



Boxxer 423S Owner's Manual

HydraMaster
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1 - General Information

The Boxxer 423S is the latest multi surface cleaning/water recovery system from HydraMaster, featuring a 23 HP air-cooled engine and the dual oil bath Tuthill Dominator 4005 Tri-lobe Blower.

Available options for the Boxxer 423S include a 70 gallon recovery tank, a 5 gallon chemical jug, 100 ft vacuum and solution hoses, and a 10 ft whip hose.



Another HydraMaster option available with the Boxxer 423S is the 70 gallon rotomold (RMT) fresh water tank which is designed to mount directly under the Boxxer 423S.



Other options include:

- a 100 gallon recovery tank
- an Automatic Pump Out (APO) system
- a Thru Floor Exhaust Kit
- Dura-Flow auto pump-out (APO)
- Hydra-Cradle Fresh Water Tank and Hose Reels
- Evolution Truckmount Wand
- RX-20 Rotary Extraction Wand



This Owner's Manual contains installation and operation instructions as well as information required for proper maintenance, adjustment and repair of the Boxxer 423S. 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 423S. 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 423S. Please read the manual to familiarize yourself with the operation of your Boxxer 423S, paying special attention to all **Warnings and Cautions**.

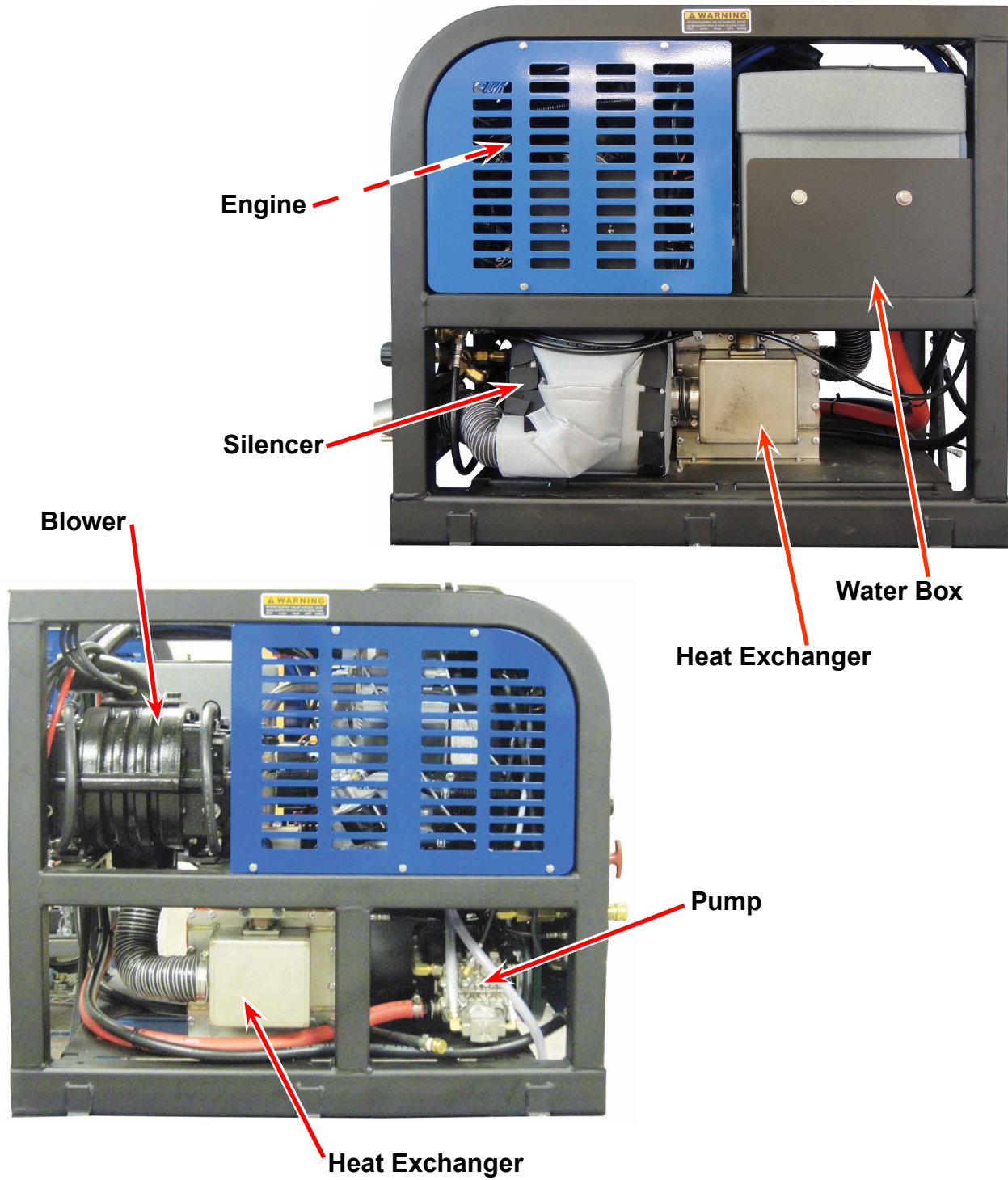
This section of the manual contains the following information:

- Major System Components
- Contact Information
- Warnings, Cautions and Notices
- Responsibilities
- Machine Specifications
- Optional Equipment
- High Altitude Operation
- Local Water Precautions

NOTICE

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

MAJOR SYSTEM COMPONENTS





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://hydramaster.com/HowToBuy/DealerLocator.aspx>

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

HOURS	TELEPHONE NUMBERS	E-MAIL ADDRESSES
Monday-Friday 7:00 a.m. to 5:00 p.m. Pacific Standard Time	Technical Support (425) 775-7275 FAX : (800) 426-4225	Technical Support techsupport@hydramaster.com
	Customer Service/Parts (425) 775-7276 FAX: (425) 771-7156	Customer Service/Parts parts@hydramaster.com

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 423S 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. 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.

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.

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.

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.

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 or higher. Using reading than 3.0 grains per gallon 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.

CAUTION

Never allow water to freeze inside the truckmount. Serious component damage will occur. Perform all freeze guarding procedures outlined in this digital 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.

CAUTION

Use of the vacuum recovery system when stripping or otherwise removing wax from floors is specifically excluded as an approved use of the truckmount. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

CAUTION

Use of the vacuum recovery system for "dry cleaning", without corresponding solution application (i.e. duct cleaning), is specifically excluded as an approved use of the truckmount. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

CAUTION

If concentrated acids or solvents are used to pre-treat surfaces before power washing, do not recover them through the vacuum system. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

RESPONSIBILITIES

Purchaser's Responsibilities

- Prior to purchasing a van, 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 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, 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.
- 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.
- Ensure timely return of the document package.

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"W x 31"H x 36"D	
Weight	563 lbs	
Engine	23HP Briggs and Stratton air-cooled	
	Pressurized Oil System	Engine Oil: 5W-30 Synthetic
	Capacity	Approx. 1 1/2 quarts, or 48 oz (when changing oil and filter)
	Engine rpm	3,000 rpm
	Fuel Consumption	1.1 gph
Ignition	Electric Keystart	
Vacuum Blower - Tuthill 4005	Oil Type	Blower Oil: Pneulube
	Gear End Capacity	Approx. 5.8 oz
	Drive End Capacity	Approx. 4.7 oz
	Blower rpm	3,000 rpm
Water Pump - General Pump	3.5 gpm plunger pump, electric clutch control	Pump Oil: 30W
Drive System	Direct-drive Hayes 40-series coupler	
Engine Exhaust Diverter	Automated Diverter Control (ADC) temperature control	
Operating Pressure	1,000 psi	
Chemical System	Stainless steel last-step chemical injection, meter controlled	
Heating System	Finned tube heat exchanger	

Standard Equipment	Runtime hour meter	
	Chemical flow meter (0-10 gph)	
	Chemical flow control valve	
	Vacuum gauge (0-30" Hg)	
	Solution pressure gauge (0 - 1,500 psi)	
	Solution pressure adjustment	
	Pre-wired pump-in switch	
	Pre-wired APO switch	
	Fresh water inlet	
	Water system drain valve	
	Diagnostic/status lights	
	Engine choke	
	Engine throttle	
	Electrical circuit protection (fuse protected)	
	Solution temperature control selector	
Available Equipment	Fresh Water Tank (FWT)	70 Gallon Rotomold
	Universal Recovery Tank (URT)	70 Gallon URT
		100 Gallon URT
	Automatic Pump Out (APO)	
	Hoses	
	Wand	
	Thru 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://www.vanguardengines.com/where-to-buy/dealer-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.

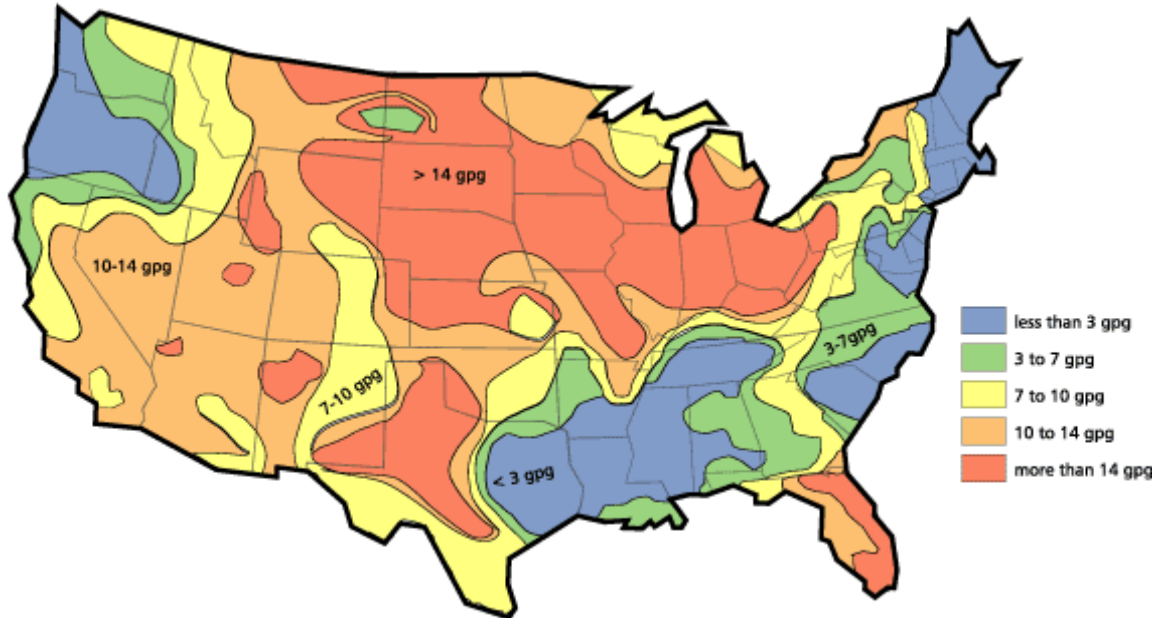


Figure 1-1. Hard Water Map of Mainland United States

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 423S 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 of water and the machine uses an average of 30 gallons/hour, for an average of 5 hours a day, this equals 150 gallons per day. In 6 days the machine would use 900 gallons 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 423S 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.

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2 - Installation Information

Although there are many different heavy duty vehicles used for carpet cleaning equipment, the preferable vehicle for a Boxxer 423S installation is a cargo van with a heavy-duty suspension package and a 3/4 HD ton capacity. If a fresh water tank is added, a one ton or larger capacity van is required.

Prior to installation of the Boxxer 423S, 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.

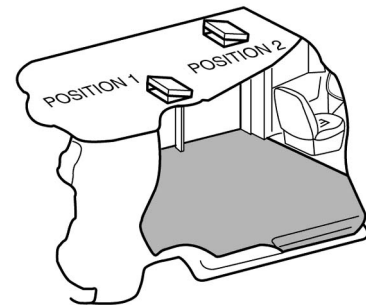


Figure 2-1. Location of Roof Vents in Vehicle

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 423S IN HOT WEATHER

HydraMaster recommends the following steps when operating the Boxxer 423S during periods of hot weather (95° F [35° C] or higher). This will help ensure that your Boxxer 423S 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 423S, when installed. Ensure that additional equipment or other materials are not stored at the sides or on top of the Boxxer 423S. 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 Boxxer 423S is running will substantially reduce the temperature inside the van 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.

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 423S IN VEHICLE

There are two recommended entry points on the vehicle for the Boxxer 423S 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 423S 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.

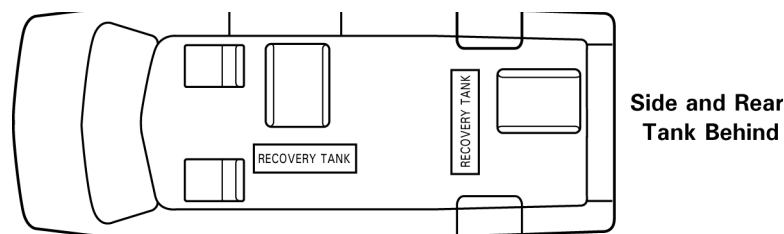


Figure 2-2. Recommended Location of Boxxer 423S in Van

Secure Installation

No matter how the unit is installed, check to see if the Boxxer 423S 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 423S 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 423S 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 423S

Prior to operating the Boxxer 423S, 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 423S 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

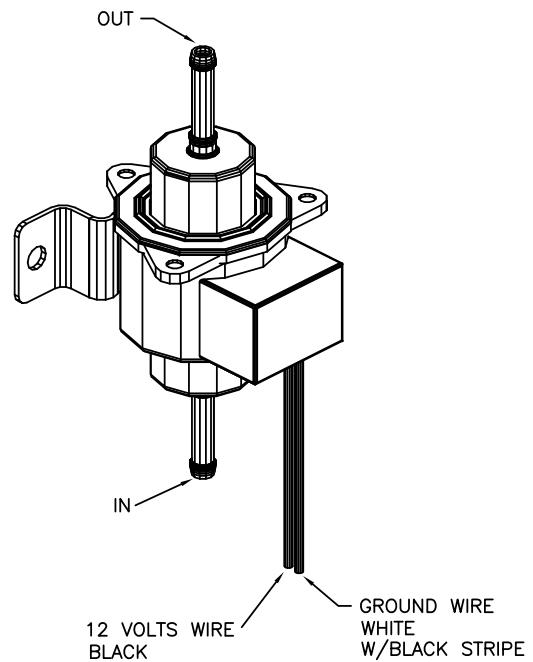


Figure 2-3. Install Fuel Pump, Outlet Side Up

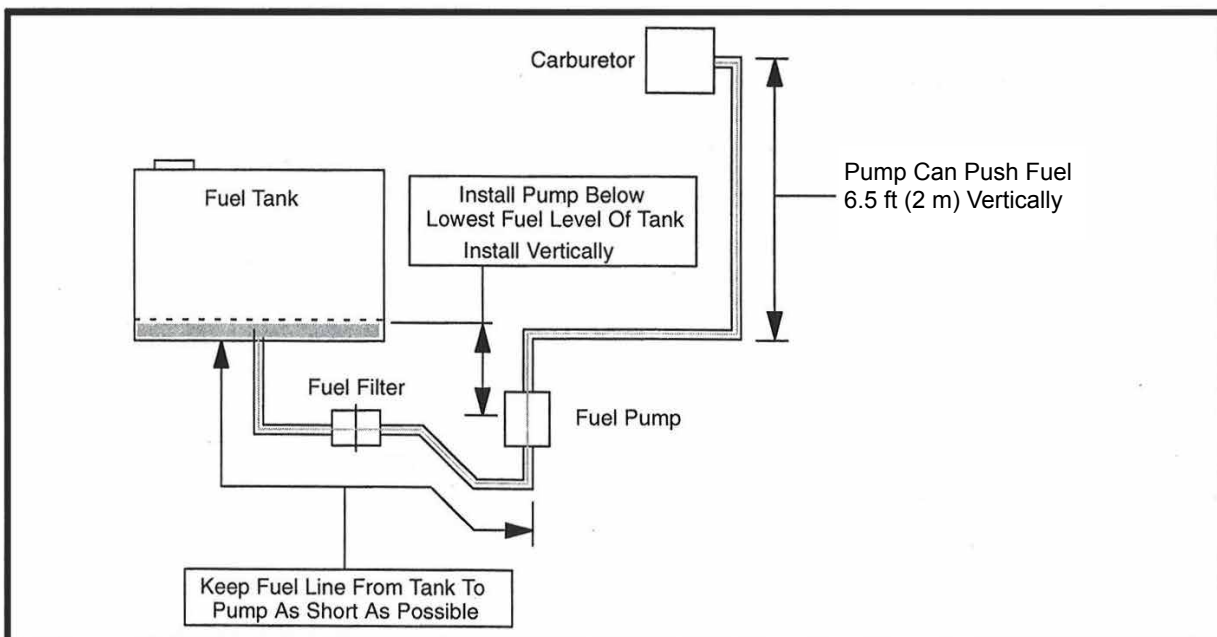


Figure 2-4. Fuel Pump Must Be in Vertical Position

3 - Cleaning Information

The Boxxer 423S 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 the Institute of Inspection, Cleaning and Restoration Certification (IICRC) 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
- Severe Cleaning Situations

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.

CAUTION

If concentrated acids or solvents are used to pre-treat surfaces before power washing, do not recover them through the vacuum system.

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.

Pre-treat 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 over-wetting 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 de-foamer 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.



The Evolution Wand is truly the next evolution in wand design and performance. The Aluminum tube and Rotomolded head make it extremely lightweight which helps to reduce fatigue on the technician. The sealed Delrin® glides help the wand to be easily pushed across the carpet, and are tapered to keep a good seal on the fibers.

No other tool has made such a dramatic increase in soil removal and water recovery. The laminar airflow design of the Evolution wand has boosted the performance of some portable extractors from a bronze to a gold level of certification from the Carpet and Rug Institute's Seal of Approval Program for tested cleaning performance. The Evolution will change the way carpets are cleaned.

Available in two sizes: a 12" head with 1-1/2" tube and two jets or a high production 16" head with 2" tube and 6 jets.

Evolution Wands

Half the weight, twice the performance.
The Evolution is not your standard wand.



Only 8.8 lbs

Only 6.5 lbs

2" Tube, 16" Head, 6 Jets

2" Evolution Truckmount Wand
Item #163-035

1-1/2" Tube, 12" Head, 2 Jets

1-1/2" Evolution Wand
Item #163-034

16"

13"



1½" 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

1½" S-Bend Two Jet Wand

This 12" wide S-Bend wand has two jets. It uses a 1½" 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 (0.9 m or 1.2 m), 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



The five vacuum heads and three spray jets rotate at 130 RPM creating 650 complete cleaning 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 #000-061-144**



**Upholstery Tool
Part #000-163-012**

NOTICE

For more information about HydraMaster accessories, please visit this web page:
<http://hydramaster.com/Products/Accessories.aspx>.

SEVERE CLEANING SITUATIONS

When your truckmount is used for hard-surface cleaning or pressure washing, some jobs may involve severe cleaning situations. In these cases, certain precautions will need to be taken in order to ensure that the recovery tank and various internal components are not damaged

The following are examples of severe cleaning situations. (This list is not intended to be complete.)

- Concrete cleaning
- Concrete stripping
- Parking lot cleaning
- Extremely greasy floors
- Cleaning that results in the recovery of extensive particulate residue
- Cleaning that results in extensive foam production

When your truckmount is used in severe cleaning situations:

- A pre-filter must be used on the vacuum hose. A fine-mesh filter (i.e. nylon) should be installed into the pre-filter. Contact your distributor for more information.
- The recovery tank should be inspected and cleaned daily.
- The recovery tank inlet filter screen should be rinsed after every job.
- The rectangular blower filter should be rinsed after every job.
- Special care should be taken to clean debris from the recovery tank float switches; they should be inspected daily to ensure that they are fully operational.
- Any cleaning job that induces excessive foam production should be halted until an approved de-foaming agent can be added to the tank.

CAUTION

Failure to follow these recommendations may lead to component failure and warranty invalidation.

CAUTION

Use of the vacuum recovery system when stripping or otherwise removing wax from floors is specifically excluded as an approved use of the truckmount. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

CAUTION

Use of the vacuum recovery system for “dry cleaning”, without corresponding solution application (i.e. duct cleaning), is specifically excluded as an approved use of the truckmount. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

CAUTION

If concentrated acids or solvents are used to pre-treat surfaces before power washing, do not recover them through the vacuum system. Failure to follow this exclusion may lead to component failure and will invalidate your warranty.

4 - Operating Instructions

This section describes how to operate the Boxxer 423S, starting with a description of the dash assembly (see Figure 4-1).

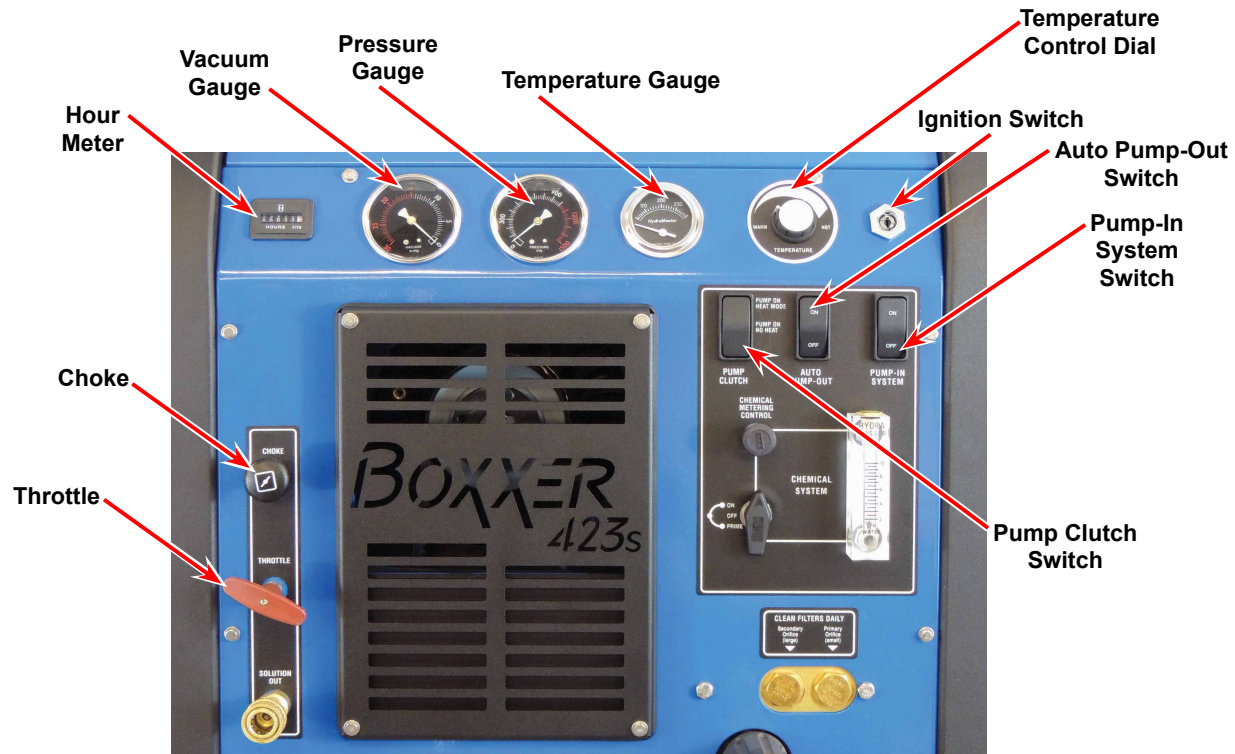


Figure 4-1. Boxxer 423S Upper Dash Assembly

The front dash assembly includes controls for the:

- System's ignition switch
- Pump clutch
- Automatic Pump-Out (APO) if included in the configuration
- Pump-In system if included in the configuration

The front dash assembly also includes the temperature control dial; the temperature, vacuum and pressure gauges; and the hour meter.

The lower dash houses the controls for:

- Water pressure
- Chemical system
- Water box drain

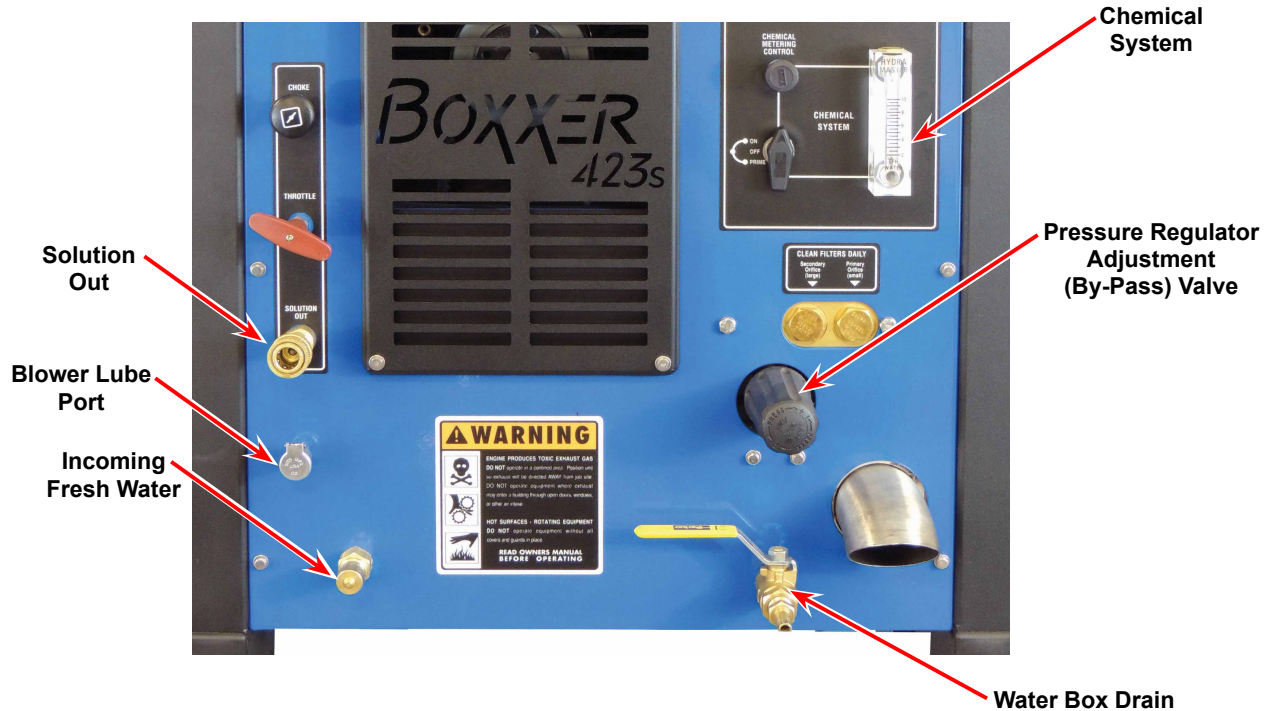


Figure 4-2. Boxxer 423S Lower Dash Assembly

The lower dash assembly also houses the blower lube port and the solution out port where the wand/tool connects to the Boxxer 423S (see Figure 4-2).

CAUTION

To ensure proper operation of the exhaust diverter system, the Boxxer 423S must have a minimum of 10" Hg vacuum. If the vacuum level is lower than 10" Hg, the exhaust diverter will remain in "Divert" mode.

NOTICE

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

CAUTION

Never perform cleaning operations when the truckmount engine is running at the IDLE throttle position. To do so will increase the risk of serious component or engine damage.

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 (see Figure 4-2). If the Pump-In feature is used on your system, push the "PUMP-IN SYSTEM" 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. Pull the "CHOKE" cable out if the engine is cold.
 - c. The "PUMP CLUTCH" switch in the "OFF " position.
5. After the engine starts, allow the truckmount to run in "IDLE " for 2 - 3 minutes to warm up. Gradually push on the "CHOKE" as the engine warms up.

CAUTION

Never clean when the Boxxer 423S 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 into place.
7. Press the "PUMP CLUTCH" switch to the "PUMP ON HEAT MODE" position for carpet cleaning or upholstery cleaning; for high pressure washing, press "PUMP ON NO HEAT".
8. Set the "TEMPERATURE CONTROL" dial to the desired position.
 - a. Set to the "WARM" position for upholstery cleaning.
 - b. Set to the "HOT" position for carpet cleaning.
9. If the Automatic Pump-Out option is included in your system's configuration, press the "AUTO PUMP-OUT" switch to the "ON" position.

10. Turn the “CHEMICAL SYSTEM” valve to the “PRIME” position to purge any air from the system (see Figure 4-3).

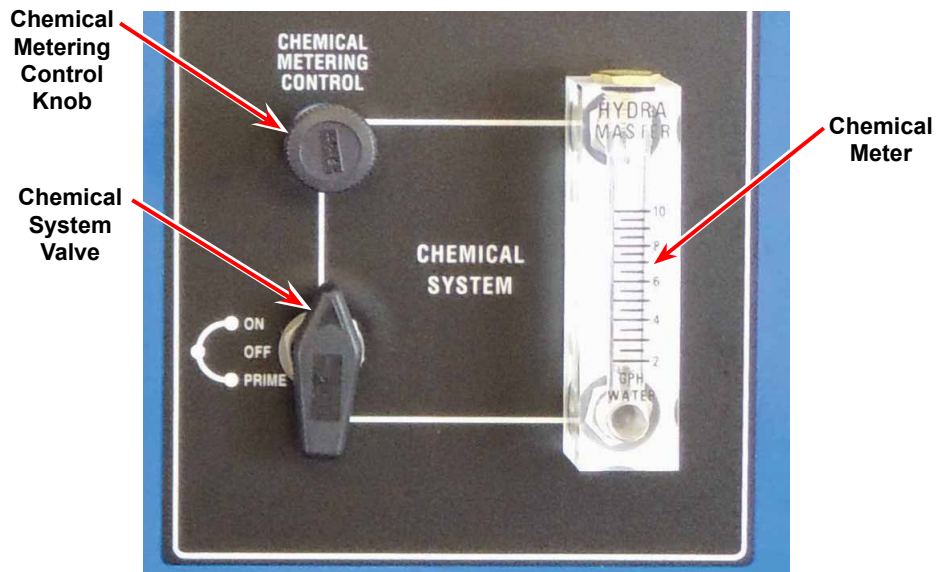


Figure 4-3. Boxxer 423S Chemical System Control and Metering

- a. With the truckmount running at full throttle, block off the vacuum intake to the recovery tank. The vacuum gauge should read 12” Hg. This will assist in priming the chemical system.
 - b. Allow the chemical to flow through the CHEMICAL METER at full flow for 30 seconds.
 - c. Turn the “CHEMICAL SYSTEM” valve to “ON.” The restriction can now be removed from the vacuum inlet.
 - d. While spraying solution from the cleaning tool, adjust the chemical flow by turning the “CHEMICAL METERING CONTROL” knob.
11. Begin cleaning.

SHUT DOWN PROCEDURE

1. Flush clean water through the chemical system for 10 seconds. Turn the “CHEMICAL SYSTEM” valve to “OFF”.
2. Cool the truckmount down by turning the “PUMP CLUTCH” switch to “PUMP ON-NO HEAT”. Spray 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 recovery tank.
 - c. Spray a Hydramaster-recommended spray lubricant into the “BLOWER LUBE PORT” for about 5 to 10 seconds while the unit is running (see Figure 4-2).
 - d. Allow machine to run additional 2 to 5 minutes under load to flush off lubricant.
 - e. 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 (see page 5-18).
6. Push the “THROTTLE” cable to the “IDLE ” position.
7. Turn the ignition switch to “OFF”.
8. Drain the water box using the water box drain valve (see Figure 4-2) .
9. Drain the recovery 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.

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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 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 belt 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 and oil filter 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 0.030". Replace if excessive carbon buildup is visible.
- Change the blower oil after first 100 hours of use.
- Check fuel filter. Replace as necessary.

100 Hours

- Replace spark plugs.

250 Hours

- Check coupler element (rubber insert) for cracks or wear. Replace as necessary.

500 Hours

- Change the blower oil.
- Change the high pressure pump oil.
- Change fuel filter.
- Check the engine valve clearance (intake and exhaust 0.004" -0.006").
- Check coupler element (rubber insert) for cracks or wear. Replace as necessary.

1,000 Hours

- Change air filters.
- Check plug wires. Replace as necessary.
- Check carburetor. Clean or replace as necessary.
- Replace coupler element (rubber insert).
- Clean heat exchanger core.

NOTICE

Refer to the Interval in Hours Maintenance chart in the Owner's Guide for more information.



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 more often if the engine is operating in dusty or extremely dirty areas, or during periods of high ambient temperature.

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 423S engine.

Oil Filter

Briggs and Stratton engines use Briggs and Stratton oil filters. 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 in 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 5-18 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).

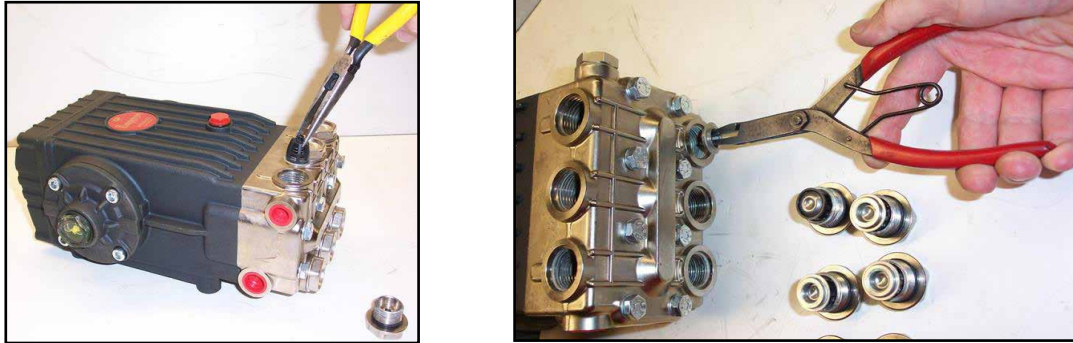


Figure 5-1. Remove Valve Cap and Valve Assembly

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 000-078-521) 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.)

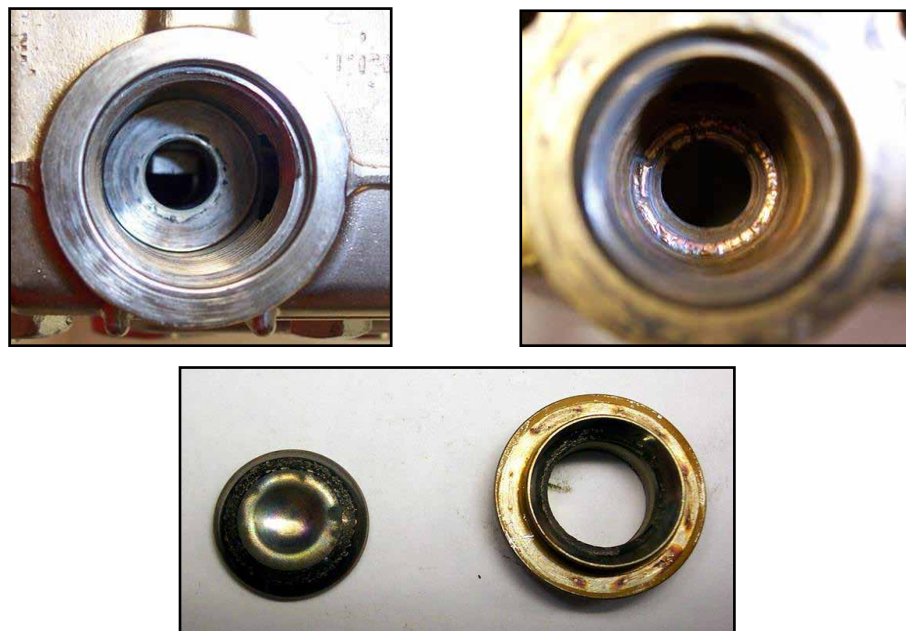


Figure 5-2. Inspect Manifold and Old Valves

7. Replace the center inlet check valve with a modified check valve - Figure 5-3.

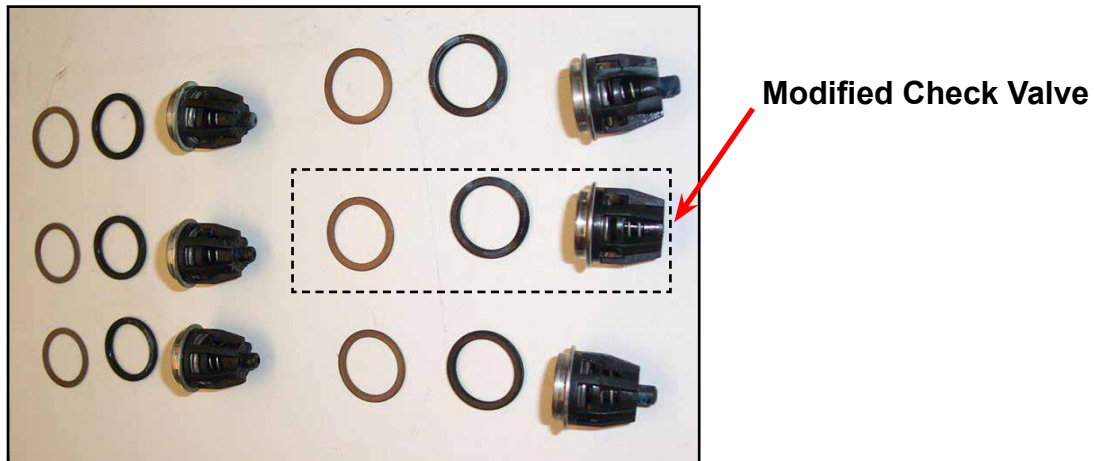


Figure 5-3. Replace Center Inlet Check Valve With Modified Check Valve

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).

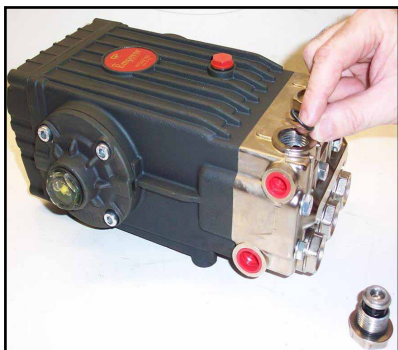


Figure 5-4. Apply Grease and Install Valves



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)

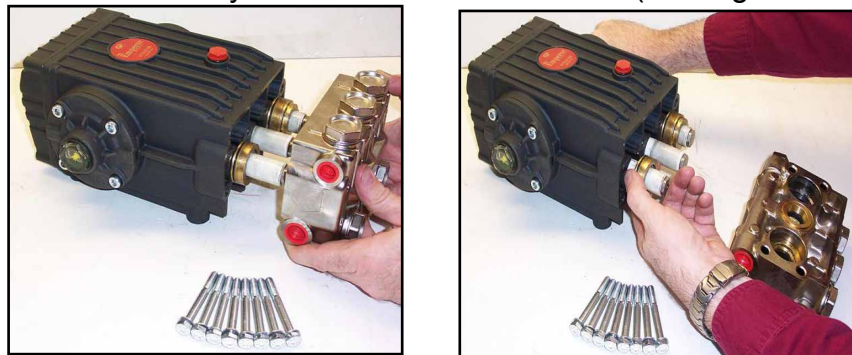


Figure 5-7. Seal Assemblies May Come Off with Manifold

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).

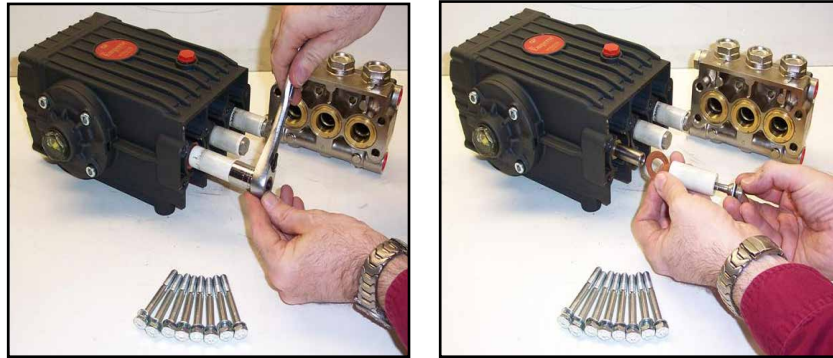


Figure 5-9. Remove Stainless Steel Plunger Bolt and Ceramic Plunger

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).

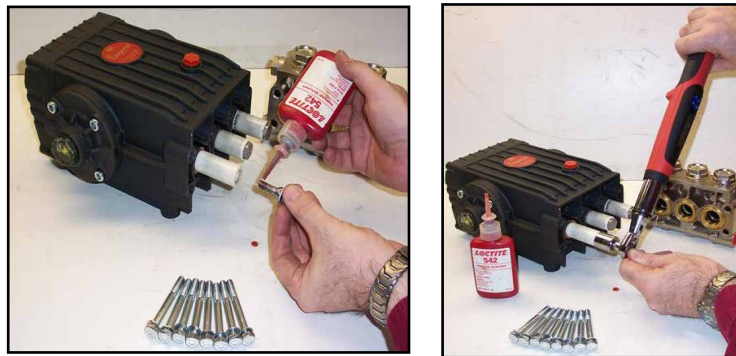


Figure 5-10. Install O-ring, Apply Sealant and Slide Plunger over Plunger Guide

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.

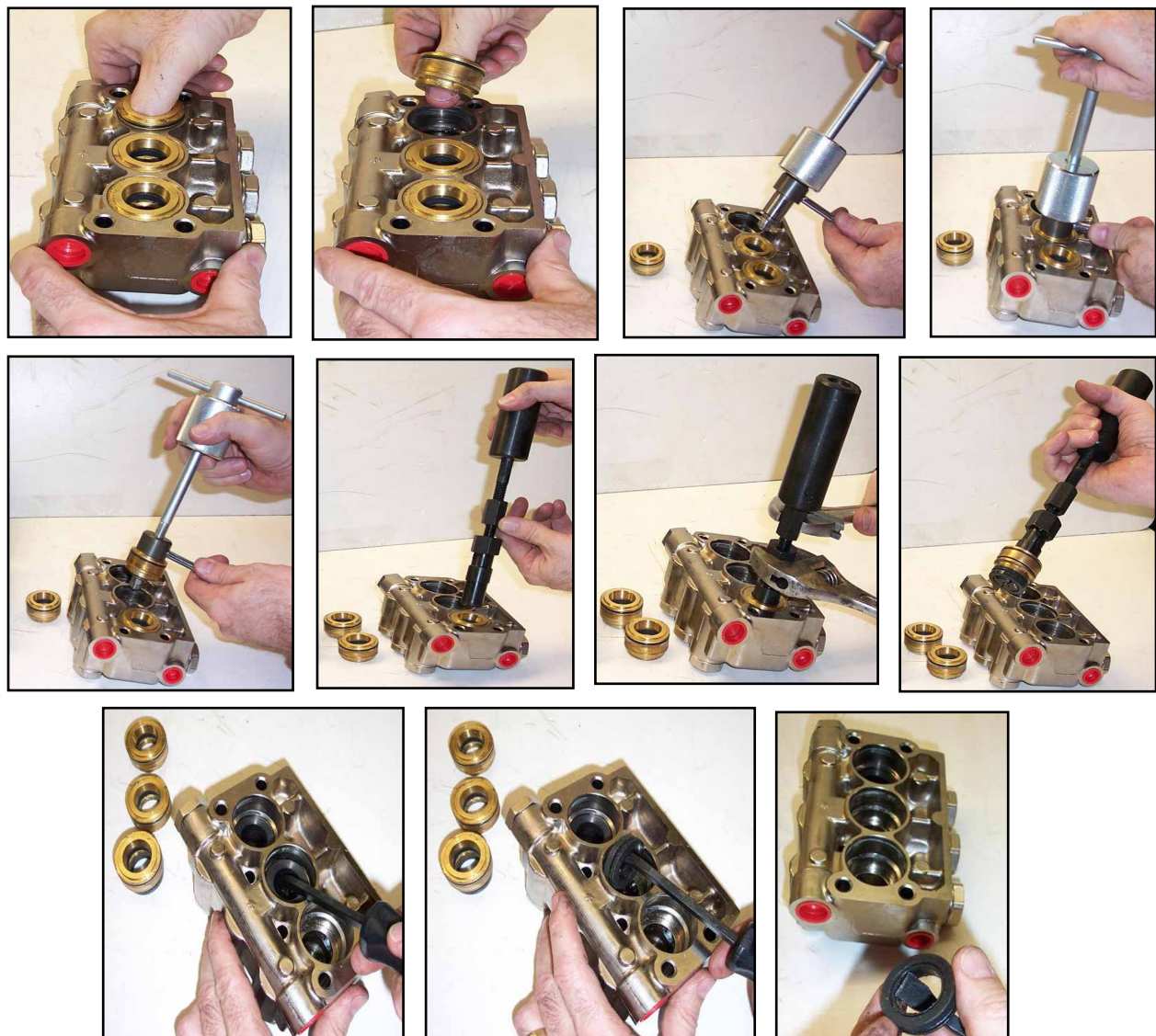


Figure 5-11. Extract Retainers and Seals

Replacing the Seal Assemblies

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

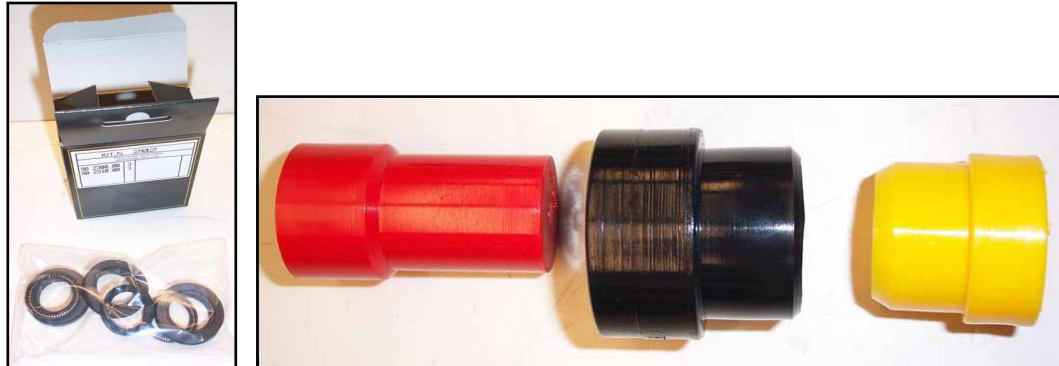


Figure 5-12. Seal Kit and Insertion Tool for Seal Installation

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).

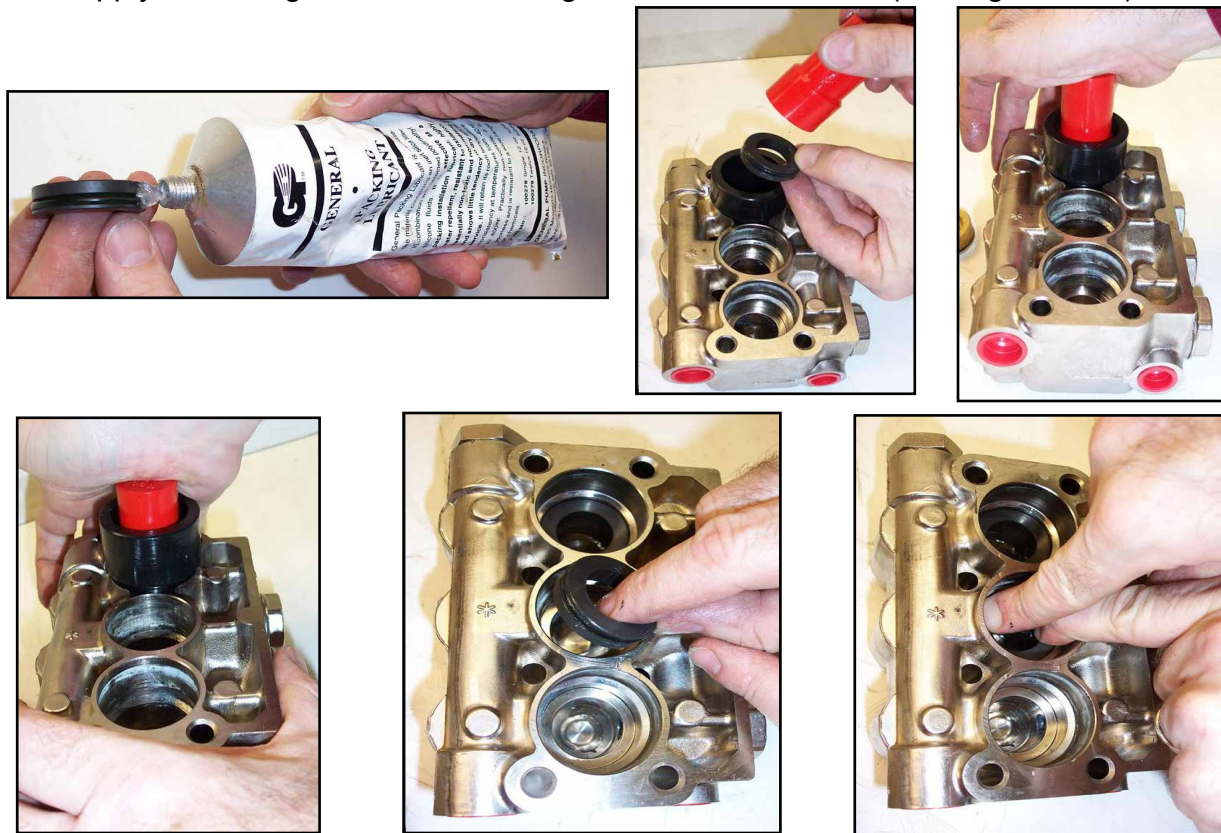


Figure 5-13. Install Seal Assembly Using O-Ring Grease

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).

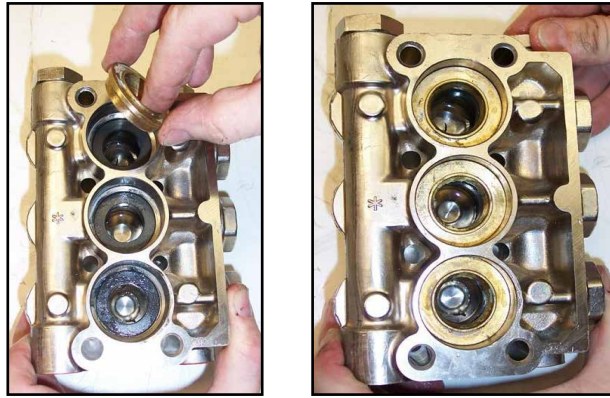


Figure 5-14. Install Retainers into Cavities

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

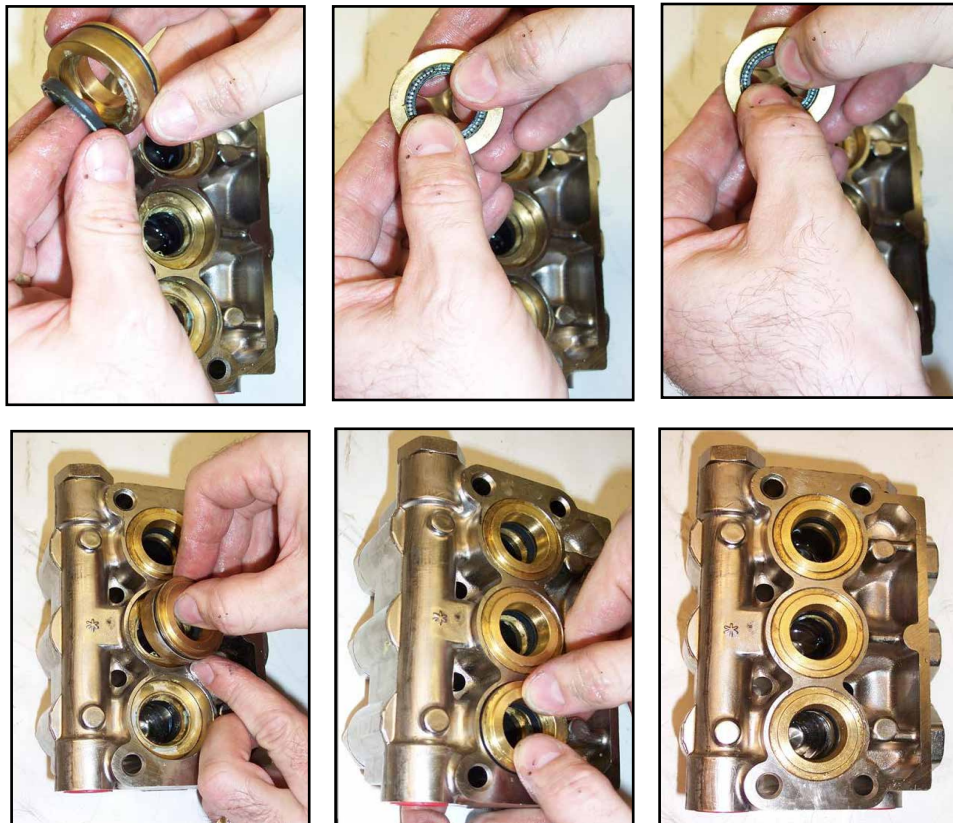


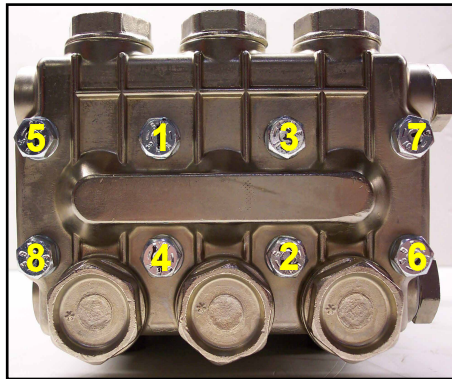
Figure 5-15. Press Low Pressure Seal Assembly into Cavity

Re-Installing Manifold

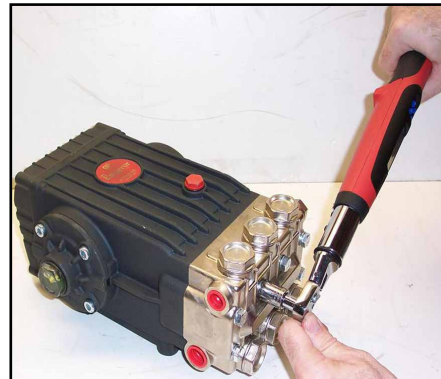
1. Position the outer plungers at the same position (see Figure 5-16).
2. Re-install manifold and torque the fasteners in an "X" pattern to 50% of specification and then retorque to 100% specification (see Figure 5-17 and Figure 5-18).



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**

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.”

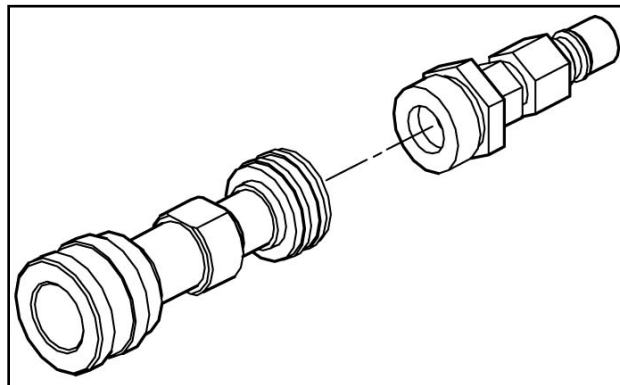


Figure 5-19. Recirculation Fitting

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.

⚠ WARNING

When draining solution from the machine, wear protective eye wear and ensure the solution temperature is cold. Failure to follow this caution can result in personal injury.

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 - 3 minutes. This will distribute antifreeze solution throughout the truckmount.
5. Remove the chemical feed line from the chemical jug. Turn the "CHEMICAL SYSTEM" 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.

6 - Water and Chemical System

This section describes the Boxxer 423S' water and chemical systems, and includes the exhaust subsystem.

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.
3. In the heat exchanger, the temperature is raised. The heat necessary to do this is provided by both the engine and blower exhausts. The heated water then travels to the high pressure manifold.
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 thermal valve. This thermal valve monitors the water box temperature.
6. When the thermal valve senses the water in the water box has reached its set point, it opens the low pressure thermal valve on the side of the water box and closes once the temperature drops back below the set point (see Figure 6-2).
7. The water that is being called for by the wand then exits the manifold and passes through a check valve (see Figure 6-2).

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 from 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.

Figure 6-1. Flow Diagram - View 1 of 3

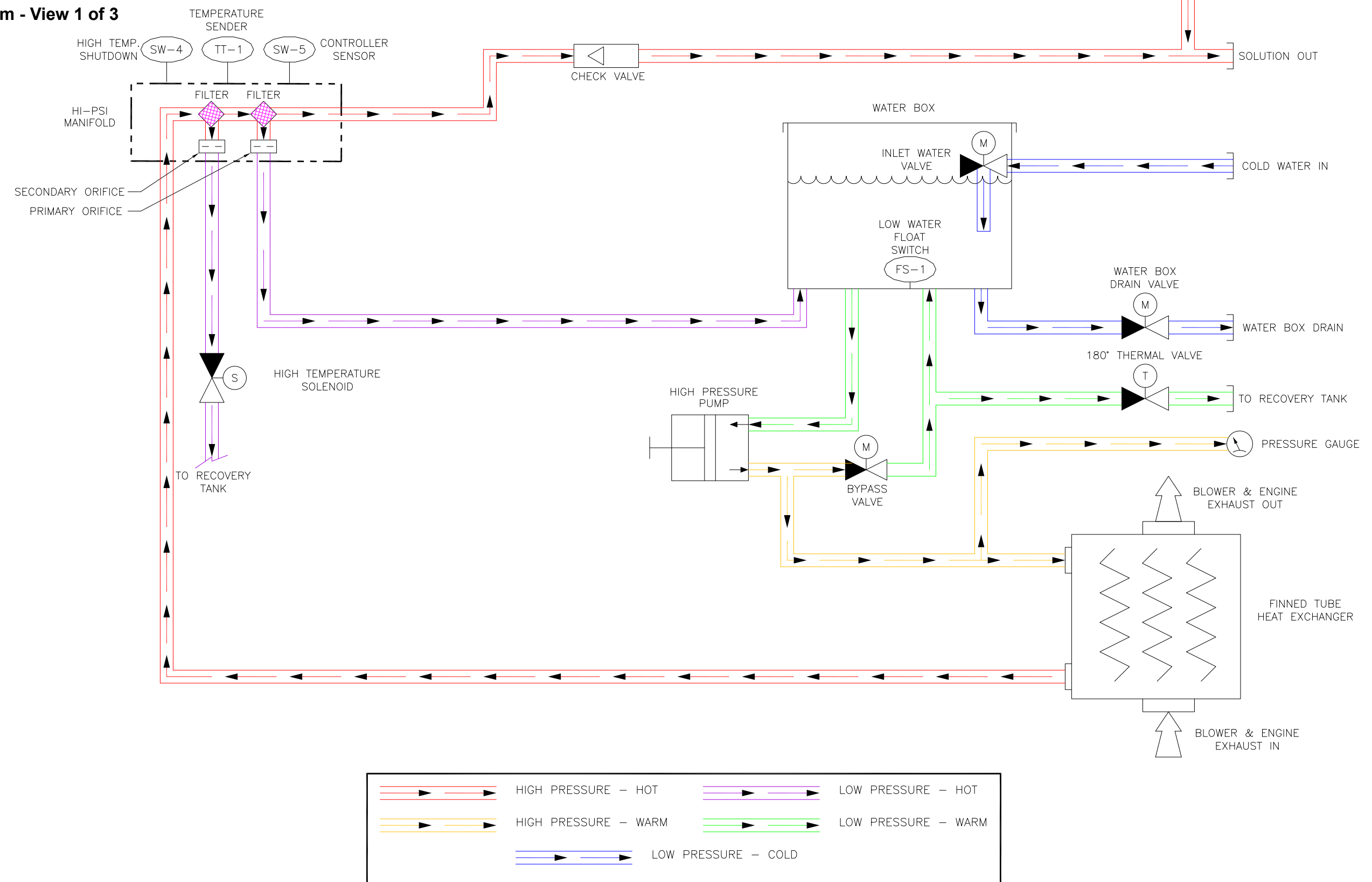


Figure 6-2. Flow Diagram - View 2 of 3

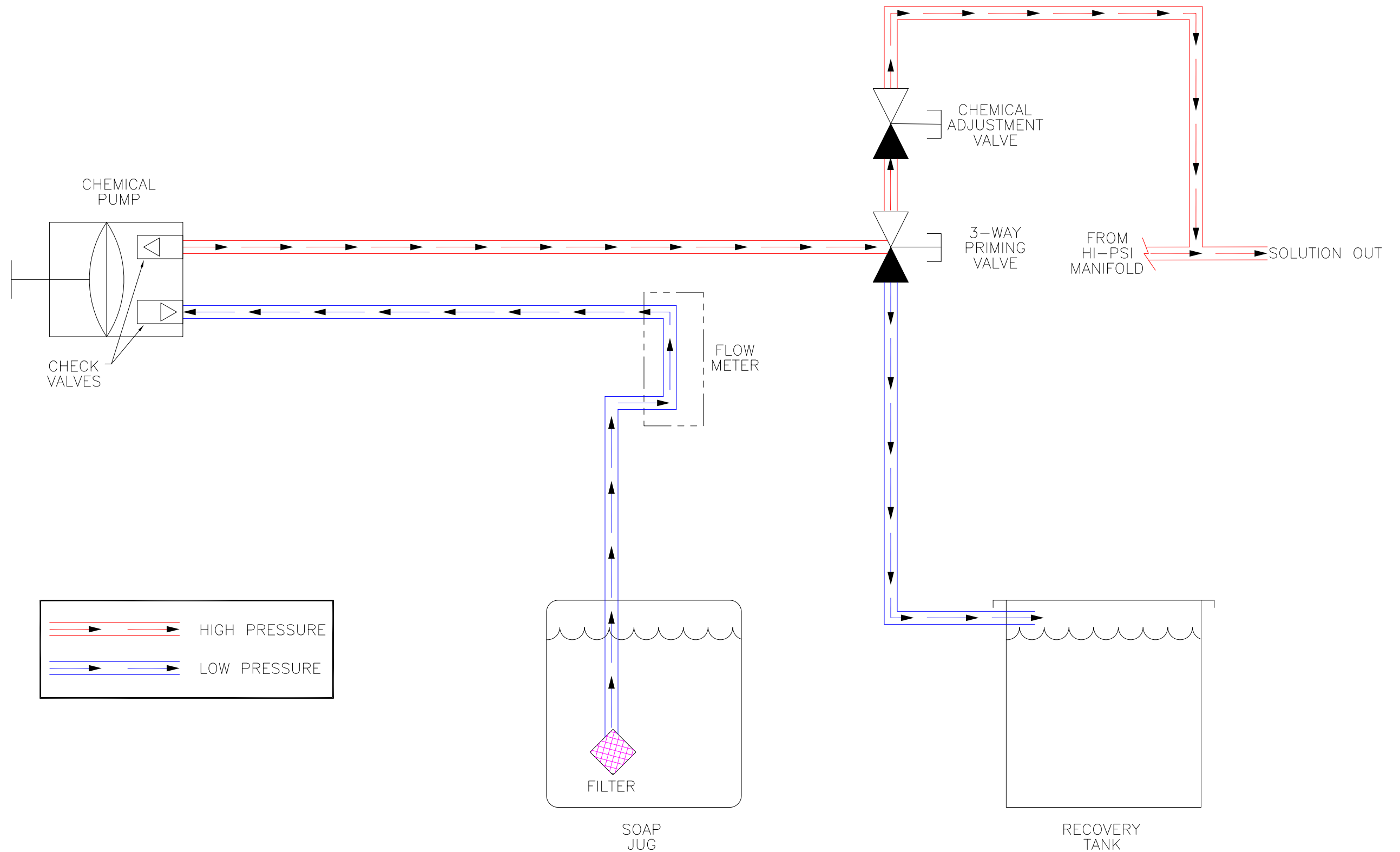
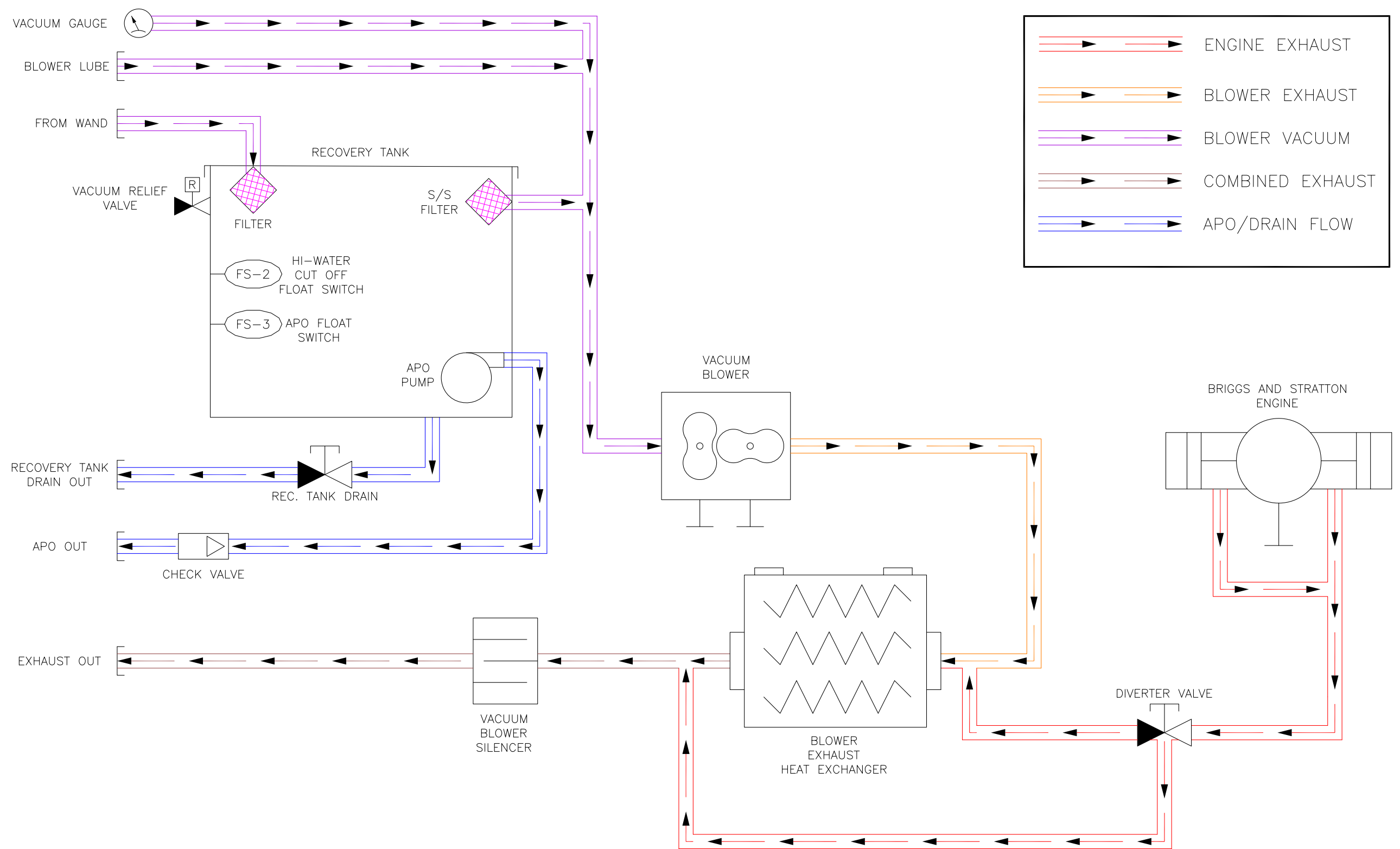


Figure 6-3. Flow Diagram - View 3 of 3



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7 - Electrical System

This section describes how the electrical system functions in the following manner:

- Electrical System Information
- Electrical Schematic
- Wiring Diagram

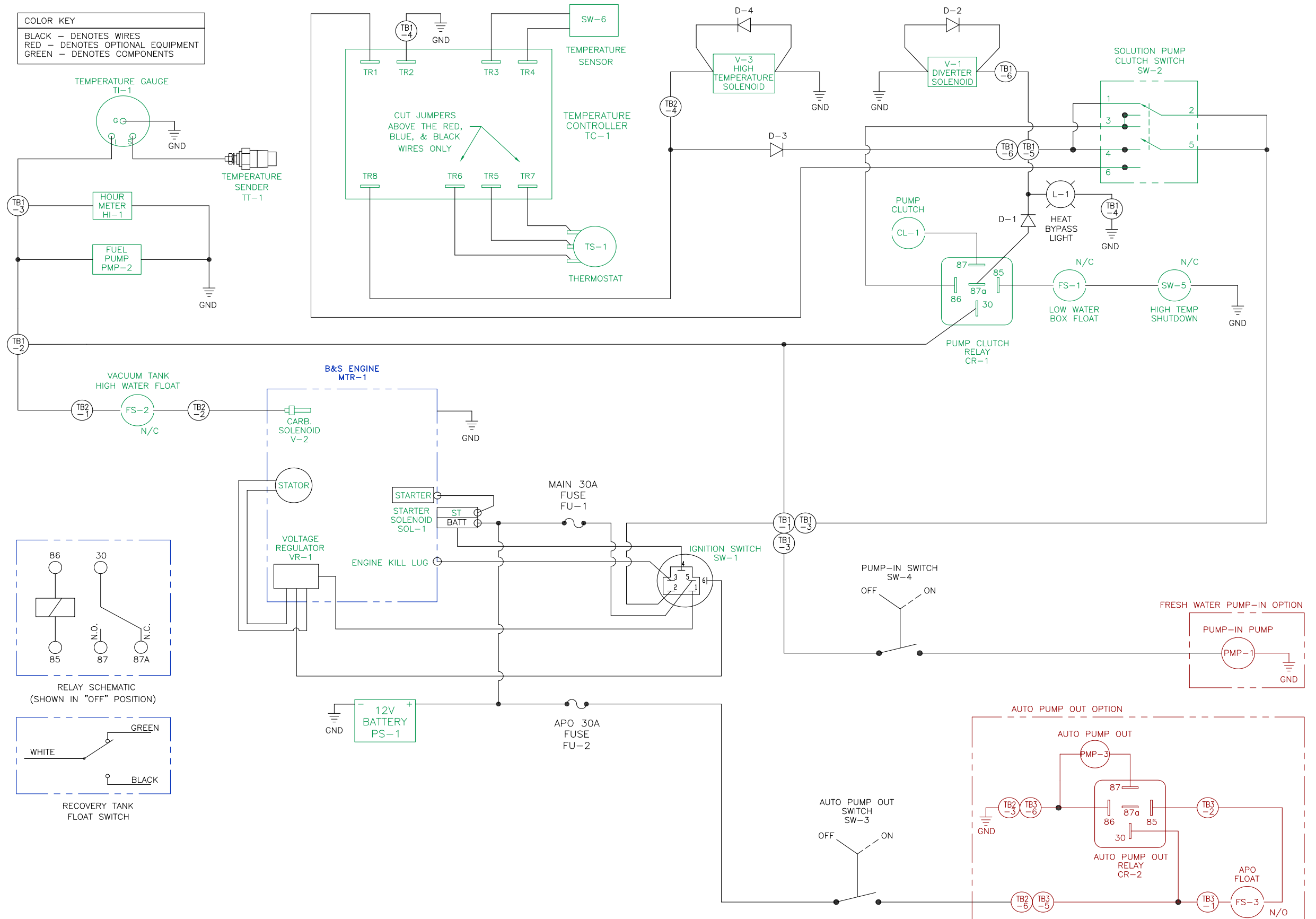
ELECTRICAL SYSTEM INFORMATION

The Boxxer 423S electrical system operates on 12 V DC which is provided by the battery. Battery levels are maintained by a 20 Amp alternator mounted on the engine.

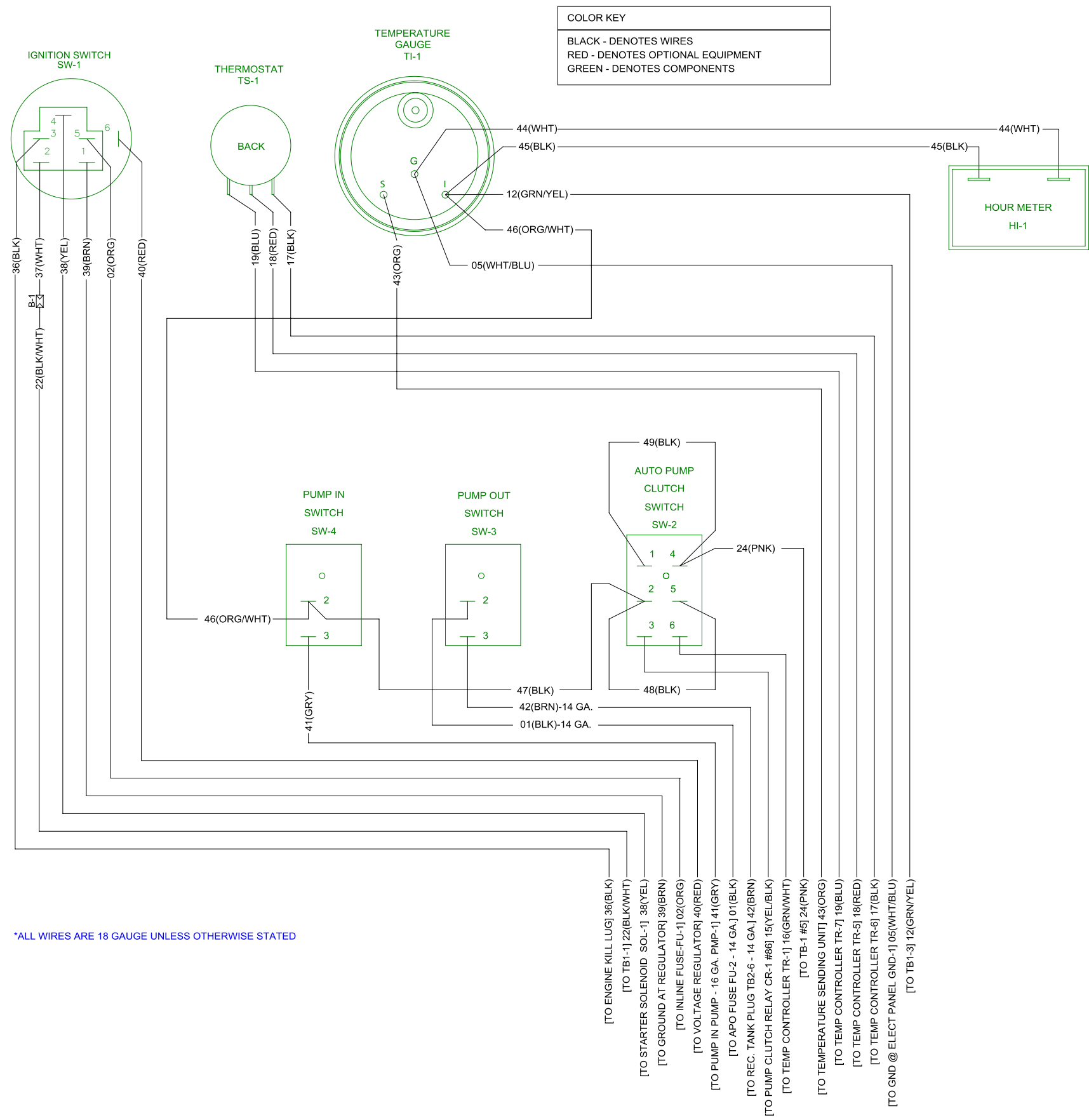
NOTICE

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
000-179-040

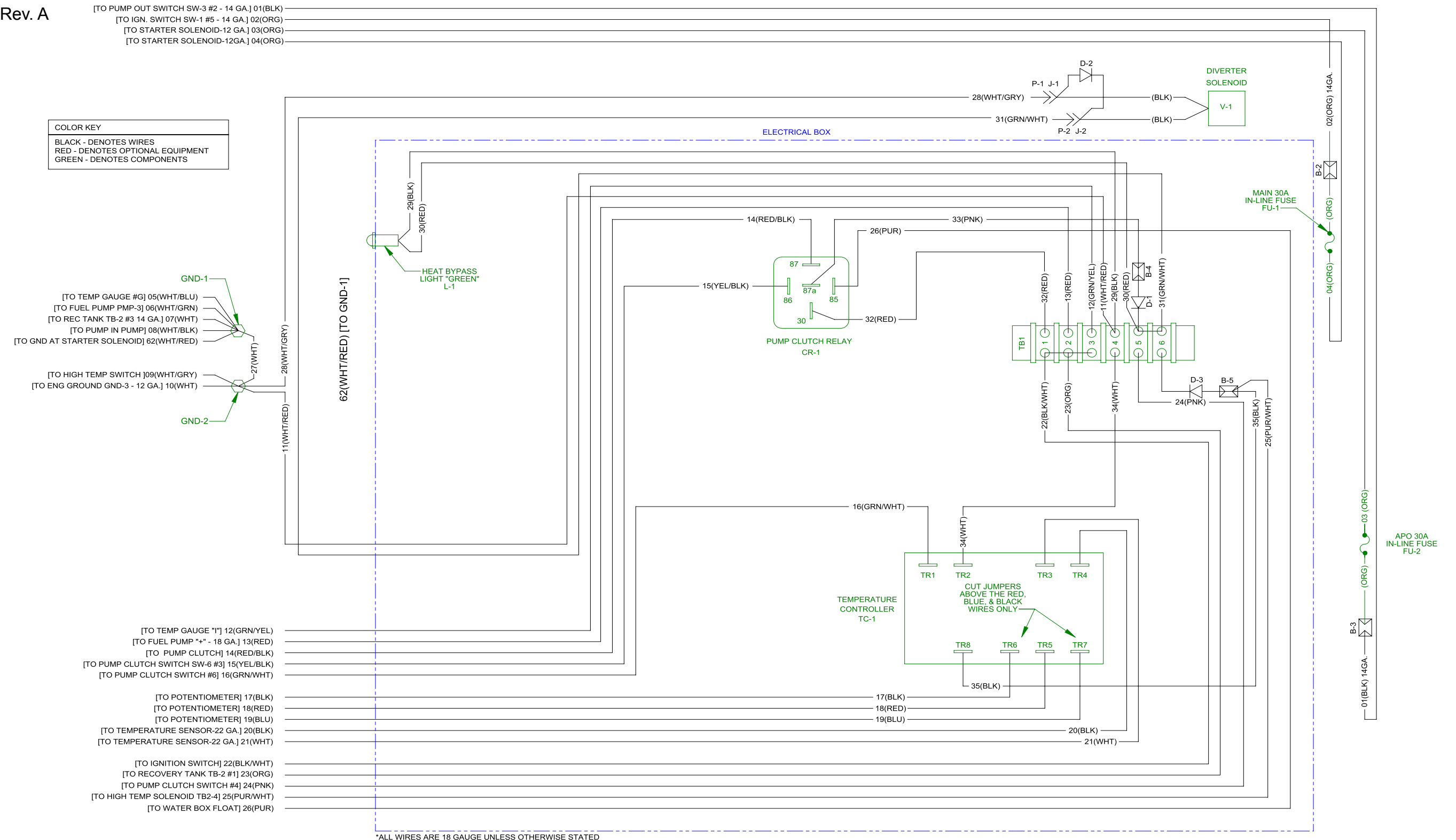


**Figure 7-2. Wiring Diagram -
View 1 of 3**
000-179-039 Rev. A

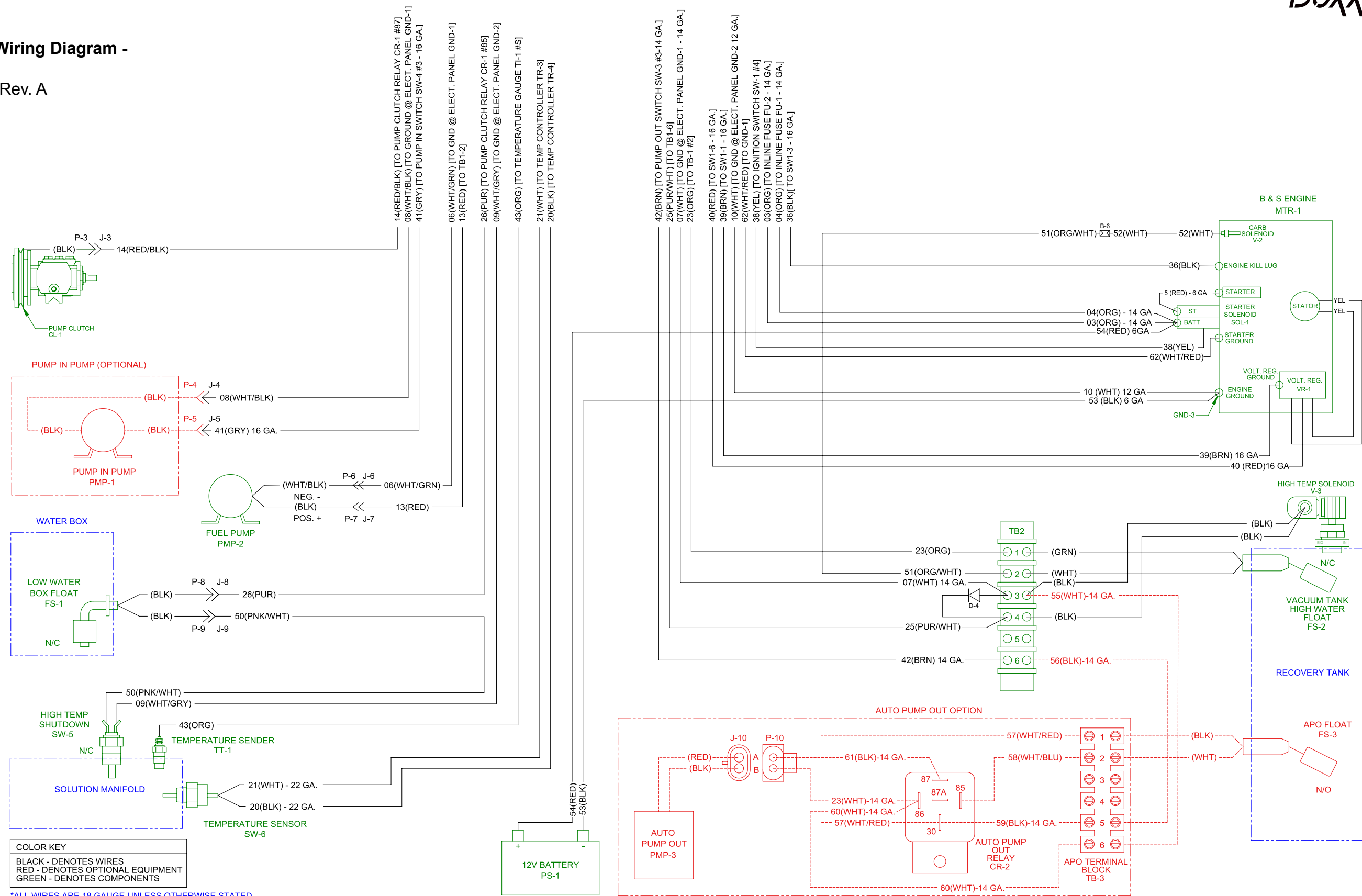


*ALL WIRES ARE 18 GAUGE UNLESS OTHERWISE STATED

Figure 7-3. Wiring Diagram - View 2 of 3
000-179-039 Rev. A



**Figure 7-4. Wiring Diagram -
View 3 of 3**
000-179-039 Rev. A



*ALL WIRES ARE 18 GAUGE UNLESS OTHERWISE STATED

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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

Possible Cause		Solution
1.1	The orifice or filter screen is 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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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.)

Possible Cause		Solution
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. <div style="background-color: yellow; padding: 5px; text-align: center;">CAUTION</div> 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.)

Possible Cause		Solution
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.

Possible Cause		Solution
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

Possible Cause		Solution
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)

Possible Cause		Solution
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

Possible Cause		Solution
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. <div style="background-color: yellow; text-align: center; padding: 5px;">CAUTION</div> <p>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.</p>
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

Possible Cause		Solution
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

Possible Cause		Solution
2.1	The pump belt is 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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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.**

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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

Possible Cause		Solution
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.

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9 - Assemblies and Parts Lists

The Boxxer 423S assembly drawings and parts list included in this section are as follows:

- Machine Assembly Parts List
- Console Assembly Parts List
- Frame Assembly Parts List
- Blower Assembly Parts List
- Pump Assembly Parts List
- Dash Assembly Parts List
- By-Pass Valve Assembly Parts List
- Hi PSI Manifold Assembly Parts List
- Electrical Panel Assembly Parts List
- Engine Assembly Parts List
- Heat Exchanger Assembly Parts List
- Idler Pulley Assembly Parts List
- Silencer Assembly Parts List
- Water Box Assembly Parts List
- Exhaust Assembly Parts List
- Exhaust Manifold Assembly Parts List
- Exhaust Diverted Assembly Parts List
- Diverter Valve Actuator Assembly Parts List
- Exhaust Diverter Valve Assembly Parts List
- 70 Gallon Universal Recovery Tank (URT) Assembly Parts List
- 70 Gallon Universal Recovery Tank (URT) Cover Assembly Parts List
- 100 Gallon Universal Recovery Tank (URT) Assembly Parts List
- 100 Gallon Universal Recovery Tank (URT) Cover Assembly Parts List
- Vacuum Relief Valve Assembly Parts List
- APO Connection Kit Assembly Parts List
- Hose Routings

Figure 9-1. Machine Assembly - View 1 of 3
700-070-728 Rev. A

Machine Assembly Parts List

Item	Part Number	Description	Qty
1	610-003-728	Assembly, 70 Gallon URT	1
2	610-050-728	Assembly, Console	1
3	000-068-771	Hose Assembly, 2.5" I.D. X 24" Lg.	1
4	000-159-016	Jug, 5 Gallon Plastic Chemicalical - Standard	1
5	000-094-014	Nut, 3/8-16 Hex Z/P	8
6	000-143-150	Screw, 3/8"-16UNC X 4" Lg. Hex Head (Full Thread)	8
7	600-011-003	Tie Down Cleat Washer - Fabricated	8
8	000-174-021	Washer, 3/8" Lock	8
9	000-174-005	Washer, 3/8" Flat	8

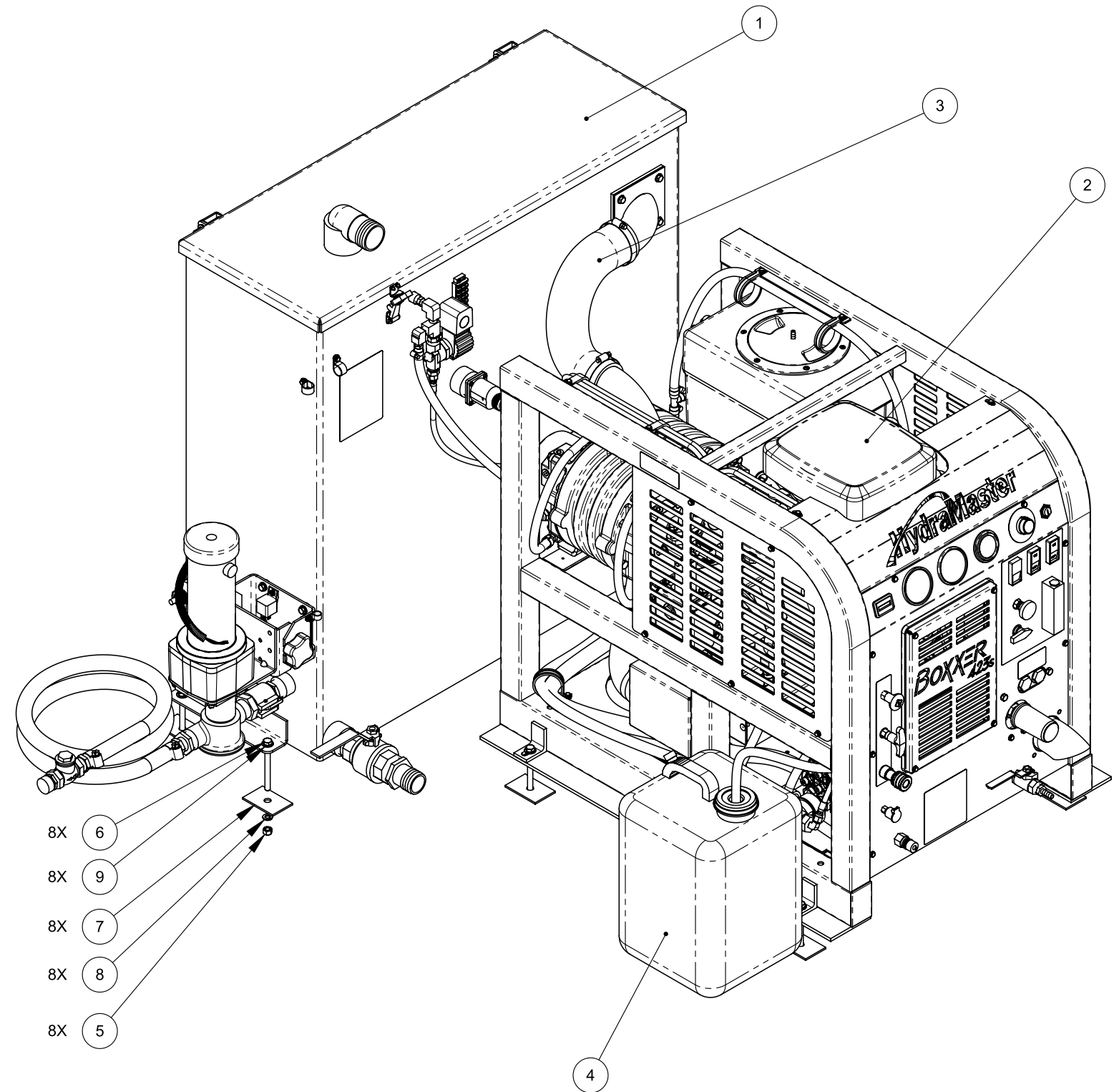
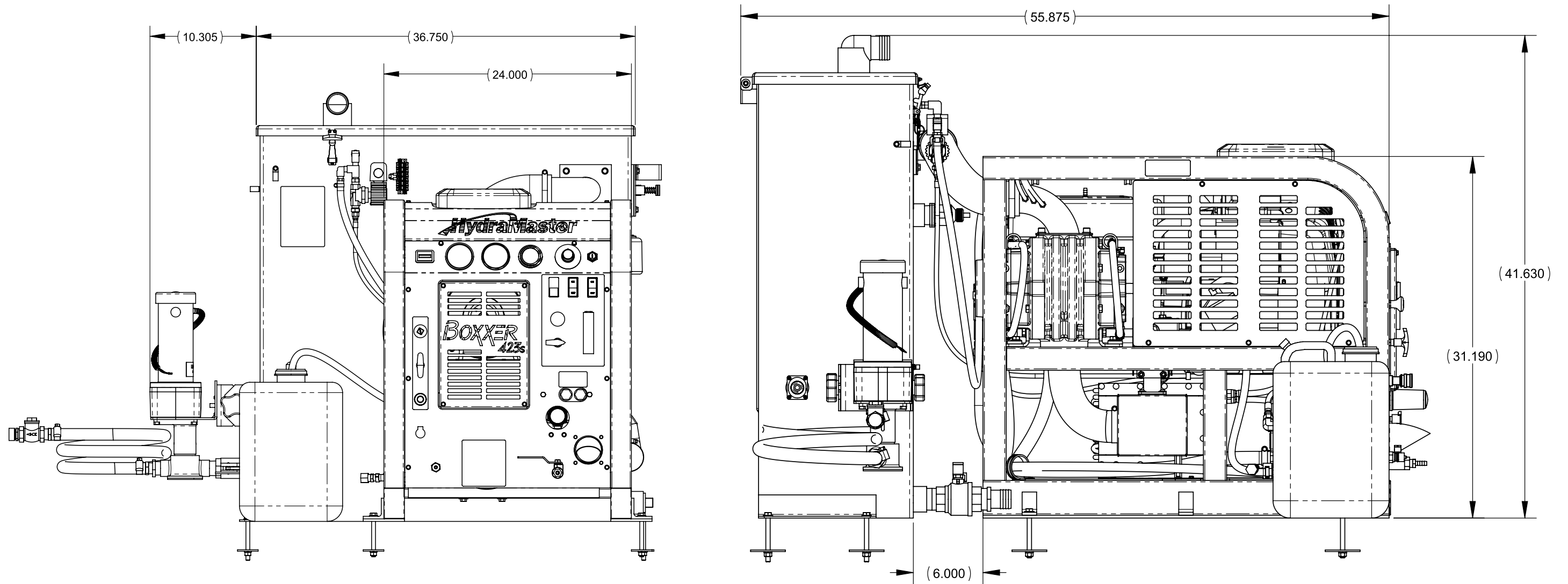


Figure 9-2. Machine Assembly - View 2 of 3
700-070-728 Rev. A



BOXXER
423s

Figure 9-3. Machine Assembly - View 3 of 3
700-070-728 Rev. A

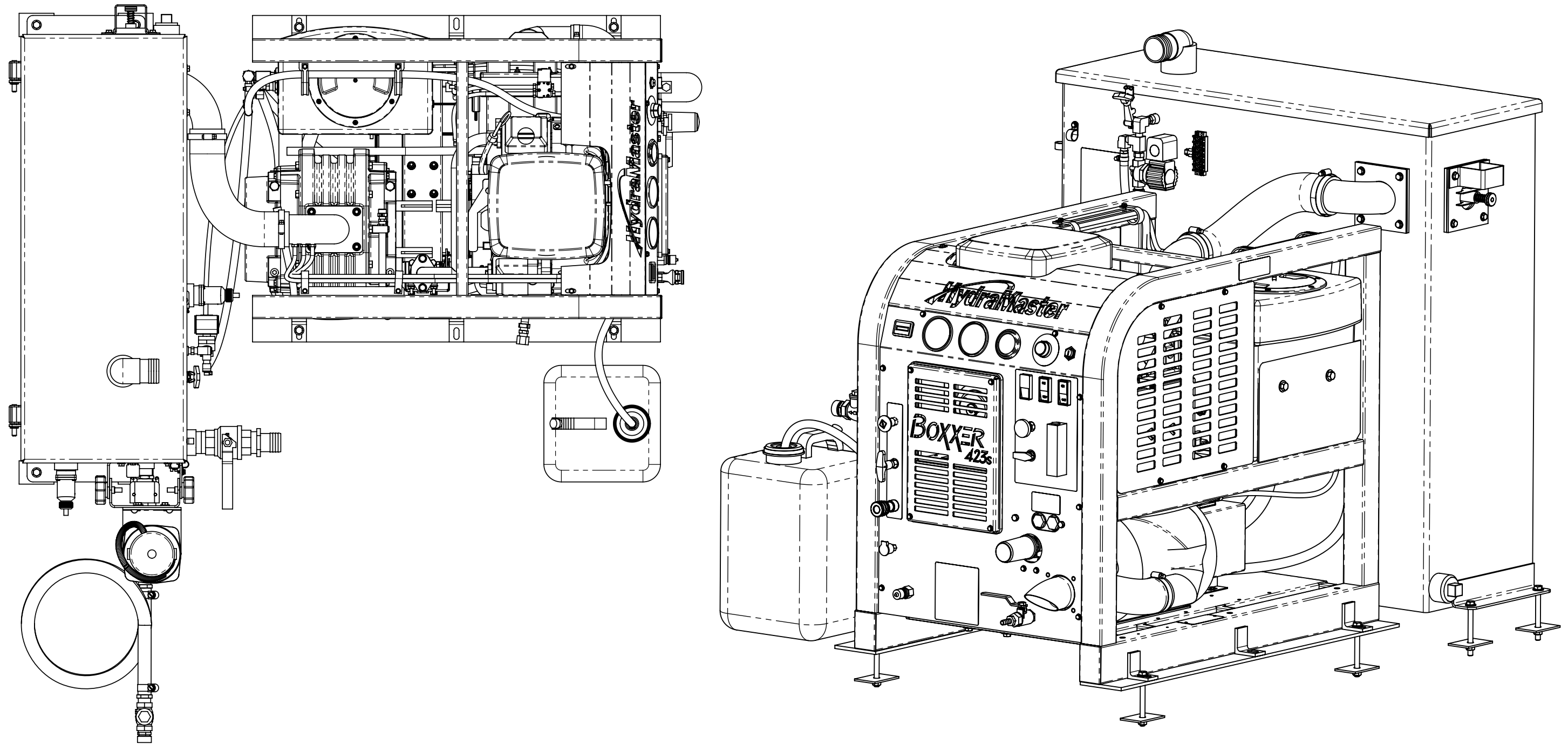


Figure 9-4. Console Assembly - View 1 of 6
610-050-728 Rev. B

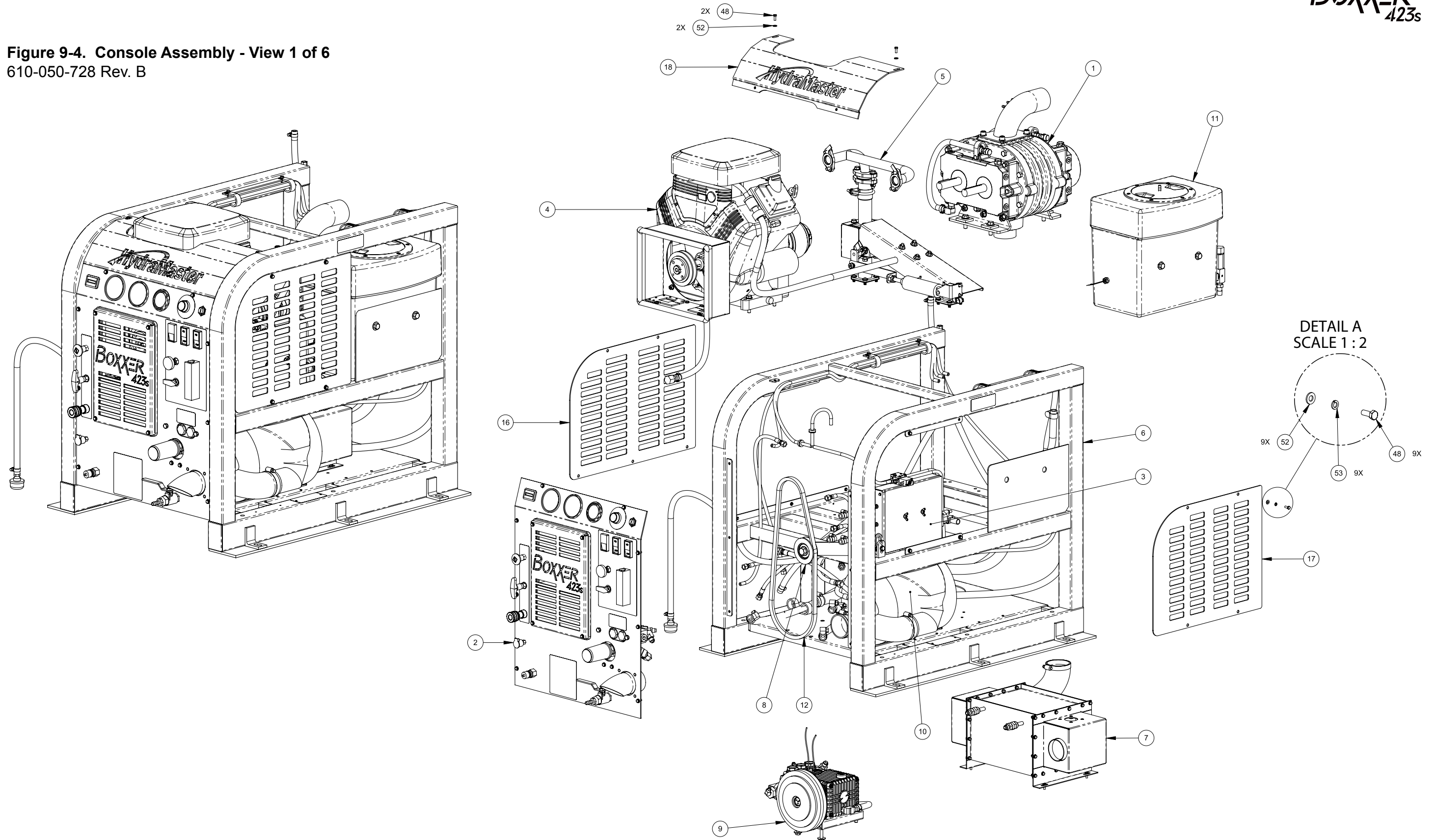


Figure 9-5. Console Assembly - View 2 of 6
610-050-728 Rev. B

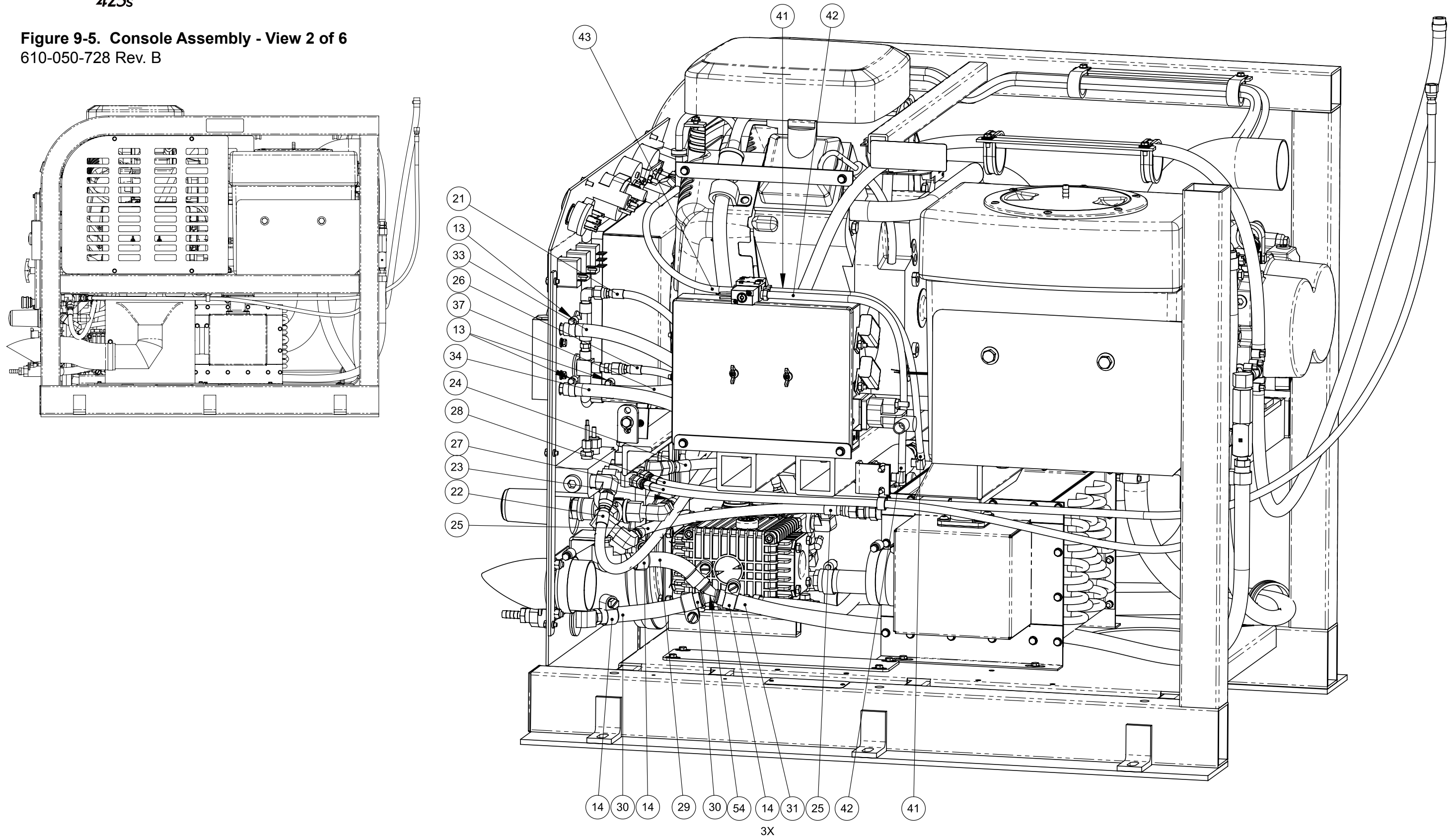


Figure 9-6. Console Assembly - View 3 of 6
610-050-728 Rev. B

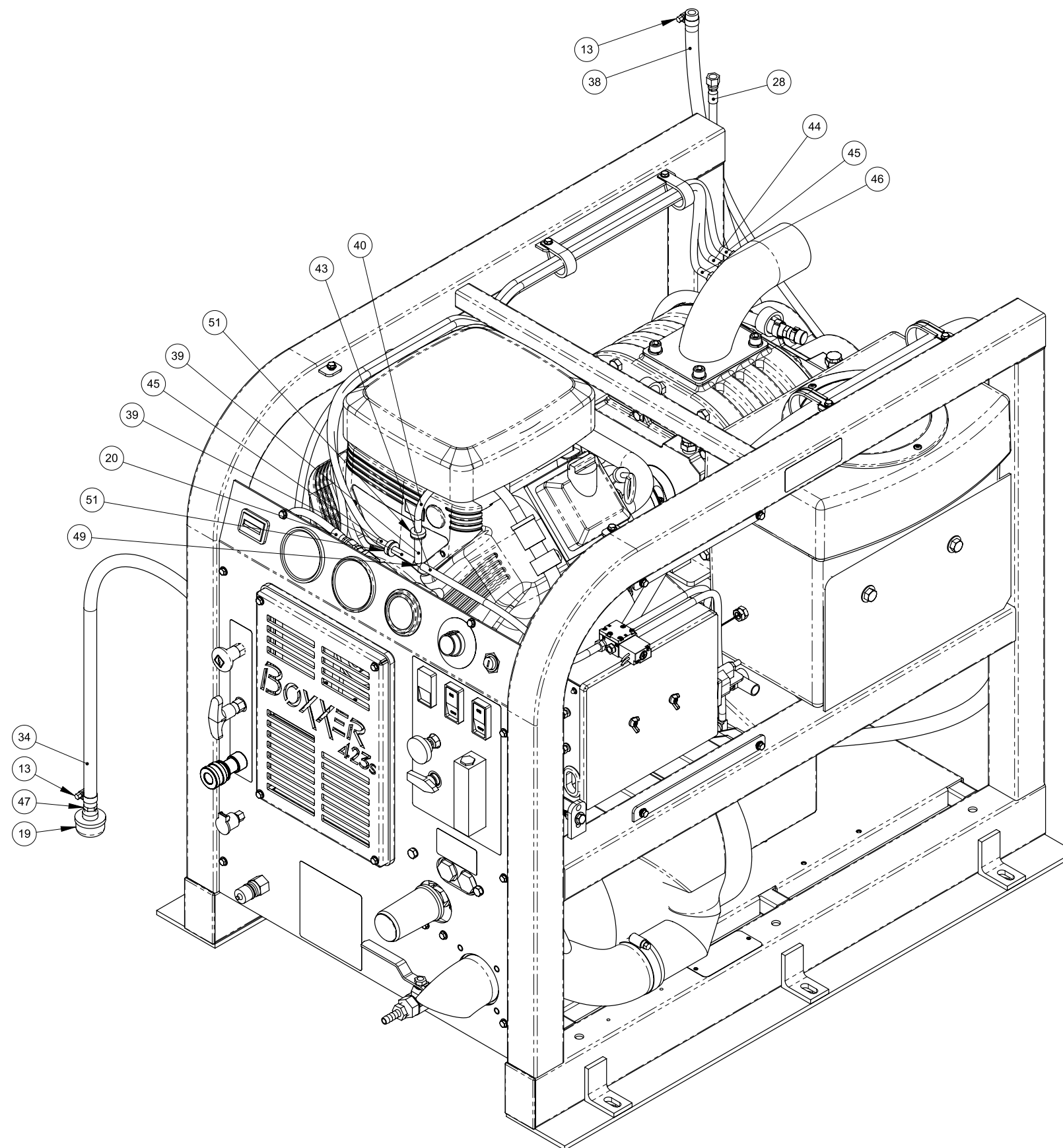


Figure 9-7. Console Assembly - View 4 of 6
610-050-728 Rev. B

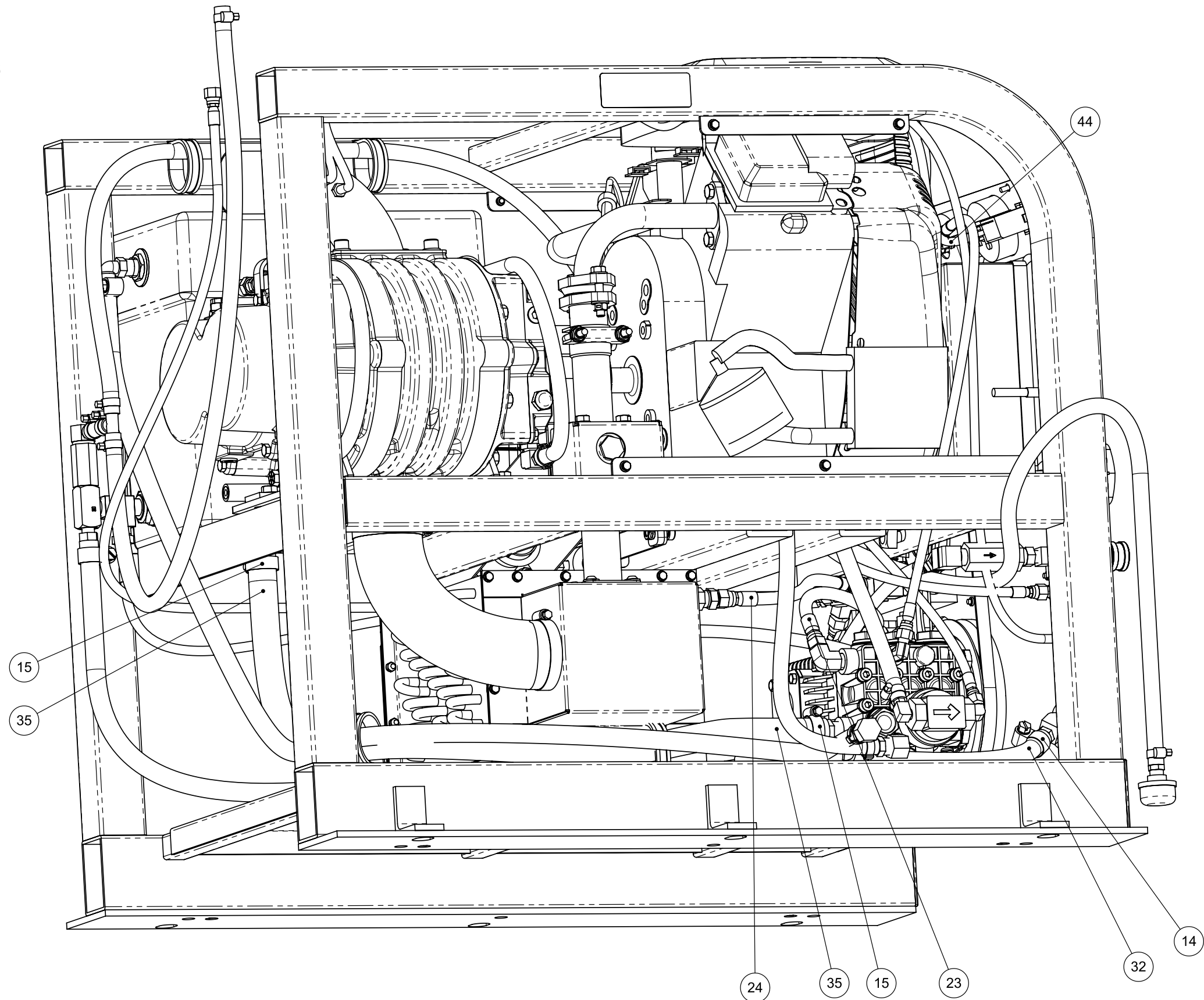


Figure 9-8. Console Assembly - View 5 of 6
610-050-728 Rev. B

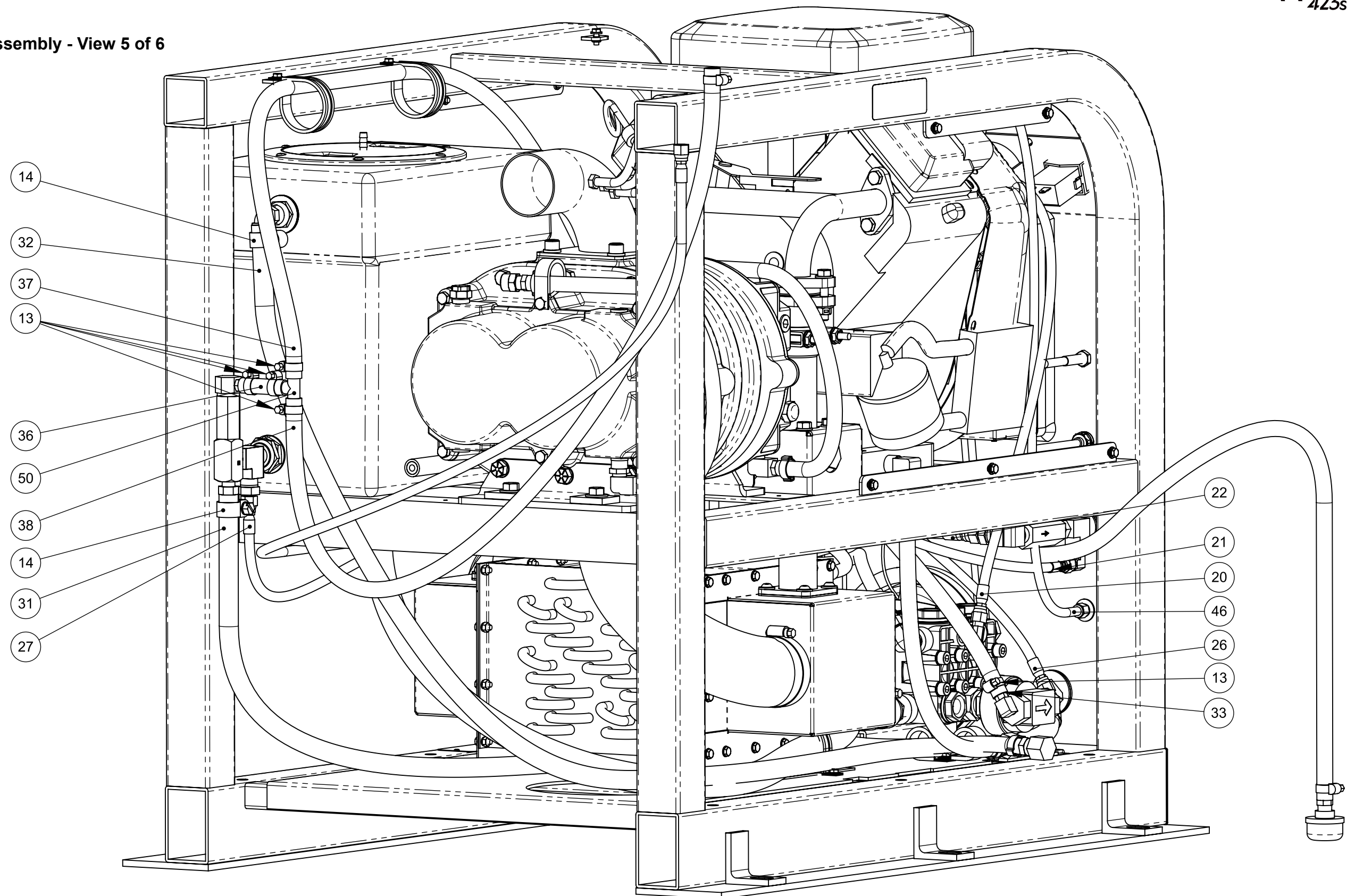
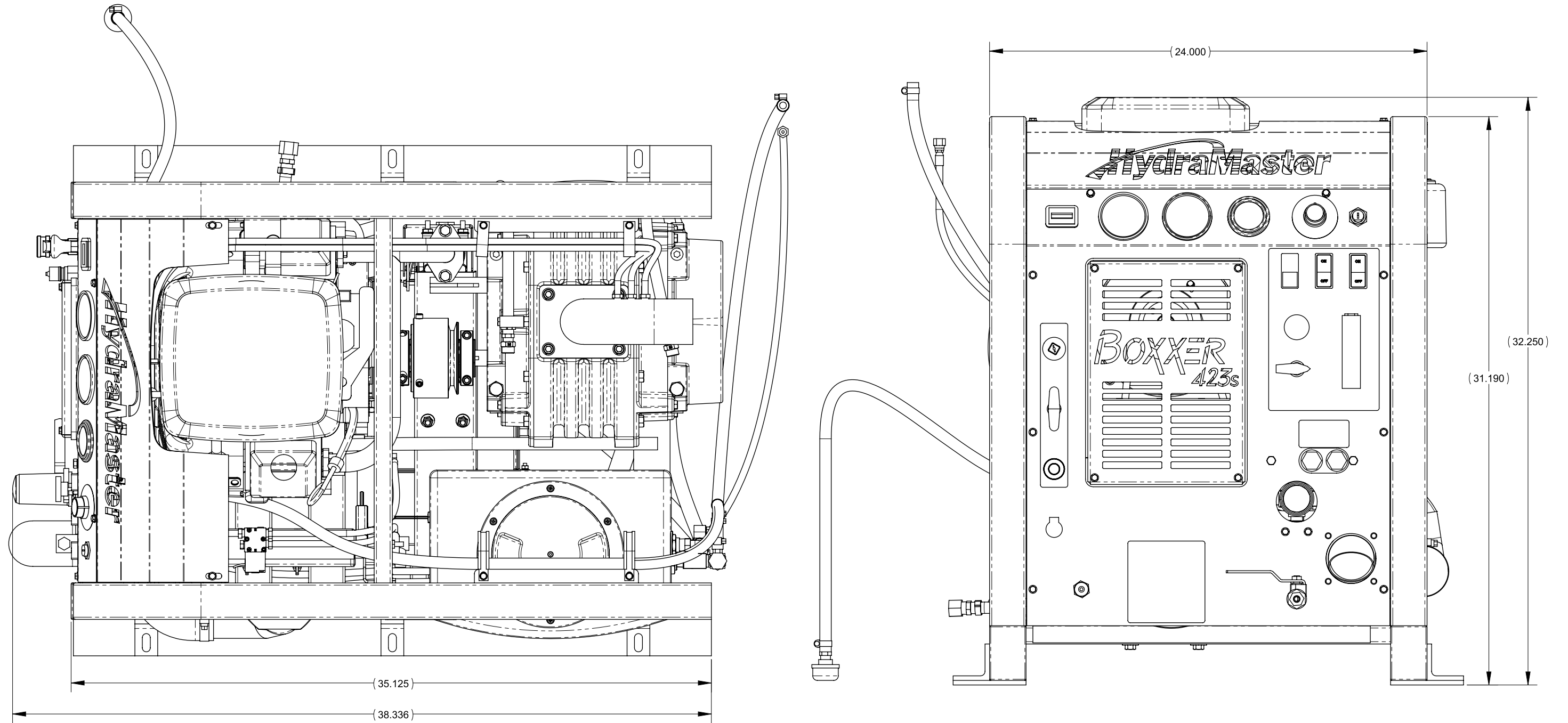


Figure 9-9. Console Assembly - View 6 of 6
610-050-728 Rev. B



Console Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	610-002-728	Assembly, Blower	1	26	000-068-933	Hose Assembly, 3/16" Teflon X 23" Lg. (Chemical Pump to Prime Valve)	1
2	610-018-728	Assembly, Dash	1	27	000-068-509	Hose Assembly, 3/16" Teflon X 37.5" Lg. (Water Box to Primary Orifice)	1
3	610-011-728	Assembly, Electrical Panel	1	28	000-068-1005	Hose Assembly, 3/16" Teflon X 110" Lg. (Secondary Orifice to Rec Tank)	1
4	610-004-728	Assembly, Engine	1	29	000-068-992	Hose, 1/2" Rubber X 4" Lg. (By-pass Return to Wye)	1
5	610-013-728	Assembly, Exhaust	1	30	000-068-993	Hose, 1/2" Rubber X 5" Lg. (Drain Valve to Wye)	1
6	610-001-728	Assembly, Frame	1	31	000-068-991	Hose, 1/2" Rubber X 42" Lg. (Water Box to Wye)	1
7	610-005-728	Assembly, Heat Exchanger	1	32	000-068-994	Hose, 1/2" Rubber X 62" Lg. (Fresh Water In to Water Box)	1
8	610-021-015	Assembly, Idler Pulley	1	33	000-068-980	Hose, 3/8" I.D. Clear w/ Braid X 28.5" Lg. (Flow Meter to Chemical Pump)	1
9	610-007-728	Assembly, Pump	1	34	000-068-971	Hose, 3/8" I.D. Clear w/ Braid X 60" Lg. (Flow Meter to Chemical Jug)	1
10	610-021-728	Assembly, Silencer	1	35	000-068-995	Hose, 3/4" I.D. EPDM X 41" Lg. (Water Box to Hi PSI Pump)	1
11	610-010-728	Assembly, Water Box	1	36	000-068-996	Hose, 3/8" I.D. Rubber X 2" Lg. (Prime Tee to Thermo Valve)	1
12	000-010-124	Belt, 9430HD	1	37	000-068-997	Hose, 3/8" I.D. Rubber X 60" Lg. (Prime Tee to Chemical Prime Valve)	1
13	000-033-003	Clamp, Size #4 Mini Hose	10	38	000-068-972	Hose, 3/8" I.D. Rubber X 76" Lg. (Prime Tee to Rec. Tank)	1
14	000-033-004	Clamp, Size #6 Mini Hose	8	39	000-068-1006	Hose, 5/32" I.D. Vacuum X 1.5" Lg. (Vac Tee to Check Valve)	2
15	000-033-029	Clamp, Size #12 Hose	2	40	000-068-1007	Hose, 5/32" I.D. Vacuum X 4.5" Lg. (Engine to Check Valve)	1
16	000-041-451	Cover, Left Side - Coated	1	41	000-068-1008	Hose, 5/32" I.D. Vacuum X 15" Lg. (Vac Solenoid - Divert Mode)	1
17	000-041-452	Cover, Right Side - Coated	1				
18	000-041-011	Cover, Top, Machine - Coated	1				
19	000-049-118	Filter, Chemicalical Inlet High Pressure	1				
20	000-068-888	Hose Assembly, 3/16" Teflon X 24" Lg. (Hi PSI Pump to PSI Gauge)	1				
21	000-068-888	Hose Assembly, 3/16" Teflon X 24" Lg. (Chemical Metering Valve to Solution Out)"	1				
22	000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg. (Hi PSI Manifold to Solution Out)	1				
23	000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg. (Hi PSI Pump to By-pass Valve)	1				
24	000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg. (Heat Exchanger Out to Hi PSI Manifold)	1				
25	000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg. (Heat Exchanger In to By-pass Valve)	1				

Console Assembly Parts List (continued)

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
42	000-068-1008	Hose, 5/32" I.D. Vacuum X 15" Lg. (Vac Solenoid - Heat Mode)	1			(Blower Inlet to Blower Lube Port)	1
43	000-068-1009	Hose, 5/32" I.D. Vacuum X 16" Lg. (Vac Tee to Vac Solenoid)	1	47	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	1
44	000-068-1010	Hose, 5/32" I.D. Vacuum X 40.5" Lg. (Blower Inlet to Vac Gauge)	1	48	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	11
45	000-068-1010	Hose, 5/32" I.D. Vacuum X 40.5" Lg. (Blower Inlet to Check Valve)	1	49	000-052-155	Tee, 3/16" Plastic Vacuum Insert	1
46	000-068-1011	Hose, 5/32" I.D. Vacuum X 57" Lg.		50	000-052-022	Tee, 3/8" Insert	1
				51	000-169-156	Valve, Check - Diverter Control	2
				52	000-174-001	Washer, #10 Flat	11
				53	000-174-014	Washer, #10 Lock	9
				54	000-052-407	Wye, 1/2" Plastic Barb	1

Figure 9-10. Frame Assembly - View 1 of 2
610-001-728

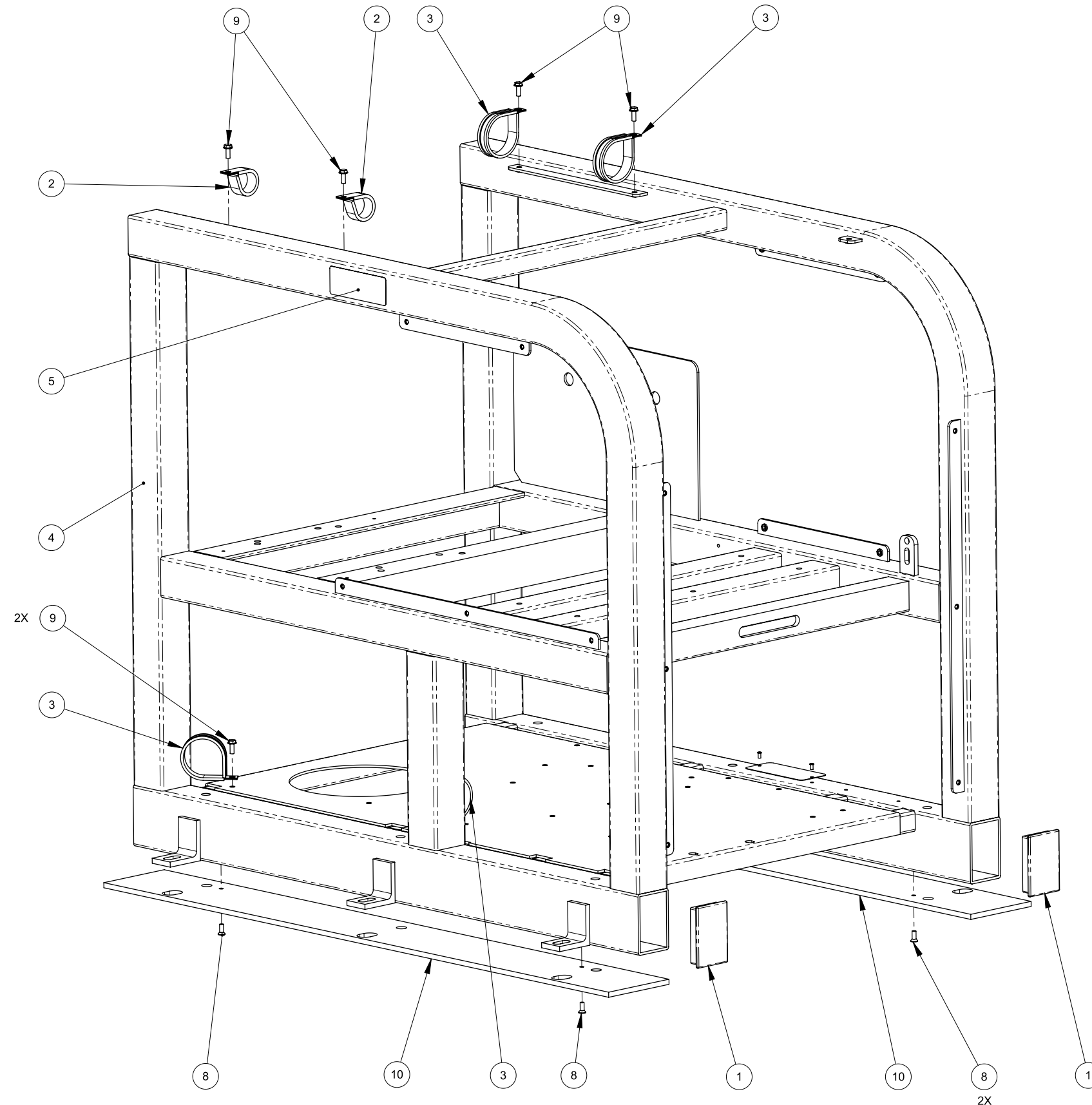


Figure 9-11. Frame Assembly - View 2 of 2
610-001-728

Frame Assembly Parts List

Item	Part Number	Description	Qty
1	000-027-110	Cap, 2" X 3" Frame End	2
2	000-033-057	Clamp, 1" Cushion Loop	2
3	000-033-067	Clamp, 2" Cushion Loop	4
4	000-055-195	Frame, Complete - Coated	1
5	000-081-327	Label, ANSI Warning	2
6	000-105-012	Plate, Machine Serial I.D.	1
7	000-140-001	Rivet, AB4-3A Aluminum Pop 1/8" X 1/4" Lg.	2
8	000-143-114	Screw, #10-24UNC X 0.50" Lg. Flat Head Phillips	4
9	000-143-583	Screw, #10-24UNC X 0.50" Lg. Hex Head Flange Z/P	6
10	000-154-156	Spacer, Machine Rising 4" X 35"	2

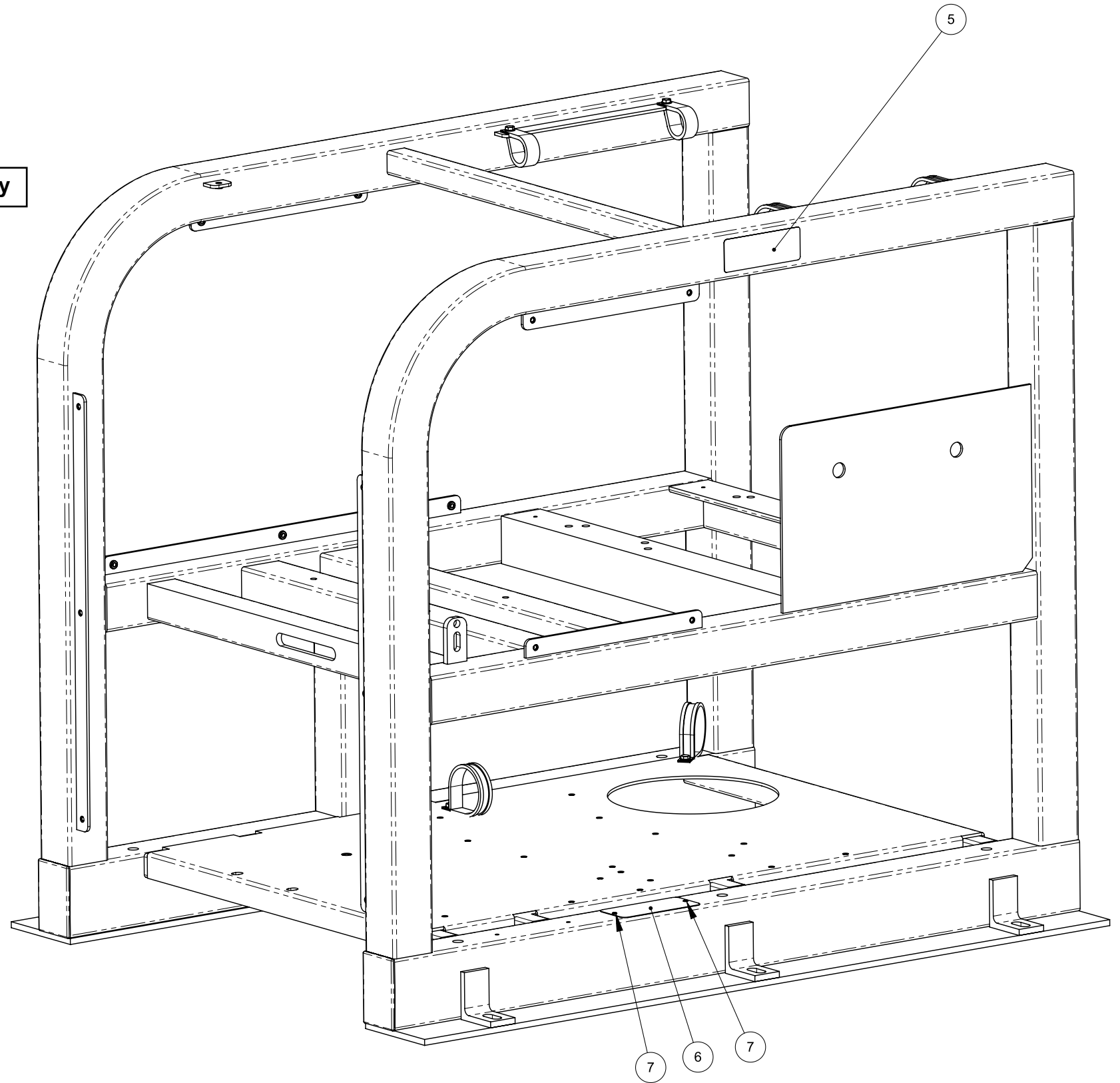
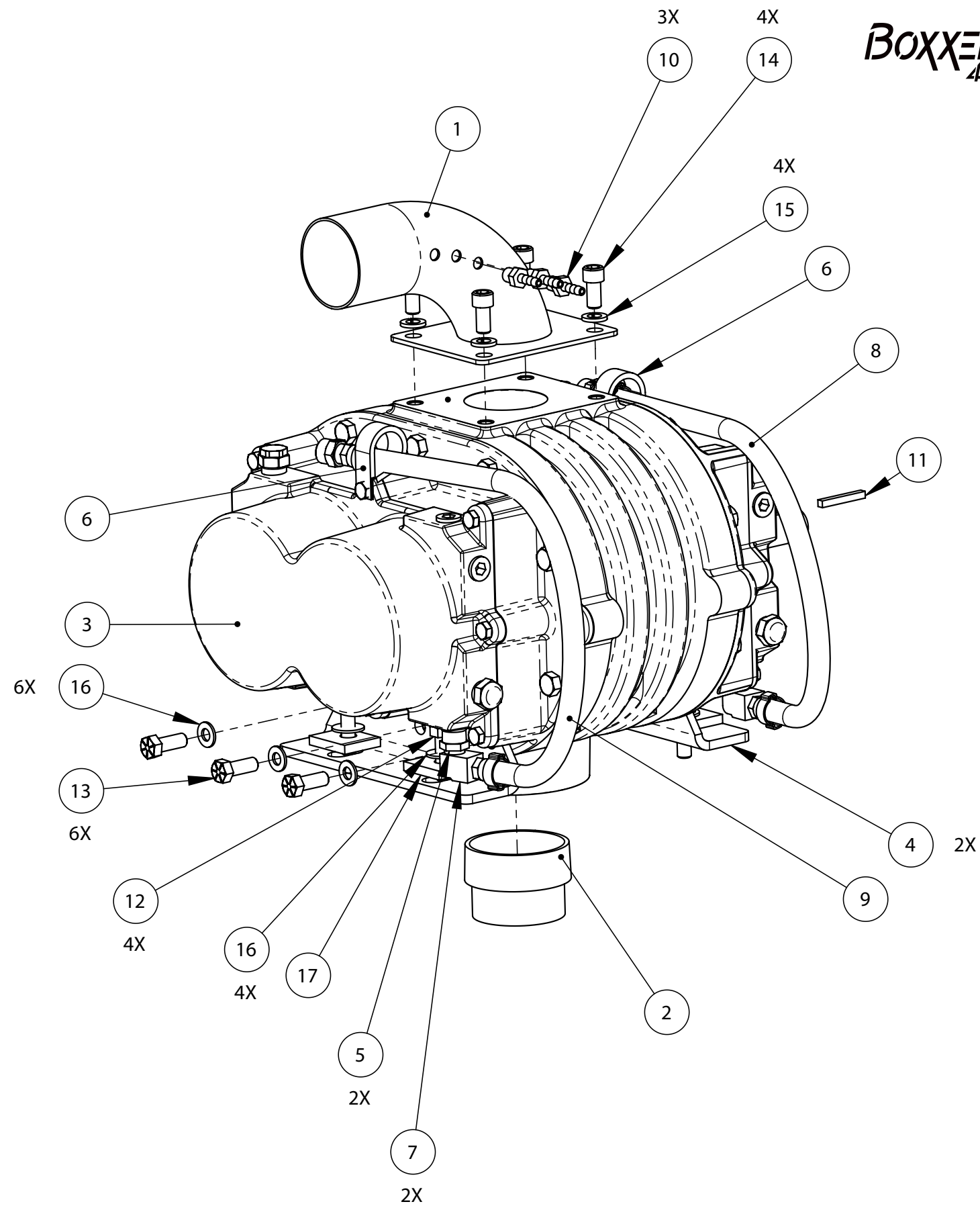
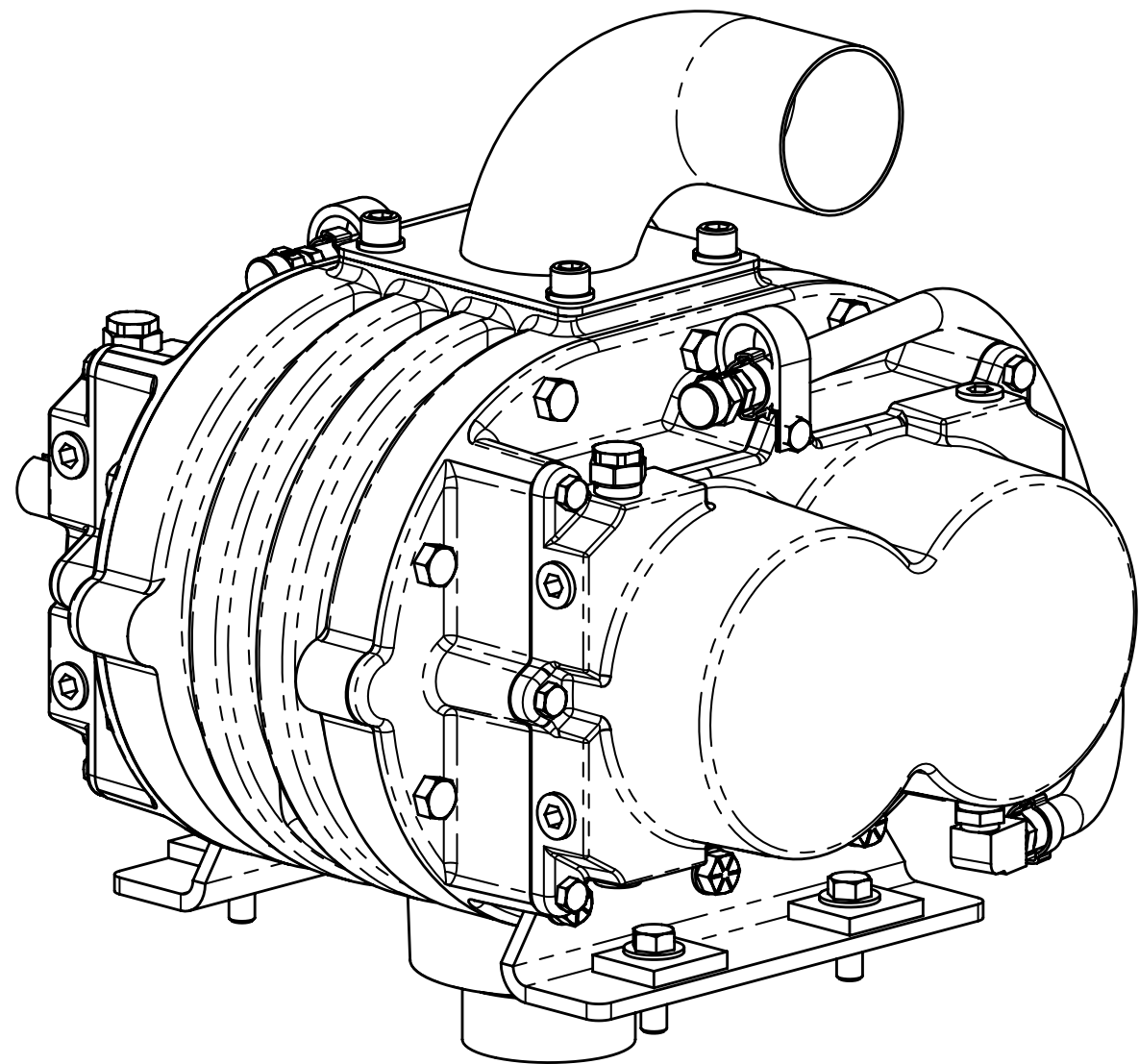


Figure 9-12. Blower Assembly
610-002-728 Rev. A



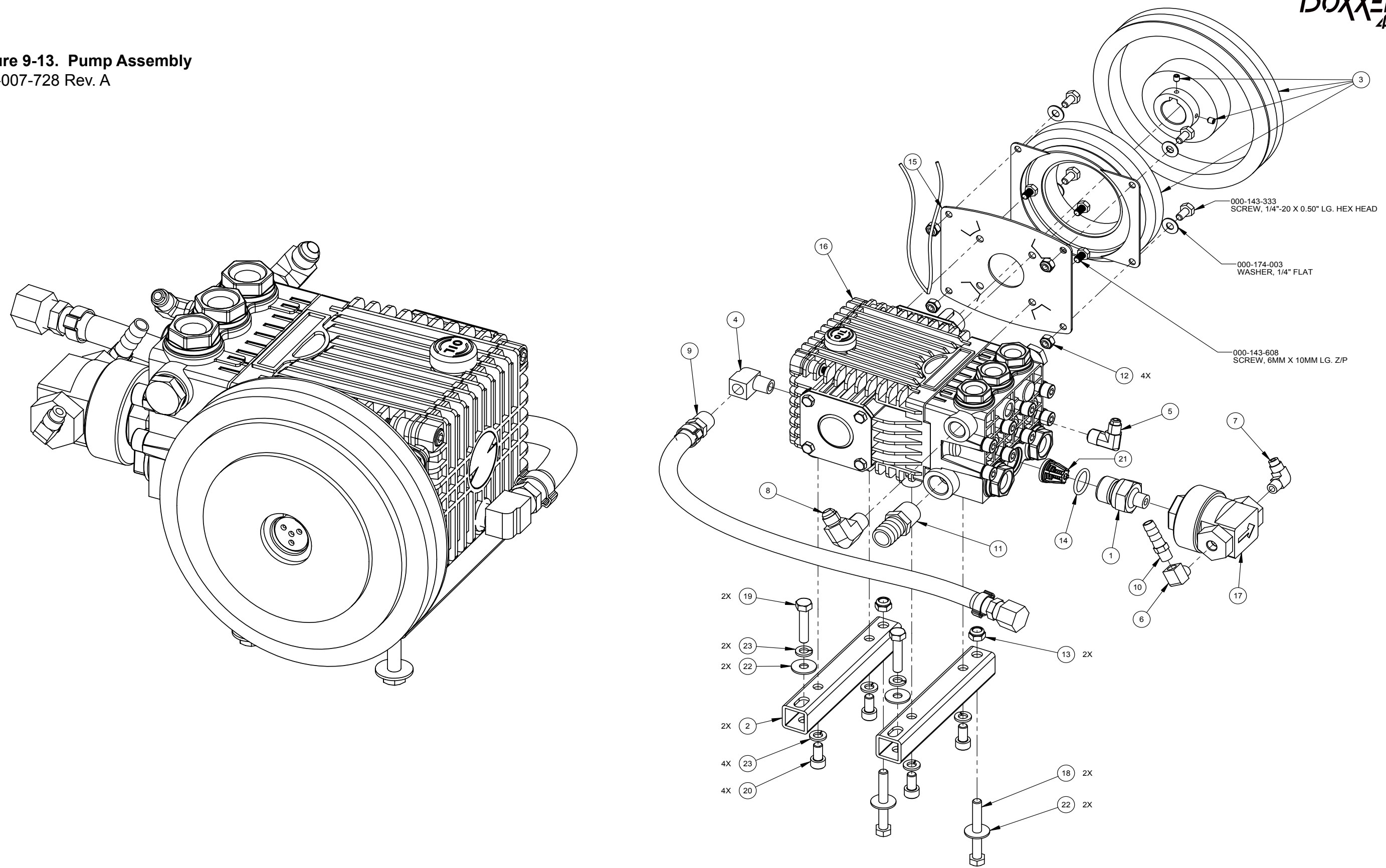


Blower Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-071	Adapter Blower Inlet - Coated	1
2	000-001-140	Adapter, 2 1/2" NPT to 2 1/2" O.D. Tube - Coated	1
3	000-111-145	Blower, 4005 Dominator	1
4	000-015-032	Bracket, Dominator 4005 Mounting - Coated	2
5	000-052-061	Bushing, 3/8" NPT X 1/4" FPT	2
6	000-033-057	Clamp, 1" Cushion Loop	2
7	000-052-085	Elbow, 1/4" NPT Street	2
8	000-068-794	Hose Assembly, 3/8" X 17" Lg. Drain	1
9	000-068-794	Hose Assembly, 3/8" X 17" Lg. Drain	1

Item	Part Number	Description	Qty
10	000-052-293	Insert, #23 (1/8" NPT X 3/16" Barb)	3
11	000-077-011	Key, 3/16" X 1 1/2" Long	1
12	000-143-025	Screw, 3/8"-16 UNC X 1.25" Lg. Hex Head Gr. 8	4
13	000-143-018	Screw, 3/8"-16UNC X 1" Lg. Hex Head - Grade 8	6
14	000-143-094-1	Screw, 3/8"-16UNC X 3/4" Lg. Socket Head	4
15	000-174-021	Washer, 3/8" Lock	4
16	000-174-004	Washer, 5/16" Flat, USS	10
17	000-174-068	Washer, Blower Feet - Coated	4

Figure 9-13. Pump Assembly
610-007-728 Rev. A



Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-154	Adapter, GP to Chemicalical Pump S/S 4.0 Gallon	1
2	000-015-1001	Bracket, Pump Mounting - Coated	2
3	000-036-008	Clutch, 7" O.D. 24mm Single Groove	1
4	000-052-085	Elbow, 1/4" NPT Street	1
5	000-052-532	Elbow, 1/4" SAE X 1/4" NPT	1
6	000-052-084	Elbow, 1/8" NPT Street	1
7	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1
8	000-052-766	Elbow, 3/8 NPT X 3/8 JIC	1
9	000-068-794	Hose, 3/8" X 17" Pump Drain	1
10	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1
11	000-052-129	Insert, #812, 1/2 NPT X 3/4 Hose	1
12	000-094-071	Nut, 1/4"-20 UNC Nylock	4

Item	Part Number	Description	Qty
13	000-094-038	Nut, 5/16"-18UNC Nylock	2
14	000-097-057	O-Ring, Adapter - Chemicalical Pump	1
15	000-105-550	Plate, Pump Clutch - GP 4.0 gpm	1
16	000-111-188	Pump, 4.0 gpm GP	1
17	000-111-184	Pump, GP Chemicalical	1
18	000-143-106	Screw, 5/16"-18UNC X 2.5" Lg. Hex Head	2
19	000-143-015	Screw, 5/16-18 X 1 1/2" HHC	2
20	000-143-701	Screw, M8 X 16mm Lg. Socket Head	4
21	000-169-221	Valve, GP Pump Check - Mod. - 4.0 Gallon	1
22	000-174-004	Washer, 5/16" Flat	4
23	000-174-018	Washer, 5/16" Lock	6

Figure 9-14. Dash Assembly - View 1 of 2
610-018-728 Rev. B

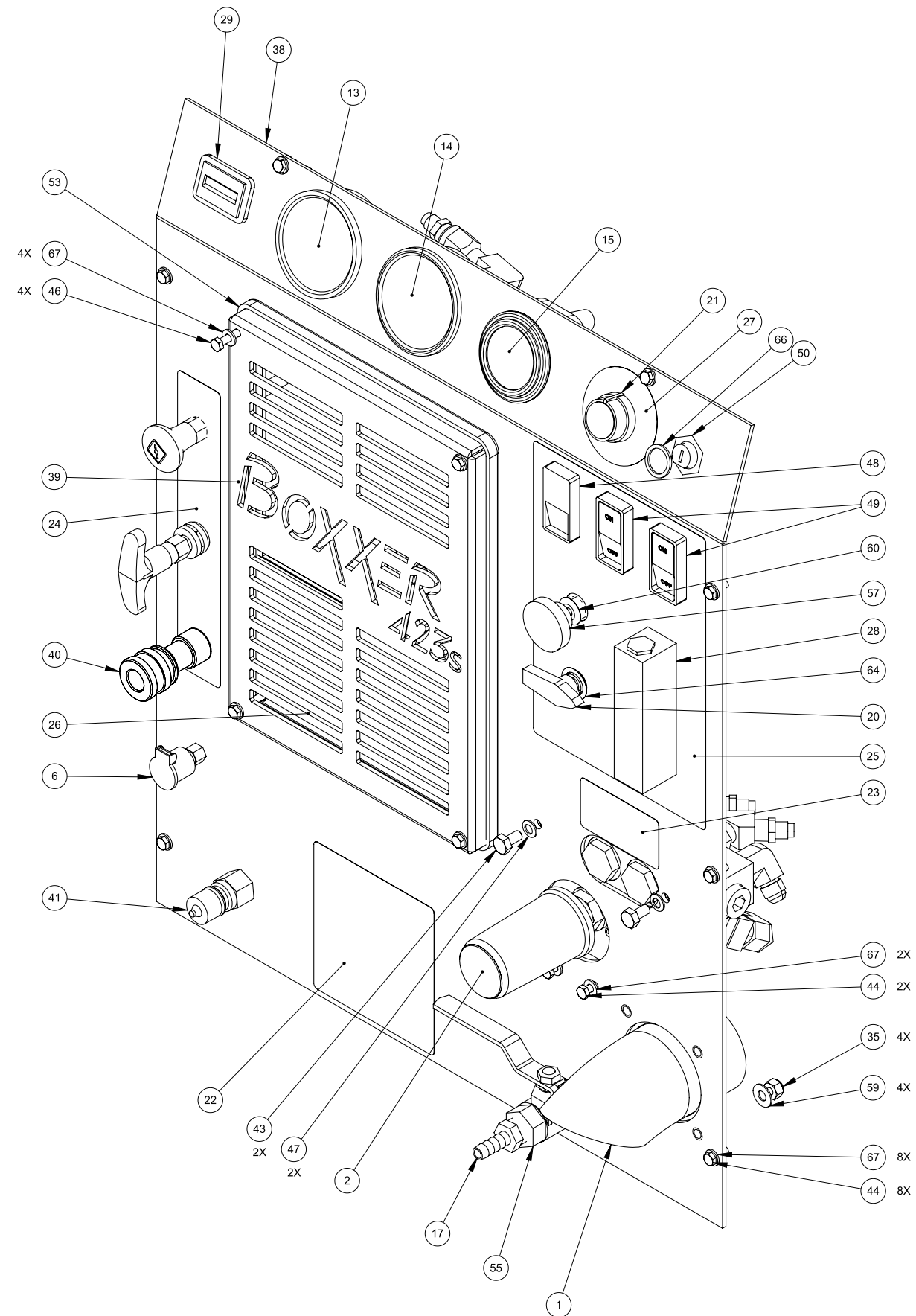
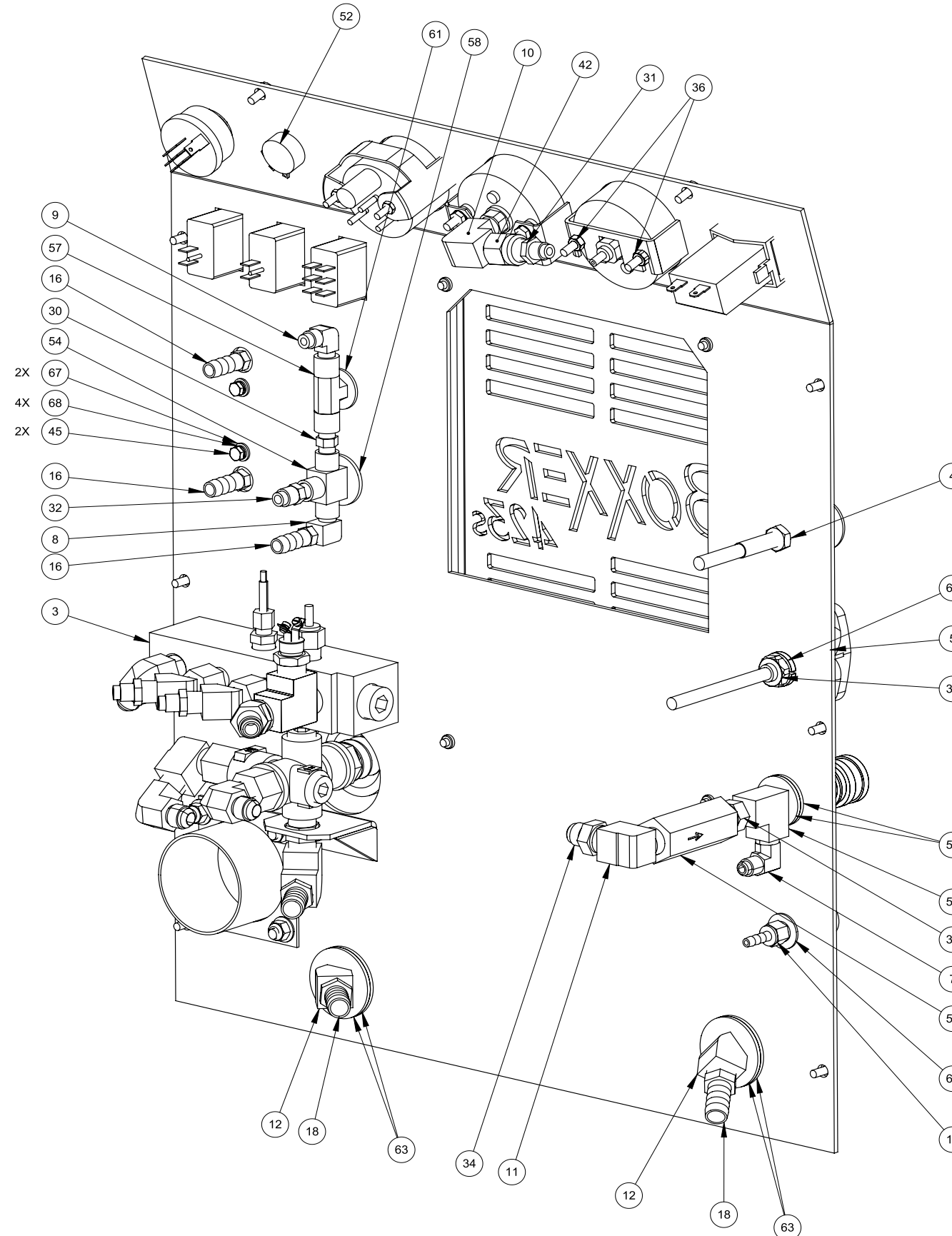


Figure 9-15. Dash Assembly - View 2 of 2
610-018-728 Rev. B

NOTICE

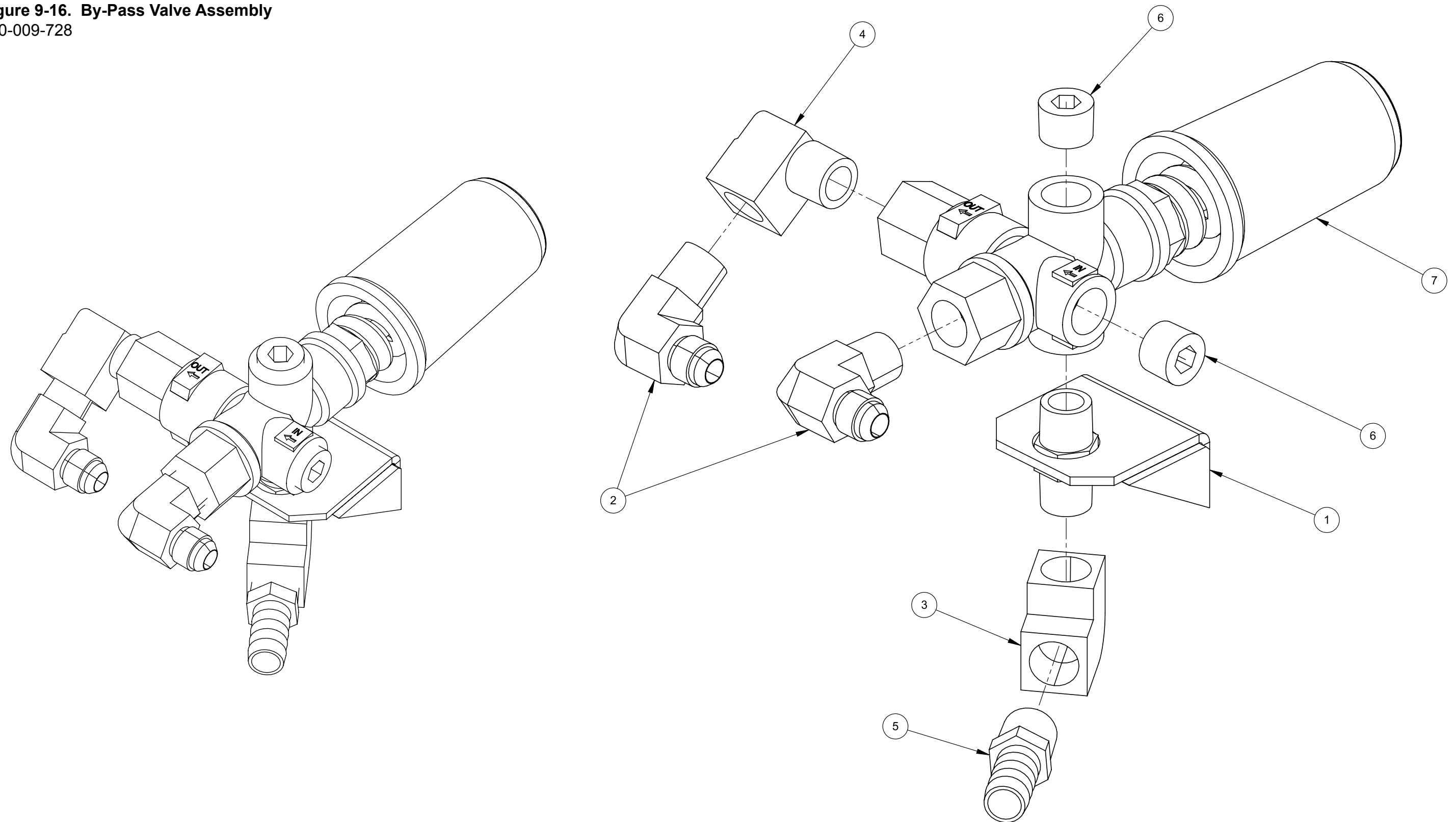
* When ordering a replacement for Item 52, P/N 000-149-560 Potentiometer Thermostat, request P/N 000-149-561.



Dash Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-148	Adapter, 2.5" Exhaust Turndown	1	35	000-094-009	Nut, 1/4"-20UNC Nylock	4
2	610-009-728	Assembly, By-Pass Valve	1	36	000-094-070	Nut, 5mm Nylock	2
3	610-008-728	Assembly, Hi PSI Manifold	1	37	000-094-092	Nut, 7/16"-20UNF Hex Jam	1
4	000-025-003	Cable, Choke with Detent	1	38	000-100-001	Panel, Dash - Coated	1
5	000-025-030	Cable, Throttle w/ Swivel	1	39	000-100-728	Panel, Grill - Coated	1
6	000-052-272	Cup, Gravity Feed Oil Blower Lube Port	1	40	000-052-051	Quick Connect, 440 Female w/ EPDM O-Ring	1
7	000-052-532	Elbow, 1/4" SAE X 1/4" NPT	1	41	000-052-052	Quick Connect, 660 3/8" Brass w/ EPDM O-Ring	1
8	000-052-084	Elbow, 1/8" NPT Street	1	42	000-135-052	Regulator, Hi PSI Snubber	1
9	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1	43	000-143-542	Screw, 1/4"-28UNF X 0.50" Lg. Hex Head	2
10	000-052-088	Elbow, 1/4" FPT X FPT	1	44	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	10
11	000-052-086	Elbow, 3/8" NPT Street	1	45	000-143-327	Screw, #10-32UNF X 0.50" Lg. Hex Head	2
12	000-052-083	Elbow, 3/8" NPT Street X 45 Degree	2	46	000-143-171	Screw, #10-24UNC X 1.25" Lg. Hex Head	4
13	000-074-017	Gauge, 30" Hg. Vacuum	1	47	000-155-053	Spring, 1/4" Belleville Washer	2
14	000-074-007	Gauge, Pressure 0 -1,500 psi	1	48	000-157-131	Switch, 3 Way Speed Control	1
15	000-074-016	Gauge, Temperature	1	49	000-157-040	Switch, 20 Amp Rocker	2
16	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	3	50	000-157-017	Switch, Ignition	1
17	000-052-104	Insert, #66 (3/8" NPT X 3/8" Barb)	1	51	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
18	000-052-105	Insert, #68 (3/8" NPT X 1/2" Barb)	2	52	000-149-560	Thermostat, Potentiometer *	1
19	000-052-096	Insert, #F23 (1/8" FPT X 3/16" Barb)	1	53	000-131-131	Trimlok, 3/8" X 1/8" Rubber	1 ft
20	000-169-0171C	Knob, 3-Way Ball Valve (Part of 000-169-0171)	1	54	000-169-0171	Valve, 3-Way Ball O-Ring Style	1
21	000-061-056	Knob, Temperature Adjustment	1	55	000-169-064	Valve, 3/8" NPT Full Port Ball	1
22	000-081-328	Label, ANSI Warning - Large	1	56	000-169-219	Valve, Check 80 psi - Last Step Chemicalical	1
23	000-081-408	Label, Clean Filters Daily - Horizontal	1	57	000-169-160	Valve, Chemicalical Metering	1
24	000-081-405	Label, Dash Control Left	1	58	000-174-007	Washer, 1/2" Flat	3
25	000-081-406	Label, Dash Control Right	1	59	000-174-003	Washer, 1/4" Flat	4
26	000-081-409	Label, Grill Black Out	1	60	000-174-062	Washer, 1/2" I.D. X 3/4" O.D. X 0.010" Thk	1
27	000-081-404	Label, Temperature	2	61	000-174-005	Washer, 3/8" Flat	1
28	000-074-030	Meter, Chemicalical Flow Raw	1	62	000-174-032	Washer, 3/8" Flat	1
29	000-074-170	Meter, Rectangular Hour w/o Bezel	1	63	000-174-008	Washer, 5/8" Flat	4
30	000-052-069	Nipple, 1/8" NPT Hex	1	64	000-174-030	Washer, 5/8" I.D. X 7/8" O.D. X 0.010" Thk	1
31	000-052-527	Nipple, 1/4" SAE X 1/4" NPT	1	65	000-174-022	Washer, 7/16" Lock	1
32	000-052-530	Nipple, 1/4" SAE X 1/8" NPT	1	66	000-174-058	Washer, 21/32" I.D. X 27/32" O.D. Nylon	1
33	000-052-073	Nipple, 3/8" NPT X 1/4" NPT Hex	1	67	000-174-001	Washer, #10 Flat	16
34	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	1	68	000-174-014	Washer, #10 Lock	4

Figure 9-16. By-Pass Valve Assembly
610-009-728



By-Pass Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-515	Bracket, By-Pass Valve Mount - Weldment	1
2	000-052-766	Elbow, 3/8 NPT X 3/8 JIC	2
3	000-052-142	Elbow, 3/8" F X F Brass	1
4	000-052-086	Elbow, 3/8" NPT Street	1
5	000-052-105	Insert, #68 (3/8" NPT X 1/2" Barb)	1
6	000-106-008	Plug, 3/8" NPT Allen Head	2
7	000-169-197	Valve, PSI Regulator 0 - 3,200 psi - Modified	1

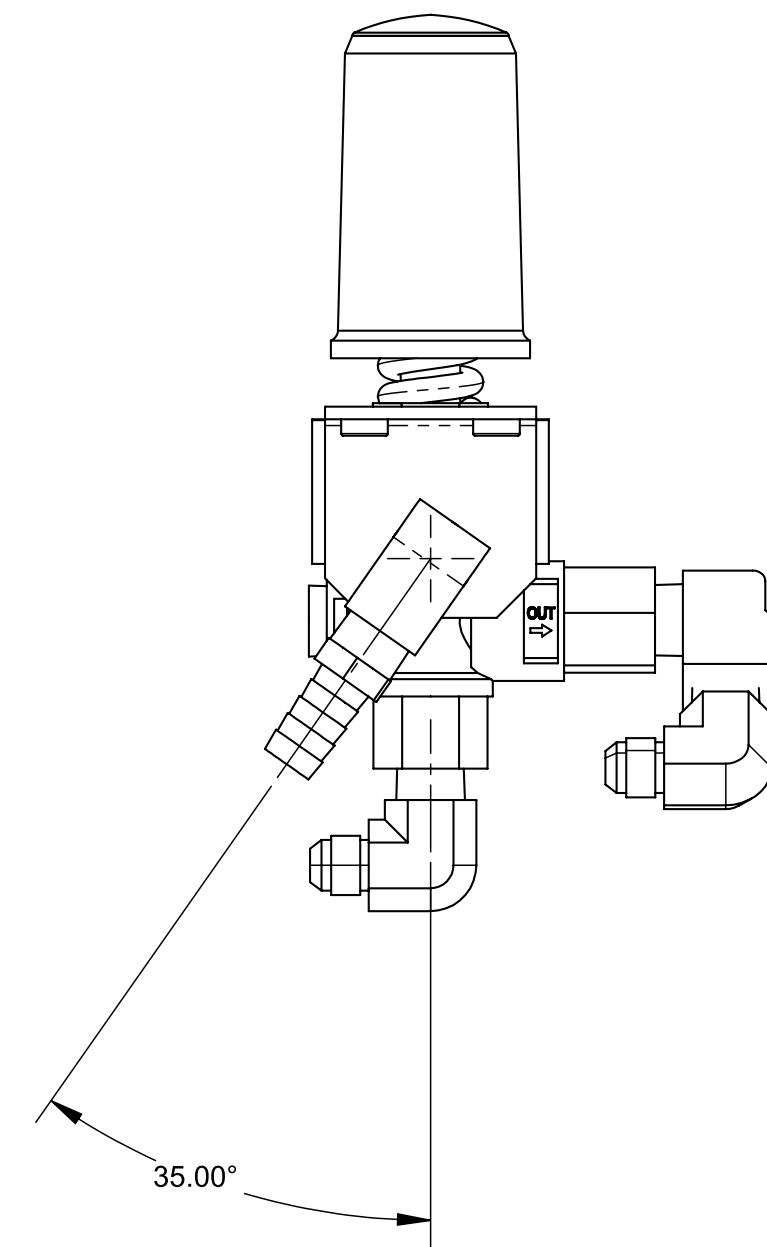
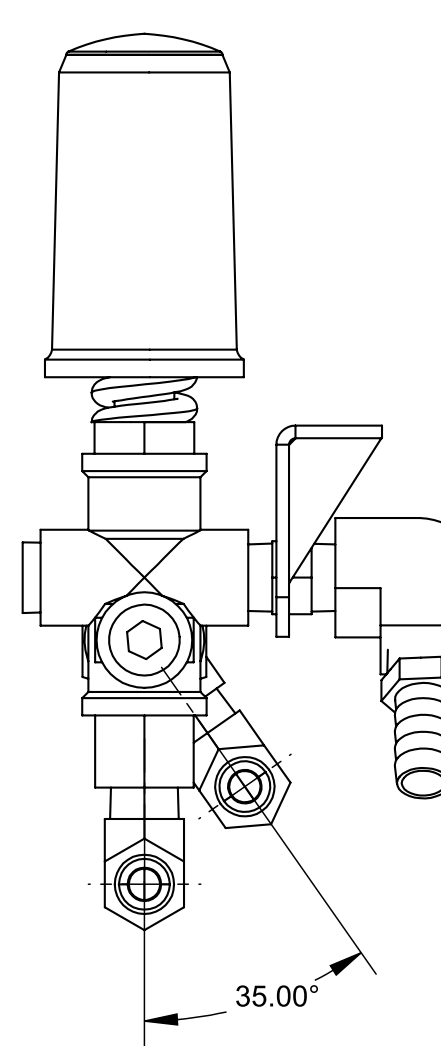
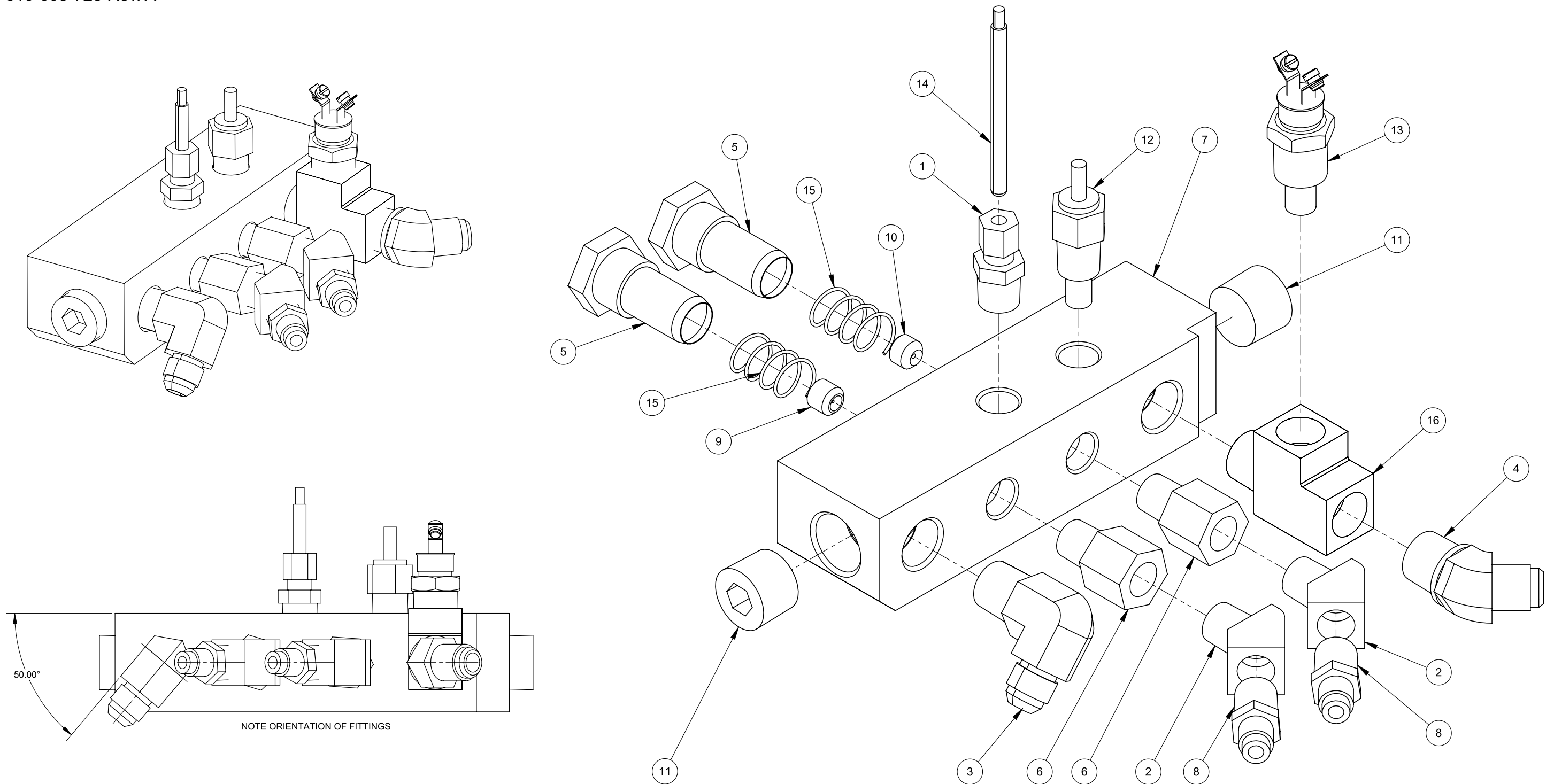


Figure 9-17. Hi PSI Manifold Assembly
610-008-728 Rev. A



Hi PSI Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-587	Compression, 3/16" X 1/4" NPT Thermocouple	1
2	000-052-082	Elbow, 1/4" NPT Street X 45 Degree	2
3	000-052-766	Elbow, 3/8 NPT X 3/8 JIC	1
4	000-052-779	Elbow, 3/8" NPT X 3/8" M JIC X 45 Degree	1
5	000-049-016	Filter, 1/4" NPT Replacement "Y"	2
6	000-052-423	Fitting, Bushing Modified Orifice Housing	2
7	000-090-010	Manifold, Hi PSI	1
8	000-052-527	Nipple, 1/4" SAE X 1/4" NPT	2

Item	Part Number	Description	Qty
9	000-180-004	Orifice, Set Screw - 0.033"	1
10	000-180-006	Orifice, Set Screw - 0.063"	1
11	000-106-111	Plug, 1/2" NPT Allen Head	2
12	000-149-039	Sender, Temperature	1
13	000-149-555	Sensor, 295 Degree F N/C High Temp Shutdown	1
14	000-149-540	Sensor, RTD Compression Fitting Style	1
15	000-155-020	Spring, 0.540 O.D. X 0.041 Wire X 1.00 Lg.	2
16	000-052-023	Tee, 3/8" NPT Male Street	1

Figure 9-18. Electrical Panel Assembly - View 1 of 2
610-011-728 Rev. A

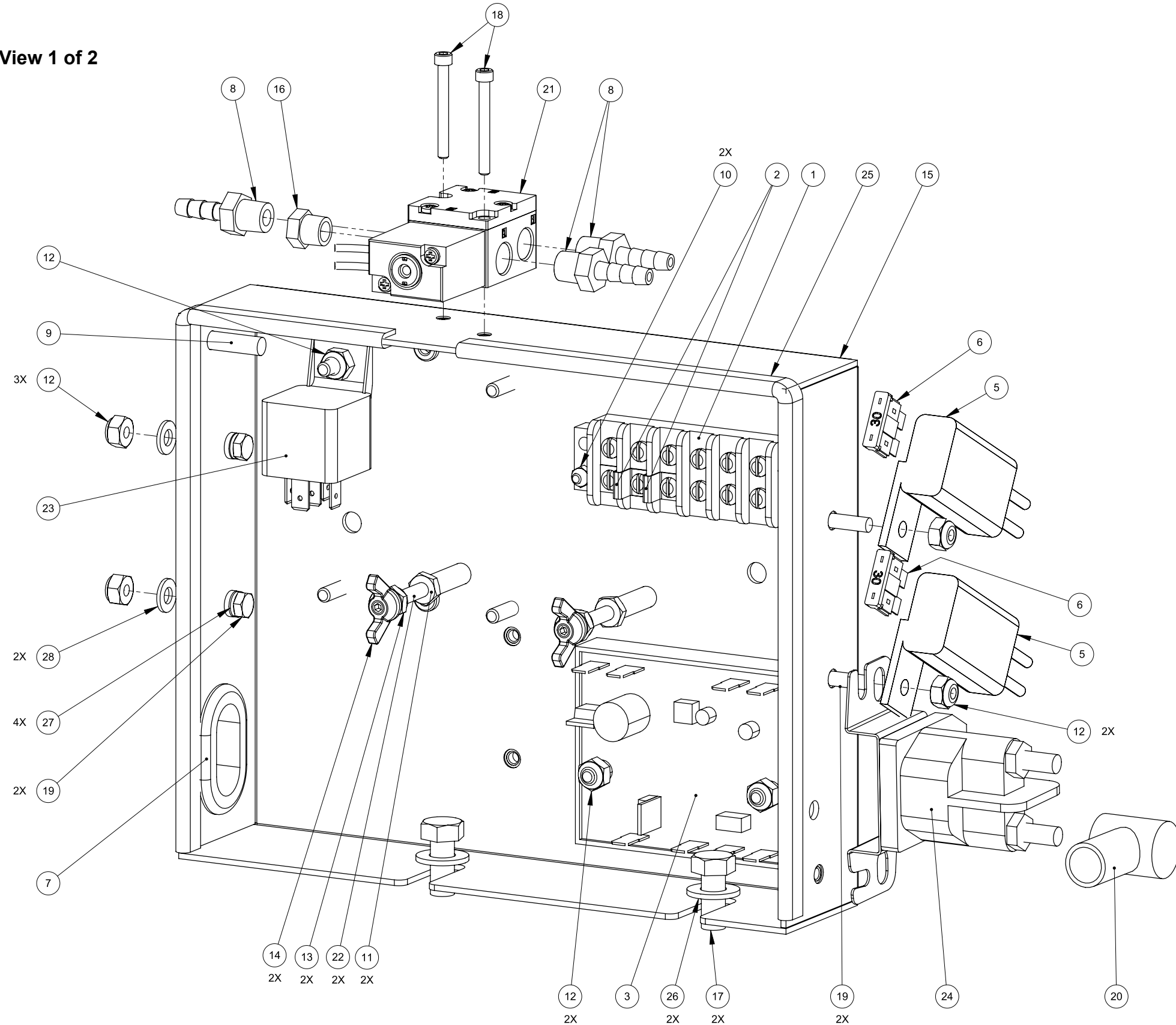
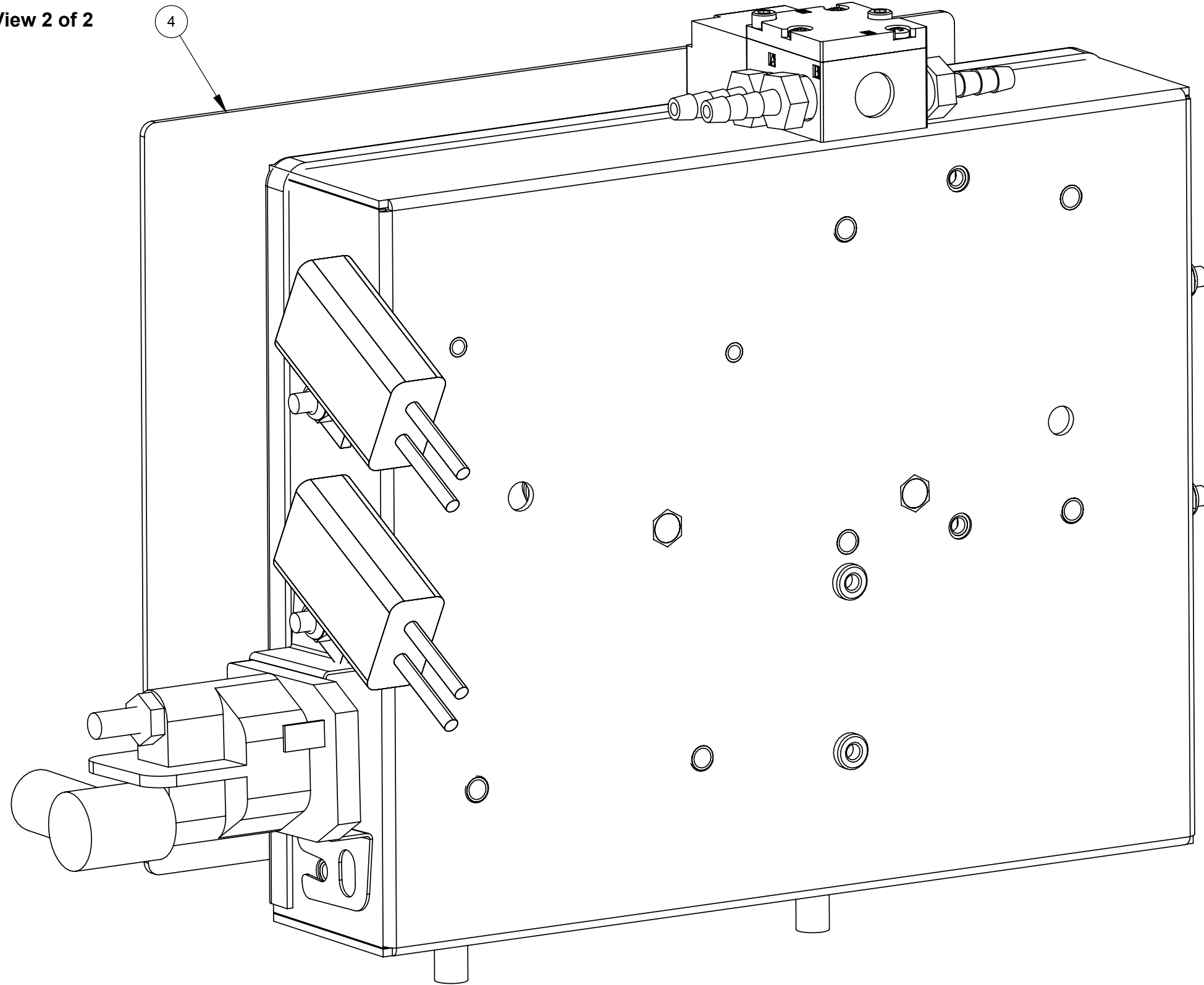


Figure 9-19. Electrical Panel Assembly - View 2 of 2
610-011-728 Rev. A



Electrical Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-012-002	Block, 6 Post Terminal	1
2	000-037-011	Connector, "Jumper" Terminal Block	2
3	000-074-125	Controller, Temp Single Analog Input - RTD	1
4	000-041-478	Cover, Electrical Panel - Coated	1
5	000-056-006	Fuse Holder, In-Line - Weatherproof	2
6	000-056-011	Fuse, 30 Amp	2
7	000-060-014	Grommet, 1.00" I.D. X 1.50" O.D.	1
8	000-052-293	Insert, #23 (1/8" NPT X 3/16" Barb)	3
9	000-084-010	Light, Green LED Indicator Mini	1
10	000-094-063	Nut, #6-32UNC Nylock	2
11	000-094-003	Nut, #10-32UNF Hex	2
12	000-094-034	Nut, #10-24UNC Nylock	7
13	000-094-058	Nut, #10-32UNF Nylock	2
14	000-094-108	Nut, #10-32UNF Wing	2

Item	Part Number	Description	Qty
15	000-100-182	Panel, Electrical - Universal - Coated	1
16	000-106-014	Plug, Vent	1
17	000-143-012	Screw, 5/16"-18UNC X 3/4" Lg.	2
18	000-143-700	Screw, #6-32UNC X 1.25" Lg. Socket Head	2
19	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	4
20	000-152-009	Sleeve, Solenoid Insulator	1
21	000-169-226	Solenoid, Air Actuator 4- Way Valve	1
22	000-156-040	Stud, #10-32 X 2.25" Lg.	2
23	000-157-022	Switch, Relay	1
24	000-157-012	Switch, Starter Solenoid 14HP (Comes w/ Engine)	1
25	000-131-131	Trimlok, 3/8" X 1/8"	1 ft
26	000-174-049	Washer, 5/16" Flat	2
27	000-174-014	Washer, #10 Lock	4
28	000-174-001	Washer, #10 Flat	2

Figure 9-20. Engine Assembly - View 1 of 2
610-004-728 Rev. B

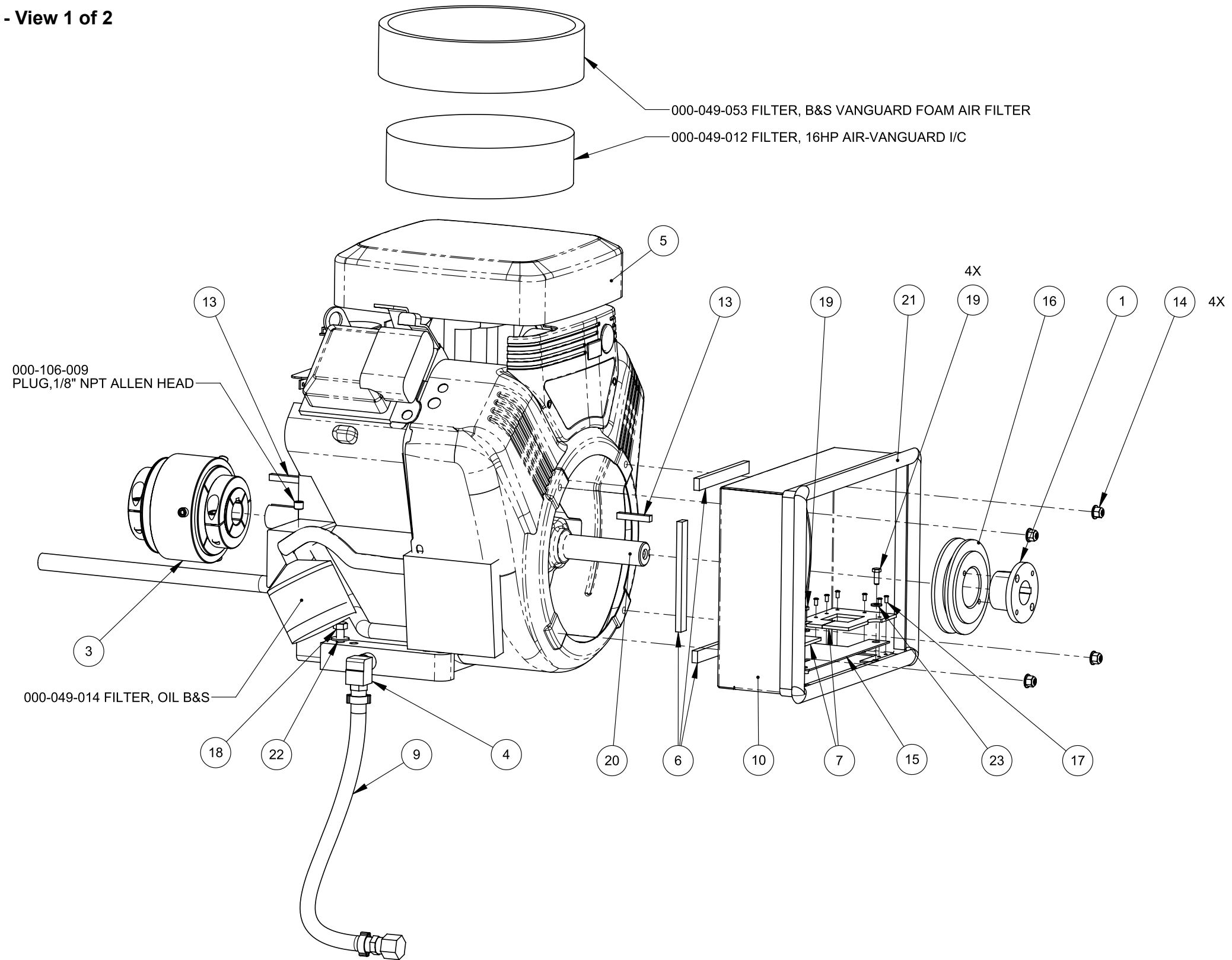
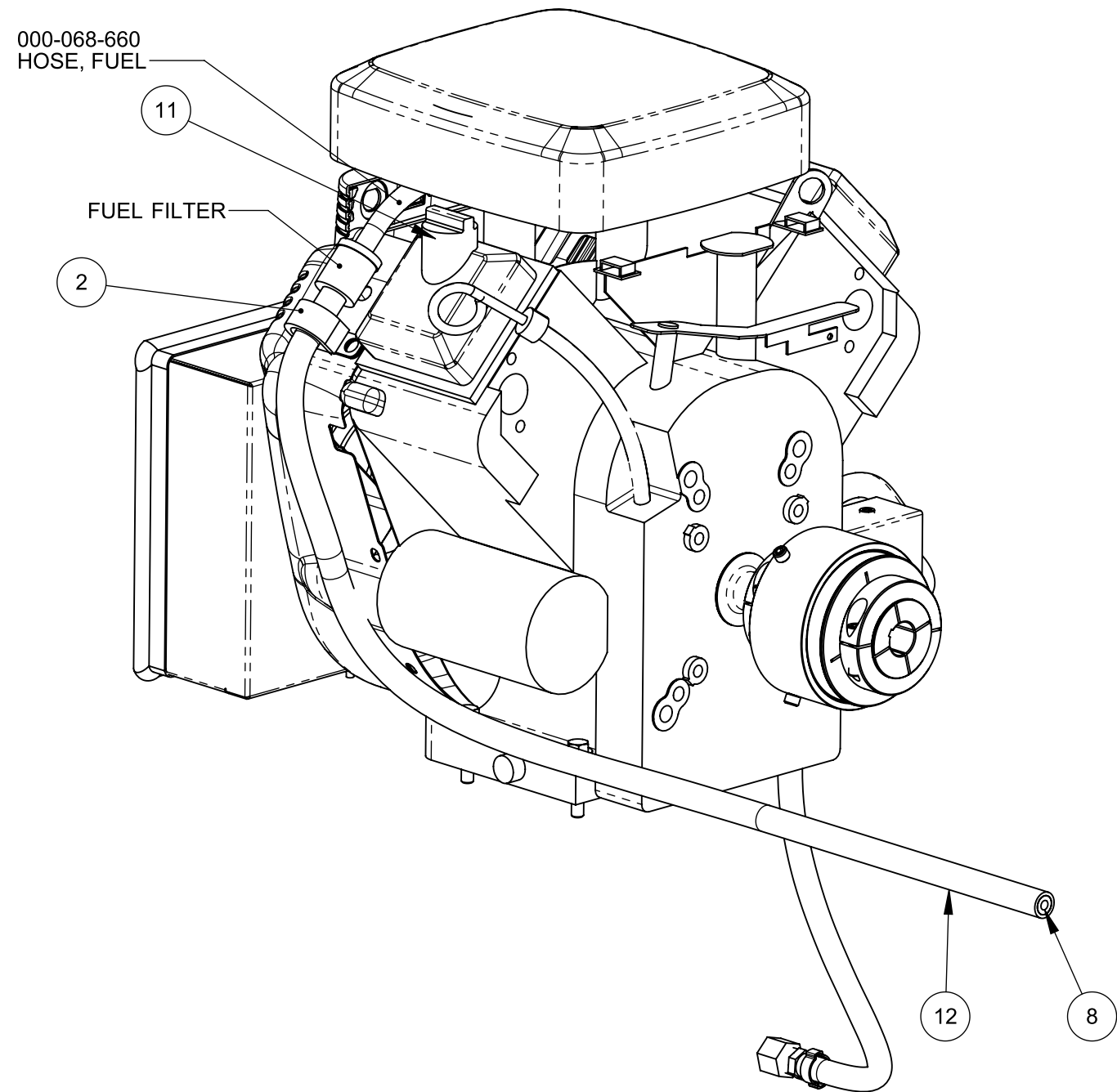


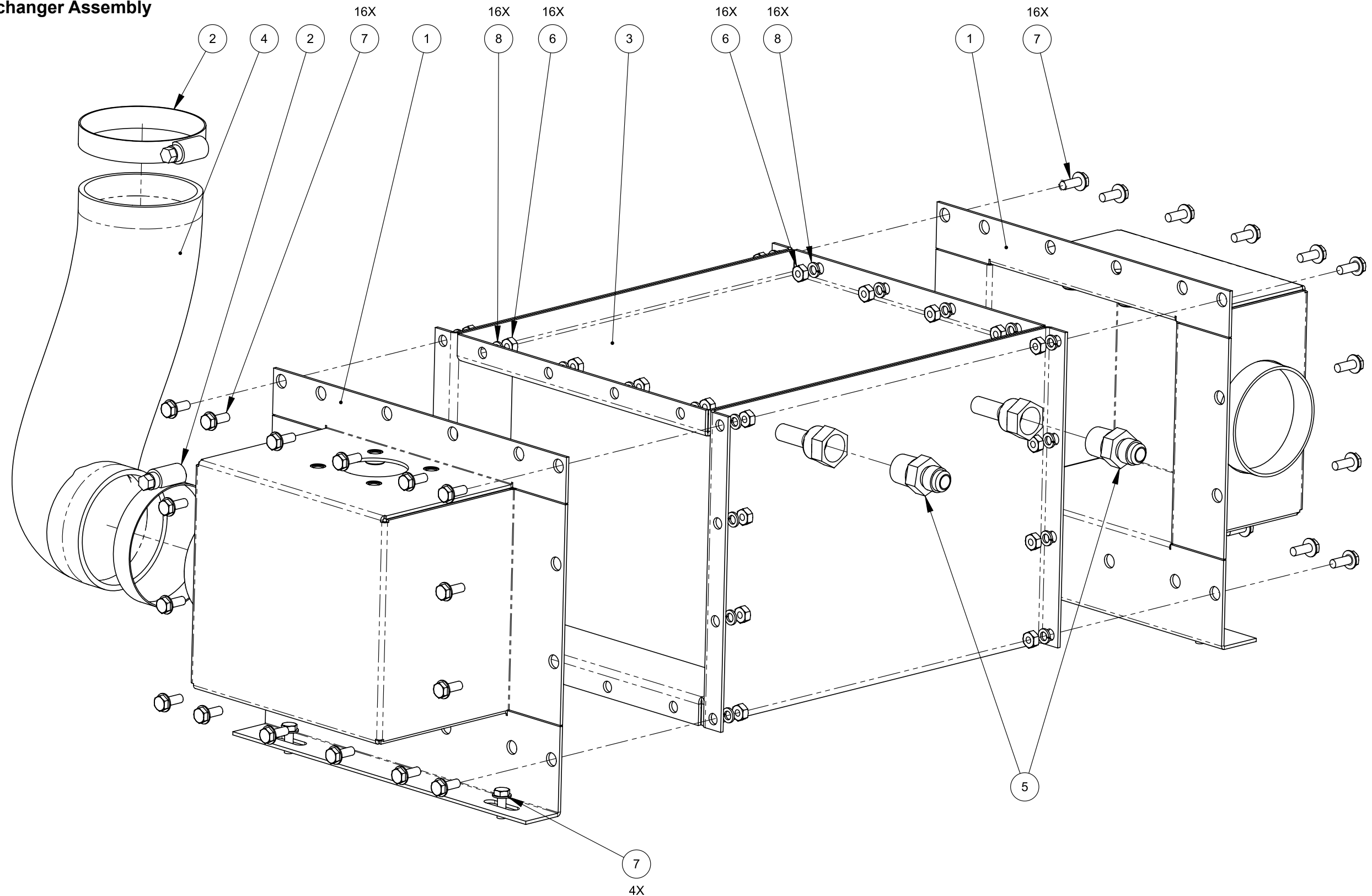
Figure 9-21. Engine Assembly - View 2 of 2
610-004-728 Rev. B



Engine Assembly Parts List

Item	Part Number	Description	Qty
1	000-020-025	Bushing, H X 1"	1
2	000-033-117	Clamp, 1" Cushion Loop w/ 7/16 Mount Hole	1
3	000-039-054	Coupler, 40 Series	1
4	000-052-086	Elbow, 3/8" NPT Street	1
5	000-047-037	Engine, 23HP	1
6	000-057-026	Gasket, 1/2" X 1/4" X 18-1/8" Lg.	2
7	000-057-226	Gasket, Engine Duct	2
8	000-068-157	Hose, 1/4" I.D. Fuel Low Perm X 120" Lg.	1
9	000-068-219	Hose, Drain	1
10	000-042-074	Housing, Radiator Duct - Coated	1
11	000-052-293	Insert, #23 (1/8" NPT X 3/16" Barb)	1
12	000-131-139	Insulation, 1" Hi-Temp Alum Sleeve X 60" Lg.	1
13	000-077-010	Key, 1/4" X 1-1/2" Lg. Class 2 Fit	2
14	000-094-125	Nut, 6mm, S/S Nylock Flange	4
15	000-105-562	Plate, Engine Duct - Coated	1
16	000-109-040	Pulley, AK47-H	1
17	000-140-001	Rivet, AB4-3A Aluminum Pop 1/8" X 1/4" Lg. 0.187"	12
18	000-143-375	Screw, 5/16"-18UNC X 1.75" Lg. Hex Head Grd. 8 Z/P	4
19	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	4
20	000-150-169	Shaft, 23HP Stub	1
21	000-131-060	Timklok Seal, 3/4" Bulb X 3/16" Opening (40" Lg.)	1
22	000-174-002	Washer, 1/4" Flat	4
23	000-174-001	Washer, #10 Flat	4

Figure 9-22. Heat Exchanger Assembly
610-005-728 Rev. A



Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-013-002	Box, Plenum - Weldment	2
2	000-033-011	Clamp, Size #36 Hose	2
3	000-038-001	Core, Blower Heat Exchanger	1
4	000-068-986	Hose, 2.5" Heat Flex NS X 15" Lg.	1

Item	Part Number	Description	Qty
5	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	2
6	000-094-004	Nut, #10-24UNC Hex	32
7	000-143-583	Screw, #10-24UNC X 0.50" Lg. Hex Head Flange Z/P	36
8	000-174-014	Washer, #10 Lock	32

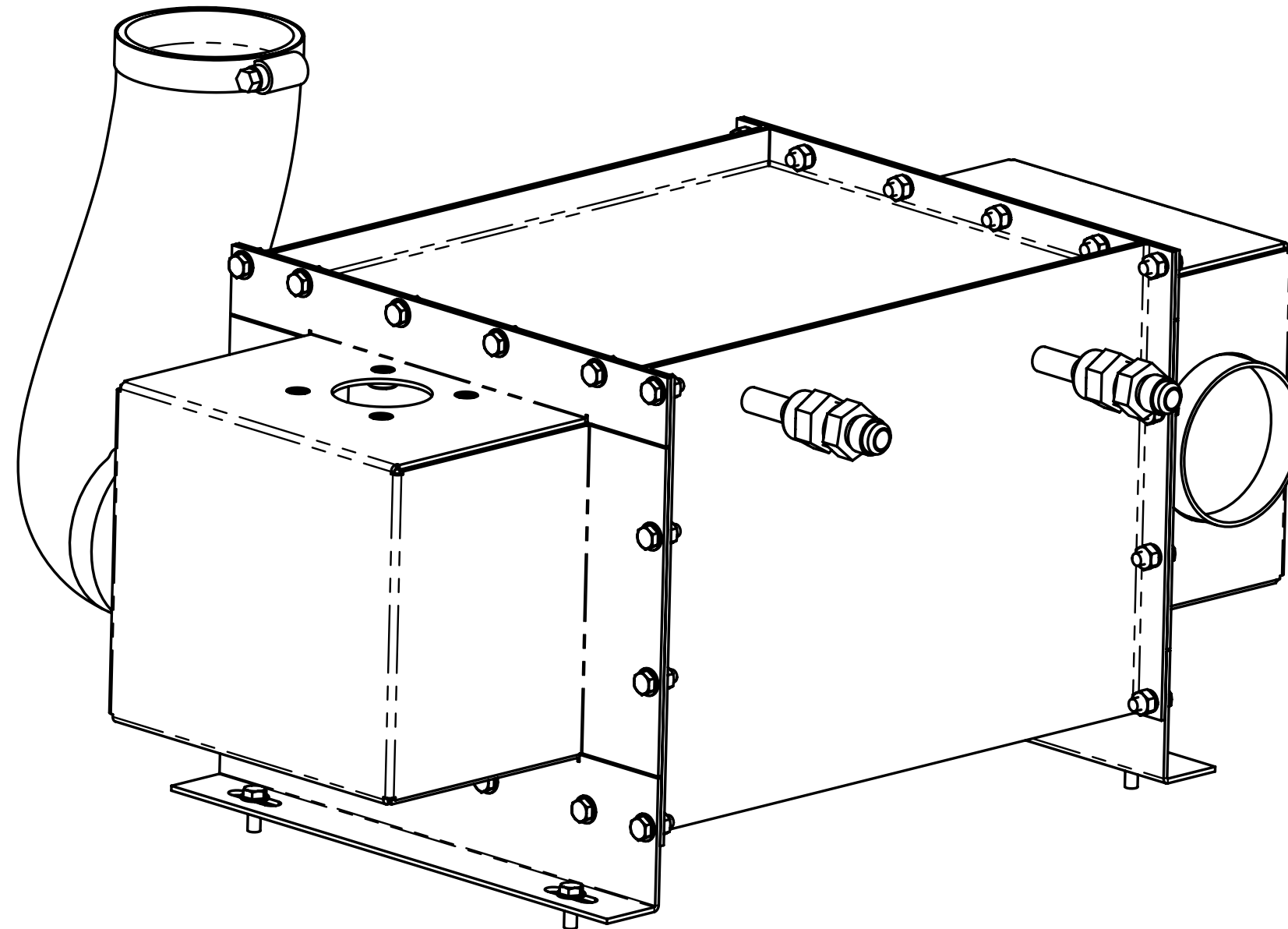
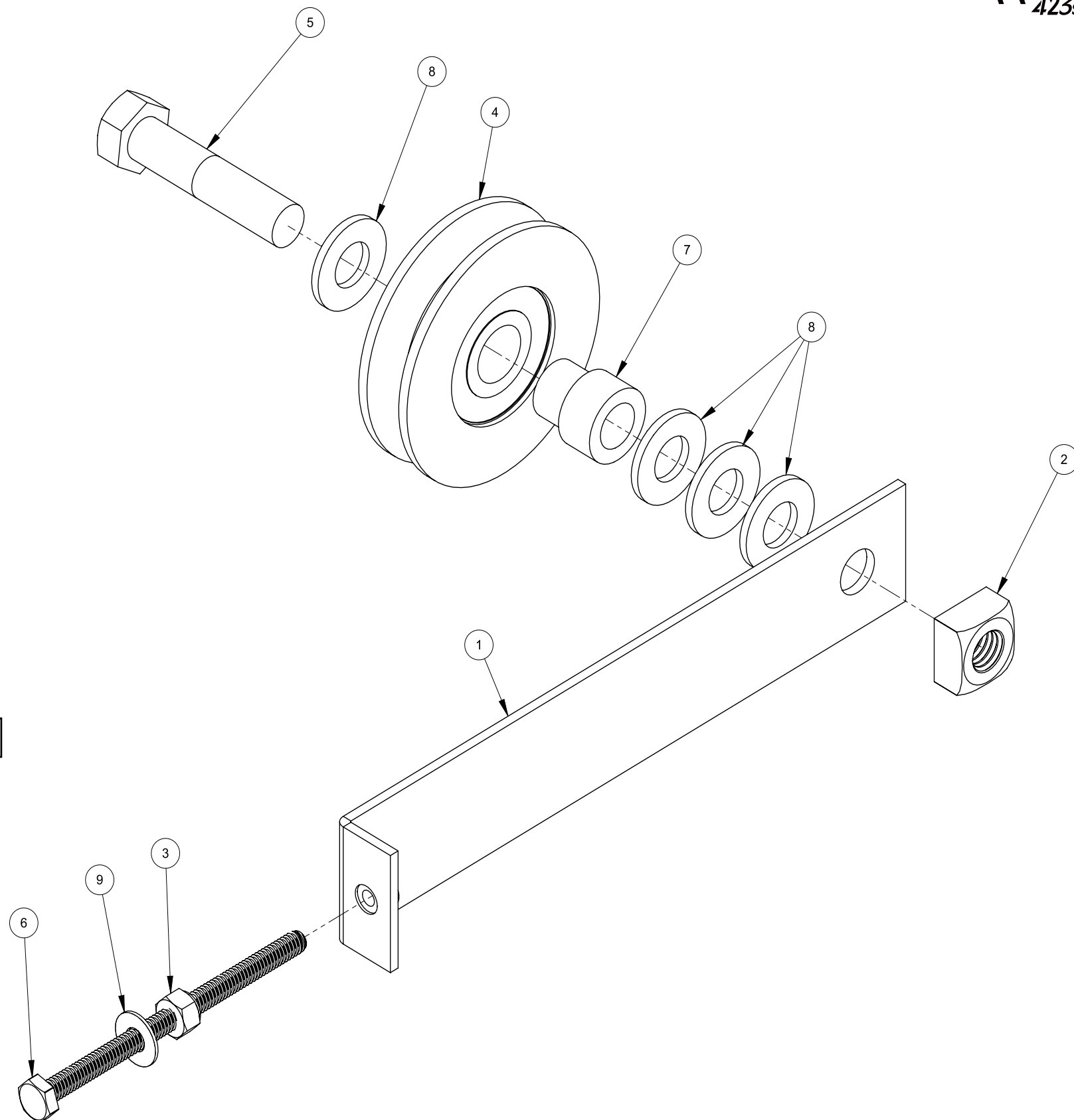
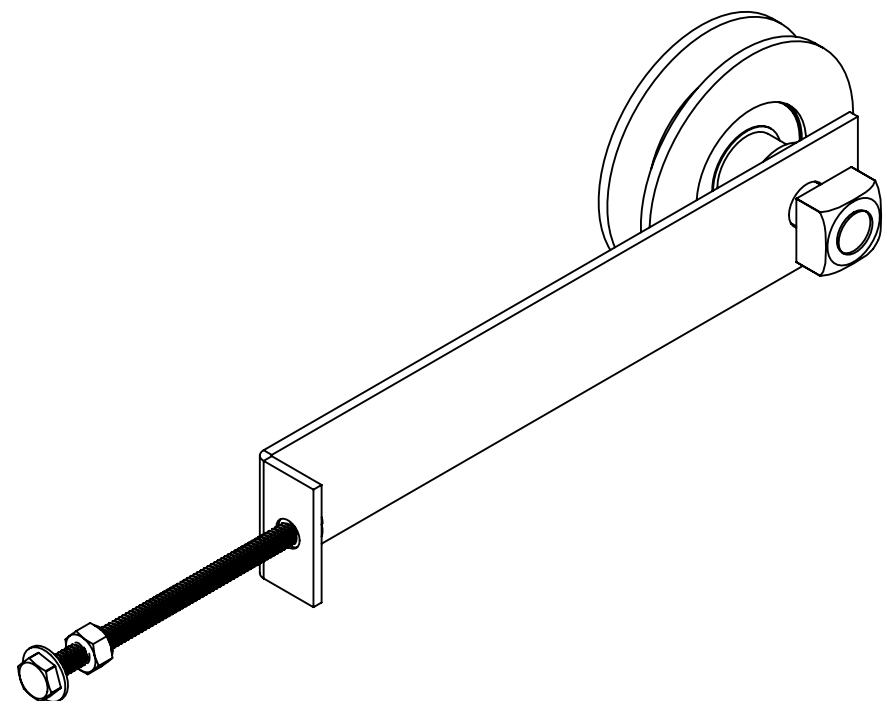


Figure 9-23. Idler Pulley Assembly
610-021-015 Rev. A



Idler Pulley Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-942	Bracket, Idler Tension - Coated	1
2	000-094-119	Nut, 1/2-13UNC Zinc Plated Square	1
3	000-094-009	Nut, 1/4"-20UNC Nylock	1
4	000-109-093	Pulley, 3" "A" Sect. Ball Bearing Assembly	1
5	000-143-041	Screw, 1/2-13UNC X 2-1/4" HHC	1
6	000-143-376	Screw, 1/4-20UNC X 4" Lg. S/S- Full Thread	1
7	000-154-049	Spacer, Pump Idler Mounting - Coated	1
8	000-174-012	Washer, 1/2 SAE H/D	4
9	000-174-003	Washer, 1/4" Flat	1

Figure 9-24. Silencer Assembly
610-021-728 Rev. A

Silencer Assembly Parts List

Item	Part Number	Description	Qty
1	000-033-011	Clamp, Size #36 Hose	4
2	000-068-984	Hose, 2.5" Heat Flex NS X 1.5" Lg.	1
3	000-068-985	Hose, 2.5" Heat Flex NS X 12" Lg.	1
4	000-108-036	Protector, Silencer	1
5	000-143-583	Screw, #10-24UNC X 0.50" Lg. Hex Head Flange Z/P	4
6	000-093-022	Silencer, 2.5" Cowl	1

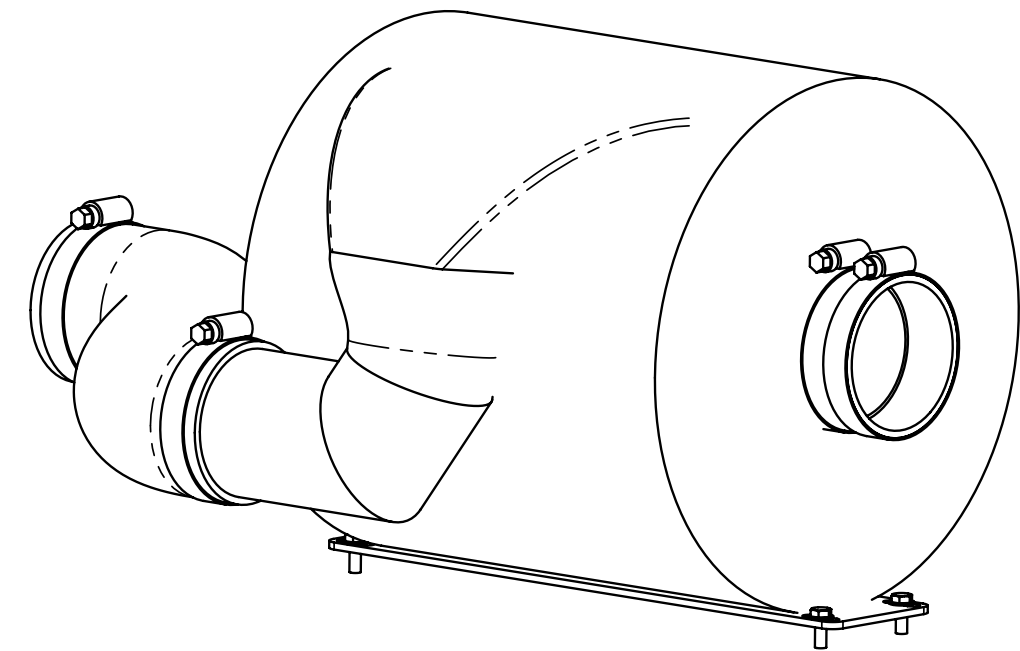
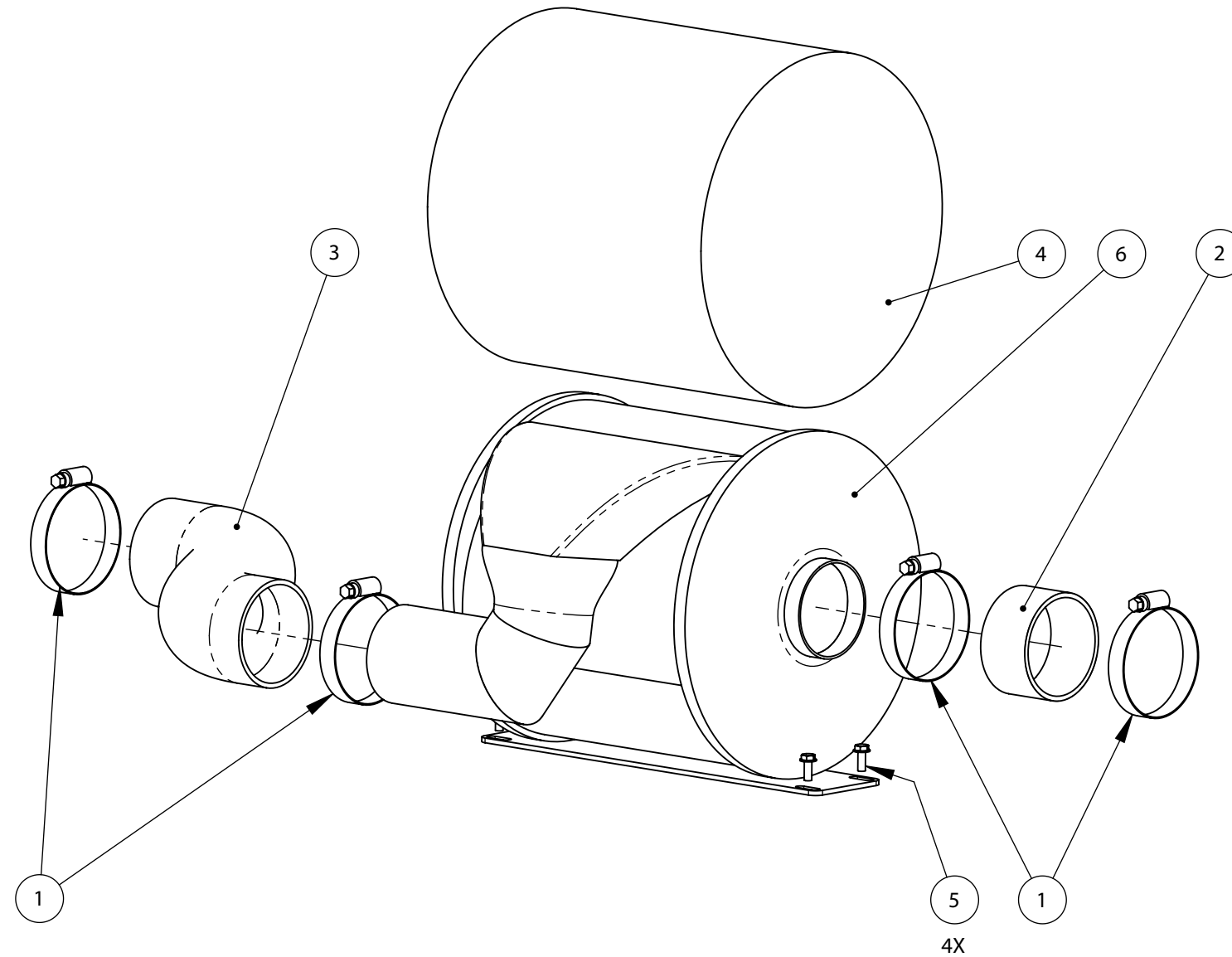
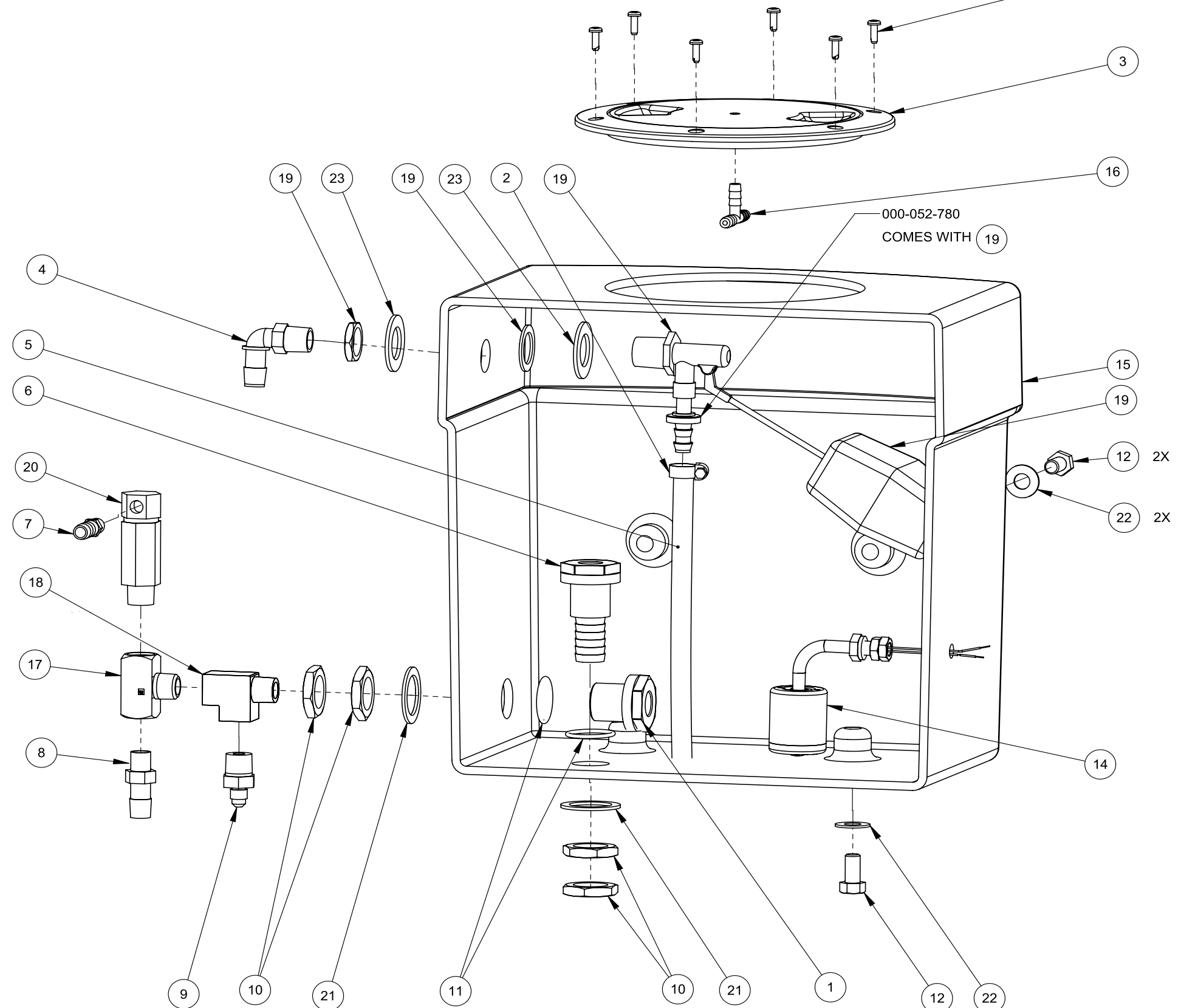
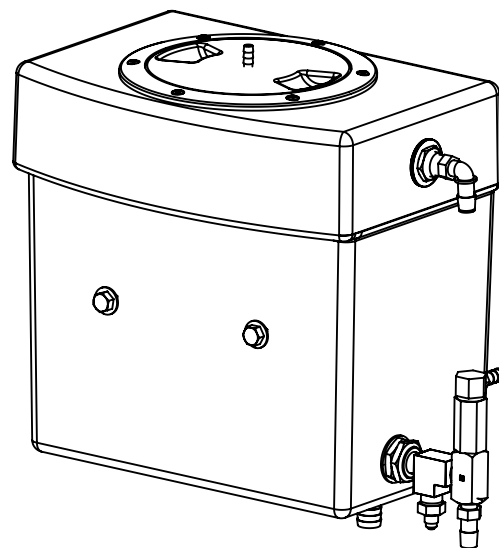
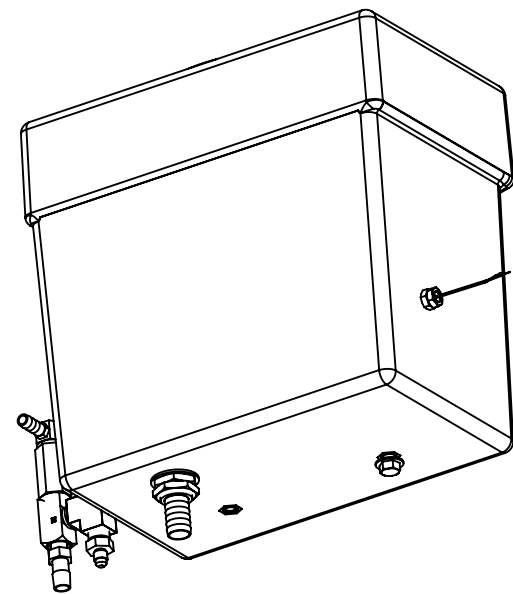


Figure 9-25. Water Box Assembly
610-010-728 Rev. A

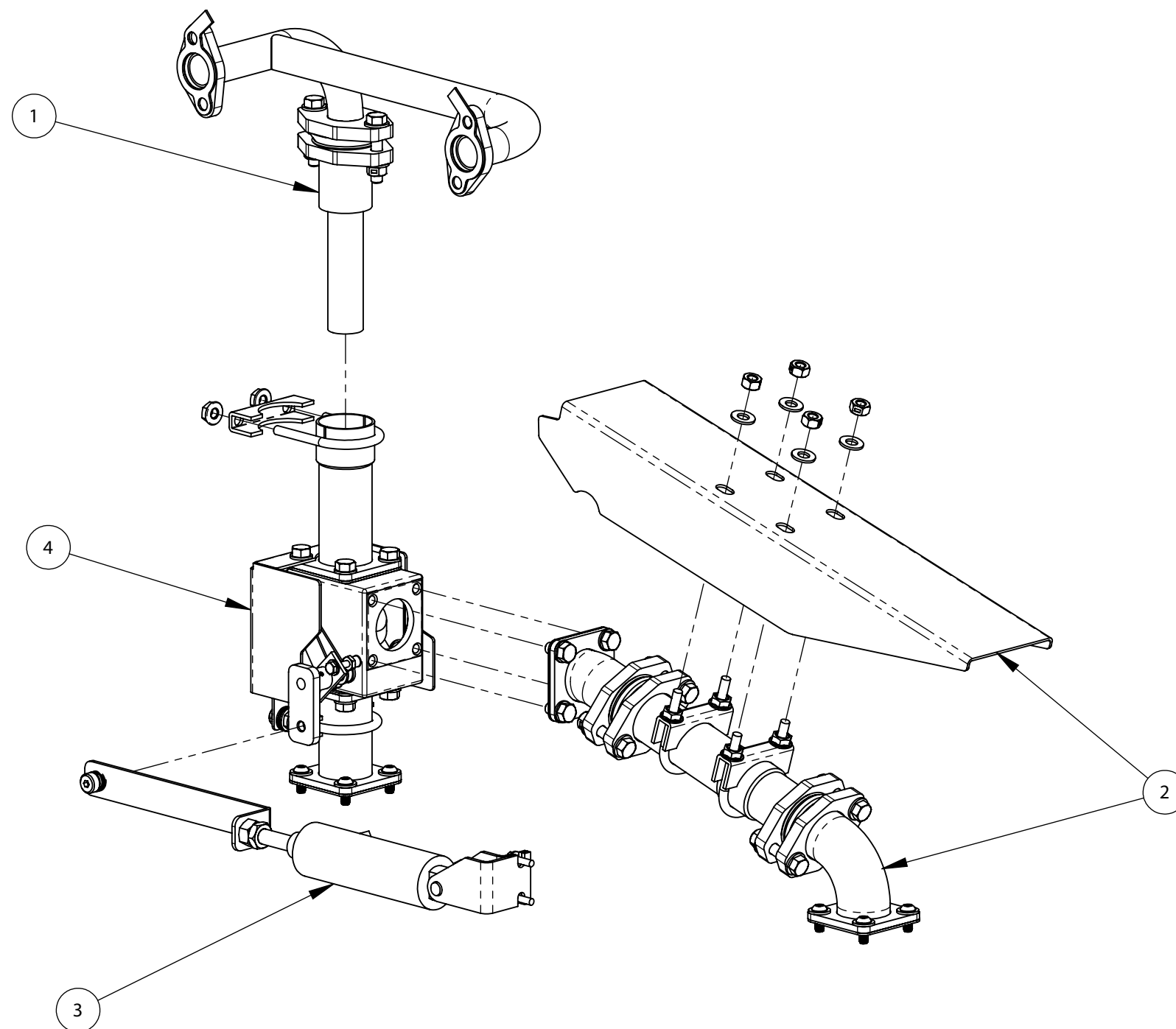
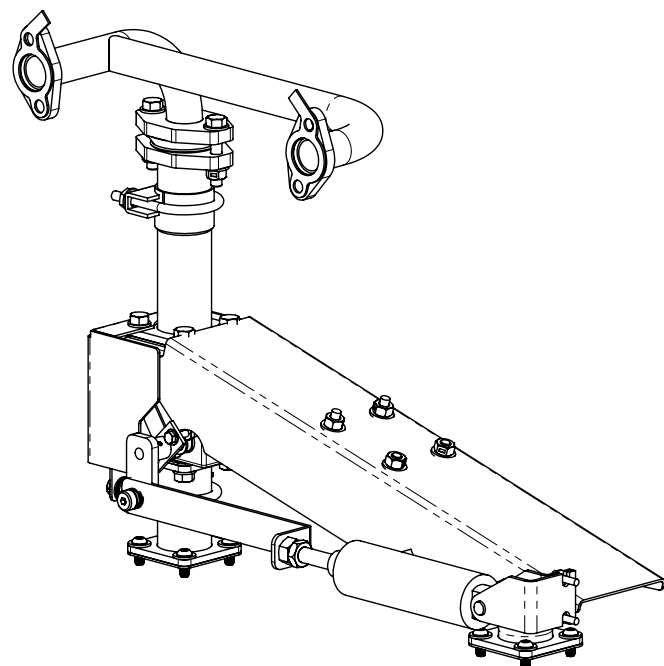


Water Box Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-660	Bulkhead, 3/8" FPT X 3/8" FPT	1
2	000-033-003	Clamp, Size #4 Mini Hose	1
3	000-041-005	Cover, 6" Access	1
4	000-052-355	Elbow, 3/8" NPT X 1/2" Hose, GFBN	1
5	000-068-827	Hose, 3/8" Clear w/ Braid X 8" Lg.	1
6	000-052-661	Insert, 3/4" Barb X Straight	1
7	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1
8	000-052-056	Insert, #68 GFBN	1
9	000-052-662	Nipple, 3/8" NPT X 1/4" M SAE	1
10	000-094-097	Nut, 1"-14UNS Brass	4
11	000-097-041	O-Ring, 1/2" Bulk Head	2
12	000-143-017-1	Screw, 3/8"-16UNC X 3/4" Lg. Hex Head	3

Item	Part Number	Description	Qty
13	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	6
14	000-157-0801	Switch, w/Protector, Polypropelene Barrel	1
15	000-159-107	Tank, Poly Water Box - 4 Gallon	1
16	000-052-156	Tee, 1/4" Plastic	1
17	000-052-447	Tee, 3/8" NPT Male Branch	1
18	000-052-023	Tee, 3/8" NPT Male Street	1
19	000-169-218	Valve, Float, Water Box	1
20	000-169-011	Valve, Hi Temp Control 180 Degree	1
21	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	2
22	000-174-032	Washer, 3/8" Flat	3
23	000-174-028	Washer, 7/8" I.D. X 1.50" O.D. X 0.090" Thk.	2

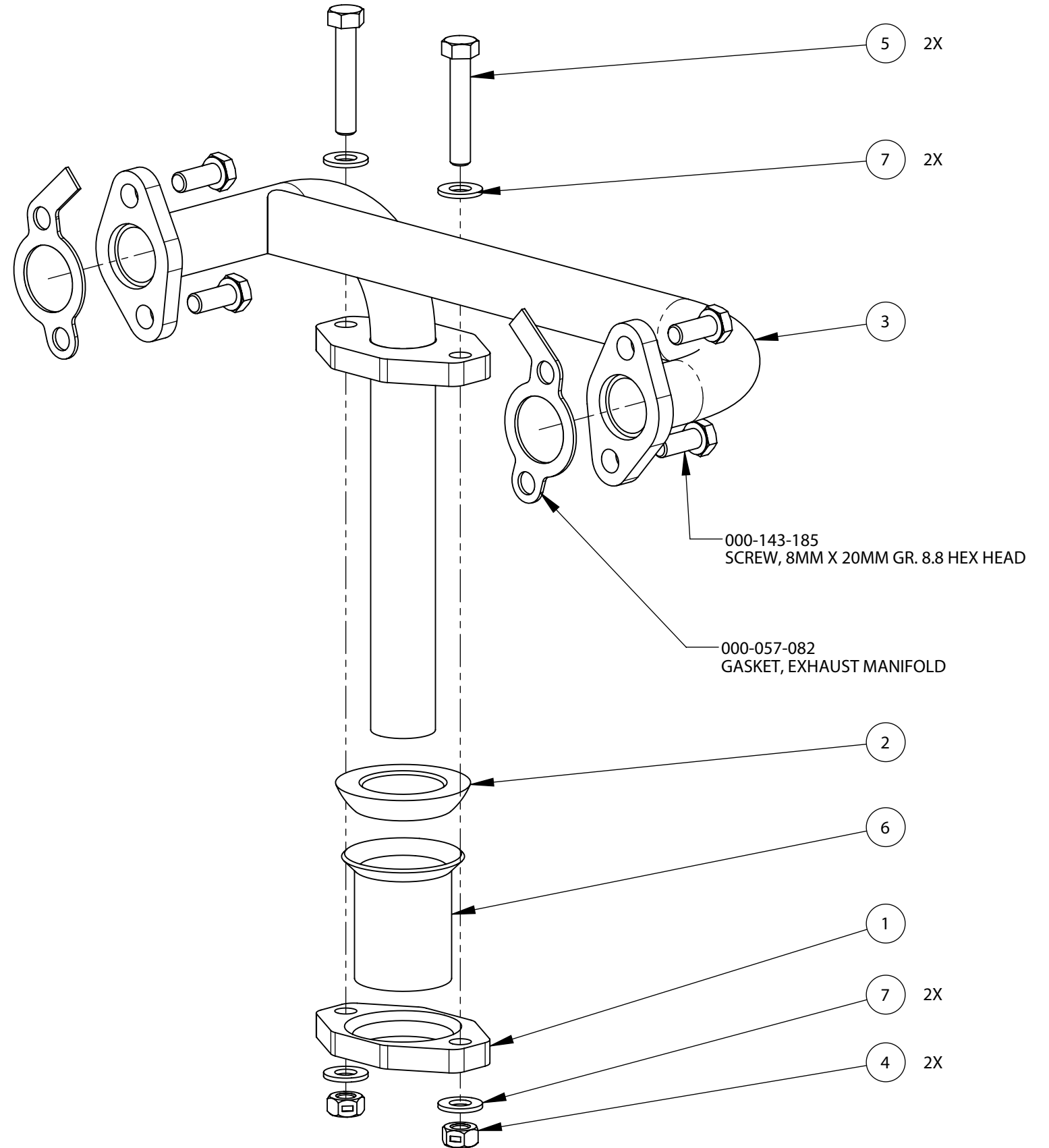
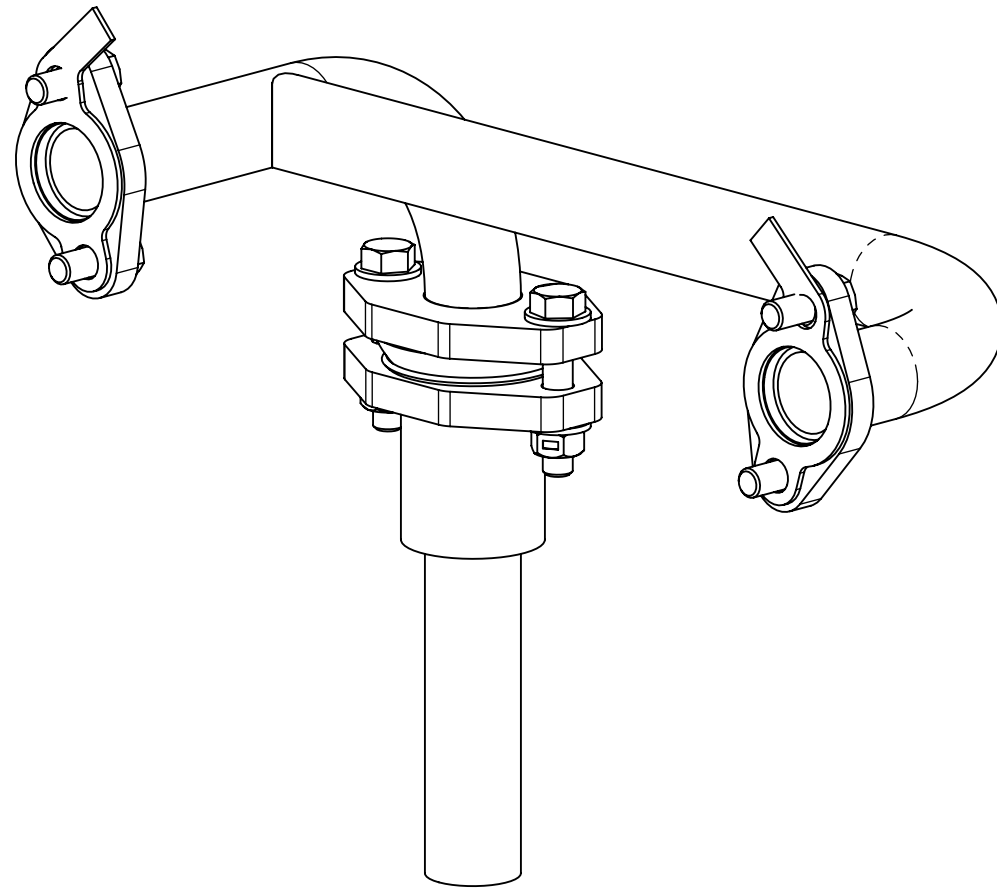
Figure 9-26. Exhaust Assembly
610-013-728



Exhaust Assembly Parts List

Item	Part Number	Description	Qty
1	610-013-002	Assembly, Exhaust Manifold	1
2	610-013-005	Assembly Exhaust Diverted	1
3	610-014-728	Assembly, Diverter Valve Actuator	1
4	610-013-003	Assembly, Exhaust Diverter Valve	1

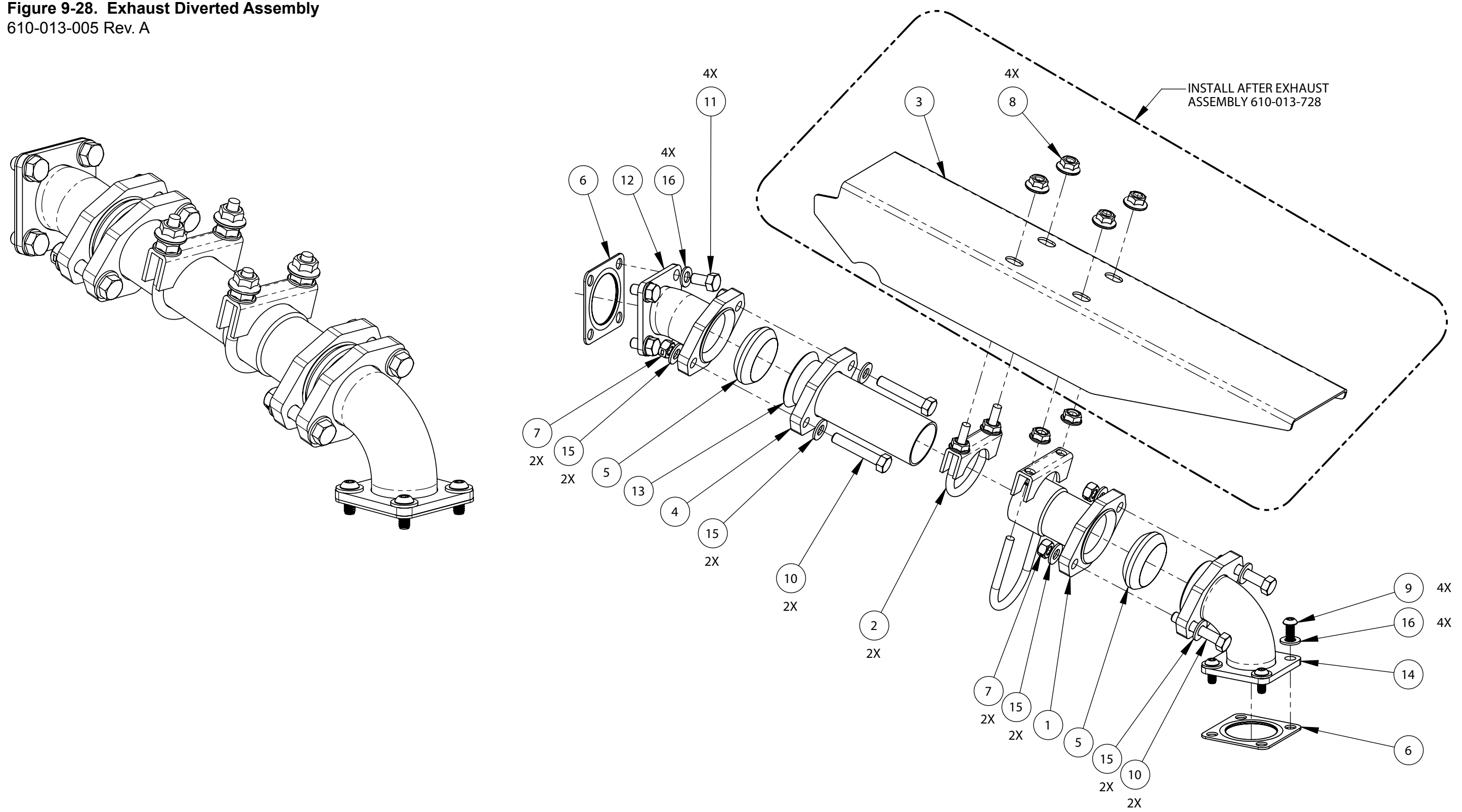
Figure 9-27. Exhaust Manifold Assembly
610-013-002 Rev. A



Exhaust Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-105-181	Flange, Ø1.50" Exhaust Donut - Coated	1
2	000-057-212	Gasket, Half Donut	1
3	000-090-001	Manifold Exhaust - Weldment	1
4	000-094-081	Nut, 5/16"-18UNC Hex 2 Way Locking	2
5	000-143-124	Screw, 5/16"-18UNC X 1.75" Lg. Hex Head	2
6	000-125-137	Tube, Exhaust 2.00" Lg. w/ Flare	1
7	000-174-049	Washer, 5/16" Flat	4

Figure 9-28. Exhaust Diverted Assembly
610-013-005 Rev. A



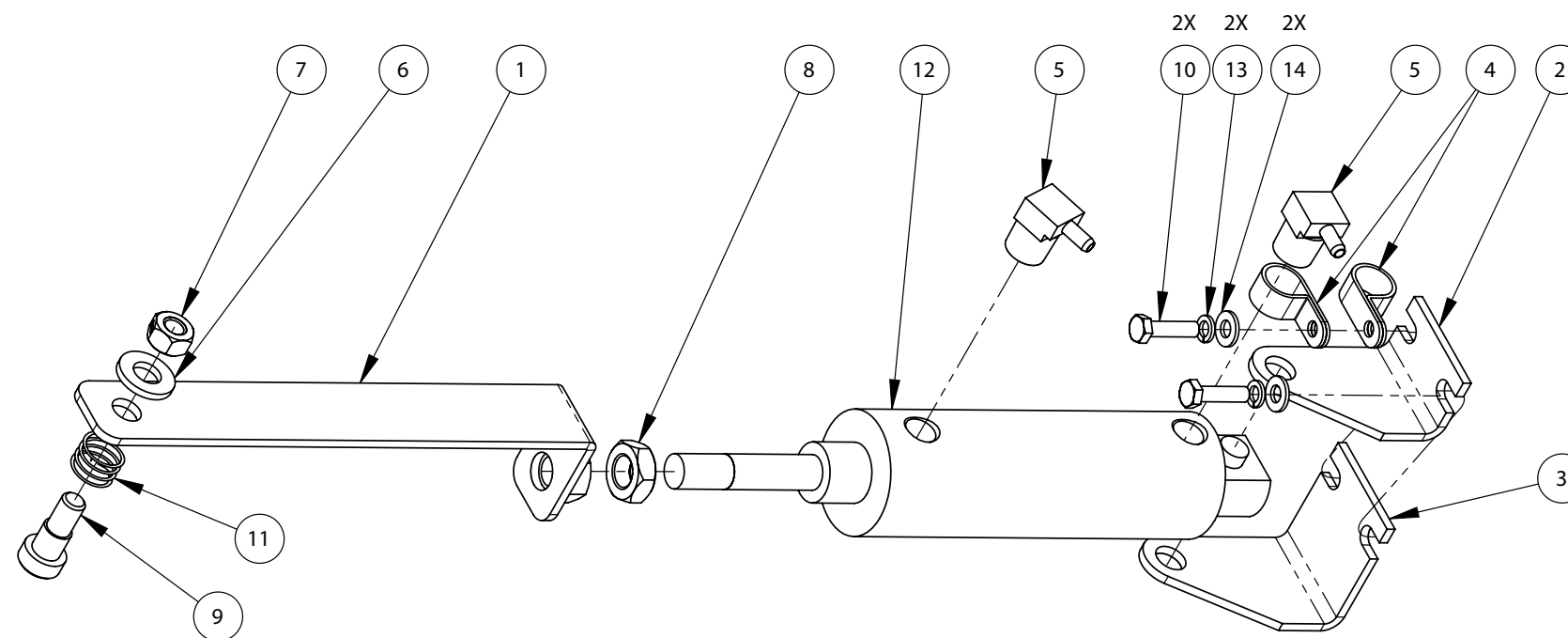
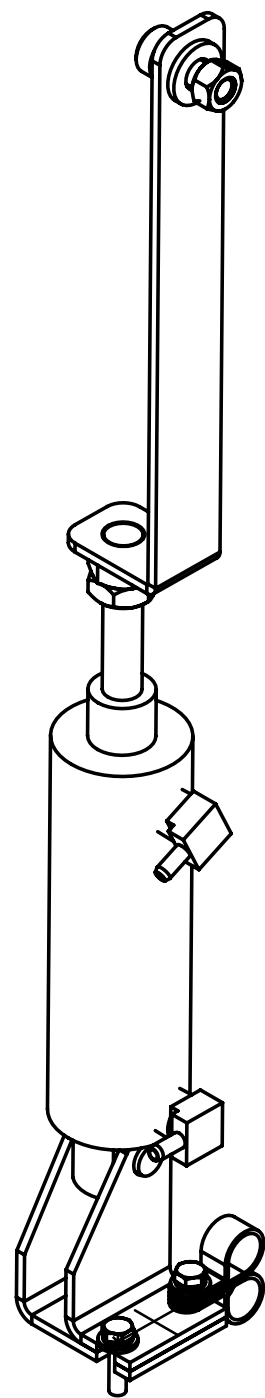


Exhaust Diverted Assembly Parts List

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	2
3	000-041-043	Cover, Diverter Exhaust	1
4	000-105-181	Flange, Ø1.50" Exhaust Donut - Coated	1
5	000-057-199	Gasket, Exhaust Donut	2
6	000-057-146	Gasket, Four Hole Exhaust	2
7	000-094-081	Nut, 5/16"-18UNC Hex 2 Way Locking	4
8	000-094-078	Nut, 5/16-18UNC Hex Flange	4

Item	Part Number	Description	Qty
9	000-143-206	Screw 1/4-20 X 5/8 SHCS Button	4
10	000-143-124	Screw, 5/16"-18UNC X 1.75" Lg. Hex Head	4
11	000-143-572	Screw, 5/16-18UNC X 5/8" Lg. Grd. 5 Hex Head	4
12	000-125-199	Tube, Exhaust Divert - Weldment	1
13	000-125-266	Tube, Exhaust 4.60" Lg. w/ Flare	1
14	000-125-265	Tube, Exhaust Divert - Weldment	1
15	000-174-049	Washer, 5/16" Flat	8
16	000-174-069	Washer, 5/16" Inconel Belleville	8

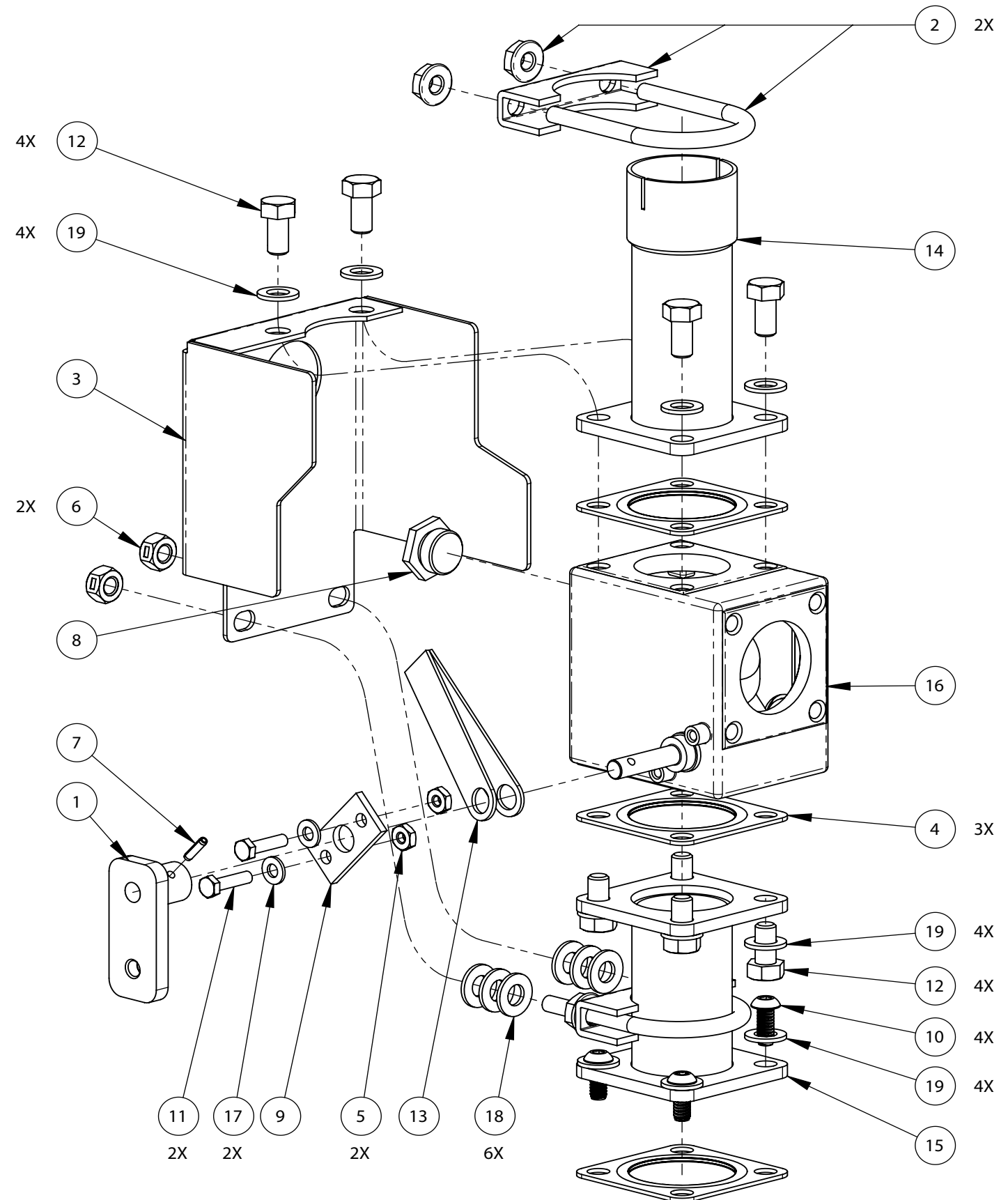
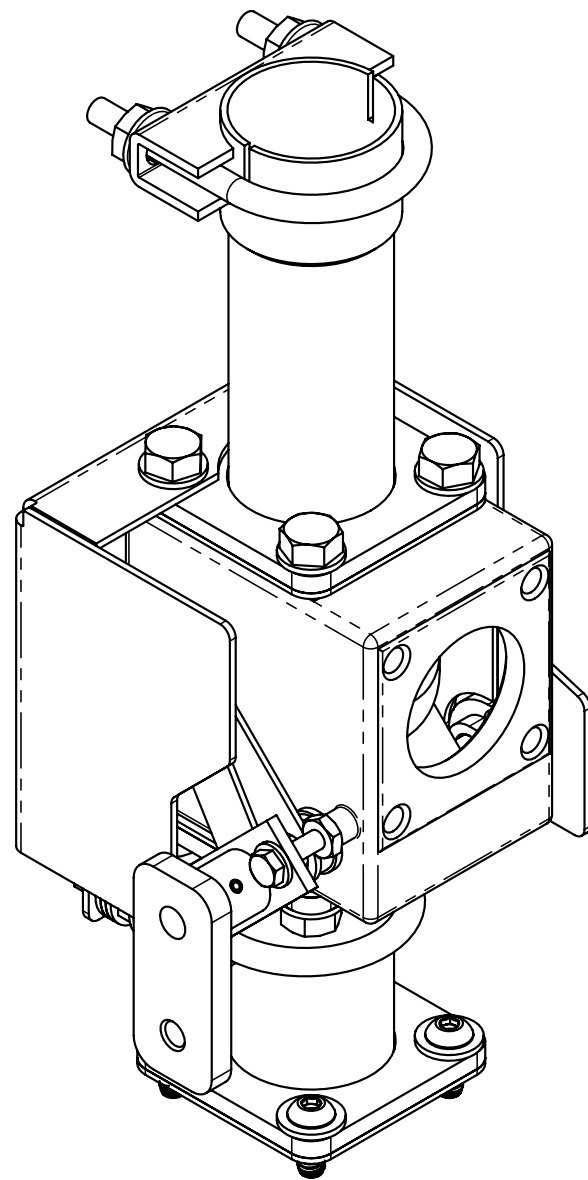
Figure 9-29. Diverter Valve Actuator Assembly
610-014-728 Rev. B



Diverter Valve Actuator Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-016	Bracket Actuator - Coated	1
2	000-015-750	Bracket, Air Cylinder Mount - Inner Coated	1
3	000-015-748	Bracket, Air Cylinder Mount - Outer - Coated	1
4	000-033-022	Clamp, 1/2" Nylon Hose	2
5	000-052-550	Elbow, 1/8" NPT X 3/16" Barb	2
6	000-057-224	Gasket, Actuator	1
7	000-094-081	Nut, 5/16"-18UNC Hex 2 Way Locking	1
8	000-094-092	Nut, 7/16"-20UNCF Hex Jam	1
9	000-143-573	Screw, 5/16"-18UNC X 7/8" Lg. w/ 3/8" X 1/2"	1
10	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	2
11	000-155-020	Spring, 0.540 O.D. X 0.041 Wire X 1.00 Lg.	1
12	000-169-169	Valve, Air Cylinder	1
13	000-174-014	Washer, #10 Lock	2
14	000-174-001	Washer, #10 Flat	2

Figure 9-30. Exhaust Diverter Valve Assembly
610-013-003 Rev. B

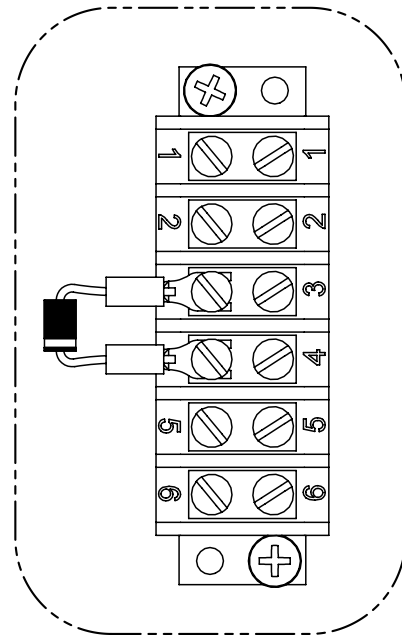


Exhaust Diverter Valve Assembly Parts List

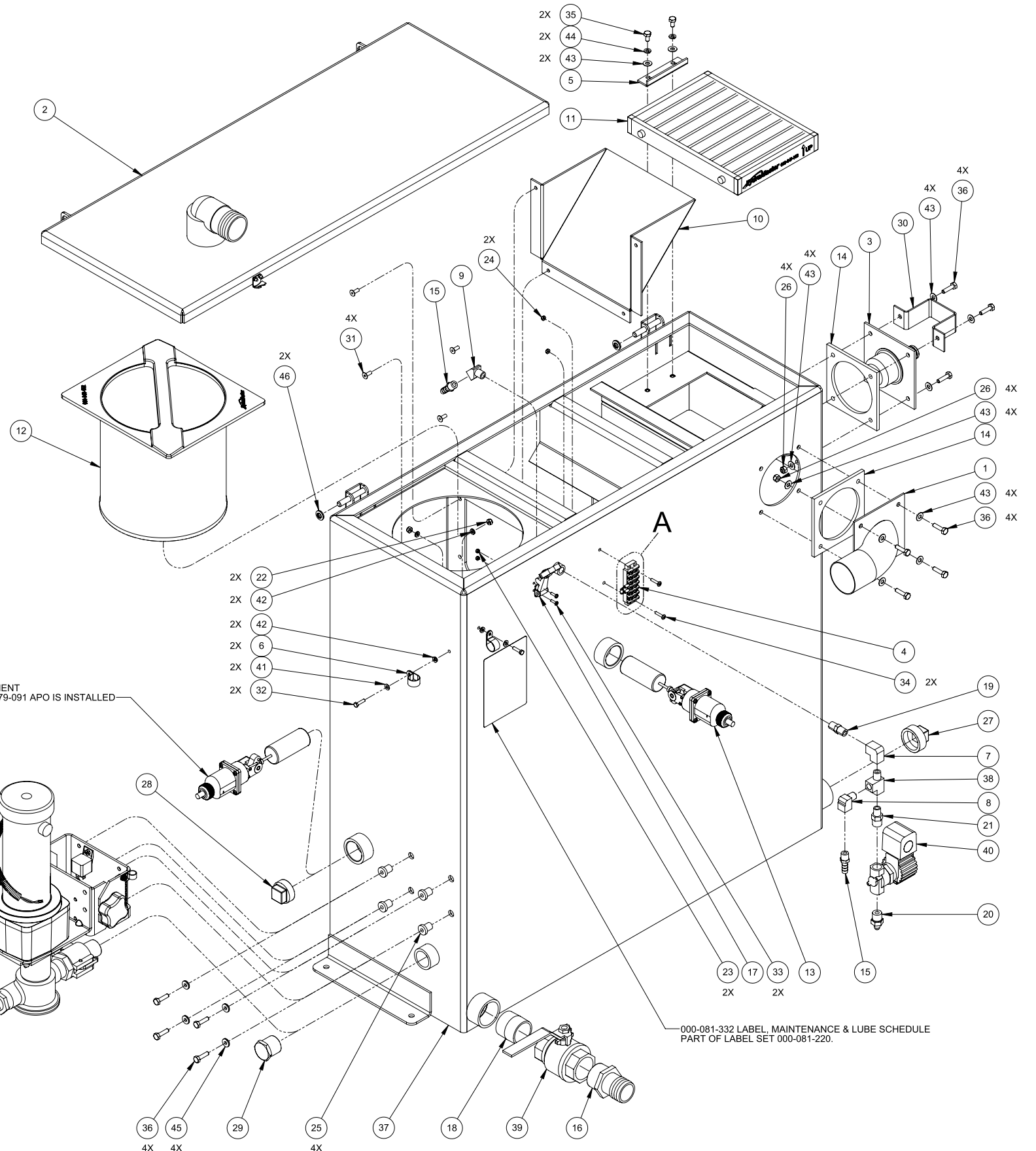
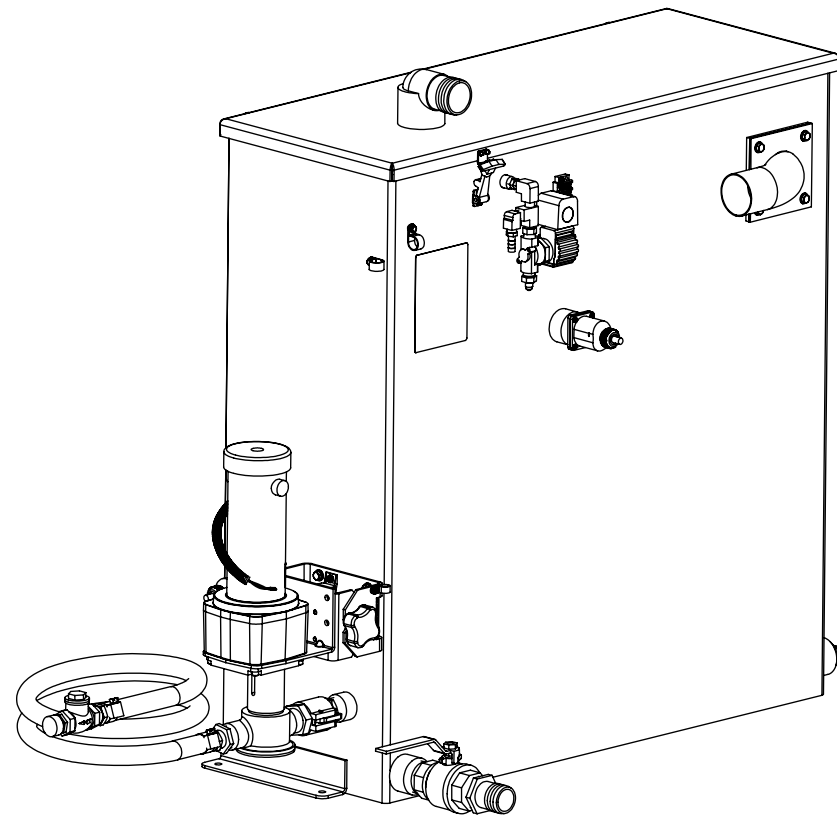
Item	Part Number	Description	Qty
1	000-015-642	Bracket, Air Cylinder Actuation - Coated	1
2	000-033-068	Clamp, 1-1/2" Exhaust	2
3	000-041-031	Cover, Diverter	1
4	000-057-146	Gasket, Four Hole Exhaust	3
5	000-094-027	Nut, #10-24UNC Hex	2
6	000-094-081	Nut, 5/16"-18UNC Hex 2 Way Locking	2
7	000-103-005	Pin, Roll - 0.125" X 0.500" Lg.	1
8	000-106-120	Plug, M18 X 1.5	1
9	000-138-010	Retainer, Leaf Spring	1
10	000-143-206	Screw 1/4-20 X 5/8 SHCS Button	4

Item	Part Number	Description	Qty
11	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	2
12	000-143-572	Screw, 5/16-18UNC X 5/8" Lg. Grd. 5 Hex Head	8
13	000-155-030	Spring, Leaf - Weldment	1
14	000-125-268	Tube Exhaust - Weldment	1
15	000-125-139	Tube Exhaust - Weldment	1
16	000-169-045	Valve, Cast Exhaust Diverter	1
17	000-174-001	Washer, #10 Flat	2
18	000-174-049	Washer, 5/16" Flat	6
19	000-174-069	Washer, 5/16" Inconel Belleville	12

Figure 9-31. 70 Gallon Universal Recovery Tank (URT) Assembly
610-003-728



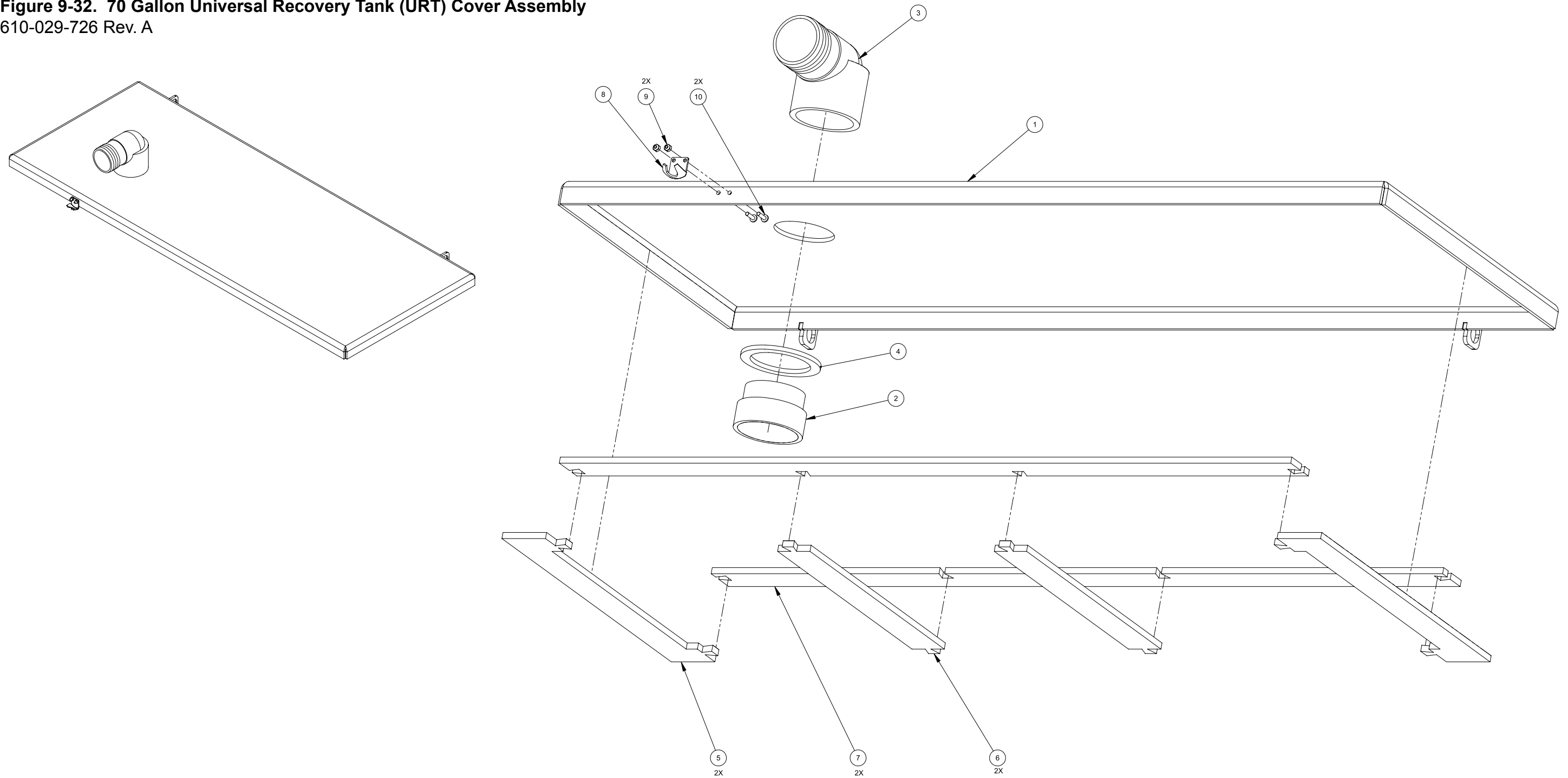
DETAIL VIEW A



70 Gallon Universal Recovery Tank (URT) Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-134	Adapter, Ø2.5" Tank X 90 Degree Blower Hose - Coated	1	24	000-094-059	Nut, #8-32UNC Nylock	2
2	610-029-726	Assembly, Cover, 70 Gal URT, Single Vac	1	25	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
3	610-026-724	Assembly, Vacuum Relief Valve - URT	1	26	000-094-009	Nut, 1/4"-20UNC Nylock	8
4	000-012-002	Block, 6 Post Terminal	1	27	000-106-019	Plug, 1-1/2" NPT	1
5	000-015-932	Bracket, Flat Filter Securing - Uncoated	1	28	000-106-046	Plug, 1-1/4" NPT	1
6	000-033-023	Clamp, 3/4" Nylon Hose	2	29	000-106-049	Plug, 1" NPT Black Nylon	1
7	000-052-088	Elbow, 1/4" FPT X FPT	1	30	000-108-179	Protector, Vacuum Relief - Coated	1
8	000-052-085	Elbow, 1/4" NPT Street	1	31	000-140-023	Rivet, AB8-6A Aluminum Pop	4
9	000-052-082	Elbow, 1/4" NPT Street X 45 Degree	1	32	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	2
10	000-049-154	Filter, Air Deflector, URT - Fabricated	1	33	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2
11	000-049-153	Filter, Flat - URT	1	34	000-143-051	Screw, #8-32UNC X 3/4" Lg. Binder Head	2
12	000-049-152	Filter, Recovery Tank Basket	1	35	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	2
13	000-157-091	Float, Lever Switch	1	36	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	12
14	000-057-206	Gasket, Adapter - URT	2	37	000-159-128	Tank, 70 Gallon URT - Coated	1
15	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	2	38	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
16	000-052-226	Insert, 1-1/2" NPT X 1-1/2" Barb (Gray)	1	39	000-169-022	Valve, 1-1/2" Full Port Ball	1
17	000-086-008	Latch, Bungee	1	40	000-169-082	Valve, 12 Volt Solenoid 1,200 psi	1
18	000-052-763	Nipple, 1-1/2" IPS Close S/S	1	41	000-174-001	Washer, #10 Flat	2
19	000-052-071	Nipple, 1/4" NPT Hex	1	42	000-174-036	Washer, #10 Flat Rubber Backed	4
20	000-052-662	Nipple, 3/8" NPT X 1/4" M SAE	1	43	000-174-003	Washer, 1/4" Flat	18
21	000-052-073	Nipple, 3/8" NPT X 1/4" NPT Hex	1	44	000-174-019	Washer, 1/4" Lock	2
22	000-094-034	Nut, #10-24UNC Nylock	2	45	000-174-060	Washer, 1/4" Rubber Backed	4
23	000-094-063	Nut, #6-32UNC Nylock	2	46	000-174-029	Washer, 3/8" Rubber Backed	2

Figure 9-32. 70 Gallon Universal Recovery Tank (URT) Cover Assembly
610-029-726 Rev. A

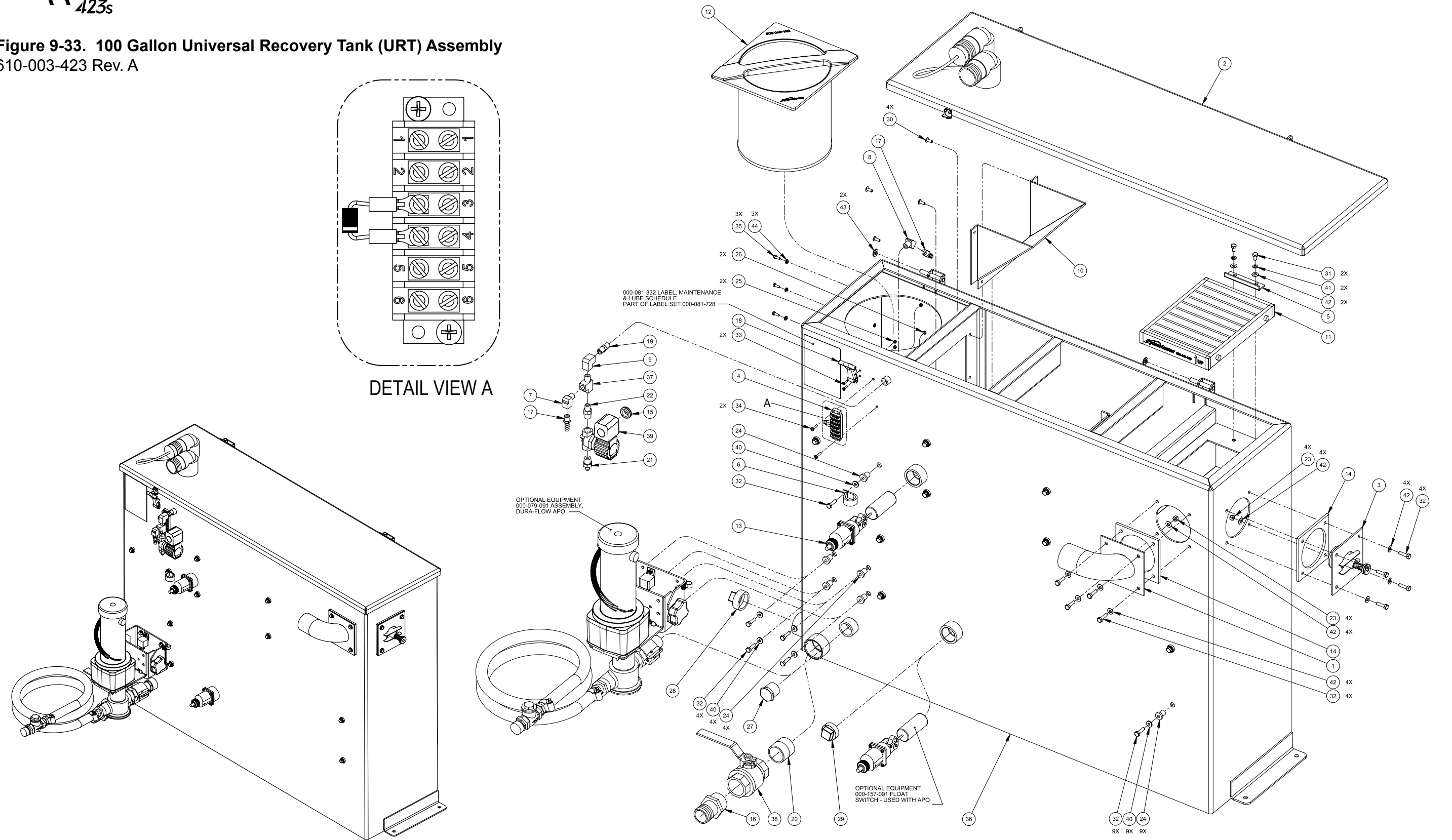


70 Gallon Universal Recovery Tank (URT) Cover Assembly Parts List

Item	Part Number	Description	Qty
1	000-041-443	Cover	1
2	000-052-219	Adapter, 2" NPT X 2" F Slip	1
3	000-052-222	Elbow, 2" Barb X 2" FPT	1
4	000-057-015	Gasket, 1-1/2" Bulkhead Fitting	1
5	000-057-202	Gasket, End - Recovery Tank Cover	2

Item	Part Number	Description	Qty
6	000-057-203	Gasket, Middle - Recovery Tank Cover	2
7	000-057-204	Gasket, Side - Recovery Tank	2
8	- - -	Latch, Bungee - Strike (Part of 000-086-008)	1
9	000-094-063	Nut, #6-32UNC Nylock	2
10	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2

Figure 9-33. 100 Gallon Universal Recovery Tank (URT) Assembly
610-003-423 Rev. A

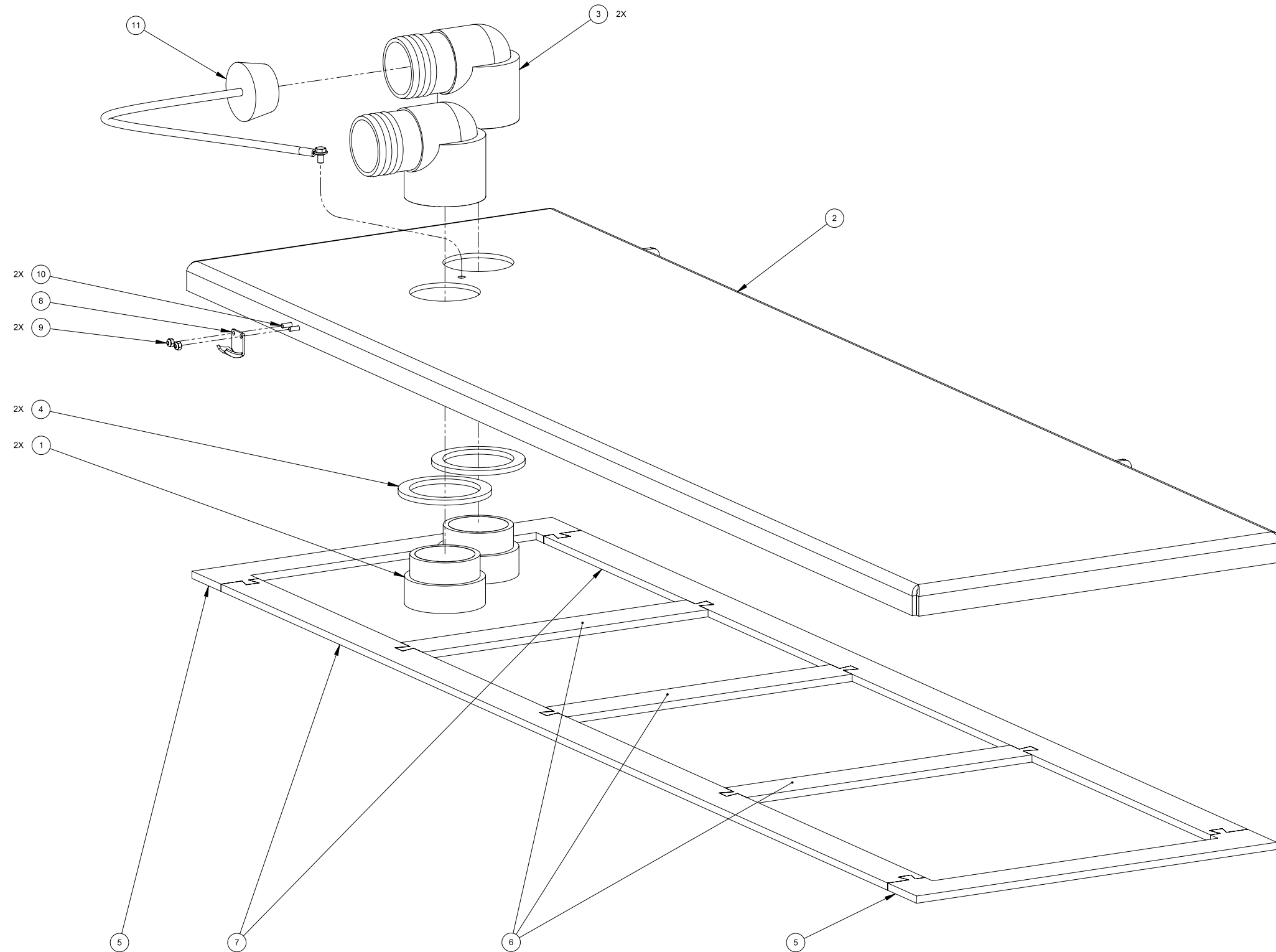


ITEMS 27 AND 29 ARE NOT USED WHEN APO IS INSTALLED.

100 Gallon Universal Recovery Tank (URT) Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-134	Adapter, Ø2.5" Tank X 90° Blower Hose - Coated	1	23	000-094-009	Nut, 1/4"-20UNC Nylock	8
2	610-029-002	Assembly, Recovery Tank Cover	1	24	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	14
3	610-026-724	Assembly, Vacuum Relief Valve - URT	1	25	000-094-063	Nut, #6-32UNC Nylock	2
4	000-012-002	Block, 6 Post Terminal	1	26	000-094-059	Nut, #8-32UNC Nylock	2
5	000-015-932	Bracket, Flat Filter Securing - Uncoated	1	27	000-106-049	Plug, 1" NPT Black Nylon	1
6	000-033-057	Clamp, 1" Cushion Loop	1	28	000-106-019	Plug, 1-1/2" NPT	1
7	000-052-085	Elbow, 1/4" NPT Street	1	29	000-106-046	Plug, 1-1/4" NPT	1
8	000-052-082	Elbow, 1/4" NPT Street X 45 Degree	1	30	000-140-023	Rivet, AB8-6A Aluminum Pop	4
9	000-052-088	Elbow, 1/4" FPT X FPT	1	31	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	2
10	000-049-154	Filter, Air Deflector, URT - Fabricated	1	32	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	22
11	000-049-153	Filter, Flat - URT	1	33	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2
12	000-049-152	Filter, Recovery Tank Basket	1	34	000-143-051	Screw, #8-32UNC X 3/4" Lg. Binder Head	2
13	000-157-091	Float, Lever Switch	1	35	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	3
14	000-057-206	Gasket, Adapter - URT	2	36	000-159-129	Tank, 100 Gal. Universal Recovery - Coated	1
15	000-060-002	Grommet, Large Wiring	1	37	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
16	000-052-226	Insert, 1-1/2" NPT X 1-1/2" Barb (Gray)	1	38	000-169-022	Valve, 1-1/2" Full Port Ball	1
17	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	2	39	000-169-082	Valve, 12 Volt Solenoid 1,200 psi	1
18	000-086-008	Latch, Bungee	1	40	000-174-060	Washer, 1/4" Rubber Backed	14
19	000-052-071	Nipple, 1/4" NPT Hex	1	41	000-174-019	Washer, 1/4" Lock	2
20	000-052-763	Nipple, 1-1/2" IPS Close S/S	1	42	000-174-003	Washer, 1/4" Flat	18
21	000-052-662	Nipple, 3/8" NPT X 1/4" M SAE	1	43	000-174-029	Washer, 3/8" Rubber Backed	2
22	000-052-073	Nipple, 3/8" NPT X 1/4" NPT Hex	1	44	000-174-036	Washer, #10 Flat Rubber Backed	3

Figure 9-34. 100 Gallon Universal Recovery Tank (URT) Cover Assembly
610-029-002 Rev. A



100 Gallon Universal Recovery Tank (URT) Cover Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-219	Adapter, 2" NPT X 2" F Slip	2
2	000-041-447	Cover, 100 Gal. URT - Coated	1
3	000-052-222	Elbow, 2" Barb X 2" FPT	2
4	000-057-015	Gasket, 1-1/2" Bulkhead Fitting	2
5	000-057-202	Gasket, End - Rec. Tank Cover	2
6	000-057-203	Gasket, Middle - Rec. Tank Cover	3

Item	Part Number	Description	Qty
7	000-057-205	Gasket, Side - Rec. Tank Cover	2
8	000-086-008	Latch, Bungee - Strike (Part of 000-086-008)	1
9	000-094-063	Nut, #6-32UNC Nylock	2
10	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2
11	000-078-039	Vacuum Inlet Stopper	1

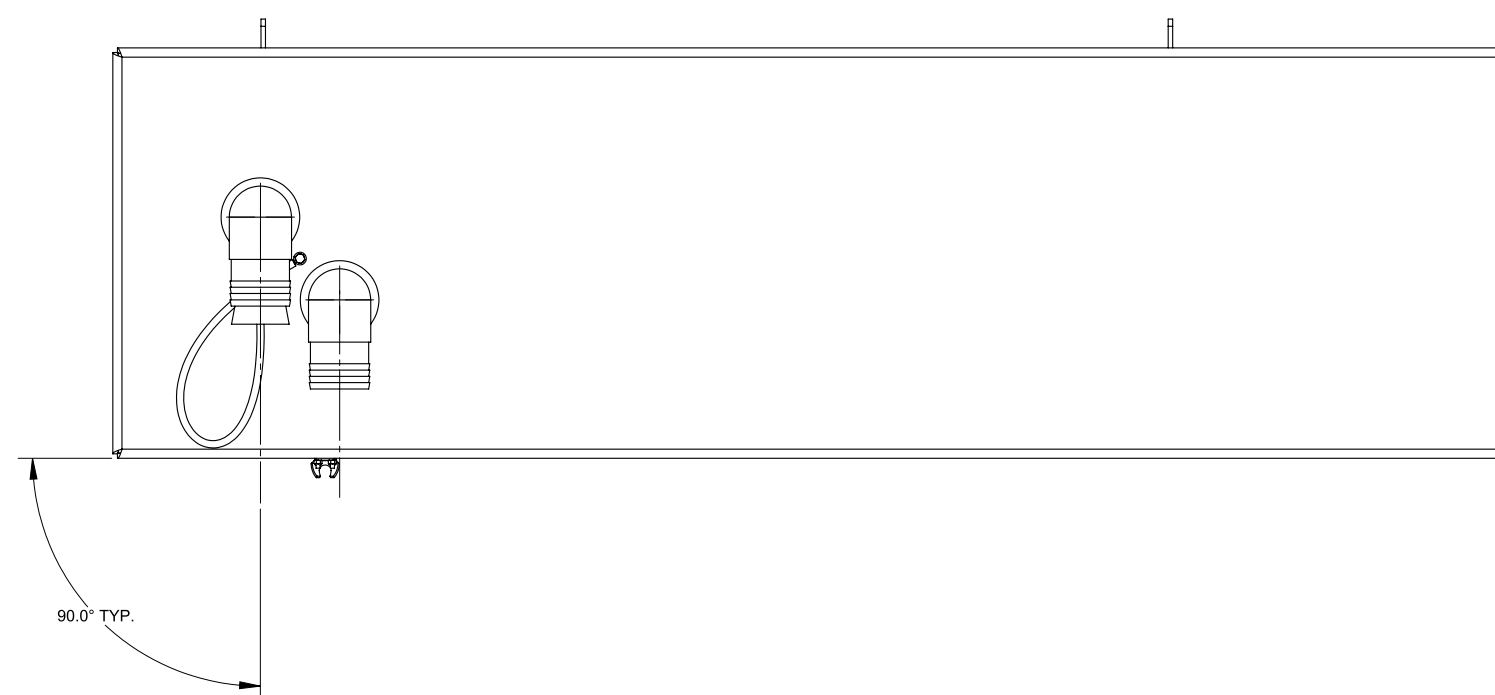
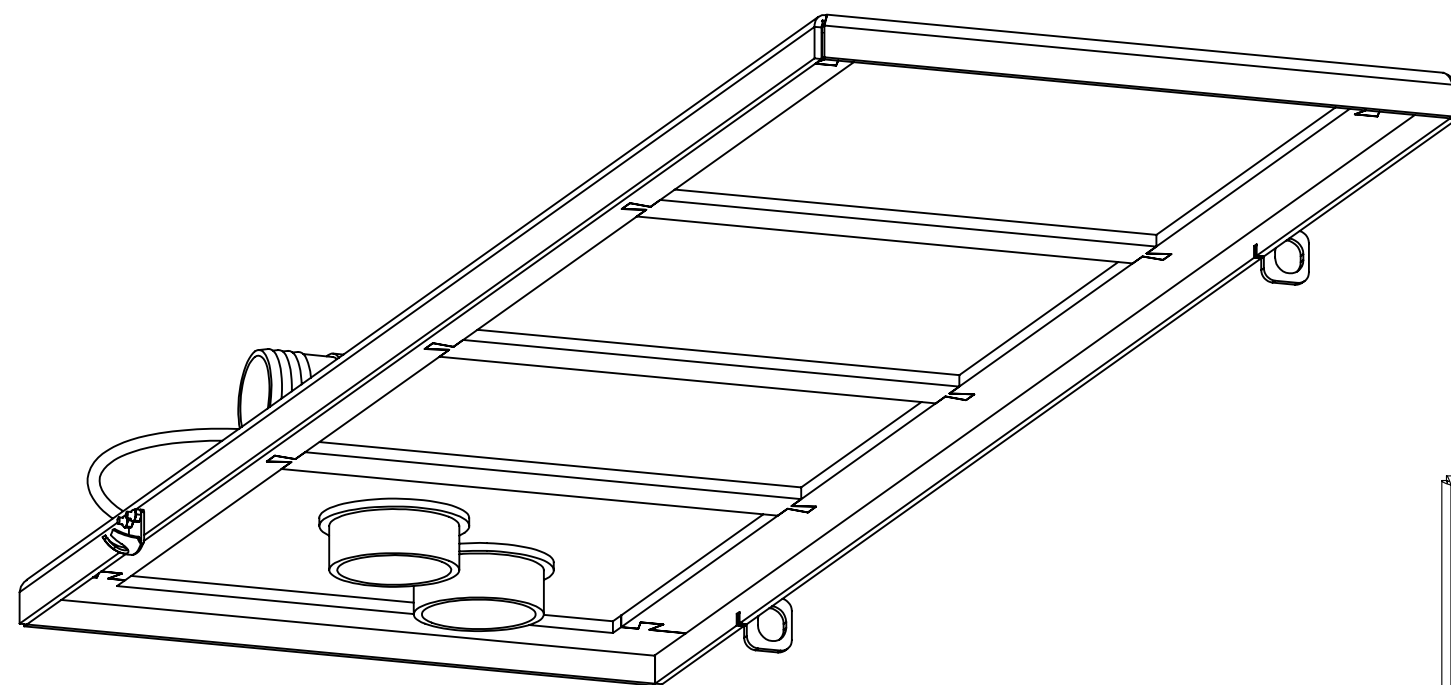
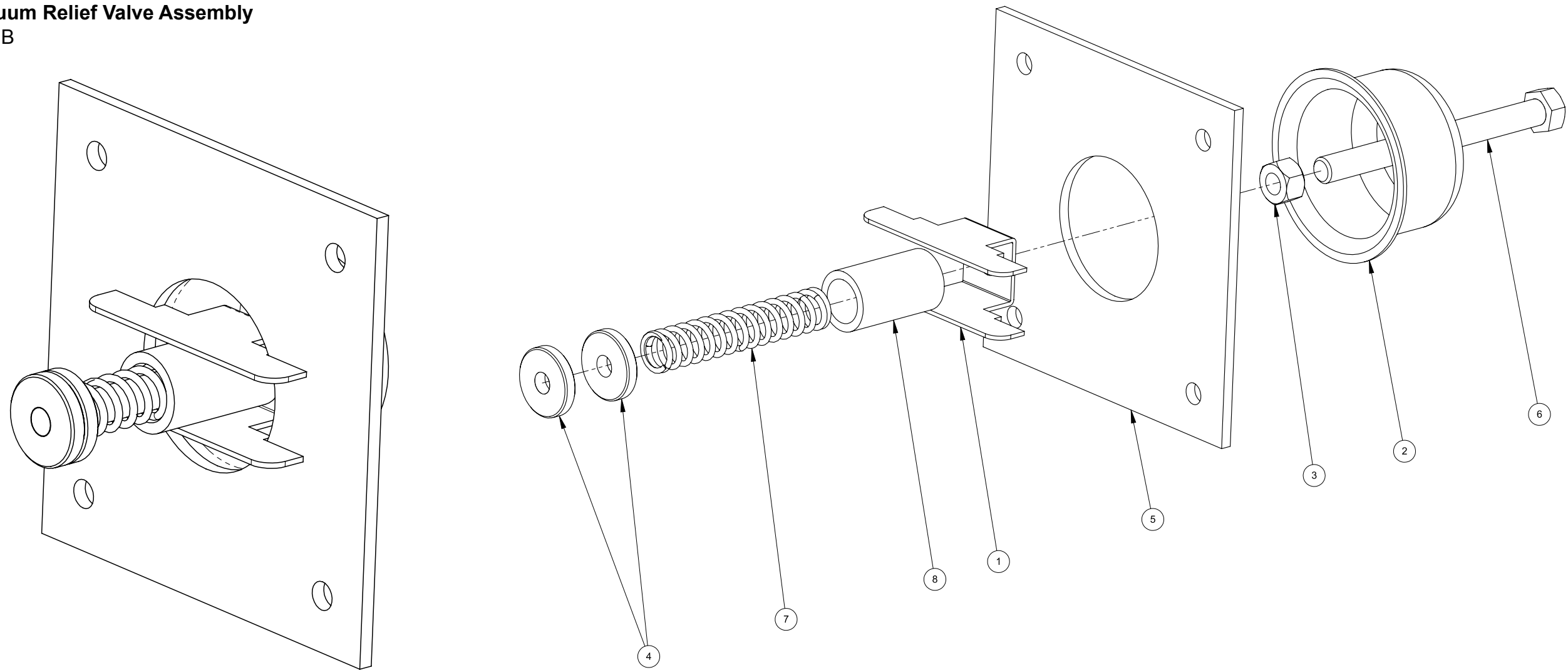


Figure 9-35. Vacuum Relief Valve Assembly
610-026-724 Rev. B

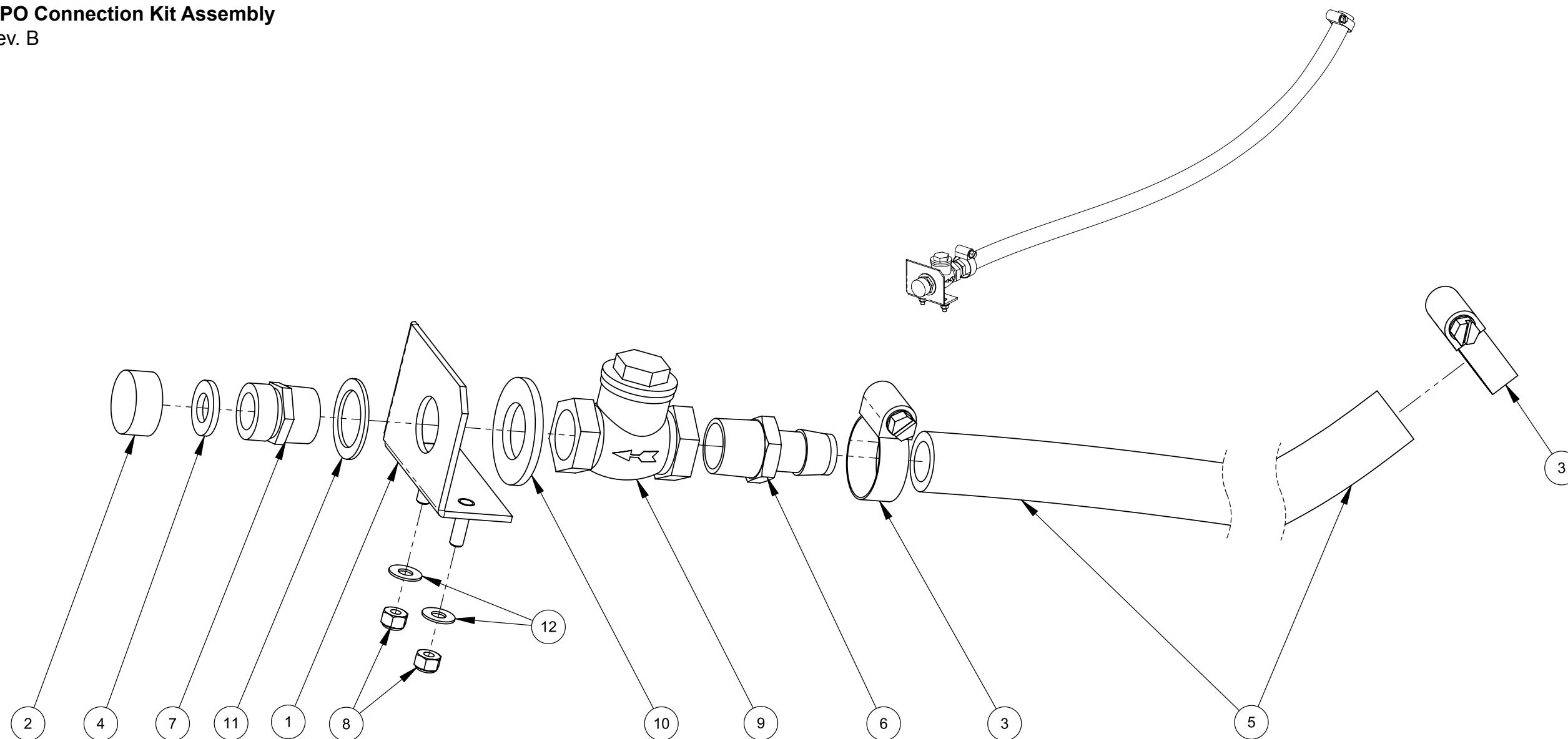


Vacuum Relief Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-182	Bracket, Vacuum Relief Valve - Fabricated	1
2	000-027-032	Cap, Spun Vacuum Relief Valve	1
3	000-094-101	Nut, 3/8"-16 UNC Hex Jam	1
4	000-094-077	Nut, 3/8"-16UNC X 1.00" O.D. Knurled	2

Item	Part Number	Description	Qty
5	000-105-332	Plate, Vacuum Relief Valve Mounting - Coated	1
6	000-143-198	Screw, 3/8"-16UNC X 4" Lg. Hex Head - Full Thread	1
7	000-155-026	Spring, Vacuum Relief Valve	1
8	000-125-111	Tube, Vacuum Relief Spring Guide	1

Figure 9-36. APO Connection Kit Assembly
610-021-010 Rev. B



APO Connection Kit Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-015-720	Bracket, APO Outlet Mounting - Coated	1	7	000-052-281	Nipple, 3/4" NPT X 3/4" Male Garden Hose	1
2	000-027-014	Cap, Garden Hose	1	8	000-094-009	Nut, 1/4"-20UNC Nylock	2
3	000-033-020	Clamp, Size #16 Hose	2	9	000-169-009	Valve, 3/4" FPT Swing Check	1
4	000-057-055	Gasket, Garden Hose	1	10	000-174-050	Washer, 1" Flat	1
5	000-068-954	Hose, 3/4" I.D. Rubber X 72" Lg. - Red	1	11	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	1
6	000-052-338	Insert, #1212 (3/4" NPT X 3/4" Barb)	1	12	000-174-003	Washer, 1/4" Flat	2

Hose Routings

Part No.	Description	From/To
000-068-888	Hose Assembly, 3/16" Teflon X 24" Lg.	Hi PSI Pump to PSI Gauge
000-068-888	Hose Assembly, 3/16" Teflon X 24" Lg.	Chemicalical Metering Valve to Solution Out
000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg.	Hi PSI Manifold to Solution Out
000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg.	Hi PSI Pump to By-Pass Valve
000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg.	Heat Exchanger Out to Hi PSI Manifold
000-068-931	Hose Assembly, 5/16" Teflon X 14.5" Lg.	Heat Exchanger In to By-Pass Valve
000-068-933	Hose Assembly, 3/16" Teflon X 23" Lg.	Chemicalical Pump to Prime Valve
000-068-509	Hose Assembly, 3/16" Teflon X 37.5" Lg.	Water Box to Primary Orifice
000-068-1005	Hose Assembly, 3/16" Teflon X 110" Lg.	Secondary Orifice to Rec Tank "
000-068-992	Hose, 1/2" Rubber X 4" Lg.	By-Pass Return to Wye
000-068-993	Hose, 1/2" Rubber X 5" Lg.	Drain Valve to Wye
000-068-991	Hose, 1/2" Rubber X 42" Lg.	Water Box to Wye
000-068-994	Hose, 1/2" Rubber X 62" Lg.	Fresh Water In to Water Box
000-068-980	Hose, 3/8" I.D. Clear w/ Braid X 28.5" Lg.	Flow Meter to Chemicalical Pump
000-068-971	Hose, 3/8" I.D. Clear w/ Braid X 60" Lg.	Flow Meter to Chemicalical Jug
000-068-995	Hose, 3/4" I.D. EPDM X 41" Lg.	Water Box to Hi PSI Pump
000-068-996	Hose, 3/8" I.D. Rubber X 2" Lg.	Prime Tee to Thermo Valve
000-068-997	Hose, 3/8" I.D. Rubber X 60" Lg.	Prime Tee to Chemicalical Prime Valve
000-068-972	Hose, 3/8" I.D. Rubber X 76" Lg.	Prime Tee to Recovery Tank
000-068-1006	Hose, 5/32" I.D. Vacuum X 1.5" Lg.	Vac Tee to Check Valve
000-068-1007	Hose, 5/32" I.D. Vacuum X 4.5" Lg.	Engine to Check Valve
000-068-1008	Hose, 5/32" I.D. Vacuum X 20" Lg.	Vac Solenoid - Divert Mode
000-068-1008	Hose, 5/32" I.D. Vacuum X 20" Lg.	Vac Solenoid - Heat Mode
000-068-1009	Hose, 5/32" I.D. Vacuum X 22" Lg.	Vac Tee to Vac Solenoid
000-068-1010	Hose, 5/32" I.D. Vacuum X 46" Lg.	Blower Inlet to Vacuum Gauge
000-068-1010	Hose, 5/32" I.D. Vacuum X 46" Lg.	Blower Inlet to Check Valve
000-068-1011	Hose, 5/32" I.D. Vacuum X 57" Lg.	Blower Inlet to Blower Lube Port

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.

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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 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.

RECOVERY 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 - 1,000 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. (You can also refer to <http://www.hydramaster.com/KnowledgeCenter/Warranty.aspx>).

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: techsupport@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.

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