-Pass Valve Assembly Parts List
- Dura-Flow APO Assembly Parts List
- 70 gallon Universal Recovery Tank Assembly Parts List
- Machine Hose Routings

BOXXER
323HP

Figure 9-1. Machine Assembly - View of 1 of 2
8106 Rev. A

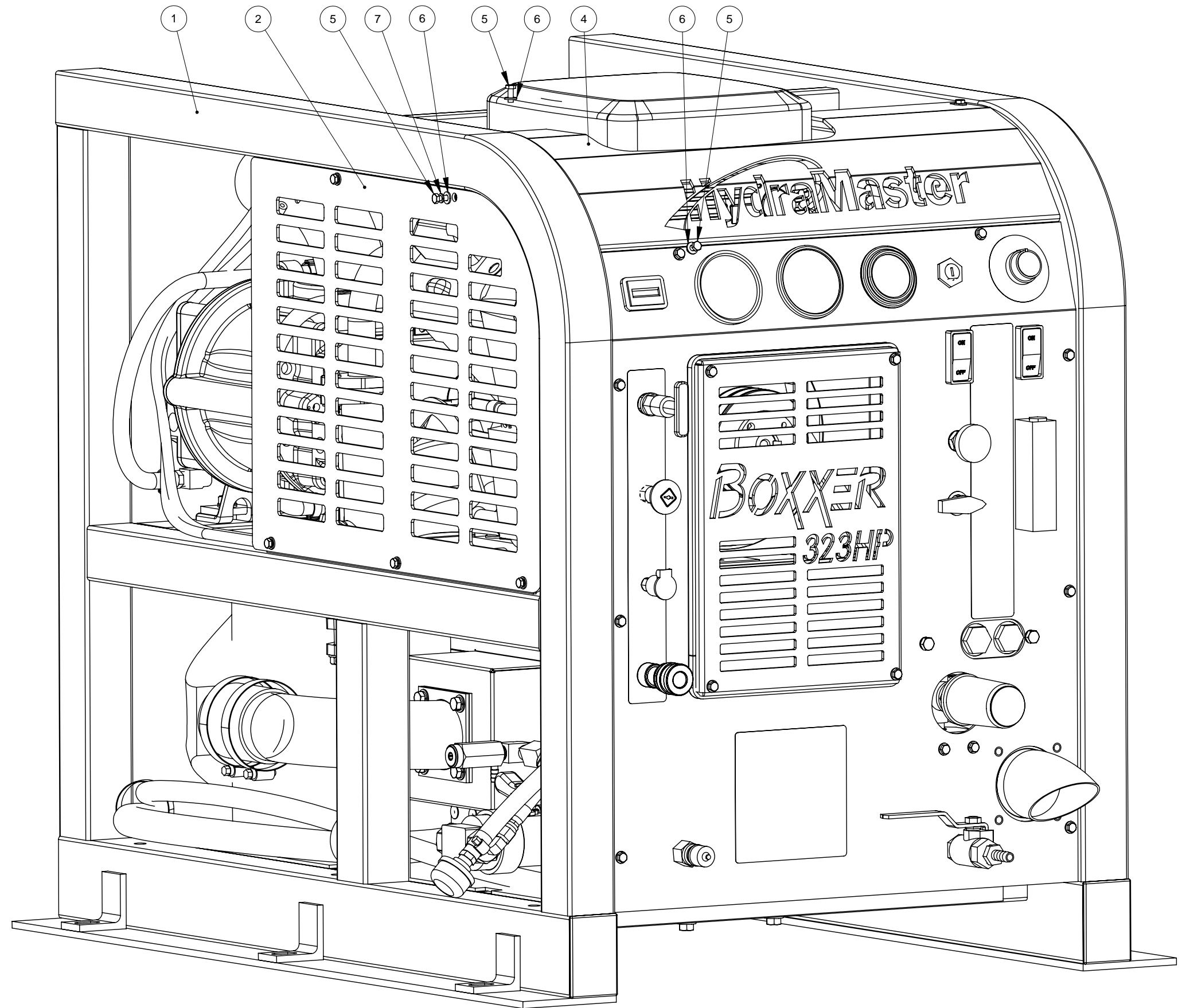
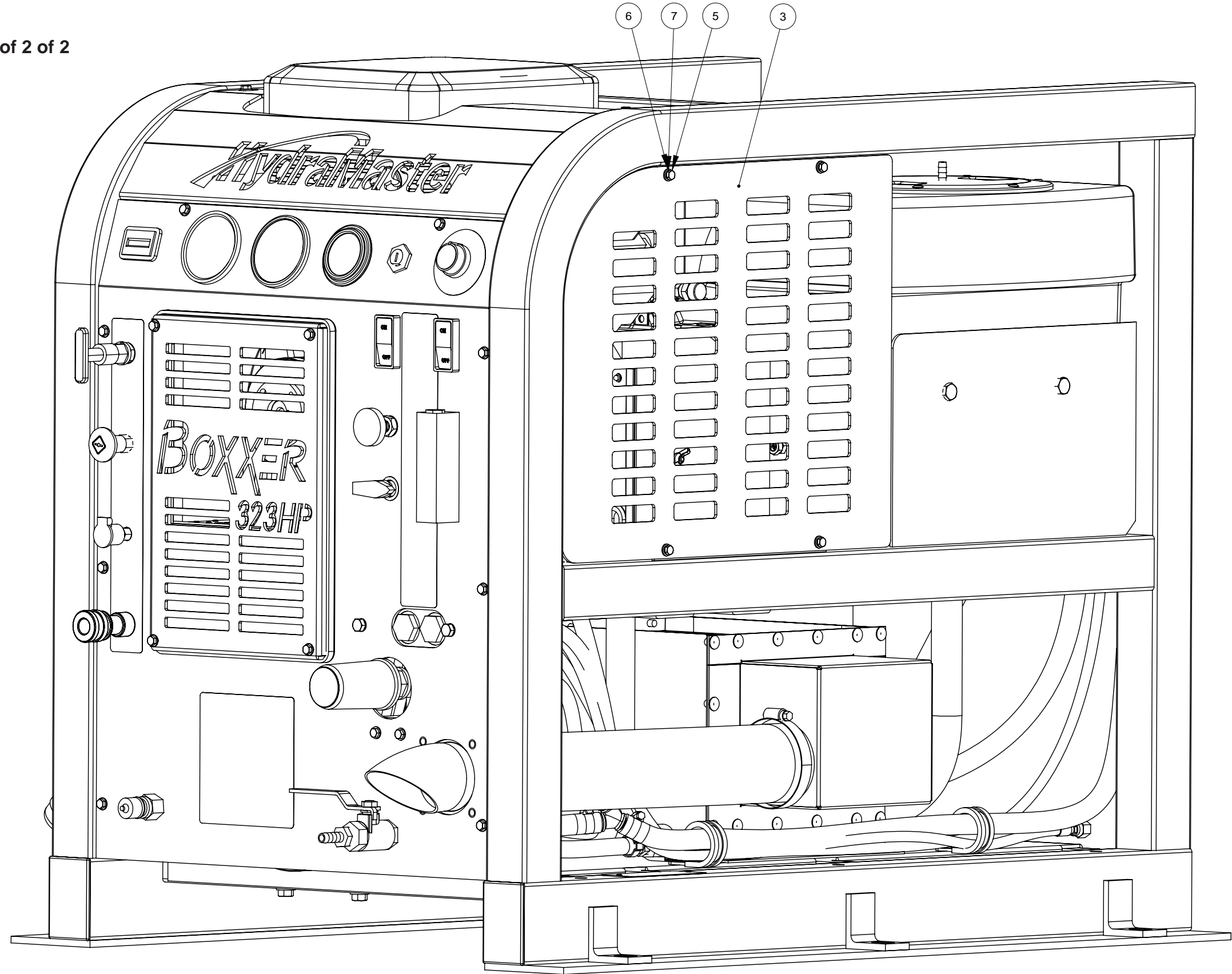


Figure 9-2. Machine Assembly - View of 2 of 2
8106 Rev. A



Machine Assembly Parts List

Item	Part Number	Description	Qty
1	- - -	Assembly, Frame	1
2	000-041-451	Cover, Side - 19.900" X 14.316"	1
3	000-041-452	Cover, Side - 17.250" X 14.316"	1
4	000-041-011	Cover, Top - Machine	1

Item	Part Number	Description	Qty
5	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	13
6	000-174-001	Washer, #10 Flat	13
7	000-174-014	Washer, #10 Lock	9

Figure 9-3. Frame Assembly - View 1 of 4
8107 Rev. A

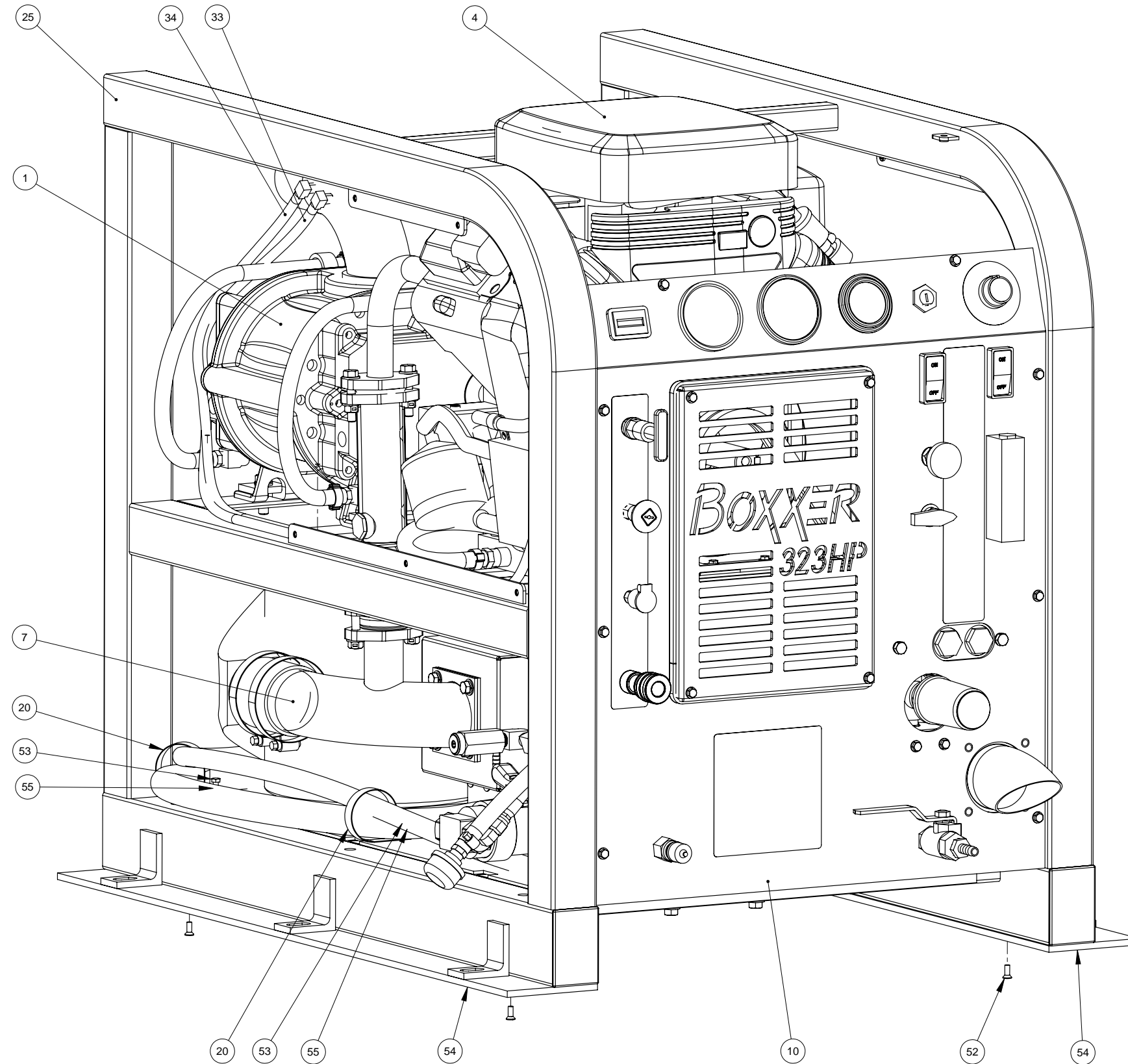


Figure 9-4. Frame Assembly - View 2 of 4
8107 Rev. A

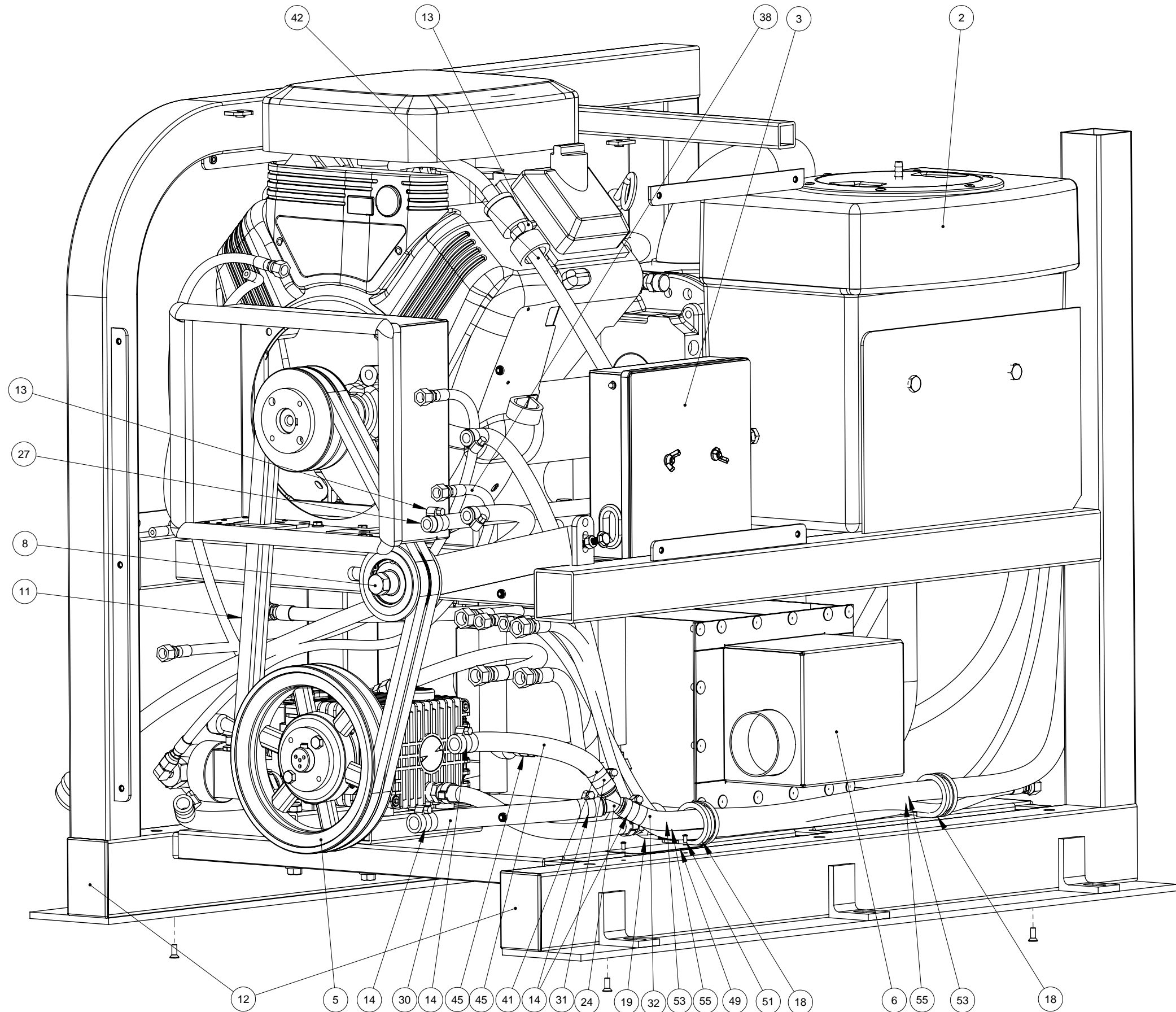


Figure 9-5. Frame Assembly - View 3 of 4
8107 Rev. A

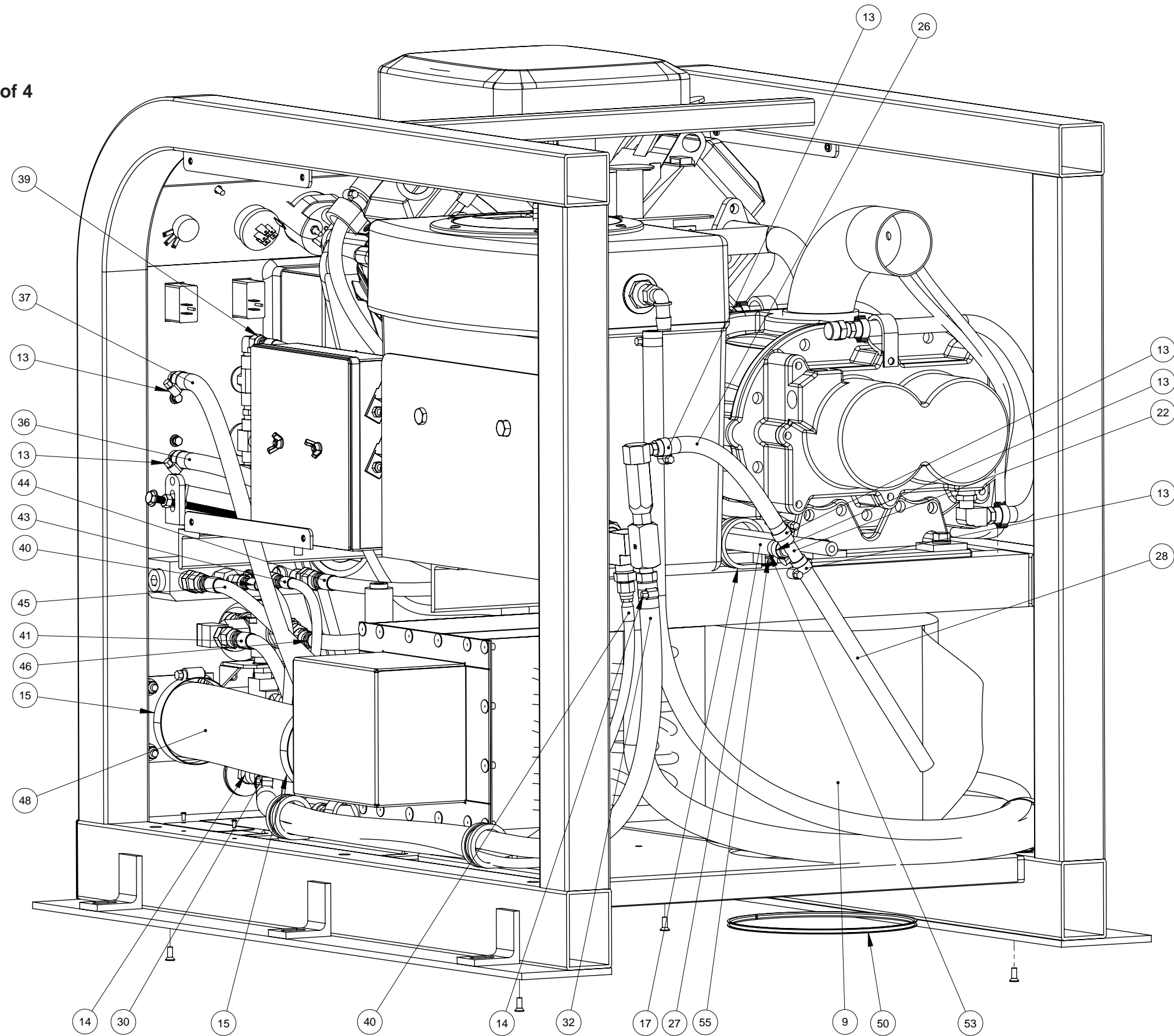
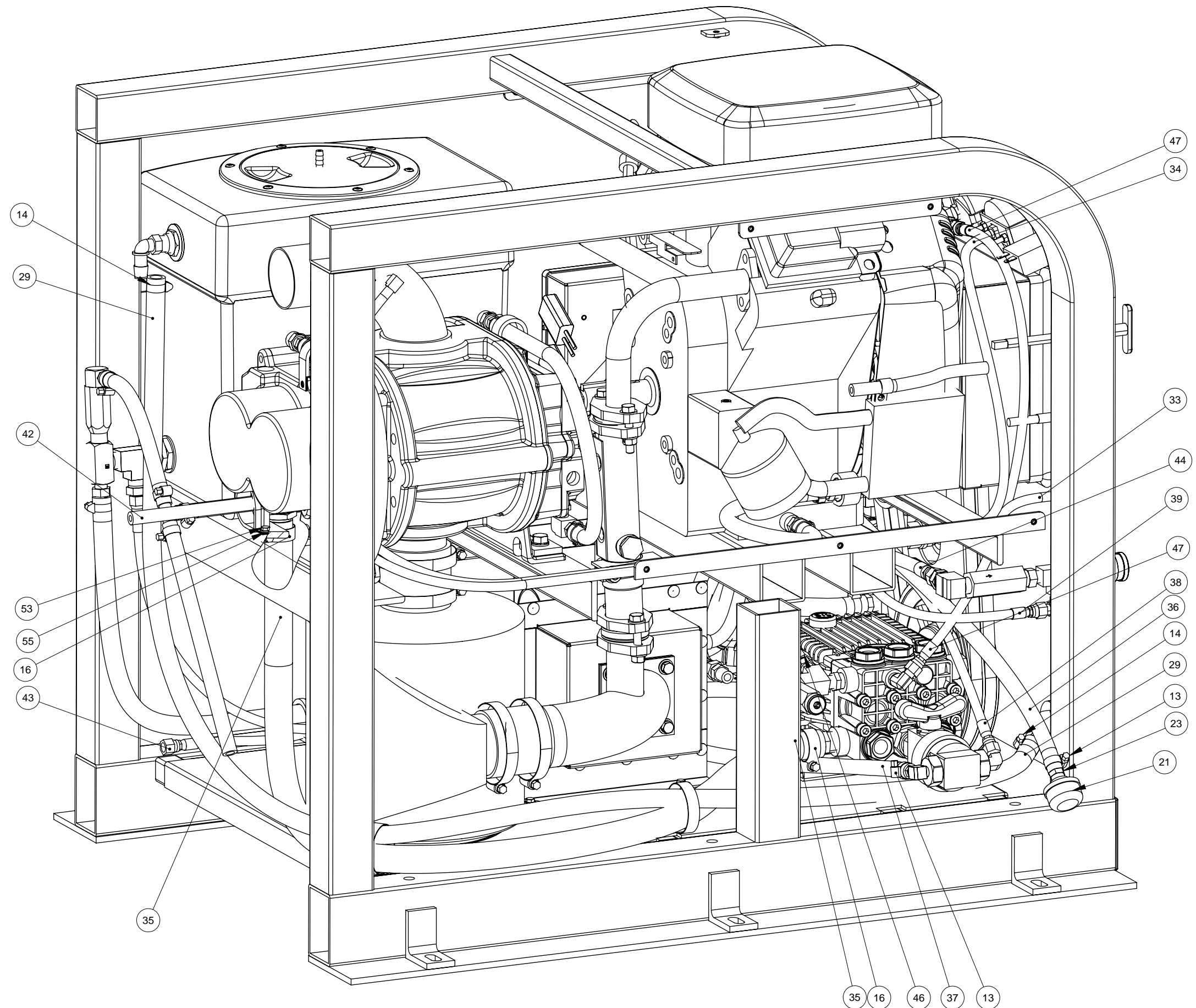


Figure 9-6. Frame Assembly - View 4 of 4
8107 Rev. A



Frame Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	---	Assembly, Blower	1	30	000-068-018	Hose, 1/2" I.D. - Bulk	1
2	---	Assembly, Water Box	1	31	000-068-018	Hose, 1/2" I.D. - Bulk	1
3	---	Assembly, Electrical Panel	1	32	000-068-018	Hose, 1/2" I.D. - Bulk	1
4	---	Assembly, Engine	1	33	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
5	610-007-015	Assembly, Pump	1	34	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
6	---	Assembly, Heat Exchanger	1	35	000-068-069	Hose, 3/4" I.D. Parker Gst li - Bulk	1
7	---	Assembly, Exhaust	1	36	000-068-326	Hose, 3/8" I.D. Clear Braid - Bulk	1
8	---	Assembly, Idler Pulley	1	37	000-068-326	Hose, 3/8" I.D. Clear Braid - Bulk	1
9	---	Assembly, Silencer	1	38	000-068-517	Hose Assembly, 3/16" X 23" Lg. Teflon	1
10	---	Assembly, Dash	1	39	000-068-517	Hose Assembly, 3/16" X 23" Lg. Teflon	1
11	000-010-132	Belt, #9447 Hd Green Back	2	40	000-068-627	Hose Assembly, 3/16" X 44" Lg. Teflon	1
12	000-027-110	Cap, 2" X 3" Frame End	2	41	000-068-641	Hose Assembly, 3/8" X 10" Lg. Teflon	1
13	000-033-003	Clamp, Size #4 Mini Hose	10	42	000-068-660	Hose, 1/4" I.D. Trident Fuel - Bulk	1
14	000-033-005	Clamp, Size #5 Hose	8	43	000-068-723	Hose Assembly, 3/16" X 75" Lg. Teflon	1
15	000-033-012	Clamp, Size #44 Hose	2	44	000-068-736	Hose Assembly, 3/8" X 19.5 Lg. Teflon	1
16	000-033-029	Clamp, Size #12 Hose	2	45	000-068-737	Hose Assembly, 3/8" X 14.5 Lg. Teflon	1
17	000-033-050	Clamp, 1-3/4" Cushion Loop	1	46	000-068-737	Hose Assembly, 3/8" X 14.5" Lg. Teflon	1
18	000-033-052	Clamp, 1-1/4" S/S EDPM	2	47	000-068-888	Hose Assembly, 3/16" X 24" Lg. Teflon	1
19	000-033-057	Clamp, 1" Cushion Loop	1	48	000-068-890	Hose, Ø 2.5" Id Silicone X 16" Lg.	1
20	000-033-067	Clamp, 2" Cushion Loop	2	49	000-105-012	Plate, Machine Serial I.D.	1
21	000-049-118	Filter, Chemical Inlet High Pressure	1	50	000-131-131	Trimlok, 3/8" X 1/8" Rubber - Bulk	1
22	000-052-022	Tee, 3/8" Insert	1	51	000-140-001	Rivet, Ab4-3a Aluminum Pop 1/8" X 1/4" Lg.	2
23	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	1	52	000-143-114	Screw, #10-24UNC X 0.50" Lg. Flat Head Phillips	4
24	000-052-407	Wye, 1/2" Plastic Barb	1	53	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	5
25	000-055-195	Frame, Complete - Painted	1	54	000-154-156	Spacer, Machine Rising 4" X 35"	2
26	000-068-017	Hose, 3/8" I.D. - Bulk	1	55	000-174-001	Washer, #10 Flat	5
27	000-068-017	Hose, 3/8" I.D. - Bulk	1				
28	000-068-017	Hose, 3/8" I.D. - Bulk	1				
29	000-068-018	Hose, 1/2" I.D. - Bulk	1				

Figure 9-7. Engine Assembly - View 1 of 2
8052 Rev. C

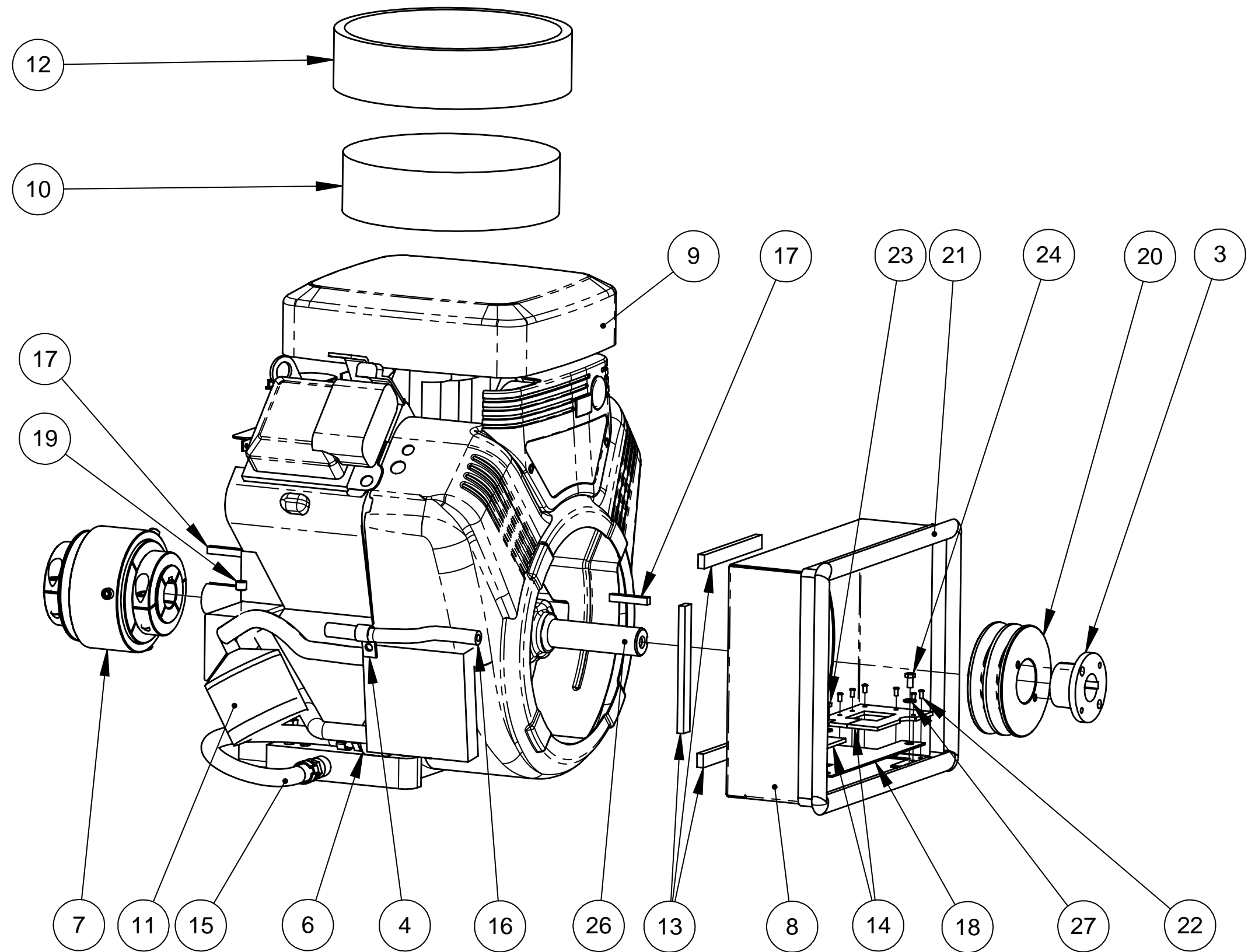
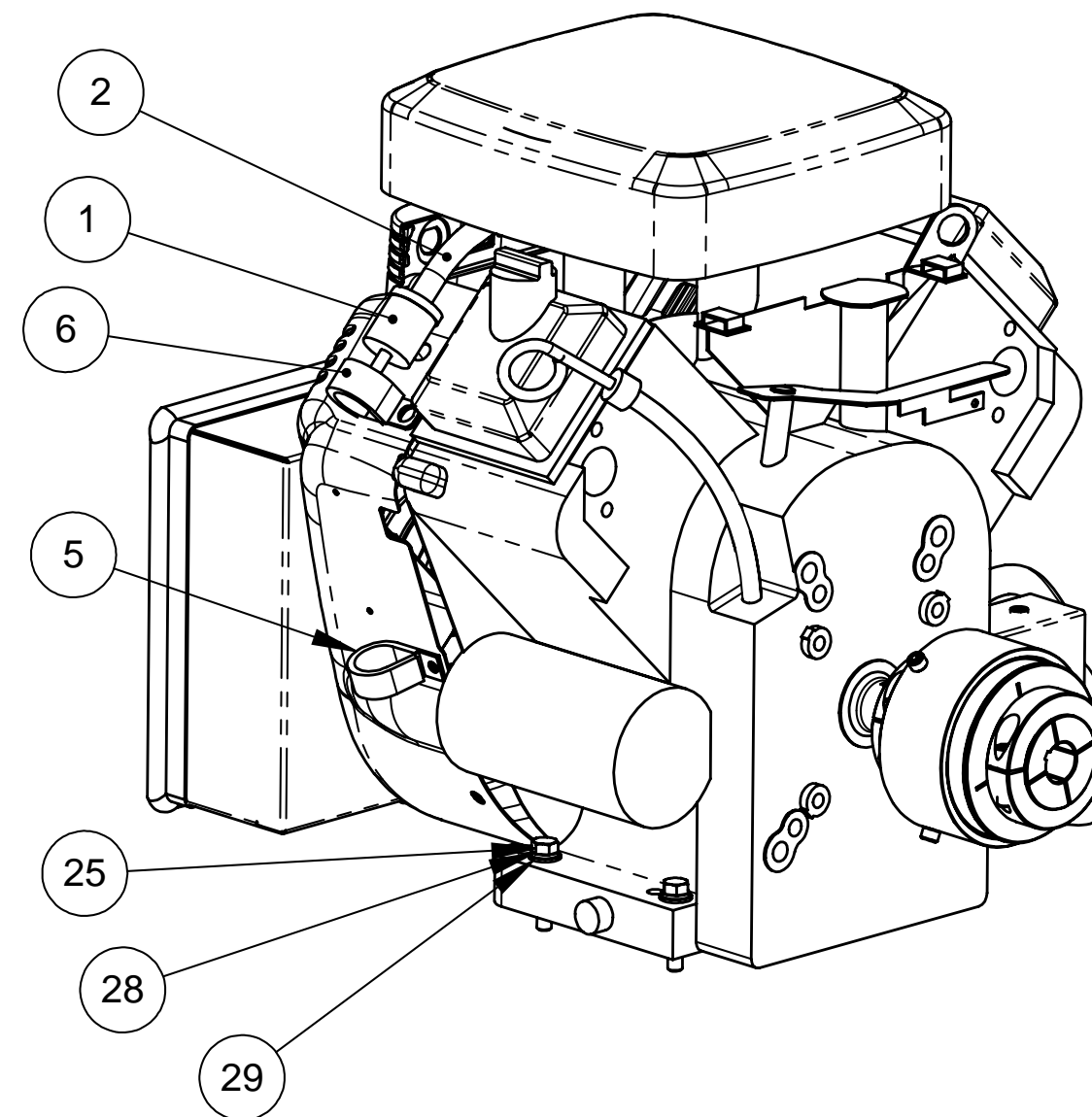
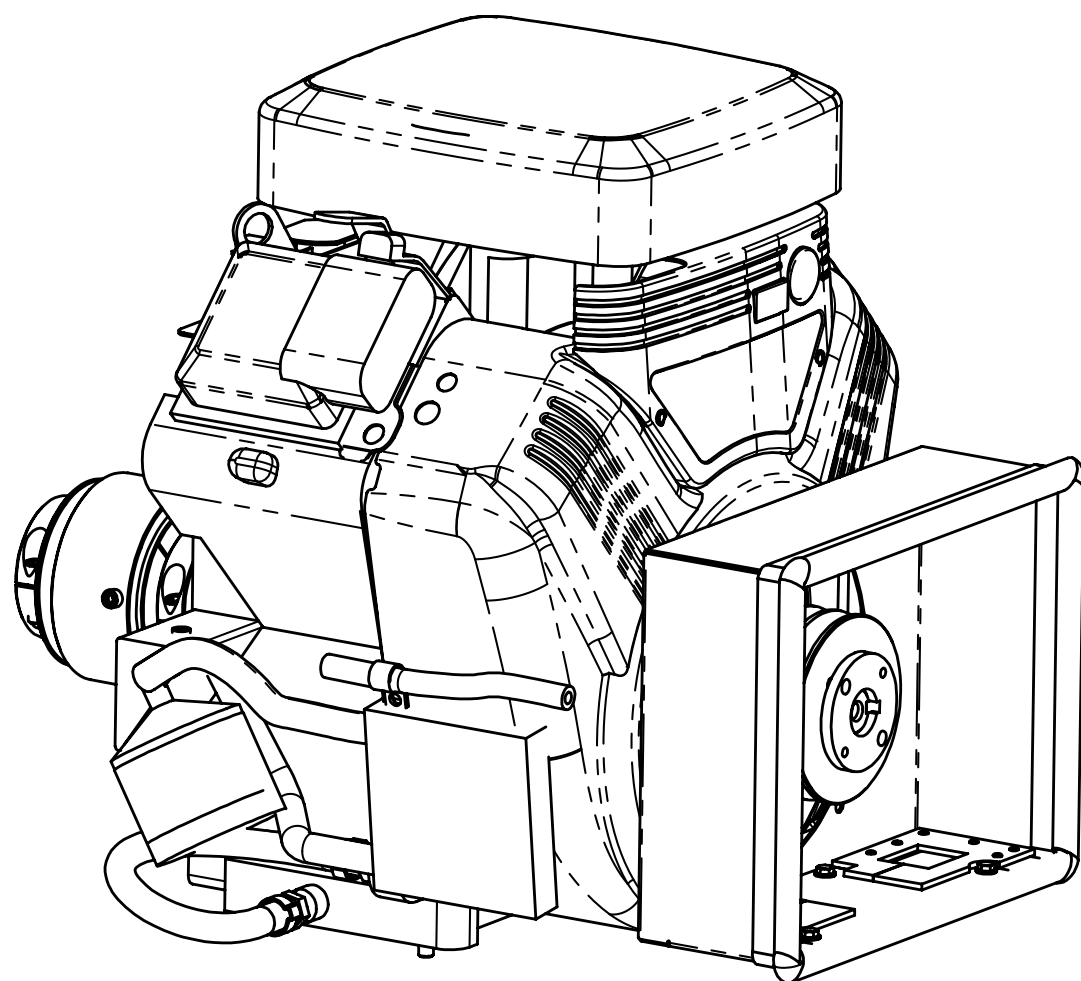


Figure 9-8. Engine Assembly - View 2 of 2
8052 Rev. C



Engine Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	---	Filter, B & S Fuel (Comes w/ Engine)	1	16	000-068-660	Hose, 1/4" Fuel	1
2	---	Hose, Fuel (Comes w/ Engine)	1	17	000-077-010	Key, 1/4" X 1-1/2" Lg.	2
3	000-020-025	Bushing, H X 1"	1	18	000-105-562	Plate, Engine Duct	1
4	000-033-046	Clamp, 1/2 Wide X 1/2 Tube	1	19	000-106-009	Plug, 1/8" NPT Allen Head	1
5	000-033-057	Clamp, 1" Cushion Loop	1	20	000-109-120	Pulley, 4" Dual Groove Axle	1
6	000-033-117	Clamp, 1" Cushion Loop w/ 7/16 Mount Hole	2	21	000-131-060	Trimlok, 3/4" Bulb X 3/16" Opening	1
7	000-039-054	Coupler, 40 Series	1	22	000-140-001	Rivet, Ab4-3a Aluminum Pop 1/8" X 1/4" Lg.	12
8	000-042-074	Housing, Radiator Duct	1	23	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	1
9	000-047-037	Engine, B & S 23 Hp	1	24	000-143-166	Screw, #10-24UNC X 3/8" Lg. Hex Head	3
10	000-049-012	Filter, 16 Hp Air-Vanguard I/C	1	25	000-143-375	Screw, 5/16"-18UNC X 1.75" Lg. Hex Head	4
11	000-049-014	Filter, Oil B & S (Comes w/ Engine)	1	26	000-150-169	Shaft, B & S 23 Hp Stub	1
12	000-049-053	Filter, B & S Vanguard Foam Air Filter Element	1	27	000-174-001	Washer, #10 Flat	4
13	000-057-026	Gasket, 1/2" X 1/4" X 18-1/8" Lg.	4	28	000-174-018	Washer, 5/16" S/S Lock	4
14	000-057-226	Gasket, Engine Duct	2	29	000-174-049	Washer, 5/16" Flat	4
15	000-068-219	Hose, Drain	1				

Figure 9-9. Pump Assembly - View 1 of 2
8053 Rev. B

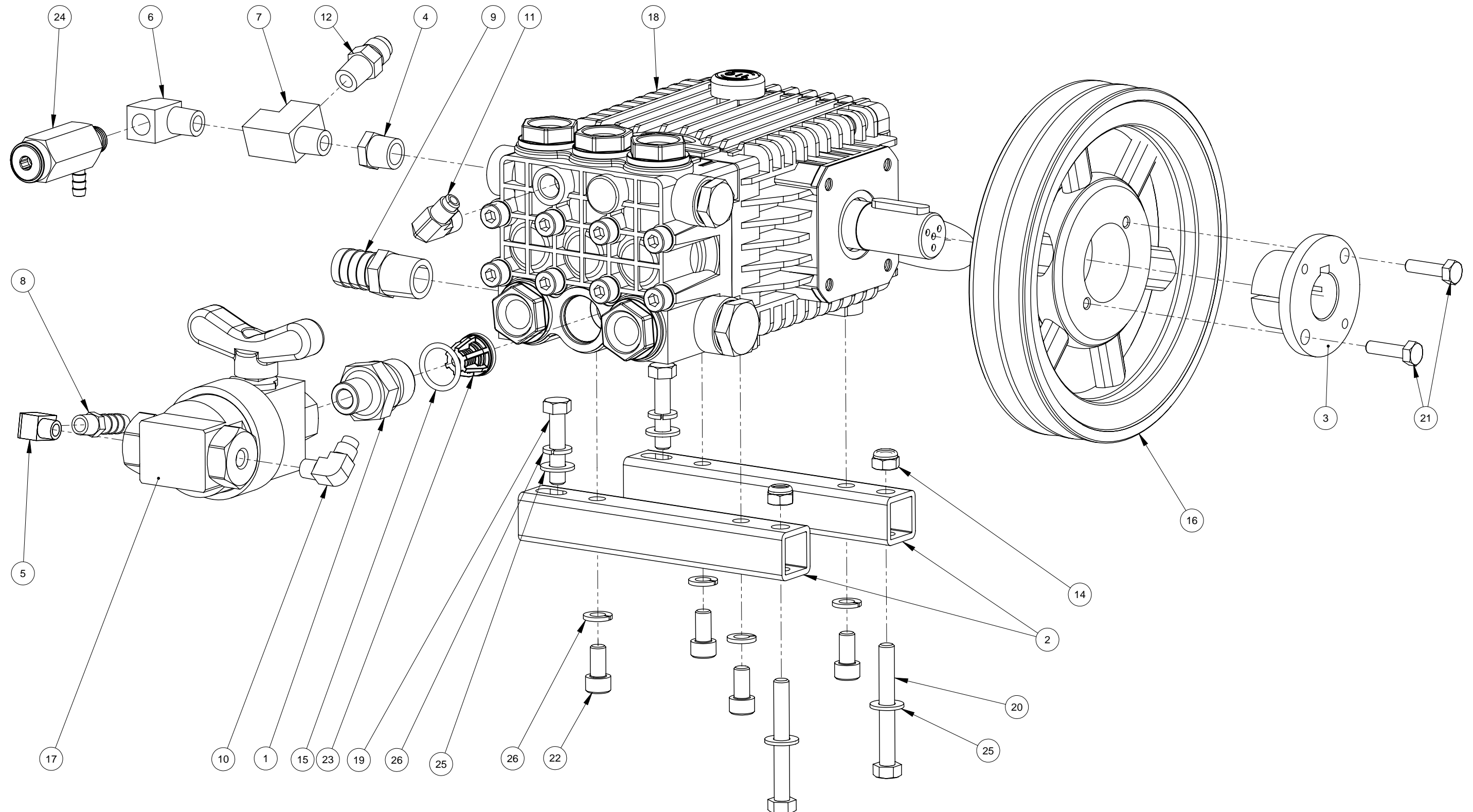
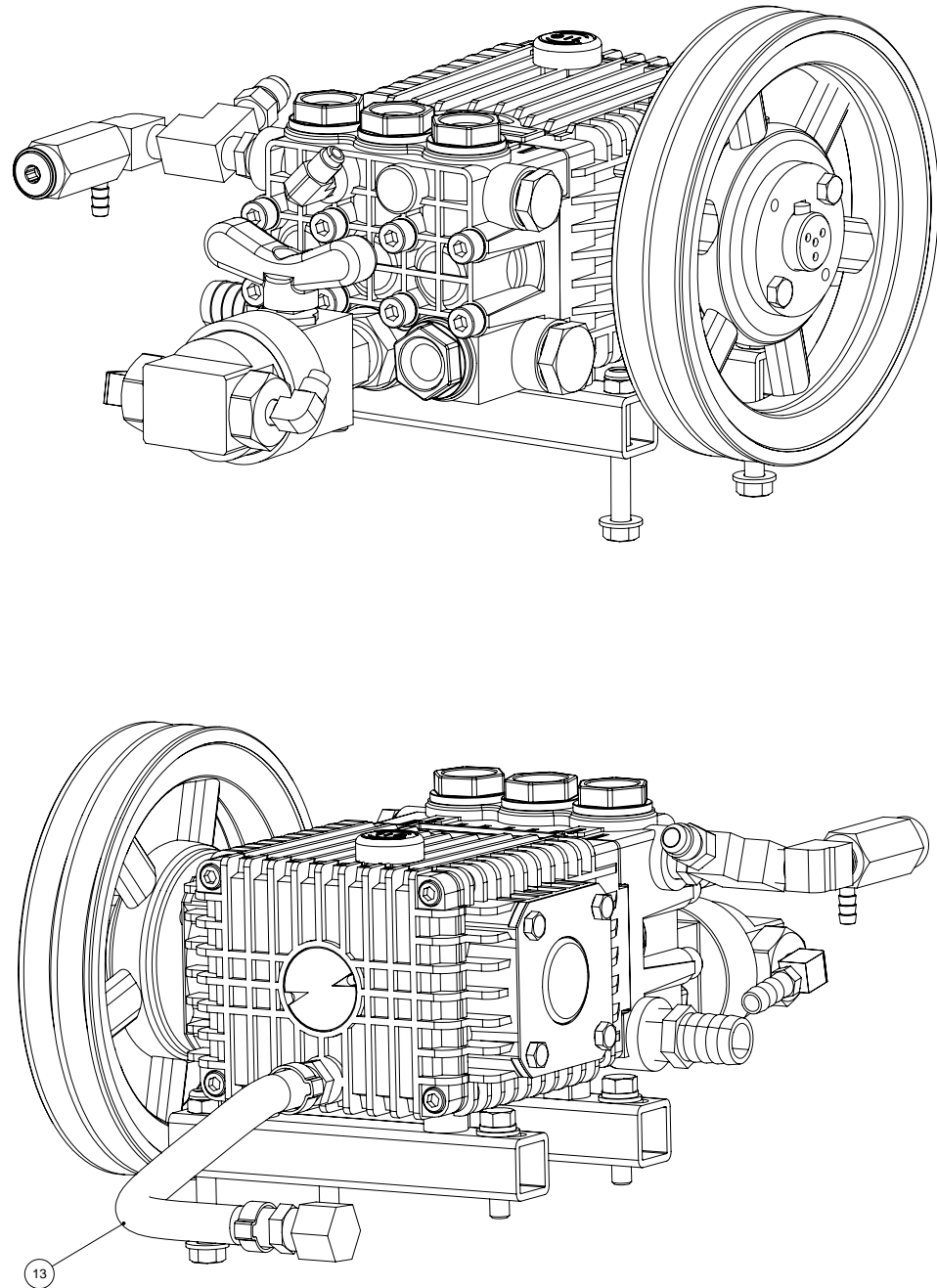


Figure 9-10. Pump Assembly - View 2 of 2
8053 Rev. B



Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-156	Adapter, GP To 3/8" NPT Chem Pump	1
2	000-015-1001	Bracket, Pump Mounting	2
3	000-020-013	Bushing, H X 24mm	1
4	000-052-061	Bushing, 3/8" NPT X 1/4" FPT	1
5	000-052-084	Elbow, 1/8" NPT Street	1
6	000-052-085	Elbow, 1/4" NPT Street	1
7	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
8	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1
9	000-052-129	Insert #812, 1/2npt X 3/4 Hose	1
10	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1
11	000-052-532	Elbow, 1/4" SAE X 1/4" NPT	1
12	000-052-533	Nipple, 3/8" JIC X 1/4" NPT	1
13	000-068-794	Hose, 3/8" X 17" Pump Drain	1
14	000-094-038	Nut, 5/16"-18UNC Nylock	2
15	000-097-057	O-Ring, Adapter - Chemical Pump	1
16	000-109-127	Pulley, 7.25" O.D. Dual Groove "A" Section	1
17	000-111-161	Pump, Chemical w/ Shut Off S/S	1
18	000-111-188	Pump, 4.0 gpm GP	1
19	000-143-015	Screw, 5/16-18 X 1 1/2"Hhc	2
20	000-143-106	Screw, 5/16"-18UNC X 2.5" Lg. Hex Head	2
21	000-143-331	Screw, 1/4"-20UNC X 1" Lg. Hex Head Grade 8	2
22	000-143-701	Screw, M8 X 16mm Lg. Socket Head	4
23	000-169-221	Valve, GP Pump Check - Mod. - 4.0 Gallon	1
24	000-169-231	Valve, 3000 psi Pop Off	1
25	000-174-004	Washer, 5/16" Flat	4
26	000-174-018	Washer, 5/16" S/S Lock	6

Figure 9-11. Dash Assembly - View 1 of 2
8108

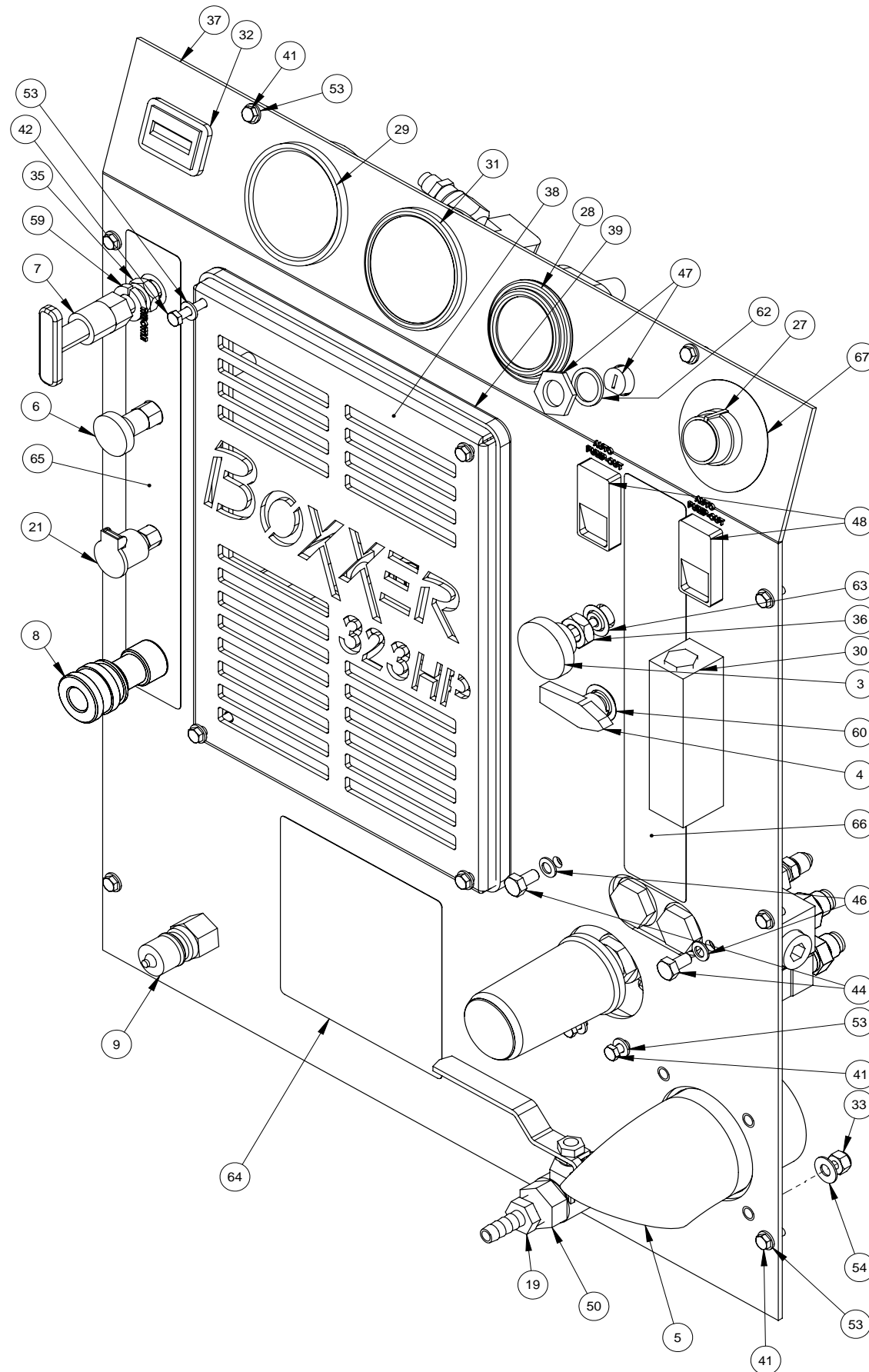
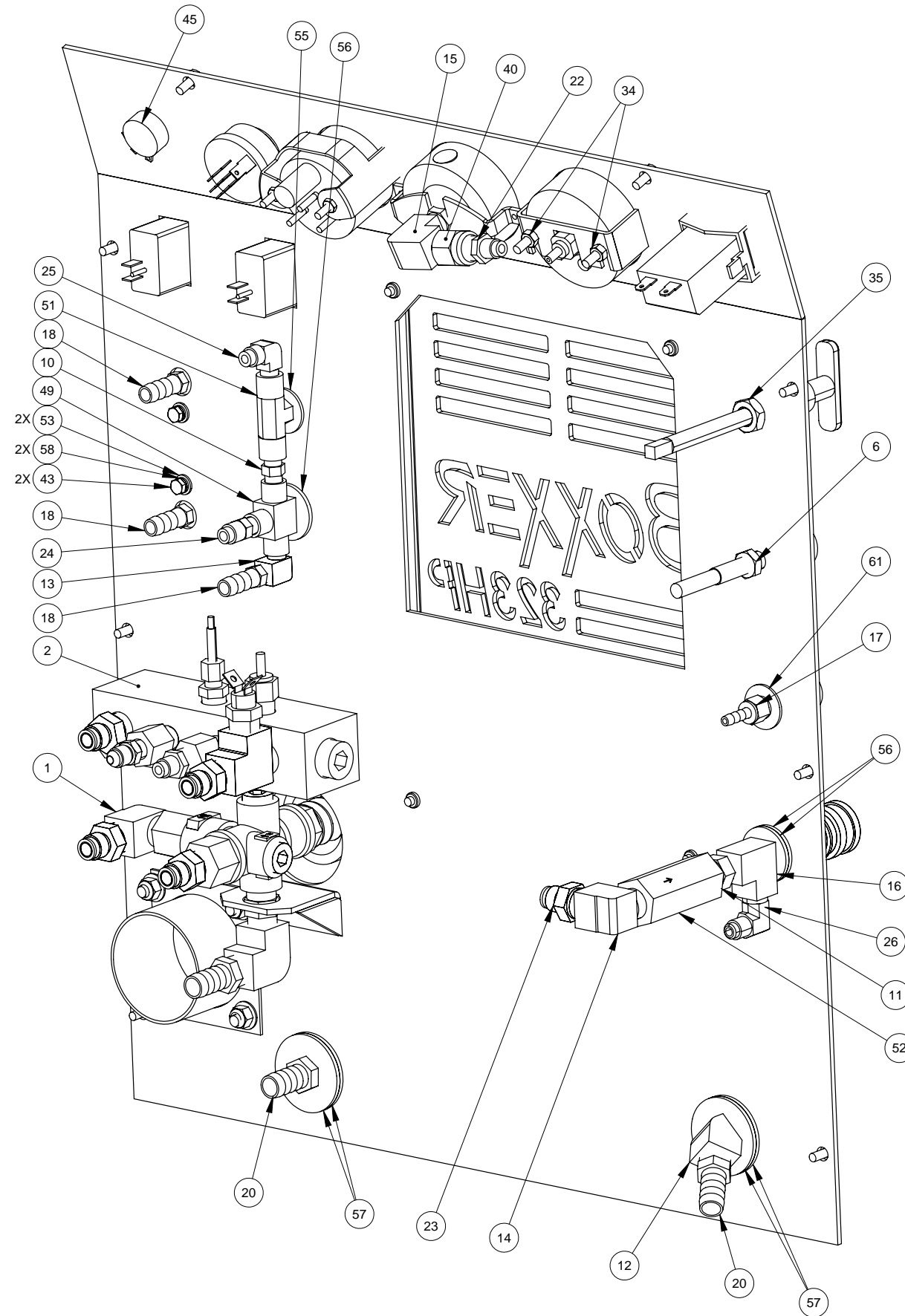


Figure 9-12. Dash Assembly - View 1 of 2
8108



Dash Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	---	Assembly, Bypass Valve	1	29	000-074-017	Gauge, 30" Hg. Vacuum - HydraMaster	1
2	---	Assembly, Hi PSI Manifold	1	30	000-074-030	Meter, Chemical Flow Raw	1
3	---	Chemical Metering Valve - Knob Only	1	31	000-074-167	Gauge, Pressure (0-3000psi)	1
4	---	Knob, 3-Way Ball Valve (Part Of 000-169-0171)	1	32	000-074-170	Meter, Rectangular Hour w/o Bezel	1
5	000-001-148	Adapter, 2.5" Exhaust Turndown	1	33	000-094-009	Nut, 1/4"-20UNC Nylock	4
6	000-025-003	Cable, Choke With Detent	1	34	000-094-070	Nut, 5mm Nylock	2
7	000-025-020	Cable, Throttle Locking	1	35	000-094-092	Nut, 7/16"-20UNF Hex Jam	2
8	000-052-051	Quick Connect, 440 Female w/ EPDM O-Ring	1	36	000-094-098	Nut, 7/16"-24UNF - 2 Way Metering Valve	1
9	000-052-052	Quick Connect, 660 3/8" Brass w/ EPDM O-Ring	1	37	000-100-192	Panel, Dash	1
10	000-052-069	Nipple, 1/8" NPT Hex	1	38	000-100-198	Panel, Grill - Coated - Boxxer 323 Hp	1
11	000-052-073	Nipple, 3/8" NPT X 1/4" NPT Hex	1	39	000-131-131	Trimlok, 3/8" X 1/8" Rubber	1
12	000-052-083	Elbow, 3/8" NPT Street X 45°	1	40	000-135-052	Regulator, Hi PSI Snubber	1
13	000-052-084	Elbow, 1/8" NPT Street	1	41	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	10
14	000-052-086	Elbow, 3/8" NPT Street	1	42	000-143-171	Screw, #10-24UNC X 1.25" Hex Head	4
15	000-052-088	Elbow, 1/4" FPT X FPT	1	43	000-143-327	Screw, #10-32UNF X 0.50" Lg. Hex Head	2
16	000-052-090	Tee, 1/4" NPT Branch M-F-F	1	44	000-143-542	Screw, 1/4"-28UNF X 0.50" Lg. Hex Head	2
17	000-052-096	Insert, #F23 (1/8" FPT X 3/16" Barb)	1	45	000-149-560	Thermostat, Potentiometer	1
18	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	3	46	000-155-053	Spring, 1/4" Belleville Washer	2
19	000-052-104	Insert, #66 (3/8" NPT X 3/8" Barb)	1	47	000-157-017	Switch, Ignition - B & S	1
20	000-052-105	Insert, #68 (3/8" NPT X 1/2" Barb)	2	48	000-157-040	Switch, 20 Amp Rocker	2
21	000-052-272	Cup, Gravity Feed Oil Blower Lube Port	1	49	000-169-0171	Valve, 3-Way Ball O-Ring Style	1
22	000-052-527	Nipple, 1/4" SAE X 1/4" NPT	1	50	000-169-064	Valve, 3/8" NPT Full Port Ball	1
23	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	1	51	000-169-160	Valve, Chemical Metering	1
24	000-052-530	Nipple, 1/4" SAE X 1/8" NPT	1	52	000-169-219	Valve, Check 80 psi - Last Step Chemical	1
25	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1	53	000-174-001	Washer, #10 Flat	16
26	000-052-532	Elbow, 1/4" SAE X 1/4" NPT	1	54	000-174-003	Washer, 1/4" Flat	4
27	000-061-056	Knob, Temperature Adjustment	1	55	000-174-005	Washer, 3/8" Flat	1
28	000-074-016	Gauge, Temperature	1	56	000-174-007	Washer, 1/2" Flat	3

Dash Assembly Parts List (continued)

Item	Part Number	Description	Qty
57	000-174-008	Washer, 5/8" Flat	4
58	000-174-014	Washer, #10 Lock	4
59	000-174-022	Washer, 7/16" Lock	1
60	000-174-030	Washer, 5/8" I.D. X 7/8" Od X 0.010" Thk	1
61	000-174-032	Washer, 3/8" Flat	1
62	000-174-058	Washer, 21/32" I.D. X 27/32" O.D. Nylon	1

Item	Part Number	Description	Qty
63	000-174-062	Washer, 1/2" I.D. X 3/4" Od X 0.010" Thk	1
64	--	Label, Dash Warning	1
65	--	Label, Left Dash	1
66	--	Label, Right Dash	1
67	--	Label, Temperature	1

Figure 9-13. Electrical Panel Assembly
7020 Rev. C

Electrical Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-171	Panel, Electrical - 7" X 7.25"	1
2	000-074-125	Controller, Temp Single Analog Input - RTD	1
3	000-056-006	Fuse Holder, In-Line - Weatherproof	2
4	000-157-022	Switch, Relay	1
5	000-084-010	Light, Green LED Indicator Mini	1
6	000-012-002	Block, 6 Post Terminal	1
7	000-041-460	Cover, Electrical Panel	1
8	000-094-034	Nut, #10-24UNC Nylock	5
9	000-156-030	Stud, #10-32UNF X 2" Lg. S/S	2
10	000-094-058	Nut, #10-32UNF - Nylock	2
11	000-094-108	Nut, #10-32UNF Wing	2
12	000-131-131	Trimlok, 3/8" X 1/8"	1
13	000-094-063	Nut, #6-32UNC Nylock	2
14	000-174-049	Washer, 5/16" Flat	2
15	000-143-012	Screw, 5/16"-18UNC X 3/4" Lg.	2
16	000-033-022	Clamp, 1/2" Nylon Hose	1
17	000-060-014	Grommet, 1.00" I.D. X 1.50" O.D.	1
18	000-037-011	Connector, "Jumper" Terminal Block	4
19	000-056-010	Fuse, 25 Amp	2

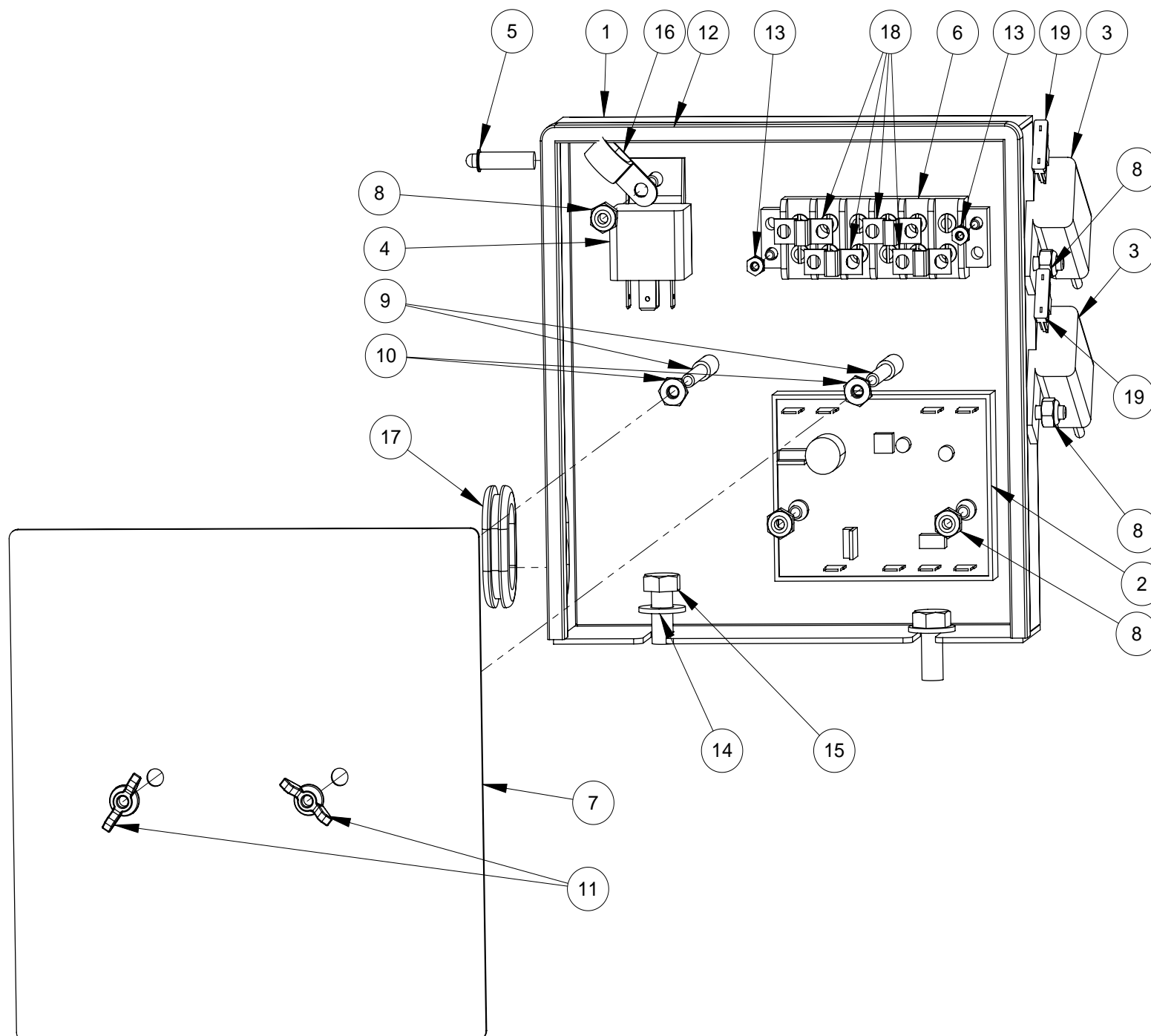
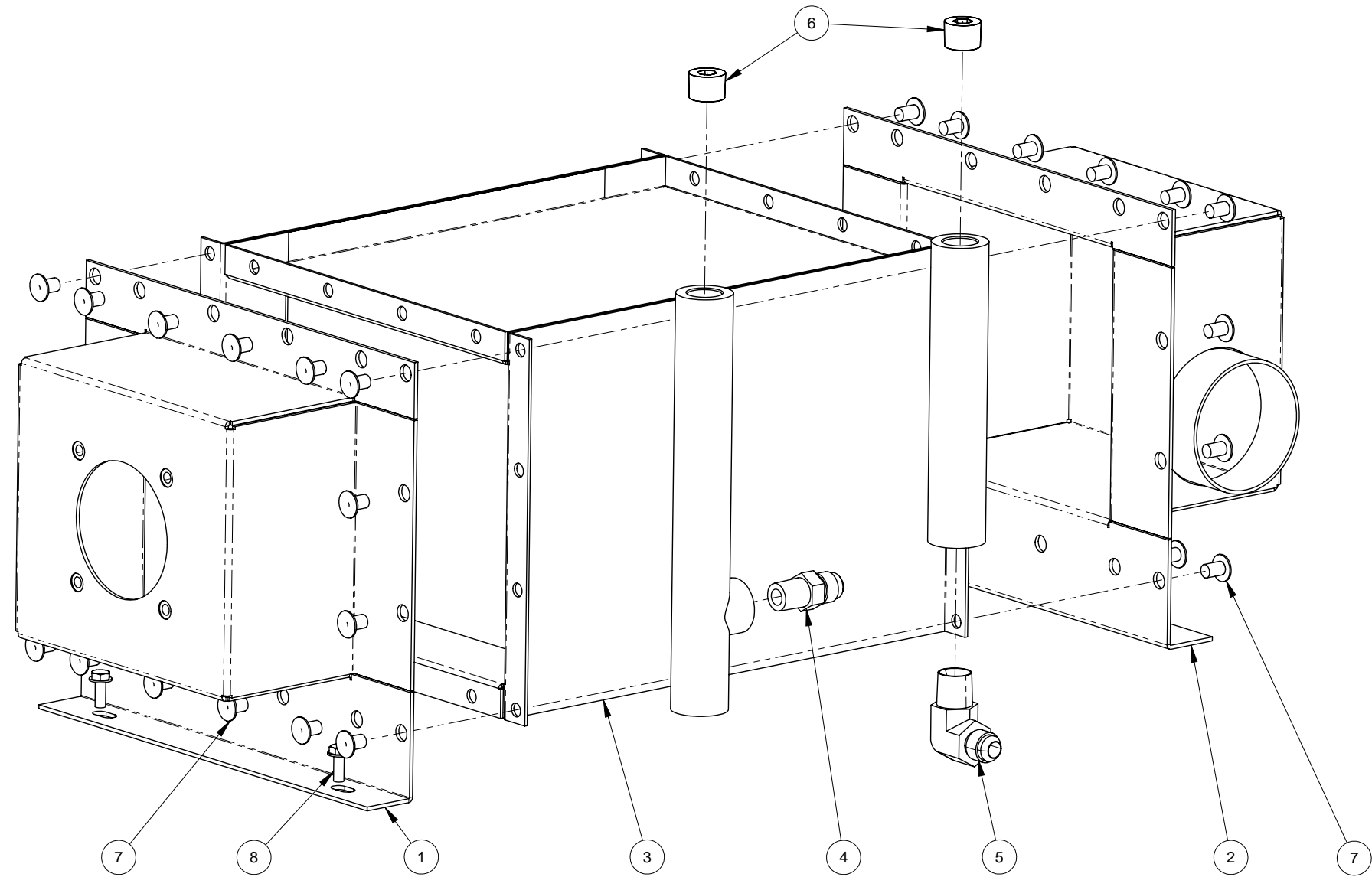


Figure 9-14. Heat Exchanger Assembly
8055

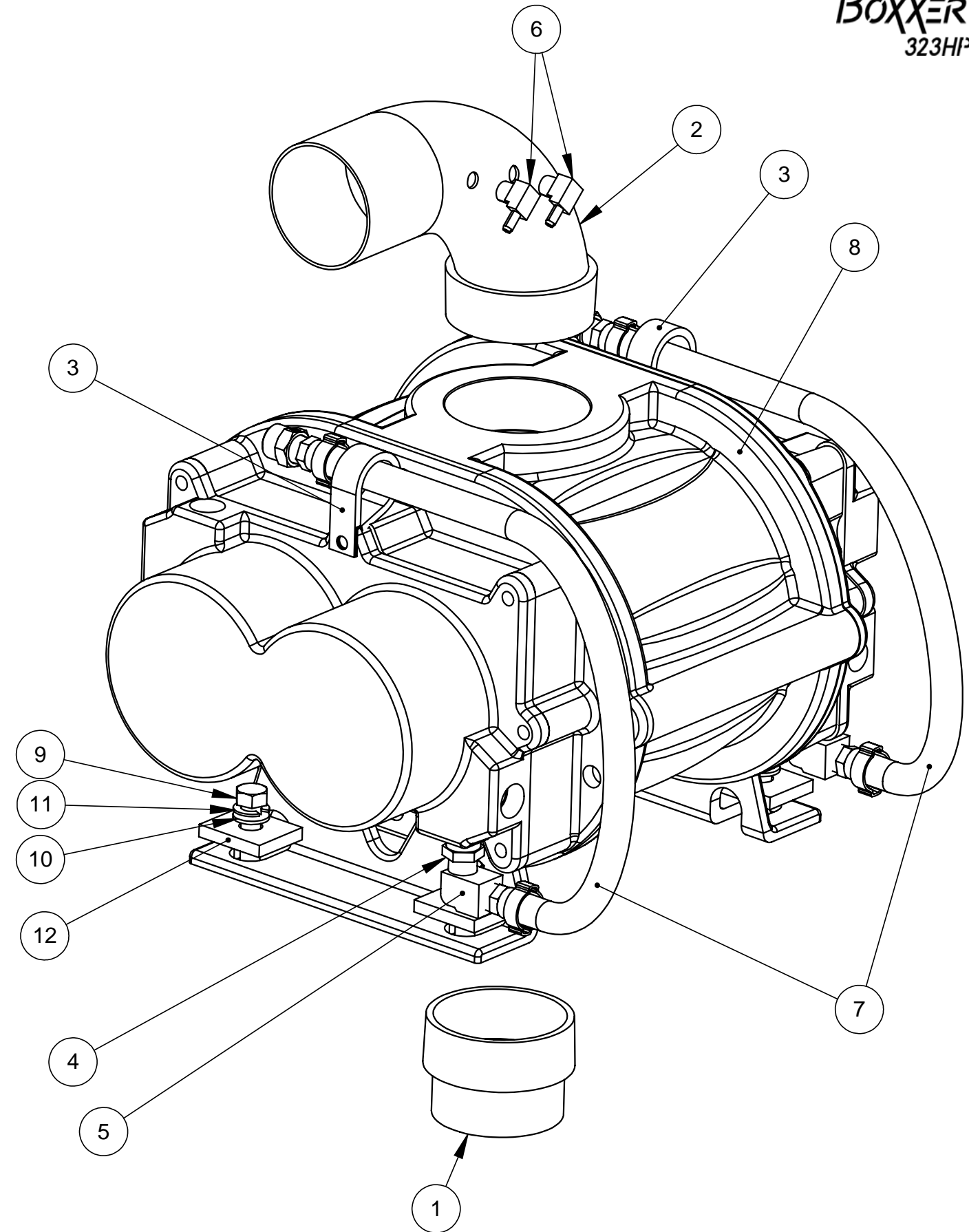
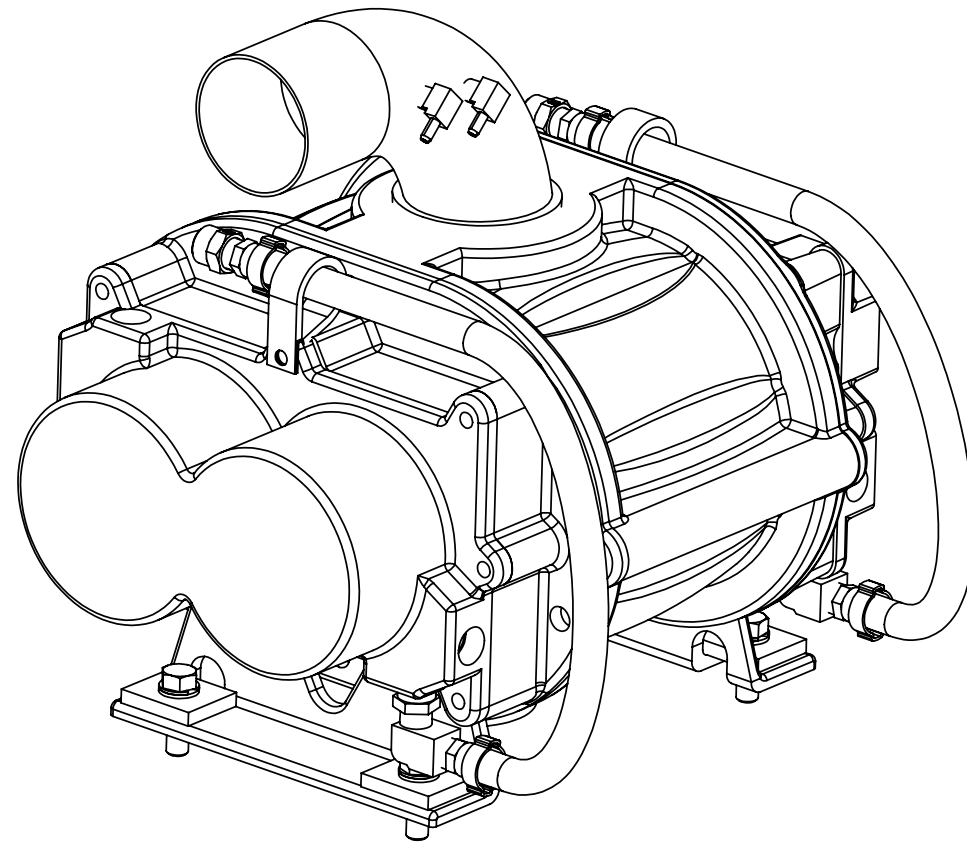


Blower Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-013-072	Box, Inlet Plenum - Weldment	1
2	000-013-073	Box, Outlet Plenum - Weldment	1
3	000-038-071	Core, Ss Hx 6 X 8 (8 Row)	1
4	000-052-533	Nipple, 3/8" JIC X 1/4" NPT	1

Item	Part Number	Description	Qty
5	000-052-766	Elbow, 3/8 NPT X 3/8 JIC	1
6	000-106-008	Plug, 3/8" NPT Allen Head	2
7	000-140-021	Rivet, 1/4" Blind X 0.50" Lg.	32
8	000-143-583	Screw, #10-24UNC X 0.50" Lg. Hex Head Flange Z/P	4

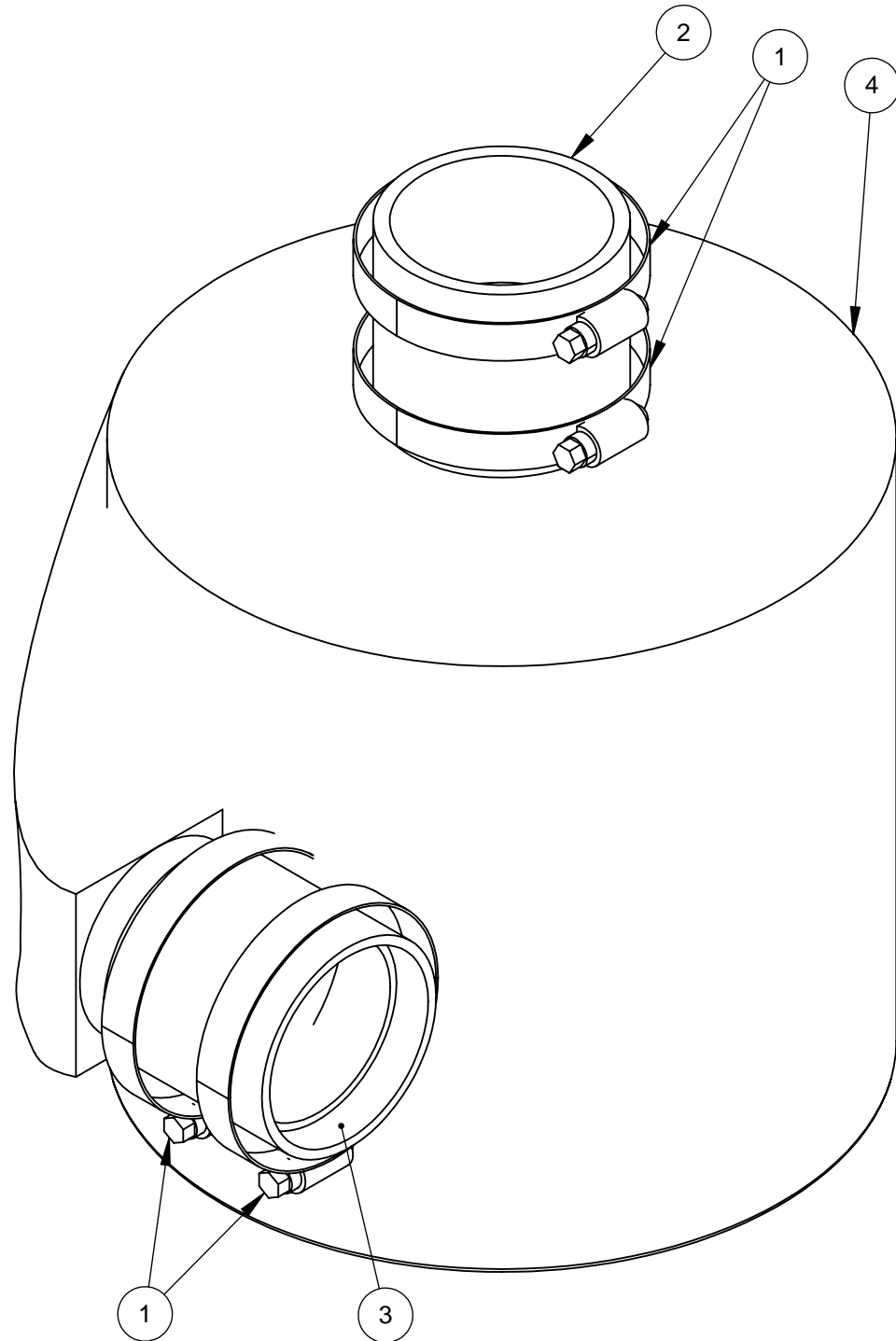
Figure 9-15. Blower Assembly
7014 Rev. B



Blower Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-140	Adapter, 2.5" NPT To 2.5" O.D. Tube	1
2	000-001-141	Adapter, 2.5" NPT X 2.5" O.D. Tube - Elbow	1
3	000-033-057	Clamp, 1" Cushion Loop	2
4	000-052-061	Bushing, 3/8" NPT X 1/4" FPT	2
5	000-052-085	Elbow, 1/4" NPT Street	2
6	000-052-106	Insert, 1/8" NPT X 5/32" Barb X 90°	2
7	000-068-794	Hose Assembly, 3/8" X 17" Lg. Drain	2
8	000-111-134	Blower, 3006 Competitor SI	1
9	000-143-025	Screw, 3/8"-16UNC. X 1.25" Lg. Hex Head Gr. 8	4
10	000-174-004	Washer, 5/16" Flat	4
11	000-174-057	Washer, 3/8" Lock	4
12	000-174-068	Washer, Blower Feet	4

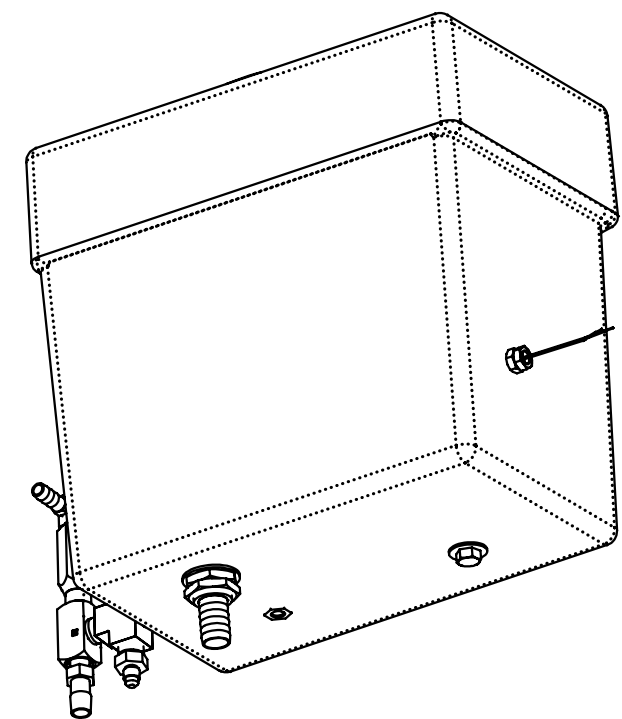
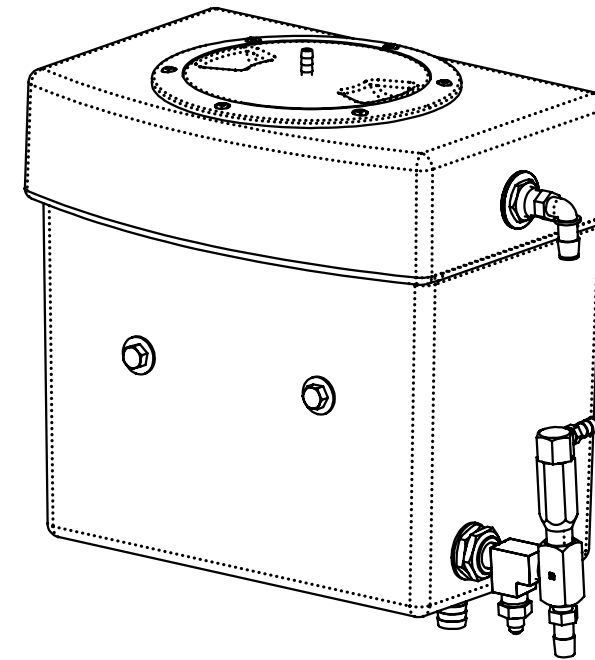
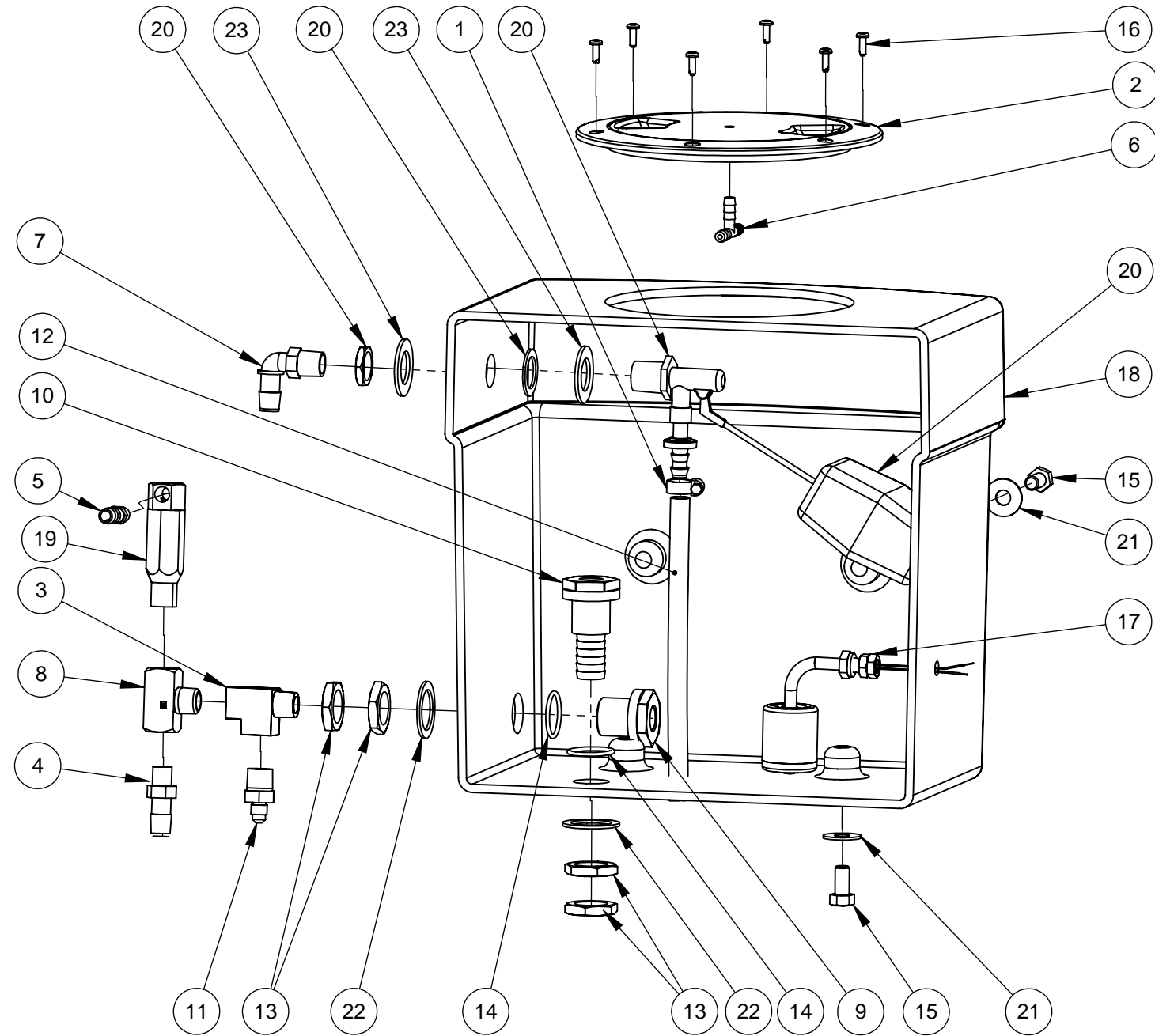
Figure 9-16. Silencer Assembly
8056



Silencer Assembly Parts List

Item	Part Number	Description	Qty
1	000-033-012	Clamp, Size #44 Hose	4
2	000-068-104	Hose, Ø 2.5" I.D. Silicone X 2.5" Lg.	1
3	000-068-889	Hose, Ø 2.5" I.D. Orange Silicone X 2.5" Lg.	1
4	000-093-108	Silencer, Ø2.5" O.D. Inlet/Outlet	1

Figure 9-17. Water Box Assembly
7015 Rev. D

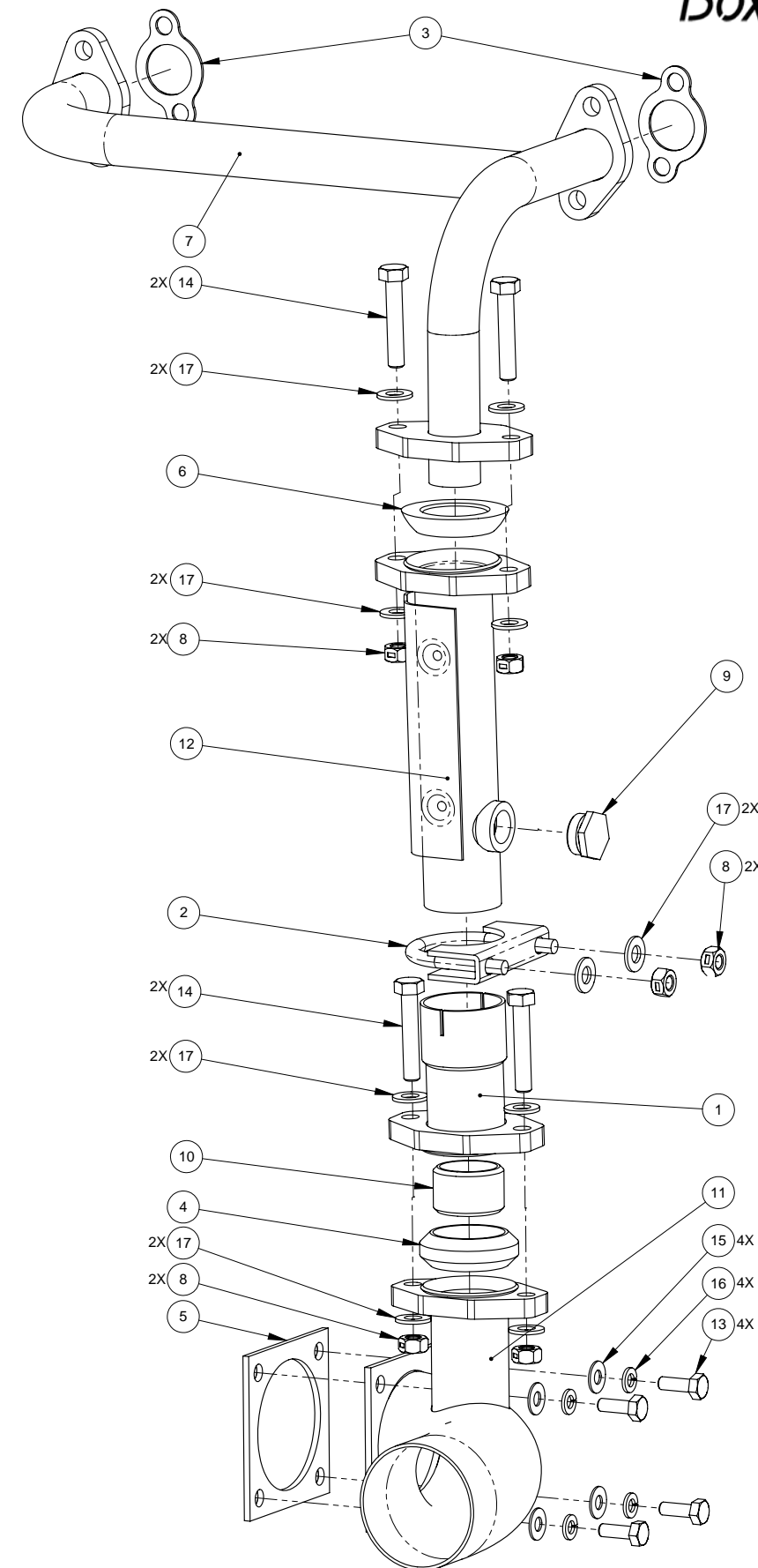
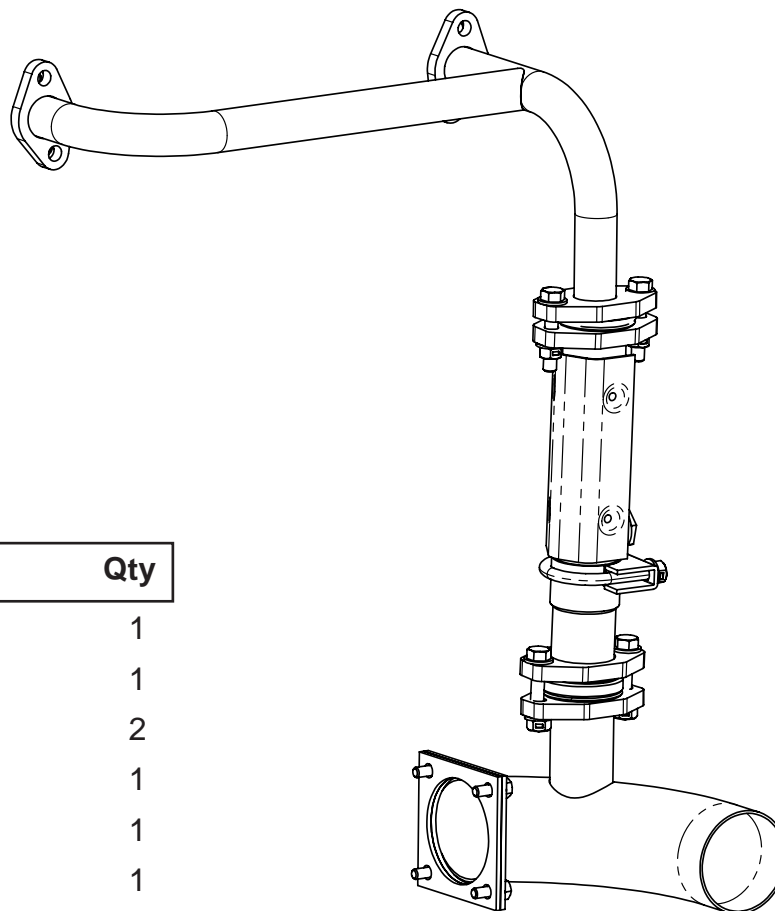


Water Box Assembly Parts List

Item	Part Number	Description	Qty
1	000-033-003	Clamp, Size #4 Mini Hose	1
2	000-041-005	Cover, 6"	1
3	000-052-023	Tee, 3/8" NPT Male Street	1
4	000-052-056	Insert, #68 Gfbn	1
5	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1
6	000-052-156	Tee, 1/4" Plastic	1
7	000-052-355	Elbow, 3/8" NPT X 1/2" Hose, Gfbn	1
8	000-052-447	Tee, 3/8" NPT Male Branch	1
9	000-052-660	Bulkhead, 3/8" FPT X 3/8" FPT	1
10	000-052-661	Insert, 3/4" Barb X Straight	1
11	000-052-662	Nipple, 3/8" NPT X 1/4" M SAE	1
12	000-068-326	Hose, 3/8"Clr w/ Braid	1

Item	Part Number	Description	Qty
13	000-094-097	Nut, 1"-14uns Brass	4
14	000-097-041	O-Ring, 1/2" Bulk Head	2
15	000-143-017-1	Screw, 3/8"-16UNC X 3/4" Lg. Hex Head	3
16	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	6
17	000-157-0801	Switch, With Protector	1
18	000-159-001	Tank, Poly Water Box - Modified	1
19	000-169-027	Valve, 165° F Thermal	1
20	000-169-218	Valve, Float, Water Box	1
21	000-174-032	Washer, 3/8" Flat	3
22	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	2
23	000-174-028	Washer, 7/8" I.D. X 1.50" O.D. X 0.090" Thk.	2

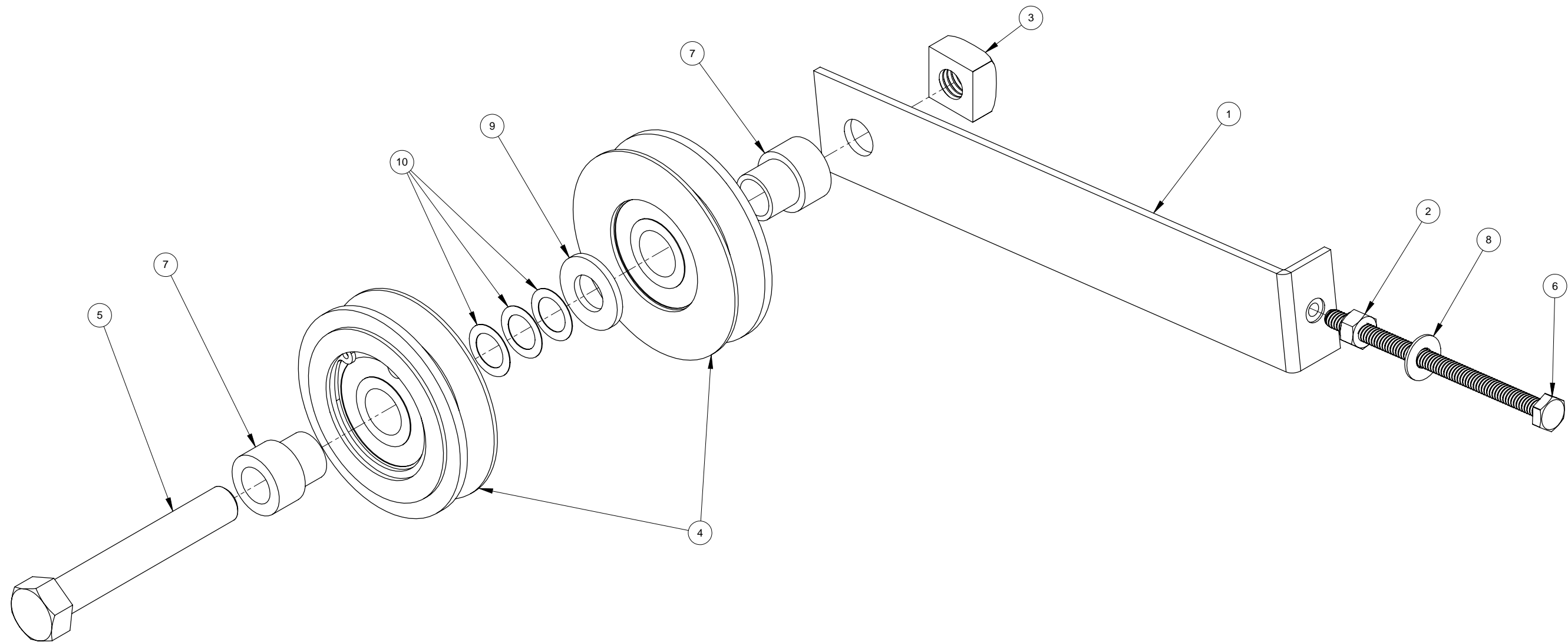
Figure 9-18. Exhaust Assembly
8057 Rev. A



Exhaust Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-116	Adapter, N1.50" F Slip To Flare	1
2	000-033-068	Clamp, 1-1/2" Exhaust	1
3	000-057-010	Gasket, Exhaust Manifold - Vanguard	2
4	000-057-177	Gasket, Exhaust Donut 1.50"	1
5	000-057-209	Gasket, Ø2.5" X 3.5" Bcd	1
6	000-057-212	Gasket, Half Donut	1
7	000-090-071	Manifold, Engine Exhaust - Weldment	1
8	000-094-081	Nut, 5/16"-18UNC Hex 2 Way Locking	6
9	000-106-120	Plug, M18 X 1.5	1
10	000-125-128	Tube, 1-3/8" Od X 1/8" Wall X 7/8" Long	1
11	000-125-259	Tube, Lower Exhaust - Weldment	1
12	000-125-262	Tube, 1.5" Od Exhaust w/ Port & Shield	1
13	000-143-001	Screw, 1/4"-20UNC X 0.75" Lg. Hex Head	4
14	000-143-124	Screw, 5/16"-18UNC X 1.75" Lg. Hex Head	4
15	000-174-003	Washer, 1/4" Flat	4
16	000-174-019	Washer, 1/4" Lock	4
17	000-174-049	Washer, 5/16" Flat	10

Figure 9-19. Idler Pulley Assembly
8058

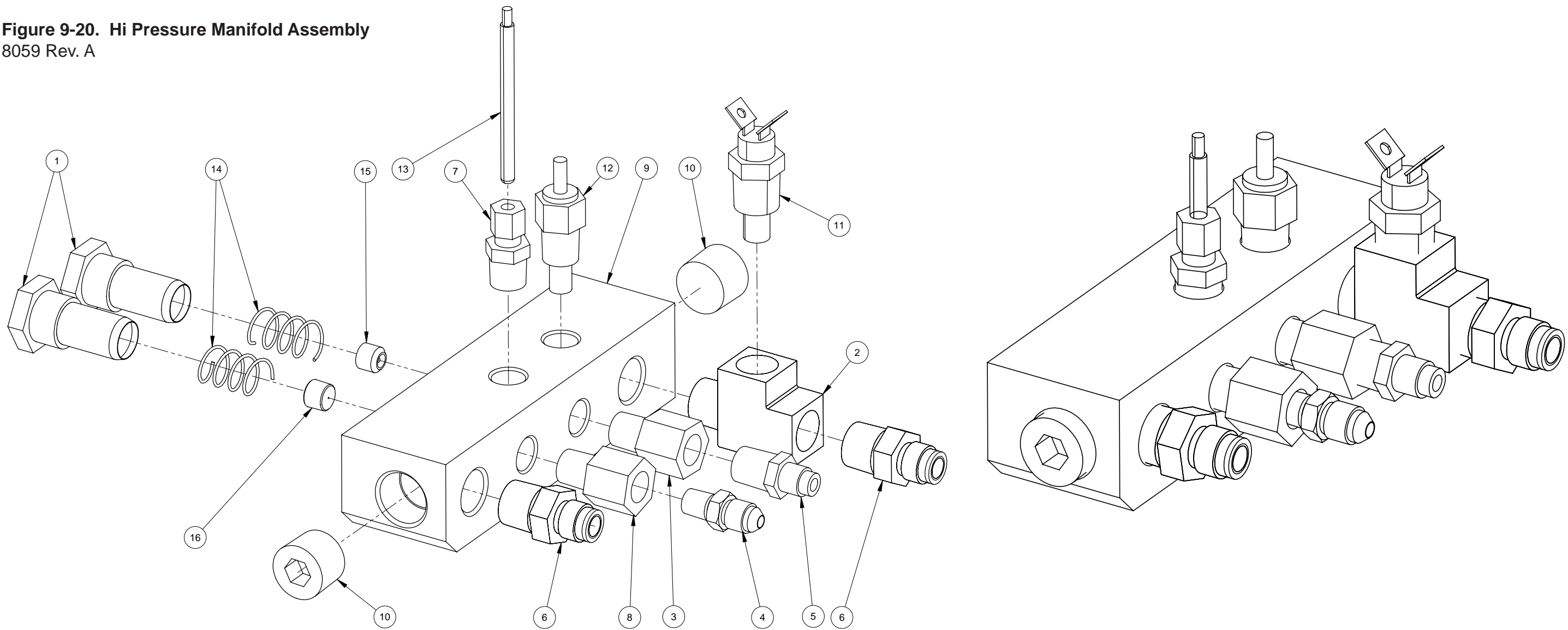


Idler Pulley Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-942	Bracket, Idler Tension	1
2	000-094-009	Nut, 1/4"-20UNC Nylock	1
3	000-094-119	Nut, 1/2-13UNC Zinc Plated Square	1
4	000-109-106	Pulley, Ø3" Offset "A" Section - Assembled	2
5	000-143-043	Screw, 1/2-13 X 3 1/4"HHC	1

Item	Part Number	Description	Qty
6	000-143-376	Screw, 1/4-20UNC X 4" Lg. S/S- Full Thread	1
7	000-154-049	Spacer, Pump Idler	2
8	000-174-003	Washer, 1/4" Flat	1
9	000-174-012	Washer, 1/2 SAE H/D	1
10	000-174-062	Washer, 1/2" I.D. X 3/4" O.D. X 0.010" Thk	3

Figure 9-20. Hi Pressure Manifold Assembly
8059 Rev. A

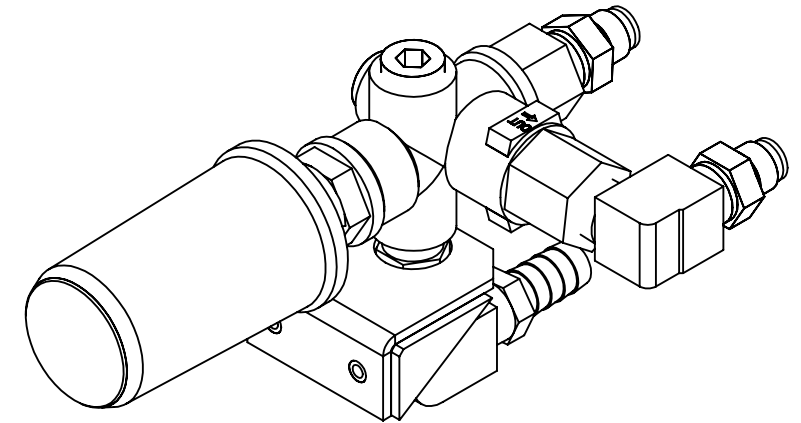
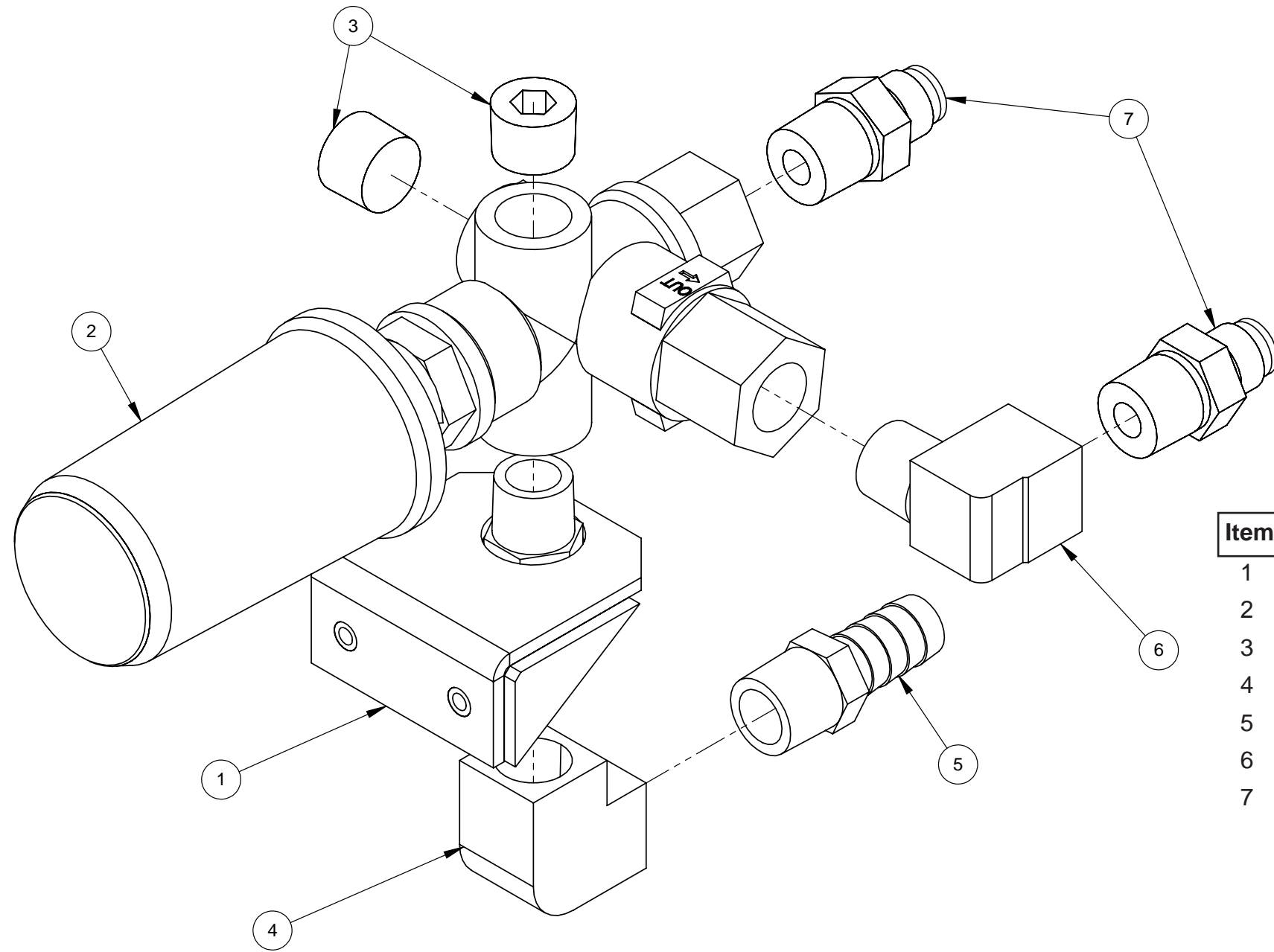


Hi Pressure Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-049-016	Filter, 1/4" NPT Replacement "Y"	2
2	000-052-023	Tee, 3/8" NPT Male Street	1
3	000-052-423	Bushing, Modified Set Screw Orifice	1
4	000-052-526	Nipple, 1/4" NPT X 1/4" JIC	1
5	000-052-527	Nipple, 1/4" SAE X 1/4" NPT	1
6	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	2
7	000-052-587	Compression, 3/16" X 1/4" NPT Thermocouple	1
8	000-052-787	Bushing, Modified Set Screw Orifice - 1/8" NPT	1

Item	Part Number	Description	Qty
9	000-090-010	Manifold, Hi-PSI	1
10	000-106-111	Plug, 1/2" NPT Allen Head	2
11	000-149-027	Sensor, 285f Nason- 3/8" NPT	1
12	000-149-039	Sender, Temperature	1
13	000-149-540	Sensor, RTD Compression Fitting Style	1
14	000-155-020	Spring, 0.540 O.D. X 0.041 Wire X 1.00 Lg.	2
15	000-180-006	Orifice, Set Screw - 0.061"	1
16	000-180-030	Orifice, Ø0.021 1/8" NPT S/S	1

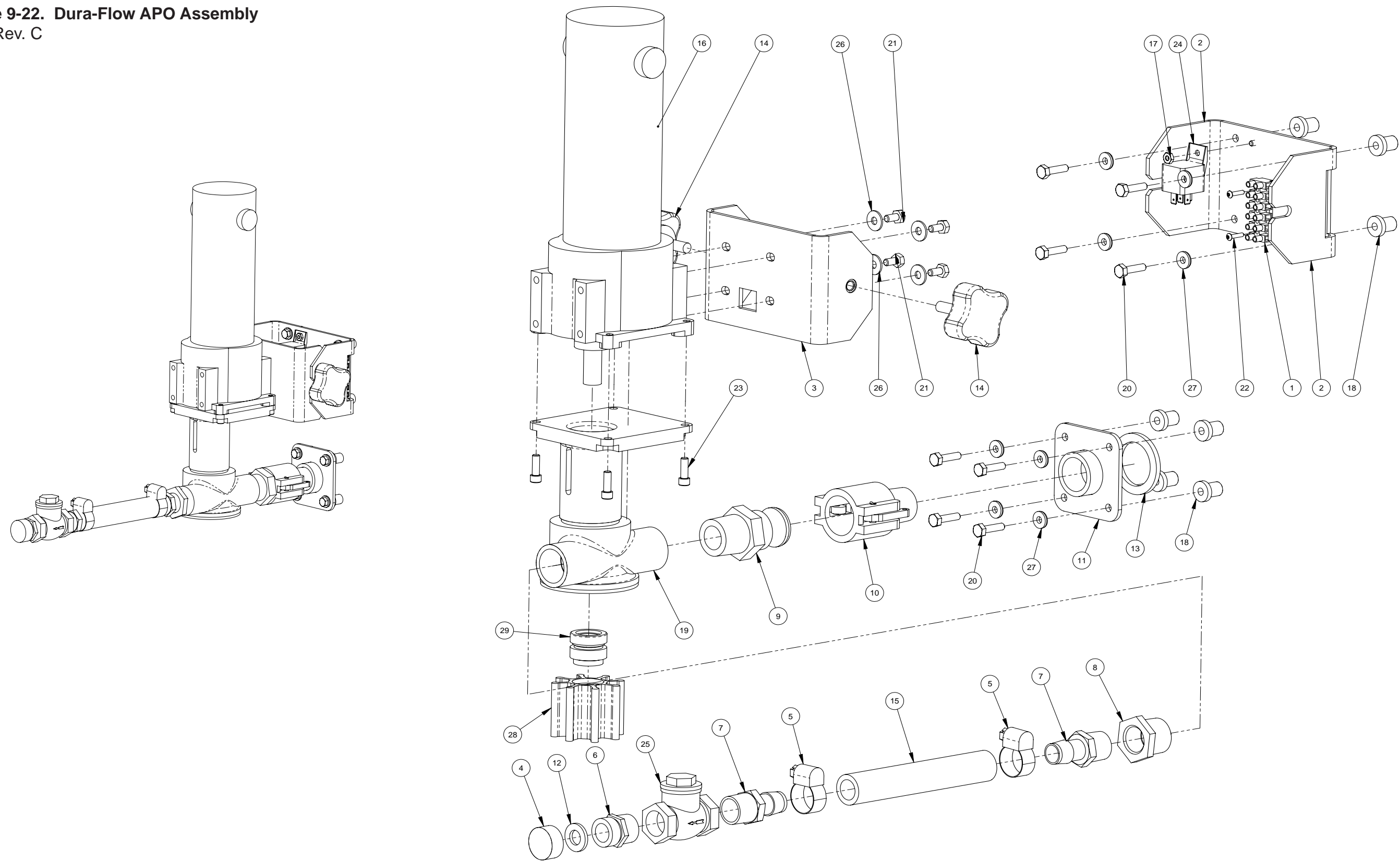
Figure 9-21. By-Pass Valve Assembly
8060 Rev. A



By-Pass Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-515	Bracket, Cat By-Pass Valve Mount	1
2	000-169-197	Valve, PSI Regulator 0 - 3,200 psi - Modified	1
3	000-106-008	Plug, 3/8" NPT Allen Head	2
4	000-052-142	Elbow, 3/8" F X F Brass	1
5	000-052-105	Insert, #68 (3/8" NPT X 1/2" Barb)	1
6	000-052-086	Elbow, 3/8" NPT Street	1
7	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	2

Figure 9-22. Dura-Flow APO Assembly
5652 Rev. C



Dura-Flow APO Assembly Parts List

Item	Part Number	Description	Qty
1	000-012-011	Block, 6 Post Terminal	1
2	000-015-890	Bracket, Tank Mounted APO Support	1
3	000-015-891	Bracket, APO Clamp	1
4	000-027-014	Cap, Garden Hose	1
5	000-033-026	Clamp, Size #10	2
6	000-052-281	Nipple, 3/4" NPT X 3/4" Male Garden Hose	1
7	000-052-338	Insert, #1212 (3/4" NPT X 3/4" Barb)	2
8	000-052-425	Bushing, 1" NPT X 3/4" FPT	1
9	000-052-723	Fitting, 1" NPT Cam Lock - Banjo 100f	1
10	000-052-724	Fitting, 1" NPT Cam Lock - Banjo 100b	1
11	000-052-725	Fitting, APO Bulkhead	1
12	000-057-055	Gasket, Garden Hose	1
13	000-057-192	Gasket, APO Bulkhead	1
14	000-061-131	Knob, Handle	2
15	000-068-069	Hose, 3/4" I.D. Weatherhead - Blue - Bulk	1

Item	Part Number	Description	Qty
16	000-091-042	Motor, Bison 438 Series	1
17	000-094-027	Nut, #10-24UNC Hex	1
18	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	8
19	000-111-169	Assembly, APO Pump - Jabsco	1
20	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	8
21	000-143-074	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head Self Tapping	4
22	000-143-532	Screw, #6-32UNC X 5/8" Lg. Socket Head	2
23	000-143-566	Screw, 1/4"-28UNF X 0.75" Lg. Socket Head	4
24	000-157-022	Switch, Relay	1
25	000-169-009	Valve, 3/4" FPT Swing Check	1
26	000-174-002	Washer, 1/4" Flat	4
27	000-174-060	Washer, 1/4" Rubber Backed	8
28	000-073-011	Impeller, Replacement for Posi-Flow and Dura-Flow	1
29	000-078-517	Kit, Jabsco Seal (Replacement)	1

70 gallon Universal Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-134	Adapter, Tank To Ø2.5" X 90° Blower Hose	1	25	000-106-019	Plug, 1-1/2" NPT	1
2	000-012-002	Block, 6 Post Terminal	1	26	000-106-046	Plug, 1-1/4" NPT	1
3	000-015-932	Bracket, Flat Filter Securing	1	27	000-106-049	Plug, 1" NPT Black Nylon	1
4	000-033-023	Clamp, 3/4" Nylon Hose	2	28	000-140-023	Rivet, Ab8-6a Aluminum Pop	6
5	000-049-152	Filter, Recovery Tank Basket	1	29	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	12
6	000-049-153	Filter, Flat - Universal Recovery Tank	1	30	000-143-051	Screw, #8-32UNC X 3/4" Lg. Binder Head	2
7	000-049-154	Deflector, Air - Universal Recovery Tank	1	31	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	2
8	000-052-071	Nipple, 1/4" NPT Hex	2	32	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	2
9	000-052-082	Elbow, 1/4" NPT Street X 45°	1	33	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2
10	000-052-085	Elbow, 1/4" NPT Street	1	34	000-157-091	Float, Lever Switch	1
11	000-052-088	Elbow, 1/4" FPT X FPT	1	35	000-159-128	Tank, 70 gallon Universal Recovery Tank - Weldment	1
12	000-052-090	Tee, 1/4" NPT Branch M-F-F	1	36	000-169-022	Valve, 1-1/2" Full Port Ball	1
13	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	2	37	000-169-227	Valve, 3,000 psi 12v Solenoid	1
14	000-052-226	Insert, 1-1/2" NPT X 1-1/2" Barb (Grey)	1	38	000-174-001	Washer, #10 Flat	2
15	000-052-527	Nipple, 1/4" SAE X 1/4" NPT	1	39	000-174-003	Washer, 1/4" Flat	18
16	000-052-763	Nipple, 1-1/2" IPS Close S/S	1	40	000-174-019	Washer, 1/4" Lock	2
17	000-057-206	Gasket, Adapter - Universal Recovery Tank	2	41	000-174-029	Washer, 3/8" Rubber Backed	2
18	000-079-091	Assembly, Dura-Flow APO	1	42	000-174-036	Washer, #10 Flat Rubber Backed	4
19	000-086-008	Latch, Bungee - Strike	1	43	000-174-060	Washer, 1/4" Rubber Backed	4
20	000-094-009	Nut, 1/4"-20UNC Nylock	8	44	601-050-001	Assembly, Vacuum Relief Valve - Universal Recovery Tank	1
21	000-094-034	Nut, #10-24UNC Nylock	2				
22	000-094-059	Nut, #8-32UNC Nylock	2	45	--	Assembly, Cover - Single Vacuum	1
23	000-094-063	Nut, #6-32UNC Nylock	2	46	--	Label, Maintenance & Lube Schedule	1
24	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4				

Machine Hose Routings

Part No.	Description	Hose Routing	
		From	To
000-068-737	3/8" X 14.5" Lg. - Throb	High Pressure Pump	By-pass Valve
000-068-888	3/16" X 24" Lg. Teflon (JIC Ends)	High Pressure Pump	Pressure Gauge
000-068-641	3/8" X 10" Lg. Teflon (JIC Ends)	By-pass Valve	Heat Exhaust Inlet
000-068-737	3/8" X 14.5" Lg. Teflon (JIC Ends)	Heat Exhaust Outlet	Manifold
000-068-517	3/16" X 23" Lg. Teflon (JIC Ends)	Chemical Pump	Chemical Selector Valve
000-068-517	3/16" X 23" Lg. Teflon (JIC Ends)	Chemical Selector Valve	Solution Out Elbow
000-068-723	3/16" X 75" Lg. Teflon (JIC Ends)	Secondary Orifice	Dump Solenoid
000-068-736	3/8" x 19.5" Lg. Teflon (JIC Ends)	Manifold	Solution Out Check Valve
000-068-627	3/16" X 44" Lg. Teflon (JIC Ends)	Primary Orifice	Water Box
000-068-018	1/2" Rubber - 67" Lg.	Inlet on Dash	Water Box
000-068-069	3/4" Parker GST II - 50" Lg.	Water Box	High Pressure Pump
000-068-018	1/2" Hi-Temp Rubber - 7" Lg.	Plastic Wye	Drain Valve
000-068-018	1/2" Hi-Temp Rubber - 6" Lg.	By-pass Valve	Plastic Wye
000-068-018	1/2" Hi-Temp Rubber - 37" Lg.	Plastic Wye	Water Box
000-068-017	3/8" Hi-Temp Rubber - 33" Lg.	Chem. Selector Valve	Brass Tee
000-068-017	3/8" Hi-Temp Rubber - 8.5" Lg.	Water Box	Brass Tee
000-068-017	3/8" Hi-Temp Rubber - 72" Lg.	Brass Tee	Insert on Recovery Tank
000-068-326	3/8" Clear w/ Braid - 28.5" Lg.	Chemical Meter	Chemical Pump
000-068-326	3/8" Clear w/ Braid - 60" Lg.	Chemical Jug	Chemical Meter
000-068-030	5/32" Rubber Vacuum - 54" Lg.	Vacuum Gauge	Elbow on Blower
000-068-030	5/32" Rubber Vacuum - 45" Lg.	Blower Lube Port	Elbow on Blower
000-068-104	2-1/2" Silicone - 2.5" Lg.	Blower	Silencer
000-068-104	2-1/2" Silicone - 2.5" Lg.	Silencer	Lower Exhaust Manifold
000-068-890	2-1/2" Orange Silicone - 17" Lg.	Heat Exchanger Exit	Exhaust Turn Down

BOXER
323HP

10 - How to Order Parts

To order warranty replacement parts or repairs, it is important that you read this section which includes:

- Warranty Parts Orders
- Parts Orders
- Emergencies

WARRANTY PARTS ORDERS

1. Call the local distributor where you purchased your equipment and ask for the Service Department.
2. Have the following information ready:
 - a. Equipment Model
 - b. Date of Purchase
 - c. Unit Serial Number
 - d. Description of Malfunction
3. Once it has been determined which parts are needed to correct the problem with your machine, make arrangements with your distributor to either perform the repairs or ship the parts to you.

Any questions you have regarding the warranty program should be directed to the Customer Service Department at (425) 775-7275, 7 a.m. to 5 p.m. Monday through Friday (PT).

We shall always endeavor to be fair in our evaluation of your warranty claim and shall provide you with a complete analysis of our findings.

HydraMaster warranty covers only defective materials and/or workmanship for the periods listed. Diagnostic reimbursement is specifically excluded.

PARTS ORDERS

Call your local distributor. In most instances, they either stock or have access to parts through a regional service center.

EMERGENCIES

If, for any reason, your distributor is unable to supply you with the necessary parts, they may call us and arrange for expedited shipping.

HydraMaster sells parts only through authorized distributors and service centers.

BOXXER
323HP

11 - Warranty Information

To avoid misunderstandings which might occur between machine owners and the manufacturer, we are listing causes of component failure that specifically voids warranty coverage. Such causes listed in this section shall constitute abuse or neglect.

BLOWER

- Failure to lubricate impellers daily with a HydraMaster-recommended lubricant, to lubricate bearings, to maintain proper oil levels, or to use the correct oil grade and viscosity as recommended in the blower manual.
- Failure to properly maintain blower safeguard systems such as waste tank filter screen, vacuum safety relief valve and waste tank automatic shut-off system.
- Allowing foam to pass through blower.

HIGH PRESSURE WATER PUMP

- Failure to maintain proper oil level as recommended in pump manual.
- Failure to change oil in pump at recommended intervals.
- Failure to protect pump against freezing.
- Failure to maintain pump protection shut-off system.
- Failure to use water softener in hard water areas.
- Use of improper chemicals.

VACUUM TANK

- Failure to properly maintain filtering devices in tank.
- Failure to clean tank as recommended by manufacturer.
- Failure to maintain vacuum safety release in tank.
- Use of improper chemicals.

CHEMICAL SYSTEM

- Use of improper chemical.
- Failure to use water softener in hard water area.
- Operating machine without proper chemical filter screen.
- Failure to protect against freezing.

CONTROL PANEL

- Failure to protect flowmeter and water pressure gauge against freezing.



VACUUM AND SOLUTION HOSES

- Failure to protect hoses against freezing.
- Failure to protect hoses against burns from engine and blower exhaust.
- Damage to hoses from being run over by vehicles.
- Kinking or cracking from failure to store or unroll hoses correctly.
- Normal wear and tear from everyday use.

CLEANING WAND AND TOOL

- Failure to protect against freezing.
- Obvious physical abuse of wand or tool.

WATER HEATING SYSTEM

- Over-pressurization of the system (recommended maximum working pressure - 1,200 psi).
- Failure to protect against freezing.

HARD WATER DEPOSITS

- Failure to use or maintain a water softening system or a properly installed magnetic-type descaler, whichever might be necessary, with machines operating in designated "Hard Water Areas" (3.0 grains or more per gallon).

WARRANTY PROCEDURE

Warranty coverage is available to you through your local distributor. Please refer to the Golden Guarantee© Limited Warranty document shipped to you with the Owner's Guide.

If you have moved to a new area or have purchased a used machine and need information regarding your local distributor, call HydraMaster at (425) 775-7272 or email us at: custsvc@hydramaster.com.

When calling your distributor, be sure to have the machine's information; model and serial number, ready for the service representative.

12 - Accessories and Chemical Solutions

HydraMaster's machine accessories are the most innovative collection available in the cleaning industry. For example, our RX-20 Rotary Extractors have changed the shape of steam cleaning. In addition, our hoses, reels and tanks are of the finest quality construction.

Our carpet care and hard floor care chemical solutions have been specially prepared, not only to give you exceptional cleaning, but also to optimize your truckmount's operation and reliability. HydraMaster's chemical solutions will help maintain your machine's water pump and water heating systems at peak efficiency and also help ensure fewer breakdowns.

HydraMaster's full line of machine accessories and chemicals can enhance cleaning performance while reducing your labor costs, and include:

- Upholstery Tools
- Wands
- Vacuum Hoses
- Tanks
- Van Accessories
- Hose Reels
- Carpet Care Detergents
- Rinse Agents
- Pre-Sprays
- Hard Floor Care Detergents
- De-Foamers and Descalers
- Deodorizers and Disinfectants
- Spotting Agents

For more information about our full line of accessories and chemical solutions, refer to the HydraMaster website at <http://www.hydramaster.com>.

To order genuine HydraMaster accessories and chemical solutions, call your nearest authorized HydraMaster Distributor.

BOXXER
323HP