

CTS 4.8 Flex Owner's Manual

Manufactured Exclusively for



HydraMaster
11015 47th Avenue West
Mukilteo, Washington 98275

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(P/N 000-182-750)

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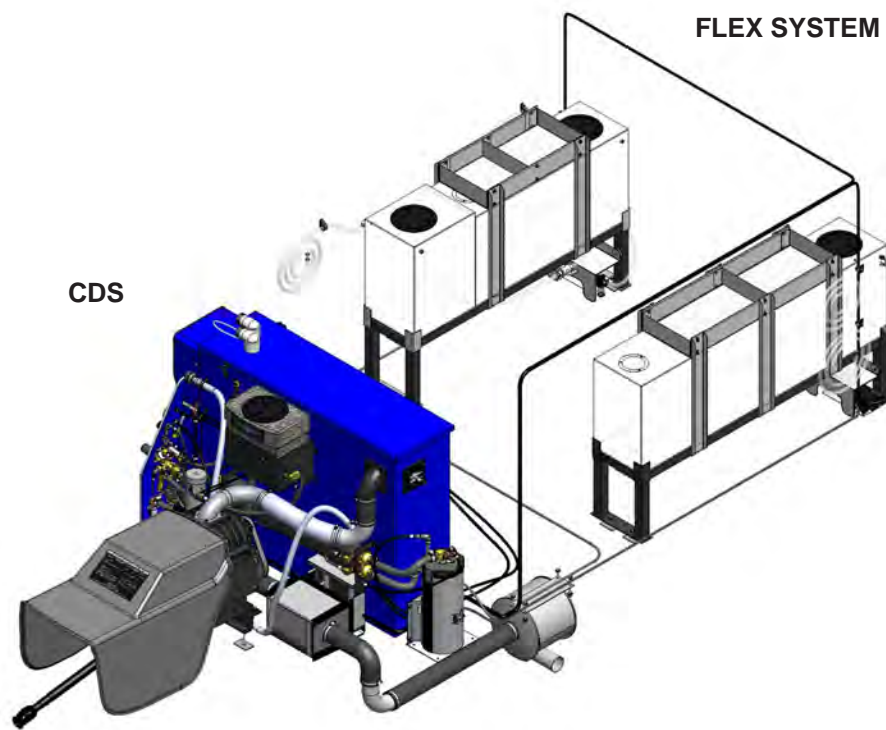
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1 - General Information

The CTS 4.8 Flex is manufactured exclusively for ChemDry by HydraMaster. The configuration* integrates HydraMaster's popular and durable CDS with the specially designed Flex System which dispenses ChemDry's proprietary solutions for carpet and upholstery cleaning.

The CDS has been purposely modified to control the Flex System, ensuring that the two systems work seamlessly with each other.



*This is a typical CTS 4.8 Flex configuration and may not represent your current configuration.

If hard surface cleaning is required, the CTS 4.8 Flex can be temporarily converted to a CDS, eliminating the need to purchase additional cleaning equipment.

The CTS 4.8 Flex includes the CDS's recovery tank and power pack which are installed toward the front of Chevy van. The silencer is installed under the van (see Figure 1-1).

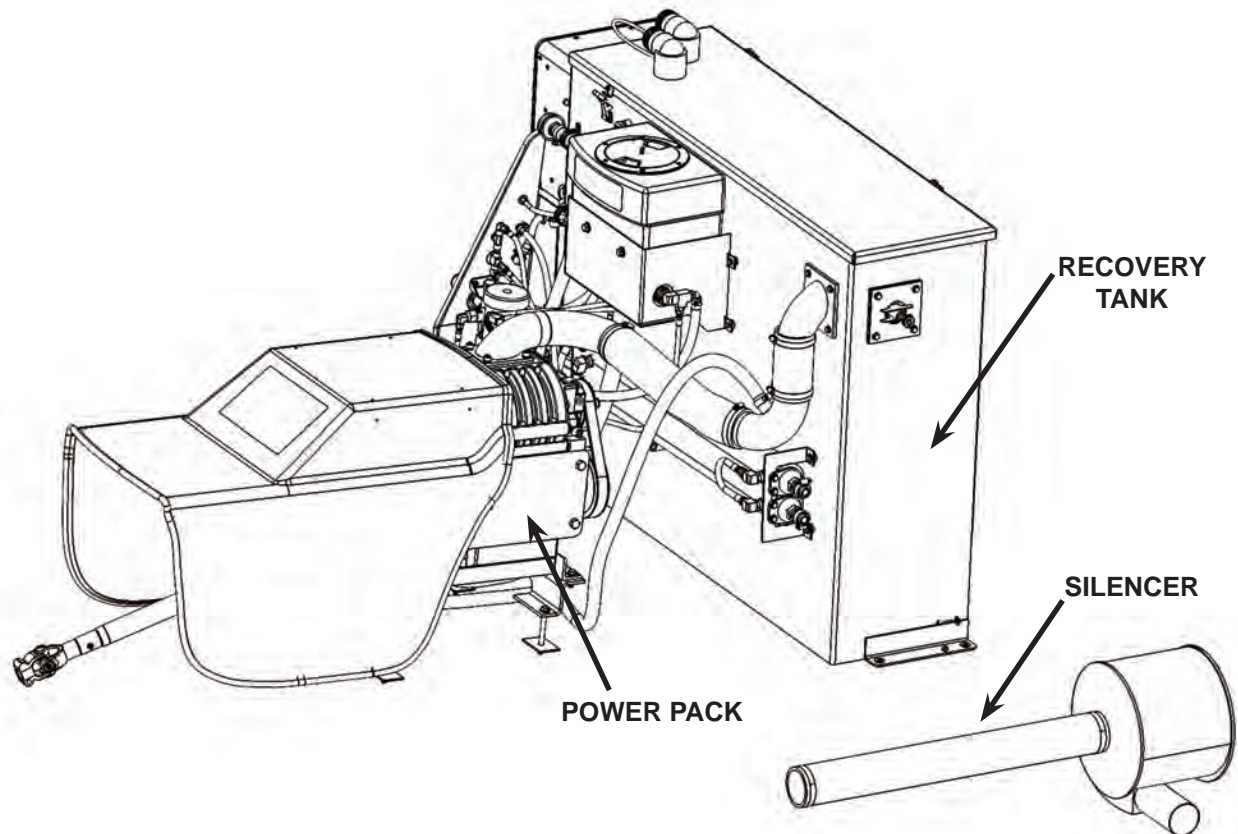


Figure 1-1. CDS Components

For more information concerning the CDS, refer to HydraMaster's webpage
<http://hydramaster.com/Products/Truckmounts/CDS48Overdrive.aspx>

The CDS Owner's Manual can be found at:
<http://hydramaster.com/Portals/0/Manuals/man182-038.pdf>

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The typical Flex System includes two tank assemblies, two diaphragm pumps, a canister-style coolant heat exchanger and a Salsa-style blower heat exchanger (see Figure 1-2)

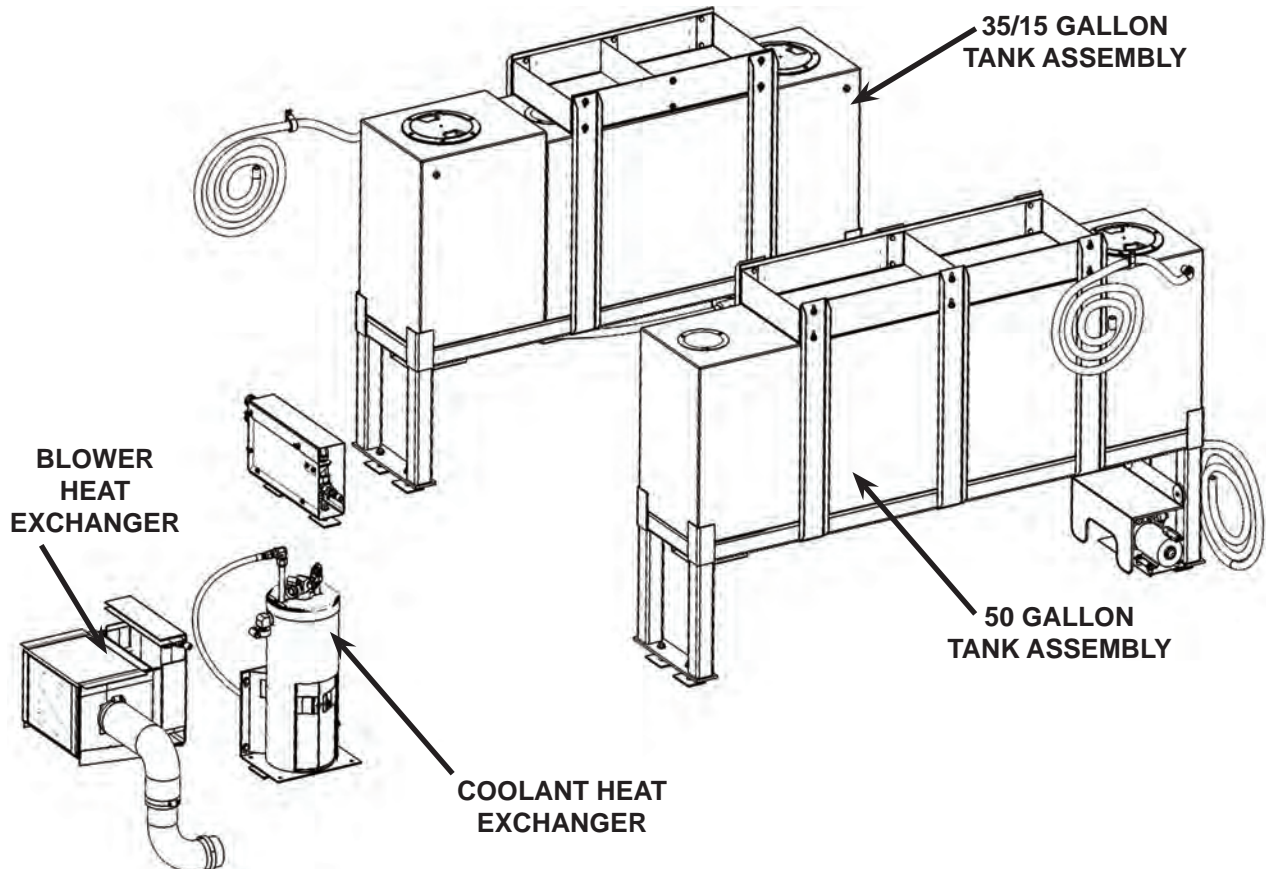


Figure 1-2. A Flex System Showing 35/15 Gallon Tank Assembly and 50 Gallon Tank Assembly

The 50 gallon tank assembly can be installed at the rear of the van on the driver's side; if the 35 gallon/15 gallon tank assembly is included, it can be installed at the rear of the van on the passenger's side.



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This Owner's Manual provides operating instructions as well as information required for proper maintenance and troubleshooting of the CTS 4.8 Flex. In addition, assembly illustrations and parts ordering information are included for your convenience.

It is the purpose of this Manual to help you properly understand and maintain your CTS 4.8 Flex system. Follow the directions and maintenance recommendations carefully, and you will be rewarded with years of profitable, trouble-free operation.

It is imperative that no section be overlooked when preparing for operation of this equipment. Please read this Owner's Manual to familiarize yourself with the operation of the CTS 4.8 Flex System, paying special attention to all ***Warnings and Cautions***.

This section of the manual contains the following helpful information:

- Contact Information
- Warnings, Cautions And Notices
- Machine Specifications - CDS
- Machine Specifications - Flex Assemblies
- Responsibilities
- Hard Water Precautions
- Waste Water Disposal Advisory

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CONTACT INFORMATION

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

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.

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Warnings and Cautions specific to the CTS 4.8 Flex include:

⚠ WARNING

HOT SURFACES: During the operation of this equipment, many surfaces on the machine will become very hot. When you are near the van for any reason, care must be taken not to touch any hot surface, such as the engine or the exhaust. If this warning is not heeded, personal injury or death can result.

⚠ WARNING

HEARING PROTECTION: The Occupational Safety and Health Administration (OSHA) recommends the use of hearing protection when a technician is exposed to an average of 85 decibels (this is an average of exposure over an 8 hour period). This equipment can produce 85 decibels to a distance of 10 feet. Please check with your local state agencies to see if OSHA standards apply to your application.

⚠ WARNING

NO SMOKING: It is unsafe to smoke in or around the vehicle. Do not allow any open flames in or around the vehicle.

⚠ WARNING

CARBON MONOXIDE: This unit generates toxic fumes. Position the vehicle so that the fumes will be directed away from the job site. Do not park where exhaust fumes can enter a building through open doors, windows, air conditioning units or kitchen fans.

⚠ WARNING

TOXIC FUMES: Do not occupy the vehicle when the cleaning equipment is operating. Toxic fumes may accumulate inside a stationary vehicle.

⚠ WARNING

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

⚠ WARNING

MOVING PARTS: Never touch any part of the machine that is in motion. Severe bodily injury may result.

CAUTION

The use of some chemicals through your mobile carpet cleaning plant can seriously damage the internal plumbing, high-pressure pump, chemical pump and heat exchangers. These harmful chemicals include concentrated acid, solvents (including d-Limonene), and some paint, oil and grease removers with a high concentration of solvents.

CAUTION

THROUGH-FLOOR DRILLING: Be cautious when drilling holes through the van floor. Many vans have critical components mounted directly below the van floor that could be damaged by a misplaced drill bit.

CAUTION

LEVEL OPERATION: During operation, the vehicle must be parked on level ground not to exceed + or - 10 degrees. Failure to ensure proper leveling may prevent proper internal lubrication of engine, vacuum and/or high pressure components.

CAUTION

ACID RINSE AGENTS: Some acid rinse products can cause damage to internal machine components. Failure to take appropriate measures to prevent acidic corrosion can result in system failure and loss of warranty on affected parts.

CAUTION

HARD WATER PROTECTION: Failure to take appropriate measures to prevent scale build up can result in system failure and loss of warranty on affected parts. Test the water in your immediate and surrounding areas with hard water test strips. Assume all water obtained from wells is hard. If you are operating in a hard water area at 3.0 grains or more per gallon, use a water softening system.

CAUTION

FREEZE PROTECTION: Failure to take appropriate measures to prevent equipment damage due to freezing can result in system failure and loss of warranty on affected parts. Placing an electric heater in the vehicle or parking the vehicle indoors will help ensure against freezing, but should not be the primary method of freeze protection.

CAUTION

HOT SURFACES: During the operation of this equipment, surfaces, ranging from the heat exchangers to the solution ports, will become hot. Do not allow components such as hoses to touch hot surfaces. Failure to heed this warning can result in equipment damage which is not covered by warranty.

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MACHINE SPECIFICATIONS - CDS

Frame		23" W x 41.5" H x 61.0" L
Weight		912 lbs.
Construction	Tank	Marine Aluminum with Baked-on Epoxy Finish
		Chassis, Painted Steel
		Cowling, Fiberglass
Power Transfer	Electric Clutch-driven shaft, Key Activated	
Vacuum Blower	4007 Tuthill/M-D Tri-Lobe	
Water Pump	Plunger Pump, 4.0 gpm (at high speed), 1,200 psi, Electric Clutch Control	
Heating System	Multiple Heat Exchangers (1,200 psi pressure)	
	Dual Shell and Tube Exchanger, Coolant Heat Exchanger, Blower Heat Exchanger	
Dash Assembly Panel		
	Electronic Tachometer, 0-3,000 rpm	
	Water Temperature Gauge, 0-320 Degrees F	
	Vacuum Gauge, 0-30" Hg	
	Hour Meter, Machine Run-Time	
	Keyed Ignition, Start/Stop	
	Electronic Circuit Protection Breaker, Re-settable	
	Machine Status Indicator LEDs	
Instrumentation Assembly Panel		
	Water Pressure Adjustment	
	Water Pressure Gauge, Liquid Filled, 0-1,500 psi	
	Blower Lubrication Port	
	Water Temperature Adjustment Knob	
	Water Box Drain Valve	
Recovery Tank	100 gallon Aluminum	



MACHINE SPECIFICATIONS - FLEX ASSEMBLIES

50 Gallon Tank with Frame	Dimensions	12" W x 33" H x 60" L
	Weight	113 lbs
35/15 Gallon Tanks with Frame	Dimensions	12" W x 33" H x 53" L
	Weight	108 lbs
Construction	Frames	Steel
	Tanks	Polyethylene

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TYPICAL CONFIGURATION EQUIPMENT	
	Coolant Heat Exchanger
	Cowling - Chevy CDS Gray
	Dash Box - QC
	Power Pack - Blower Assembly, Water Pump Assembly and Frame Assembly
	Flex Tank Frames and Assemblies with Passenger Side Pump and Driver Side Pump
	Recovery Tank
	Blower Heat Exchanger
	Front End - Chevy
	Silencer
	Wheel Chock Set
	125 ft Solution Hose
	50 ft, 2" Vacuum Hose
	Owner's Manual (on CD)
	Owner's Guide (hardcopy)
OPTIONAL EQUIPMENT	
	Automatic Pump Out (APO)
	Rear Door Kits



RESPONSIBILITIES

Prior to the arrival of the unit, the van that it will be installed in should be delivered to the installer.

Purchaser's Responsibility

If you are the purchaser, it is your responsibility to read the Owner's Manual and to familiarize yourself with the information contained herein, paying special attention to all Warnings and Cautions.

Sales Representative's Responsibility

Acceptance of Shipment

1. If the unit shows any outward signs of damage, do not sign the delivery receipt until you have closely inspected the unit and noted any damage on the delivery receipt.
2. The sales representative from whom you purchased your unit is responsible for supervising the correct installation of the unit in your vehicle and thoroughly training you in its operation, maintenance and precautions.

Installation

- Correctly installing the unit and recovery tank in your vehicle and securing them with bolts and tie down washers.
- Checking the pump, vacuum blower and engine oil levels prior to starting the unit.
- Starting the unit to check the drive system and see that all other systems function normally.
- Checking all hoses, tools/wands and accessories for correct operation.

Training

- A thorough review of the Owner's Manual with the purchaser.
- Instruction in and familiarization with:
 1. How to correctly start up and shut down the unit
 2. How to correctly clean with the unit
 3. Where and how often to check and change component oil levels
 4. How the unit's systems work, how to troubleshoot the unit
 5. How to do basic repairs
 6. Safety precautions and their importance
 7. How to avoid freezing damage
 8. How to avoid hard water damage
- A thorough review of the unit warranty and warranty procedures.
- A thorough review of hard water precautions and warnings.
- How to determine hard water areas.
- Use of water softening systems.

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HARD WATER PRECAUTIONS

Consult your local ChemDry distributor about recommendations for dealing with hard water conditions in your area before adding water to the Flex tanks.

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 solution, recovered into your unit's recovery tank, contains materials that 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 CDS 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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FLEX

2 - Operating Instructions

This section describes how to properly start up, operate and shut down the CTS 4.8 Flex, starting with a description of the Dash Assembly and Instrumentation Panel Assembly (see Figure 2-1).



Figure 2-1. CTS 4.8 Flex Dash Panel and Instrumentation Panel

DASH PANEL AND INSTRUMENTATION PANEL

The CTS 4.8 Flex Dash Assembly, shown in Figure 2-2, controls the:

- System’s power on/off and throttle control
- Flex pumps - also called Natural Pump 1 (Driver’s Side) and Natural Pump 2 (Passenger’s Side)
- Automatic Pump-Out (APO) if included in the configuration



Figure 2-2. CTS 4.8 Flex Dash Panel

The Dash Assembly also includes the temperature, tach and vacuum gauges; status LEDs, the hour meter, and the reset button.

When the status LEDs on the left of the dash are lit, they indicate that:

- Vacuum Tank (recovery tank) - tank is full and should be emptied.
- Pump Out - APO is operating
- Low Water - water in the water box is low

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The reset button will pop out if your machine encounters any shut down condition, such as an electrical short in the system.

If the button pops out, troubleshoot and fix the problem(s) before trying to reset the machine (by pressing the button).

The Instrumentation Panel Assembly shown in Figure 2-3, includes the:

- Blower lubrication port
- Coolant flow lever (temperature control)

**BLOWER
LUBRICATION
PORT**

**COOLANT FLOW
LEVER**



**Figure 2-3. CTS 4.8 Flex
Instrumentation Panel**

BEFORE OPERATING THE CTS 4.8 FLEX

1. Locate the van and equipment in a well-ventilated area.

⚠ WARNING

The CTS 4.8 Flex generates toxic fumes. Position the vehicle so that the fumes will be directed away from the job site. Do not park where exhaust fumes can enter a building through open doors, windows, air conditioning units or kitchen fans. If this warning is not heeded, personal injury and death can result.

2. Check the fuel tank to be certain there is adequate fuel to complete the job.
3. Position the wheel chocks in front of/behind one of the front tires.
4. Connect the solution hose(s) to the Quick Connect (QC) Dash Box (see Figure 2-4).
5. Connect the vacuum hose to the vacuum inlet as shown in Figure 2-4.

NOTICE

Make sure the recovery tank drain valve is closed when operating the machine.

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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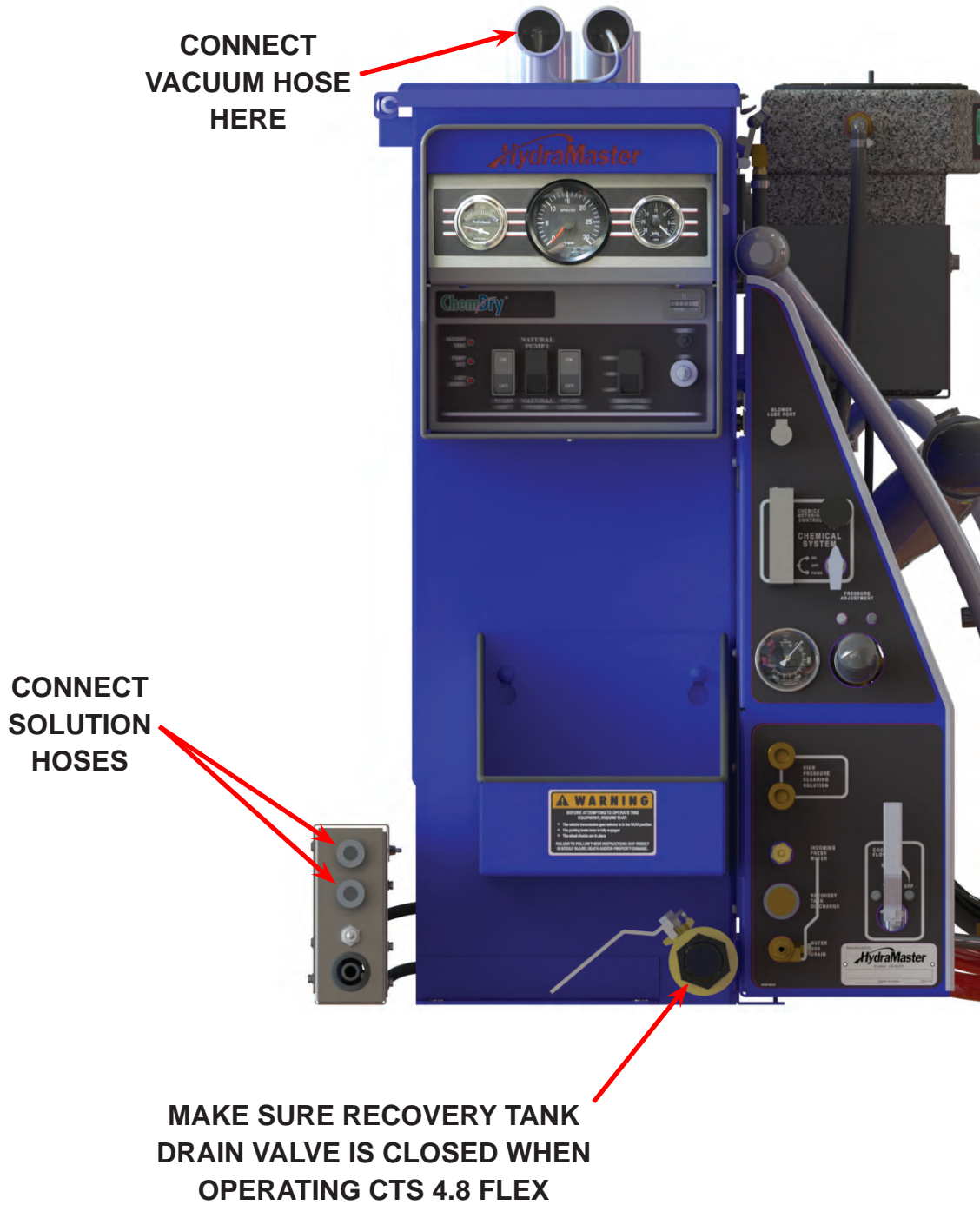


Figure 2-4. CTS 4.8 Flex Vacuum, Solution and Garden Hose Connections

6. Make sure the 3-way ball valve levers are all in the downward or vertical position (see Figure 2-5). The levers on the Flex pumps control the direction of the chemical flow. When the levers are in the vertical position, the flow is turned “OFF”.

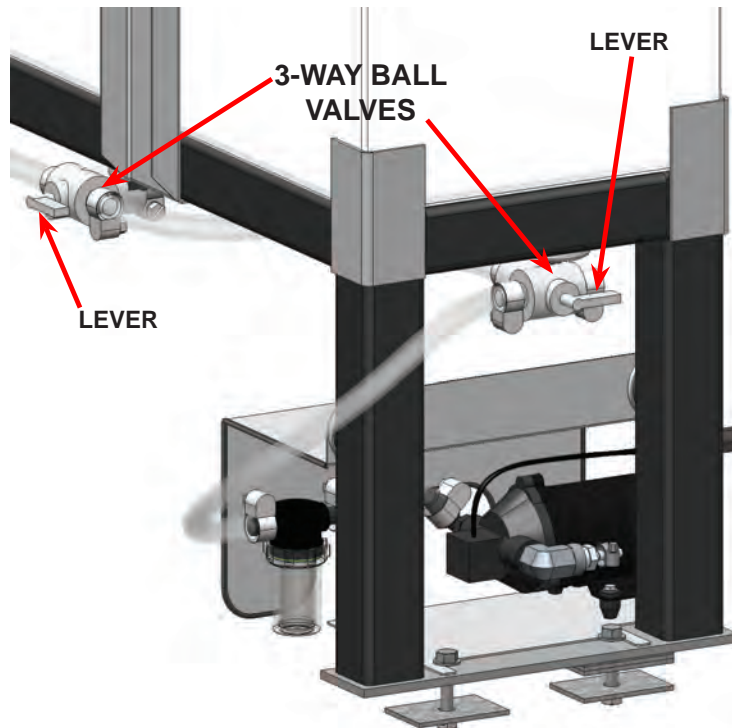


Figure 2-5. Flex Pump Levers

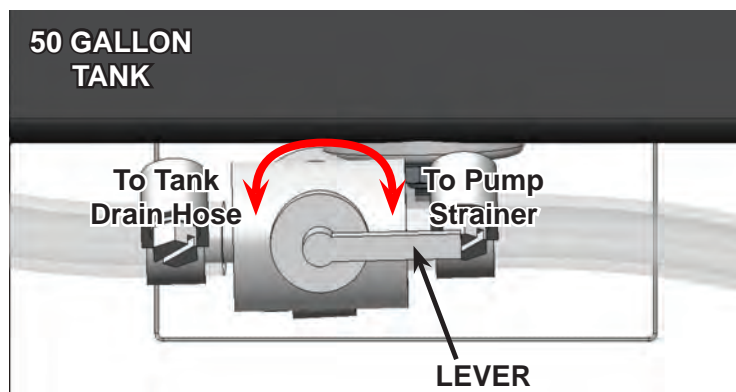


Figure 2-6. For 50 Gallon/Tank Assembly:
Turn Lever to Tank Drain Hose or in Direction of Pump Strainer

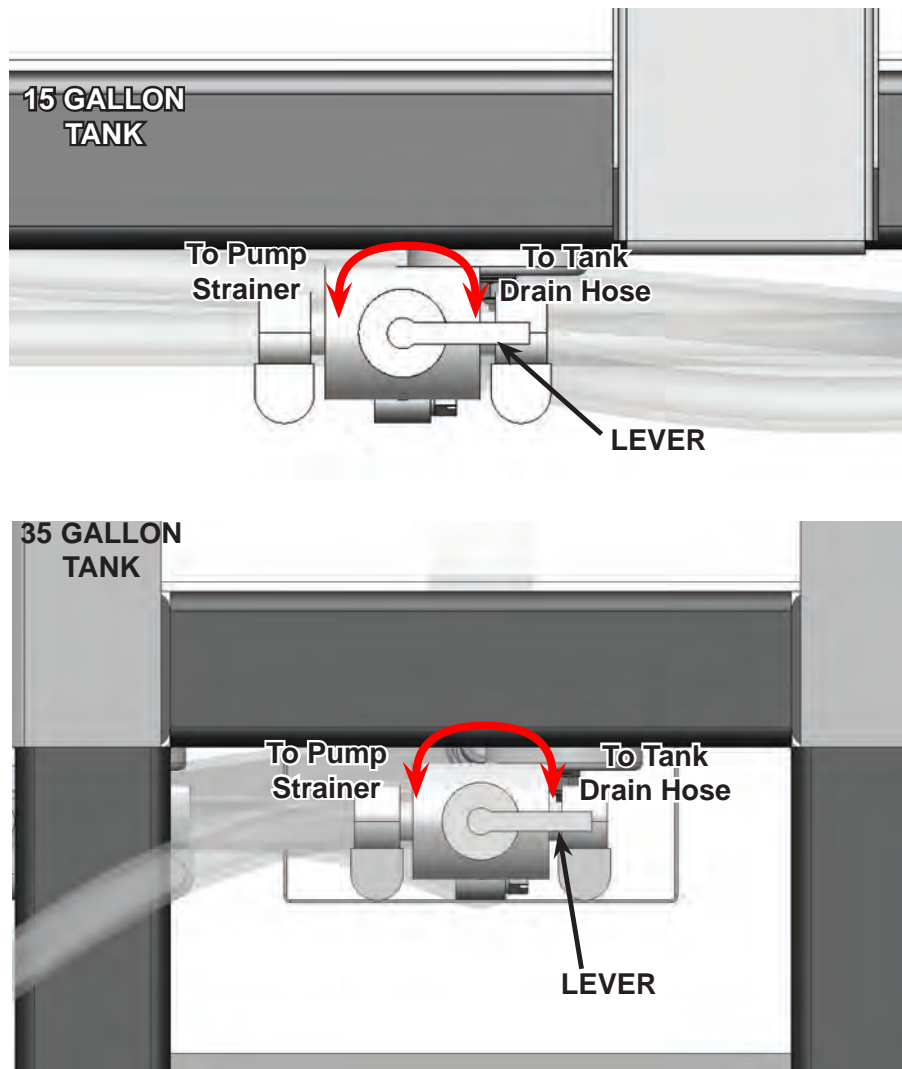
7. Open the Flex chemical tank lid(s) and fill the chemical tank(s) with appropriate ChemDry chemical until the chemical levels off below the tank vent hose hole.

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There are 2 levers on the 35 Gallon/15 Gallon Tank Assembly, one for each tank (see Figure 2-5). There is 1 lever located on the 3-way ball valve on the 50 Gallon Tank Assembly (see Figure 2-6).

Before operating the Flex System, turn the appropriate lever toward the direction of the flow (toward the hose connected to the pump strainer - see Figure 2-6 and Figure 2-7).



**Figure 2-7. For 35 Gallon/15 Gallon Tank Assembly:
Turn Levers in Direction of Pump Strainer or to Tank Drain Hose**

To drain the pumps, turn the lever away from the flow.

To turn the flow off, turn the levers downward or in the vertical position.

CTS 4.8 FLEX START-UP

1. Make sure the vehicle's gear select lever is in the Park position and the emergency brake is set
2. Start the vehicle's engine.
3. Turn the ignition key on the CTS 4.8 Flex dash panel to the "ON" position (see Figure 2-8).



Figure 2-8. Switches on Dash Panel

4. Press the THROTTLE CONTROL switch to High, Mid or Low cleaning speed appropriate for the cleaning job.
5. Press the NATURAL PUMP switch to #1 or #2, depending upon which Flex Tank Assembly will be used.
6. Optional: Press the PUMP OUT switch to "ON" if using the Automatic Pump-Out feature.

NOTICE

The PUMP OUT system will not engage until the water level rises inside the recovery tank.

7. Now, proceed with the cleaning operation.

NOTICE

The machine will automatically shut down when it reaches its full capacity due to the float switch located inside the recovery tank. When this occurs, turn the NATURAL PUMP switch "OFF" and empty the recovery tank. Then, turn the unit back on and continue to clean.

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CTS 4.8 FLEX SHUT-DOWN

1. Turn off the Flex system by pressing the NATURAL PUMP switch to the middle “OFF” position (see Figure 2-9).
2. Lay vacuum hoses out in order for all moisture to be removed from the hoses. This prevents spillage of any dirty solution in your vehicle when storing the hoses.



Figure 2-9. Press NATURAL PUMP Switch to Middle “OFF” Position

3. Disconnect the hoses and put them away.
4. Allow the unit to run for a few minutes with the vacuum hose disconnected in order to remove all moisture from the vacuum pump.
5. Plug the vacuum inlets. Spray a Hydramaster-recommended lubricant (P/N 000-087-006) into the blower lube port for about 5 to 7 seconds while the unit is running. This will lubricate the vacuum pump and prevent it from rusting. (The blower lube port is located on the front panel above the pressure gauge - see Figure 2-3).
6. Remove the inlet plugs, then turn the ignition “OFF” before draining the recovery tank.
7. Turn the COOLANT FLOW LEVER to the “OFF” position. This will help avoid engine overheat problems due to reduced coolant flow through the radiator.

8. If you do not have an APO: Attach a drain hose to the recovery tank drain outlet and open the valve to drain the waste water from the recovery tank (see Figure 2-4).
9. If you have an APO: Attach a drain hose to the recovery tank discharge outlet before draining the waste water (see Figure 2-10).

NOTICE

Do not dump waste in any area which might violate local, state or federal law. If you have the optional Automatic Pump-Out (APO) system, drain the recovery tank into a sanitary drain system.

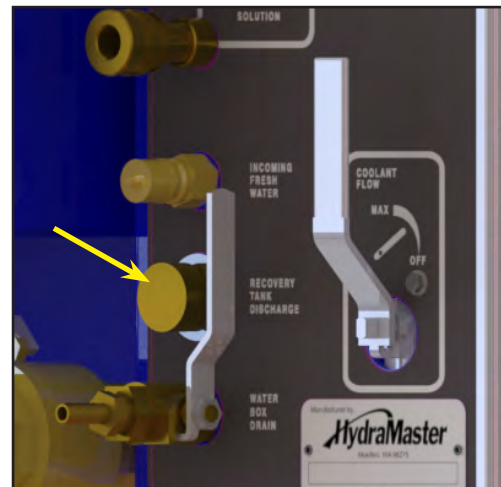


Figure 2-10. Attach Hose to Discharge Outlet

10. After the recovery tank is drained, lift the recovery tank lid up and remove the filter basket.
11. Clean out any accumulated debris.
12. Rinse and re-install.
13. Check the corrugated blower filter.
14. Clean out any accumulated debris.
15. Rinse and re-install.

3 SPEED THROTTLE CONTROL FUNCTION

The GM Throttle Controller must meet certain “Chassis Ready” conditions to elevate the engine rpm, which are as follows:

1. Parking Brake is set
2. Gear shift is in “Park”
3. Foot is off Service Brake (brake pedal)
4. Foot is off Accelerator Pedal
5. Vehicle is stationary (no speed)
6. Engine is started and idling
7. The A/C / Heater switch is in off position

NOTICE

The Throttle Controller must be initialized anytime the Data Link Cable (DLC) harness is disconnected from the Data Link Connector. To initialize the system switch ignition key to OFF position, plug in DLC harness, switch the ignition on, and then start the engine. This allows the Throttle Controller to read the PCM engine computer.

On the Throttle Controller, there are LED lights with corresponding labels to provide status and problem detection information (refer to Figure 2-11 and Table 2-1).

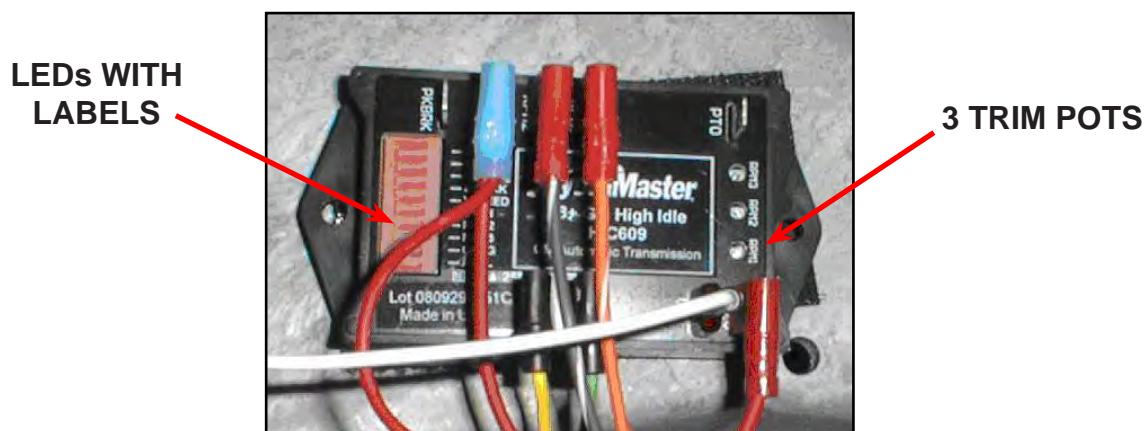


Figure 2-11. Location of Controller's LEDs and Potentiometers

Table 2-1. GM Throttle Controller LED Functions

LED	STATUS	INDICATION
BUSS	On Solid	Unit ON and functioning (harness connected to data link)
BUSS	Flashing	Unit ON, but a problem was detected
GEAR	On Solid	Transmission in PARK
GEAR	Flashing	Transmission NOT in Park
PK BRK	On Solid	Parking Brake Set
PK BRK	Flashing	Parking Brake is NOT set
SR BRK	On Solid	Service Brake is set (not being used)
SR BRK	Flashing	Service Brake is NOT set
VSPEED	On Solid	Vehicle is stationary
VSPEED	Flashing	Vehicle is moving
RPM1	On Solid	RPM1 mode selected, engine at fast idle
RPM1	Flashing	RPM1 mode selected, engine not at fast idle
RPM2	On Solid	RPM2 mode selected, engine at fast idle
RPM2	Flashing	RPM2 mode selected, engine not at fast idle
RPM3	On Solid	RPM3 mode selected, engine at fast idle
RPM3	Flashing	RPM3 mode selected, engine not at fast idle

NOTICE

On GM gas engine vehicles, the PCM engine computer will cause the engine speed to momentarily drop back to normal idle speed every time the air conditioner pump cycles on or off. Make sure the operator of the CDS understands that the AC / HEAT switch needs to be in the OFF position before activating the CDS unit.

3 - Freeze Guarding

When operating the CTS 4.8 Flex during the colder months of the year, ensure that you properly freeze guard the System. No part of the CTS 4.8 Flex is covered by warranty if machine damage occurs because of freezing.

CAUTION

BE SURE YOUR MACHINE IS PROTECTED! Freezing will cause component damage.

The following precautions are recommended prior to and during cleaning jobs:

1. Run the machine before leaving for the first job to ensure nothing has frozen the night before, including hoses and tool/wand.
2. Insulate the solution hose from the cold ground by running it through an extra 1½” vacuum hose.
3. Leave vehicle doors closed until you begin cleaning; afterwards, open slightly.

NOTICE

In colder climates, insulating the vehicle walls and floor boards will help protect the unit.

Do not procrastinate during the cleaning operation or the hot water solution line will also freeze on the ground. The solution line should be insulated in extremely cold climates.

Whenever possible, store the van in a heated garage at night or over the weekend. If not possible, place a 1,500 Watt electric heater inside the vehicle, aimed directly at the machine.

⚠ WARNING

Never use a propane heater. It causes excessive moisture on the vehicle ceiling and the possibility of it malfunctioning is therefore higher, which may cause bodily injury. If the CTS 4.8 Flex and vehicle are left outside with a heater, drain water from the cleaning tools and hoses because they can be freeze damaged also.

FREEZE GUARDING THE FLEX SYSTEM

1. Connect a solution line to one of the connectors on the Flex QC Dash Box with the tool of your choice attached at the end.
2. Place the tool into a container to collect the solution from the tool.
3. Pour 2 gallons of 50/50 antifreeze and water into each Flex tank.
4. Turn on Natural Pump # 1 and squeeze the trigger on the tool until antifreeze starts to come out of the tool.
5. Turn on Natural Pump # 2 and squeeze the trigger on the tool until antifreeze starts to come out of the tool.
6. Press the NATURAL PUMP switch to the middle “OFF” position.

NOTICE

Before filling the Flex tanks with chemical and starting the next cleaning job, drain the antifreeze completely from the Flex tanks and run water through the pumps until clear water drains from the machine.

NOTICE

WHEN DISPOSING OF USED ANTIFREEZE COOLANT: Follow local laws and regulations. If required, dispose at facilities licensed to accept household hazardous waste. If permitted, dispose in sanitary sewer systems. Do not discard into storm sewers, septic systems, or onto the ground.

⚠ WARNING

This warning appears on the label of one brand of antifreeze:
“HARMFUL OR FATAL IF SWALLOWED. Do not drink antifreeze coolant or solution. If swallowed, induce vomiting immediately. Call a physician. Contains Ethylene Glycol which caused birth defects in animal studies. Do not store in open or unlabeled containers.

KEEP OUT OF REACH OF CHILDREN AND ANIMALS.”

4 - Chemical System

The general concept of the CTS 4.8 Flex chemical flow is as follows:

Chemical is fed into the CTS 4.8 Flex from the Flex tanks.

The chemical is then pumped through the heating system and out to the cleaning tool/wand.

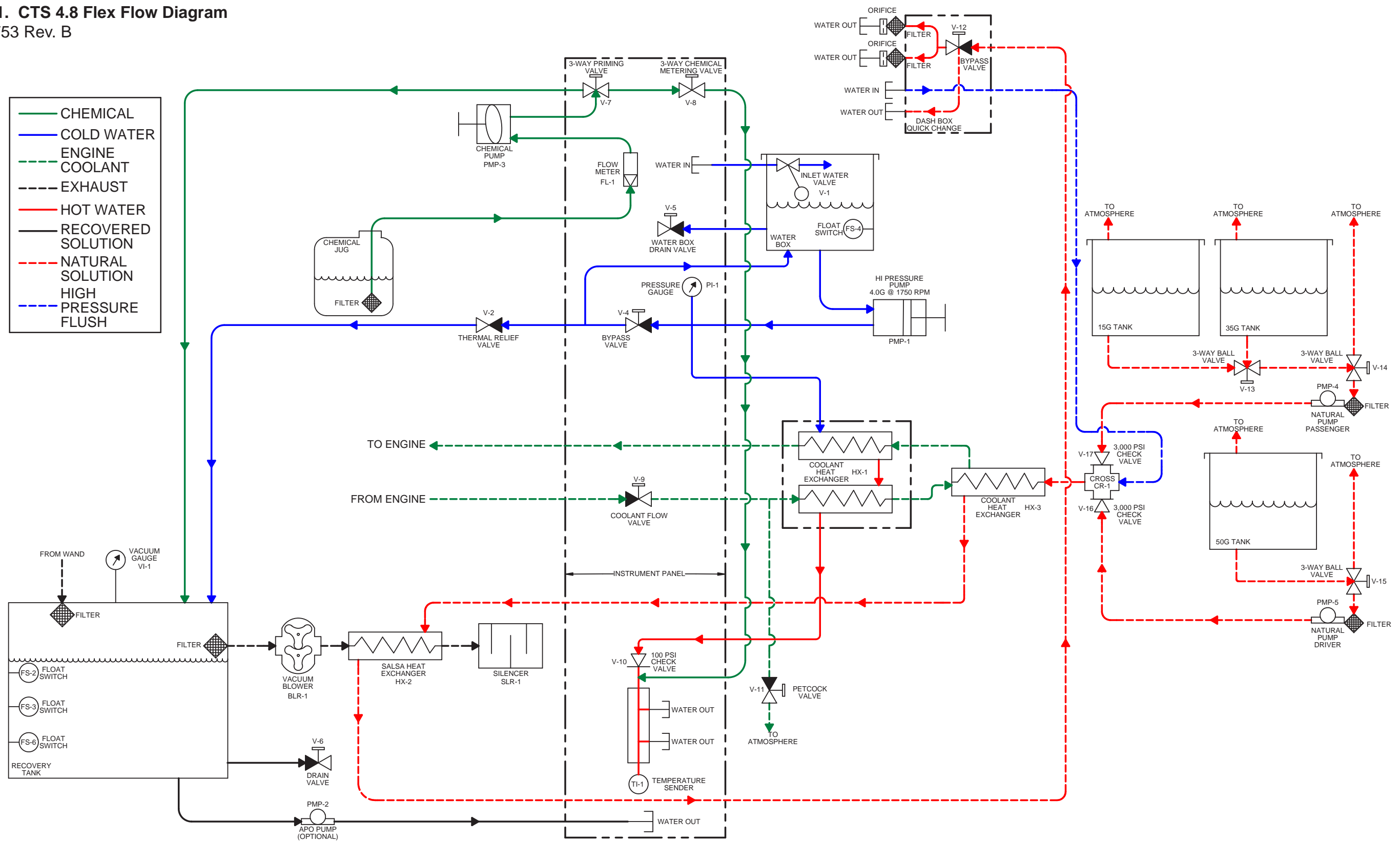
After the solution is applied to the carpet, it is recovered by the vacuum system and carried back to the recovery tank.



**CTS 4.8
FLEX**

CTS 4.8 FLEX

Figure 4-1. CTS 4.8 Flex Flow Diagram
000-179-753 Rev. B





5 - Water Pump Maintenance

The CDS water pump features a dynamic low-pressure seal retainer, an innovative intermediate ring, and superior low-pressure and high-pressure seals. With its ceramic plungers and nickel-plated forged brass manifold, this high-temperature pump is ideal for use in carpet cleaning.



NOTICE

For maintenance information on the Flex pumps, see page 9-2 and 9-3.

You must perform daily and periodic maintenance on the CDS water pump to maintain maximum performance of seals and valves.

This section of the manual explains:

- Daily Maintenance
- Periodic Maintenance
- Water Pump Troubleshooting

DAILY MAINTENANCE

1. 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 back of the pump.
2. Use GP series oil.

CAUTION

If the oil becomes discolored and contaminated, one of the oil seals may be damaged. Refer to the Pump Owner's Manual, included with the CD version of the CTS 4.8 Flex Owner's Manual, for more information.

Do not operate the pump if the crankcase has been contaminated with water; if contamination occurs, component damage can result.

CAUTION

Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil as soon as it is discovered and replace it with clean oil; if contamination occurs, component damage can result.

CAUTION

Do not turn the drive shaft while the oil reservoir is empty. This can cause component failure.

CAUTION

Protect the pump from freezing. Failure to do so can result in component failure which will void warranty coverage.

PERIODIC MAINTENANCE

Change the oil after the first 50 hours of operation, with the pump stopped and the oil still warm, and after every 300 operating hours or 3 months of operation. When changing the oil, remove the drain plug on the oil drain hose so all oil and accumulated sediment will drain out.

The initial oil change is recommended for no other reason than to eliminate impurities that may be in the oil during the running-in phase. If these impurities are not removed, but are allowed to remain in the oil, they may cause premature wear to the moving parts and the oil seals.

NOTICE

If the pump works in conditions with high humidity and with sharp temperature changes, condensation may appear inside the crankcase. Condensation mixing with the oil can change the oil's properties, which is easy to detect because the oil changes to a white, milky color.

If the pump does not have excessive water leaking from the packings, and the oil becomes milky, the oil has to be changed more frequently.

WATER PUMP TROUBLESHOOTING

1.0. Will not come up to normal cleaning pressure

POSSIBLE CAUSE	SOLUTION
1.1. Pressure adjusting valve is defective or dirty.	Disassemble valve. Repair or replace as necessary.
1.2. Worn seals or valves in pump.	Test pump output volume directly from pump at normal operating rpm. If volume is below manufacturers specifications, replace seals and inspect for defective valves.
1.3. Pump rpm is too low.	Check engine rpm and adjust as necessary. Check for loose pump belt. Adjust tension as necessary.
1.4. Primary system control orifice is missing or loose*.	Remove filter and inspect. Tighten or replace as necessary.
1.5. Primary orifice is worn.*	Measure orifice size and replace as necessary.

*Applies to SALSA option only.

2.0. No pressure reading on PSI gauge

POSSIBLE CAUSE	SOLUTION
2.1. Pump switch is not turned on.	Turn on switch
2.2. No water in water box.	Refer to section 4 of this manual.
2.3. Pump belt is broken.	Replace belt.
2.4. Pump clutch is not activated. There is no water in water box	Check system back to source to locate cause of interruption to water flow.
2.5. Pump clutch is not activated. There is water in the water box.	Check for 12V at clutch. If 12V is present, replace clutch.
	If 12V is not present, check power to the low-water relay. If there is 12V at the relay, check low water switch in water box.
	If low water switch has no continuity when float is up, replace the switch. If switch is good, replace the low water relay.

3.0. PSI gauge reads normal: low pressure from tool/wand

POSSIBLE CAUSE	SOLUTION
3.1. There is a restriction in the cleaning tool/wand.	Inspect tool jet and clean or replace as necessary. Inspect any filters in the cleaning tool and clean or replace as necessary.
3.2. There is a defective quick connect in the system.	Inspect each quick connect and replace as necessary.
3.3. There is a restriction in one of the solution hoses.	Remove quick connects and inspect hoses. Clean or replace as necessary.
3.4. There are hard water deposits restricting the system between the heat exchanger and the high-pressure solution connection at the front of the machine.	Descale the machine. If this doesn't solve the problem, disassemble this portion of the system and locate restriction.

4.0. Pressure pulsation

POSSIBLE CAUSE	SOLUTION
4.1. Water in the water-box is too hot and is approaching boiling point.	Check temperature of water in the water-box.
4.2. There is an air leak between the water box outlet and the pump inlet.	Physically check all hoses and fittings for cuts, breaks, cracks or tightness. Repair as necessary.
4.3. One of the intake or outlet valves in the high-pressure pump is defective or is being held open by debris.	Remove each valve and inspect for correct operation.

5.0. Water box empty or fills slowly

POSSIBLE CAUSE	SOLUTION
5.1. There is a restriction in the water supply system.	Inspect the supply system from the source through the incoming quick connect for kinks, clogs or restricted filters. Clean or repair as necessary.
5.2. The float valve in the water box is defective	Replace.

6 - Vacuum Blower System

This section of the manual covers the CDS' vacuum blower system and includes information on:

- Recovery Tank Inlet Filter
- Vacuum Blower Lubrication
- Vacuum Blower Troubleshooting

The vacuum blower, featuring tri-lobe rotors, is designed for maximum positive displacement and manufactured using special porting technology to significantly reduce noise.

Lubrication for both the gear end and drive end of the blower is provided by full oil splash. Unlike grease lubrication, oil-splash lubrication provides for longer bearing and seal life through improved heat dissipation.

At the gear end, the timing gear teeth are lubricated by submersion in oil with the gear teeth serving as oil slingers. At the drive end, the bearings are also lubricated by submersion in oil with oil slingers attached on the shafts.

The performance and life of the vacuum blower is greatly dependent on the care and proper maintenance it receives.

Because of the close tolerances between the 3 lobes and housing of the vacuum blower, solid objects entering the inlet will damage the internal lobes, gears, bearings or drive system.

To prevent this from happening, a stainless steel filter screen has been placed at the vacuum blower intake inside the vacuum recovery tank. This stainless steel filter system should be removed for cleaning on a daily basis.

⚠ WARNING

Use caution when the CDS is being run for test purposes and the vacuum inlet is open. Unregulated vacuum may cause injury if body parts come in contact with the open vacuum inlet.

CAUTION

To protect the vacuum blower from overloading and damaging itself, there is a vacuum relief system installed on the vacuum recovery tank. When the recovery tank inlet is completely sealed off, a maximum of 14" Hg will be attained. At the end of each day, spray the HydraMaster-recommended lubricant (P/N 000-087-006) into the blower lubrication port before shutting down the machine. If you fail to lubricate the vacuum blower on a daily basis, rust deposits and moisture can form and decrease the life of the vacuum blower.

CAUTION

Foam passing through the blower could lead to serious problems. Therefore, it is important to keep the recovery tank foam free. When cleaning surfaces with excessive foaming residue, use HydraMaster's Defoamer as directed.

NOTICE

The recovery tank is protected from excessive water level overflowing by a recovery tank float kill switch. The switch is not activated by foam, only by liquid.

RECOVERY TANK INLET FILTER

HydraMaster inlet filter screens are designed to trap lint, hair and large objects that would normally collect at the bottom of your recovery tank. Clean the screen at the end of each job to eliminate build-up of debris in the tank.

VACUUM BLOWER LUBRICATION

Read the vacuum blower Owner's Manual for proper oil changing instructions. (A digital copy of the vacuum blower Owner's Manual can be found on the CD which is shipped with each CTS 4.8 Flex Owner's Guide.) Because the CDS is very demanding of the vacuum blower, the vacuum blower should be maintained as recommended in the vacuum blower Owner's Manual.

NOTICE

The vacuum blower manufacturer recommends the use of PneuLube™ (ISO 100) as a lubricant at temperatures ranging from 0 degrees F to 120 degrees F.

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Remember to:

1. Remove fill plugs or breathers from both gear end and drive end plates.
2. SLOWLY pour oil through fill until oil appears in the oil sight glass. Bring oil level to center of sight glass.
3. Verify oil level is at proper level in BOTH gear end and drive end sight glasses.
4. Replace fill plugs or breathers that were removed in step 1.
5. Add fresh oil as required to maintain proper level.

The oil should be drained, flushed and replaced every 400 hours. The oil drain hose is connected under the head plate; at the end of the oil drain hose is a cap.

VACUUM BLOWER TROUBLESHOOTING

1.0. Weak vacuum at tool/wand. Gauge reads normal (10” Hg to 14” Hg)

POSSIBLE CAUSE	SOLUTION
1.1. Clogged hoses or tool/wand tube.	Disconnect hoses and carefully check for an obstruction.
1.2. Excessive length of hoses connected to machine.	Make sure machine is rated for the conditions under which it is being operated.

2.0. Vacuum gauge will not come up to 14” Hg

POSSIBLE CAUSE	SOLUTION
2.1. There is an air leak somewhere in the vacuum system.	Check vacuum relief valve for proper adjustment. Check all hoses for cuts and breaks. Check recovery tank lid gasket. Make sure the recovery tank drain valve is fully closed.
2.2. The vacuum gauge is defective.	Test and replace as necessary.
2.3. Vacuum blower is turning too slowly.	Check blower rpm at tachometer on the CDS’ dash. Blower rpm should be 2 times the tachometer rpm. See the throttle control kit instructions for further troubleshooting assistance.

3.0. Vacuum gauge reads high with no hoses attached

POSSIBLE CAUSE	SOLUTION
3.1. Filter in recovery tank is clogged.	Remove and clean or replace as necessary.
3.2. Hose from recovery tank to blower is collapsed internally	Inspect and replace as necessary.

7 - Electrical System

Because the most difficult problem to trace in any system is often an electrical failure, HydraMaster has designed the CDS' electrical system with the technician in mind.

This section of the manual includes troubleshooting guides as well as wiring schematics and diagrams.

The entire electrical system operates on 12V DC which is provided by the vehicle's battery.

CAUTION

To avoid equipment damage, it is very important to tie up any loose wires or hoses near the drive shaft area. Tie wraps are sufficient for wires and small hoses.

When securing large hoses or wiring harnesses in the area of the drive shaft, tie down the components with a hose clamp, with a clear vinyl hose inserted onto the clamp. On some installations, if the fuel injector wires are not properly secured, the wires could rub against the CDS drive shaft causing a short in the electrical system of the van.

CTS 4.8 FLEX ELECTRICAL TROUBLESHOOTING

1.0. CDS will not turn on

POSSIBLE CAUSE	SOLUTION
1.1. The main power fuse has blown.	Remove CDS cowling and engine cover and check all wiring from the power source back to the CDS console for damage. Replace fuse only after locating the problem that caused the fuse to blow. If unable to locate problem, refer to qualified service technician.
1.2. The plug-in connection at the base of the recovery tank is corroded.	Clean and seal connection to protect it from moisture.
1.3. The main circuit breaker has blown on the CDS dash.	Reset breaker and look for loose connections or damaged wires. Check all wires from the control panel forward to the front of the vehicle. If no problem is found but the breaker still trips refer to qualified service technician.

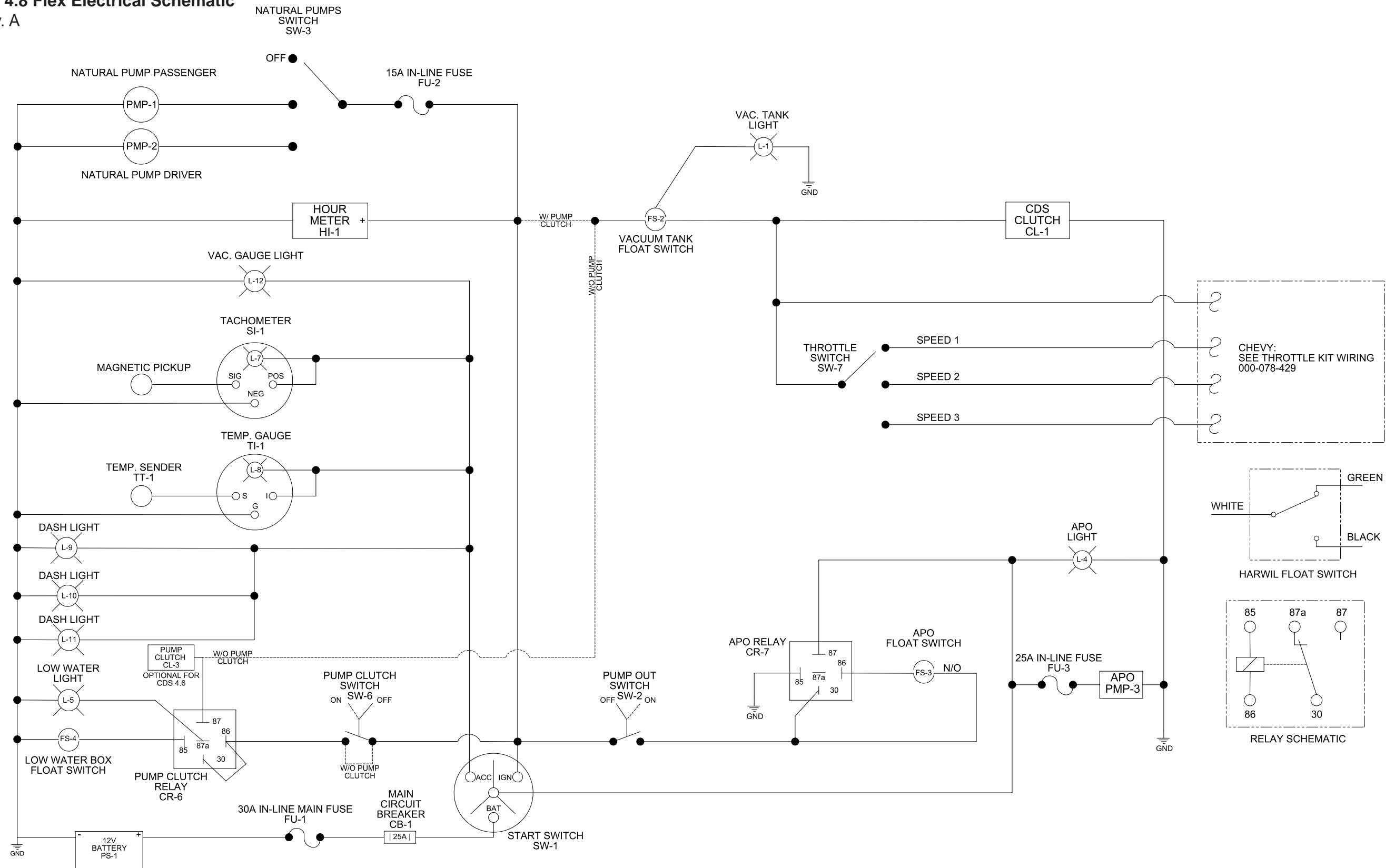
2.0. CDS shuts off while in use

POSSIBLE CAUSE	SOLUTION
2.1. Recovery tank is full.	Empty tank and restart machine.
2.2. Recovery tank float switch is dirty or defective.	Inspect float to see if the triangle mark on the float is facing up. If it is, and the float slides freely on the post, replace the float assembly.
2.3. The vehicle gear selector has moved.	Inspect the gear selector to be sure it is in the proper position. If selector has moved, refer to qualified service technician.

⚠ WARNING

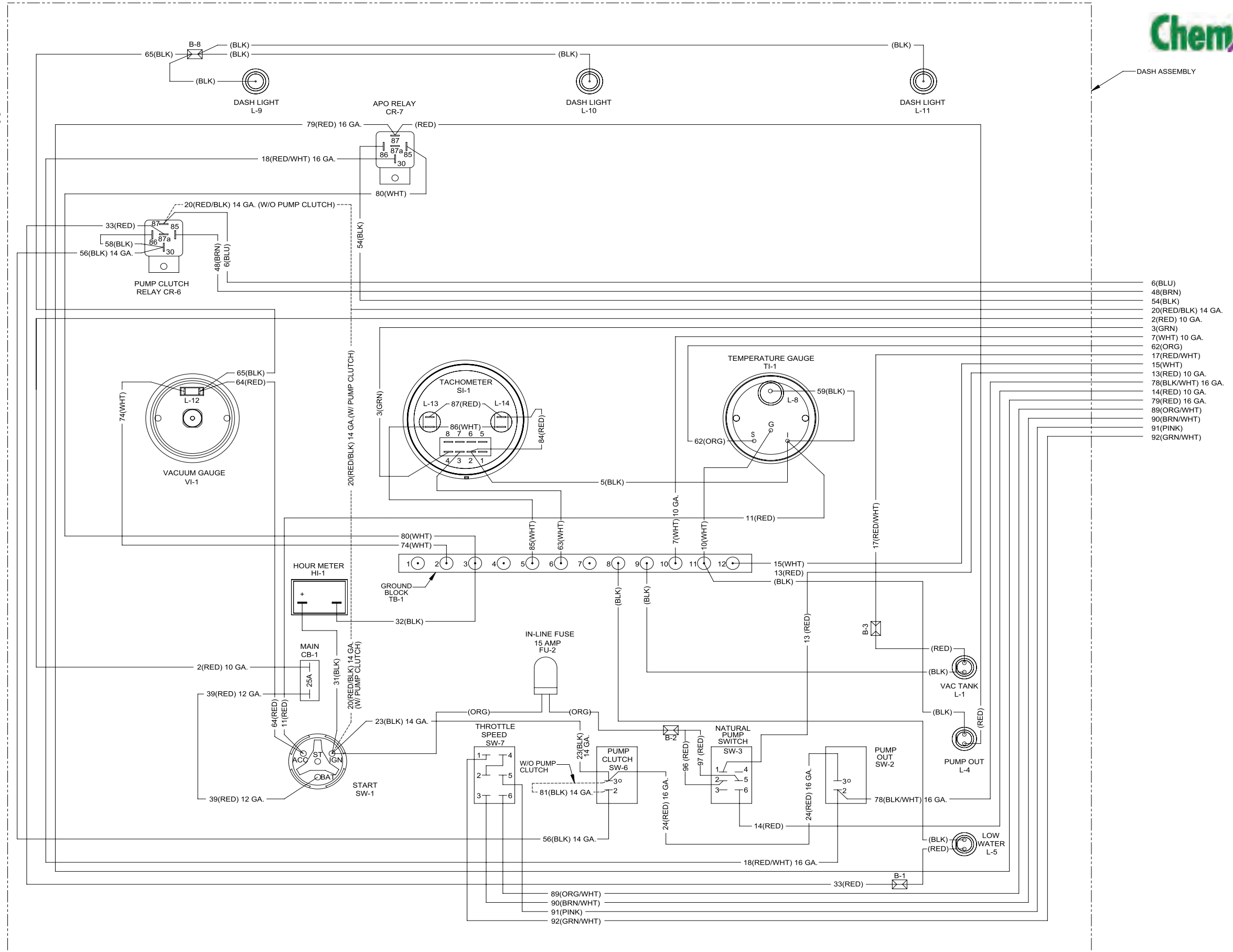
If vehicle gear selector has moved, refer to qualified service technician - it needs to be repaired immediately. This is a dangerous condition and can cause death or injury.

Figure 7-1. CTS 4.8 Flex Electrical Schematic
000-179-752 Rev. A



CTS 4.8 FLEX

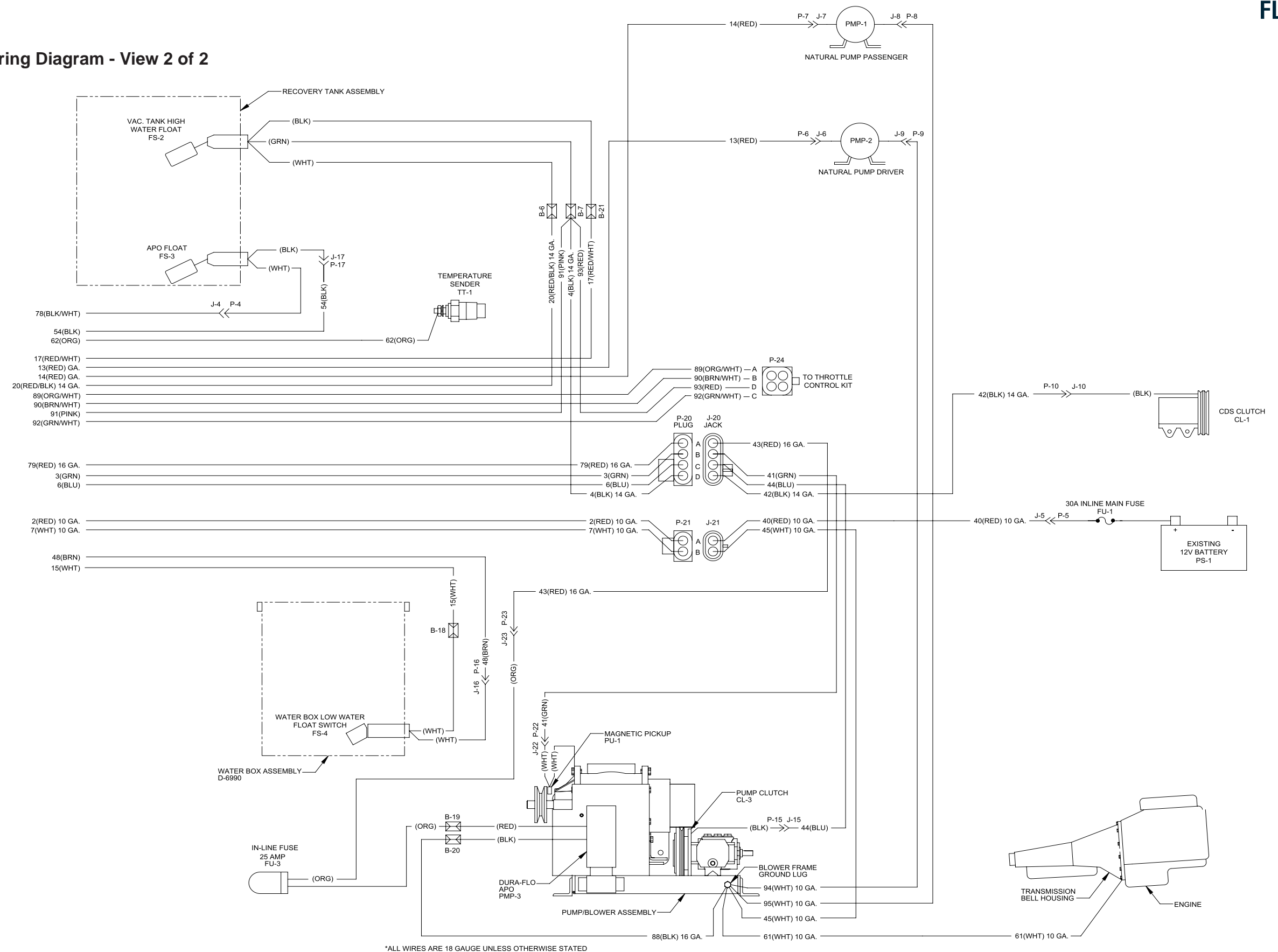
Figure 7-2. CTS 4.8 Flex
Wiring Diagram - View 1 of 2
000-179-751 Rev. A



- 6(BLU)
- 48(BRN)
- 54(BLK)
- 20(RED/BLK) 14 GA.
- 2(RED) 10 GA.
- 3(GRN)
- 7(WHT) 10 GA.
- 62(ORG)
- 17(RED/WHT)
- 15(WHT)
- 13(RED) 10 GA.
- 78(BLK/WHT) 16 GA.
- 14(RED) 10 GA.
- 79(RED) 16 GA.
- 89(ORG/WHT)
- 90(BRN/WHT)
- 91(PINK)
- 92(GRN/WHT)

*ALL WIRES ARE 18 GAUGE UNLESS OTHERWISE STATED

Figure 7-3. CTS 4.8 Flex Wiring Diagram - View 2 of 2
000-179-751 Rev. A



*ALL WIRES ARE 18 GAUGE UNLESS OTHERWISE STATED

8 - Assemblies and Parts Lists

This section of the manual provides detailed illustrations and parts lists for the following assemblies.

NOTICE

When ordering parts for assemblies, first refer to the appropriate assembly listed here and then find the part number listed on that specific page. In most cases, you do not have to order the entire assembly to get a part.

If you have an electronic copy (a .pdf) of this Manual, you can search for the part number by pressing the **CTRL** key and the **F** key at the same time. This will “pop up” the Find window on your monitor. Type the part number, including dashes, into the Find window and press the **Enter** key.

■ Top Level Assembly Parts List	8-6	■ Chevy Cowling Assembly Parts List.....	8-48
■ Recovery Tank Assembly Parts List.....	8-11	■ Driver Side Pump Kit Assembly Parts List	8-49
■ Power Pack Assembly Parts List	8-14	■ Passenger Side Pump Kit Assembly Parts List.....	8-50
■ Blower Assembly Parts List.....	8-16	■ Pump Flex Assembly Parts List	8-51
■ Pump Assembly Parts List	8-19	■ 50 Gallon Tank Flex Kit Assembly Parts List.....	8-52
■ Frame Assembly Parts List	8-21	■ 50 Gallon Tank Flex Assembly Parts List	8-53
■ Coolant Heat Exchanger Assembly Parts List	8-23	■ 35 Gallon and 15 Gallon Tank Kit Assembly Parts List	8-54
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■ Cross Kit Assembly Parts List	8-26	■ 35 Gallon Tank Solo Flex Assembly Parts List.....	8-57
■ Dash Box Assembly Parts List	8-28	■ 35 Gallon Tank Flex Assembly Parts List	8-58
■ Dash Panel Assembly Parts List	8-30	■ 50 Gallon Tank Flex Chemical Caddy Assembly Parts List.....	8-59
■ Dual Heat Exchanger Assembly Parts List	8-32	■ 35 Gallon Tank Flex Chemical Caddy Assembly Parts List.....	8-60
■ Instrument Panel Assembly Parts List	8-35	■ Quick Connect Dash Box Flex Assembly Parts List.....	8-62
■ By-Pass Valve Assembly Parts List.....	8-37	■ By-Pass Valve Flex Assembly Parts List.....	8-63
■ Hi-PSI Manifold Assembly Parts List.....	8-38	■ Dura-Flow Automatic Pump Out (APO) Assembly Parts List	8-65
■ Differential Valve Assembly Parts List.....	8-39	■ APO Pump Parts List	8-66
■ Recovery Tank Cover Assembly Parts List	8-40	■ Pump Cover Flex Assembly Parts List.....	8-67
■ Vacuum Relief Valve Assembly Parts List.....	8-41	■ Flex Install Kit Assembly Parts List	8-68
■ Water Box Assembly Parts List.....	8-44	■ Wire Harness Flex Assembly Parts List	8-69
■ Diffuser Filter Assembly Parts List	8-45	■ CDS Hose Routing List	8-70
■ Yaw Sensor Cooling Kit Parts List.....	8-46	■ Flex Hose Routing List.....	8-71
■ Pass Through Assembly Parts List	8-47		

Some of the illustrations in this section reference sealants, thread lockers, adhesive, primer, anti-seize and lubricant specifications that are used in the construction of the CTS 4.8 Flex equipment.

Refer to Figure 8-1 to identify those substances such as A1, A2 and so forth. Equivalent products are acceptable if they meet or exceed current specifications and are approved by HydraMaster.

Adhesive Material Production Line Reference Card from ENG-45975 Rev. 0

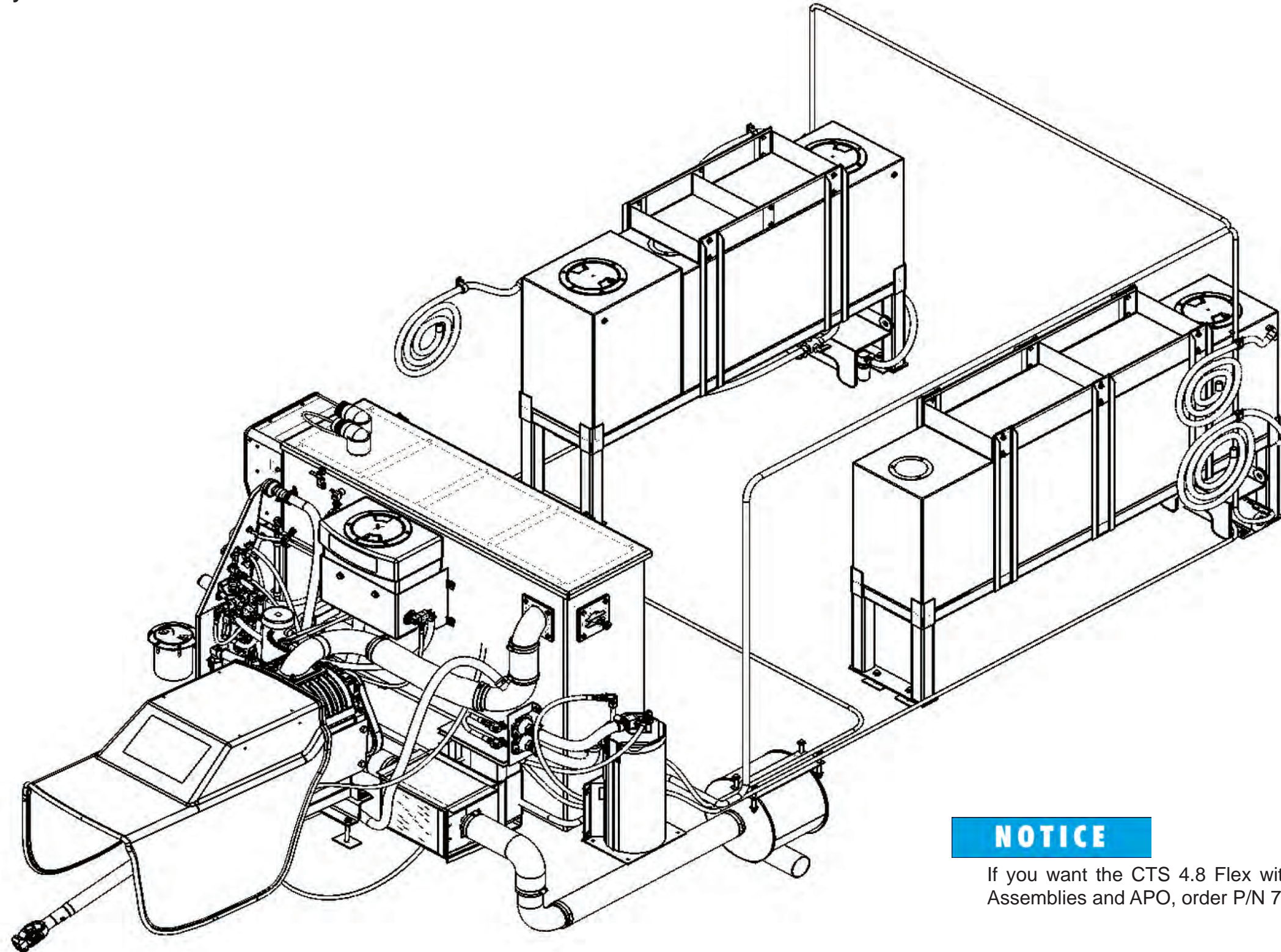
<p>A1 Silicone RTV</p> 	<p>A2 Loctite 567</p> 	<p>A3 Loctite 545</p> 	<p>A4 Teflon Tape</p> 	<p>E1 Loctite 51252 Grease</p> 	
<p>B1 Loctite 242</p> 	<p>B2 Loctite 262</p> 	<p>B3 Loctite 266</p> 	<p>C1 Gapper</p> 	<p>D1 Loctite 7649</p> 	<p>E2 Molykote Anti-Seize</p> 
<p>B4 Loctite 222MS</p> 	<p>B5 Loctite 425</p> 	<p>E4 Super Lube</p> 	<p>E5 SKF Anti-Fret</p> 		

Figure 8-1. Adhesive and Sealant Material Reference

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Figure 8-2. Top Level Assembly - View 1 of 4
751-021-722-10 Rev. D



NOTICE

If you want the CTS 4.8 Flex without the Flex Tank Assemblies and APO, order P/N 751-020-722-10.

Figure 8-3. Top Level Assembly - View 2 of 4
7!

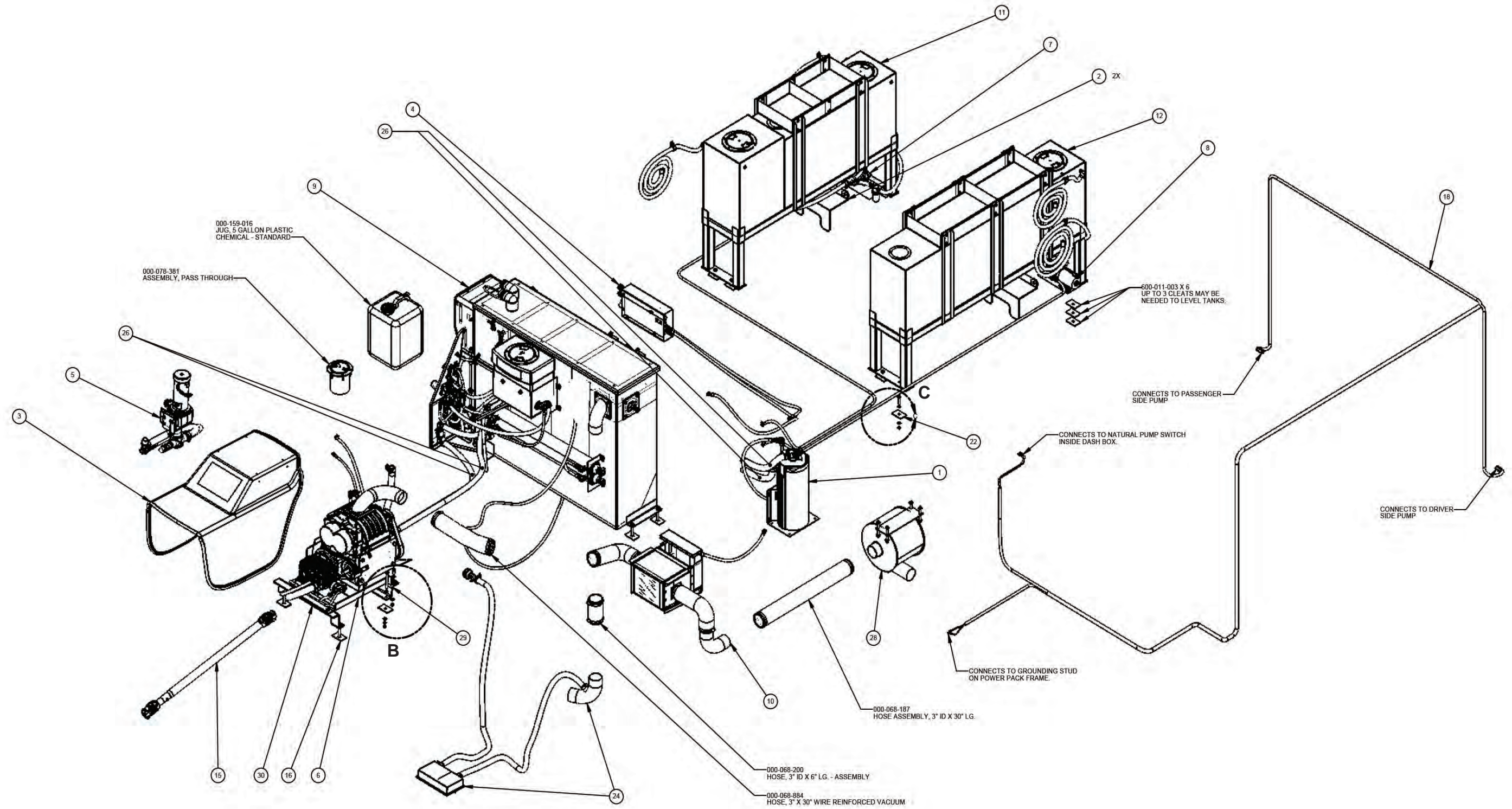


Figure 8-4. Top Level Assembly - View 3 of 4
751-021-722-10 Rev. D

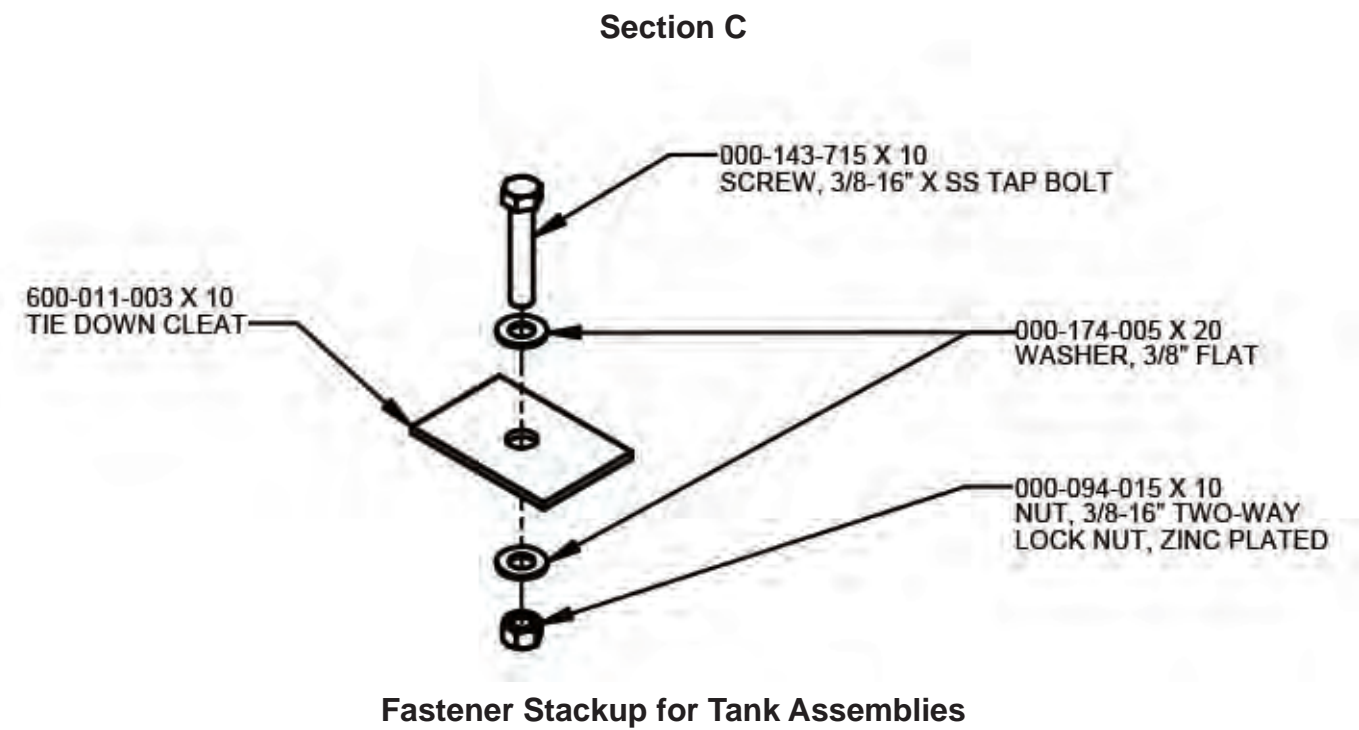
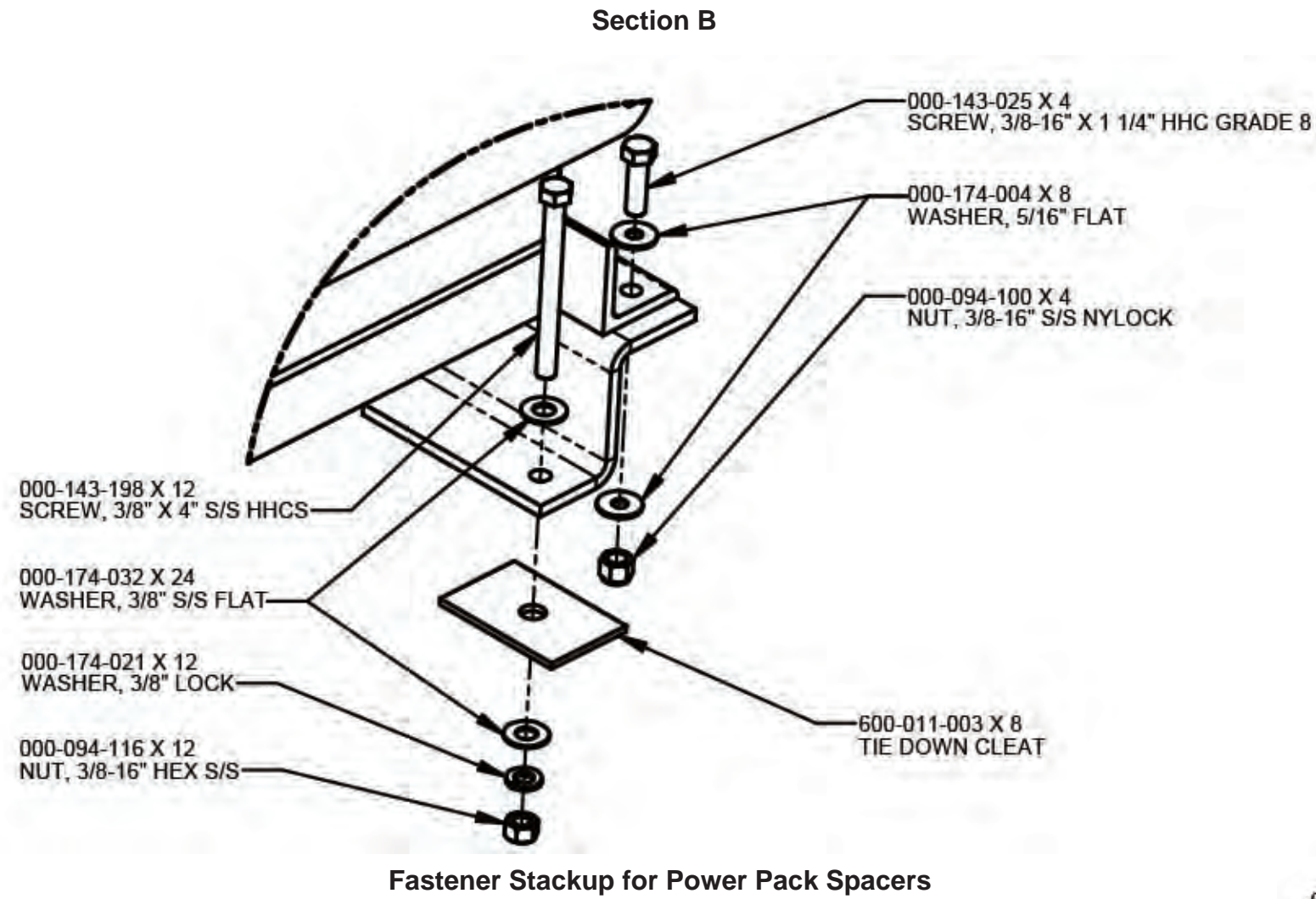
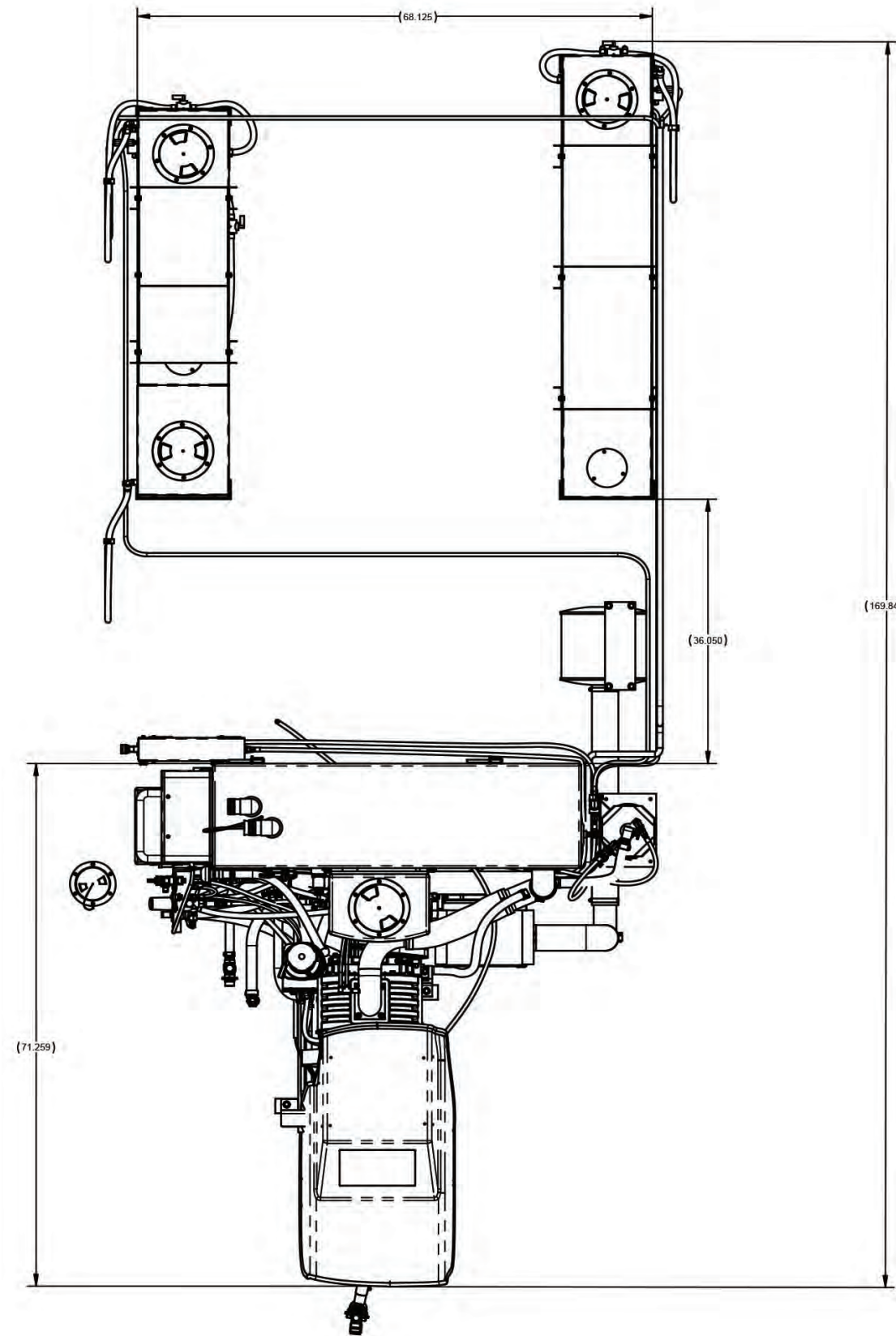


Figure 8-5. Top Level Assembly - View 4 of 4
751-021-722-10 Rev. D

Top Level Assembly Parts List

Item	Part Number	Description	Qty
1	601-006-751	Assembly, Coolant Heat Exchanger Flex	1
2	000-041-707	Assembly, Cover - Pump Flex	2
3	601-020-008	Assembly, Cowling - Chevy CDS Gray	1
4	601-021-750	Assembly, Dash Box - QC Flex	1
5	000-079-097	Assembly, Dura-Flow APO	1
6	601-004-701	Assembly, Power Pack	1
7	601-021-752	Assembly, Pump - Passenger Flex Kit	1
8	601-021-753	Assembly, Pump, Driver Flex Kit	1
9	601-060-750	Assembly, Recovery Tank Flex	1
10	601-005-751	Assembly, Salsa Heat Exchanger Flex	1
11	000-163-753	Assembly, Tank - 35 Gallon and 15 Gallon Flex Kit	1
12	000-163-751	Assembly, Tank - 50 Gallon Flex Kit	1
13	601-021-134	Assembly, Front End	1
14	000-052-168	Connector, 2" Plastic Vacuum Hose	2
15	000-150-174	Drive Line Axle	1
16	601-015-014	Finish Package, CDS	1
17	000-063-060	Harness, Chevy - Secondary	1
18	000-063-067	Harness, Wire - CTS 4.8 Flex	1
19	000-068-990	Hose Assembly, 1/4" Solution X 125" Lg.	2
20	000-068-065	Hose, 2" X 50' Vacuum - Blue	5
21	000-068-385	Hose, 3/4" Green Stripe X 18" Lg.	1
22	000-078-934	Kit, Installation Flex	1
23	000-078-562	Kit, Mach Parts CDS	1
24	000-079-130	Kit, Yaw Sensor Cooling - Chevy	1
25	000-081-057	Label Set, Equipped	1
26	000-182-750D	Manual, CTS 4.8 Flex Owners Guide (not shown)	1
27	000-182-038D	Manual, CDS Owners Guide (not shown)	1
28	000-093-030	Silencer, 3" Inlet and Outlet - Coated	1
29	000-154-147	Spacer, Power Pack - Rear	1
30	000-154-185	Spacer, Power Pack - Front	1



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Figure 8-6. Recovery Tank Assembly - View 1 of 4
601-060-750 Rev. C

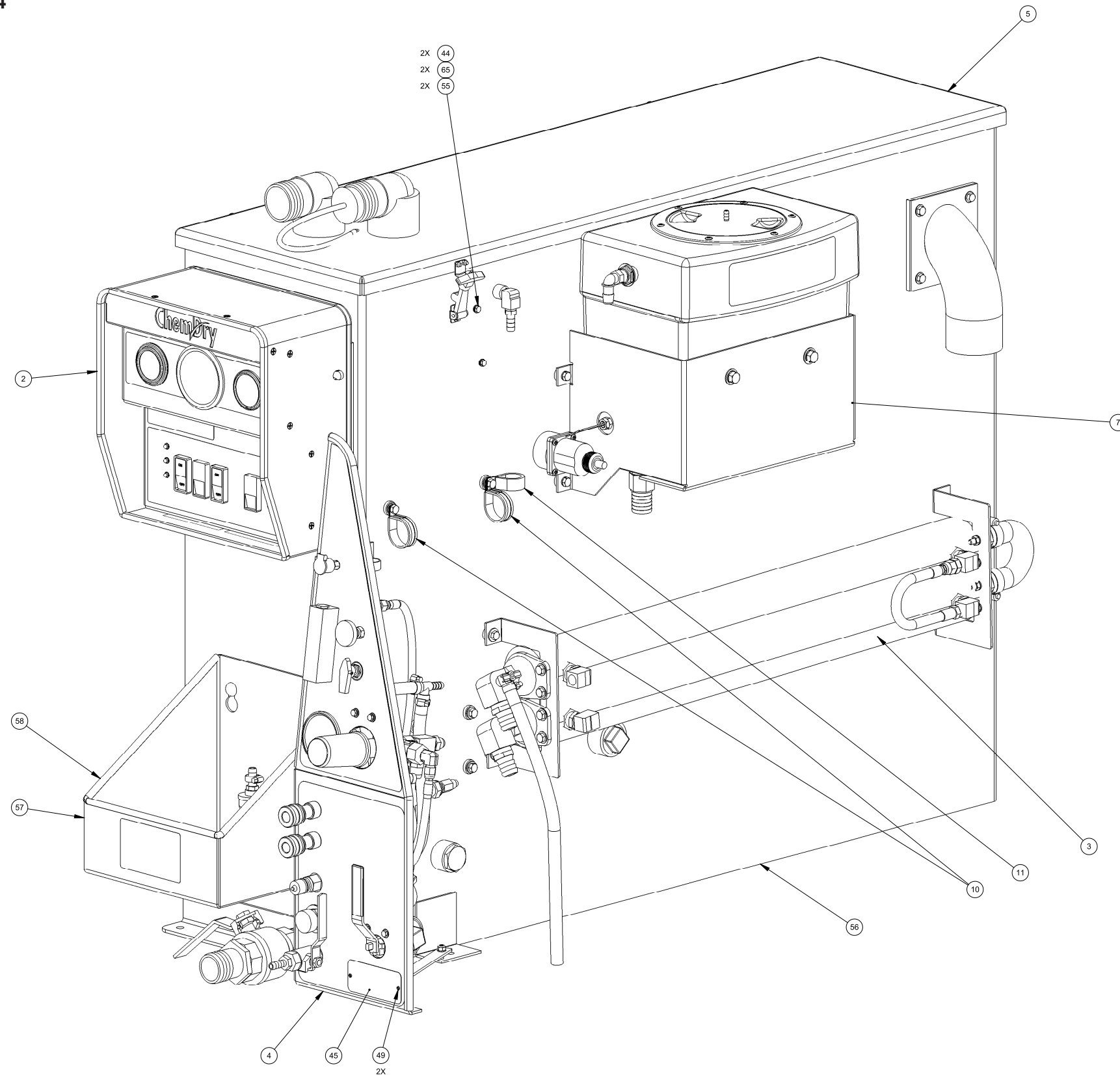
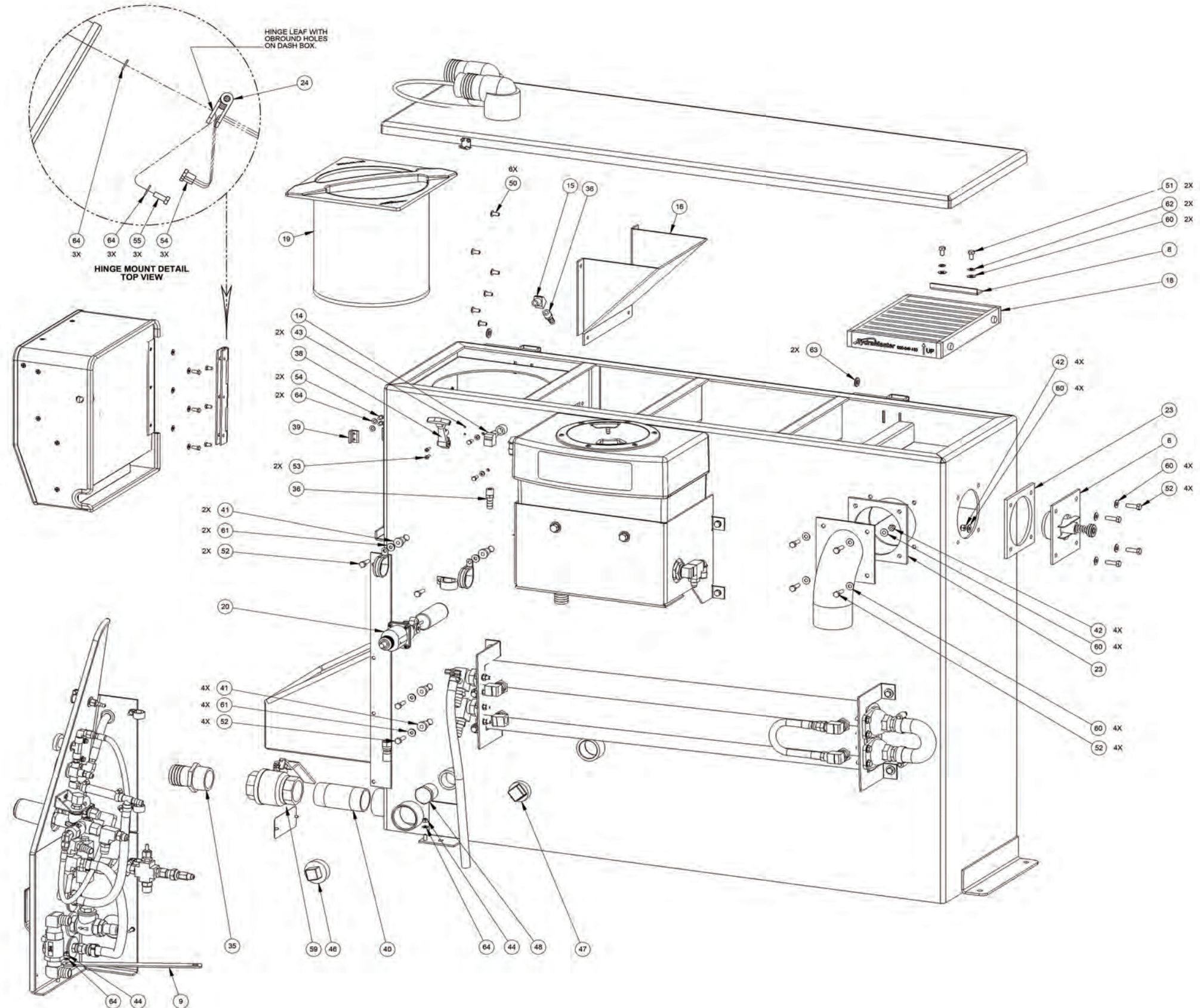


Figure 8-7. Recovery Tank
Assembly - View 2 of 4
601-060-750 Rev. C



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Figure 8-8. Recovery Tank Assembly - View 3 of 4
601-060-750 Rev. C

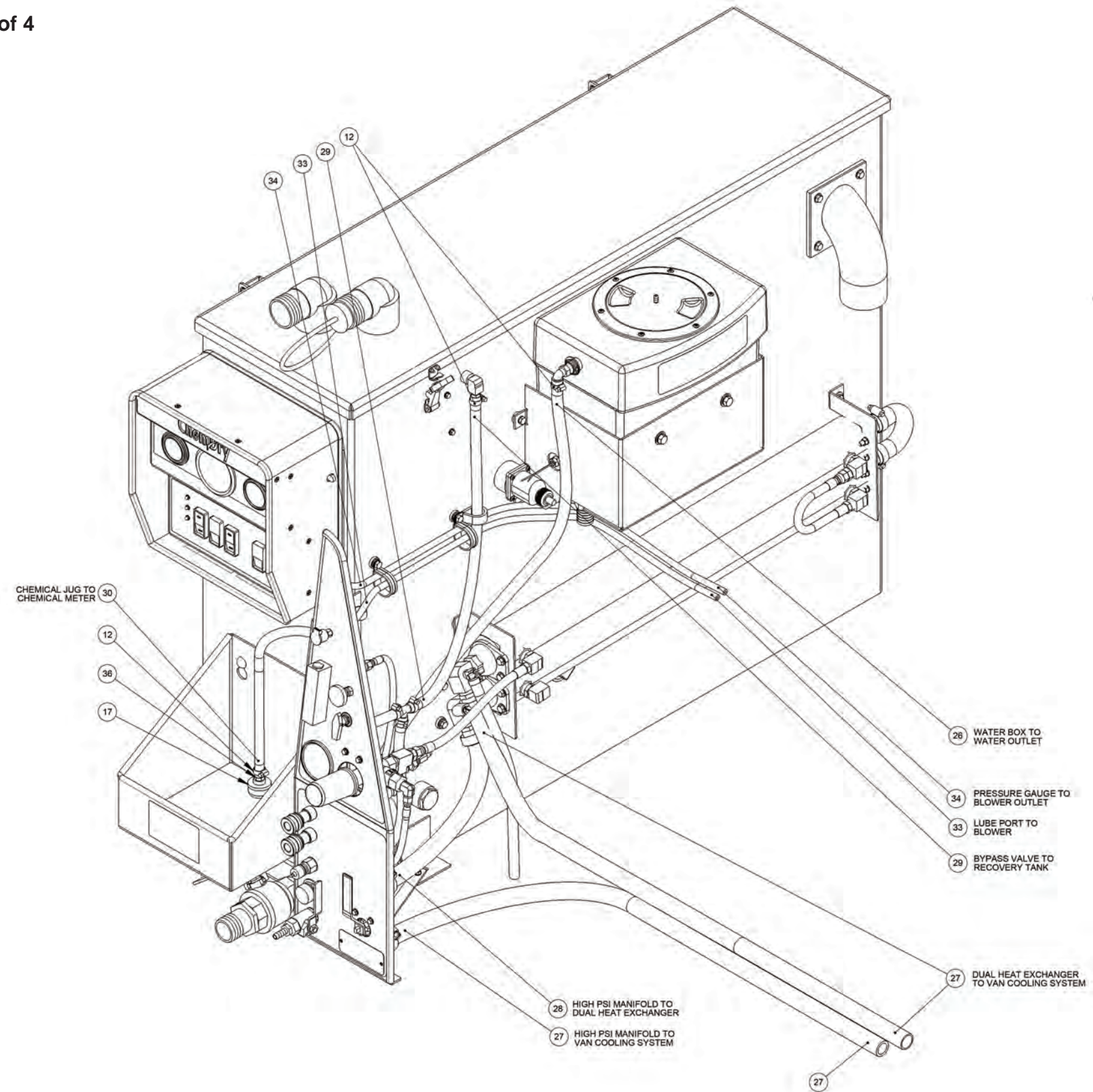
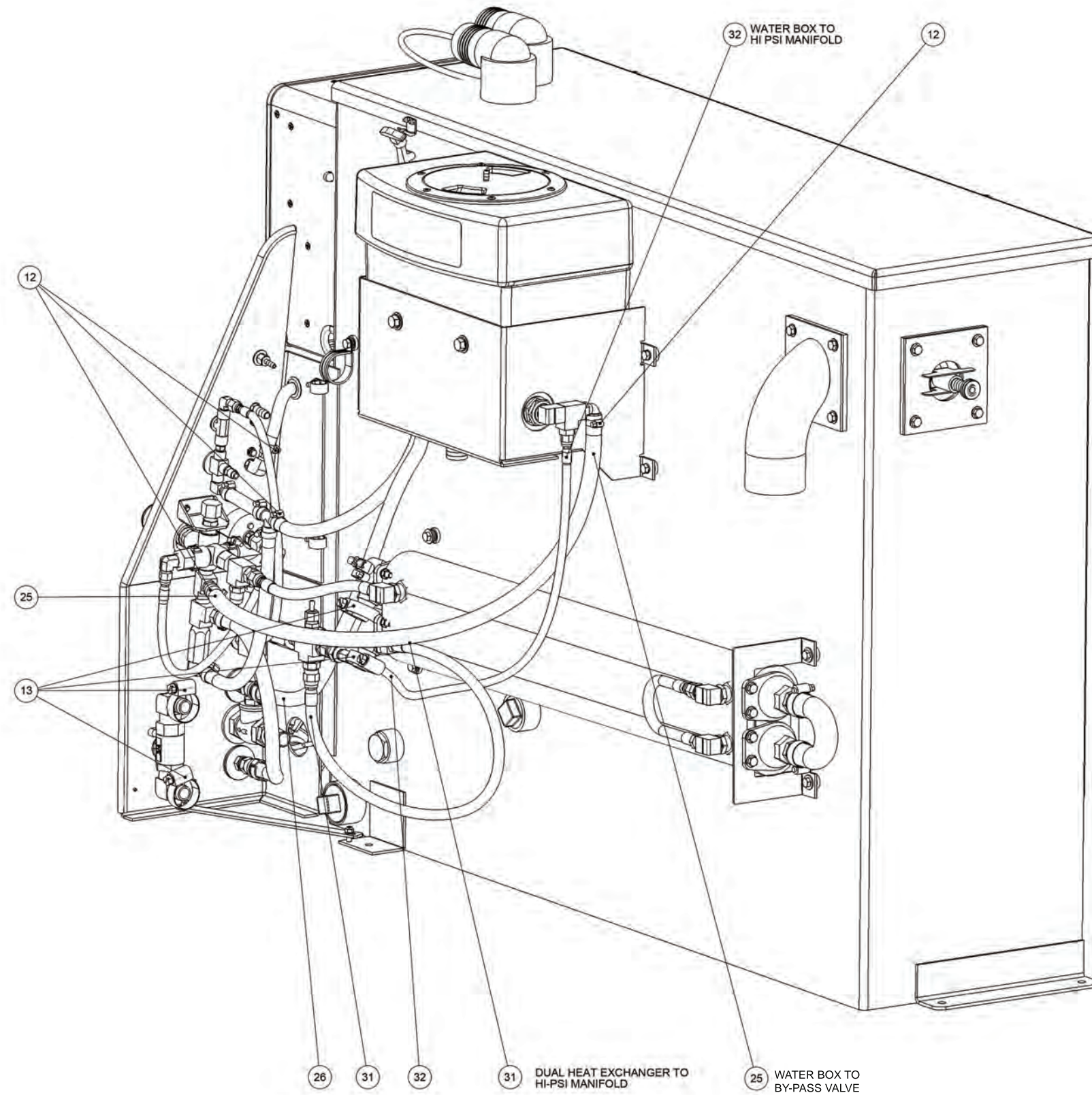


Figure 8-9. Recovery Tank Assembly - View 4 of 4
601-060-750 Rev. C

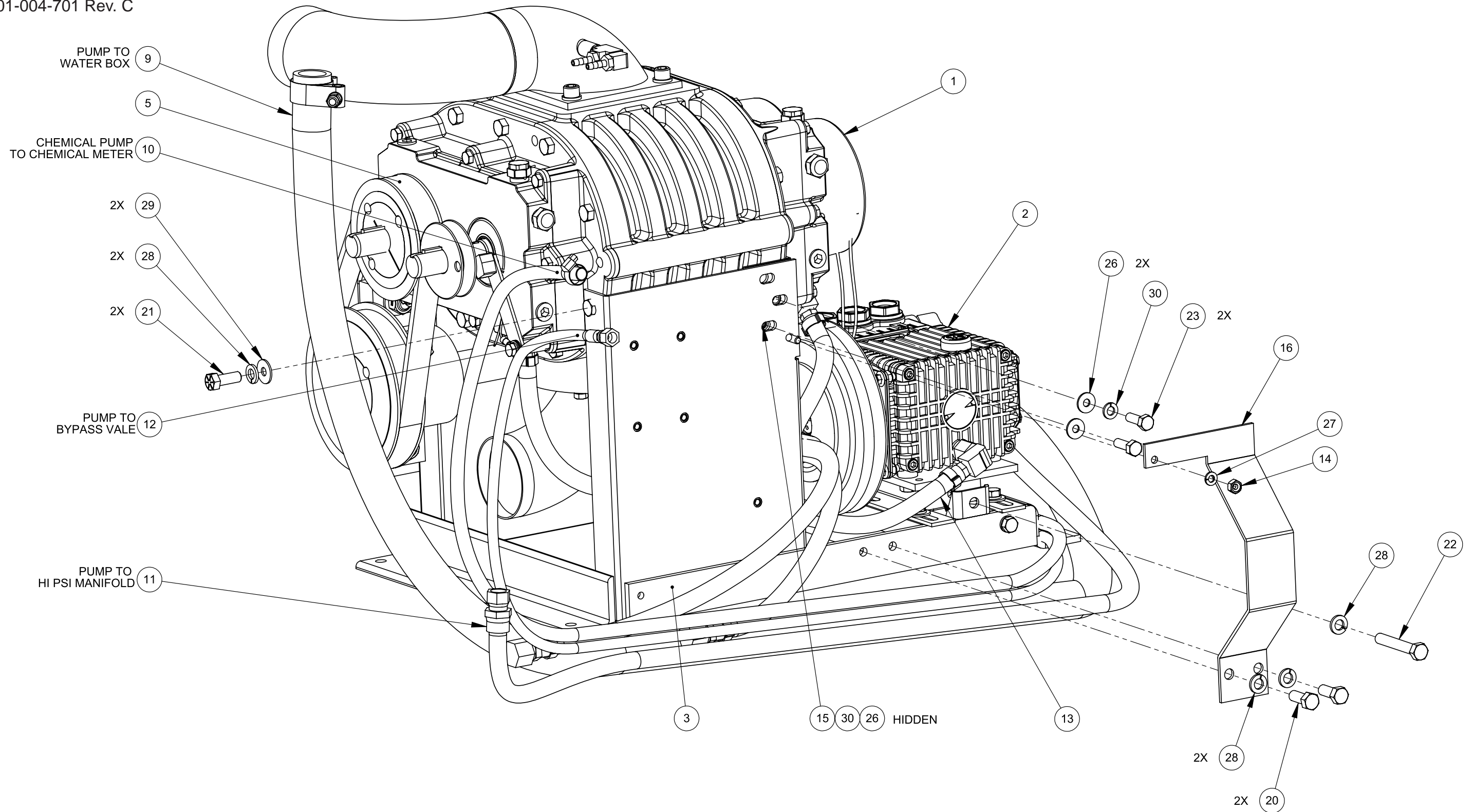


Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-135	Adapter, Ø3.0 Tank to X 90 Degree Blower Hose	1	34	000-068-977	Hose, 5/32" I.D. Vacuum X 82" Lg.	1
2	601-018-750	Assembly, Dash Box	1	35	000-052-226	Insert, 1-1/2" NPT X 1-1/2" Barb (Gray)	1
3	601-006-701	Assembly, Dual Heat Exchanger	1	36	000-052-102	Insert, #46 (1/4" NPT X 3/8" Barb)	3
4	601-019-701	Assembly, Instrument Panel	1	37	000-081-413	Label Set	1
5	601-029-701	Assembly, Recovery Tank Cover	1	38	000-086-008	Latch, Bungee	1
6	610-026-724	Assembly, Vacuum Relief Valve - URT	1	39	000-086-032	Latch, Dash Strike	1
7	601-010-751	Assembly, Water Box	1	40	000-052-921	Nipple, 1-1/2" NPT X 4" Lg. S/S	1
8	000-015-932	Bracket, Flat Filter Securing - Uncoated	1	41	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	6
9	000-015-1208	Bracket, Instrument Panel to Vacuum Tank Stabilizer	1	42	000-094-009	Nut, 1/4"-20UNC Nylock	8
10	000-033-053	Clamp, 1-1/2" Cushion Loop	2	43	000-094-063	Nut, #6-32UNC Hex Nylock	2
11	000-033-057	Clamp, 1" Cushion Loop	1	44	000-094-034	Nut, #10-24UNC Hex Nylock	4
12	000-033-005	Clamp, Size #5 Hose	7	45	000-105-012	Plate, Machine Serial I.D.	1
13	000-033-020	Clamp, Size #16 Hose	4	46	000-106-019	Plug, 1-1/2" NPT	1
14	000-052-085	Elbow, 1/4" NPT Street	1	47	000-106-046	Plug, 1-1/4" NPT	1
15	000-052-082	Elbow, 1/4" NPT Street X 45 Degree	1	48	000-106-049	Plug, 1" NPT Black Nylon	1
16	000-049-154	Filter, Air Deflector, URT - Fabricated	1	49	000-140-001	Rivet, Ab4-3A Aluminum Pop 1/8" X 1/4" Lg.	2
17	000-049-118	Filter, Chemical Inlet High Pressure	1	50	000-140-023	Rivet, AB8-6A Aluminum Pop	6
18	000-049-153	Filter, Flat - URT	1	51	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	2
19	000-049-152	Filter, Recovery Tank Basket	1	52	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	14
20	000-157-091	Float, Lever Switch	1	53	000-143-539	Screw, #6-32UNC X 0.50" Lg. Button Head	2
21	000-057-026	Gasket, 1/2" X 1/4" X 18-1/8" Lg.	1	54	000-143-166	Screw, #10-24UNC X 0.375" Lg. Hex Head	5
22	000-131-002	Gasket, 1/2" X 1/8" X 100 ft Lg. Closed Cell	1.5	55	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	5
23	000-057-206	Gasket, Adapter - URT	2	56	000-159-130	Tank, 100 Gallon Universal Recovery - Coated	1
24	000-067-031	Hinge, Dash Box	1	57	000-166-002	Tray, Soap Jug - Coated	1
25	000-068-991	Hose, 1/2" I.D. Rubber X 42" Lg.	1	58	000-131-131	Trimlok, 3/8 X 1/8 Rubber	1
26	000-068-734	Hose, 1/2" X 42.5 Lg w/ 3/8" NPT and 3/8" SAE F Ends	1	59	000-169-022	Valve, 1-1/2" Full Port Ball	1
27	000-068-385	Hose, 3/4" I.D. X 18 ft - Green Stripe - Cut to Fit	1	60	000-174-003	Washer, 1/4" Flat	18
28	000-068-940	Hose, 3/8" I.D. Rubber X 17" Lg.	1	61	000-174-060	Washer, 1/4" Flat Rubber Backed	6
29	000-068-1039	Hose, 3/8" I.D. Rubber X 31" Lg.	1	62	000-174-019	Washer, 1/4" Lock	2
30	000-068-1037	Hose, 3/8" I.D. X 38" Lg., Clr w/Braid	1	63	000-174-029	Washer, 3/8" Flat Rubber Backed	2
31	000-068-801	Hose, 3/8" X 37" w/ 3/8" JIC End	1	64	000-174-001	Washer, #10 Flat	10
32	000-068-203	Hose, 3/16" X 34" 1/4" FJIC X 1/4" FJIC	1	65	000-174-036	Washer, #10 Flat Rubber Backed	2
33	000-068-978	Hose, 5/32" I.D. Vacuum X 52" Lg.	1				

Figure 8-10. Power Pack Assembly -
View 1 of 2

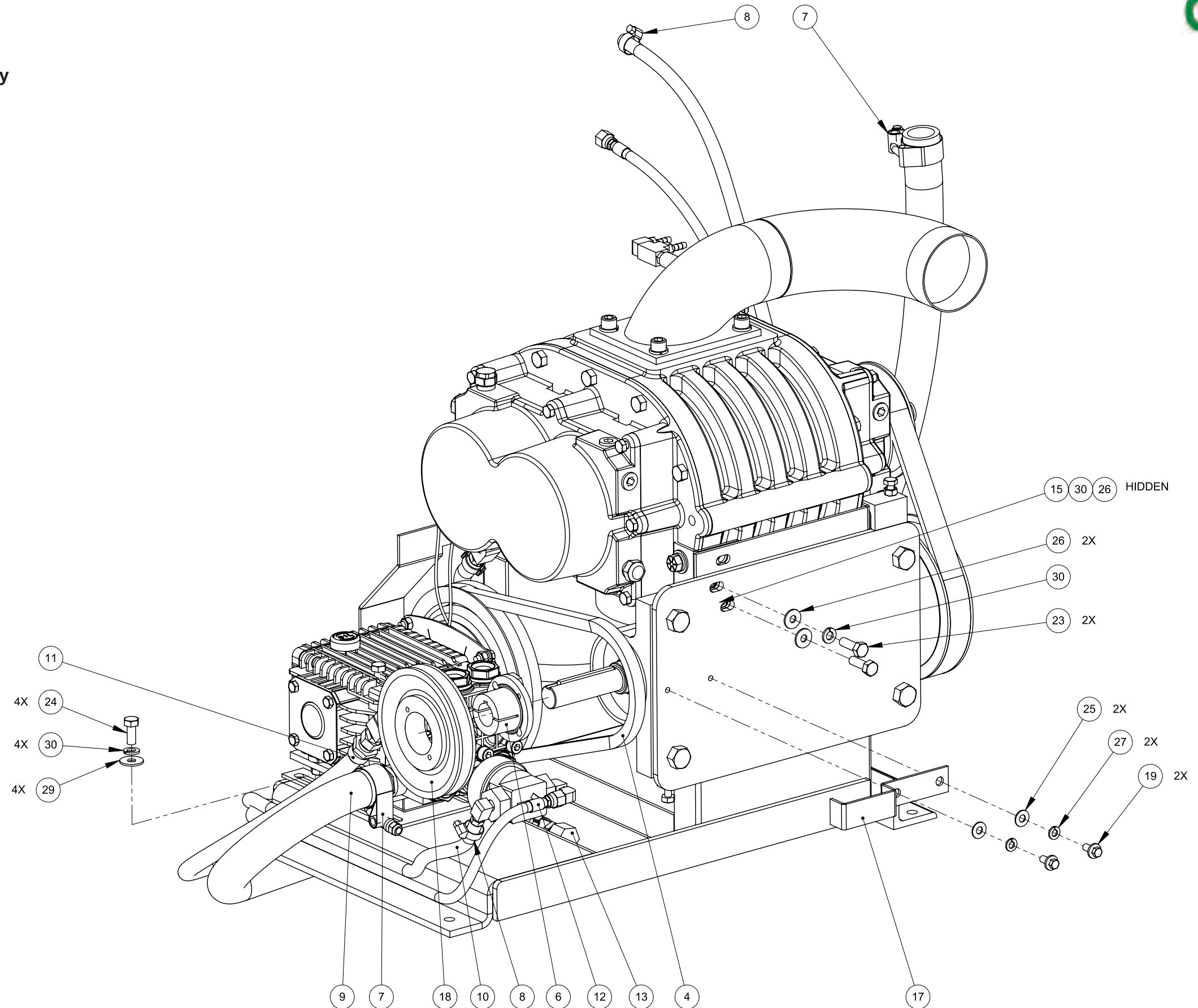
601-004-701 Rev. C



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Figure 8-11. Power Pack Assembly
- View 2 of 2
601-004-701 Rev. C



Power Pack Assembly Parts List

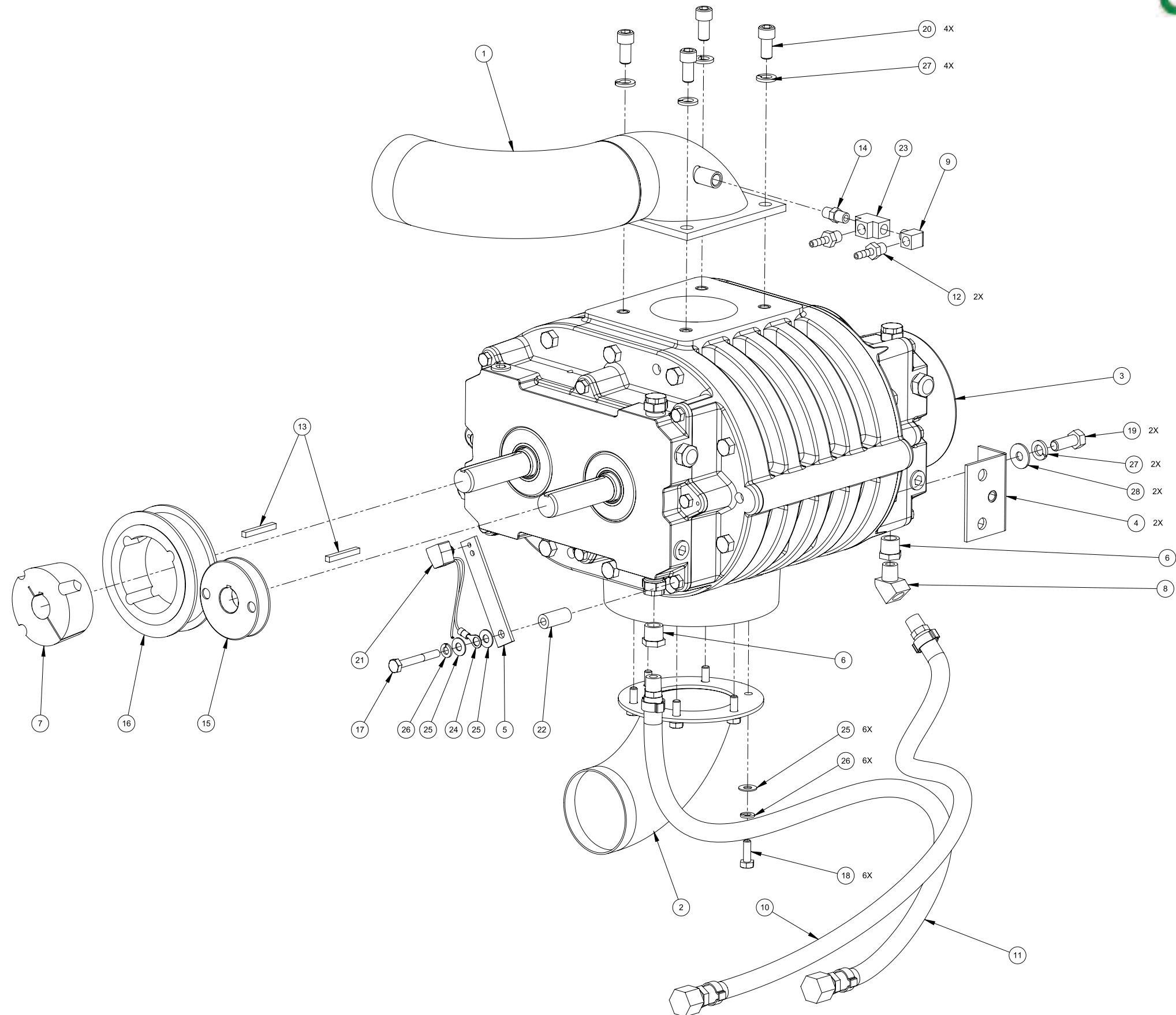
Item	Part Number	Description	Qty
1	601-002-701	Assembly, Blower	1
2	601-007-701	Assembly, Pump	1
3	601-001-701	Assembly, Universal CDS Frame	1
4	000-010-065	Belt, #9345 Pump Drive	1
5	000-010-052	Belt, Polychain GT	1
6	000-020-019	Bushing, #H X 7/8" Bore	1
7	000-033-132	Clamp, 1-1/2" T-Bolt	2
8	000-033-005	Clamp, Size #5 Hose	2
9	000-068-777	Hose, 1" X 65" Lg. Suction	1
10	000-068-1038	Hose, 3/8" I.D. High Temp X 72" Lg.	1
11	000-068-588	Hose, 3/8" X 52" Lg. Throb - CDS	1
12	000-068-706	Hose, 3/16" X 70" Lg. w/ Fem JIC Ends	1
13	000-068-149	Hose, CDS Blower Oil Drain	1
14	000-094-010	Nut, 1/4"-20UNC Hex	1
15	000-094-012	Nut, 5/16-18"UNC Hex	2

Item	Part Number	Description	Qty
16	000-108-065	Protector, Pump Belt Shield - Coated	1
17	000-108-109	Protector, Pump Drive Belt - Coated	1
18	000-109-043	Pulley, AK51H	1
19	000-143-141	Screw, 1/4"-20UNC X 1/2" Lg. Whiz Lock	2
20	000-143-096	Screw, 3/8"-16UNC X 1.00" Lg. Hex Head	2
21	000-143-018	Screw, 3/8"-16UNC X 1" Lg. Hex Head - Grade 8	2
22	000-143-098	Screw, 3/8-16 X 2 1/2" Hex Head	1
23	000-143-013	Screw, 5/16"-18UNC X 1.00" Lg. Hex Head Grade 8	4
24	000-143-012	Screw, 5/16"-18UNC X 3/4" Lg.	4
25	000-174-003	Washer, 1/4" Flat	2
26	000-174-002	Washer, 1/4" Flat	6
27	000-174-019	Washer, 1/4" Lock	3
28	000-174-021	Washer, 3/8" Lock	5
29	000-174-004	Washer, 5/16" Flat, USS	6
30	000-174-018	Washer, 5/16" Lock	8

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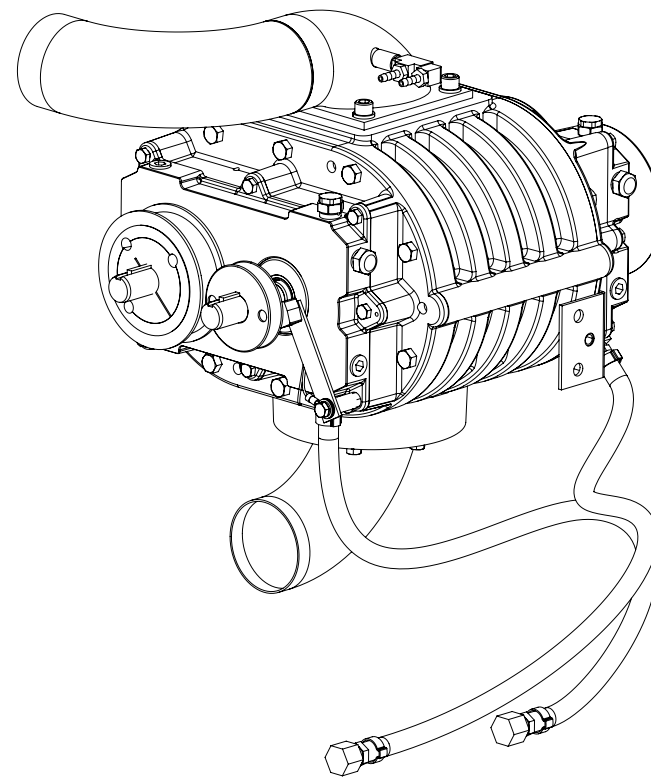


Figure 8-12. Blower Assembly
601-002-701 Rev. B



Blower Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-001-090	Adapter, Blower Inlet - Coated	1	15	000-109-009	Pulley, 2 3/4" X 7/8" Pump Drive - Machined	1
2	000-001-042	Adapter, Blower Outlet - Coated	1	16	000-109-057	Pulley, 40 Tooth	1
3	000-111-147	Blower, 4007	1	17	000-143-373	Screw, 1/4"-20UNC X 2" Lg. Hex Head Grade 5	1
4	000-015-801	Bracket, Blower Mounting - Coated	2	18	000-143-001	Screw, 1/4"-20UNC X 3/4" Lg. Hex Head	6
5	000-015-930	Bracket, Tach. Magnetic Extension - Coated	1	19	000-143-018	Screw, 3/8"-16UNC X 1" Lg. Hex Head - Grade 8	2
6	000-052-061	Bushing, 3/8" NPT X 1/4" FPT	2	20	000-143-094-1	Screw, 3/8"-16UNC X 3/4" Lg. Socket Head	4
7	000-020-020	Bushing, 7/8" Taper-Lock	1	21	000-149-010	Sensor, CDS Magnetic Tach	1
8	000-052-082	Elbow, 1/4" NPT Street X 45 Degree	1	22	000-154-153	Spacer, Tach, Sensor	1
9	000-052-084	Elbow, 1/8" NPT Street	1	23	000-052-092	Tee, 1/8" FPT	1
10	000-068-149	Hose, CDS Blower Oil Drain	1	24	000-037-015	Terminal, 5/16 Ring-16 AWG	1
11	000-068-149	Hose, CDS Blower Oil Drain	1	25	000-174-003	Washer, 1/4" Flat	8
12	000-052-293	Insert, #23 (1/8" NPT X 3/16" Barb)	2	26	000-174-019	Washer, 1/4" Lock	7
13	000-077-011	Key, 3/16" X 1 1/2" Long	2	27	000-174-021	Washer, 3/8" Lock	6
14	000-052-069	Nipple, 1/8" NPT Hex	1	28	000-174-004	Washer, 5/16" Flat	2



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Figure 8-13. Pump Assembly - View 1 of 2
601-007-701 Rev. C

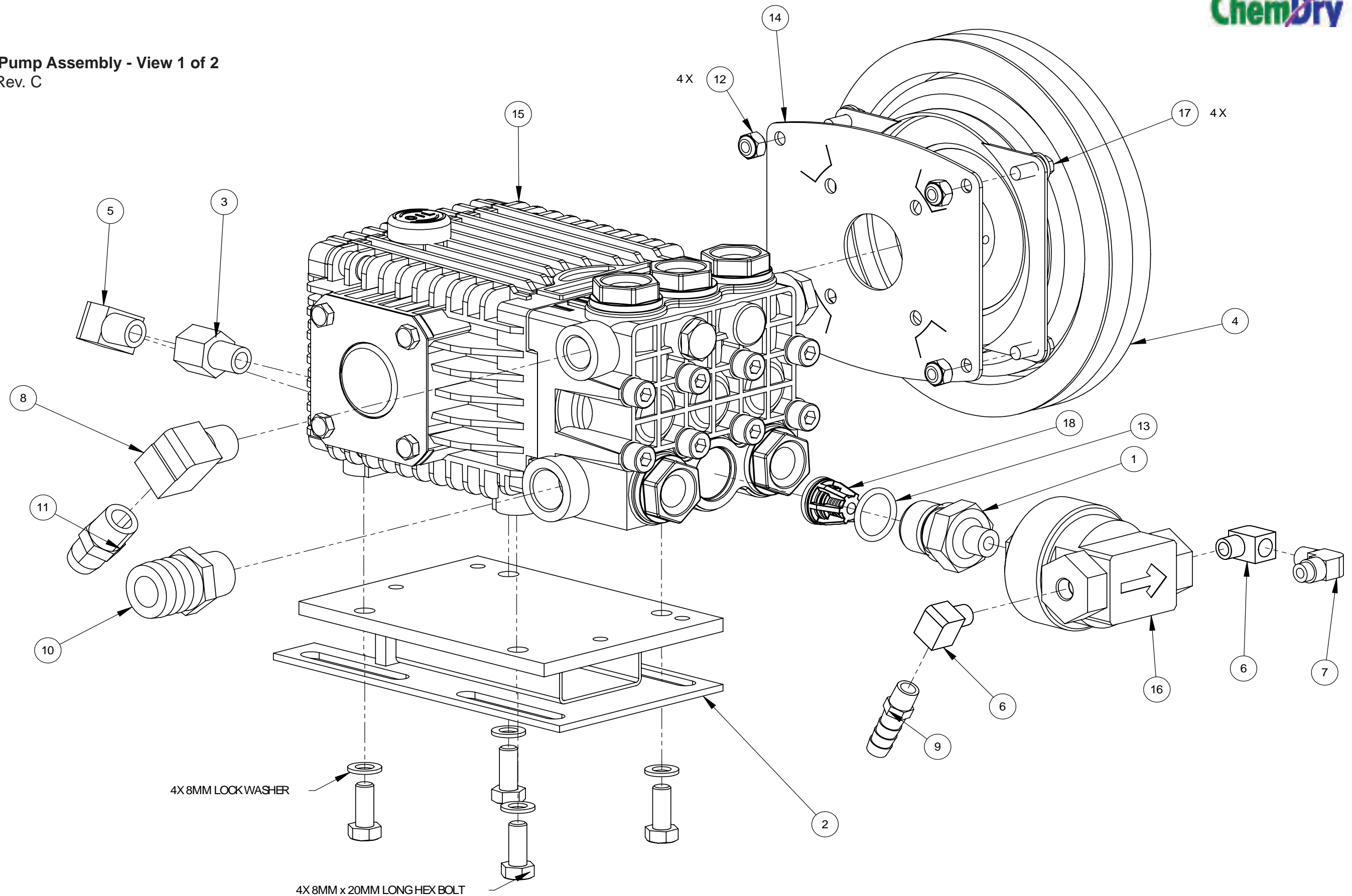
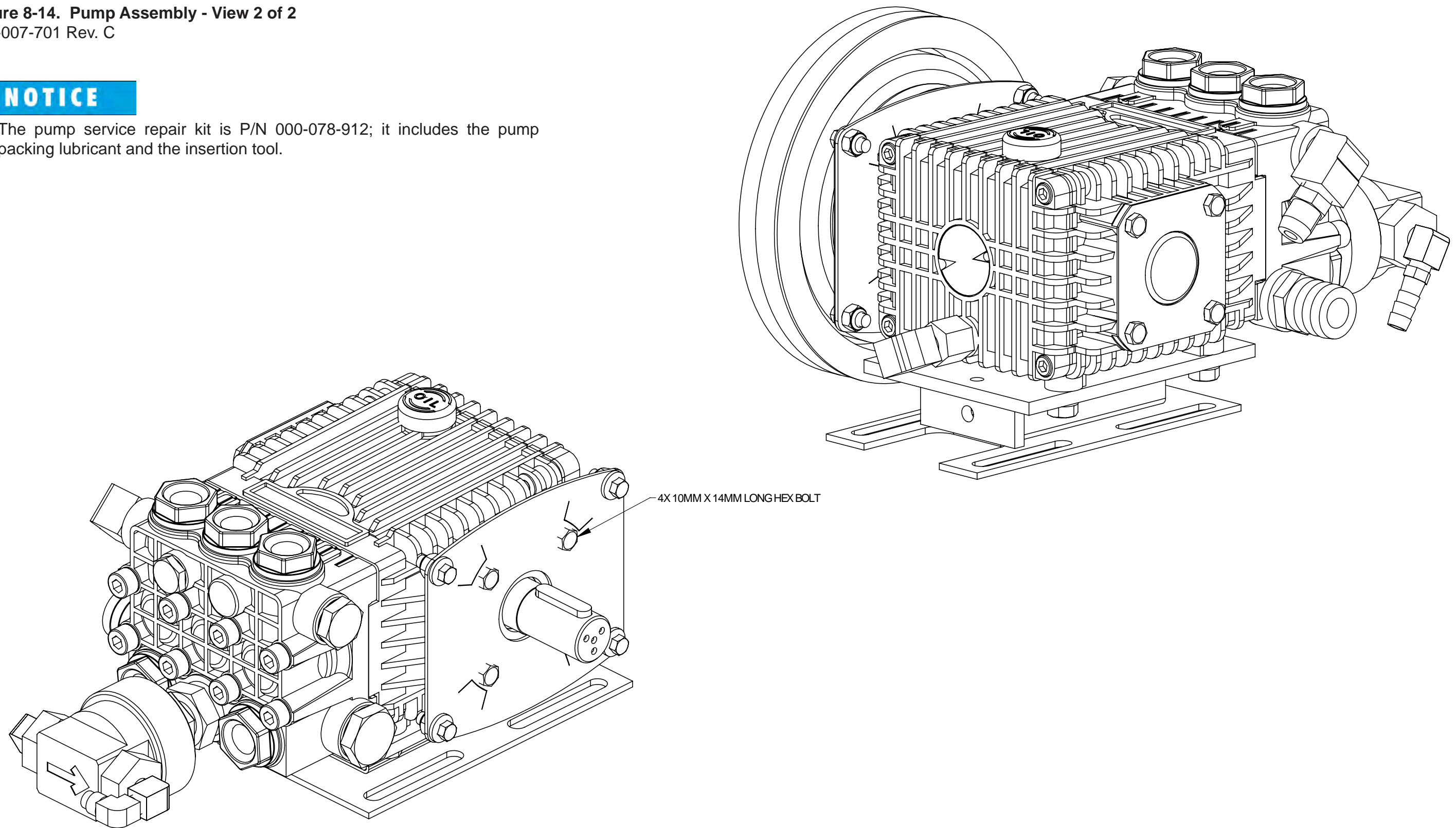


Figure 8-14. Pump Assembly - View 2 of 2
601-007-701 Rev. C

NOTICE

The pump service repair kit is P/N 000-078-912; it includes the pump packing lubricant and the insertion tool.

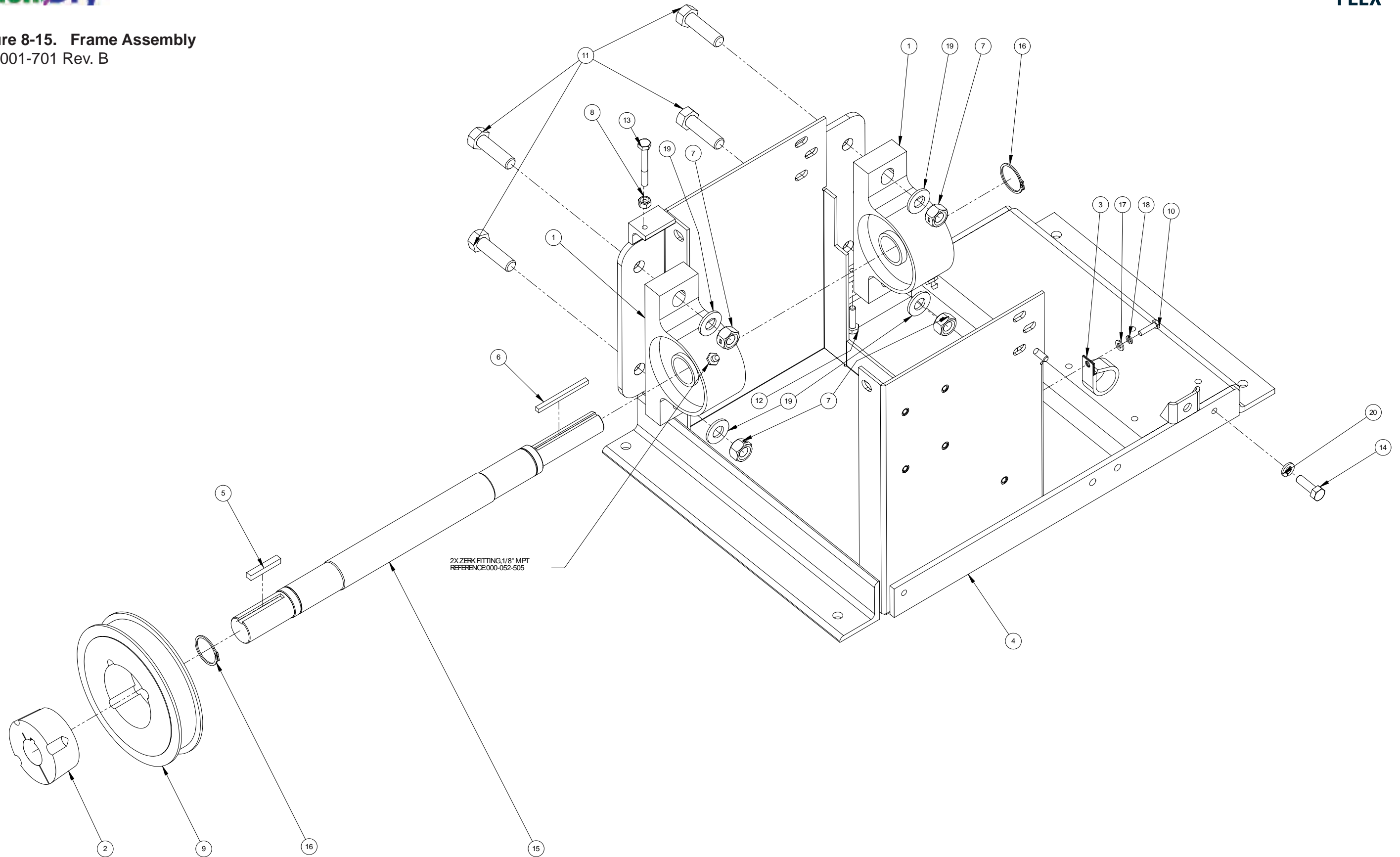


Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-001-154	Adapter, GP to Chemical Pump S/S 4.0 gallon	1
2	000-015-927	Bracket, Compressor Mount - Coated	1
3	000-052-062	Bushing, 1/4" NPT Male X 1/4" NPT Female	1
4	000-036-008	Clutch, 7" O.D. 24mm Single Groove	1
5	000-052-085	Elbow, 1/4" NPT Street	1
6	000-052-084	Elbow, 1/8" NPT Street	2
7	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1
8	000-052-086	Elbow, 3/8" NPT Street	1
9	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1

Item	Part Number	Description	Qty
10	000-052-753	Insert, #816 (1/2" NPT X 1" Barb)	1
11	000-052-128	Nipple, 3/8 MPT X 3/8SAE Flare	1
12	000-094-071	Nut, 1/4"-20UNC Nylock	4
13	000-097-057	O-Ring, Adapter - Chemical Pump	1
14	000-105-550	Plate, Pump Clutch - GP 4.0 gpm	1
15	000-111-188	Pump, 4.0 gpm GP	1
16	000-111-184	Pump, GP Chemical	1
17	000-143-141	Screw, 1/4"-20UNC X 1/2" Lg. Whiz Lock	4
18	000-169-216	Valve, GP Pump Check - Mod. - 4.0 gallon	1

Figure 8-15. Frame Assembly
601-001-701 Rev. B



Frame Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-008-020	Bearing, Pillow Block - 1-3/16" Bore	2	11	000-143-240	Screw, 1/2"-13UNC X 1.75" Lg. Hex Head - Grade 5	4
2	000-020-026	Bushing, 1-1/8" Taper-Lock	1	12	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	1
3	000-033-057	Clamp, 1" Cushion Loop	1	13	000-143-548	Screw, 1/4"-20UNC X 2.00" Lg. Hex Head	1
4	000-055-028	Frame, Pump and Blower - Coated	1	14	000-143-013	Screw, 5/16"-18UNC X 1.00" Lg. Hex Head Grade 8	1
5	000-077-010	Key, 1/4" X 1-1/2" Lg. Class 2 Fit	1	15	000-150-040	Shaft, Drive Sprocket	1
6	000-077-012	Key, 3/16" X 2.5" Lg. Class 2 Fit	1	16	000-139-021	Snap Ring, 1-3/16" Shaft	2
7	000-094-037	Nut, 1/2-13UNC 2 Way Locking	4	17	000-174-001	Washer, #10 Flat	1
8	000-094-010	Nut, 1/4"-20UNC Hex	1	18	000-174-014	Washer, #10 Lock	1
9	000-109-058	Pulley, 56 Tooth GT2 8MX-56S-21 Engine and Blower	1	19	000-174-012	Washer, 1/2 SAE H/D	4
10	000-143-132	Screw, #10-24UNC X 0.75" Lg. Hex Head	1	20	000-174-018	Washer, 5/16" Lock	1

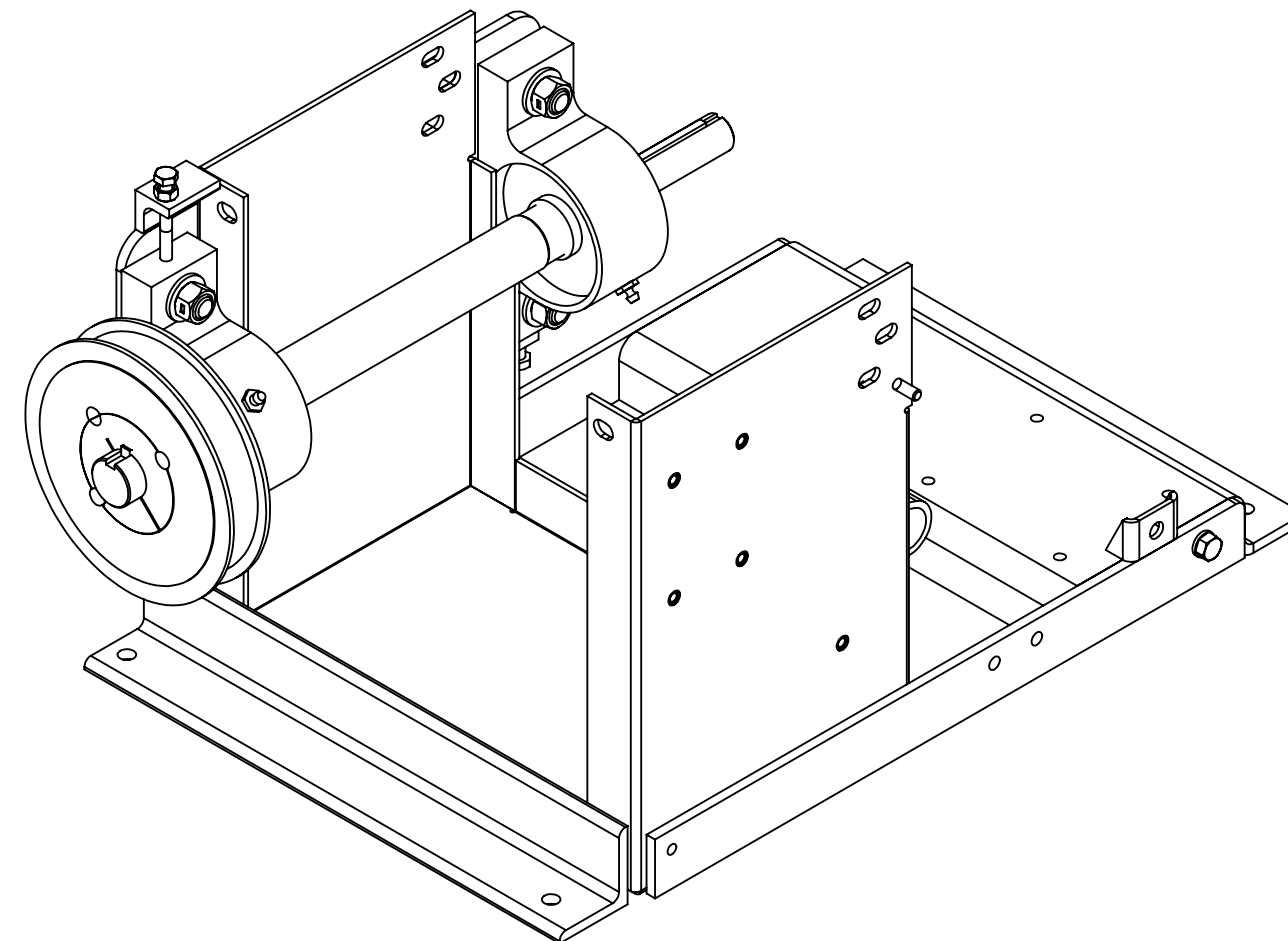
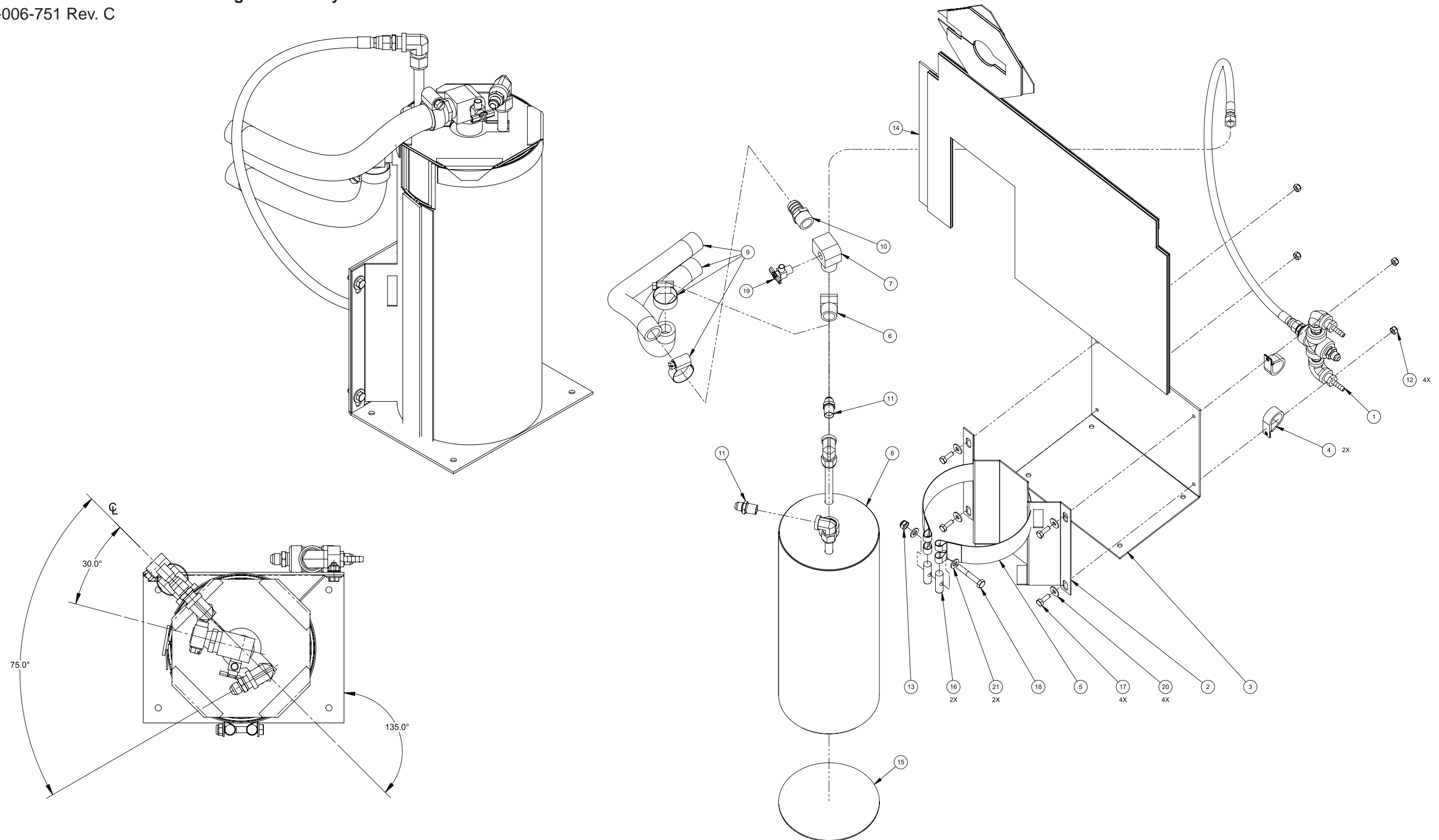


Figure 8-16. Coolant Heat Exchanger Assembly
601-006-751 Rev. C

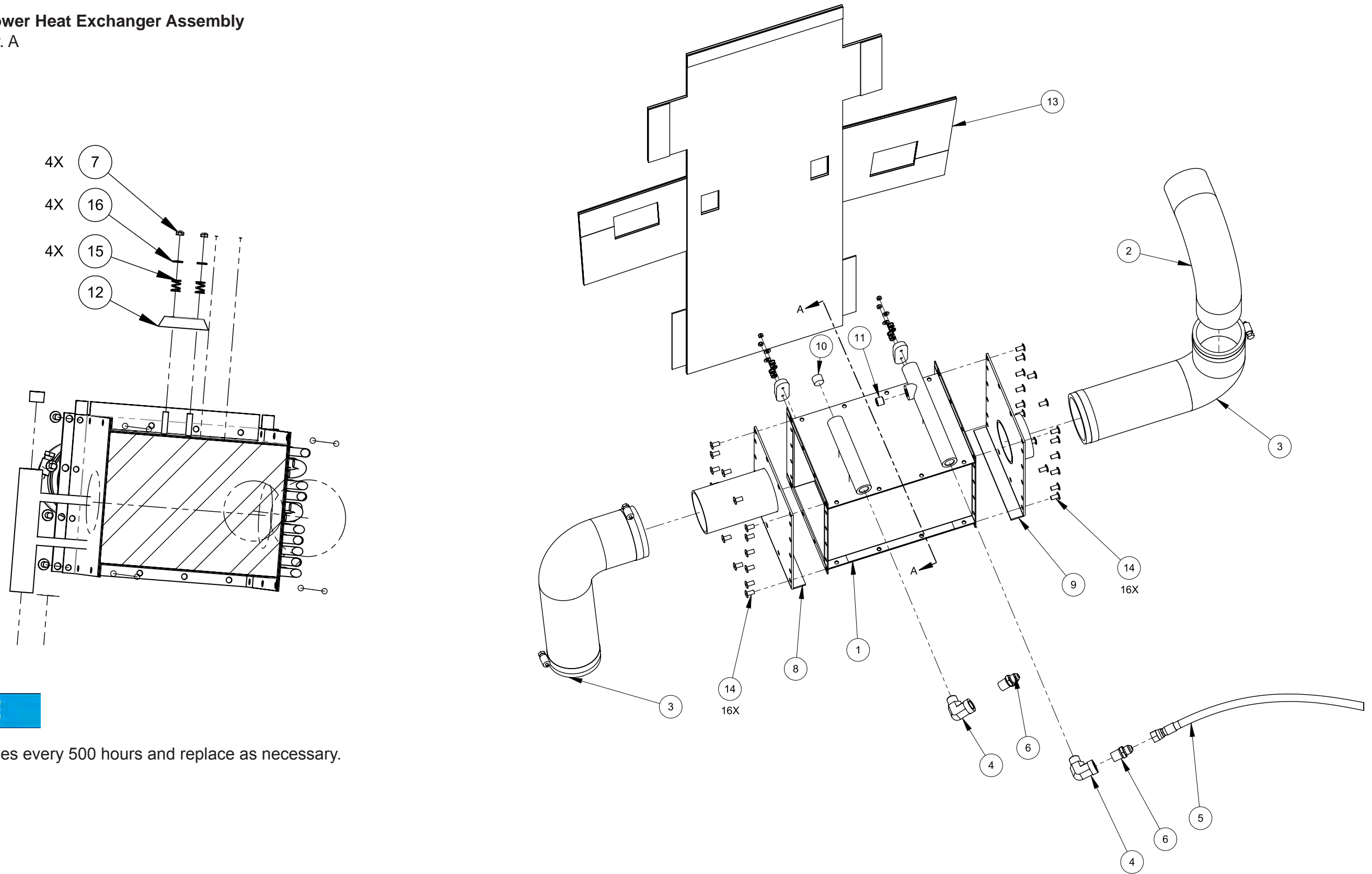


Coolant Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	601-021-751	Assembly, Cross Flex Kit	1
2	000-015-745	Bracket, After Burner Mounting Saddle - Fabricated	1
3	000-015-971	Bracket, Coolant Heat Exchanger - Uncoated	1
4	000-033-057	Clamp, 1" Cushion Loop	2
5	000-033-123	Clamp, After Burner Mount - 21.125" Lg.	1
6	000-052-589	Elbow, 3/4" NPT X 3/4" Barb	1
7	000-052-733	Fitting, 3/4" NPT Street Elbow - Modified	1
8	000-038-067	Heat Exchanger, Coolant - Weldment	1
9	000-068-340	Hose Assembly, 3/4" I.D. Green Stripe X 18" Lg	2
10	000-052-602	Insert, #1212 Brass	1
11	000-052-507	Nipple, 3/8" NPT X 9/16"-18 37 Degree JIC S/S	2

Item	Part Number	Description	Qty
12	000-094-009	Nut, 1/4"-20UNC Nylock	4
13	000-094-038	Nut, 5/16"-18UNC Nylock	1
14	000-108-102	Protector, Coolant Heat Exchanger	1
15	000-108-131	Protector, Heat Exchanger Pad Ø6.625	1
16	000-141-033	Rod, Heat Exchanger Strap Retainer - Fabricated	2
17	000-143-001	Screw, 1/4"-20UNC X 0.75" Lg. Hex Head	4
18	000-143-316	Screw, 5/16"-18UNC X 2.00" Lg. Hex Head	1
19	000-169-205	Valve, Petcock 90 Degree	1
20	000-174-002	Washer, 1/4" Flat	4
21	000-174-049	Washer, 5/16" Flat	2

Figure 8-17. Blower Heat Exchanger Assembly
601-005-751 Rev. A



NOTICE

* Check anodes every 500 hours and replace as necessary.

Blower Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-038-071	Core, S/S Heat Exchanger 6 X 8 (8 Row)	1
2	000-052-649	Elbow, 3.00" O.D. X 0.065 Wall	1
3	000-052-674	Elbow, 3" Rubber w/Clamps	2
4	000-052-747	Elbow, 3/8 S/S Street 90	2
5	000-068-328	Hose, 5/16" X 68" Lg. -	
		Blower Heat Exchanger to Coolant Heat Exchanger	1
6	000-052-507	Nipple, 3/8" NPT X 9/16"-18 37 Degree JIC S/S	2
7	000-094-059	Nut, #8-32UNC Nylock	4
8	000-100-154	Panel, Blower Inlet - Weldment	1

Item	Part Number	Description	Qty
9	000-100-155	Panel, Blower Outlet - Weldment	1
10	000-106-173	Plug, 3/8" NPT Allen Head	1
11	000-106-124	Plug, Pipe, 1/4", Flush Fitting	1
12	000-108-022	Protector, Magnesium Anode *	2
13	000-108-140	Protector, Blower Insulation Set	1
14	000-140-021	Rivet, 1/4" Blind X 0.50" Lg.	32
15	000-155-003	Spring, Solution Valve	4
16	000-174-001	Washer, #10 Flat	4

NOTICE

* Check anodes every 500 hours and replace as necessary.

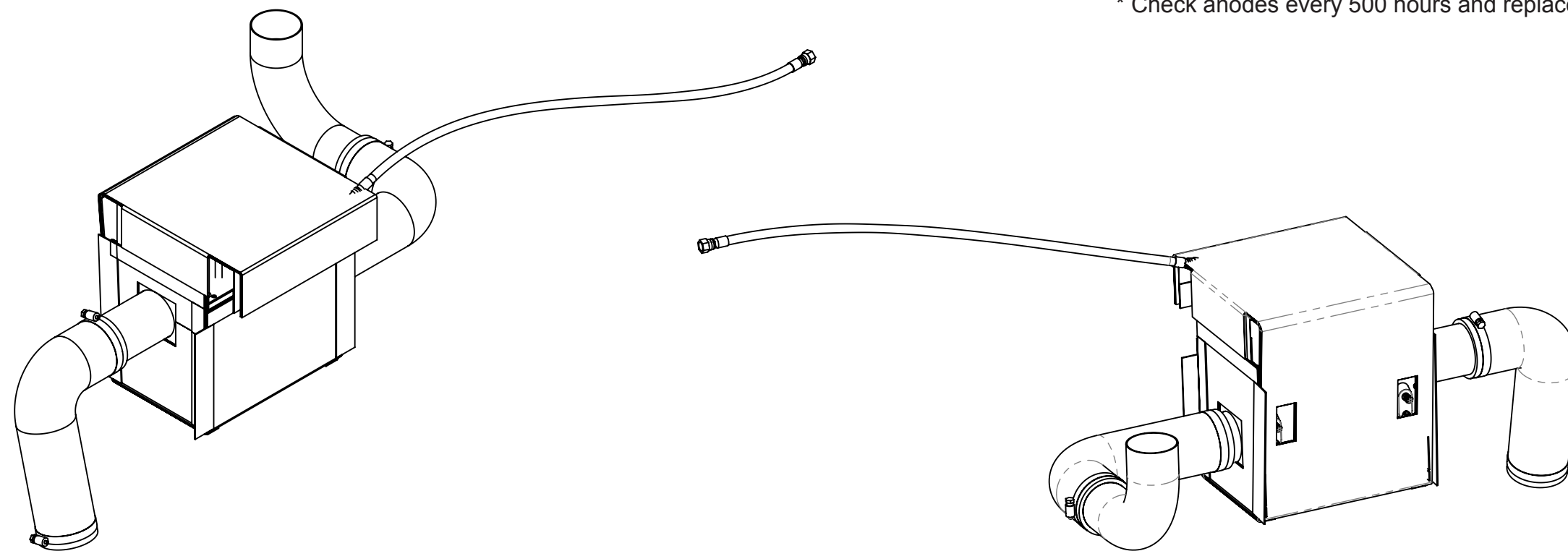
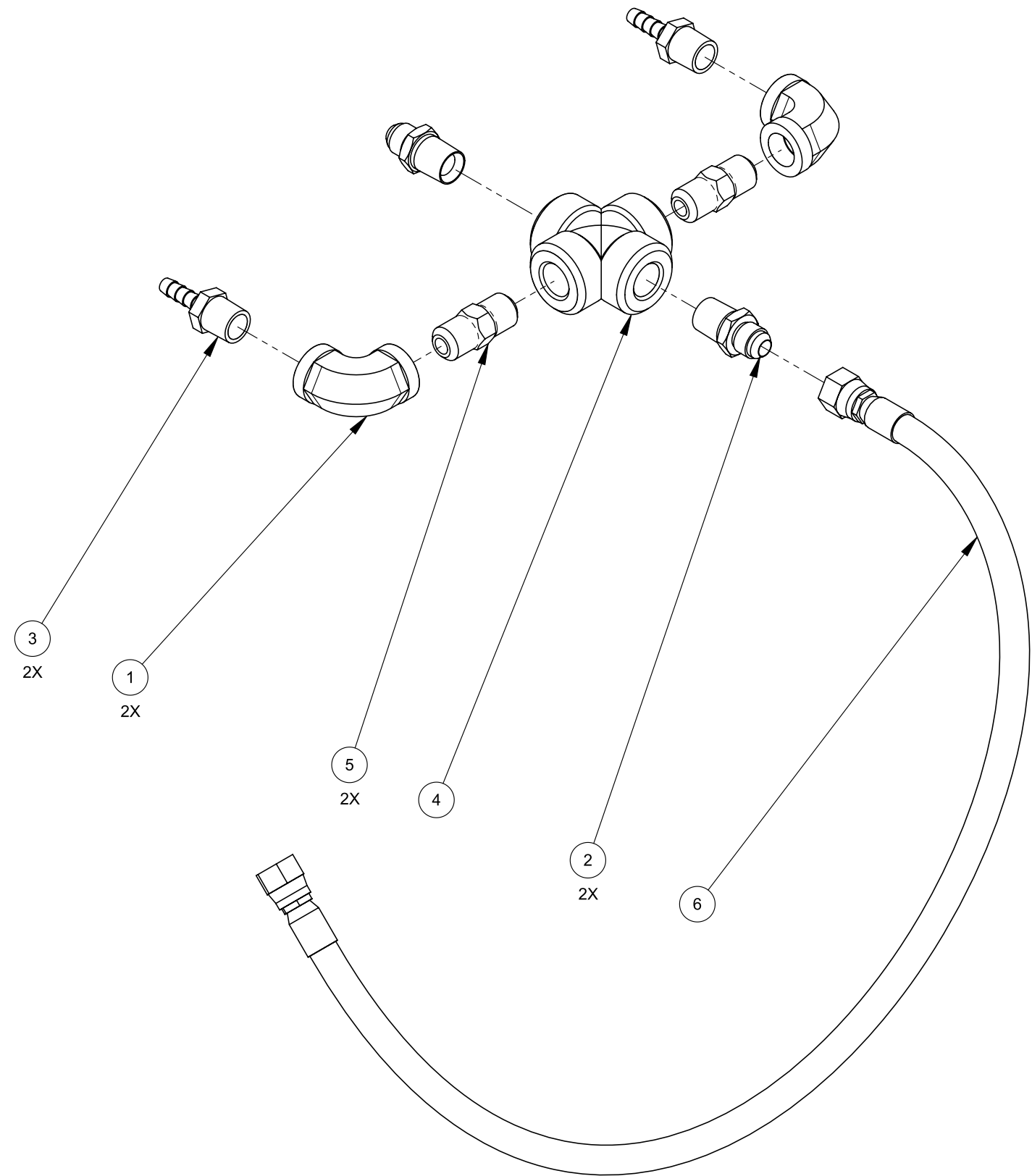
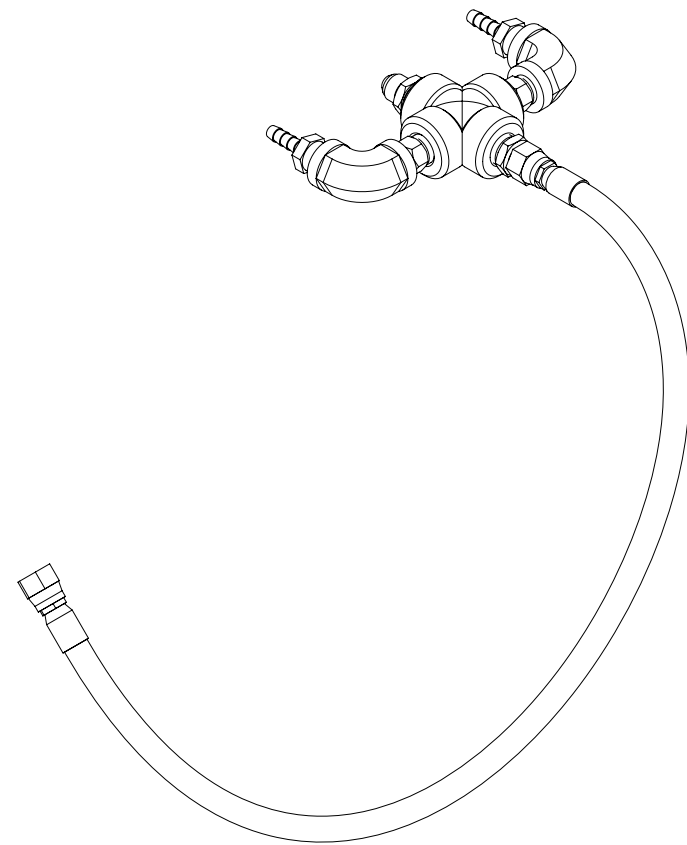


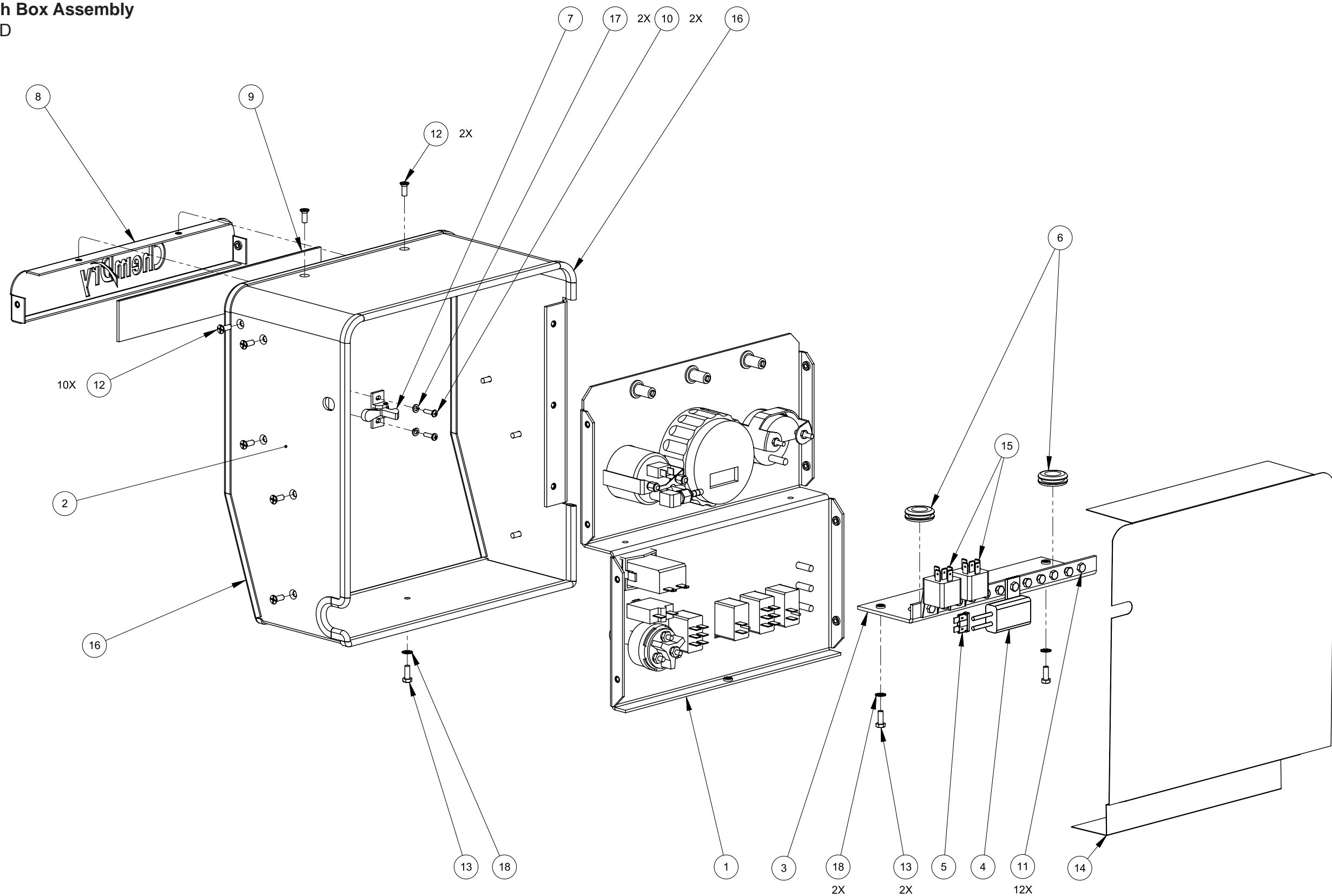
Figure 8-18. Cross Kit Assembly
601-021-751 Rev. B



Cross Kit Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-188	Elbow, 3/8" S/S Female	2
2	000-052-507	Nipple, 3/8" NPT X 9/16"-18 37 Degree JIC S/S	2
3	000-052-749	Insert, #64 (3/8" NPT X 1/4" Barb) S/S	2
4	000-052-924	Cross, 3/8" FPT S/S	1
5	000-169-589	Valve, 3/8" Hi-PSI S/S - Check	2
6	000-068-621	Hose Assembly, 5/16" I.D. X 35" Lg. - Coolant Heat Exchanger to Hi-PSI	1

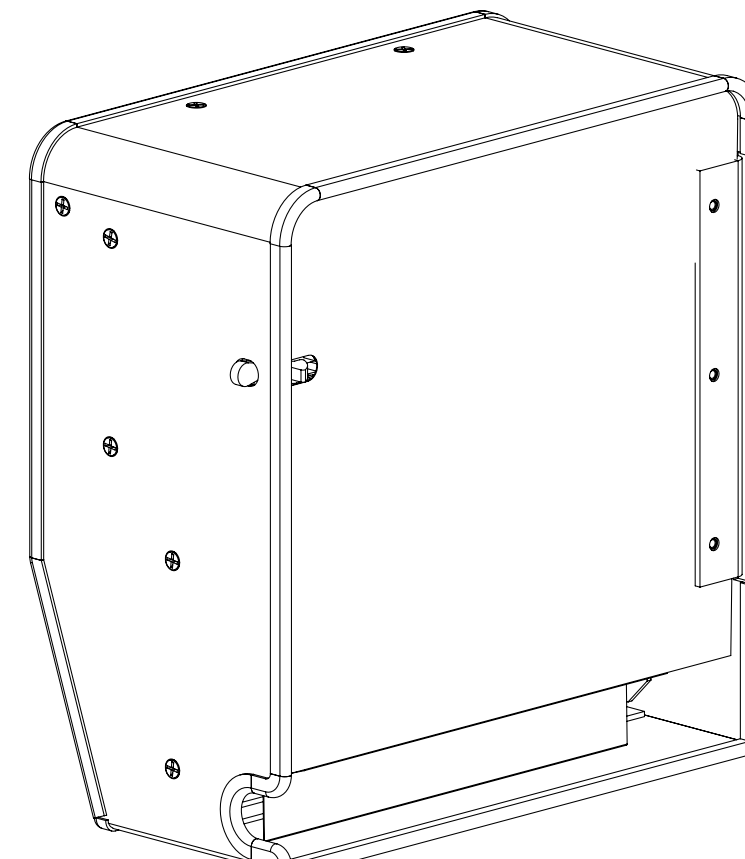
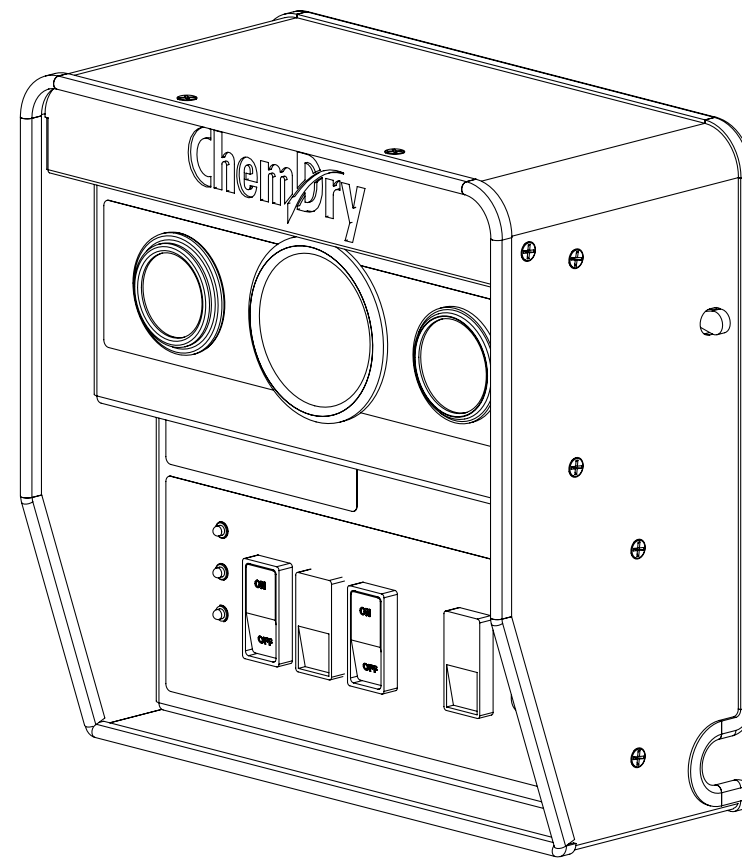
Figure 8-19. Dash Box Assembly
601-018-750 Rev. D



Dash Box Assembly Parts List

Item	Part Number	Description	Qty
1	601-020-750	Assembly, Dash Panel	1
2	000-013-025	Box, Dash - Coated	1
3	000-015-183	Bracket, Grounding Bus - Fabricated	1
4	000-056-006	Fuse Holder, In-Line - Weatherproof	1
5	000-056-003	Fuse, 15 Amp Plug In	1
6	000-060-002	Grommet, Large Wiring	2
7	000-086-104	Latch, Dash Securing	1
8	000-105-707	Plate, Dash Name - Coated	1
9	000-084-016	Reflector, 1.625" X 11"	1

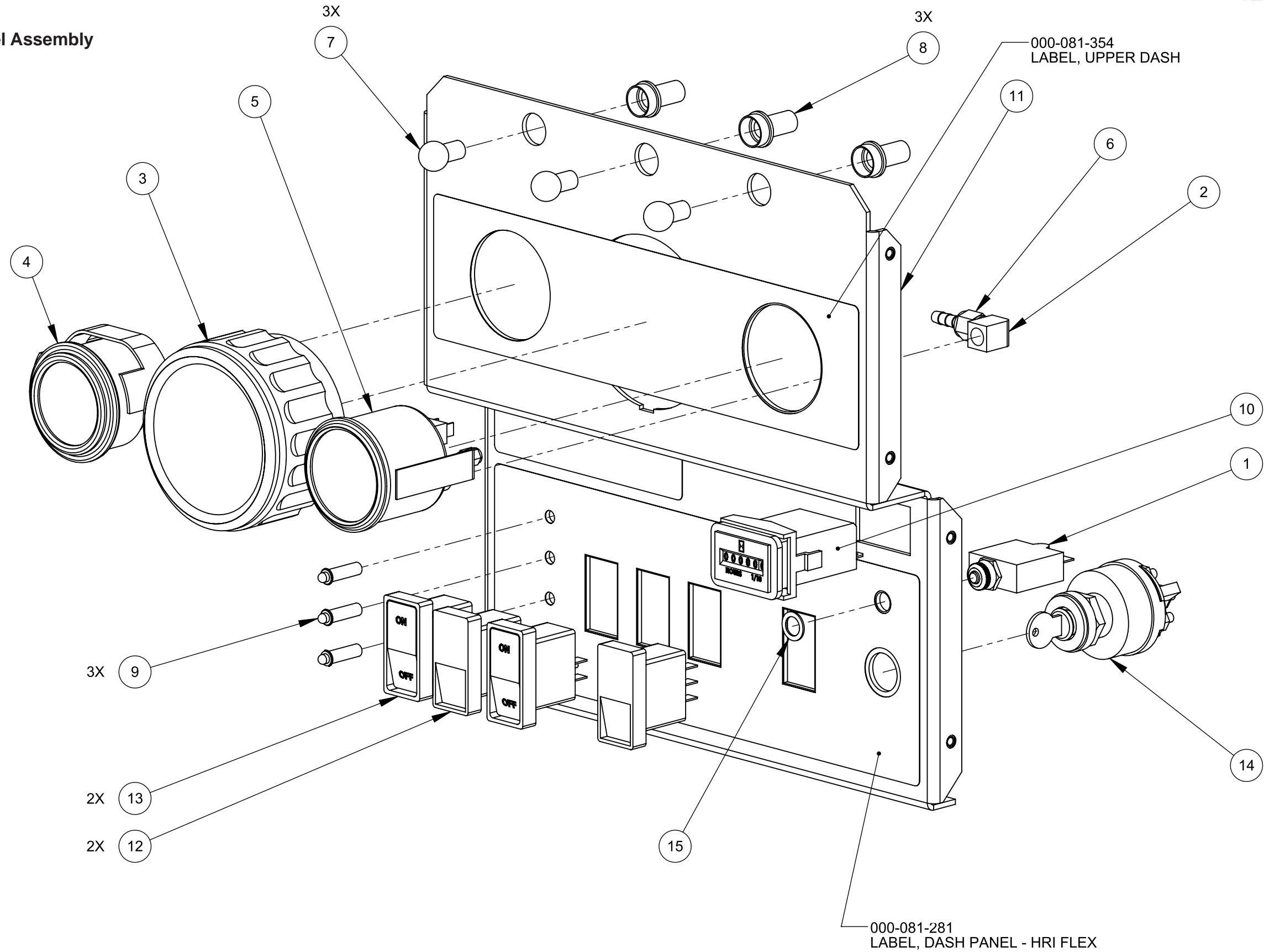
Item	Part Number	Description	Qty
10	000-143-046	Screw, #6-32 X .500" Lg. PHP	2
11	000-143-166	Screw, #10-24UNC X 0.375" Lg. Hex Head	12
12	000-143-114	Screw, #10-24UNC X 0.50" Lg. Flat Head Phillips	12
13	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	3
14	000-108-013	Shield, Drip - Dash	1
15	000-157-022	Switch, Relay	2
16	000-131-027	Trimlok, 1/8" I.D. X 3/8"	9 ft
17	000-174-043	Washer, #6 Lock	2
18	000-174-015	Washer, #10 Outside Star	3



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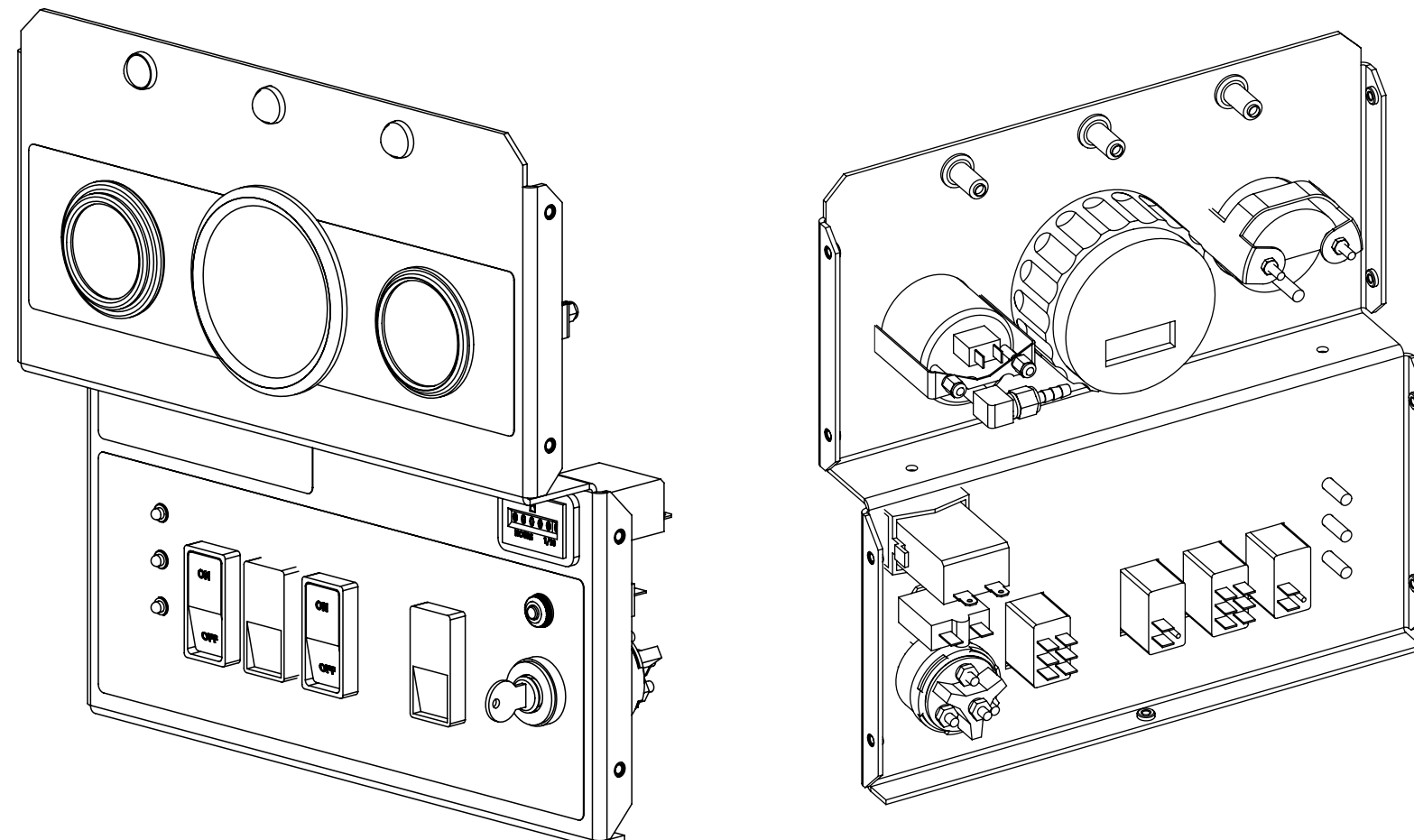
Figure 8-20. Dash Panel Assembly
601-020-750 Rev. C



Dash Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-018-004	Breaker, 25 Amp Circuit	1
2	000-052-084	Elbow, 1/8" NPT Street	1
3	000-074-034	Gauge, Tach. Mag Pick Up 3-3/8" Dia	1
4	000-074-016	Gauge, Temperature	1
5	000-074-006	Gauge, Vacuum	1
6	000-052-096	Insert, #F23 (1/8" FPT X 3/16" Barb)	1
7	000-084-004	Lamp, Replacement Gauge	3
8	000-084-009	Lamp, Socket - Dashboard	3

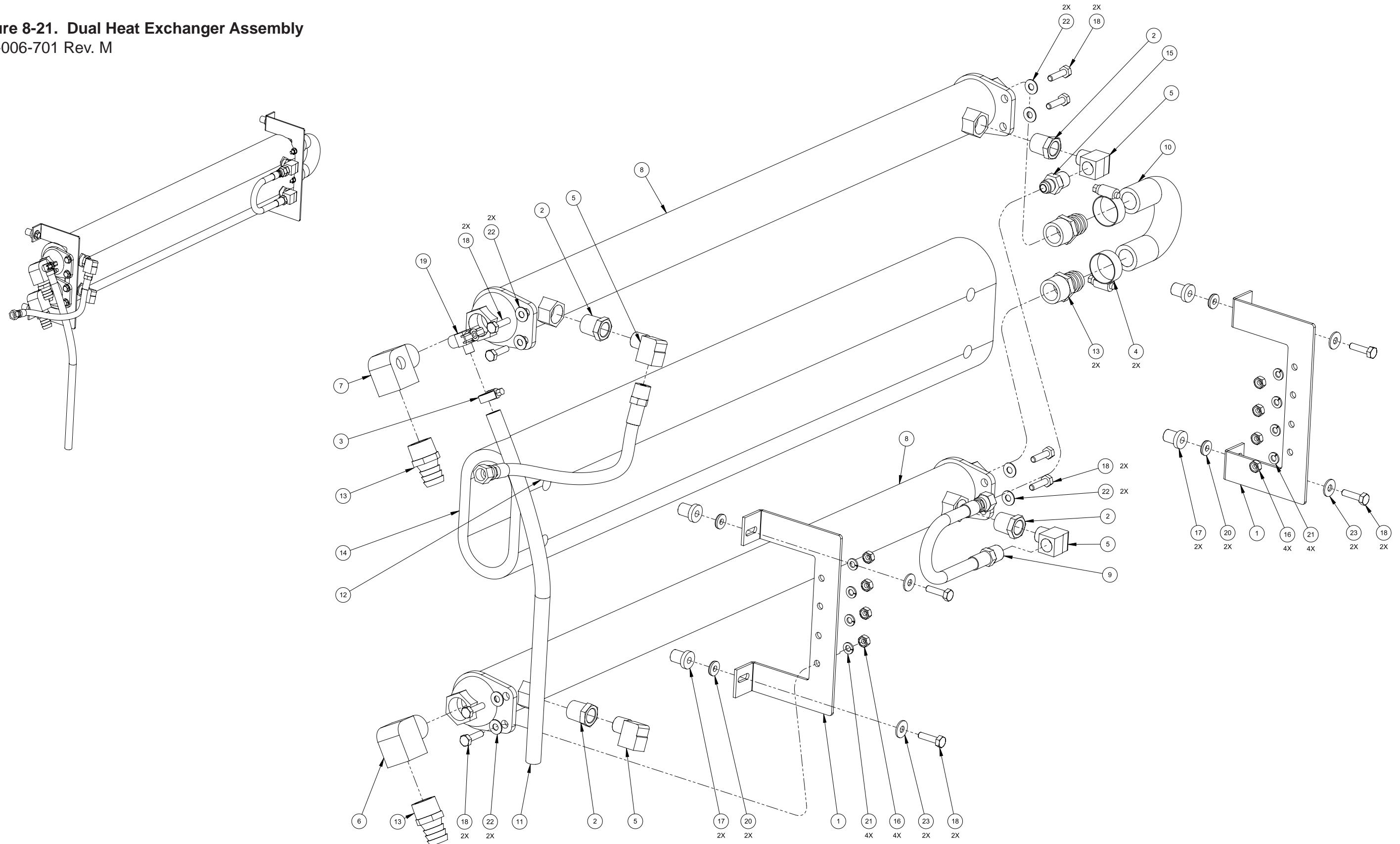
Item	Part Number	Description	Qty
9	000-084-011	Light, Red LED Indicator Mini	3
10	000-074-170	Meter, Rectangular w/o Bezel	1
11	000-100-071	Panel, Dash - Coated	1
12	000-157-131	Switch, Pump Selection/CDS Speed Control	2
13	000-157-040	Switch, 20 Amp Rocker	2
14	000-157-008	Switch, Ignition	1
15	000-174-052	Washer, 3/8" Flat	1



CTS 4.8 FLEX



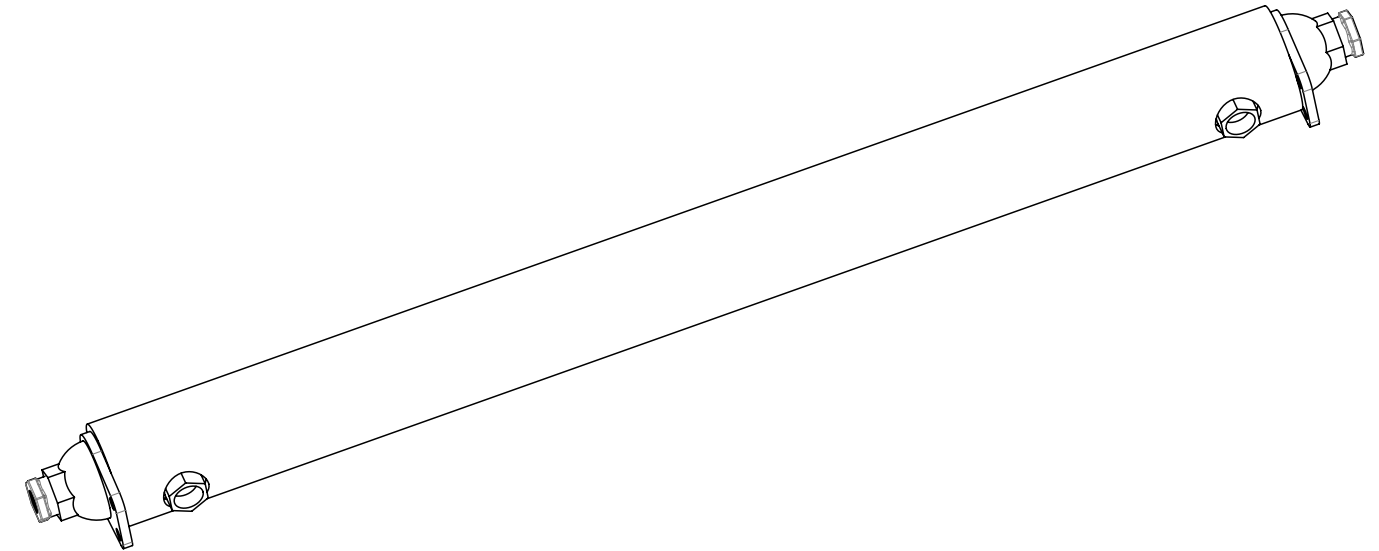
Figure 8-21. Dual Heat Exchanger Assembly
601-006-701 Rev. M



Dual Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-1159	Bracket, Heat Exchanger Mounting - Coated	2
2	000-052-064	Bushing, 1/2 M X 3/8 F	4
3	000-033-003	Clamp, Size #4 Mini Hose	1
4	000-033-029	Clamp, Size #12 Hose	2
5	000-052-086	Elbow, 3/8" NPT Street	4
6	000-052-340	Elbow, 3/4" NPT Street	1
7	000-052-733	Fitting, 3/4" NPT Street Elbow - Modified	1
8	000-038-046	Heat Exchanger, Water to Water Hi-PSI	2
9	000-068-070	Hose, 3/8" X 12" Lg. w/ JIC Ends	1
10	000-068-066	Hose, 3/4" I.D.w/ 180~ Bend for Heat Exchanger	1
11	000-068-091	Hose, 3/8" I.D. Clear - Bulk	1
12	000-068-196	Hose, 3/8" I.D. X 11" Lg w/ 3/8" MPT and 3/8" JIC End	1
13	000-052-602	Insert, #1212 Brass	4
14	000-131-042	Insulation, 4-1/8" X 1/2"	1
15	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	1
16	000-094-010	Nut, 1/4"-20UNC Hex	8
17	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
18	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	12
19	000-169-205	Valve, Petcock 90 Degree	1
20	000-174-060	Washer, 1/4" Rubber Backed	4
21	000-174-019	Washer, 1/4" Lock	8
22	000-174-003	Washer, 1/4" Flat	8
23	000-174-002	Washer, 1/4" Flat	4

Figure 8-22. CDS Heat Exchanger Core Assembly - Product Support
000-038-015 Rev. B



NOTICE

Order two P/N 000-038-015 when replacing original P/N 000-038-046 and P/N 000-131-042.

NOTICE

* Use P/N 000-038-015 for Product Support (see Figure 8-22).

**CTS 4.8
FLEX**



Figure 8-23. Instrument Panel Assembly - View 1 of 2
601-019-701 Rev. G

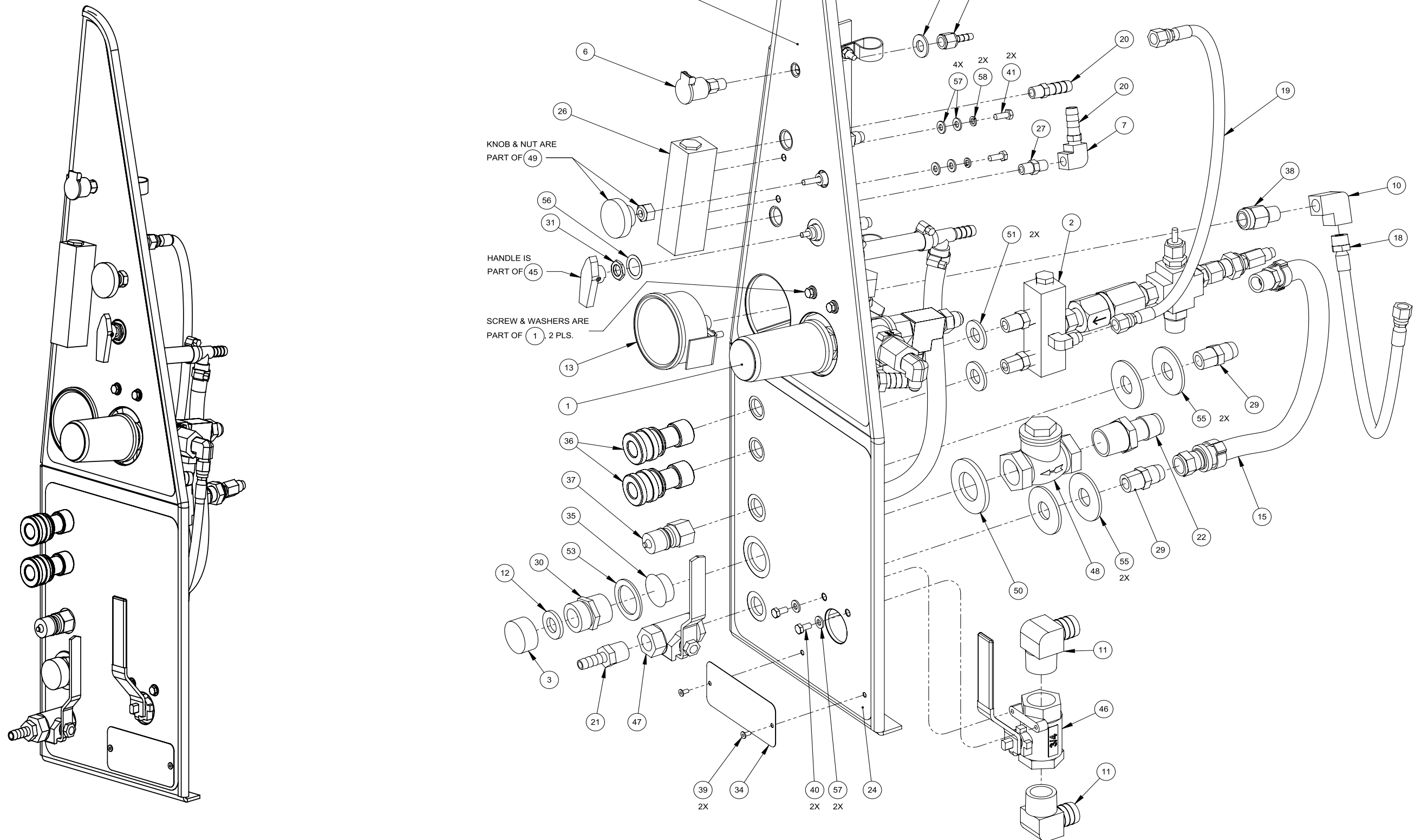


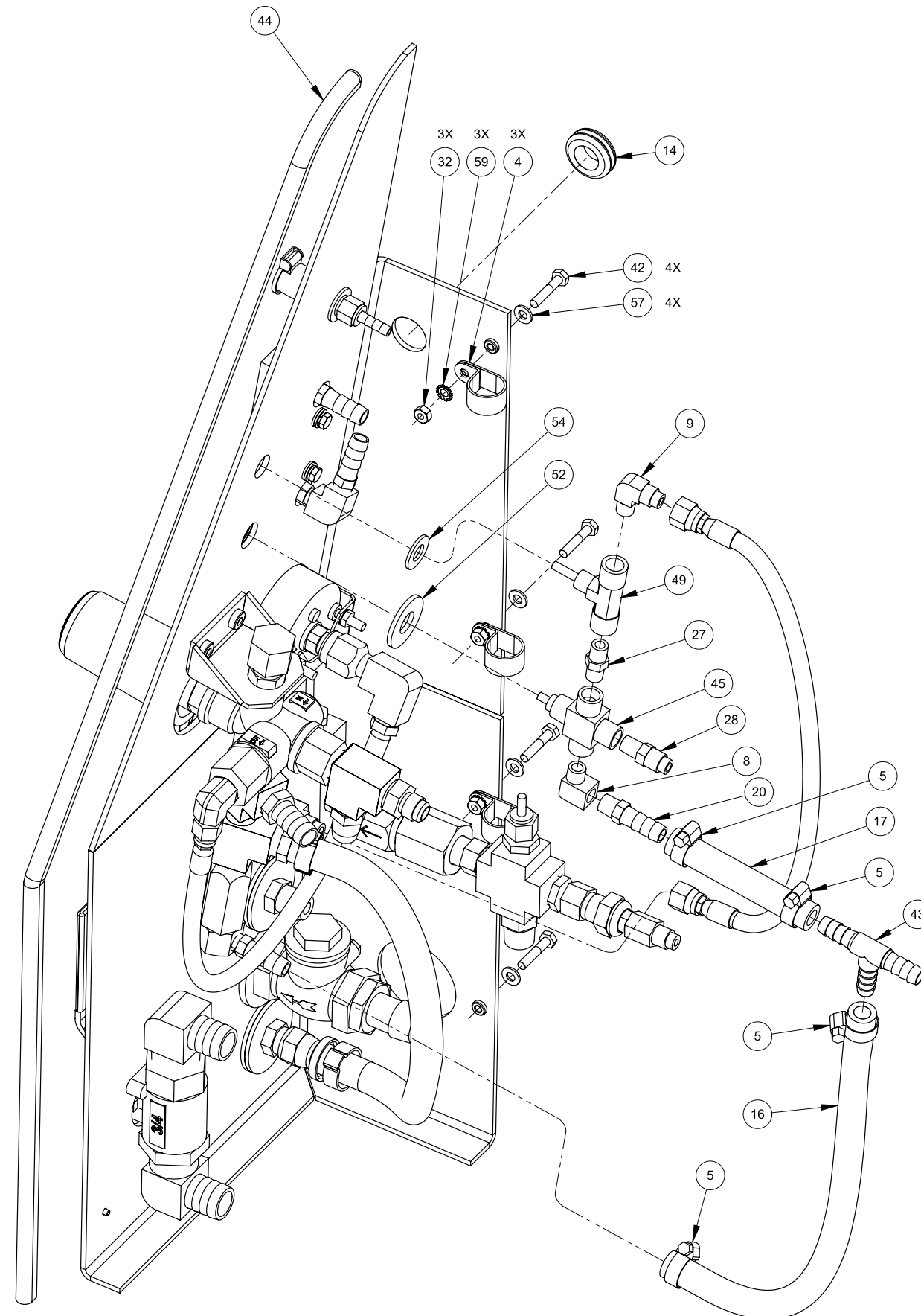
Figure 8-24. Instrument Panel Assembly - View 2 of 2
601-019-701 Rev. G

NOTICE

Apply hydraulic sealant to all pipe threads.

All these items - 3, 12, 22, 30, 48 and 50 - replace item 35 when the APO, P/N 000-079-097, is installed.

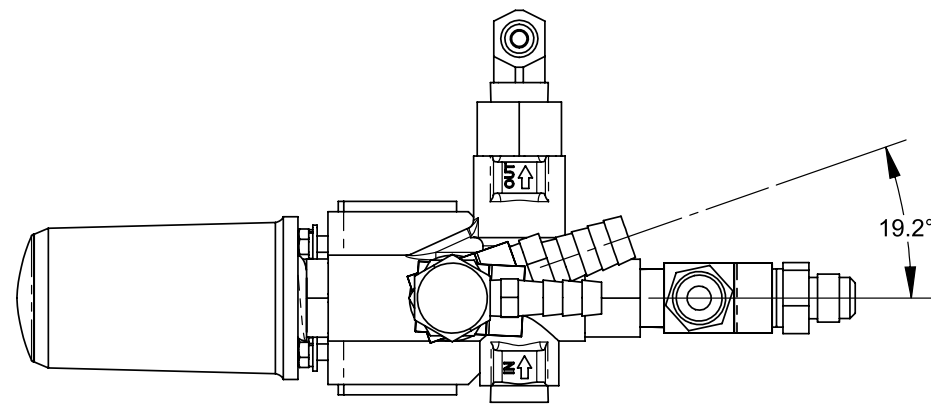
Items 24 and 25 are part of label set P/N 000-081-252.



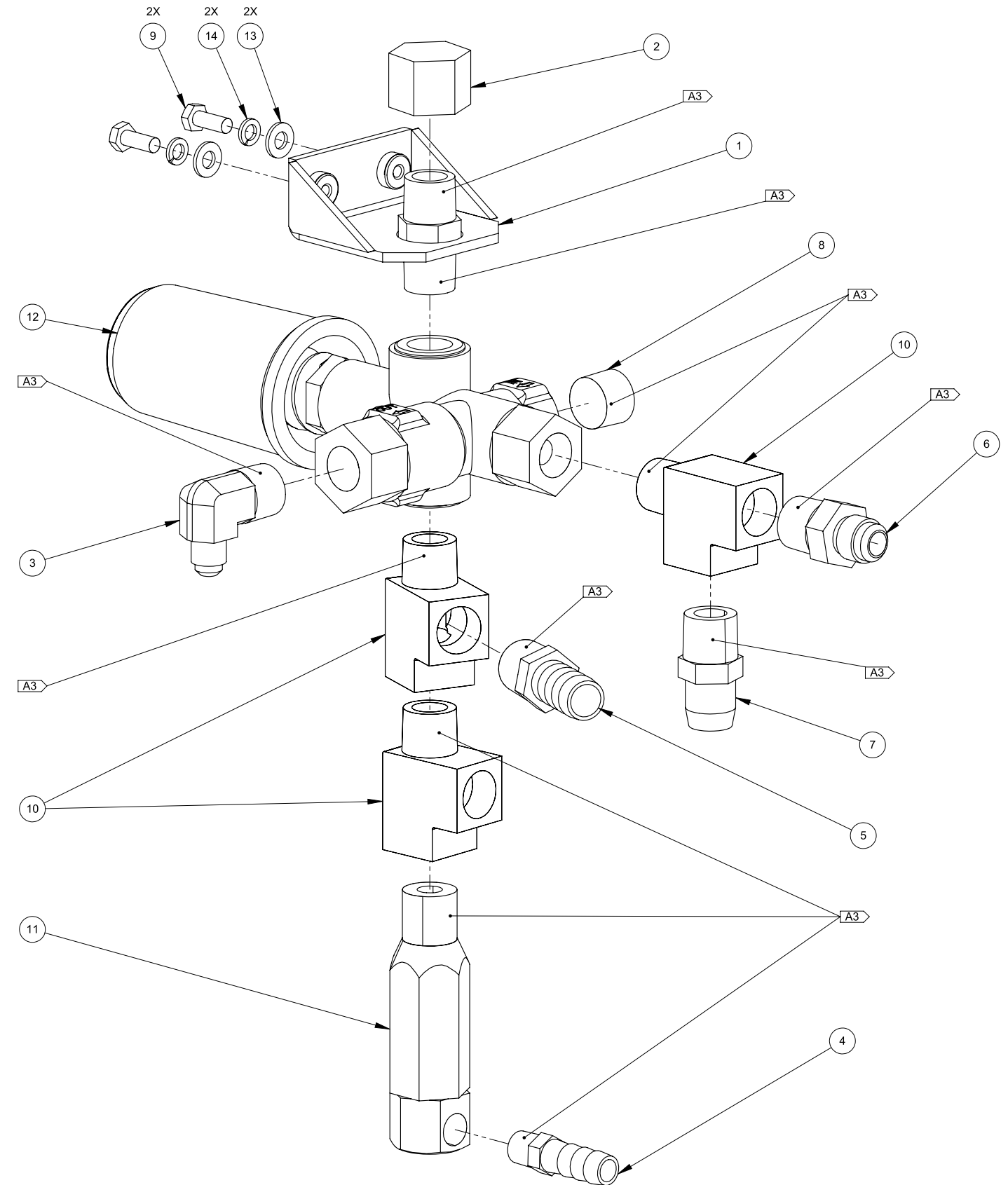
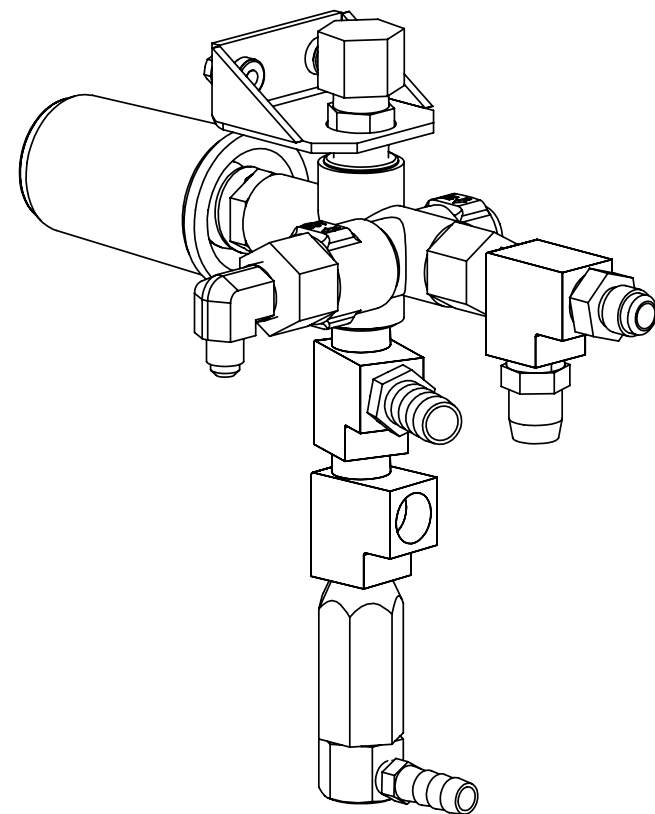
Instrument Panel Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	601-009-701	Assembly, By-Pass Valve	1	31	000-094-098	Nut, 7/16"-24UNF - 2 Way Metering Valve	1
2	601-008-701	Assembly, Hi-PSI Manifold	1	32	000-094-004	Nut, #10-24UNC Hex	3
3	000-027-014	Cap, Garden Hose	1	33	000-100-168	Panel, Instrument - Coated	1
4	000-033-023	Clamp, 3/4" Nylon Hose	3	34	000-105-012	Plate, Machine Serial I.D.	1
5	000-033-005	Clamp, Size #5 Hose	4	35	000-106-029	Plug, 1" Hole	1
6	000-052-272	Cup, Gravity Feed Oil Blower Lube Port	1	36	000-052-051	Quick Connect, 440 Female w/ EPDM O-Ring	2
7	000-052-089	Elbow, 1/8" NPT Female	1	37	000-052-052	Quick Connect, 660 3/8" Brass w/ EPDM O-Ring	1
8	000-052-084	Elbow, 1/8" NPT Street	1	38	000-135-052	Regulator, Hi-PSI Snubber	1
9	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1	39	000-140-015	Rivet, 1/8" X 1/4" Lg. Pop	2
10	000-052-088	Elbow, 1/4" FPT X FPT	1	40	000-143-166	Screw, #10-24UNC X 0.375" Lg. Hex Head	2
11	000-052-589	Elbow, 3/4" NPT X 3/4" Barb	2	41	000-143-327	Screw, #10-32UNF X 0.50" Lg. Hex Head	2
12	000-057-055	Gasket, Garden Hose	1	42	000-143-134	Screw, #10-24UNC X 1" Lg. Hex Head S/S	4
13	000-074-007	Gauge, Pressure 0 -1,500 psi	1	43	000-052-022	Tee, 3/8" Insert	1
14	000-060-002	Grommet, Large Wiring	1	44	000-131-027	Trimlok, 1/8" X 3/16" Lg.	1
15	000-068-757	Hose, 1/2" X 20.5" Lg. Rubber w/ 3/8" NPT X 3/8" S	1	45	000-169-017	Valve, 3-Way Ball O-Ring Style	1
16	000-068-017	Hose, 3/8" Bulk	1	46	000-169-201	Valve, 3/4" Heater Panel Mount	1
17	000-068-017	Hose, 3/8" Bulk	1	47	000-169-064	Valve, 3/8" NPT Full Port Ball	1
18	000-068-491	Hose, 3/16" X 10" Lg. 1/4" NPT X 1/4" JIC F	1	48	000-169-009	Valve, 3/4" FPT Swing Check	1
19	000-068-518	Hose, 3/16" X 18.25" Lg. w/F JIC Ends	1	49	000-169-160	Valve, Chemical Metering	1
20	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	3	50	000-174-050	Washer, 1" Flat	1
21	000-052-104	Insert, #66 (3/8" NPT X 3/8" Barb)	1	51	000-174-012	Washer, 1/2 SAE H/D	2
22	000-052-338	Insert, #1212 (3/4" NPT X 3/4" Barb)	1	52	000-174-007	Washer, 1/2" Flat	1
23	000-052-096	Insert, #F23 (1/8" FPT X 3/16" Barb)	1	53	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	1
24	000-081-376	Label, Lower Instrument Panel	1	54	000-174-005	Washer, 3/8" Flat	2
25	000-081-375	Label, Upper Instrument Panel	1	55	000-174-008	Washer, 5/8" Flat	4
26	000-074-030	Meter, Chemical Flow Raw	1	56	000-174-030	Washer, 5/8" I.D. X 7/8" O.D. X 0.010" Thk	1
27	000-052-069	Nipple, 1/8" NPT Hex	2	57	000-174-001	Washer, #10 Flat	10
28	000-052-530	Nipple, 1/4" SAE X 1/8" NPT	1	58	000-174-014	Washer, #10 Lock	2
29	000-052-128	Nipple, 3/8" MPT X 3/8" SAE Flare	2	59	000-174-015	Washer, #10 Outside Star	3
30	000-052-281	Nipple, 3/4" NPT X 3/4" Male Garden Hose	1				

Figure 8-25. By-Pass Valve Assembly
601-009-701 Rev. C



BOTTOM VIEW



NOTICE

See Figure 8-1 for adhesive/sealant information.

By-Pass Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-515	Bracket, By-Pass Valve Mount - Weldment	1
2	000-027-008	Cap, 3/8" Brass Pipe	1
3	000-052-764	Elbow, 1/4" SAE X 3/8" MPT X 90 Degrees	1
4	000-052-099	Insert, #26 (1/8" NPT X 3/8" Barb)	1
5	000-052-105	Insert, #68 (3/8" NPT X 1/2" Barb)	1
6	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	1
7	000-052-128	Nipple, 3/8" MPT X 3/8" SAE Flare	1

Item	Part Number	Description	Qty
8	000-106-008	Plug, 3/8" NPT Allen Head	1
9	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	2
10	000-052-023	Tee, 3/8" NPT Male Street	3
11	000-169-027	Valve, 165 Degrees F Thermal	1
12	000-169-351	Valve, Pressure Regulator-Modified *	1
13	000-174-001	Washer, #10 Flat	2
14	000-174-014	Washer, #10 Lock	2

NOTICE

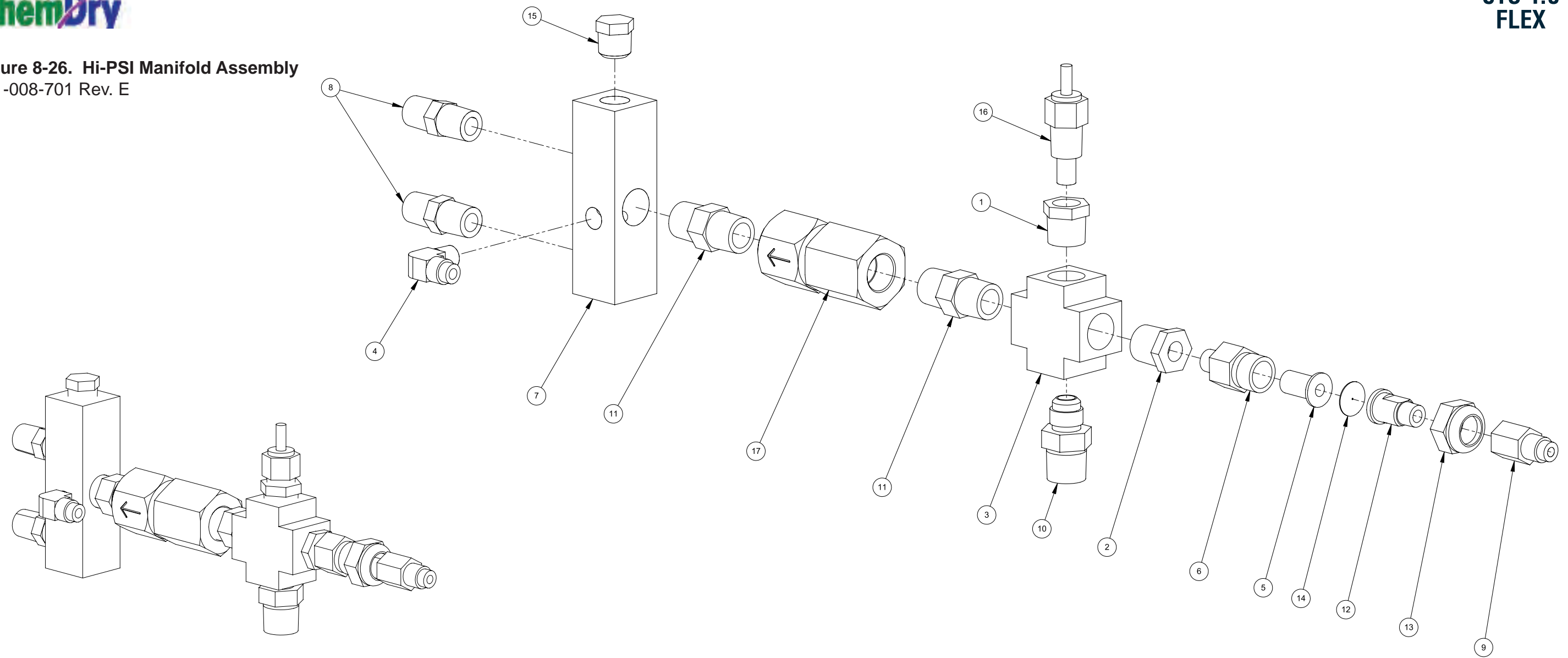
The By-Pass Valve Assembly for the Instrument Panel Assembly is P/N 601-009-701 (see Figure 8-25).

The By-Pass Valve Assembly for the Flex's Quick Connect Box is P/N 601-009-750 (see Figure 8-48).

NOTICE

* Order P/N 000-078-582 for the valve repair kit.

Figure 8-26. Hi-PSI Manifold Assembly
601-008-701 Rev. E

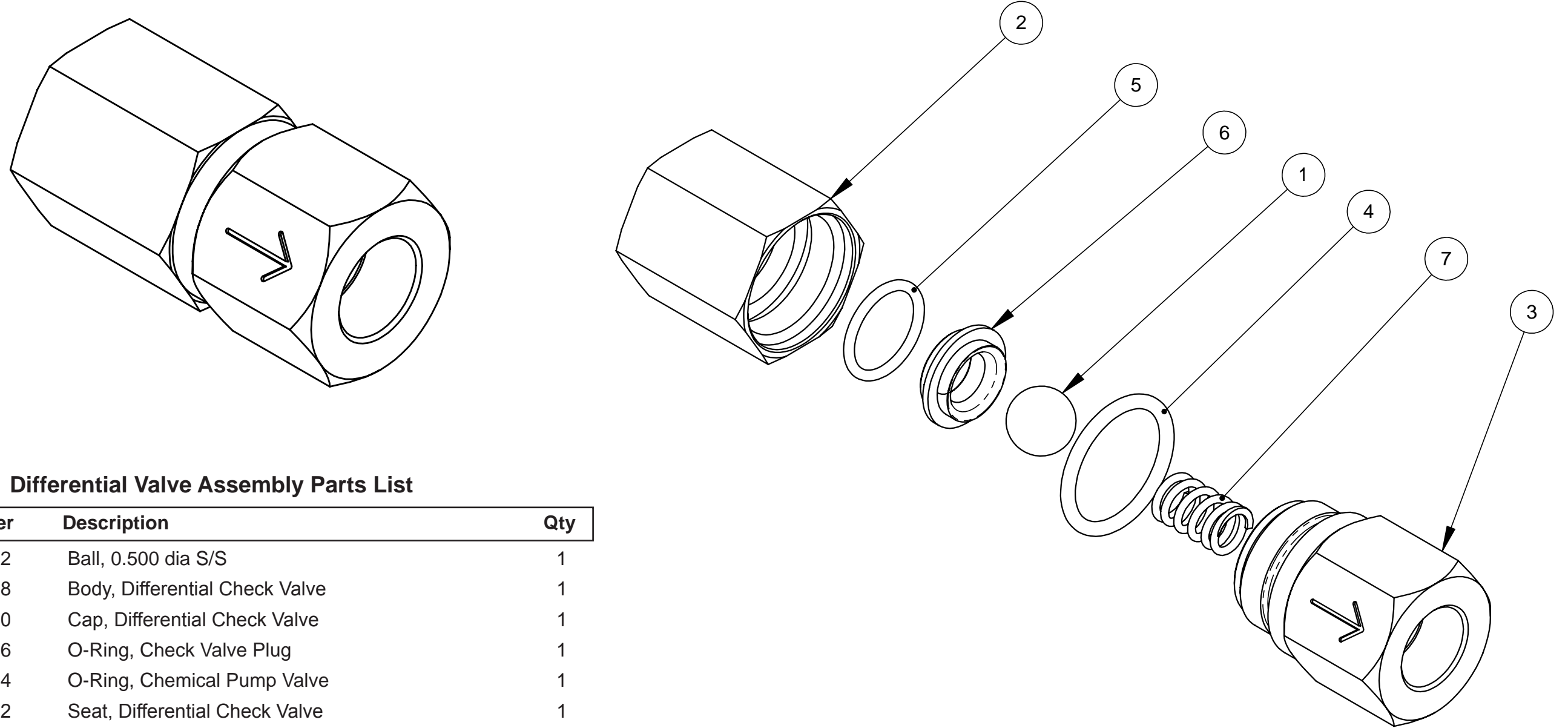


Hi-PSI Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-061	Bushing, 3/8" NPT X 1/4" FPT	1
2	000-052-060	Bushing, 3/8" NPT X 1/8" FPT	1
3	000-052-113	Cross, 3/8" FPT	1
4	000-052-531	Elbow, 1/8" NPT X 1/4" SAE	1
5	000-049-052	Filter Cartridge, 1/4" Brass	1
6	000-052-153	Housing, Stabilizer Nozzle	1
7	000-090-008	Manifold, High Pressure	1
8	000-052-071	Nipple, 1/4" NPT Hex	2
9	000-052-586	Nipple, 1/8" FPT X 1/4" SAE	1

Item	Part Number	Description	Qty
10	000-052-528	Nipple, 3/8" M JIC X 3/8" NPT	1
11	000-052-074	Nipple, 3/8" NPT Hex	2
12	000-052-582	Nipple, Tee Jet Style Collar X 1/8" NPT	1
13	000-094-028	Nut, Brass Jet Assembly	1
14	000-180-009	Orifice, 0.027" Plate	1
15	000-106-002	Plug, 1/4" NPT Hex	1
16	000-149-039	Sender, Temperature	1
17	000-169-236	Valve, Differential	1

Figure 8-27. Differential Valve Assembly
000-169-236 Rev. B



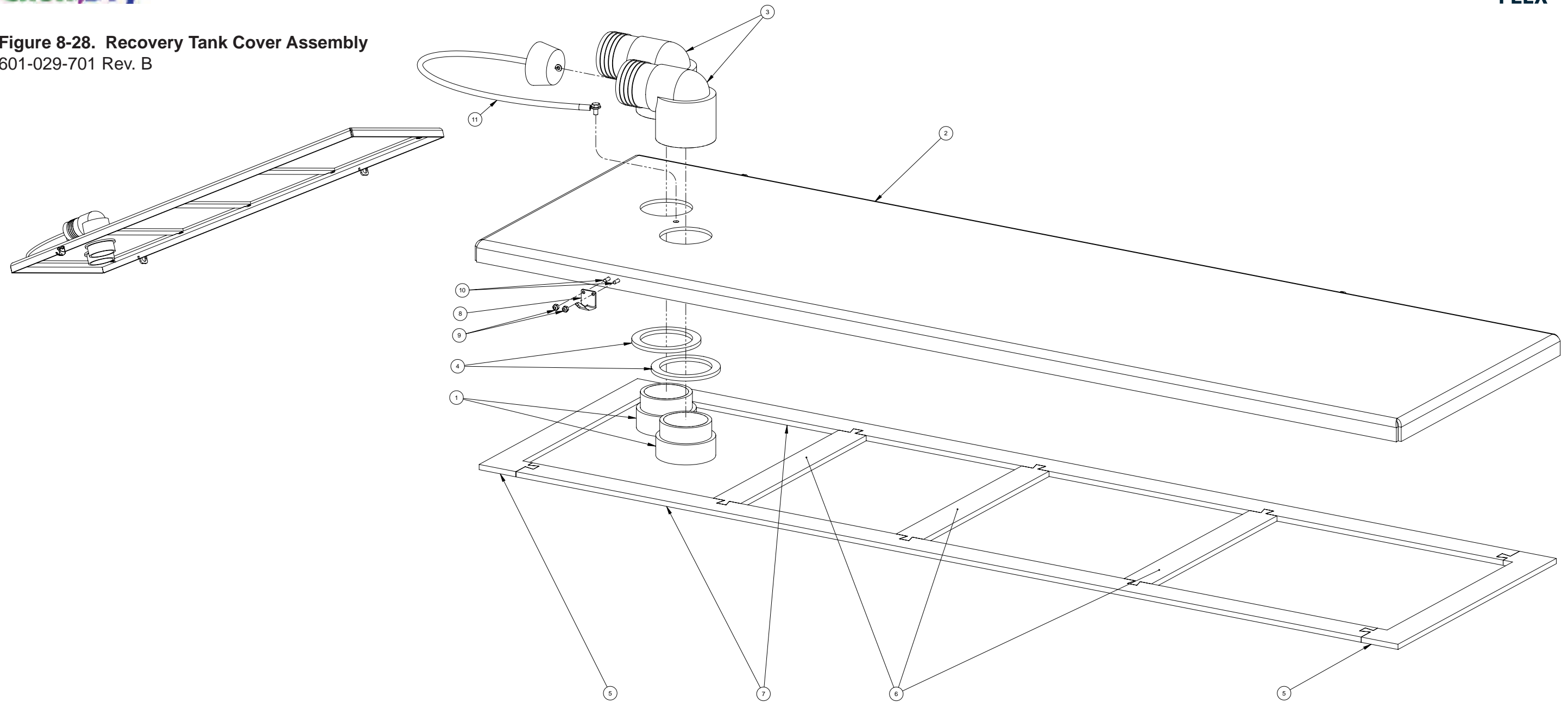
Differential Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-005-012	Ball, 0.500 dia S/S	1
2	000-107-258	Body, Differential Check Valve	1
3	000-106-180	Cap, Differential Check Valve	1
4	000-097-056	O-Ring, Check Valve Plug	1
5	000-097-054	O-Ring, Chemical Pump Valve	1
6	000-148-012	Seat, Differential Check Valve	1
7	000-155-106	Spring, Differential Check Valve	1

NOTICE

Apply O-ring grease or equivalent to items 5 and 4 prior to installation.

Figure 8-28. Recovery Tank Cover Assembly
601-029-701 Rev. B

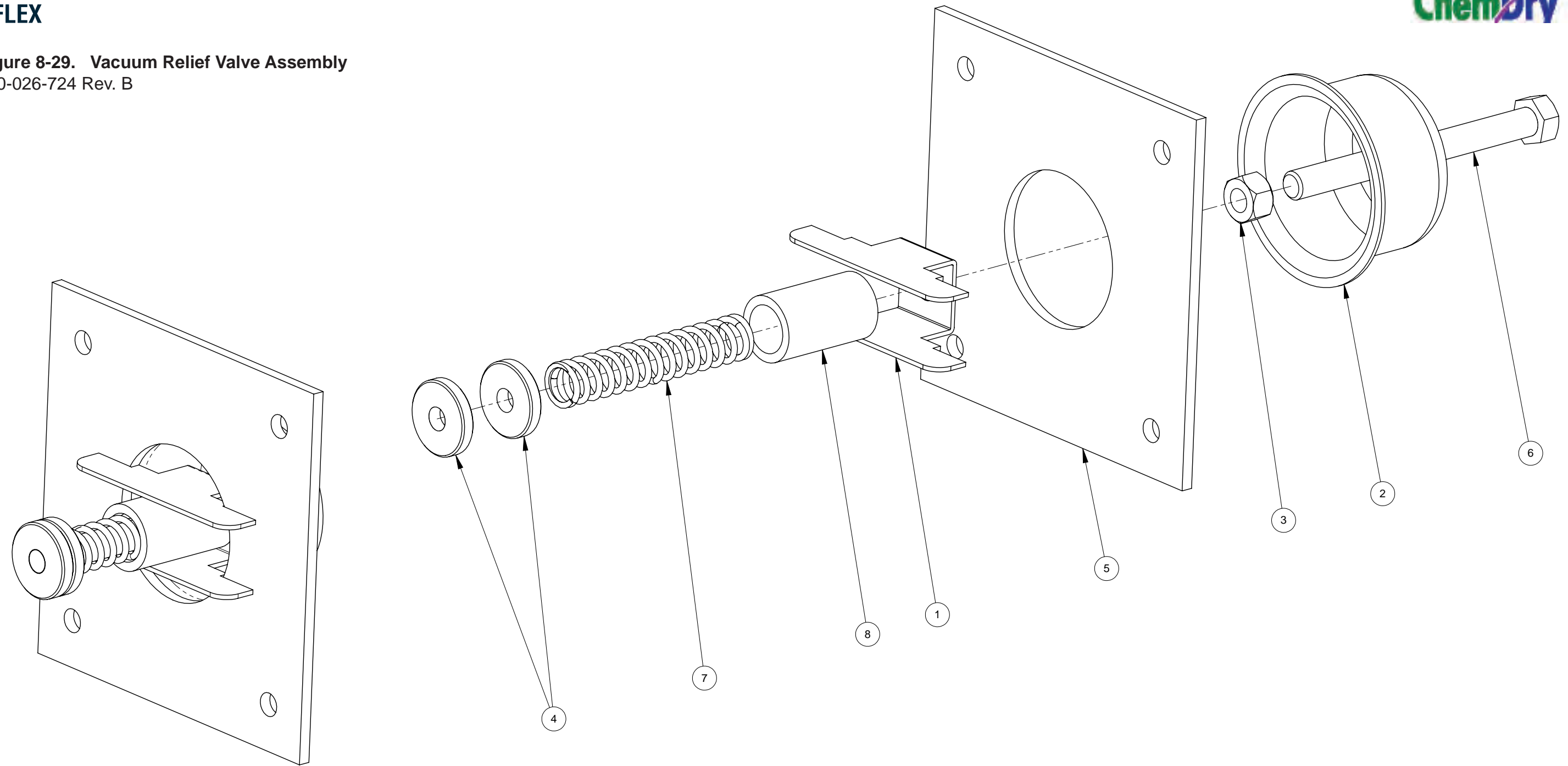


Recovery Tank Cover Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-219	Adapter, 2" NPT X 2" F Slip	2
2	000-041-447	Cover, 100 Gallon Universal Recovery Tank - 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 - URT Cover	2
6	000-057-203	Gasket, Middle - URT Cover	3

Item	Part Number	Description	Qty
7	000-057-205	Gasket, Side - URT 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 8-29. 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"-16UNC 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.HH	1
7	000-155-026	Spring, Vacuum Relief Valve	1
8	000-125-111	Tube, Vacuum Relief Spring Guide	1

Figure 8-30. Water Box Assembly - View 1 of 2
601-010-751 Rev. A

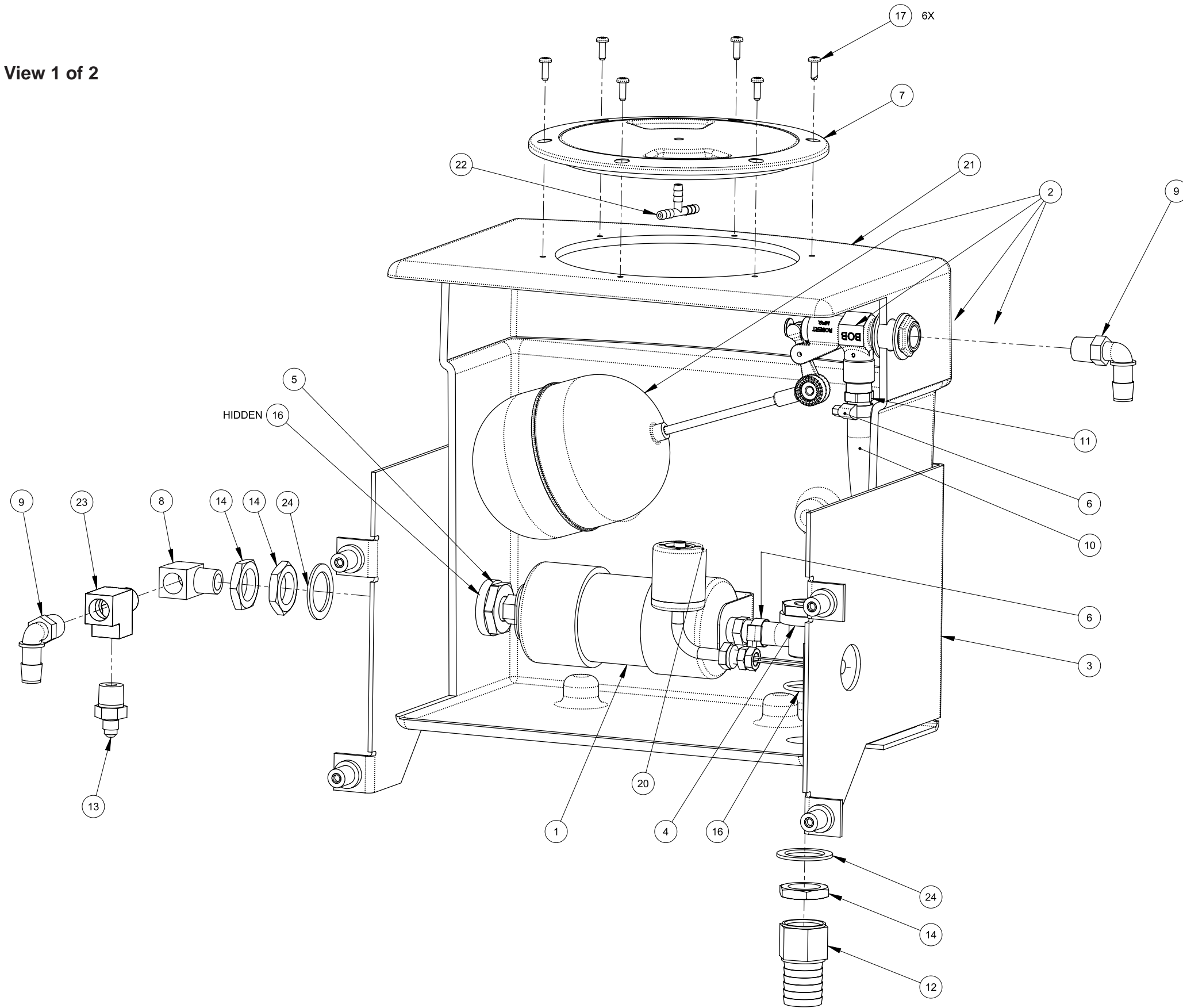
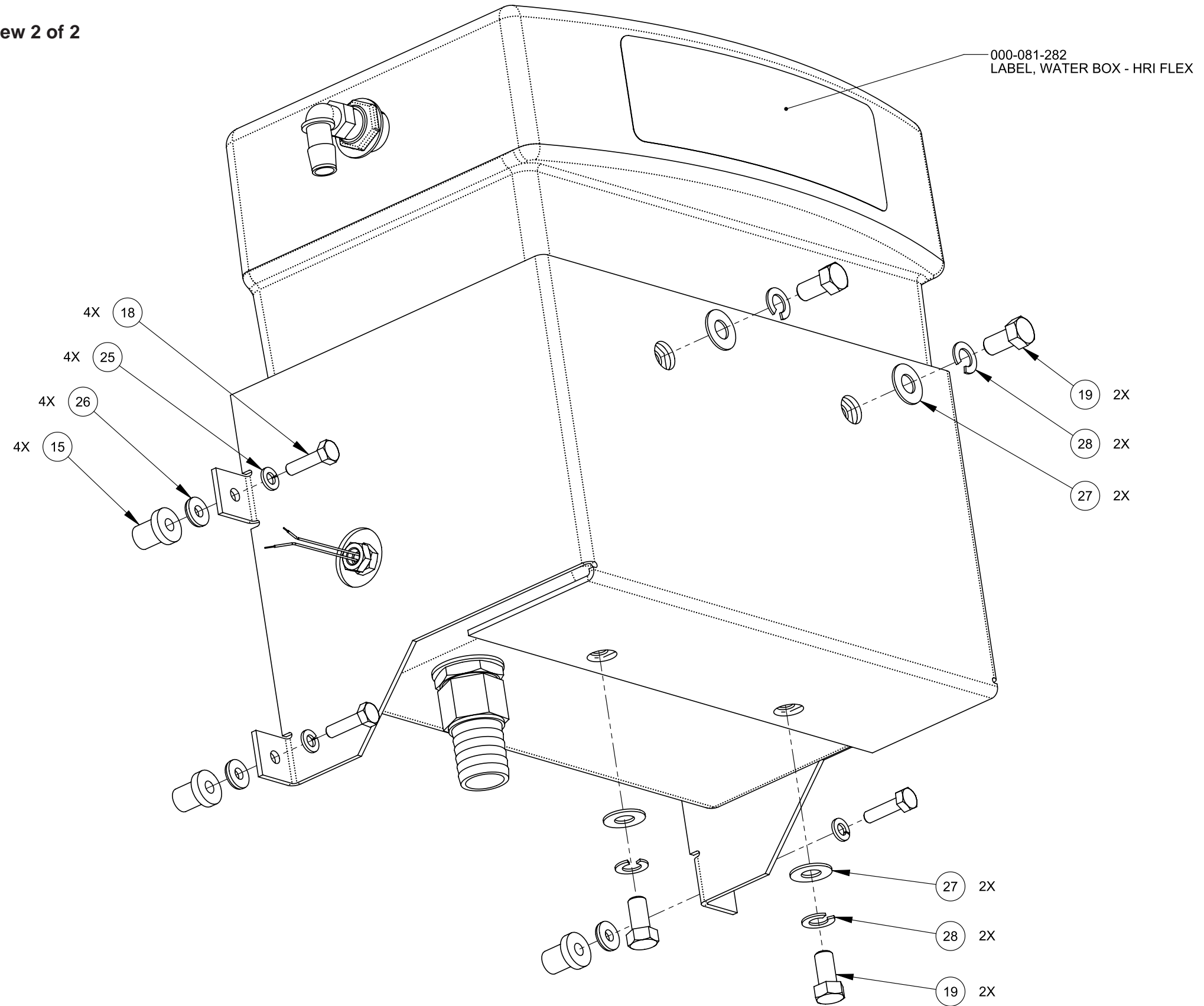


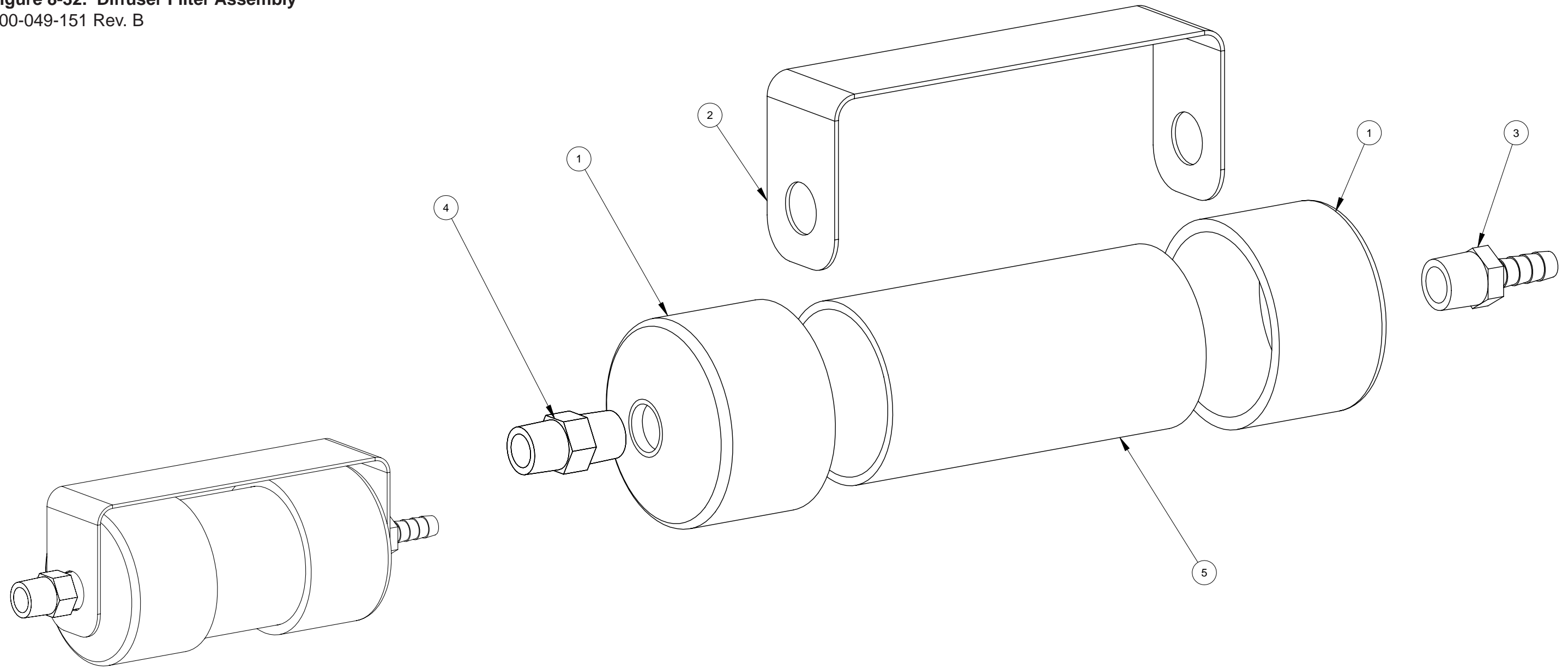
Figure 8-31. Water Box Assembly - View 2 of 2
601-010-751 Rev. A



Water Box Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-049-151	Assembly, Diffuser Filter	1	15	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
2	000-169-235	Assembly, Float Valve	1	16	000-097-041	O-Ring, 1/2" Bulk Head	2
3	000-015-938	Bracket, Water Box Mounting - Coated	1	17	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	6
4	000-052-728	Bulkhead, 1/2" FPT	1	18	000-143-002	Screw, 1/4"-20UNC X 1.00" Lg. Hex Head	4
5	000-052-660	Bulkhead, 3/8" FPT X 3/8" FPT	1	19	000-143-017	Screw, 3/8"-16UNC X 0.75" Lg. Hex Head Grd. 8	4
6	000-033-005	Clamp, Size #5 Hose	2	20	000-157-0801	Switch, w/Protector, Polypropylene Barrel	1
7	000-041-005	Cover, 6" Access	1	21	000-159-154	Tank, Poly Water Box	1
8	000-052-086	Elbow, 3/8" NPT Street	1	22	000-052-155	Tee, 3/16" Plastic Vacuum Insert	1
9	000-052-355	Elbow, 3/8" NPT X 1/2" Hose, GFBN	2	23	000-052-023	Tee, 3/8" NPT Male Street	1
10	000-068-326	Hose, 3/8" I.D. Clear w/ Braid Solution	1	24	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	2
11	000-052-104	Insert, #66 (3/8" NPT X 3/8" Barb)	1	25	000-174-017	Washer, 1/4" Lock	4
12	000-052-754	Insert, #F816 (1/2" FPT X 1" Barb)	1	26	000-174-060	Washer, 1/4" Rubber Backed	4
13	000-052-662	Nipple, 3/8" NPT X 1/4" M SAE	1	27	000-174-032	Washer, 3/8" Flat	4
14	000-094-097	Nut, 1"-14UNS Brass	3	28	000-174-057	Washer, 3/8" Lock	4

Figure 8-32. Diffuser Filter Assembly
000-049-151 Rev. B

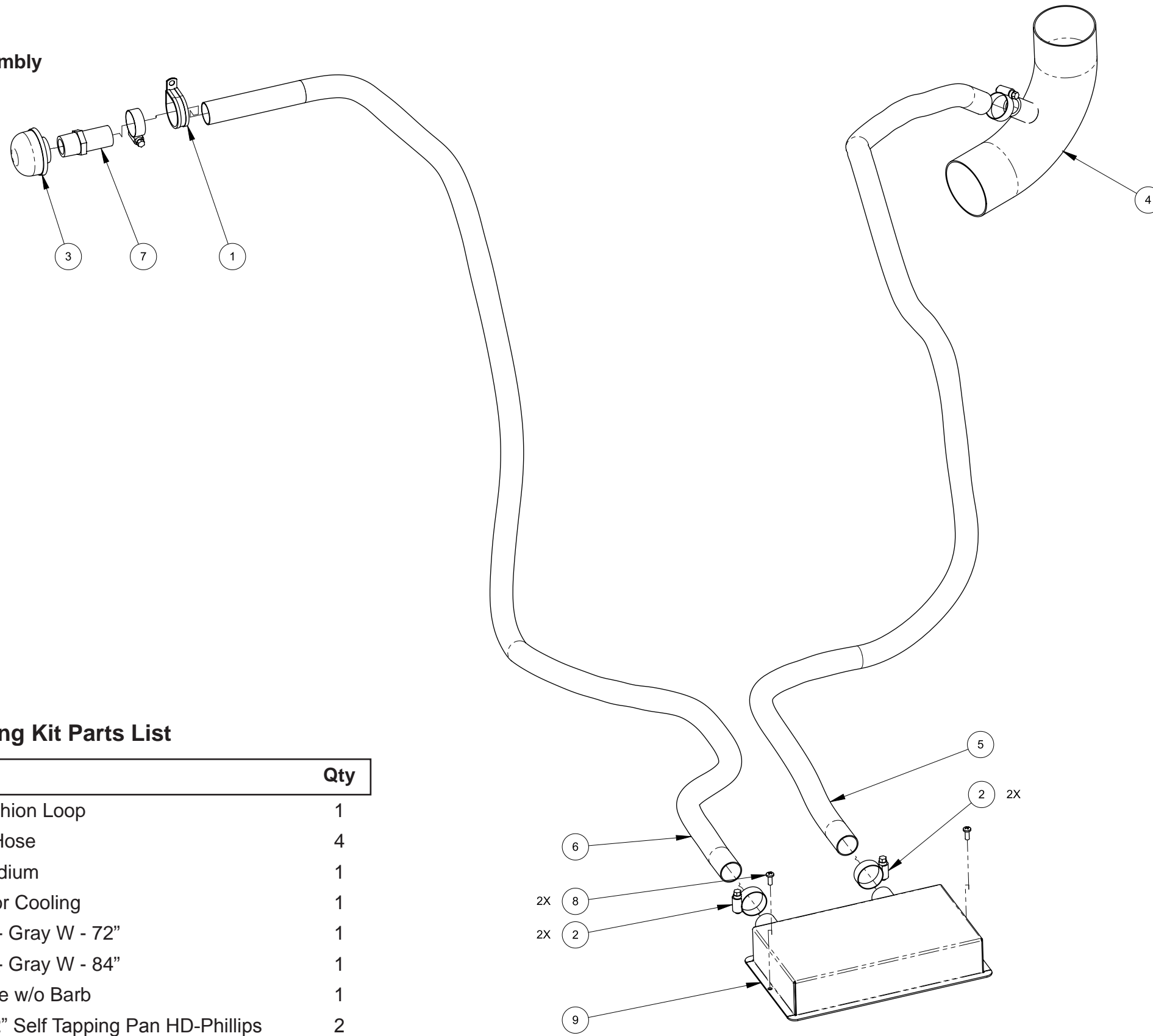


Diffuser Filter Assembly Parts List

Item	Part Number	Description	Qty
1	000-027-115	Cap, 2" PVC Modified for Diffuser	2
2	000-033-131	Clamp, Diffuser	1
3	000-052-104	Insert, #66 (3/8" NPT X 3/8" Barb)	1

Item	Part Number	Description	Qty
4	000-052-074	Nipple, 3/8" NPT Hex	1
5	000-125-222	Tube, Diffuser	1

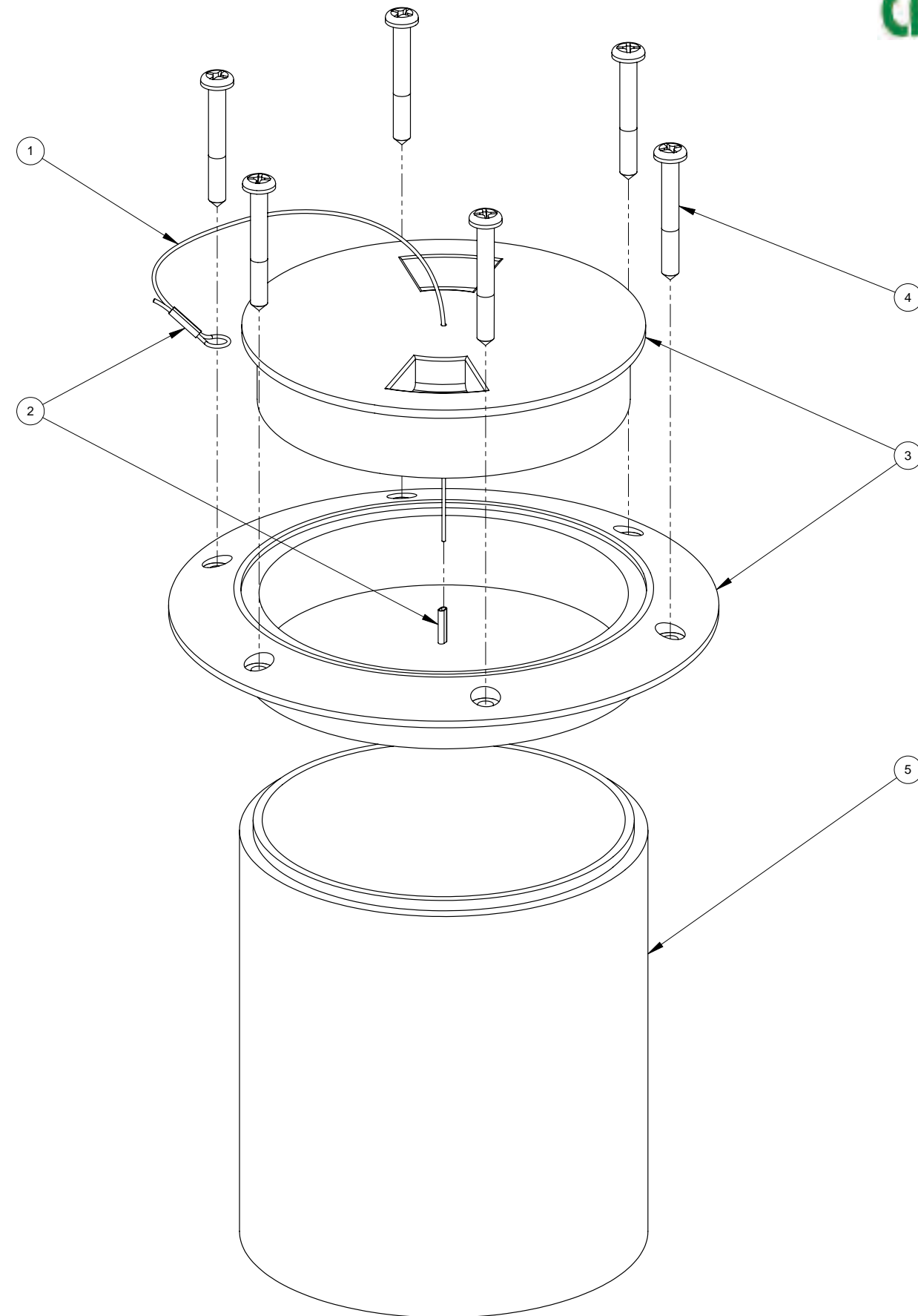
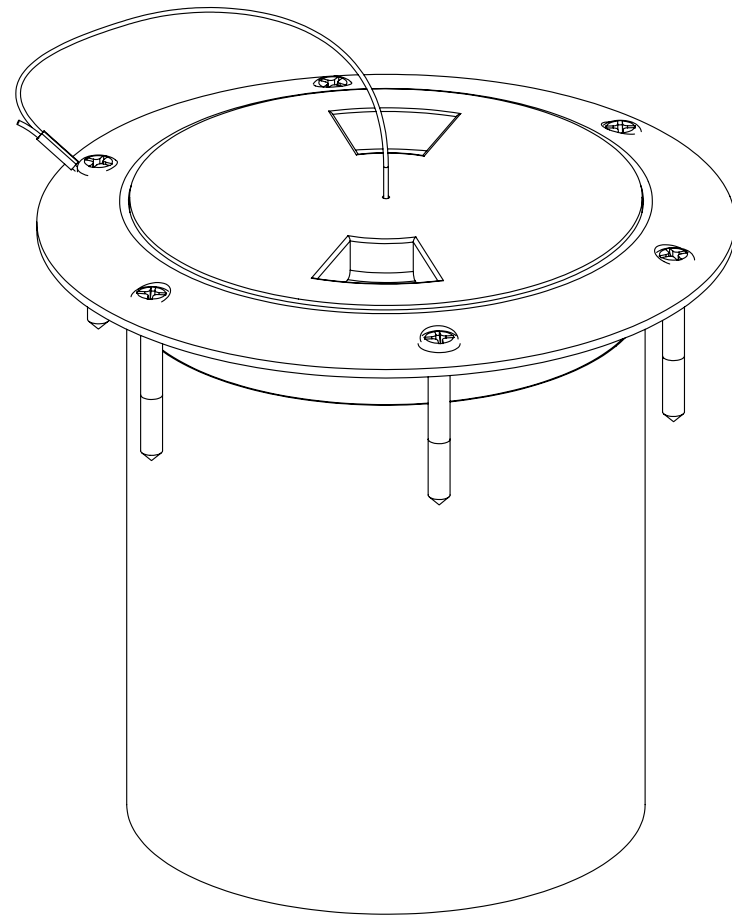
Figure 8-33. Yaw Sensor Cooling Kit Assembly
000-079-130 Rev. A



Yaw Sensor Cooling Kit Parts List

Item	Part Number	Description	Qty
1	000-033-053	Clamp, 1-1/2" Cushion Loop	1
2	000-033-029	Clamp, Size #12 Hose	4
3	000-049-020	Filter Screen - Medium	1
4	000-052-034	Fitting, Yaw Sensor Cooling	1
5	000-068-829	Hose, 1" Vacuum - Gray W - 72"	1
6	000-068-828	Hose, 1" Vacuum - Gray W - 84"	1
7	000-052-908	Insert 3/4 X 1 Hose w/o Barb	1
8	000-143-112	Screw, 10-24 X 1/2" Self Tapping Pan HD-Phillips	2
9	000-041-312	Weldment, Yaw Sensor Cooling - Chevy	1

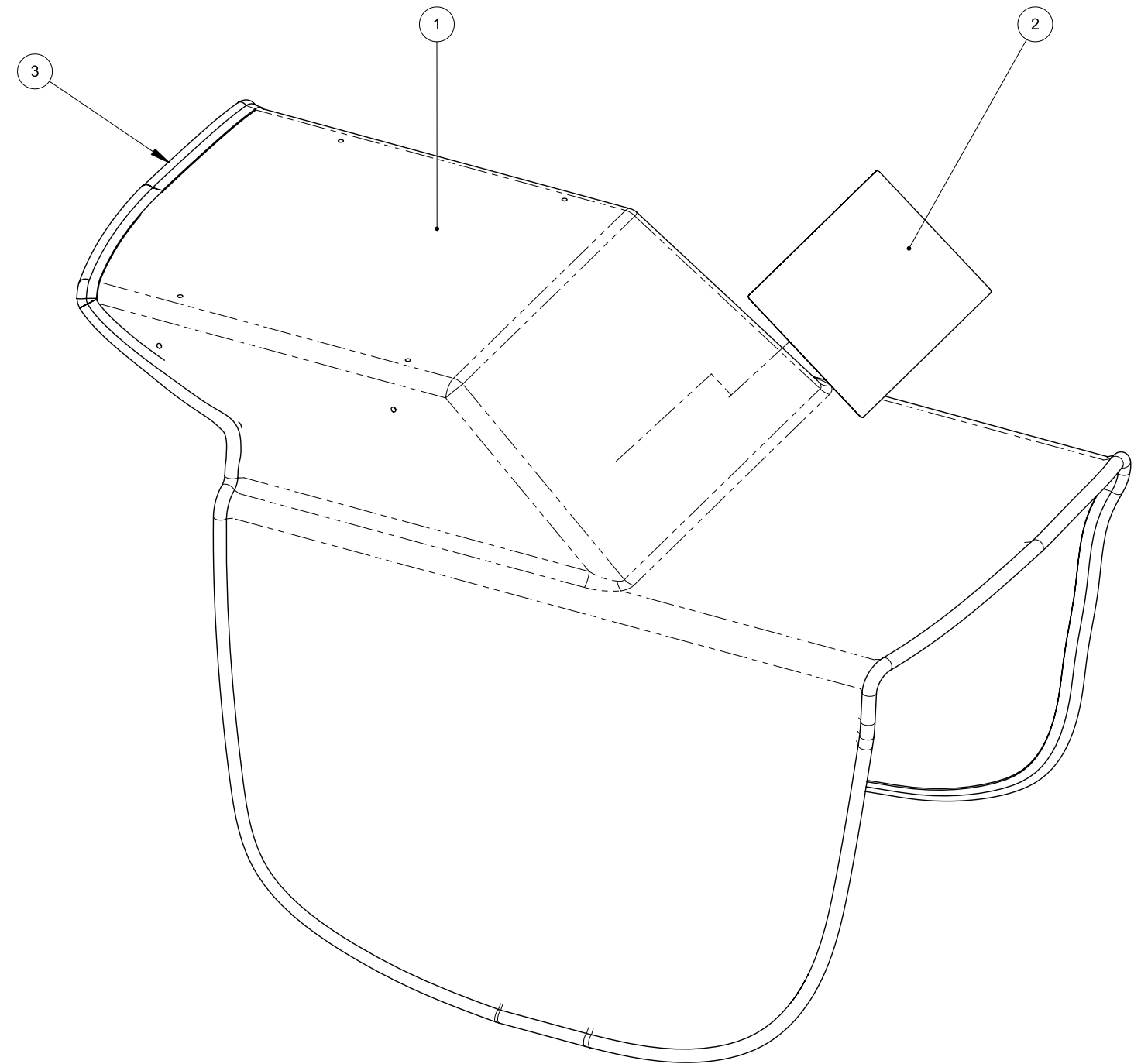
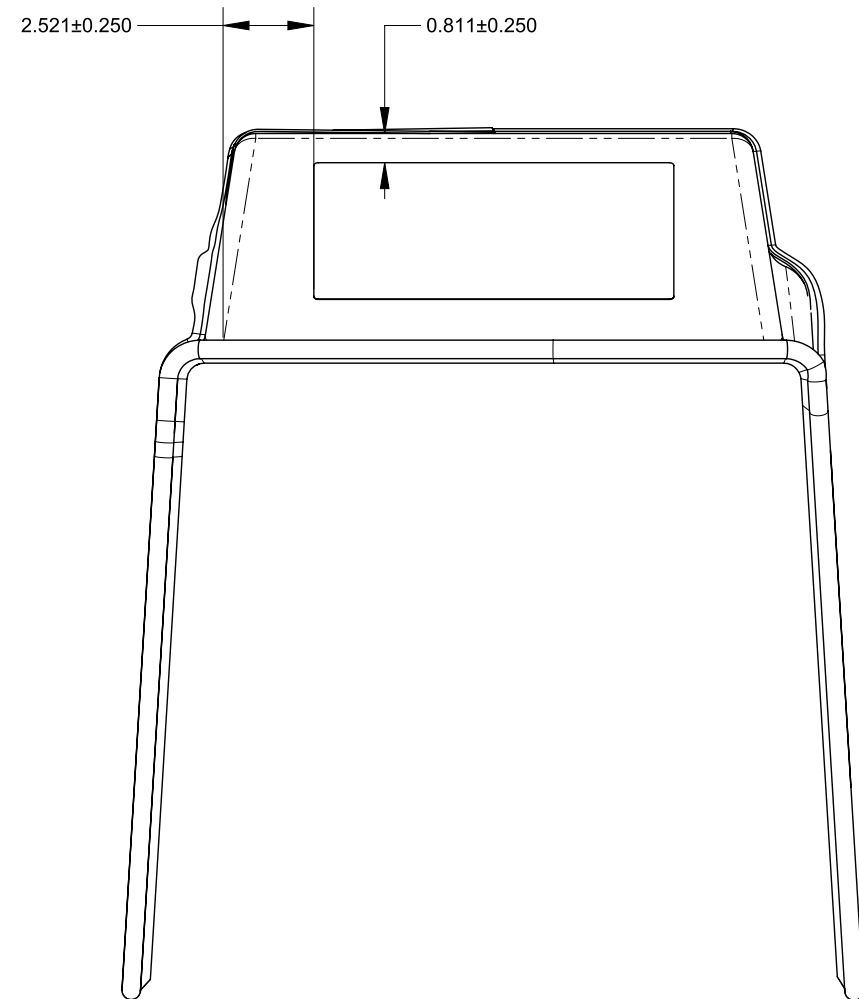
Figure 8-34. Pass Through Assembly
000-078-381 Rev. C



Pass Through Assembly Parts List

Item	Part Number	Description	Qty
1	000-025-008	Cable, 150 lb Test S/S	1
2	000-033-032	Clamp, Throttle Cable	2
3	000-041-200	Cover, 4" Round ABS-Mod. - Pass Through	1
4	000-143-537	Screw, #10 X 1.5" Lg. Pan Head Sheet Metal	6
5	000-125-182	Tube, Pass Through	1

Figure 8-35. Chevy Cowling Assembly
601-020-008 Rev. A



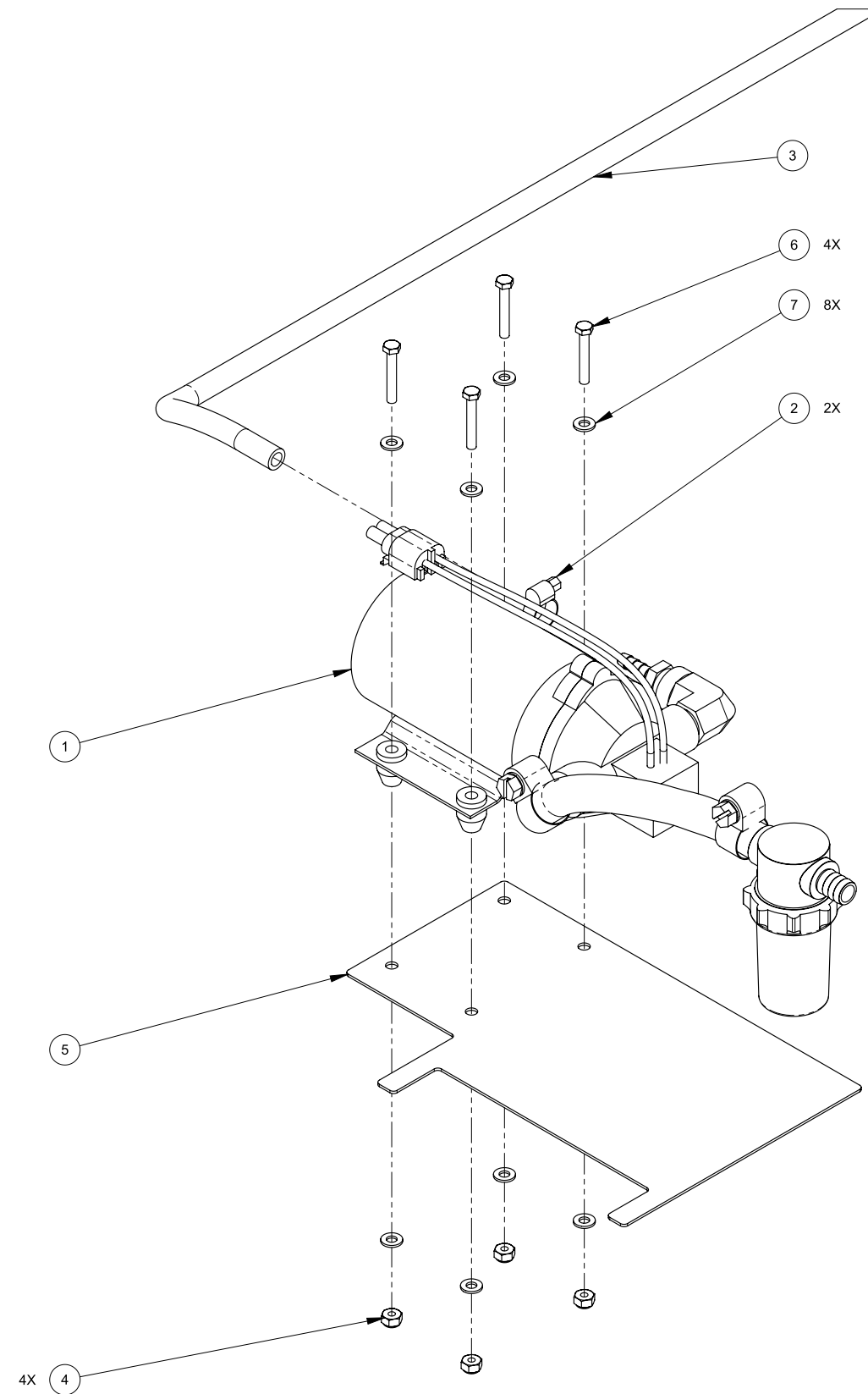
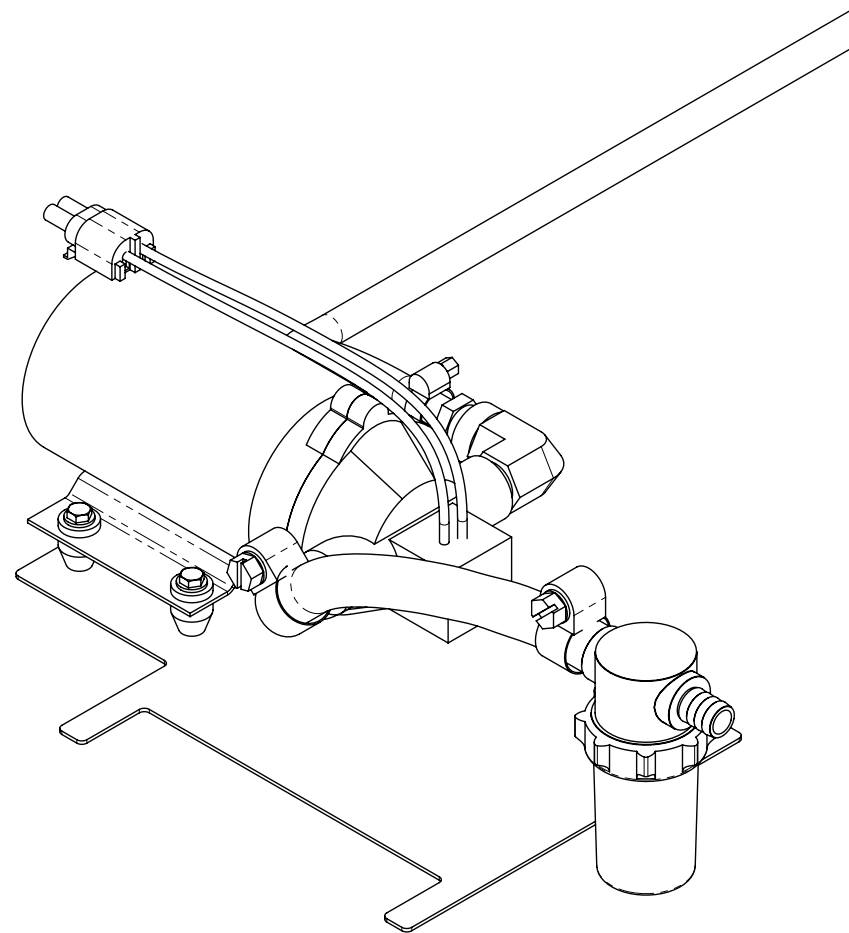
Chevy Cowling Assembly Parts List

Item	Part Number	Description	Qty
1	000-041-139	Cowling, Chevy	1
2	000-081-403	Label, Driveline Lubrication Procedure and Specification 1	1
3	000-131-060	Trimlok, 3/4" Bulb	1 ft

NOTICE

Figure 8-35 shows cowling before being modified during final installation.

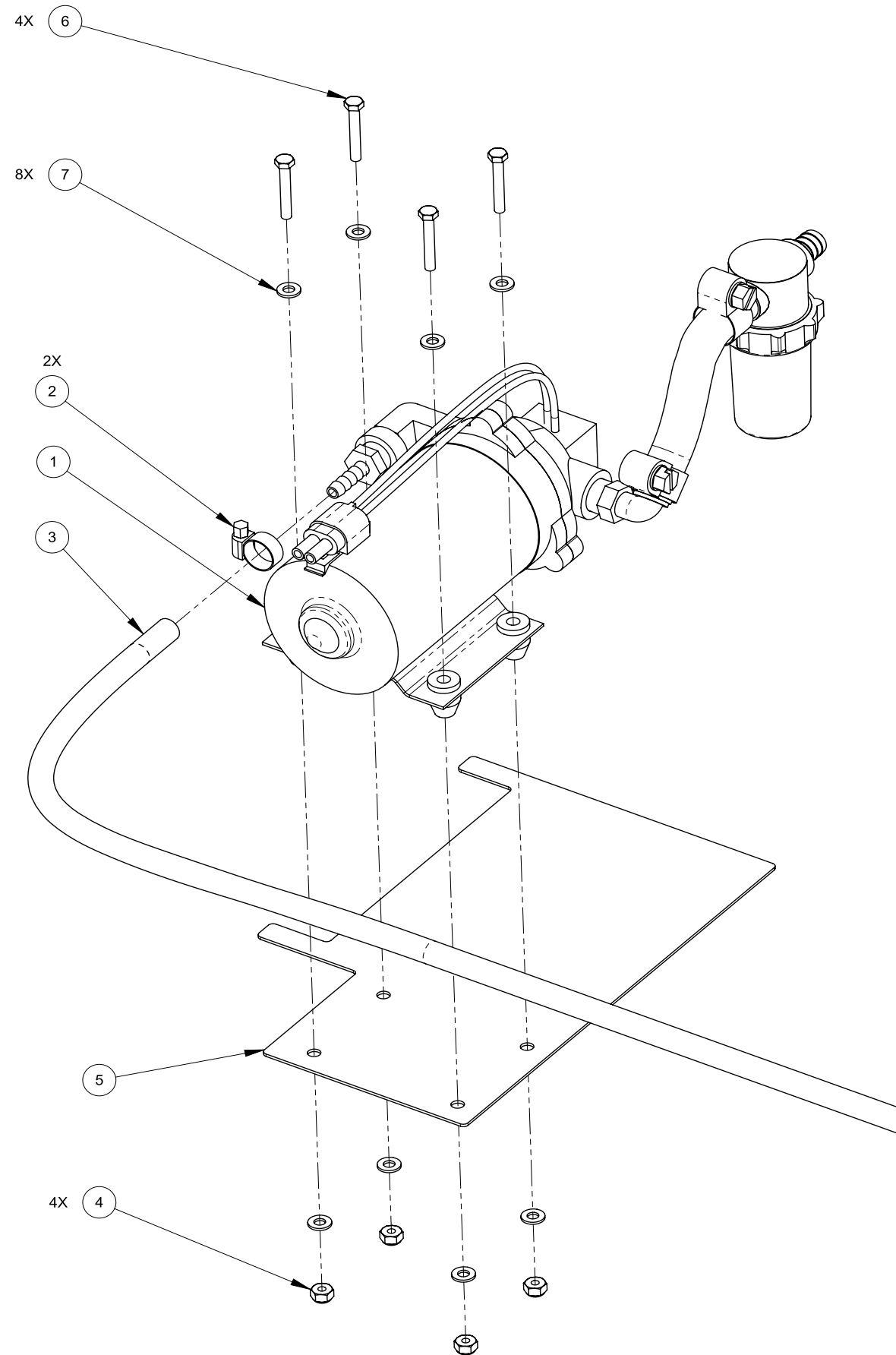
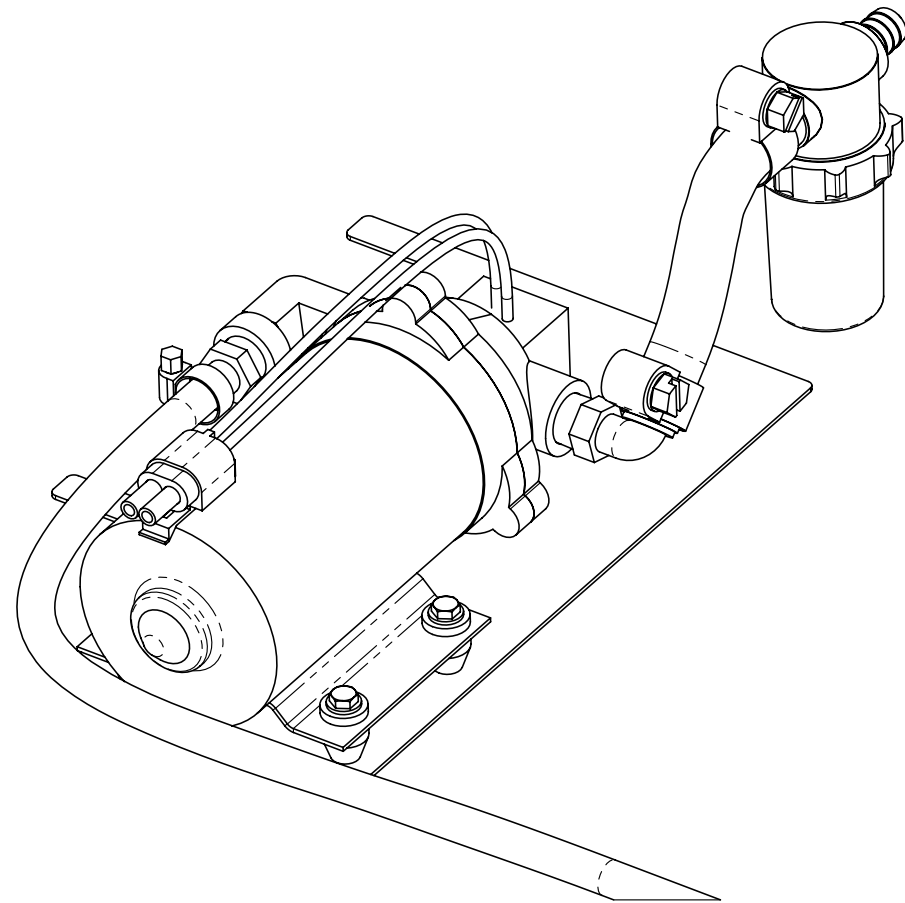
Figure 8-36. Driver Side Pump Kit Assembly
601-021-753 Rev. B



Driver Side Pump Kit Assembly Parts List

Item	Part Number	Description	Qty
1	601-021-800	Assembly, Pump	1
2	000-033-003	Clamp, Size #4 Mini Hose	2
3	000-068-679	Hose, 1/4" I.D. Rubber X 110" Lg. - Pump to Cross	1
4	000-094-034	Nut, #10-24UNC Nylock	4
5	000-105-705	Plate, Pump Mounting	1
6	000-143-171	Screw, #10-24UNC X 1.25" Lg. Hex Head	4
7	000-174-001	Washer, #10 Flat	8

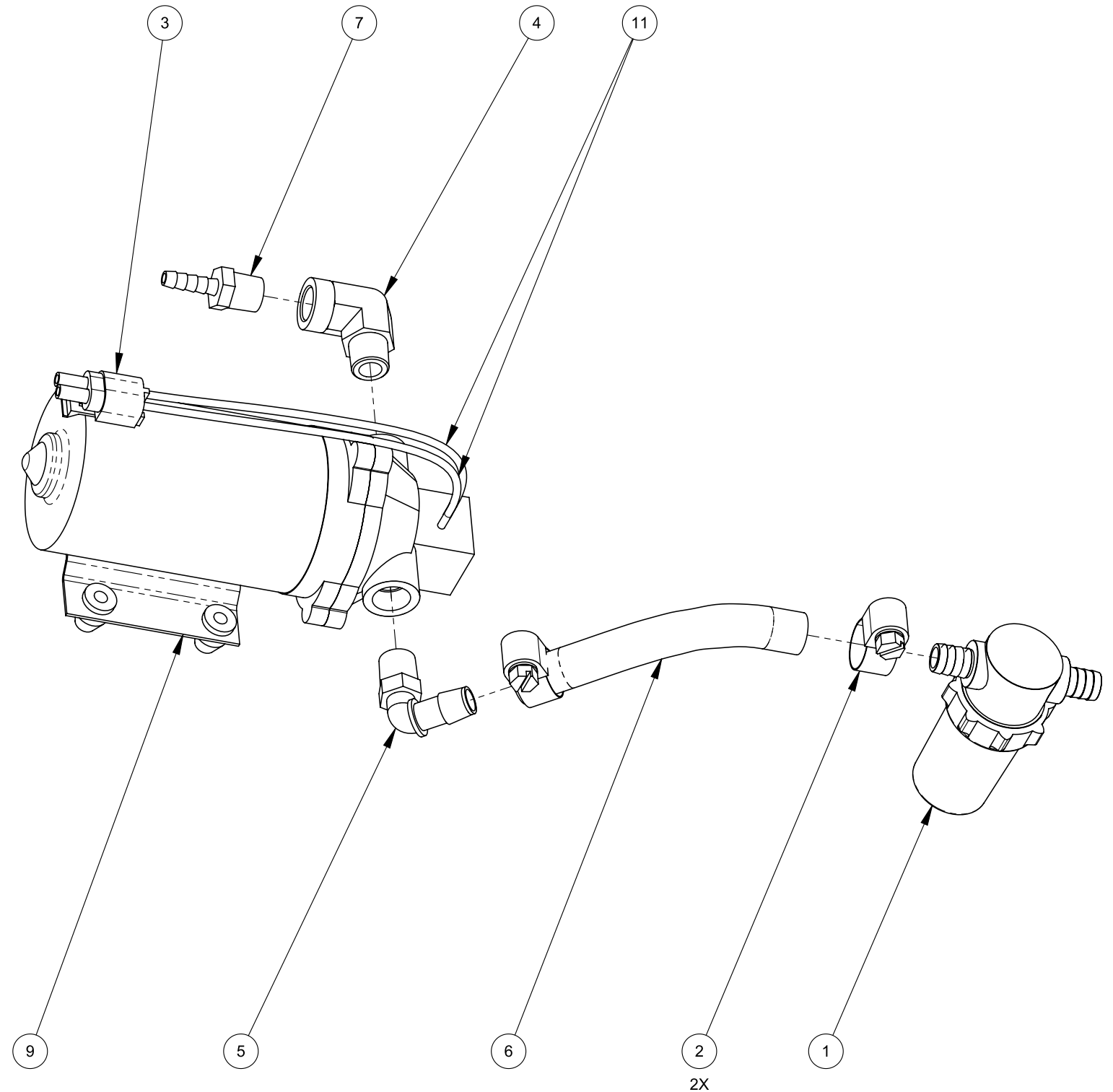
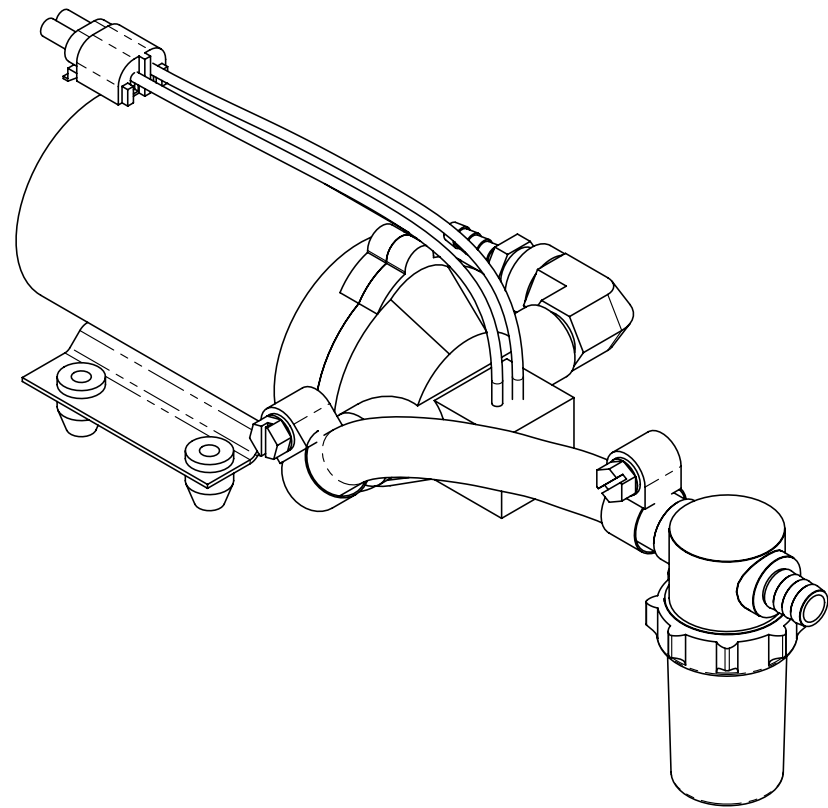
Figure 8-37. Passenger Pump Kit Assembly
601-021-752 Rev. C



Passenger Side Pump Kit Assembly Parts List

Item	Part Number	Description	Qty
1	601-021-800	Assembly, Pump	1
2	000-033-003	Clamp, Size #4 Mini Hose	2
3	000-068-680	Hose, 1/4" I.D. Rubber X 173" Lg. - Pump to Cross	1
4	000-094-034	Nut, #10-24UNC Nylock	4
5	000-105-705	Plate, Pump Mounting	1
6	000-143-171	Screw, #10-24UNC X 1.25" Lg. Hex Head	4
7	000-174-001	Washer, #10 Flat	8

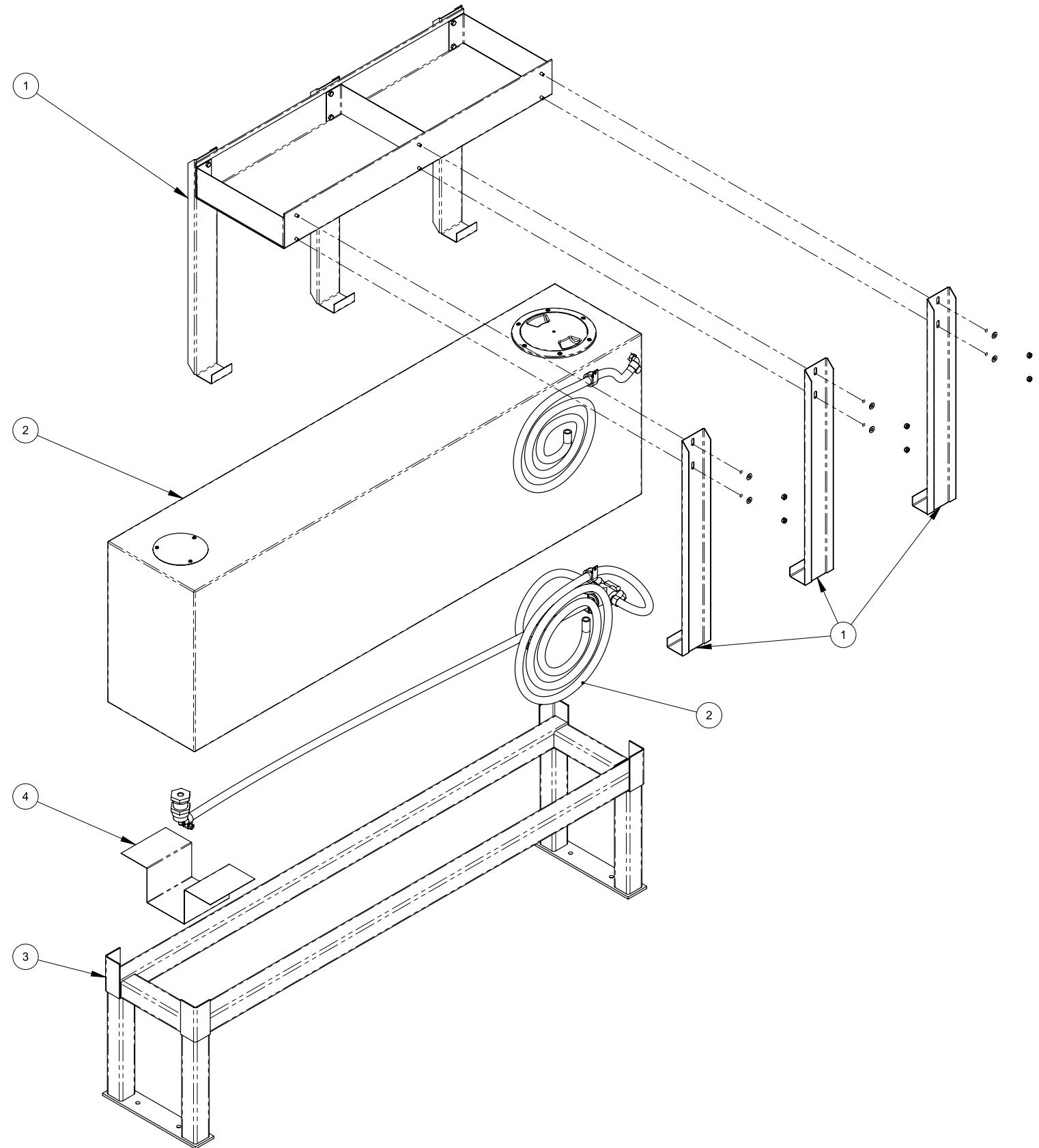
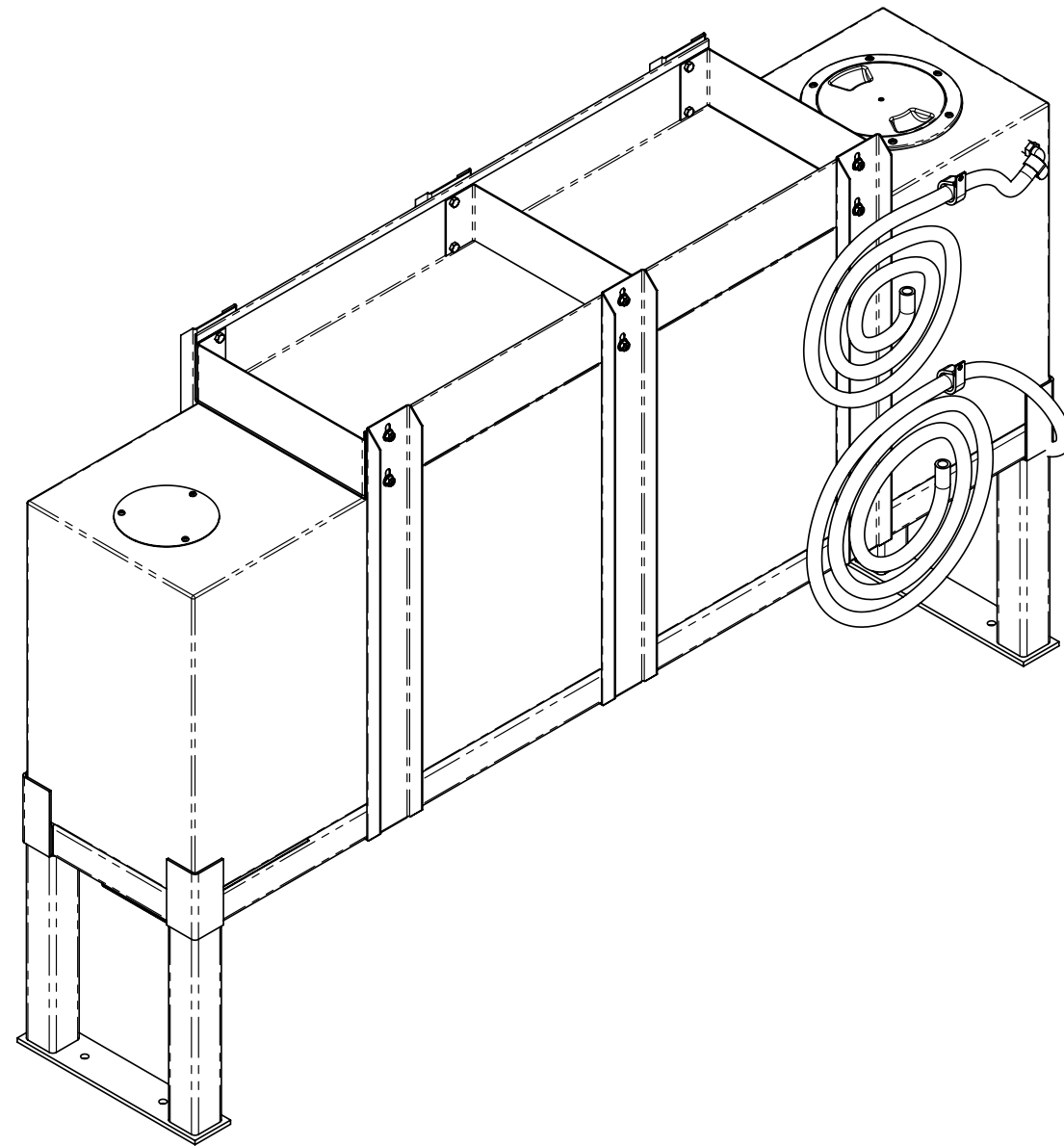
Figure 8-38. Pump Flex Assembly
601-021-800 Rev. B



Pump Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-049-588	Strainer	1
2	000-033-004	Clamp, Size #6 Mini Hose	2
3	000-037-048	Connector, 2 Pole Water Tight Female	1
4	000-052-747	Elbow, 3/8 S/S Street 90	1
5	000-052-355	Elbow, 3/8" NPT X 1/2" Hose, GFBN	1
6	000-068-1032	Hose, 1/2" I.D. PVC X 8" Lg. - Braided - Pump to Strainer	1
7	000-052-749	Insert, #64 (3/8" NPT X 1/4" Barb) S/S	1
8	000-037-051	Pin, Female	2
9	000-111-588	Pump	1
10	000-147-030	Seal, Water Tite Wire Connector	2
11	000-063-021	Wire, 1/4" Loom	1.5 ft

Figure 8-39. 50 Gallon Tank Flex Kit Assembly
000-163-751 Rev. C



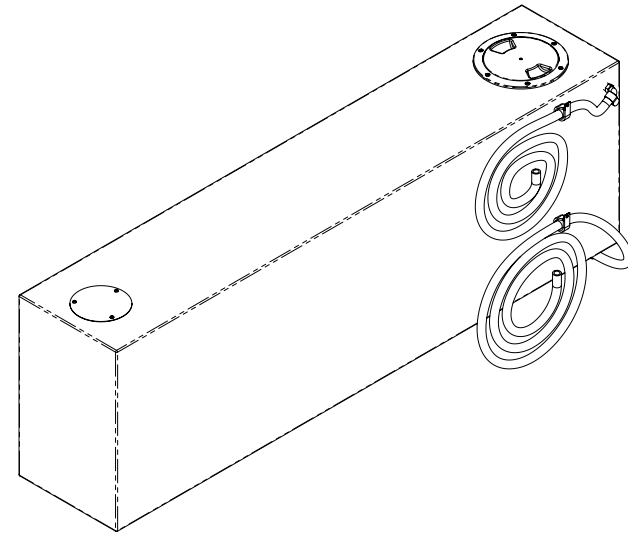
50 Gallon Tank Flex Kit Assembly Parts List

Item	Part Number	Description	Qty
1	000-163-756	Assembly, Chemical Caddy 50 Gallon	1
2	000-163-750	Assembly, Tank 50 Gallon	1
3	000-055-215	Frame, 12" X 60" Tank - Coated	1
4	000-108-196	Protector, Bulkhead	1

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Figure 8-40. 50 Gallon Tank Flex Assembly
000-163-750 Rev. E



NOTICE

The following items are shipped with the Tank Assembly in a plastic bag, ready to be used at installation: Item 2, 1X; Item 3 1X; Item 6; Item 9; Item 14

50 Gallon Tank Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-923	Bulkhead	1
2	000-033-057	Clamp, 1" Cushion Loop	3
3	000-033-004	Clamp, Size #6 Mini Hose	6
4	000-041-005	Cover, 6" Access	1
5	000-052-484	Elbow, 1/2" NPT X 1/2 Hose	1
6	000-052-355	Elbow, 3/8" NPT X 1/2" Hose	1
7	000-068-674	Hose, 1/2" I.D. Clr X 16" Lg. Braid - 3 Way Valve to Pump Filter	1
8	000-068-677	Hose, 1/2" I.D. Clr X 54" Braid	2
9	000-068-678	Hose, 1/2" I.D. Clr X 78" Lg. Braid - Vent	1
10	000-089-003	Magnet	1
11	000-169-588	Miniature 3 Way PVC Ball Valve	1
12	000-094-034	Nut, #10-24UNC Nylock	1
13	000-041-729	Plate, Tank Cover	1
14	000-106-173	Plug, 3/8" NPT Allen Head	1
15	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	9
16	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	1
17	000-159-259	Tank, 50 Gallon - Modified	1

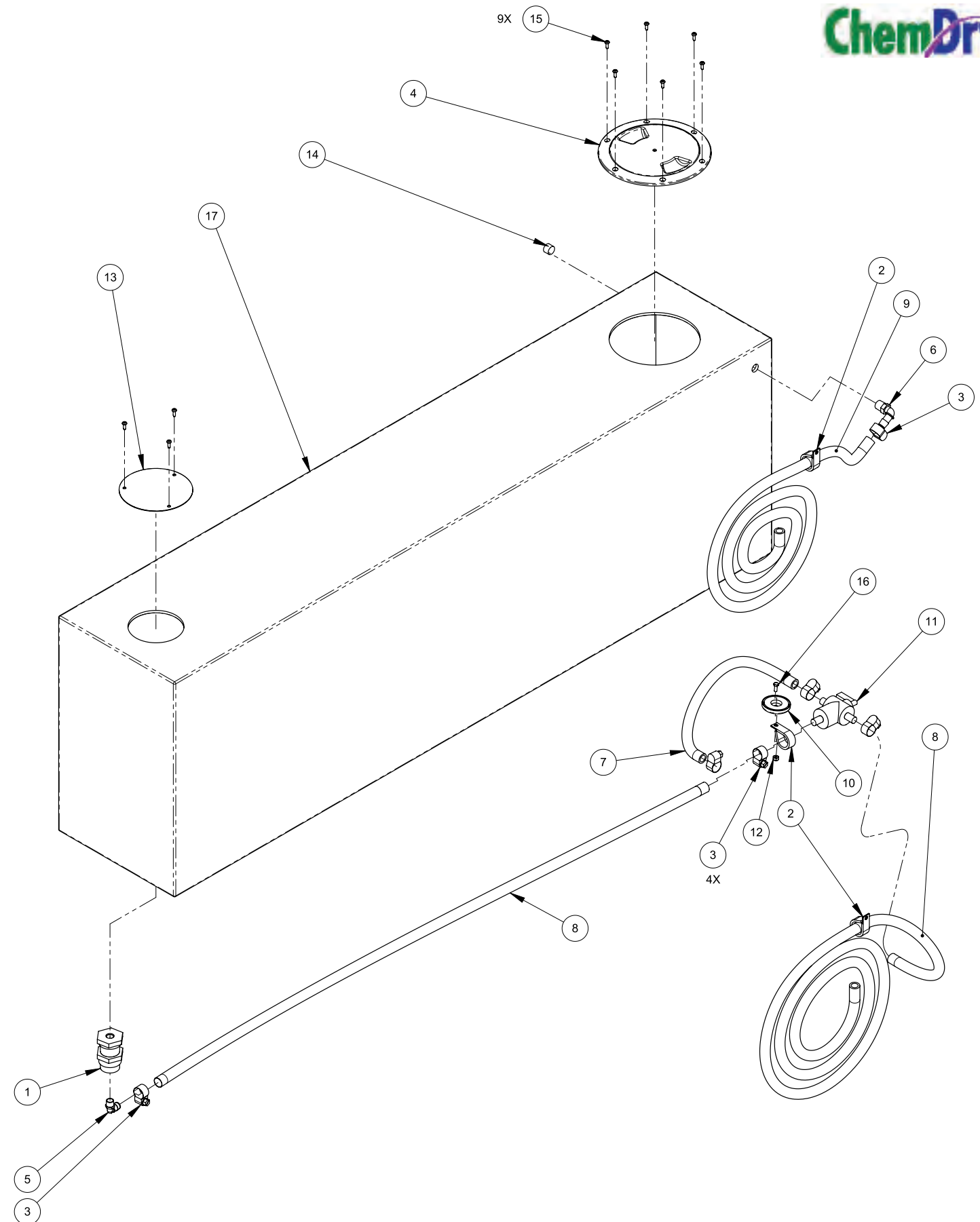
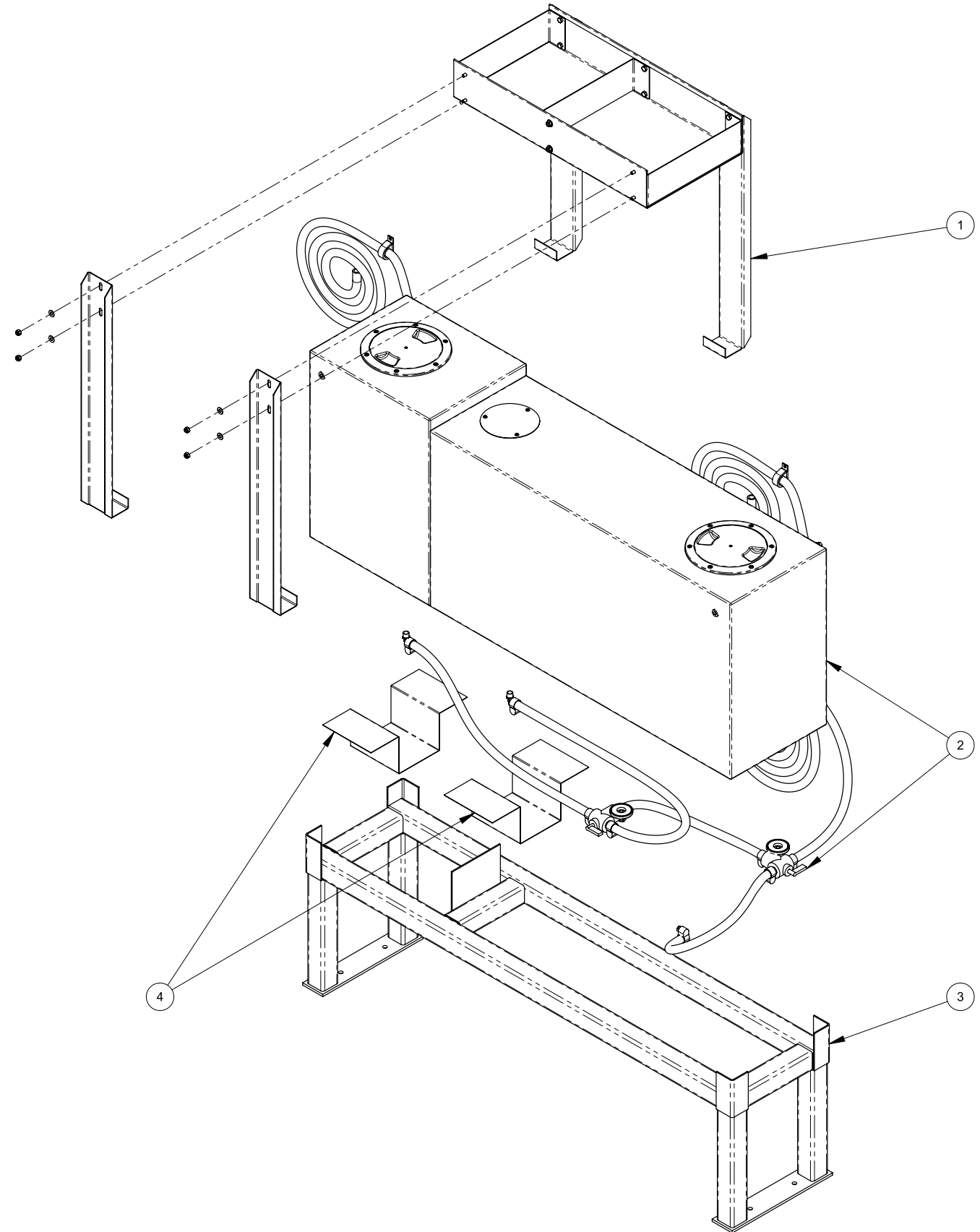
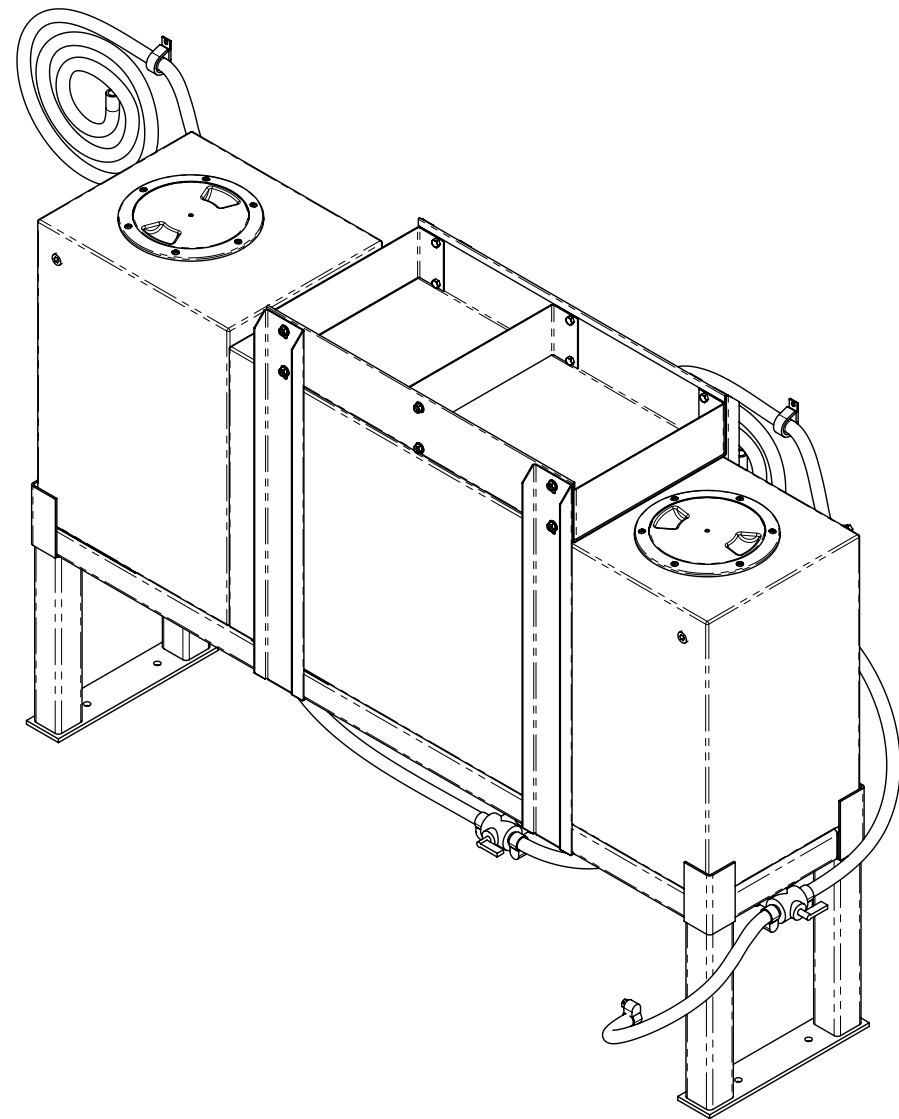


Figure 8-41. 35 Gallon and 15 Gallon Tank Kit Assembly
000-163-753 Rev. C



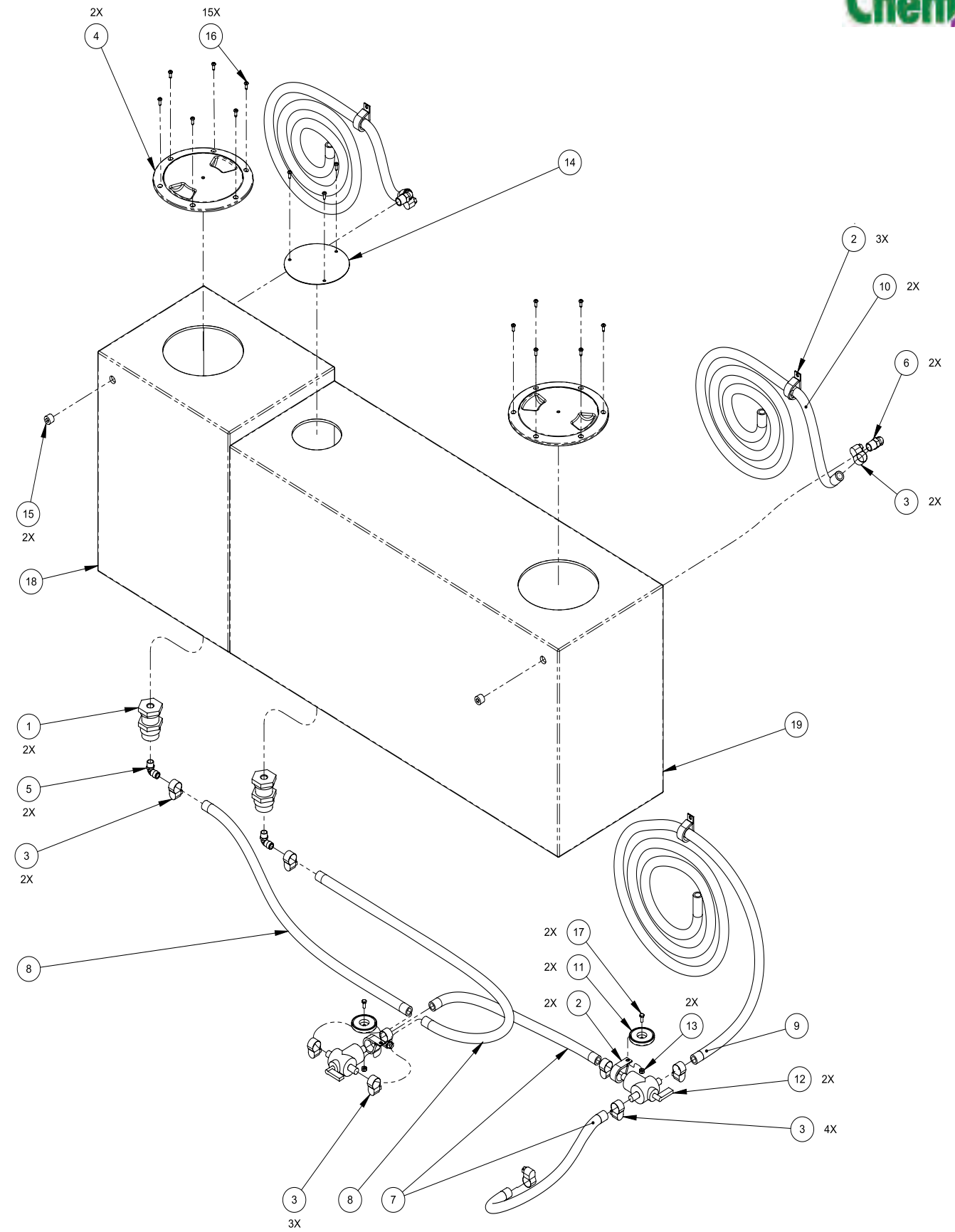
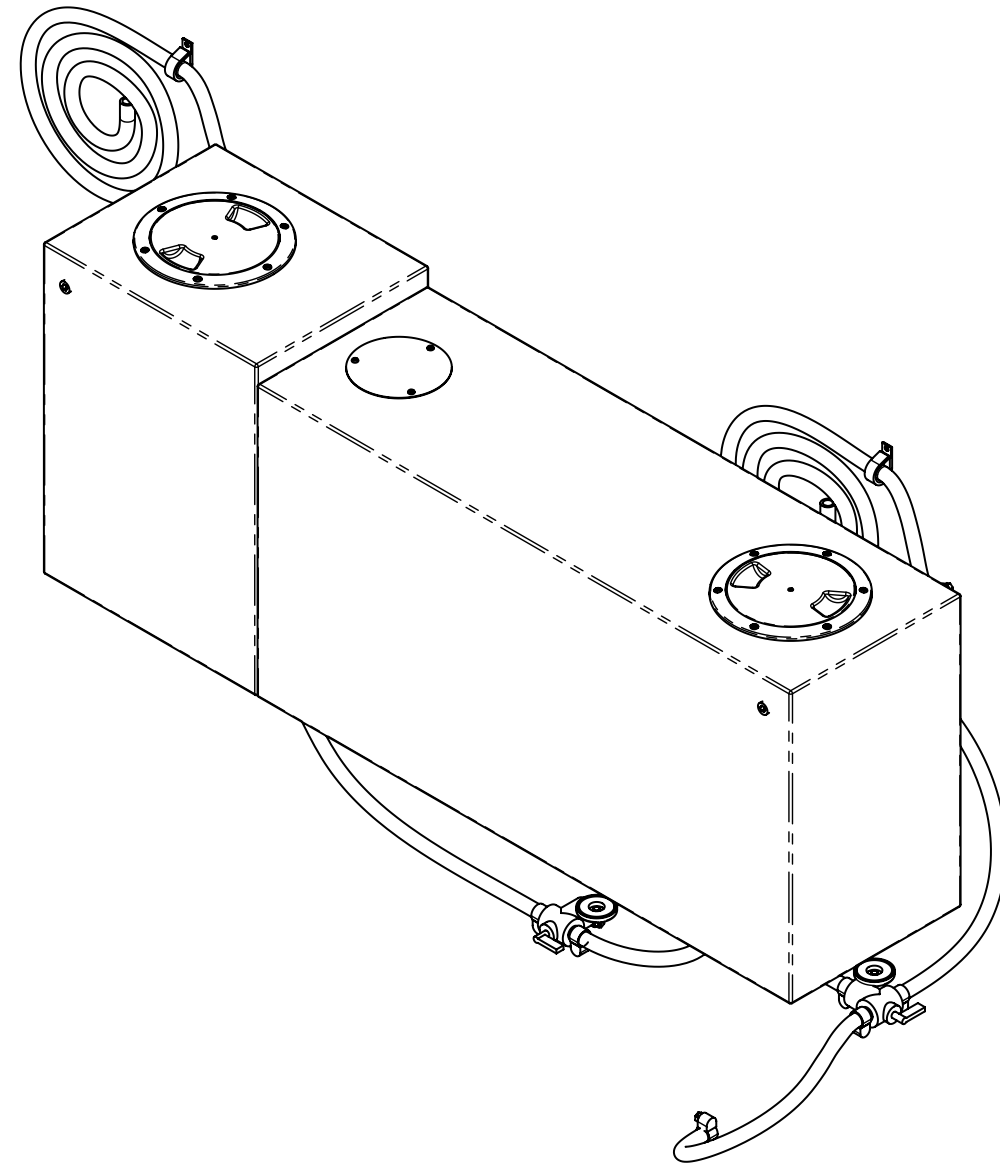
35 Gallon and 15 Gallon Tank Kit Assembly Parts List

Item	Part Number	Description	Qty
1	000-163-757	Assembly, Chemical Caddy 35 Gallon	1
2	000-163-752	Assembly, Tank - 35 Gallon and 15 Gallon	1
3	000-055-217	Frame, 12" X 53" Tank - Coated	1
4	000-108-196	Protector, Bulkhead	2

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Figure 8-42. 35 Gallon and 15 Gallon Tank Flex Assembly
000-163-752 Rev. E



35 Gallon and 15 Gallon Tank Flex Assembly Parts List

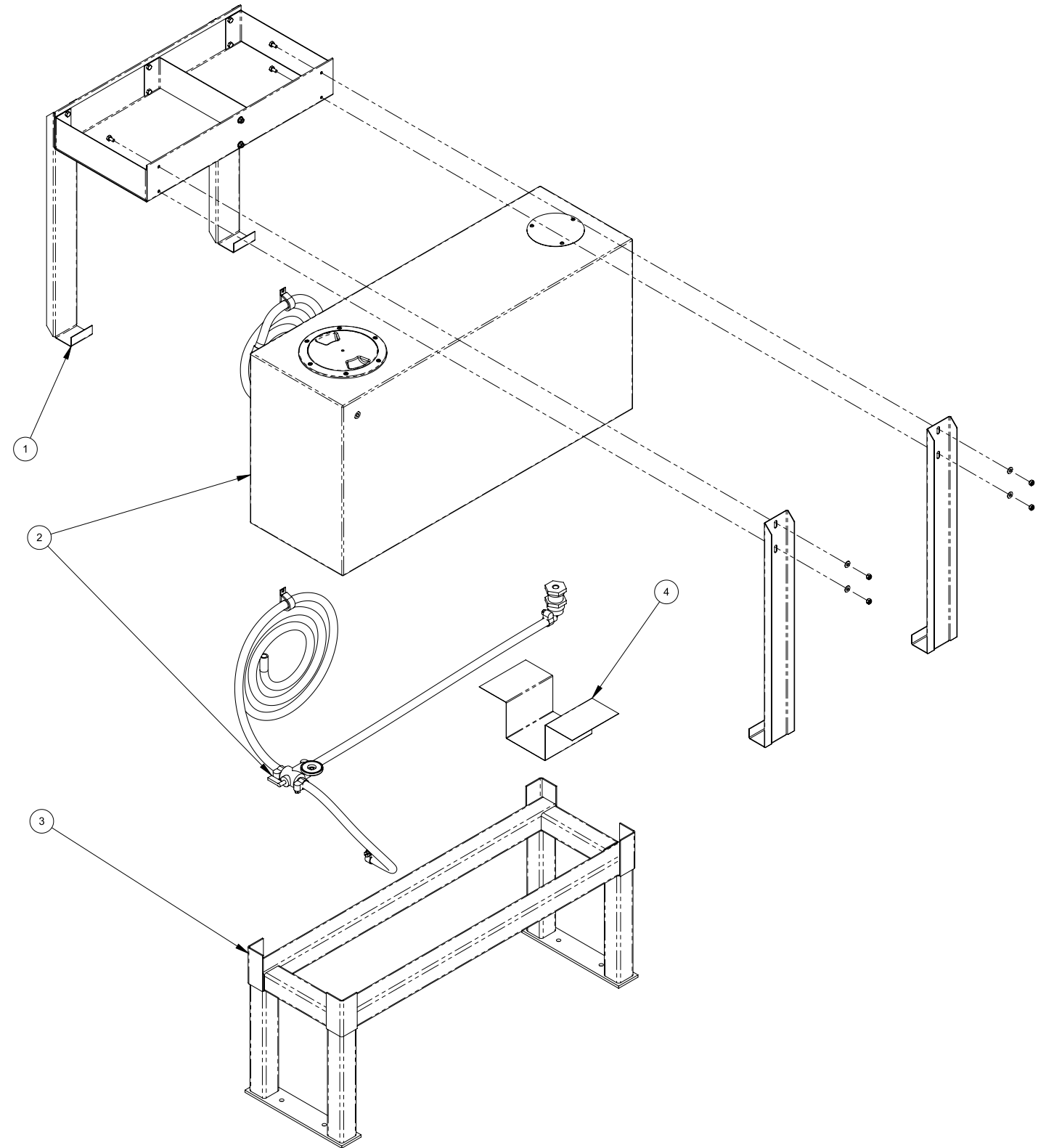
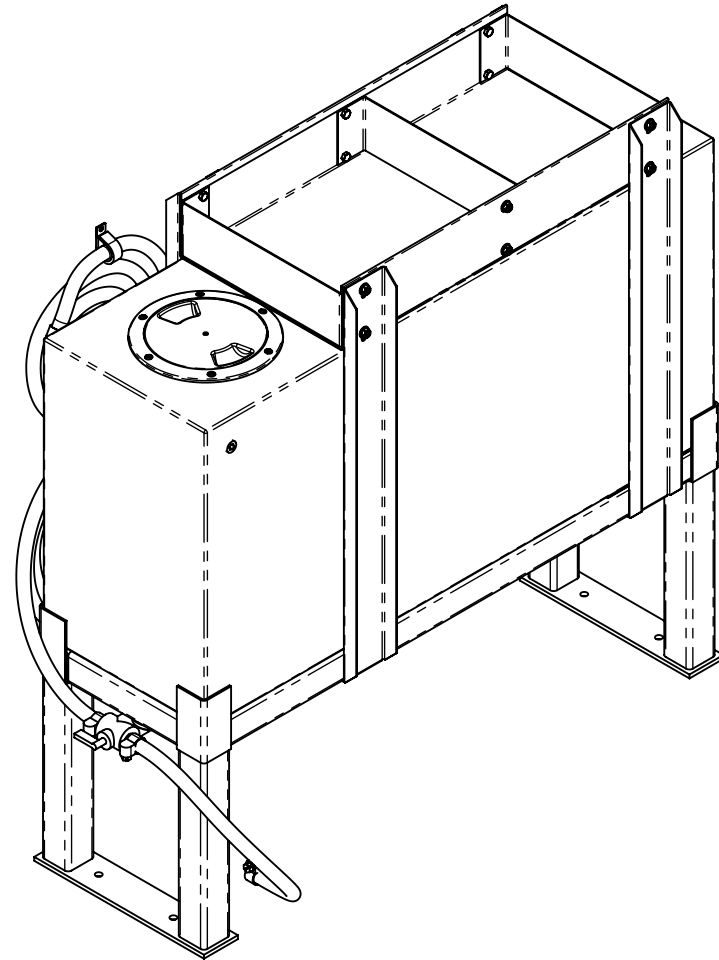
Item	Part Number	Description	Qty
1	000-052-923	Bulkhead	2
2	000-033-057	Clamp, 1" Cushion Loop	5
3	000-033-004	Clamp, Size #6 Mini Hose	11
4	000-041-005	Cover, 6" Access	2
5	000-052-484	Elbow, 1/2" NPT X 1/2" Hose	2
6	000-052-355	Elbow, 3/8" NPT X 1/2" Hose	2
7	000-068-674	Hose, 1/2" I.D. Clr X 16" Lg. - Braid	2
8	000-068-676	Hose, 1/2" I.D. Clr X 36" Lg. - Braid	2
9	000-068-677	Hose, 1/2" I.D. Clr X 54" Lg. Braid - Drain Hose	1
10	000-068-678	Hose, 1/2" I.D. Clr X 78" Lg. Braid - Vent Hose	2

Item	Part Number	Description	Qty
11	000-089-003	Magnet	2
12	000-169-588	Miniature 3 Way PVC Ball Valve	2
13	000-094-034	Nut, #10-24UNC Nylock	2
14	000-041-729	Plate, Tank Cover	1
15	000-106-173	Plug, 3/8" NPT Allen Head	2
16	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	15
17	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	2
18	000-159-257	Tank, 15 Gallon - Modified	1
19	000-159-258	Tank, 35 Gallon - Modified	1

NOTICE

The following items are shipped with the Tank Assembly in a plastic bag, ready to be used at installation: Item 2, 2X; Item 3, 2X; Item 6, 2X ; Item 10, 2X; Item 15, 2X

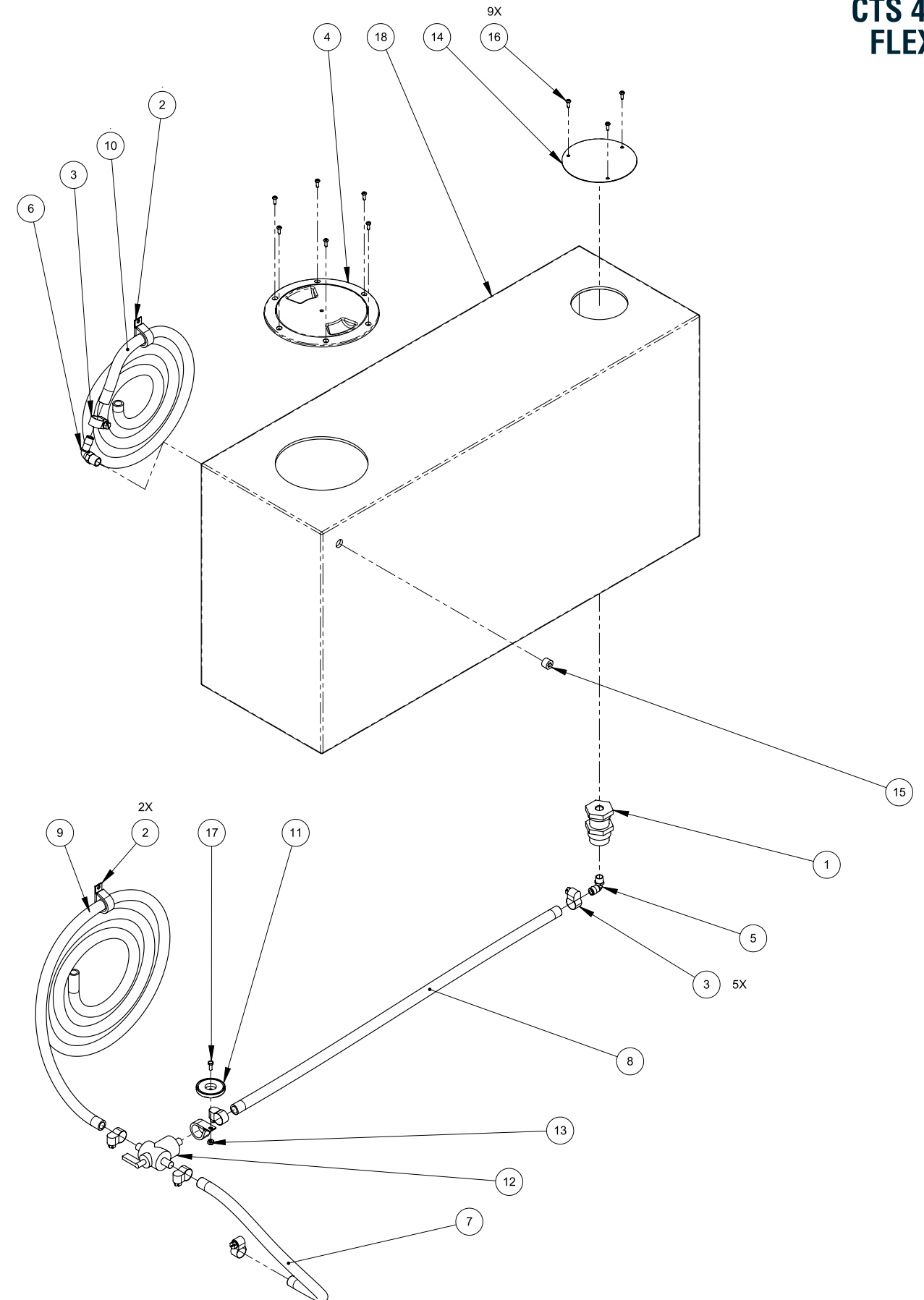
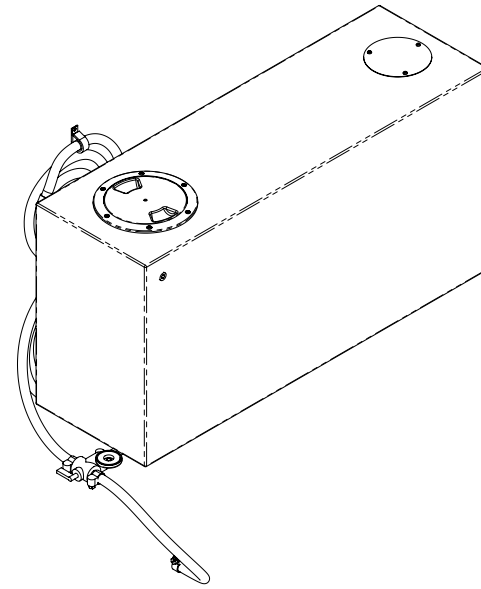
Figure 8-43. 35 Gallon Tank Solo Flex Assembly
000-163-755 Rev. C



35 Gallon Tank Solo Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-163-757	Assembly, Chemical Caddy 35 Gal	1
2	000-163-754	Assembly, Tank, 35 Gallon Solo	1
3	000-055-226	Frame, 12.50" X 38.261" Tank - Coated	1
4	000-108-196	Protector, Bulkhead	1

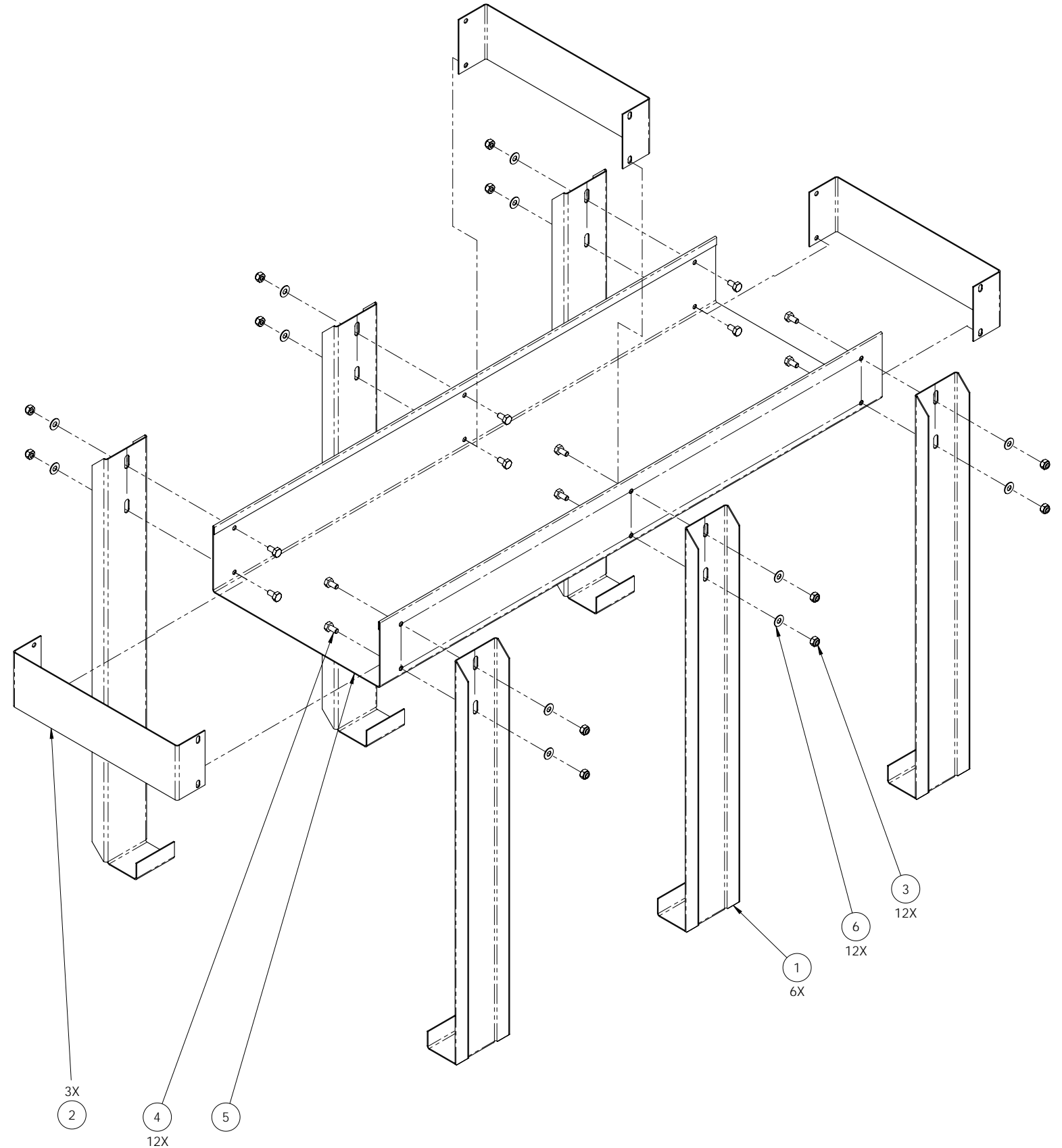
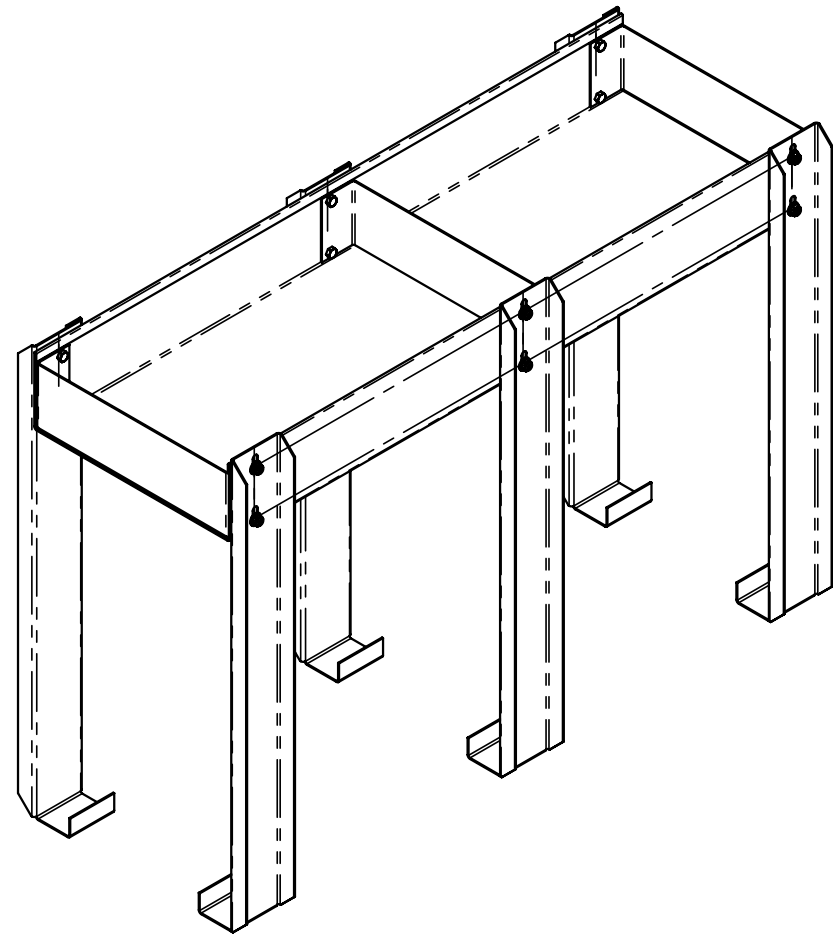
Figure 8-44. 35 Gallon Tank Flex Assembly
000-163-754 Rev. C



35 Gallon Tank Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-923	Bulkhead	1
2	000-033-057	Clamp, 1" Cushion Loop	3
3	000-033-004	Clamp, Size #6 Mini Hose	6
4	000-041-005	Cover, 6" Access	1
5	000-052-484	Elbow, 1/2" NPT X 1/2 Hose	1
6	000-052-355	Elbow, 3/8" NPT X 1/2" Hose	1
7	000-068-674	Hose, 1/2" I.D. Clear X 16" Lg. - 3 Way Valve to Filter	1
8	000-068-675	Hose, 1/2" I.D. Clear X 32" Lg. - Braid	1
9	000-068-677	Hose, 1/2" I.D. Clear X 54" Lg. - Braid - Drain Hose	1
10	000-068-678	Hose, 1/2" I.D. Clear X 78" Lg. Braid - Vent Hose	1
11	000-089-003	Magnet,	1
12	000-169-588	Miniature 3 Way PVC Ball Valve	1
13	000-094-034	Nut, #10-24UNC Hex Nylock	1
14	000-041-729	Plate, Tank Cover	1
15	000-106-173	Plug, 3/8" NPT Allen Head	1
16	000-143-314	Screw, #8 X 1/2" Lg. Pan Head	9
17	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	1
18	000-159-258	Tank, 35 Gallon - Modified	1

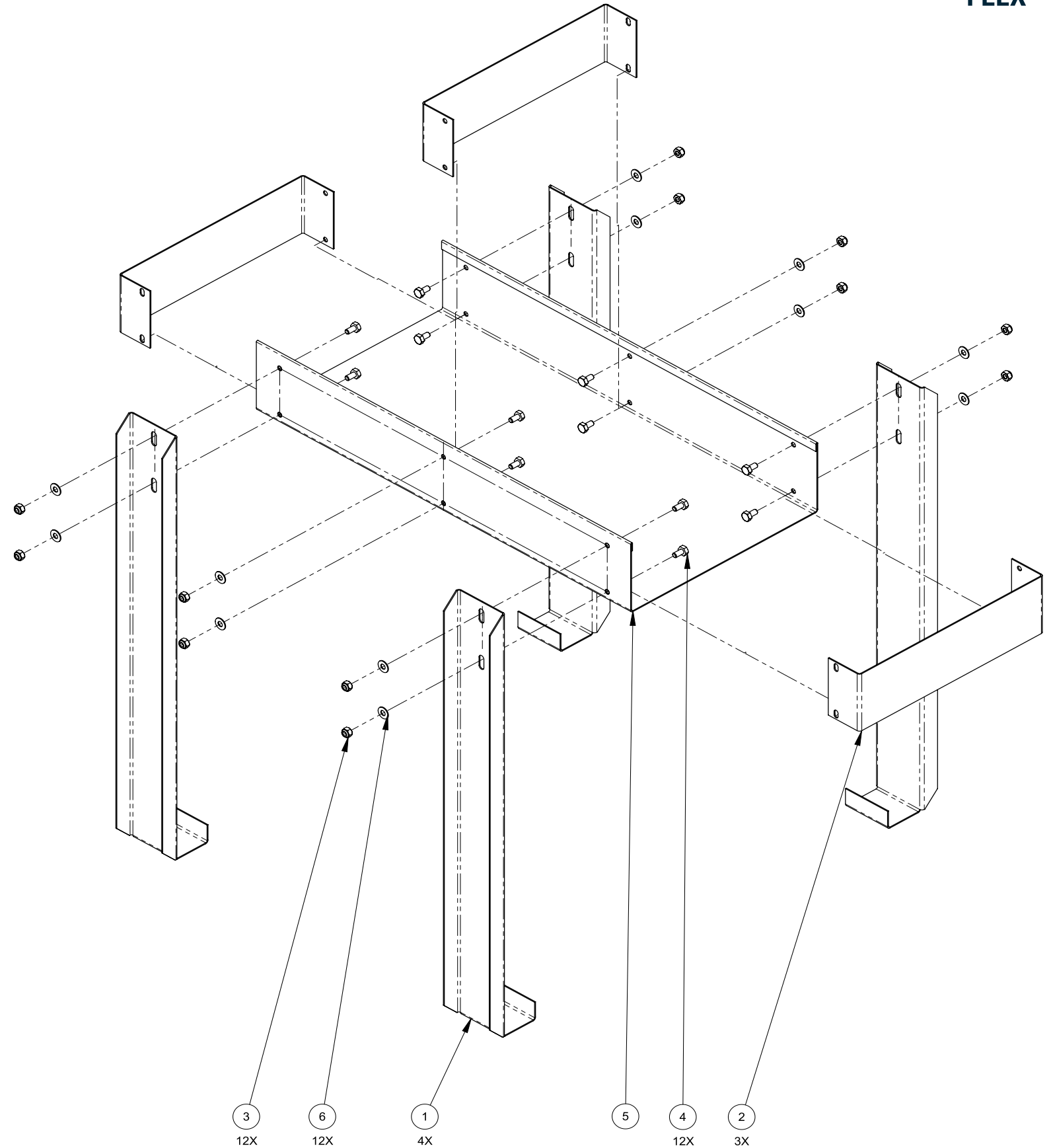
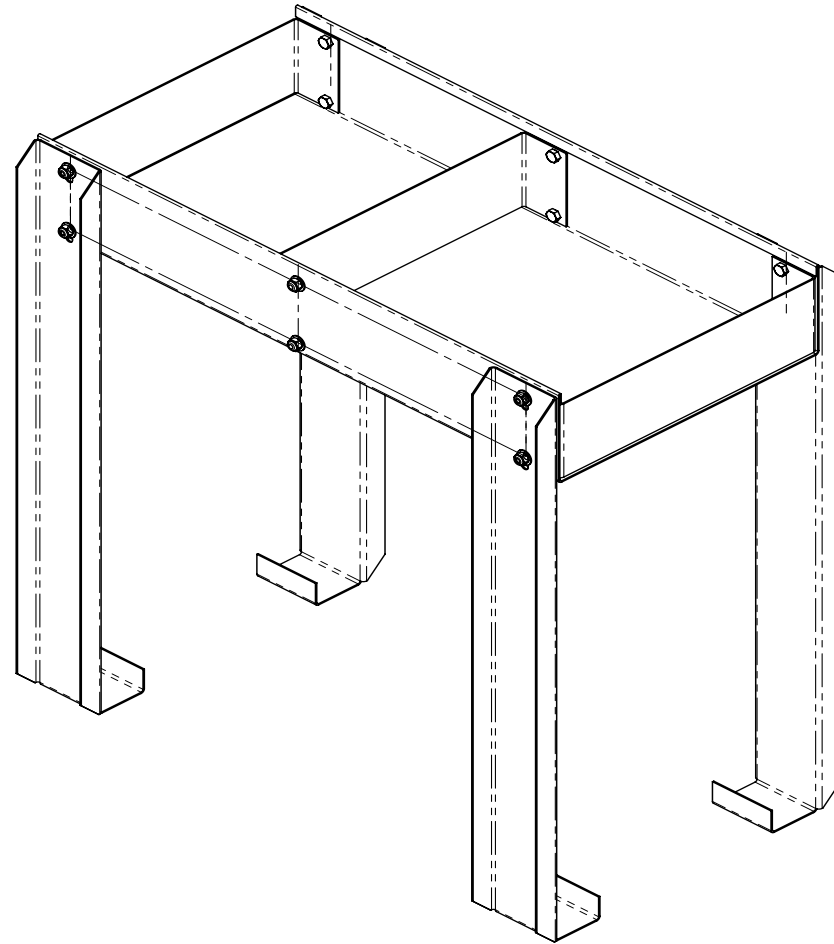
Figure 8-45. 50 Gallon Tank Flex Chemical Caddy Assembly
000-163-756 Rev. B



50 Gallon Tank Flex Chemical Caddy Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-1265	Bracket, Tank Stiffener	6
2	000-015-1264	Bracket, Tank Tray Rib	3
3	000-094-071	Nut, 1/4"-20UNC Nylock Half	12
4	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	12
5	000-166-178	Tray, Tank - 36"	1
6	000-174-003	Washer, 1/4" Flat	12

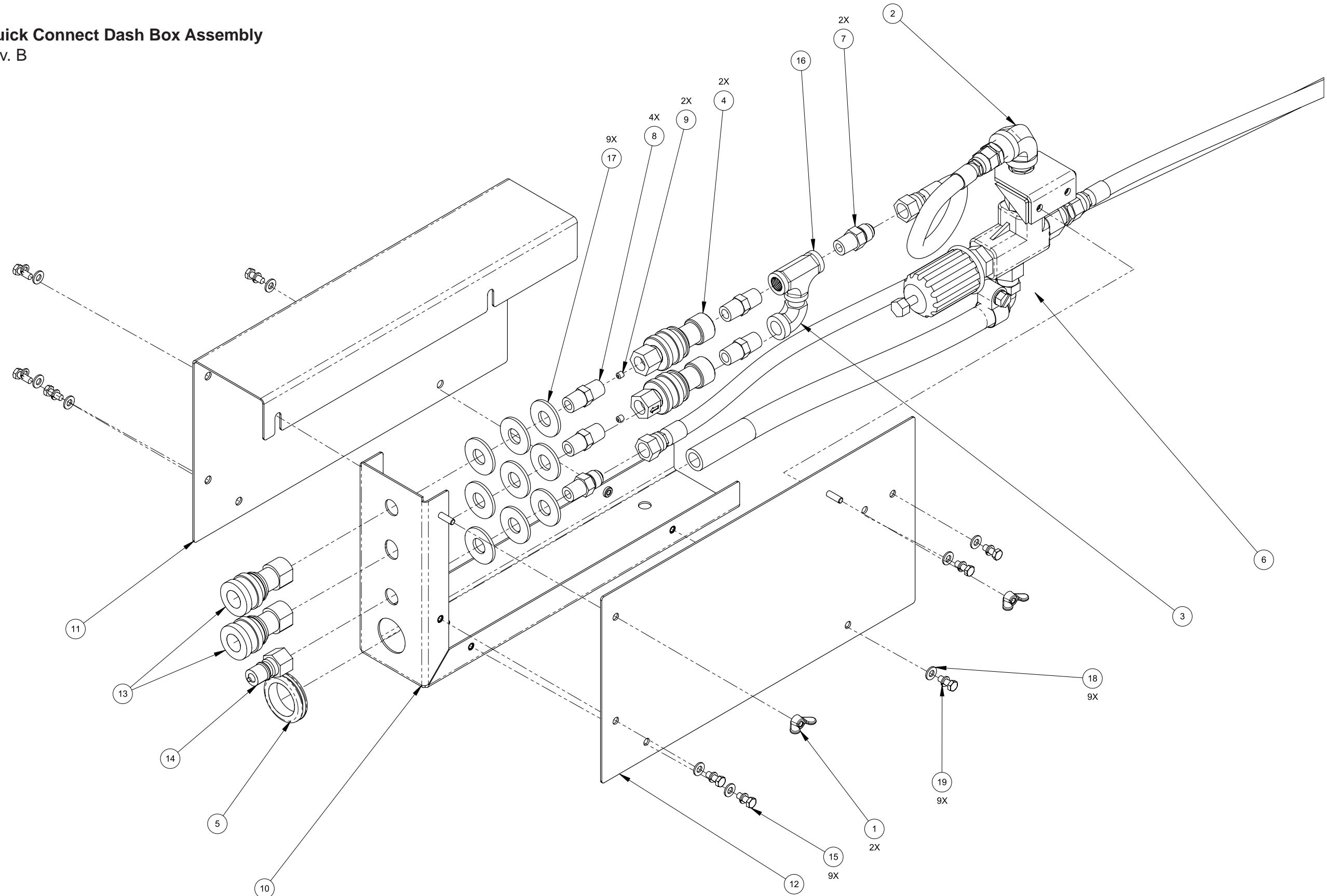
Figure 8-46. 35 Gallon Tank Flex Chemical Caddy Assembly
000-163-757 Rev. B



35 Gallon Tank Flex Chemical Caddy Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-1265	Bracket, Tank Stiffener	4
2	000-015-1264	Bracket, Tank Tray Rib	3
3	000-094-071	Nut, 1/4"-20UNC Nylock Half	12
4	000-143-333	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head	12
5	000-166-179	Tray, Tank - 26"	1
6	000-174-003	Washer, 1/4" Flat	12

Figure 8-47. Quick Connect Dash Box Assembly
601-021-750 Rev. B



Quick Connect Dash Box Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-094-091	Nut, #10-24UNC Wing S/S	2
2	601-009-750	Assembly, By-Pass Valve *	1
3	000-052-691	Elbow, 1/4" Street S/S	1
4	000-049-137	Filter, In-Line Quick Connect	2
5	000-060-014	Grommet, 1.00" I.D. X 1.50" O.D.	1
6	000-068-511	Hose Assembly, 5/16" X 59" Lg. - Hose Clean Out	1
7	000-052-506	Nipple, 1/4" MPT X 9/16"	2
8	000-052-095	Nipple, 1/4" S/S Hex	4
9	000-180-021	Orifice, Set Screw #10-32UNF X 0.052" I.D.	2

Item	Part Number	Description	Qty
10	000-100-345	Panel, QC- Front and Bottom	1
11	000-100-346	Panel, QC - Left and Top	1
12	000-100-347	Panel, QC - Right	1
13	000-052-690	Quick Connect, 1/4" Female S/S	2
14	000-052-516	Quick Connect, 440 Male w/ Viton Std	1
15	000-143-126	Screw, #10-24UNC X 0.50" Lg. Hex Head	9
16	000-052-189	Tee, 1/4" Female S/S	1
17	000-174-007	Washer, 1/2" Flat	9
18	000-174-001	Washer, #10 Flat	9

NOTICE

*The By-Pass Valve Assembly for the Instrument Panel Assembly is P/N 601-009-701 (see Figure 8-25).

The By-Pass Valve Assembly for the Flex's Quick Connect Dash Box is P/N 601-009-750 (Figure 8-48).

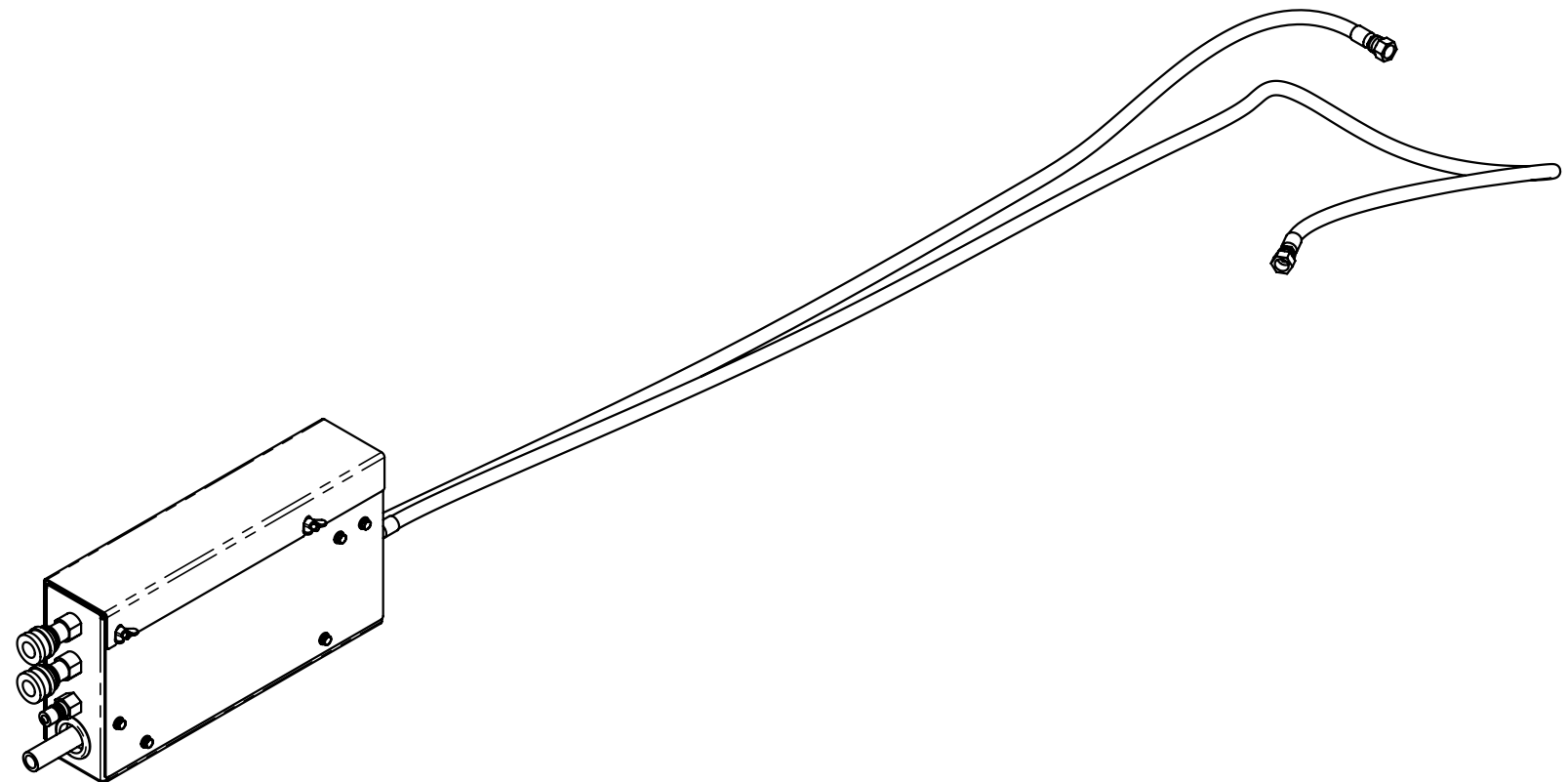
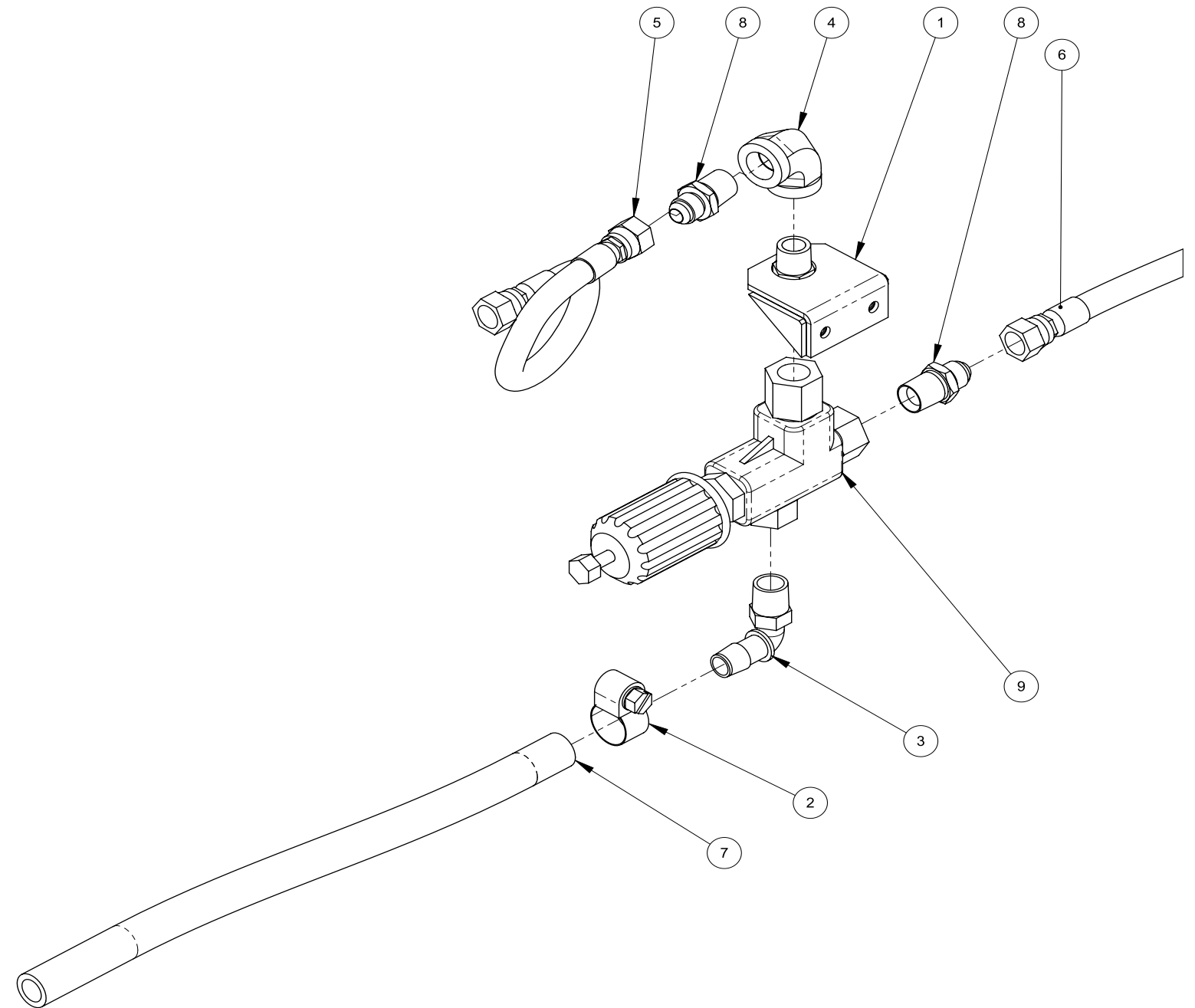
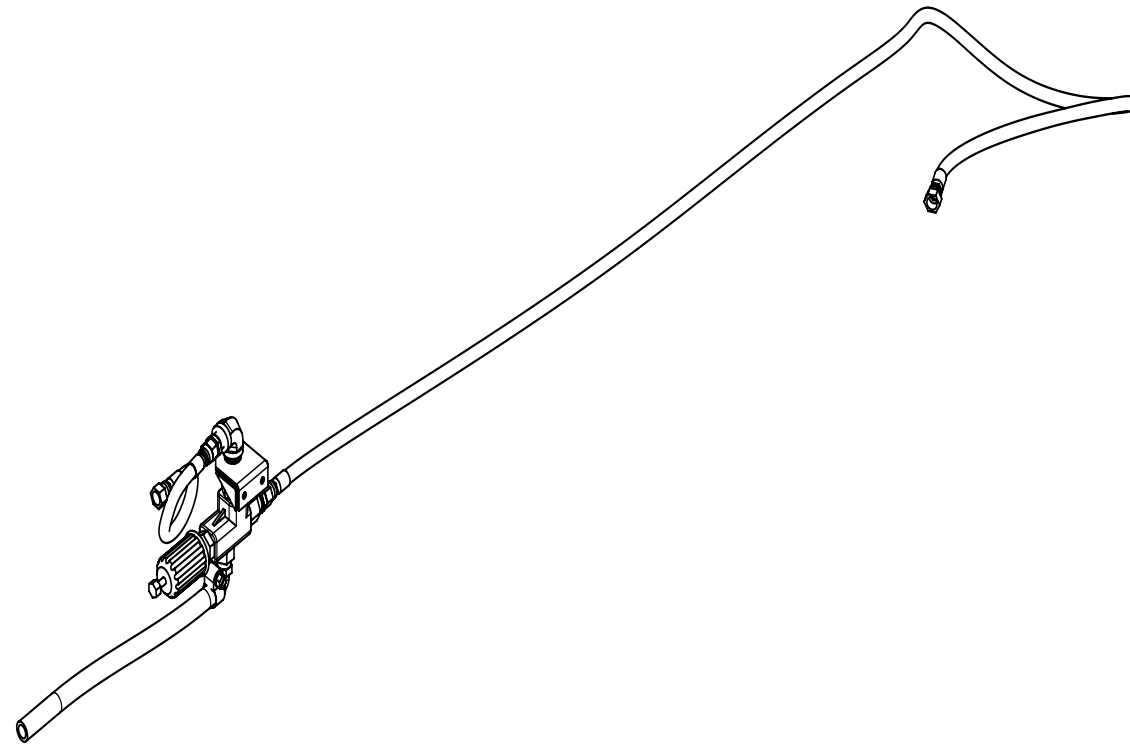


Figure 8-48. By-Pass Valve Flex Assembly
601-009-750 Rev. B



By-Pass Valve Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-515	Bracket, By-Pass Valve Mount - Weldment	1
2	000-033-004	Clamp, Size #6 Mini Hose	1
3	000-052-355	Elbow, 3/8" NPT X 1/2" Hose	1
4	000-052-188	Elbow, 3/8" S/S Female	1
5	000-068-329	Hose Assembly, 5/16" X 21" Lg. - Hose By-Pass to Orifice Manifold	1
6	000-068-681	Hose Assembly, 5/16" X 82" Lg. - Hose By-Pass In-Let - Hi-PSI Hose"	1
7	000-068-682	Hose, 1/2" Rubber X 60" Lg.	1
8	000-052-507	Nipple, 3/8" NPT X 9/16"-18 37 Degrees JIC S/S	2
9	000-169-178	Valve, S/S Press Reg	1

NOTICE

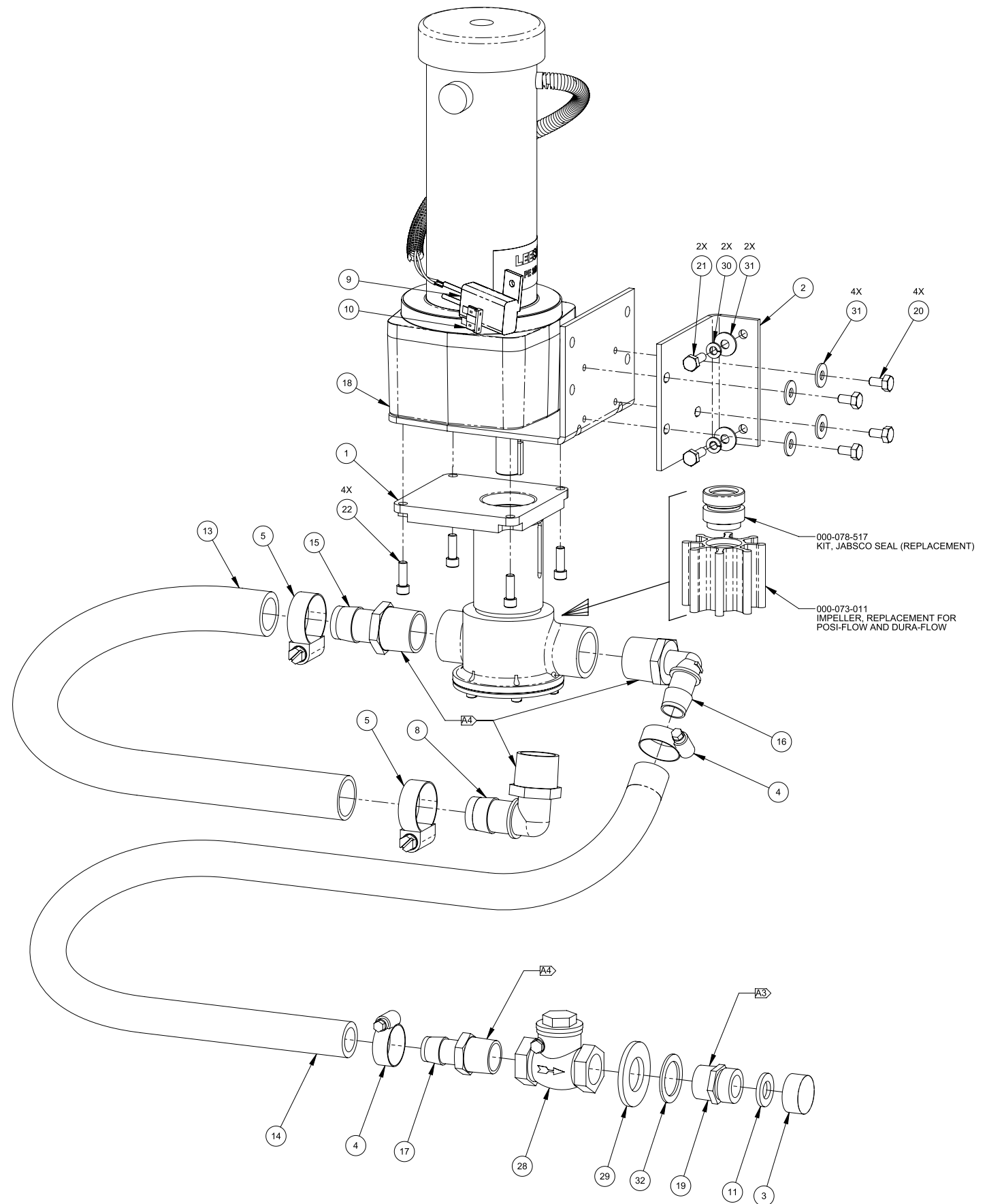
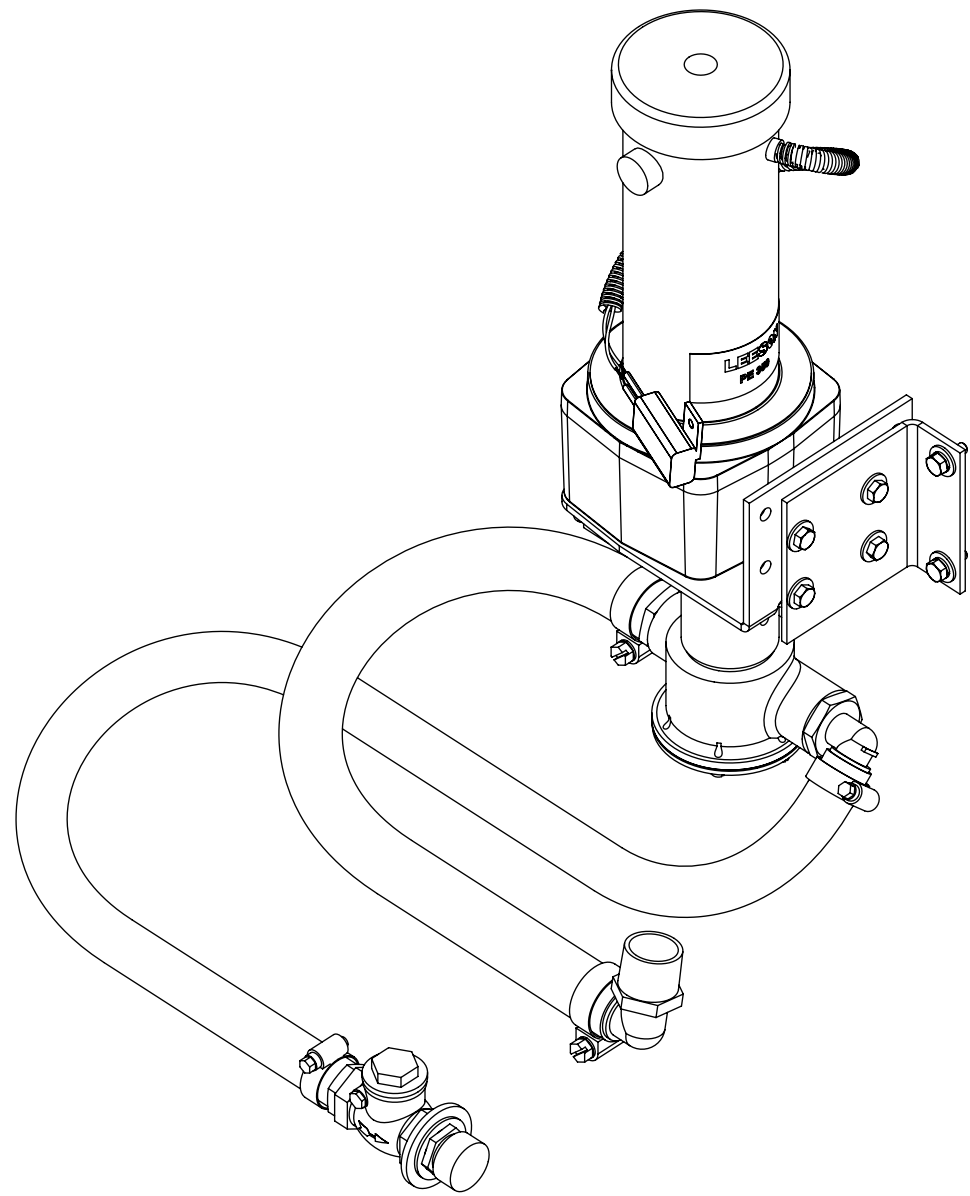
The By-Pass Valve Assembly for the Instrument Panel Assembly is P/N 601-009-701 (see Figure 8-25).

The By-Pass Valve Assembly for the Flex's Quick Connect Box is P/N 601-009-750 (see Figure 8-48).

Figure 8-49. Dura-Flow Automatic Pump Out (APO)
000-079-097 Rev. F

NOTICE

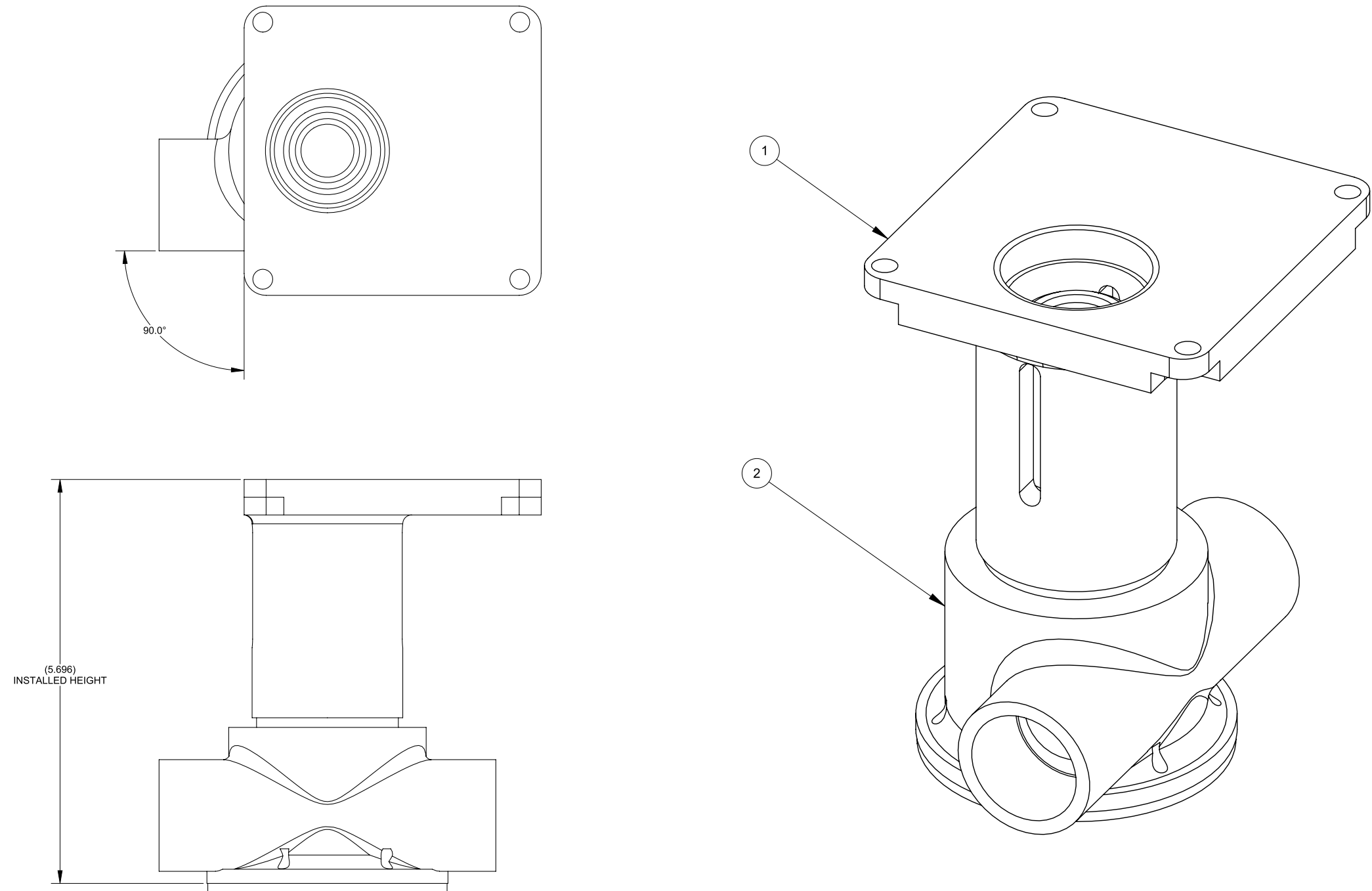
See Figure 8-1 for adhesive/sealant information.



Dura-Flow Automatic Pump Out (APO) Assembly Parts List

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	000-111-169	Assembly, APO Pump	1	17	000-052-338	Insert, #1212 (3/4" NPT X 3/4" Barb)	1
2	000-015-908	Bracket, Dura-Flow Support - Fabricated	1	18	000-091-042	Motor, Leeson PE350 Series	1
3	000-027-014	Cap, Garden Hose	1	19	000-052-281	Nipple, 3/4" NPT X 3/4" Male Garden Hose	1
4	000-033-029	Clamp, Size #12 Hose	2	20	000-143-074	Screw, 1/4"-20UNC X 0.50" Lg. Hex Head Self-Tapping	4
5	000-033-020	Clamp, Size #16 Hose	2	21	000-143-001	Screw, 1/4"-20UNC X 0.75" Lg. Hex Head	2
6	000-037-029	Connector, Butt 10/12	1	22	000-143-566	Screw, 1/4"-28UNF X 0.75" Lg. Socket Head	4
7	000-037-003	Connector, Butt 14/16 Blue	3	23	000-157-091	Switch, Harwil Float - Modified	1
8	000-052-131	Elbow, 1" NPT X 1" Barb (Glass Filled Black Nylon)	1	24	000-037-017	Terminal, 3/8" Stud 10 GA Wire w/ Vinyl	1
9	000-056-006	Fuse Holder, In-Line - Weatherproof	1	25	000-037-022	Terminal, 10 AWG Fully Insulated Female	1
10	000-056-010	Fuse, 25 Amp	1	26	000-037-023	Terminal, 10 AWG Fully Insulated Male	1
11	000-057-055	Gasket, Garden Hose	1	27	000-162-001	Tie Wrap, 4" Nylon	6
12	000-063-021	Harness, 1/4 Split Wire Loom	2 ft	28	000-169-009	Valve, 3/4" FPT Swing Check	1
13	000-068-1028	Hose, 1" I.D. Rubber X 16" Lg. - Red	1	29	000-174-050	Washer, 1" Flat	1
14	000-068-1027	Hose, 3/4" I.D. EPDM X 36" Lg.	1	30	000-174-017	Washer, 1/4" Lock	2
15	000-052-758	Insert, 1" NPT X 1" Barb	1	31	000-174-002	Washer, 1/4" Flat	6
16	000-052-757	Insert, 1" NPT X 3/4" Elbow	1	32	000-174-063	Washer, 1.5" O.D. X 1.073" I.D. X 0.075" Thk.	1

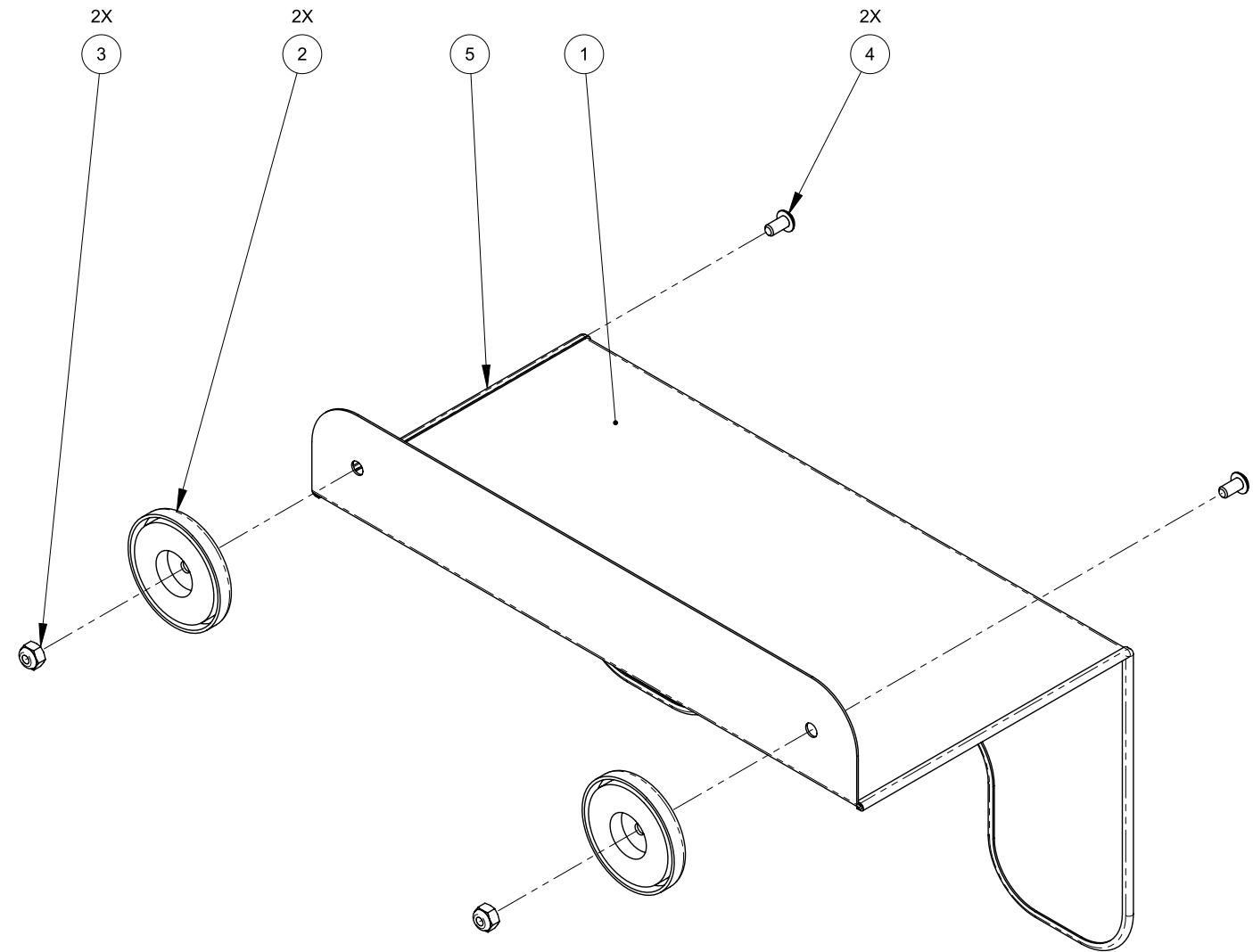
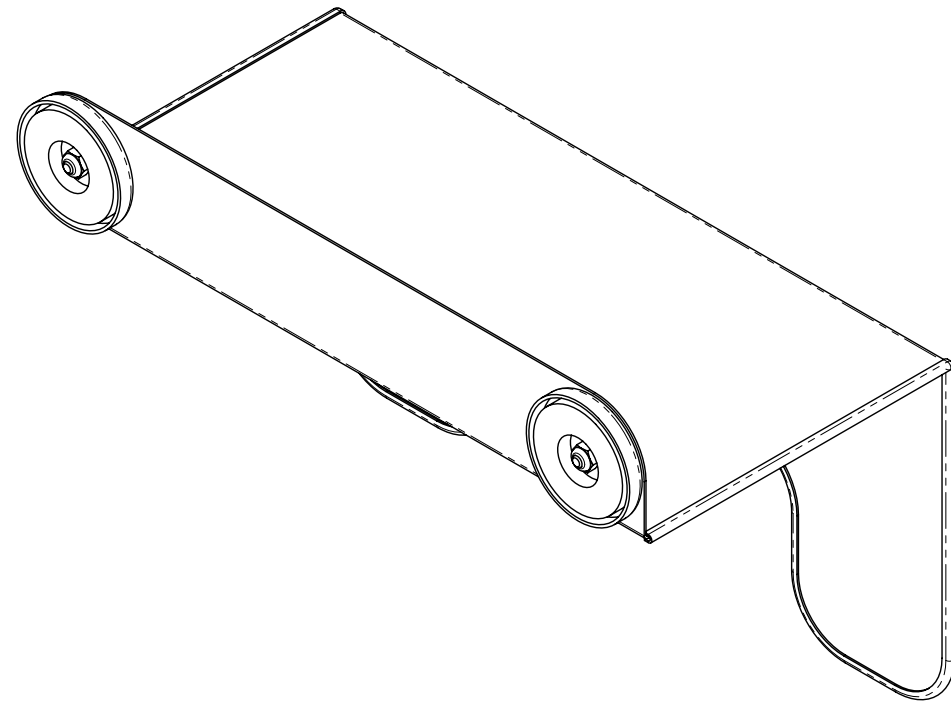
Figure 8-50. APO Pump
000-111-169 Rev. D



APO Pump Parts List

Item	Part Number	Description	Qty
1	000-092-010	Mount, APO Pumhead - Coated	1
2	000-105-696	Plate S/S APO Inner Wear	1
3	000-105-697	Plate S/S APO Outer Wear	1
4	000-111-168	Pump	1

Figure 8-51. Pump Cover Flex Assembly
000-041-707 Rev. B



Pump Cover Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-041-706	Cover, Pump	1
2	000-089-003	Magnet	2
3	000-094-034	Nut, #10-24UNC Nylock	2
4	000-143-107	Screw, #10-24UNC X 0.375" Lg. Button Head Socket	2
5	000-131-027	Trimlok, 1/8" X 3/8"	2 ft

Figure 8-52. Flex Install Kit Assembly
000-078-934 Rev. B

Flex Install Kit Assembly Parts List

Item	Part Number	Description	Qty
1	000-164-588	1/16" Allen L-Key	1
2	000-143-715	3/8"-16 X 2" Tap Bolt	10
3	000-094-015	Nut, 3/8"-16UNC Hex 2-Way Locking	10
4	000-143-546	Screw, #8 Washer Head X 1/2", Philips - Self Drill	8
5	600-011-003	Tie Down Cleat Washer - Fabricated	16
6	000-174-005	Washer, 3/8" Flat	20

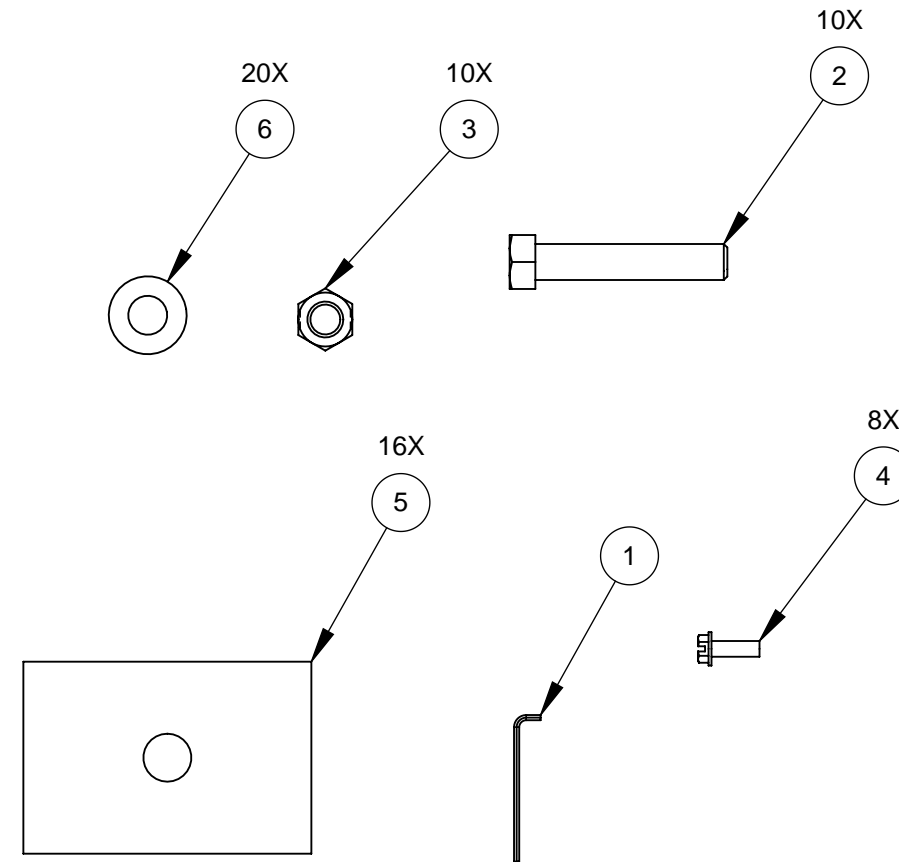
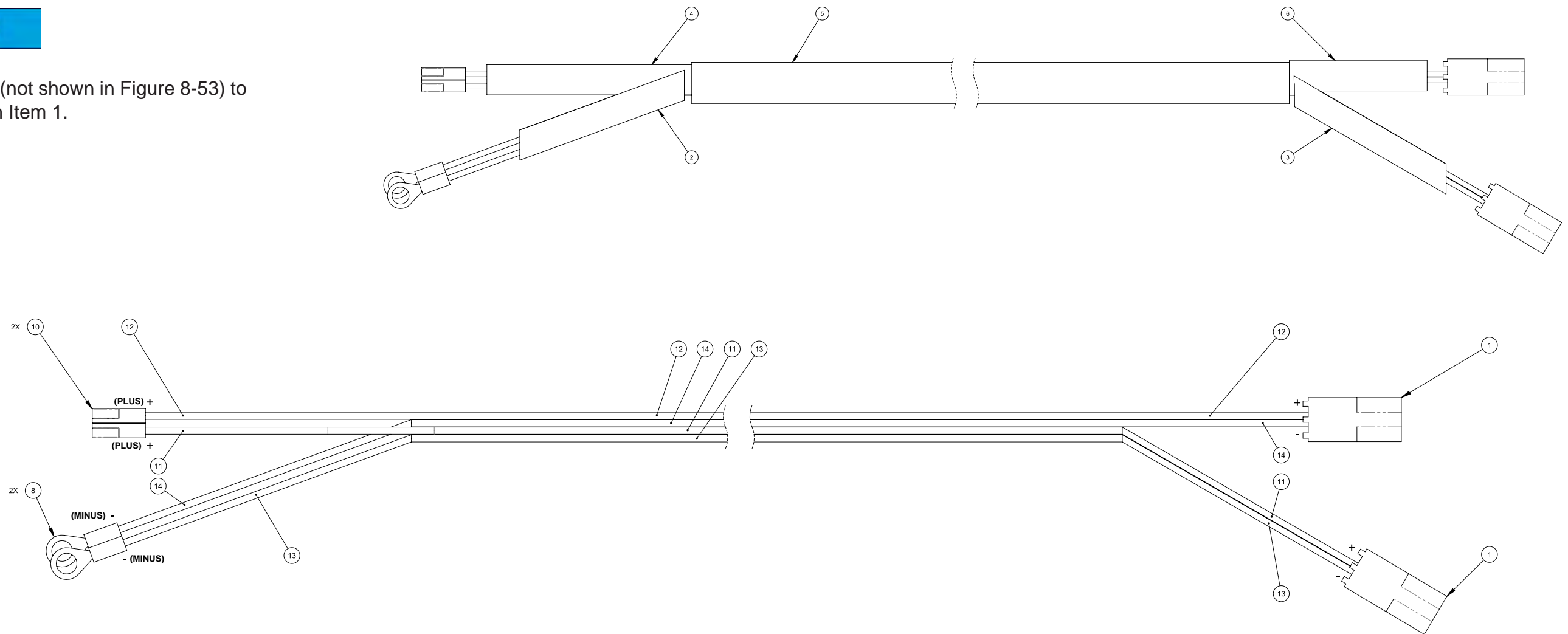


Figure 8-53. Wire Harness Flex Assembly
000-063-067 Rev. A

NOTICE

Items 7 and 9 (not shown in Figure 8-53) to be installed on Item 1.



Wire Harness Flex Assembly Parts List

Item	Part Number	Description	Qty
1	000-037-047	Connector, 2 Pole Water Tight Female	2
2	000-063-008	Wire Harness Wrap - Bulk Split Seam	2 ft
3	000-063-008	Wire Harness Wrap - Bulk Split Seam	4 ft
4	000-063-008	Wire Harness Wrap - Bulk Split Seam	6 ft
5	000-063-017	Harness Wrap, 3/4" Split	16 ft
6	000-063-008	Wire Harness Wrap - Bulk Split Seam	10 ft
7	000-147-030	Seal, Water Tite Wire Connector	4

Item	Part Number	Description	Qty
8	000-037-017	Terminal, 3/8 Stud, 10 GA Wire, Insulated	2
9	000-037-050	Terminal, Male Pin - 4 - Polewater Tight	4
10	000-037-022	Terminal, Fully Insulated Female, 12-10 ga	2
11	000-178-015	Wire, 12 GXL Red - Bulk	26
12	000-178-015	Wire, 12 GXL Red - Bulk	31 ft
13	000-178-062	Wire, 12 GXL White - Bulk	22 ft
14	000-178-062	Wire, 12 GXL White - Bulk	28 ft

CDS Hose Routing List

Part Number	Description	From	To
000-068-092	Hose, 3/8" X 15" w/ 3/8" JIC End	Dual Heat Exchanger	CDS: By-Pass Valve
000-068-1037	Hose, 3/8" I.D. X 38" Lg., Clr w/Braid	Chemical Jug	Chemical Meter
000-068-1039	Hose, 3/8" I.D. Rubber X 31" Lg.	CDS: By-Pass Valve	Recovery Tank
000-068-196	Hose, 3/8" I.D. X 11" Lg w/ 3/8" MPT and 3/8" JIC End	CDS: By-Pass Valve	Dual Heat Exchanger
000-068-203	Hose, 3/16" X 34" 1/4" F JIC X 1/4" F JIC	Water Box	Hi-PSI Manifold
000-068-385	Hose, 3/4" I.D. X 18 ft - Green Stripe - Cut to Fit	Dual Heat Exchanger	Van Cooling System
000-068-734	Hose, 1/2" X 42 1/8" Lg w/ 3/8" NPT and 3/8" SAE F Ends	Water Box	Water Outlet
000-068-940	Hose, 3/8" I.D. Rubber X 17" Lg.	Hi-PSI Manifold	Dual Heat Exchanger
000-068-977	Hose, 5/32" I.D. Vacuum X 52" Lg.	Pressure Gauge	Blower Outlet
000-068-978	Hose, 5/32" I.D. Vacuum X 52" Lg.	Lube Port	Blower
000-068-991	Hose, 1/2" I.D. Rubber X 42" Lg.	Water Box	CDS: By-Pass Valve

Flex Hose Routing List

Part Number	Qty	Description	From	To
000-068-1032	2	1/2" Clear x 8" Lg	Pump Filter	Pump Inlet
000-068-329	1	5/16" Hi-PSI x 21" Lg	QC Box: By-Pass Valve	QC Box: Orifice and Filter Manifold
000-068-328	1	5/16" Hi-PSI x 68" Lg	Coolant Heat Exchanger	Blower Heat Exchanger
000-068-511	1	5/16" Hi-PSI x 59" Lg	Cross	QC Box: Clean Out Port
000-068-621	1	5/16" Hi-PSI x 35" Lg	Cross	Coolant Heat Exchanger
000-068-674	1	1/2" Clear x 16" Lg	Tank Select Valve	Primary Valve
000-068-674	2	1/2" Clear x 16" Lg	Primary Valve	Pump Filter
000-068-675	1	1/2" Clear x 32" Lg	35 Gallon Tank	Tank Select Valve
000-068-676	1	1/2" Clear x 36" Lg	15 Gallon Tank	Tank Select Valve
000-068-677	2	1/2" Clear x 54" Lg	Primary Valve	Drain
000-068-677	1	1/2" Clear x 54" Lg	50 Gallon Tank	Primary Valve
000-068-678	3	1/2" Clear x 78" Lg	Tank	Vent
000-068-679	1	1/4" Rubber x 110" Lg	Driver's Side Pump	Cross
000-068-680	1	1/4" Rubber x 173" Lg	Passenger's Side Pump	Cross
000-068-681	1	5/16" Hi-PSI x 82" Lg	Blower Heat Exchanger	QC Box: By-Pass Valve
000-068-682	1	1/2" Rubber x 60" Lg	QC Box: By-Pass Valve	Drain



9 - Machine Maintenance

To avoid costly repairs and down-time, it is imperative to develop and practice good maintenance procedures from the beginning. These procedures fall into daily, weekly, monthly and quarterly increments, and are outlined in this section. All recommended maintenance must be performed by competent service personnel.

This section covers:

- Operational Maintenance
- Appearance Maintenance
- Van Long-Term Maintenance Schedule
- Drive Shaft Maintenance
- Troubleshooting
- Descaling Flex System as Required
- Back Flushing Heat Exchangers
- Clean QC Dash Box Filters and Orifices
- Pump Tuning Instructions

NOTICE

Record the date and machine hours on the maintenance log provided for your convenience in the Owner's Guide. Records of maintenance must be kept and copies may be required to be furnished to HydraMaster before the warranty is honored. It is recommended that you affix a copy of the log on the vehicle door near your unit for convenience and to serve as a maintenance reminder.

OPERATIONAL MAINTENANCE

This section contains recommendations for maintenance that will affect the service life of your unit.

NOTICE

HydraMaster recommends that you follow the vehicle maintenance schedule as stated by the manufacturer. All HydraMaster references to vehicle maintenance serve as general vehicle service reminders. If there are any questions regarding servicing of your vehicle, please contact your local vehicle dealership.

Daily

- Check engine oil level.
- Empty recovery tank inlet filter.
- Check Flex strainers (filter screens and plastic housings) for debris; clean as necessary.
- Inspect and clean garden hose screen.
- Visually inspect machine for loose wires, oil leaks, water leaks, etc.
- Inspect recovery tank stainless steel filter for clogging or damage; clean, repair or replace as needed.
- Inspect and clean the vacuum slot on the cleaning wand. Watch for sharp edges that may tear the carpet; remove any sharp edges as required.
- Lubricate blower with a HydraMaster-recommended spray lubricant (P/N 000-087-006) through blower lube port.
- Park the vehicle inside or turn on heater during freezing weather.

Weekly

- Check around vehicle and CDS unit for any evidence of oil/fluid leaks.

⚠ WARNING

Grease, oil, antifreeze, and debris build-up near hot equipment, such as the vehicle engine exhaust system or the blower exhaust system, can present a fire hazard and can cause death or bodily injury.

Vehicle engine exhaust system or the blower exhaust system, can present a fire hazard and can cause death or bodily injury.

- Clean and inspect float switches.
- Change pump oil after first 50 hours; every 300 hours thereafter.
- Check pump oil. Add as necessary.
- Check pump drive belt for wear.
- Check pump pulleys for wear.
- Check blower mounting fasteners, drive shaft clamping collar fasteners, and front end component fasteners, tighten as needed.
- Check internal machine high pressure water lines for wear or chafing.
- Clean and inspect recovery tank inlet filter.

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- Inspect and clean vacuum relief valve.
- Inspect all external solution hoses, vacuum hoses, and quick connects for wear or damage that may cause premature failure, replace as needed.
- Clean recovery tank thoroughly with high pressure washer.
- Check vehicle engine rpm on tachometer:
 - Speed 1 = 1,500
 - Speed 2 = 1,400
 - Speed 3 = 1,300

Monthly

- Check engine air cleaner filter. Clean as necessary.
- Clean Flex strainers (filter screens and plastic housings) with water.
- Clean and inspect the QC Dash Box in-line quick connect filters and orifices every 100 hours (see page 9-14).
- Check blower drive belt.
- Clean and inspect battery connections as needed.
- Change blower oil after first 100 hours.

Every 2 Months (60 Days)

- Tune Flex System pumps. See page 9-15 of this Owner's Manual for pump tuning instructions.

Quarterly

- Change oil in blower every 400 hours.
- Change oil in pump every 300 hours. Replace pump drive belt (P/N 000-010-065) every 300 hours.
- Check the CDS wiring harness for any chafing or wear, especially in the vehicle engine compartment or near any rotating parts.
- Check the vehicle wiring harness for any chafing or wear, especially in the vehicle engine compartment or near any rotating parts.
- Grease the power pack pillow block bearings.



Every 500 Hours

- Grease drive shaft U-joints, spline and zerks.
- Clean and inspect blower heat exchanger.
- Check blower heat exchanger magnesium anodes (P/N 000-108-022) and replace as necessary.
- Back flush all heat exchangers.

Yearly

- Give van complete vehicle service.
- Flush the van's cooling system. Add new anti-freeze.
- Change the van's transmission fluid.

Change engine oil and filter after every 2,000 miles.

NOTICE

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

APPEARANCE MAINTENANCE

Maintaining the original appearance of your unit is important for two reasons:

1. It represents a big dollar investment for your cleaning business and its appearance should reflect that fact. A dirty machine does not look professional.
2. Maintenance, troubleshooting and repair is much easier to accomplish on a clean, well-maintained unit. Regular cleaning of the machine offers you an opportunity to visually inspect all parts of the machine and spot potential problems before they occur.

The following maintenance is recommended by the manufacturer at the frequency indicated:

Daily

- Wipe machine down thoroughly with a damp cloth.
- Flush recovery tank out thoroughly.
- Clean wand to maintain original appearance.
- Wipe down vacuum and high pressure hoses as needed.
- Visually inspect hoses for cuts, etc.

Weekly

- Wipe down entire unit as needed.
- Apply good coat of auto wax to all painted surfaces inside and out.
- Thoroughly clean wand and inspect for clogged jet, debris in vacuum slot and leaking fittings at valve.
- Apply light coat of auto wax to wand. Thoroughly clean vacuum and high pressure hoses including hose cuffs.



VAN LONG-TERM MAINTENANCE SCHEDULE

The following components or systems should be serviced or replaced at the specified intervals.

Component	Interval (Machine hours / months of service)
High pressure water pump rebuild	2,000 / 24
Vehicle engine thermostat	2,000 / 24
Vehicle engine accessory drive belt	2,000 / 24
CDS clutch	3,000 / 36
CDS drive shaft	3,000 / 36
CDS blower silencer and exhaust plumbing	4,000 / 48
CDS and vehicle heater hoses	4,000 / 48
CDS wire harness	4,000 / 48
CDS clutch housing drive bearings	4,000 / 48

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DRIVE SHAFT MAINTENANCE

Every 500 operating hours, apply lubricant to the drive shaft's zerk fittings at clutch and blower flange U-joints (see Figure 9-1).

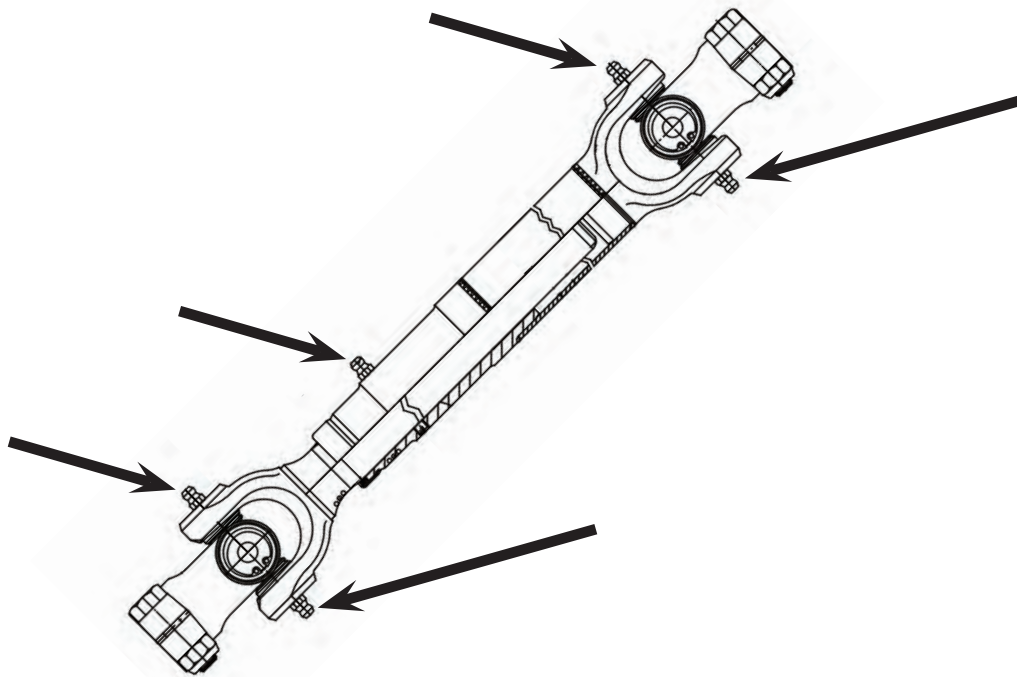


Figure 9-1. Zerk Fittings on Drive Shaft

The drive shaft spline should also be lubricated with a bearing grease with an application temperature range of -4°F to $+347^{\circ}\text{F}$; the drive shaft manufacturer recommends Mobil Delvac Xtreme Service™ grease as the lubricant.

TROUBLESHOOTING

HEATING SYSTEM

1.0. Vehicle overheats and shuts off CDS

Refer to vehicle dealer for diagnosis and repair.

2.0. Vehicle overheats

POSSIBLE CAUSE	SOLUTION
2.1. Faulty thermostat in vehicle.	Refer to dealer
2.2. Faulty water pump on vehicle	Refer to dealer
2.3. Faulty radiator (plugged) limited water flow	Refer to dealer
2.4. Faulty fan clutch, limited air-flow.	Refer to dealer

3.0. Unable to achieve normal cleaning temperature

POSSIBLE CAUSE	SOLUTION
3.1. There is hard water or chemical build-up in the heat exchangers.	This will not allow the heat to transfer properly. Descale and flush as necessary. See page 9-11 of this Manual for the heat exchanger back flush procedure.
3.2. Cleaning solution flow is too great.	Measure flow at tool.
	3.2.1. The jet in the cleaning tool is too large or worn out. Test the tool for water flow and replace or repair jet as necessary.
	3.2.2. Cleaning solution pressure is too high. Adjust pressure to normal. Inspect pressure gauge for accurate reading.
3.3. The system thermal valve is stuck open.	Remove recovery tank lid and check for premature flow from thermal valve hose at tank. The machine must be at or below normal operating temperature for this test. Replace or repair as necessary.
3.4. The CDS is being operated at too low rpm or too low vacuum setting.	The system must be at full operating rpm and full vacuum load to achieve full operating temperature. These values must be set per manufacture's specifications. Adjust vacuum or rpm as necessary.

4.0. System attains normal heat but drops off sharply

POSSIBLE CAUSE	SOLUTION
4.1. Solution flow at cleaning tool is too high. Orifice in tool is too large or worn out.	Test flow of tool. Repair or replace as necessary.
4.2. The rpm of machine is set too low.	Adjust as necessary.
4.3. Recirculation orifice plugged, giving incorrect reading at gauge.	Clean filter screen and inspect orifice. Clean or replace as necessary.
4.4. Cleaning solution pressure is too high.	Adjust pressure to normal. Inspect pressure gauge for accurate reading.
4.5. Hard water deposits are in the system.	Descale the Flex System as directed (see page 9-10).

Miscellaneous

1.0. Vehicle radiator overflows into coolant overflow container while machine is in use.

POSSIBLE CAUSE	SOLUTION
1.1. Internal leak in coolant heat exchanger.	Pressure test each heat exchanger separately to determine which heat exchanger is faulty. This process requires heated water and high pressure to simulate the same conditions that are causing the leak. Refer to qualified service technician if necessary.

DESCALING FLEX SYSTEM AS REQUIRED

1. With the CDS turned off, remove the fasteners from the QC Dash Box cover panel and lift the cover off of the QC Dash Box.
2. Disconnect and remove the female QC fitting assembly from the QC Dash Box, with the 18" hose still attached, and place the female QC fitting assembly/hose into a large bucket (see Figure 9-2).

NOTICE

The descaler will drain from the female QC fitting assembly/hose quickly. Have extra buckets ready to swap out because each bucket should fill quickly.

3. Pour 5 gallons of descaler solution into each of the Flex tanks.
4. Turn on the CDS but do not start it.
5. Turn on Natural Pump #1 and run it until the Flex tank is empty.
6. Add water to the Flex tank to flush all descaler out of the solution line.
7. Turn on Natural Pump #2 and run it until the Flex tank is empty.
8. Add water to the Flex tank to flush all descaler out of the solution line.
9. Turn off the CDS.
10. Re-assemble and re-connect the female QC fitting assembly and 18" hose into the QC Dash Box.
11. Re-install the cover panel onto the QC Dash Box.

BACK FLUSHING HEAT EXCHANGERS

NOTICE

Back flushing should be performed every 500 operating hours. It must be performed in addition to descaling. Please note that, although similar, back flushing is not the same as descaling.

1. With the CDS turned off, remove the fasteners from the QC Dash Box cover panel and lift the cover off of the QC Dash Box.

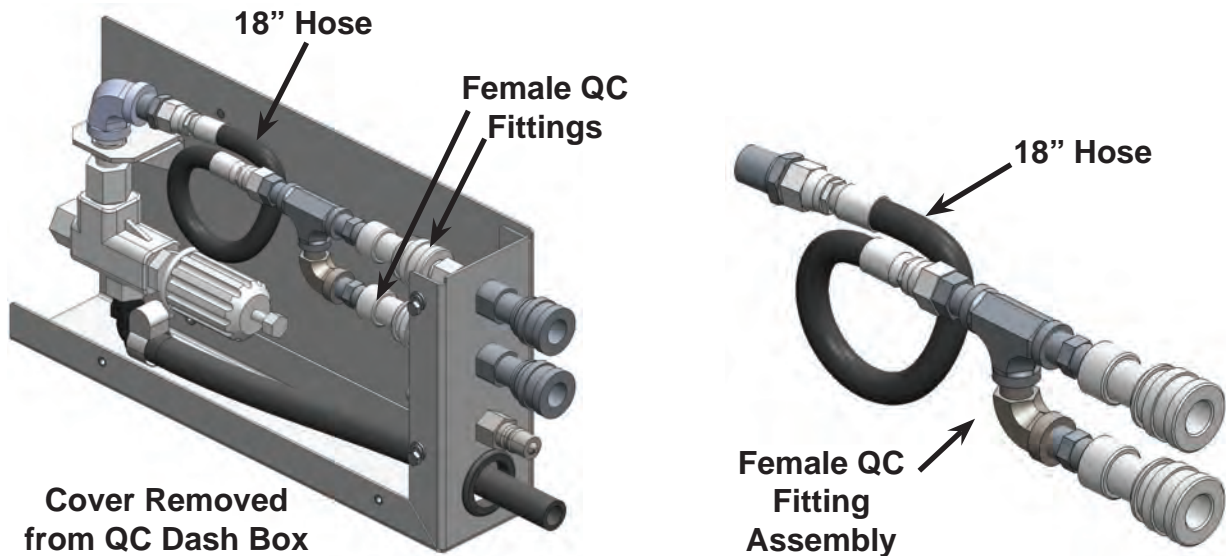


Figure 9-2. Disconnect Female QC Fitting Assembly with 18” Hose Attached

2. Disconnect and remove the female QC fitting assembly from the QC Dash Box, with the 18” hose still attached, and place the female QC fitting assembly/hose into a large bucket (see Figure 9-2).

NOTICE

The back flushed hot water will drain from the female QC fitting assembly/hose. Have extra buckets ready to swap out because each bucket should fill quickly.

Press the PUMP CLUTCH switch to “OFF” when swapping buckets to avoid spillage.

3. Connect the garden hose to the CDS fresh water inlet (see Figure 9-3). Turn on the fresh water source (typically, the outdoor water faucet).
4. Start the CDS.
5. Set the THROTTLE CONTROL switch to High (Speed 1) and follow normal warm up procedures.
6. After the CDS is warmed up, press the PUMP CLUTCH switch to "ON" and set the pressure to 900 psi (see Figure 9-3).

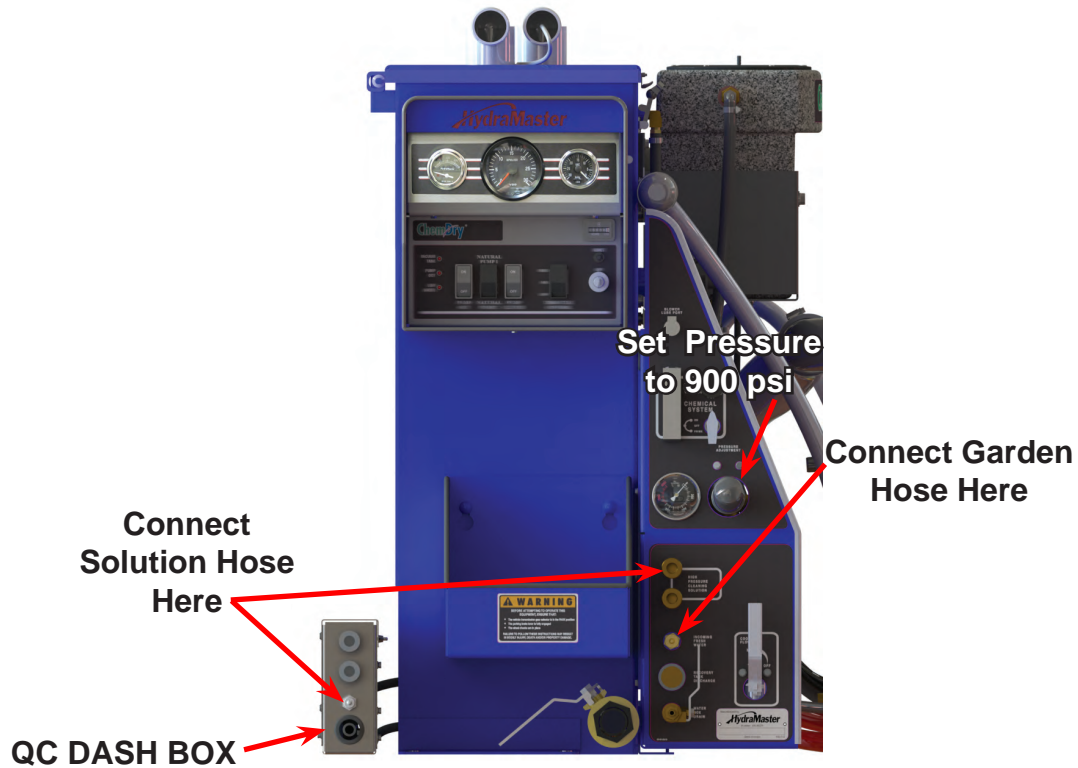


Figure 9-3. Set Pressure, and Connect Solution Hose and Garden Hose

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7. Press the PUMP CLUTCH switch to "OFF" momentarily to connect the solution hose.
8. Connect one end of the solution hose to one of the CDS solution out fittings and the other end to the male QC fitting on the QC Dash Box (see Figure 9-3).
9. Press the PUMP CLUTCH switch to "ON" and run the CDS for 5 minutes, or longer, until the water coming out from the hose into the bucket is clear.
10. After about 5 minutes, press the PUMP CLUTCH switch to "OFF" and then turn off the CDS.
11. Re-assemble and re-connect the female QC fitting assembly and 18" hose into the QC Dash Box.
12. Re-install the cover panel onto the QC Dash Box.
13. Turn off the outdoor water source and disconnect the solution hose and the garden hose.

CLEAN QC DASH BOX FILTERS AND ORIFICES

Clean and inspect the in-line quick connect filters and orifices every 100 hours.

1. With the CDS turned off, remove the fasteners, including the wing nuts, from the QC Dash Box top/left cover panel and lift the cover off of the QC Dash Box.
2. Disconnect and remove the female QC fittings from the 18" hose (see Figure 9-4).
3. Disassemble the QC fittings, remove the filter from each fitting and wash with clean water, removing any debris (see Figure 9-5).
4. With a hex L-key, remove the orifice from each fitting and wash with clean water, removing any debris (see Figure 9-4).

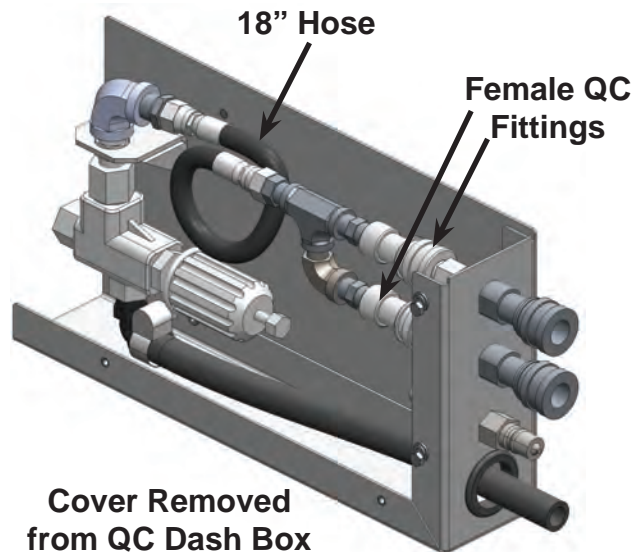


Figure 9-4. Remove Cover from QC Box

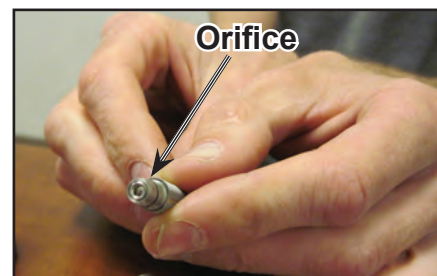
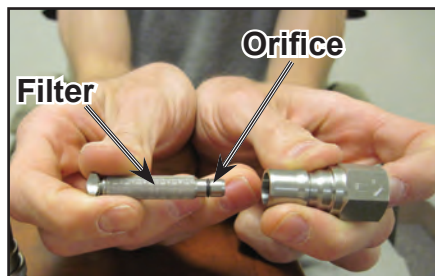


Figure 9-5. Remove Filter and Orifice from Each Fitting

5. Re-assemble the fittings with the filters and orifices, and reconnect the female QC fittings onto the 18" hose.
6. Replace the cover panel onto the QC Dash Box and re-install all the fasteners, including the wing nuts.

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PUMP TUNING INSTRUCTIONS

Pump tuning for the CTS 4.8 Flex allows the pump pressure switch to turn off when there is no flow out of the tool. This reduces the pump operating temperatures and increases the pump durability.

NOTICE

Pump tuning should be performed every 60 days.

The pump pressure setting adjustment is performed by turning the hex screw, which is close to the center of the pump head, with a hex L-key, provided in the Flex Installation Kit - (see Figure 9-6).

- Clockwise increases the pressure
- Counterclockwise decreases the pressure.

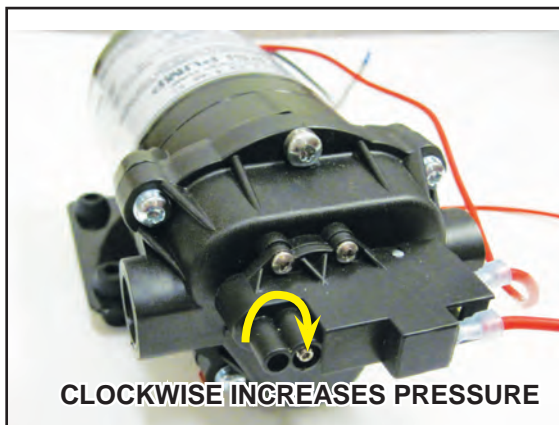


Figure 9-6. Location of Pump's Hex Screw

Tools required include:

- 1/16" hex L-key (one is provided with each pump for your convenience in Installation Kit, P/N 000-078-934).
- Solution hose
- Cleaning tool (upholstery tool/ wand/ rotary cleaning tool) to allow solution to flow out
- Container to collect solution flowing out of the tool.

Start up Pump Tuning Procedure

1. Connect the tool's solution hose to one of the 2 quick disconnects (the stainless steel low pressure solution ports) on the QC Dash Box (see Figure 9-7).
2. Turn the CDS key to the "ON" position but do not start the CDS unit (see Figure 9-8).

NOTICE

You do not need to start the CDS unit since vacuum is not needed for this procedure.

3. Turn on the driver's side pump (Pump 1) until all air is bled from the system (see Figure 9-8).

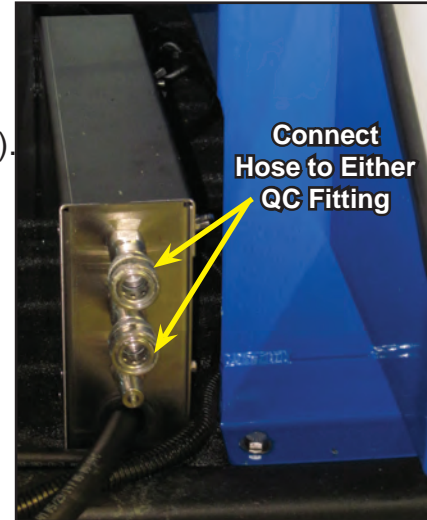


Figure 9-7. Connect Solution Hose to QC Dash Box

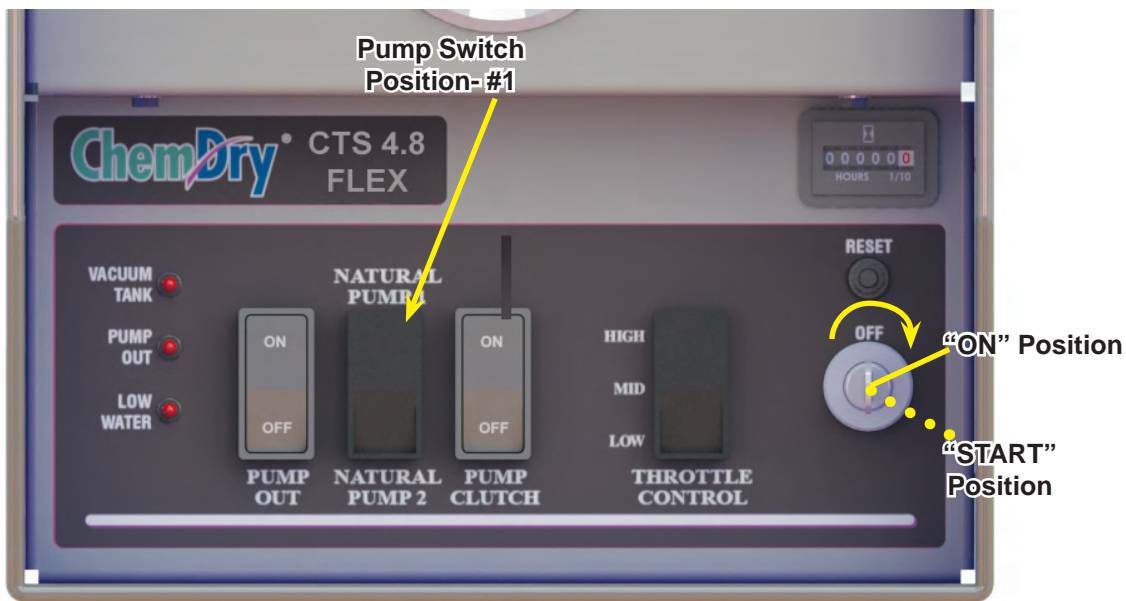


Figure 9-8. CTS 4.8 Flex Dash Panel, Showing Pump Switch Position for Pump #1

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4. With the pump still on, disconnect the solution hose from the Flex unit (see Figure 9-9).

The pump should run for about 3 to 5 seconds and then switch off.

5. Leave the hose disconnected.

Continue on to the Adjustment procedure (page 9-18).

NOTICE

After the Adjustment procedure has been performed for the driver's side pump (#1 - see page 9-18), repeat the entire procedure for the passenger side pump (#2 - see Figure 9-10), starting with step 1 on page 9-16.

Then, perform the Adjustment procedure for the passenger side pump.

ChemDry



Figure 9-9. Disconnect Solution Hose

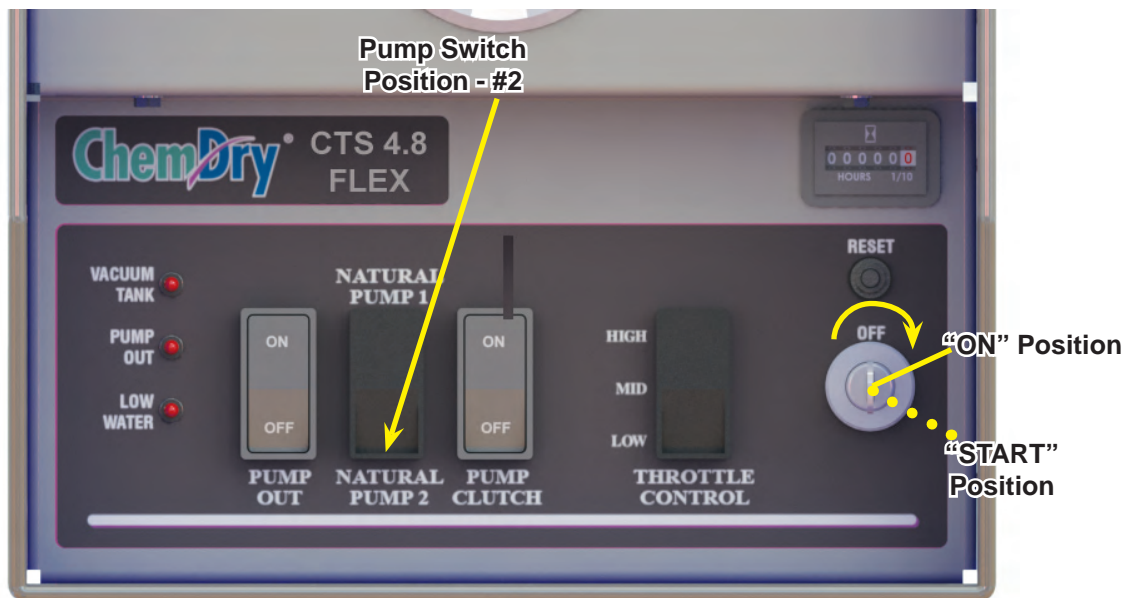


Figure 9-10. CTS 4.8 Flex Dash Panel, Showing Pump Switch Position for Pump #2

Adjustment

1. If the pump continues to run for longer than 3 to 5 seconds, turn the screw counterclockwise until the pump switches off (see Figure 9-11).
2. If the pump switches off as soon as the hose is disconnected (less than 3 to 5 seconds), turn the pump screw clockwise one complete turn.
3. With the pump still on, reconnect the solution hose onto the Flex unit (see Figure 9-7).

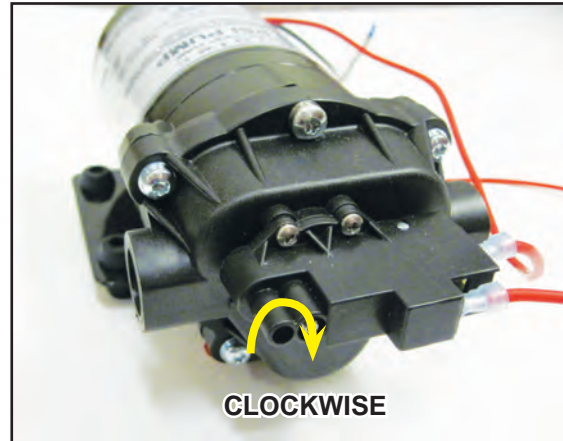


Figure 9-11. Insert Hex L-Key and Turn It Counterclockwise/Clockwise

The pump should switch on.

4. Repeat steps 1 through 3 on this page until the pump switches off within 3 to 5 seconds after the hose is disconnected.
5. Repeat the entire procedure for the passenger side pump, starting with step 1 on page 9-16.

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. Hours on the Unit
 - d. Unit Serial Number
 - e. 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.

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 HydraMaster and arrange for expedited shipping.

HydraMaster sells parts only through authorized distributors and service centers. Any questions you have regarding the warranty program should be directed to your distributor..

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



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FLEX**

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 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.
- Operating machine without proper chemical filter screen.
- Failure to protect against freezing.

CONTROL PANEL

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

VACUUM AND SOLUTION HOSES

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

CLEANING WAND AND TOOL

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

WATER HEATING SYSTEM

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

HARD WATER DEPOSITS

- Failure to use or maintain a water softening system or a properly installed magnetic-type descaler, whichever might be necessary, with machines operating in designated "Hard Water Areas" (3.5 grains or more per gallon).

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WARRANTY PROCEDURE

Warranty coverage is available to you through your local distributor.

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

FOR YOUR REFERENCE:

Model No. _____

Serial No. _____

Date of Purchase: _____

Purchased From (Distributor): _____



HYDRAMASTER® STANDARD CDS LIMITED WARRANTY

HydraMaster warrants to the original end user, each new machine, new accessories and genuine replacement parts against defects in material and workmanship under normal use and service. Our obligation under this warranty is limited to repair or replacement of the defective item at our factory or by an Authorized Service Center. Warranty coverage shall begin on the date of purchase by the original end user (as evidenced by your invoice from the factory or Authorized Dealer) or six (6) months from the date the machine was shipped from the factory, whichever is earlier. The warranty registration card must be completed and returned within 30 days of purchase. The warranty coverage period is specified below.

GROUP	Parts ^{1,2}	Labor ²
Frame	3 Years	2 Years
Covers	3 Years	2 Years
Vacuum Recovery Tank (Structural only)	3 Years	2 Years
Vacuum Pump – see Note 3	2 Years	2 Years
Chemical Systems	2 Years	2 Years
Hoses, Internal Machine	2 Years	2 Years
Hoses, External Machine	2 Years	2 Years
Valve, High pressure bypass	2 Years	2 Years
Water Heating System	2 Years	2 Years
Pump, High pressure water	2 Years	2 Years
Belts	2 Years	2 Years
Fittings, internal machine	2 Years	2 Years
Filter Screens	2 Years	2 Years
Gauges	2 Years	2 Years
Electrical Components	2 Years	2 Years
Accessories and Fresh Water Tanks	1 Year	1 Year
Replacement Parts- see Note 4	90 Days	NA
NOTES:		
1-Parts repaired or replaced are guaranteed for the remainder of the original machine warranty period.		
2-Coverage only applicable to products sold and used in the United States and Canada.		
3-As provided by the original Manufacturer.		
4-Applies to replacement parts only after machine warranty coverage has expired.		

This warranty shall not apply to repairs resulting from accidents or misuse, damage in transit, overloading the capacity of the machine, failure due to lack of proper maintenance or care as described in the operating and maintenance instructions. Freezing of any water or chemical related component will VOID all warranties on water or chemical related components, internal or external. Corrosion, deposits and/or build-up in the water, chemical, recovery or heating systems due to hardness in the water used or chemicals which result in deposits, will VOID all warranties on affected components. The use or application of any chemical, including but not limited to acids or solvents, which results in damage to metal, rubber, plastic, or painted parts will VOID all warranties on those parts. Minor adjustments, such as tightening of screws or bolts not connected with the replacement of parts, are not covered. Replacement of expendable wear items including, but not limited to paint, labels and other cosmetic parts are also not covered. Repairs or alterations by an organization other than the factory or an Authorized Service Center are not covered and will void any HydraMaster warranty as to the parts or systems repaired or altered by a non-authorized organization.

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION OF THE LIMITED WARRANTIES STATED WITHIN. NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS MADE EXCEPT AS EXPRESSLY STATED HEREIN. ANY STATUTORY IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, THAT ARE IMPOSED BY LAW DESPITE THE EXPRESS LIMITATION OR WARRANTIES ABOVE, ARE EXPRESSLY LIMITED TO THE DURATION OF THE WRITTEN WARRANTY. BUYER UNDERSTANDS, ACKNOWLEDGES AND AGREES THAT THE REMEDIES PROVIDED UNDER THIS LIMITED WARRANTY ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO THE BUYER. HYDRAMASTER WILL NOT BE LIABLE FOR ANY OTHER OR ADDITIONAL DAMAGES, INCLUDING BUT NOT LIMITED TO INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE FURNISHING, PERFORMANCE, USE OF OR INABILITY TO USE THE MACHINE. ANY EXTENSIONS OF OR MODIFICATIONS MADE TO THIS WARRANTY BY A DEALER/DISTRIBUTOR OF HYDRAMASTER ARE THE SOLE RESPONSIBILITY OF THE DEALER/DISTRIBUTOR.

HydraMaster will pay all freight and transportation charges within the United States, via normal ground shipping means, for replacement of parts covered under this warranty. All material must be properly authorized by HydraMaster prior to being returned. When returning, please provide an explanation of the problem and include the serial number of the machine as well as the name of the selling organization. All defective material must be returned to HydraMaster within 60 days of authorization. The Technical Service department of the authorized Dealer Service Center or the factory will investigate and then contact you.

Transportation of hazardous waste or contaminated equipment is subject to various laws and regulations. In returning machines, parts, or accessories under this limited warranty, the end user must certify in writing that the machines, parts or accessories being returned have not been used for handling, clean up, or disposal of hazardous waste or hazardous materials including but not limited to such things as asbestos, anthrax etc. or if the machines, parts or accessories being returned have been used for handling, clean up, or disposal of hazardous waste or hazardous materials, then the end user must have the machines, parts or accessories decontaminated by licensed and qualified decontamination professionals and provide written certification of this decontamination signed by the decontamination professionals. These machines, parts or accessories are to be returned only to the local HydraMaster Authorized Service Center for Warranty service along with decontamination certification.

HydraMaster reserves the right to change its warranty policy without notice.

HydraMaster is a Nilfisk, Inc. brand.

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CS-46565 Rev. A

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FLEX SYSTEM WARRANTY - ADDENDUM TO THE HYDRAMASTER STANDARD CDS LIMITED WARRANTY

Flex System items which are not included in HydraMaster CDS Standard Limited Warranty:

- Flex tank assemblies
- Flex diaphragm pumps
- Strainers

These listed items are covered for one (1) year only.

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**FLEX SYSTEM WARRANTY - ADDENDUM TO THE HYDRAMASTER STANDARD
CDS LIMITED WARRANTY**

Flex System items which are not included in HydraMaster CDS Standard Limited Warranty:

- Flex tank assemblies
- Flex diaphragm pumps
- Strainers

These listed items are covered for one (1) year only.

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