



CDS xDrive Owner's Manual

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1 - General Information

The CDS xDrive is HydraMaster's newest, most technologically advanced carpet cleaning and hard surface cleaning machine. This electrically powered system has been designed to fit into a compact, modular configuration, providing not only high performance but ease of installation and simpler maintenance.

The drive shaft, associated bearings and universal joints typically associated with other clutch drive systems have been eliminated from the CDS xDrive, which means it can also be installed in various van types without major vehicle modifications. *(Currently installed in the Ford Transit)*



The CDS xDrive features:

- a HydraMaster-exclusive generator located in the van's front end
- a power pack assembly that includes a HydraMaster-exclusive motor, which drives the Gardner Denver 408 Tri-Flow® blower, and the General Pump® high pressure water pump
- two pack programmable electronic controllers - one dedicated to the generator and one dedicated to the blower
- a 48 V battery pack

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

This Owner's Manual contains operation instructions as well as information required for proper maintenance of the CDS xDrive.

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 CDS xDrive. Truckmount System, paying special attention to all **Warnings and Cautions**.

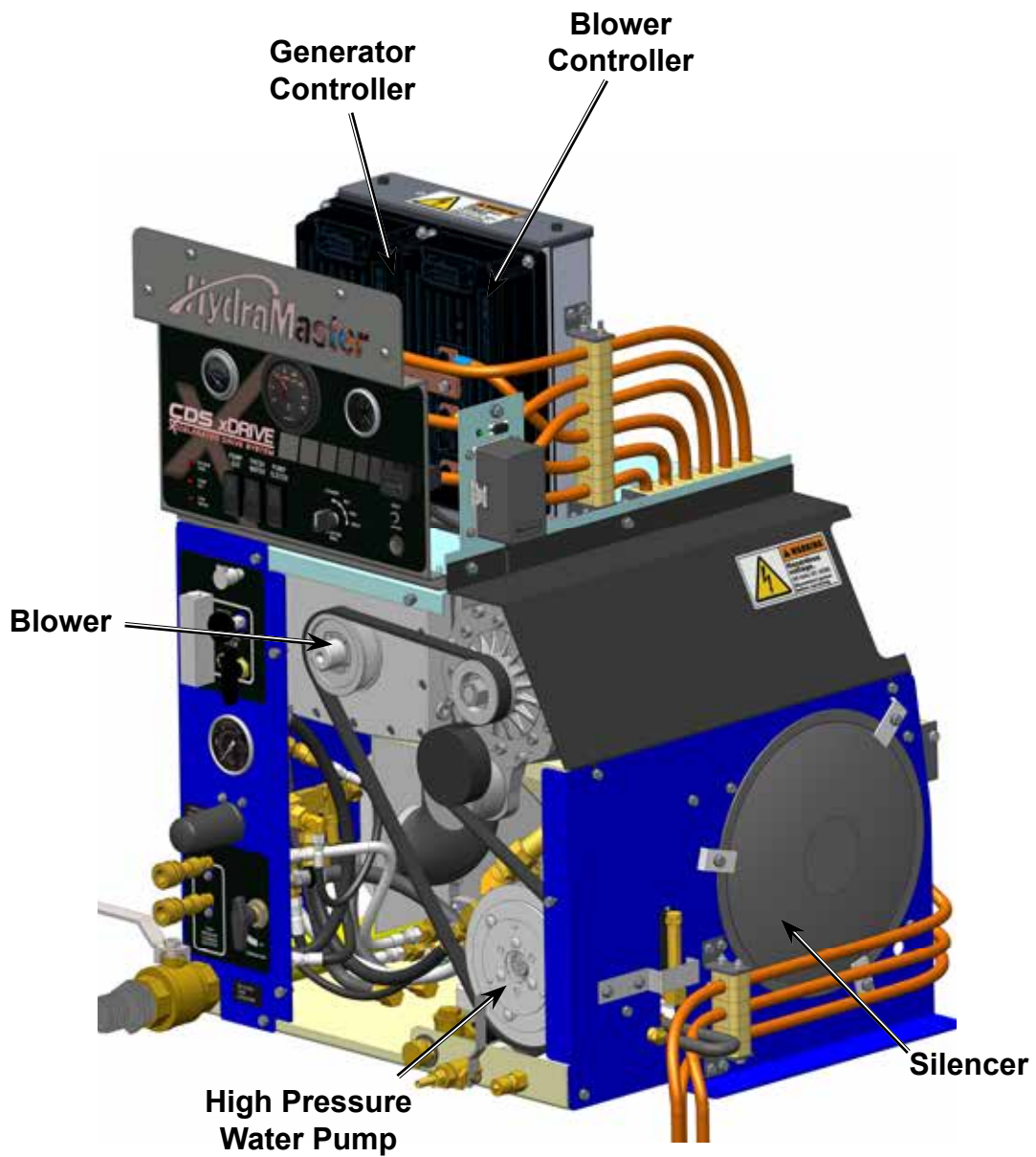


Figure 1-1. CDS xDrive Unit Showing Location of Power Pack, Silencer and Controllers.

CONTACT INFORMATION

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

To find a local distributor, please visit our website at <http://hydramaster.com/HowToBuy/DealerLocator.aspx>

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

HOURS	TELEPHONE NUMBERS	E-MAIL ADDRESSES
Monday-Friday 7:00 a.m. to 5:00 p.m. Pacific Time	Technical Support (800) 426-1301 FAX : (800) 426-4225	Technical Support techsupport@hydramaster.com
	Customer Service/Parts 800) 426-1301 FAX : (800) 426-4225	Customer Service/Parts parts@hydramaster.com

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

FOR YOUR REFERENCE:

Serial No. _____

Date of Purchase: _____

Purchased From (Distributor): _____

WARNINGS, CAUTIONS AND NOTICES

WARNING

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

CAUTION

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

NOTICE

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

⚠ WARNING

HOT SURFACES: During the operation of this equipment, many surfaces on the machine will become very hot. When near the van for any reason care must be taken not to touch any hot surface, such as the engine or the exhaust.

⚠ 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.*

⚠ WARNING

*Do not attempt to service battery pack.
Severe bodily injury may result.*

⚠ WARNING





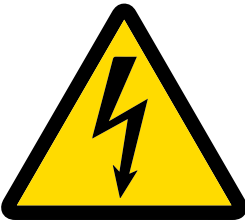
ENGINE PRODUCES TOXIC EXHAUST GAS
DO NOT operate in a confined area. Position unit so exhaust will be directed AWAY from job site. DO NOT operate equipment where exhaust may enter a building through open doors, windows, or other air intake.

HOT SURFACES - ROTATING EQUIPMENT
DO NOT operate equipment without all covers and guards in place.

READ OWNER'S MANUAL BEFORE OPERATING

⚠ WARNING

ROTATING EQUIPMENT AND HOT SURFACES
DO NOT operate equipment without all covers and guards in place. READ owner's manual before operating.



⚠ WARNING

Hazardous voltage.
(48 Volts DC AGM)
Disconnect power before servicing.

⚠ WARNING

BEFORE ATTEMPTING TO OPERATE THIS EQUIPMENT, ENSURE THAT:

- The vehicle transmission gear selector is in the PARK position
- The parking brake lever is fully engaged
- The wheel chocks are in place

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN BODILY INJURY, DEATH AND/OR PROPERTY DAMAGE.





⚠ WARNING

BEFORE ATTEMPTING TO OPERATE THE VEHICLE, ENSURE THAT:

- The CDS xDRIVE "POWER" switch is OFF.
- The vehicle engine has returned to low idle (~800 rpm).

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN BODILY INJURY, DEATH AND/OR PROPERTY DAMAGE.

⚠ DANGER / POISON

 SHIELD EYES. EXPLOSIVE GASES CAN CAUSE BLINDNESS OR INJURY.	 NO • SPARKS • FLAMES • SMOKING	 SULFURIC ACID. CAN CAUSE BLINDNESS OR SEVERE BURNS.	 FLUSH EYES IMMEDIATELY WITH WATER. GET MEDICAL HELP FAST.
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KEEP OUT OF THE REACH OF CHILDREN. DO NOT TIP. DO NOT OPEN BATTERY!

CAUTION

The use of some chemicals through your machine can seriously damage the internal plumbing, high-pressure pump, chemical pump and heat exchanger. 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

Do not attempt to open the controller as there are no serviceable components. Opening the controller will invalidate the warranty.

CAUTION

Do not mechanically modify the controller in any way as unexpected damage may occur. Mechanically modifying the controller will invalidate the warranty.

CAUTION

Do not use any other form of fasteners other than those supplied with the controller without contacting HydraMaster for advice. Use of inappropriate fasteners or torques could damage the controller.

RESPONSIBILITIES

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 receipt of vehicle and communication with the transport company. The sales representative is also responsible for training you in its operation, maintenance and precautions.

Installation Verification

- The correct installation of the unit and recovery tank in your vehicle and the securing of 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.

MACHINE SPECIFICATIONS

Frame and Recovery Tank	26.25"W x 40.75"H x 68.25"L	
Total Weight	775 lbs	
Construction	Marine aluminum with epoxy finish	
	Chassis galvanized steel	
Power Pack	Vacuum Blower	Gardner Denver 408 TriFlow
	Water Pump	General Pump
Drive System	3 Phase PMAC Generator	
	3 Phase Motor	
	(2) PMAC Motor Controllers	
	48 V battery pack	
Chemical System	Last-step chemical injection, meter controlled	
Heating System	3- Zone	
Instruments		
	Electronic tachometer, 0-3,500 rpm	
	Water temperature gauge, 0-320 degrees F	
	Vacuum gauge, 0-30" hg	
	Hour meter, machine run-time	
	Electronic circuit protection breaker, resettable	
	Machine status indicator lamps	
	Chemical flowmeter, 0-10 gph	
	Solution pressure gauge, liquid filled, 0-1,500 psi	
	Water pressure adjustment	
	Blower lubrication port	
	High pressure solution outlets, quick-disconnects	
	Fresh water inlet fitting, quick-disconnect	
	Water box drain valve	
	Chemical controls	
Recovery Tank	100 gallon aluminum	
Cleaning Tool/ Wand	One HydraMaster Evolution wand	

High Pressure Hose	1/4" high temperature, lined, vinyl covered
	Hose rated to 2,200 psi, 250 degrees F
Other Standard Equipment	Runtime hour meter
	Chemical flow meter (0-10 GPM)
	Chemical flow control valve
	Vacuum gauge (0"-30" Hg)
	Solution pressure gauge (0-1,500 PSI)
	Solution pressure adjustment
	Pre-wired pump-in switch
	Pre-wired APO Switch/APO outlet
	Fresh water inlet
	Water system drain valve
	Blower tachometer (0-3,500 RPM)
	Electronic throttle control
	Electrical circuit protection (resettable)
	Solution pump switch
	4 speed control
	CDS Power Transfer package
	Top-mounted gauge cluster & control console
	Dual wand solution connections
	Dual wand vacuum connections
	Freeze guard system
	Safety wheel chocks
	10 ft x 1 1/2" whip line
	10 ft x 1 1/2" drain line
	150 feet High Performance Solution/Vacuum Hoses
	Garden Hose
	Chemical jug holder
	2.5 gallon chemical jug
	Operation & maintenance manual
	Embroidered HydraMaster jacket
	Van decal
	3 Year Warranty

LOCAL WATER PRECAUTIONS

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

Hard Water Advisory

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

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

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

CAUTION

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

Hard Water Area Map

The hard water map, shown in Figure 1-2, defines hard water areas in the lower 48 United States which compromise fluid related components such as hoses, fittings, heaters, pumps, valves and water-cooled engines. For other countries, hard water area maps can be obtained from geological societies.

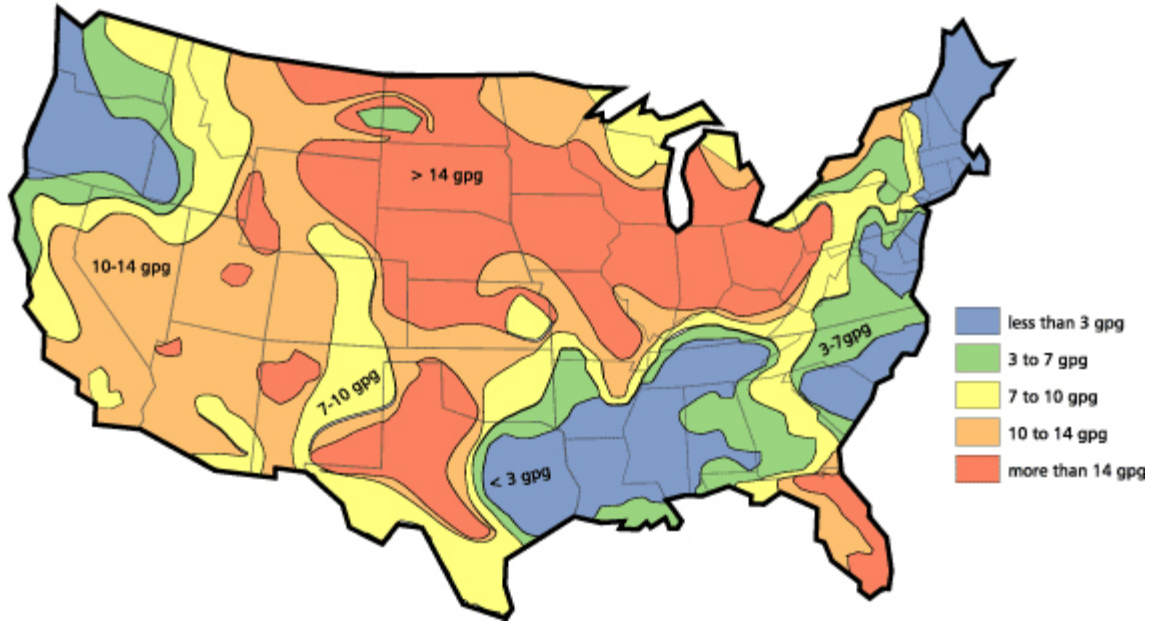


Figure 1-2. Hard Water Map of Mainland United States

NOTICE

The map shown in Figure 1-2 is provided for general reference only. Water hardness in your geographical location should be confirmed by testing.

Water Softener

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

Failure to use a water softener in these areas will invalidate the machine's warranty. Referring to the hard water area map shown Figure 1-2, determine the quality of water in your area and take immediate action if the water hardness exceeds 3.0 grains per gallon.

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

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

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

WASTE WATER DISPOSAL ADVISORY

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

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

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

One disposal method which usually complies with the law is to accumulate the waste water and haul it to an appropriate dump site. Another solution to the disposal problem is to equip your CDS xDrive 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.

BATTERY RESET FOR FORD TRANSIT VAN

If the battery has been disconnected or a new battery has been installed, some system settings must be reset after the battery is reconnected.

Refer to the Ford Transit Owner’s Manual for instructions for battery reset conditions.

2 - Chemicals and Cleaning

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

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

This section of the manual contains the following information:

- Cleaning Precautions
- Cleaning Stroke Procedure
- Overwetting
- Cleaning Tool Tips

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 (see pH chart in Figure 2-1).

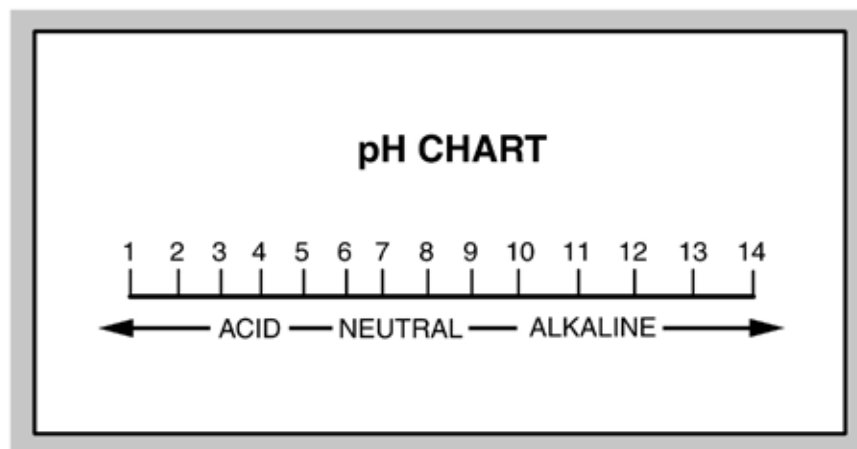


Figure 2-1. pH Chart

CLEANING PRECAUTIONS

There are no short cuts to good carpet cleaning. It requires time, cleaning knowledge and the use of good chemicals. Therefore, the manufacturer recommends the use of spotting agents and traffic lane cleaners, as required, prior to the actual cleaning of carpeting.

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

CAUTION

*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.*

HydraMaster will not warranty parts that have been damaged from using acid products that have obviously caused failures.

Avoid using detergents and chemicals which create foam when those products are agitated because foam passing through the blower could lead to serious mechanical failures. To ensure proper cleaning, use HydraMaster detergents and chemicals which are formulated with built in anti-foaming agents. When cleaning surfaces with excessive foaming residue, use HydraMaster de-foamer products as directed.

CLEANING STROKE PROCEDURE

To eliminate excess moisture remaining in the carpet fiber and eliminate the sawtooth appearance which results from diagonal movement of the cleaning tool, follow these steps.

1. Always move the cleaning tool in smooth, forward and backward stroke
2. Apply slight pressure to the forward stroke while the solution is injected into the carpet.
3. When extracting (drying), apply firm pressure on the forward stroke to ensure a positive "lock" for the vacuum and minimize the "hopping" effect resulting on carpet that is not smooth.
4. During the forward and reverse strokes, movement to the right or left should only be done at the extreme rear of the stroke.
5. Overlapping is also important to ensure even application of solution and prevent saturation when the cleaning tool is stopped twice at the same point at the rear of the cleaning stroke Figure 2-2.

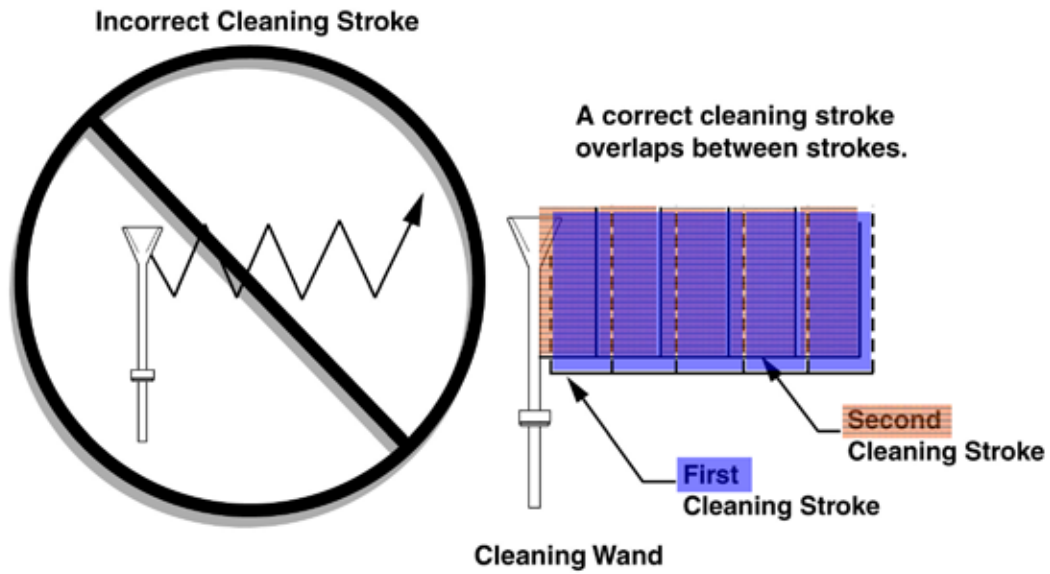


Figure 2-2. Cleaning Stroke Procedure

CAUTION

Failure to adopt the previous procedure can result in increased chance of “clean streaks,” fiber shrinkage, brown-out and longer drying periods.

PRECAUTIONS

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

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

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

CAUTION

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

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

PREPARING THE CARPET FOR EXTRACTION

Pre-Vacuum the Carpet

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

Pretreat the Carpet

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

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

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

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

RINSE AND RECOVER

Whether you are using a wand or a rotary extraction tool, you should clean an area approximately 3 ft. x 3 ft. with the solution valve open then immediately go over that area with vacuum only to remove any excess moisture.

CAUTION

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

HydraMaster recommends the following rinse aids: Alkaline - **HydraDri Powder™** or **HydraCleanLiquid™**. Acid - **Clear Water Rinse™**.

NOTICE

For more information about HydraMaster's complete chemical product line, visit this webpage:
<http://hydramaster.com/Products/Chemicals.aspx>

OVERWETTING

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

There are several factors that will cause over-wetting:

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

STREAKING

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

Possible reasons of streaking may include:

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

SEVERE CLEANING SITUATIONS

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

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

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

When your truckmount is used in severe cleaning situations:

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

CAUTION

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

CAUTION

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

CAUTION

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

CAUTION

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

CLEANING TOOL TIPS

Wands

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

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

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

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

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

3 - Operating Instructions

This section of the manual contains the following instructions:

- Before Operating the CDS xDrive
- CDS xDrive Start Up
- CDS xDrive Shut Down

BEFORE OPERATING THE CDS XDRIVE

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

WARNING

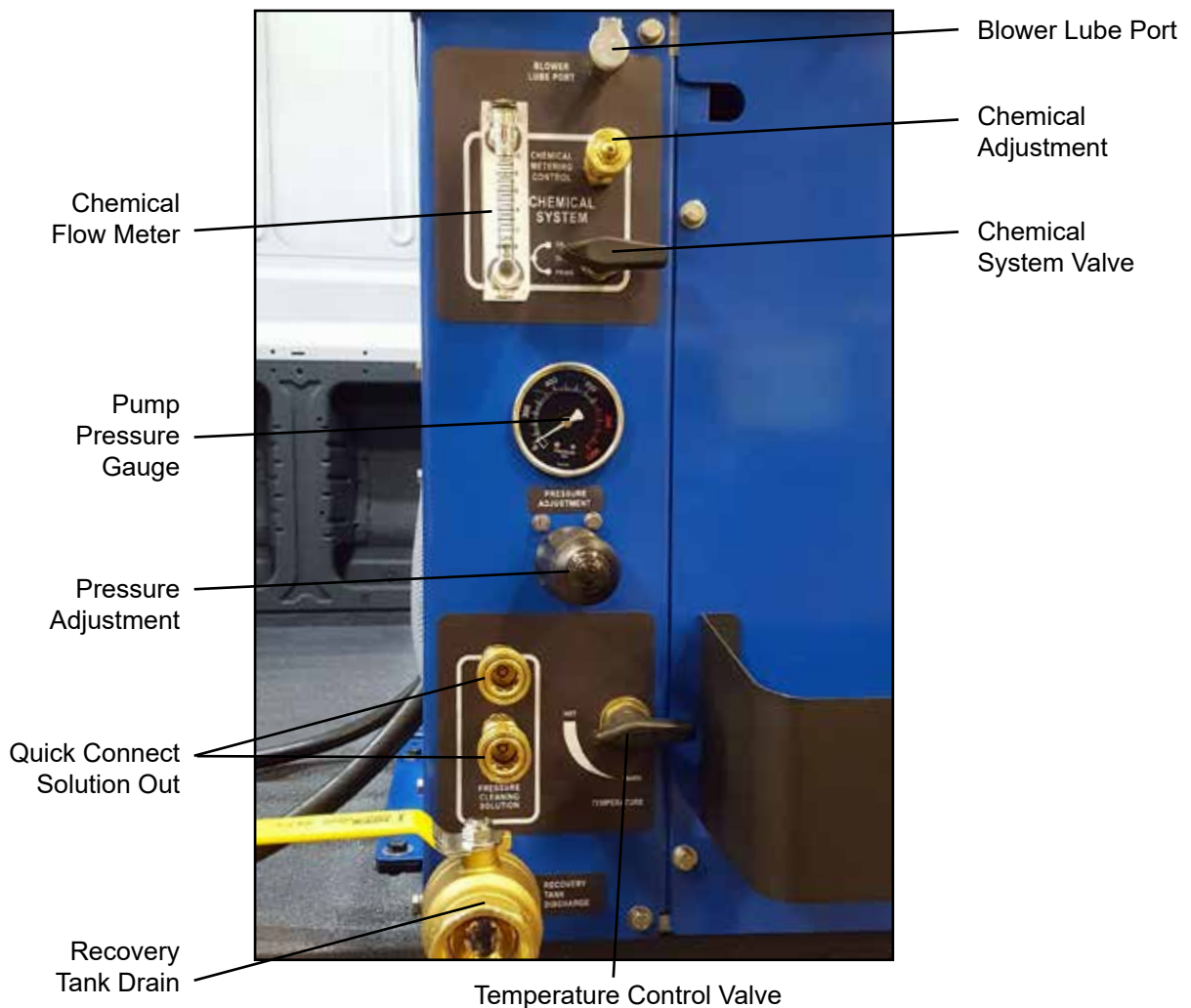
The vehicle in which the CDS xDrive operates generates toxic fumes. Position the vehicle so that the fumes will be directed away from the job site. Do not park where exhaust fumes can enter a building through open doors, windows, air conditioning units or kitchen fans.

2. Check the fuel tank to be certain there is adequate fuel to complete the job.
3. Position the wheel chocks on one of the front tires.
4. If using a water supply hose which has not been used recently or if using a customer's hose, first connect the hose to the faucet and flush out any debris which may be in the hose. Afterwards connect the hose to the unit.
5. Check the chemical jug to see if you have enough concentrated chemical to finish the job. If not, mix and fill a 2.5 gallon chemical jug.
6. Connect all required hoses.
7. When connecting the pressure hose to the pressure outlet connections at the front of the unit, go to the farthest area to be cleaned and connect to the cleaning tool. This ensures that you have the proper length of hose required to perform the cleaning.

CDS XDRIVE UPPER DASH



CDS XDRIVE LOWER DASH



CDS xDRIVE START-UP

1. Make sure the vehicle's gear select lever is in the Park position and the parking brake is set. Also make sure all vehicle accessories are turned off (A/C, fan).

NOTICE

The CDS xDrive will not operate correctly without parking brake engaged.

2. Start the vehicle's engine.
3. Turn on the POWER switch.
4. Select the motor speed - Economy, Mid, High, Boost (Allow the unit to achieve operating RPM).
5. Turn on the PUMP CLUTCH switch. Adjust cleaning pressure to desired level.

NOTICE

CDS xDrive Flood restoration work

When using equipment for flood damage, leave the pump clutch off. This will reduce the engine power load and save on fuel consumption.

6. Turn on the FRESH WATER switch (if fresh water tank is included).
7. Turn the heat control valve to 'MAX' adjust temperature to desired level.
8. Turn the CHEMICAL SYSTEM valve to the 'PRIME' position to purge any air from the system.

NOTICE

The prime hose is plumbed into the recovery tank.

Leaving the valve in the 'PRIME' position will cause excessive chemical usage.

- a. When the chemical begins to flow through the flowmeter, with the flow indicator reading maximum flow and the PRIME line pulsing, turn the CHEMICAL SYSTEM valve to 'ON'. Cap off vacuum if necessary.
- b. While spraying the solution from the cleaning tool, adjust the chemical flow by turning the CHEMICAL METERING CONTROL knob to the desired level.

- Optional: Turn the Pump Out switch 'ON' if using the Automatic Pump-Out feature.

NOTICE

The Pump Out pump will not engage until the water level rises inside the recovery tank.

- Proceed with the cleaning operation.

NOTICE

The machine will automatically shut down when the recovery tank reaches its full capacity due to the float switch located inside the tank. When this occurs, turn the CDS xDrive POWER switch off and empty the recovery tank. Then, turn the unit back on and continue to clean.

CDS xDRIVE SHUT-DOWN

1. Flush clear water through the chemical system for 10 seconds.
2. Open the water box drain and actuate the tool/wand valve to run fresh water through the water box, heat exchangers and cleaning tools.

NOTICE

If freeze guarding is necessary, perform the freeze guard procedure at this time. Draining the water box to ½ full or less is recommended to reduce spillage inside the vehicle.

NOTICE

Rinse the system with vinegar on a weekly basis. Rinse the entire system with descaler each month.

3. 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.
4. Disconnect the hoses and put them away.
5. If you are using an outside water source, turn the water supply faucet off. Bleed pressure out of the supply hose by loosening the hose at the water supply. Unhook the water supply hose and store it in the vehicle.
6. Allow the unit to run for a few minutes with the vacuum hose disconnected in order to remove all moisture from the vacuum pump.
7. Plug the vacuum inlets. Spray a HydraMaster-recommended lubricant (P/N 000-087-006) into the 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 lube port is located on the front panel above the pressure gauge).
8. Remove the inlet plugs, turn off CDS xDrive power switch.
9. Drain the recovery tank.

NOTICE

If your CDS xDrive is equipped with an automatic Pump Out, first connect a garden hose to the outlet on the front of the machine. The CDS xDrive must be 'ON' for APO to operate.

If your CDS xDrive is not equipped without an automatic Pump Out, drain the recovery tank through the recovery tank discharge valve.

NOTICE

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

10. After the recovery tank is drained, lift the recovery tank lid and remove the filter basket.
11. Clean out any accumulated debris.
12. Rinse and re-install.
13. Check the pleated blower filter.
14. Clean out any accumulated debris.
15. Rinse and re-install.
16. Recommend leaving the tank lid open overnight for air circulation in the waste tank.

NOTICE

When re-installing the blower filter, ensure that it is fully seated against its mount so that debris cannot pass under it and into the blower.

4 - Freeze Guard

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

CAUTION

If freeze damage does occur to the engine and generator, those components can lock up and require replacement. Also, seals can fail, resulting in broken hoses and water leakage.

BE SURE YOUR MACHINE IS PROTECTED!

Freezing will cause component damage and void warranty.

This section of the manual includes information concerning:

- Draining the CDS xDrive
- Freeze Protecting Pump In System

The following precautions are recommended prior to and during cleaning:

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 fresh water (garden) hose from the cold ground by running it through an extra 1½" vacuum hose.

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 machine and vehicle are left outside with a heater, drain water from the machine cleaning tools and hoses because they can be freeze-damaged also.

CAUTION

If the coolant mix in the engine incorrect (too much - too little), damage to the engine and generator can result which is not covered by warranty. Make sure that the coolant mix ratio is correct.

DRAINING THE CDS xDRIVE

To drain the machine, follow these steps:

1. Before shutting off the machine, remove the chemical line from the chemical jug and place in a mixture of 50/50 antifreeze and water. Turn the CHEMICAL SYSTEM valve to the 'PRIME' position until coolant registers in the flow meter. With the cleaning tool on, allow mixture to fill the remainder of the chemical system.
2. Open the water box drain valve and allow the water to drain thoroughly from the water box.
3. Close the water box drain and fill the water box with 50 / 50 antifreeze and water mixture. Run the unit for 1 minute to circulate the mixture through the machines low-pressure hoses. Spray through the wand or other tool into a suitable container until the water box shut-off switch activates (pump stops). This freeze guards the high-pressure circuit
4. Open the water box drain and drain out the residual fluid into a suitable container. This antifreeze solution may be retained for reuse (attach freeze guard fitting to inlet quick connect and vacuum water out of the inlet line).

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.

FREEZE PROTECTING FRESH WATER PUMP IN SYSTEM

1. Drain the fresh water tank.
2. Open water box drain valve.
3. Turn on the fresh water tank pump and run for 1 - 2 minutes until all the water is purged from the hose.

CAUTION

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

5 - Water and Chemical System

The CDS xDrive high-pressure water and chemical system has been designed to be simple and trouble free.

This section of the manual explains:

- Water and Chemical Flow Operation
- Chemical System Maintenance

WATER AND CHEMICAL FLOW OPERATION

The general concept of the water and chemical flow is as follows:

- Water is fed into the CDS xDrive under tap pressure to the water box.
- The water is then pumped from the water box through the heating system, mixed with the chemical and then that mixed solution is pumped 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.

The chemical pump draws the chemical from the inlet filter which is in the chemical container. The chemical solution flows through the flowmeter, indicating the flow of chemical being used in gallons/hour. The chemical then flows through the chemical pump to the chemical selector valve. The CHEMICAL SYSTEM valve can be used to prime the pump (evacuate air from the system), inject chemical into the system or turn the chemical flow off. When the CHEMICAL SYSTEM valve is in the "ON" position, chemical flows through the metering valve, and is injected into the heated water path just prior to its leaving the machine.

The low water float switch in the water box is a safety switch that is designed to protect your system from sudden or unexpected loss of water supply. If, for example, the water source at the house were turned off, the water level of the water box would drop, activating the low water float switch, which automatically disengages the system and prevents the water pump from running dry.

The desired chemical injection ratio may be obtained by adjusting the chemical metering valve when spraying of water through the cleaning tool.

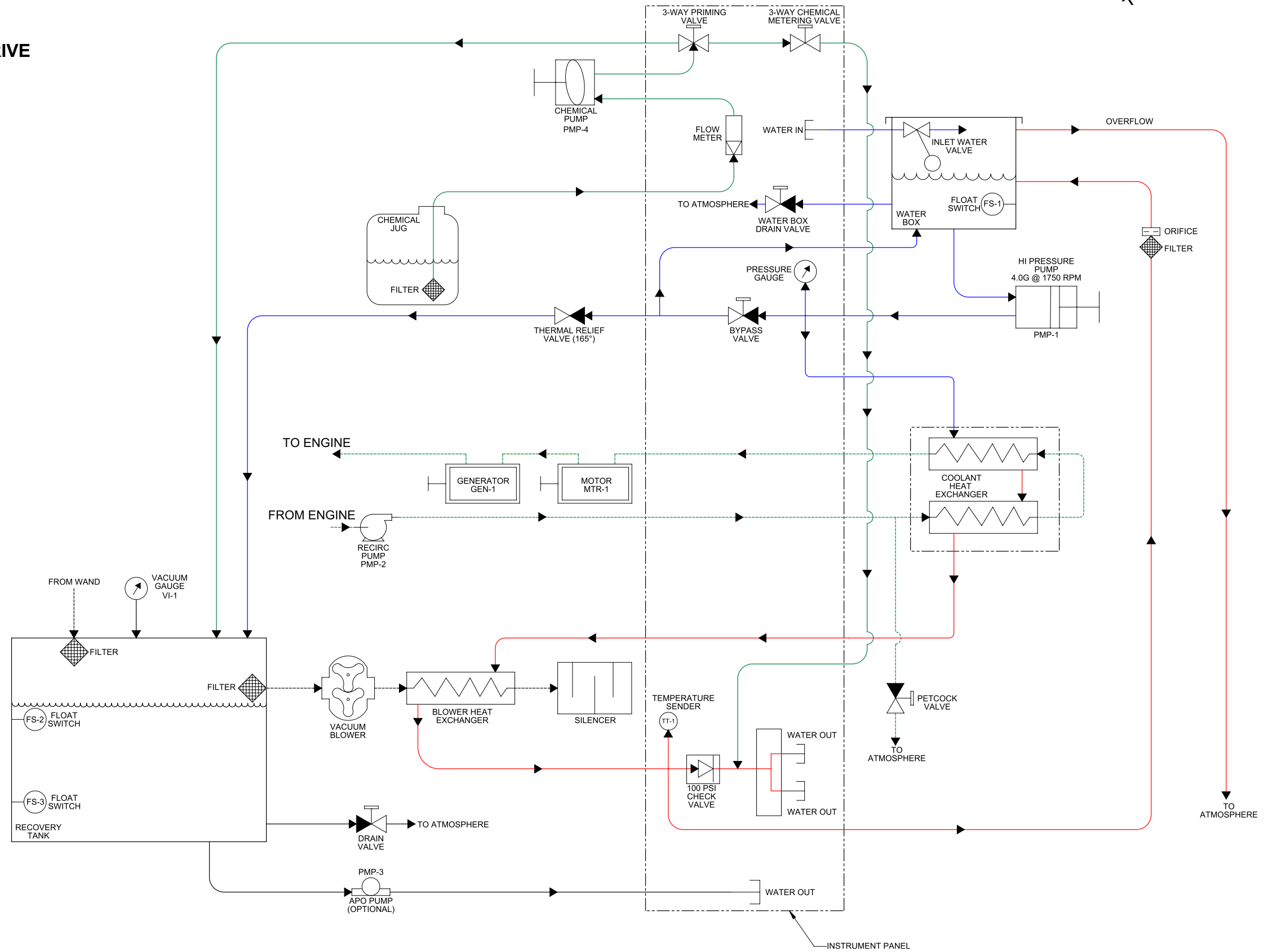
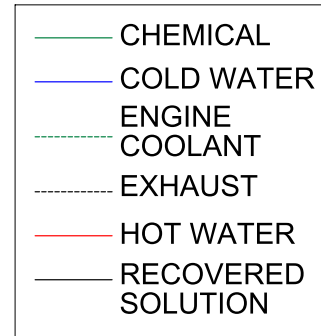
CHEMICAL SYSTEM MAINTENANCE

The chemical lines may need to be flushed with vinegar periodically to prevent abnormal chemical build-up.

To flush the chemical system:

1. Set the CHEMICAL FLOWMETER to 10 gph.
2. Remove the clear plastic hose from the chemical jug and insert it into a 1-quart container of vinegar.
3. Spray water from the tool/wand until the vinegar is gone.
4. Repeat the process with 1 quart of clear water to void all lines of vinegar.

Figure 5-1. FLOW DIAGRAM - CDS xDRIVE
000-179-052 Rev A



6 - Water Pump Maintenance

The CDS xDrive 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.

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

This section of the manual explains:

- Daily Maintenance
- Periodic Maintenance

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 CDS xDrive 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 (see section 11).

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.

7 - Vacuum Blower System

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

- Recovery Tank Inlet Filter
- Vacuum Blower Lubrication

The positive displacement 408 TriFlow® Rotary Tri-Lobe blower is compact in design while providing high throughput and low noise.



The blower's dual splash lubrication system has independent oil sumps which prevent cross contamination and allow the blower to operate safely on an incline or a decline.

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 and bearings.

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 xDrive 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 CleanMaster's DeFoam as directed. (Part# 950-177)

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

Because the CDS xDrive is very demanding of the vacuum blower, the vacuum blower should be maintained as recommended in the Maintenance section of this manual.

NOTICE

The vacuum blower manufacturer recommends the use of AEON® PD lubricant.

The oil should be drained, flushed and replaced every 500 hours. Locate the blower drain hoses inside the lower left hand panel of the CDS unit.

To drain the lubricant:

Position a drain pan to capture the oil. Remove cap from end of hose fitting and drain into oil pan.

To replace the lubricant:

To refill the blower, remove the plug from the top left side of the blower. Using a flexible funnel/bottle with hose, refill the blower with oil through this port. Watch oil sight glasses at bottom of the gear case. When oil is visible in the sight glasses, stop filling. Replace oil fill plugs.

8 - Electrical System

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

The drive system operates on 48 VDC which is provided by the battery pack located on the floor between the driver and passenger seats.

Dash controls, gauges, switches and clutches operate on 12 VDC supplied by vehicle.

To diagnose electrical system problems - see troubleshooting section.

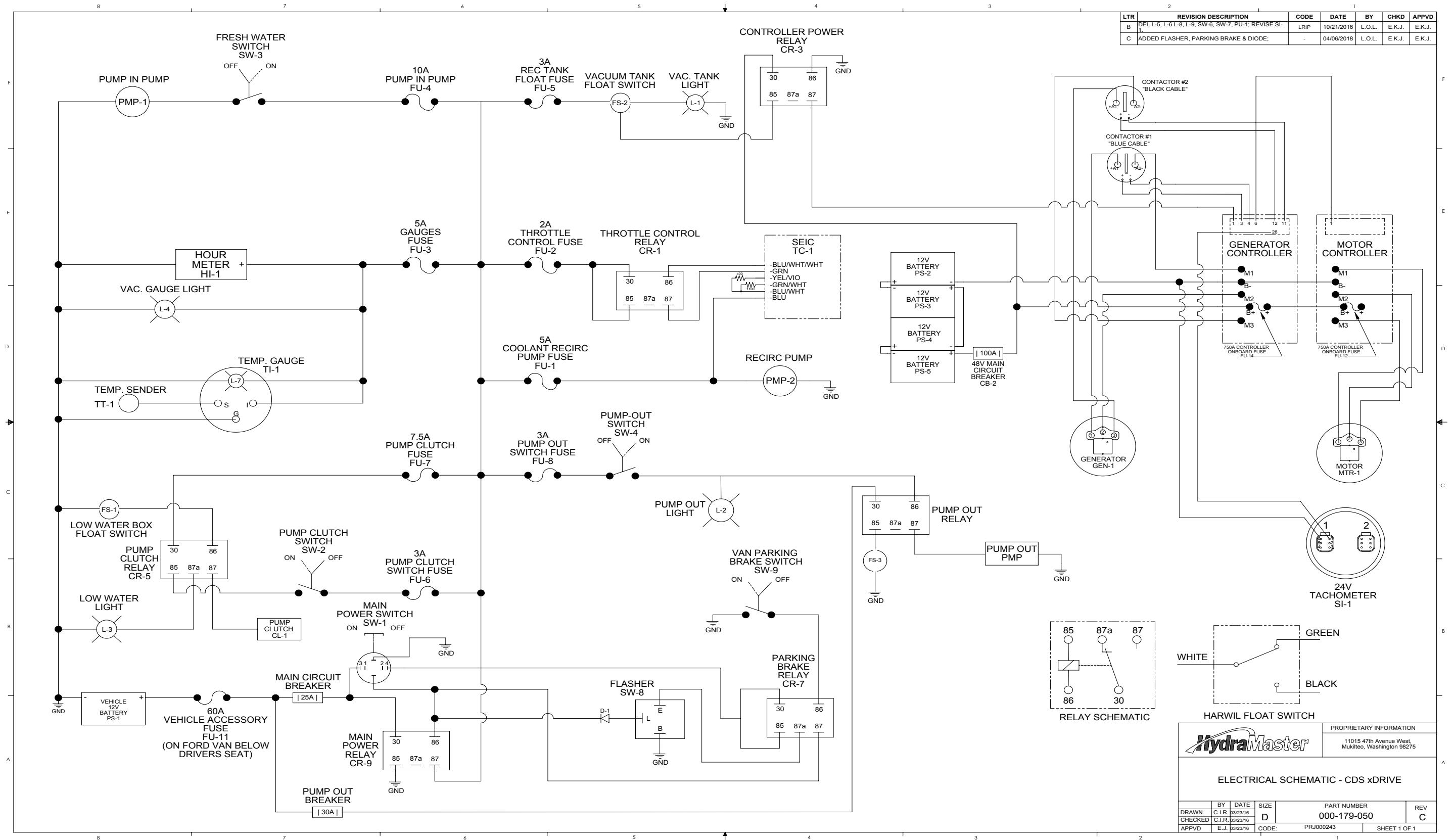
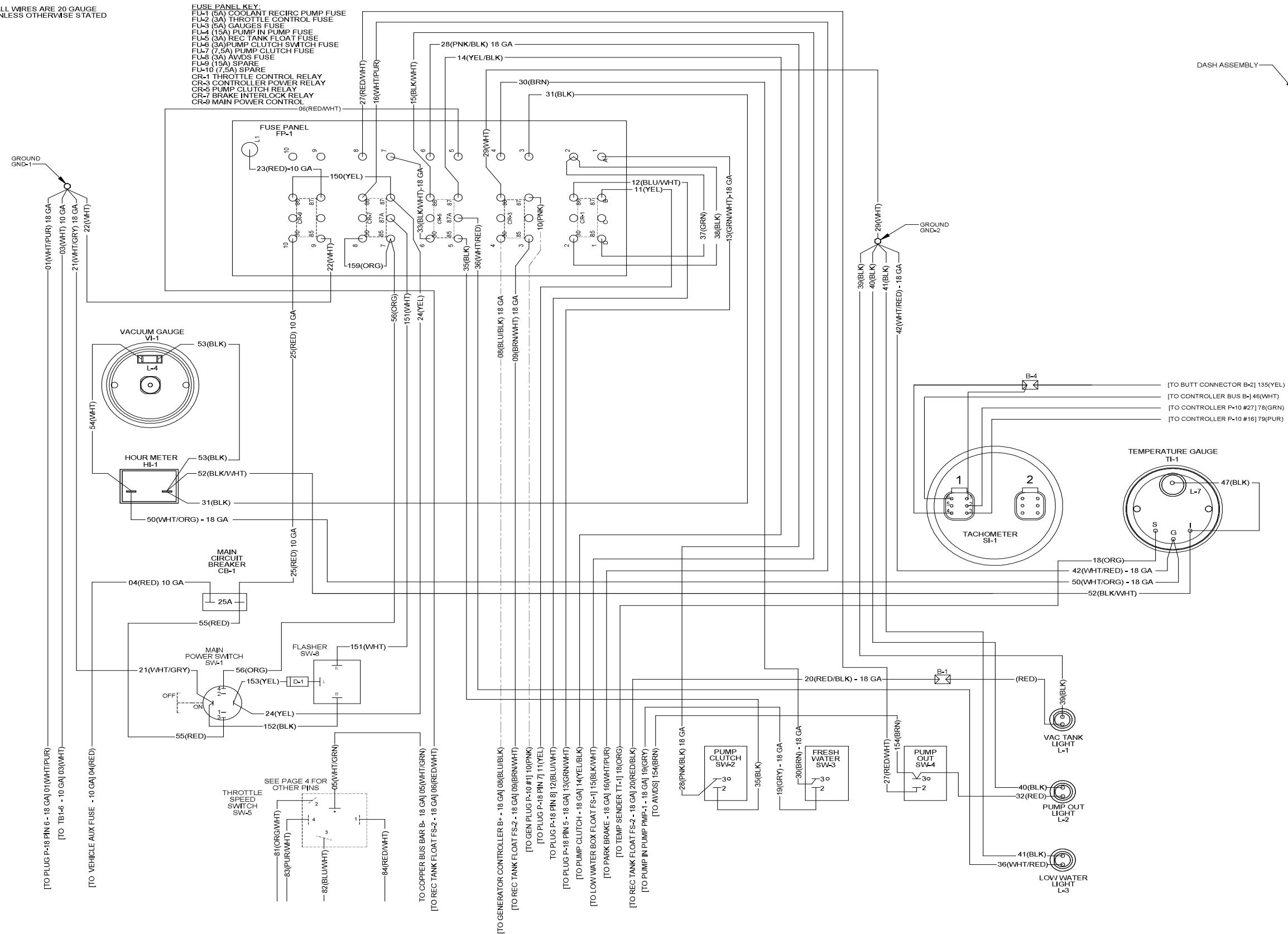
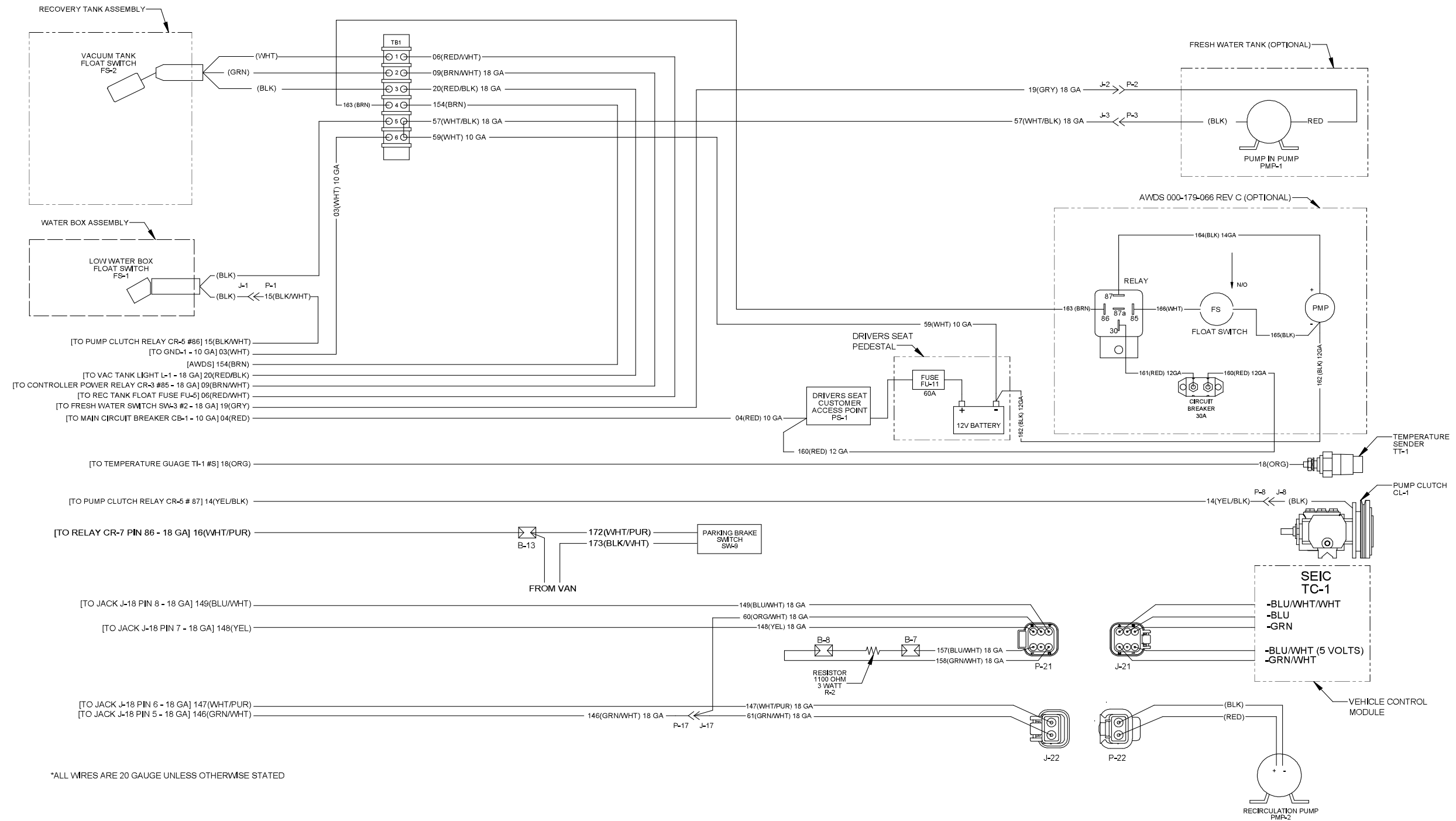


Figure 8-2. Wiring Diagram
000-179-051 Rev F - View 1 of 3

*ALL WIRES ARE 20 GAUGE UNLESS OTHERWISE STATED





8 - Electrical System Batteries

LOCATION

The 48Vdc battery pack is mounted between the van seats in order to provide some cooling. The batteries have a maximum operational temperature of 150°F. The location also allows for easy access to the batteries for servicing.

FUNCTION

The battery pack provides the 48Vdc power source that the controllers require in order to start up. The battery pack also provides some 'buffering' or smoothing of the voltage coming from the generator so that the motor controller doesn't have to work as hard to maintain the proper control of the electric motor.

FEATURES

Size: YTX12 – 12Vdc, 10Ah, 180amp

Circuit breaker: 100amp

Type: AGM (Absorbed Glass Mat)

"Advantages:

- Spill-proof through acid encapsulation in matting technology
- High specific power, low internal resistance, responsive to load
- Up to 5 times faster charge than with flooded technology
- Better cycle life than with flooded systems
- Water retention (oxygen and hydrogen combine to produce water)
- Vibration resistance due to sandwich construction
- Stands up well to cold temperature
- Less prone to sulfation if not regularly topped charged"

-BatteryUniversity.com

DESIGN

The battery pack contains four 12Vdc batteries wired together in series. This produces 48V from the negative post of the first battery to the positive post of the fourth battery. The positive lead from the battery pack is connected to a circuit breaker inside the enclosure. Both leads are connected to a 'quick release' plug for easy removal of the entire pack.

Note: Series vs Parallel battery connection. Series = Additive voltage, same amperage. Parallel = Additive amperage, same voltage (four 12v 180 amp batteries wired in parallel would = 12v 720amps, same as automotive car battery).

TESTING

The battery pack can be tested as a complete unit with a 48V tester. However the preferred method of testing would be to test each individual 12V cell. It is possible for the battery pack to still measure 48V but one of the 12 batteries is weak, resulting in poor battery pack performance.

Note: A properly charged 48V battery pack should measure around 51V

CHARGING

Battery chargers and load testers may be purchased at most automotive supply stores. It is recommended that a charger with a 'maintenance', 'float', or 'trickle' feature be used in order to not over charge the batteries if the batteries need to be stored for longer than 90 days. A load tester that can be set for the proper Amp Hour rating is also recommended. These load testers are more common in the power sport markets (motorcycle, snow mobile, ATV).

BATTERY SAFETY

⚠ WARNING

Insulate metallic tools. Using non insulated tools may cause a short circuit, and the heat or sparks generated could result in burns, damage to the battery, or ignite an explosion..

⚠ WARNING

Remove watches, rings or other metal objects before servicing.

⚠ WARNING

Use tools with insulated handles to prevent inadvertent shorts..

⚠ WARNING

Wear rubber gloves and boots..

⚠ WARNING

Do not lay tools or metal parts on top of batteries..

⚠ WARNING

Verify circuit polarities before making connections..

⚠ WARNING

Disconnect charging source and load before connecting or disconnecting terminals.

⚠ WARNING

Lead-acid batteries contain an explosive mixture of hydrogen gas. Do not smoke, cause a fire or spark in the immediate area of the batteries. This includes static electricity from the body.

⚠ WARNING

Use proper lifting technic and wear all appropriate safety clothing and equipment.

CAUTION

Avoid using organic solvents to clean batteries. The use of these materials may cause the container or covers to crack and leak, or ignite.

CAUTION

Take safety measure such as wearing rubber gloves for insulation when handling a voltage of 45V or higher. Operating without safety measures may result in electrical shock to the operator..

CAUTION

Do not place the battery on material that may generate static electricity. A static charge may trigger fire or explosion.

CAUTION

When fastening bolts and nuts of the battery, observe the torque values specified. Failure to observe fastener torque values may result in sparks, or damage to the battery terminals.

CAUTION

Do not dispose of battery in fire. The battery may burst or generate toxic gas.

CAUTION

Do not attempt to disassemble, remodel or destroy the battery, as it may cause battery leakage, fire or bursting, and could create sulfuric acid spills from the battery resulting in possible burns to personnel and damage to the immediate environment.

CAUTION

Do not connect the (+) and (-) terminals of the battery to each other with a metallic material such as a wire, tool, jewelry, etc. Failure to observe these precautions may result bodily injury, damage to the battery, leaking of battery electrolyte, explosion.

CAUTION

Sulfuric acid. If the liquid inside spills on the skin or clothing, immediately wash with plenty of clean water. If the liquid splashes into eyes, immediately flush the eyes with clean water and consult a doctor. Sulfuric acid may cause loss of eyesight and acid on the skin will cause burns

CAUTION

Lead acid batteries. Lack of preventative maintenance could result in batteries exploding and emitting gasses and/or flame. An authorized, trained technician must perform maintenance.

CAUTION

Failure to replace a battery before it becomes exhausted may cause the case to crack, possibly releasing electrolyte and resulting in secondary faults such as odor, smoke and fire.

CAUTION

Installation and servicing of batteries should be performed by personnel knowledgeable about batteries and the required precautions. Keep unauthorized personnel away from the batteries.

CAUTION

Check the battery for any sign of irregularities in appearance. If there is any damage to the battery case/cover such as cracks, deformation or leakage, replace the battery with a new one.

CAUTION

Clean the battery with a slightly damp cloth. Do not use a dry cloth or duster, as it may cause the battery to generate static electricity, leading to possible ignition and bursting of the battery.

CAUTION

If any corrosion of the terminals, leakage or deformation of the case is found, do not use the battery and turn off the power supply. If a battery with irregular or substandard performance is used, leakage, fire or bursting of the battery may occur and there is also a potential for electrical shock.

CAUTION

Misuse of this equipment could result in human injury and equipment damage. In no event will Nilfisk be responsible or liable for either indirect or consequential damage or injury that may result from the use of this equipment.

CAUTION

Do not open or mutilate the batteries. Released electrolyte is harmful to the eyes and skin and may also be toxic.

STORAGE

CAUTION

Do not store the battery in direct sunlight, or in temperatures higher than 140F. Deterioration of performance and life of the battery may occur

CAUTION

Do not stack batteries. Damage may occur and warranty may be voided.

- During storage of the battery, charge at least once every 6 months. Shorten the interval of charging to a half by every 50F rise of ambient temperature. The rate of self-discharge doubles for every 5F rise of ambient temperature. If the battery is stored for a long period in a discharged state, it may not be able to regain its capability even if it is recharged.
- Storing batteries for a year or longer without being charged, may reduce service life.
- Store batteries after fully charging, otherwise the service life may be shortened.
- Use batteries as soon as possible. Batteries gradually deteriorates during storage and thus decreased capacity may be irreversible even allowing when recharged.
- Store batteries indoors in a clean, dry and cool location. Storage at higher temperatures will result in accelerated rates of self-discharge and possible deterioration of battery performance and life.
- Maximum storage time from shipment to initial charge is six months for batteries stored at ambient temperatures no warmer than 77F (25C). For storage temperatures greater than 77F, the battery must be recharged one month sooner for every 5F increase above 77F.

DISPOSAL

CAUTION

Do not dispose of lead acid batteries except through channels in accordance with local, state and federal regulations.

CAUTION

Do not dispose of the batteries in a fire. The batteries may explode.

- Used batteries are recyclable. When returning used batteries, insulate their terminals with adhesive tape, etc. otherwise the residual electricity in used batteries may cause a fire or explosion.

SAFETY PRECAUTIONS - GENERAL

CAUTION

Remove all jewelry (i.e. rings, watches, chains, etc.)

CAUTION

Keep sparks, flames and smoking materials away from the battery

CAUTION

Never lay tools or other metallic objects on the battery

AGM batteries are reduced-maintenance batteries that operate on recombinant principles and are safer than conventional 'wet cell' lead-acid batteries.

Under normal operating conditions and use, their design features:

- Minimize hydrogen gas release
- Virtually eliminate acid misting
- Essentially eliminate leakage

Under abnormal operating conditions or as a result of damage, abuse and/or misuse, the potentially hazardous conditions of hydrogen gassing, acid misting and leakage may occur.

You should be trained in handling, installing, operating and maintaining batteries before you work on any battery system.

You must understand the risk of working with batteries and be prepared and equipped to take the necessary safety precautions. If not, contact HydraMaster customer service.

SAFETY EQUIPMENT

When working with any battery system, be sure to have the necessary tools and safety equipment, including but not limited to:

- Insulated tools
- Rubber gloves
- Fire extinguisher
- Rubber apron
- Safety goggles
- Acid spill cleanup kit
- Face shield
- Emergency eye wash
- Shower, if available

Using the correct tools and wearing the proper safety equipment will help prevent injury should an accident occur.

SAFETY PROCEDURES

SULFURIC ACID BURNS

Because VRLA cells are sealed, they normally do not present an acid danger. However, they do contain sulfuric acid, which can cause burns and other serious injuries.

CAUTION

Always wear protective clothing and use the correct safety tools.

In case of skin contact with sulfuric acid, immediately

1. Remove contaminated clothing
2. Flush the area thoroughly with water
3. Get medical attention, if required

In case of eye contact with sulfuric acid, immediately

1. Flush thoroughly for at least 15 minutes with large amounts of water.
2. Get medical attention

In case of sulfuric acid contact with clothing or materials, immediately

1. Remove contaminated clothing
2. Apply a solution of sodium bicarbonate solution (1.0lb/1.0gal or 0.5kg/5.0liters of water) on the clothing or materials.
3. Apply the solution until bubbling stops, then rinse with water.

Note: in case of a sulfuric acid spill, bicarbonate of soda or an emergency spill kit should be within the work area in accordance with OSHA regulations 1910.178g2

EXPLOSIVE GASES

Batteries can generate gases, which when released can explode, causing blindness and other serious personal injury.

CAUTION

Always wear protective clothing and use the correct safety tools.

In case of fire: To extinguish a fire in a room containing lead-acid batteries, use a CO₂, foam or dry chemical extinguisher medium. Do not discharge the extinguisher directly onto the battery. The resulting thermal shock may cause cracking of the battery case/cover.

TOXIC FUMES

Burning plastic may cause toxic fumes. Leave the area as soon as possible if toxic fumes are present. Wear breathing apparatus if required to remain in the area.

ELECTRICAL SHOCK AND BURNS

Multi-cell battery systems can attain high voltage and/or currents. Do not touch uninsulated batteries, connectors or terminals. To prevent serious electrical burns and shock, use extreme caution when working with the system.

CAUTION

Always wear protective clothing and use nonconductive or insulated safety tools when working with any battery system.

CAUTION

Remove all jewelry that could produce a short circuit. Eliminate any potential of sparks, flames or arcing..

Before working on the system:

1. Disconnect all loads and power sources to the battery. Use appropriate lockout/tagout procedures.
2. If working on an assembled battery system, sectionalize (interrupt the battery sections) into safe working voltage levels.
3. Check the battery system grounding. Grounding of a battery system is not recommended. However, grounding of the work surface is recommended.

9 - Assemblies and Parts Lists

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

- PACKAGE - CDS XDRIVE
- ASSEMBLY - CONSOLE
- ASSEMBLY - POWER PACK CDS XDRIVE
- ASSEMBLY - FRAME CDS XDRIVE
- ASSEMBLY - BLOWER - CDS XDRIVE
- ASSEMBLY - HEAT SINK CDS XDRIVE
- ASSEMBLY - INSTRUMENT CDS XDRIVE
- ASSEMBLY - HI-PSI MANIFOLD XDRIVE
- ASSEMBLY - BYPASS VALVE - XDRIVE
- ASSEMBLY - DASH PANEL CDS XDRIVE
- ASSEMBLY - PUMP CDS XDRIVE
- ASSEMBLY - BLOWER HX - CDS XDRIVE
- ASSEMBLY - TOP COVER CDS XDRIVE
- ASSEMBLY - RIGHT COVER CDS XDRIVE
- ASSEMBLY - REC TANK CDS XDRIVE
- ASSEMBLY - DUAL HX CDS XDRIVE
- ASSEMBLY - WATER BOX CDS XDRIVE
- ASSEMBLY - REC TANK COVER CDS XDRIVE
- ASSEMBLY - VACUUM RELIEF VALVE - URT
- ASSEMBLY - BATTERY CDS XDRIVE

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 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.

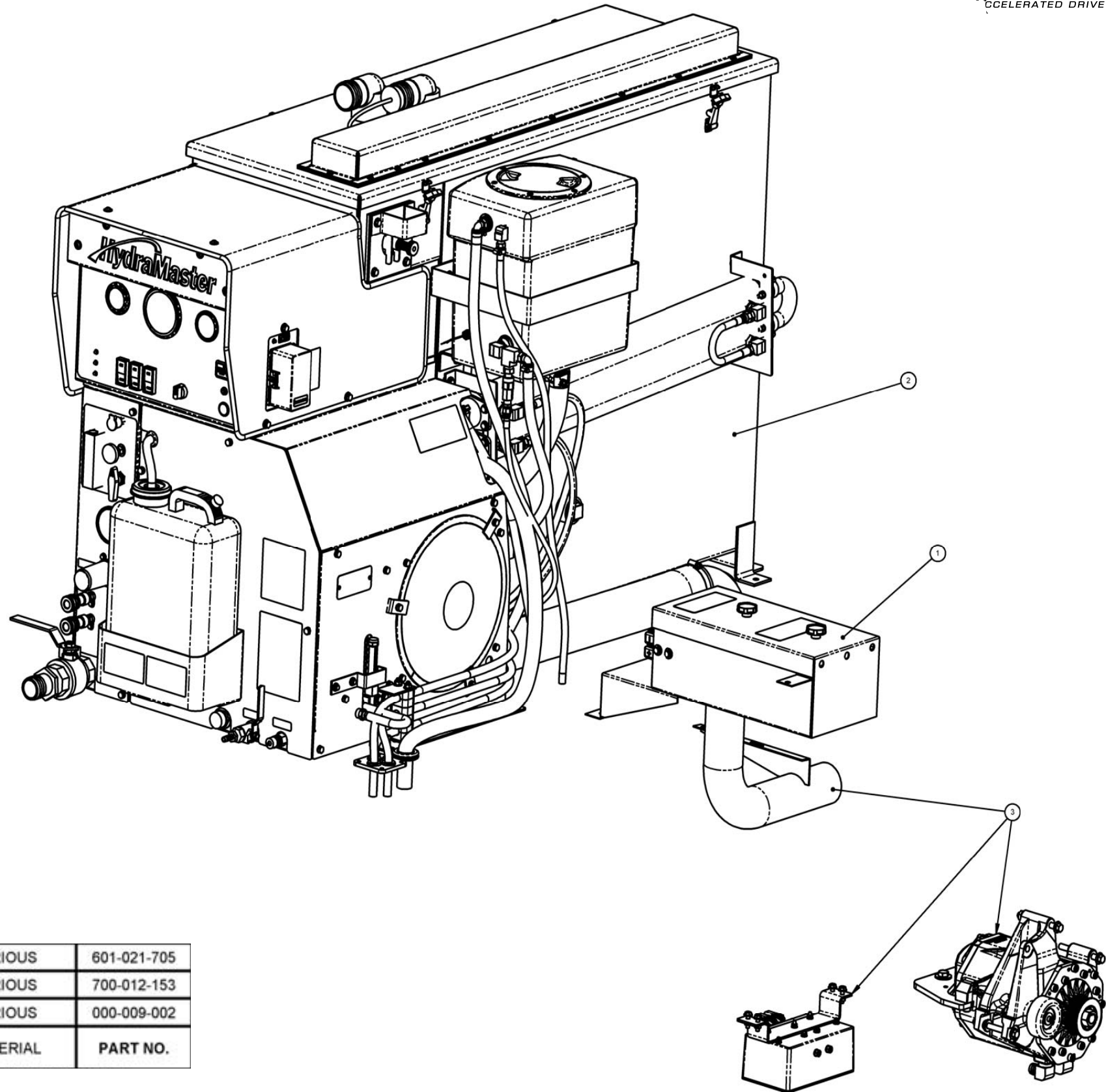
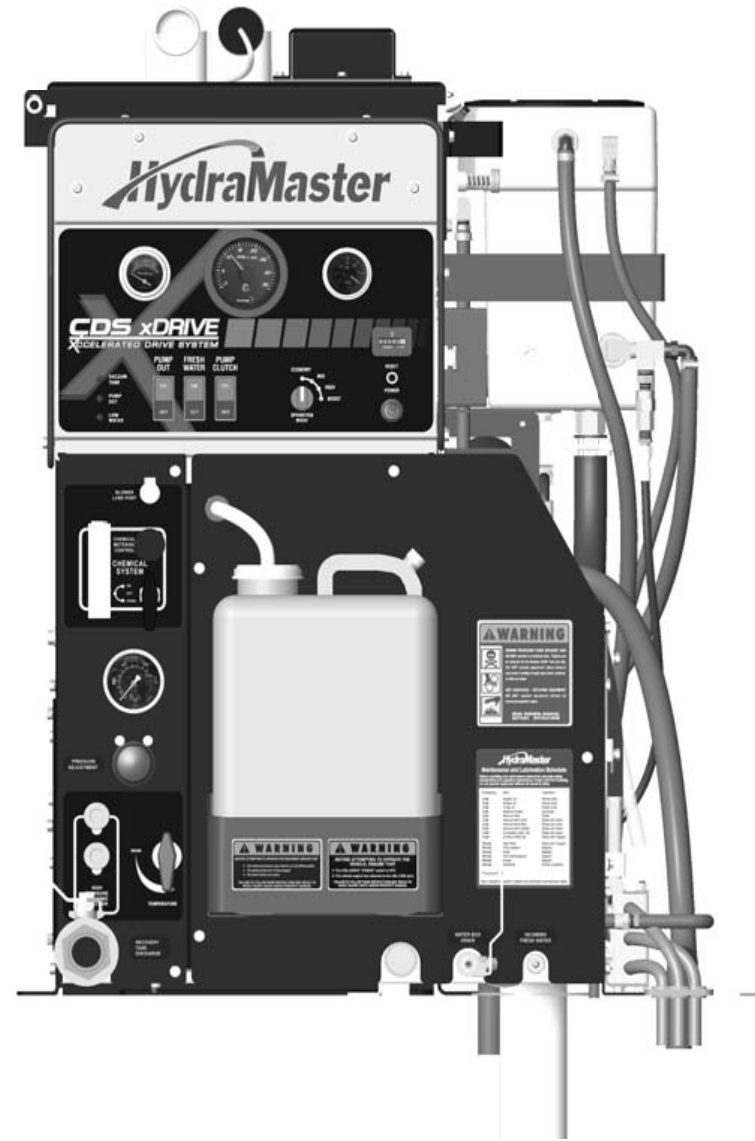
Some of the illustrations in this section reference sealants, thread lockers, adhesive, primer, anti-seize and lubricant specifications that are used in the construction of HydraMaster equipment.

Refer to Figure 9-1 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.



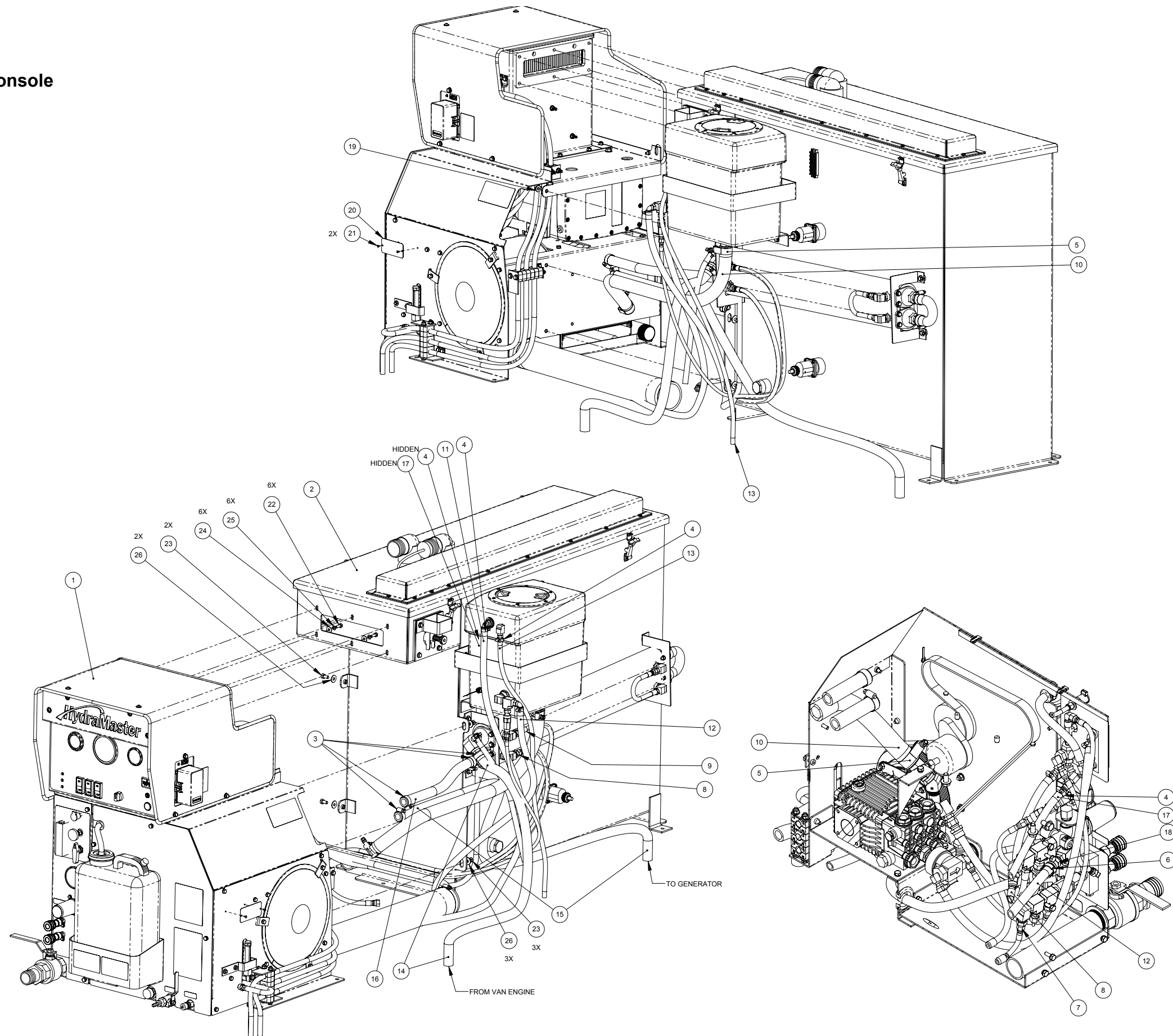
Figure 9-1. Adhesive and Sealant Material Reference

Figure 9-2. Package - CDS xDrive
751-024-705-10 Rev. B



3	1	ASSEMBLY, FRONT END TRANSIT 2016	VARIOUS	601-021-705
2	1	ASSEMBLY, CONSOLE - CDS xDRIVE	VARIOUS	700-012-153
1	1	ASSEMBLY, BATTERY - CDS xDRIVE	VARIOUS	000-009-002
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-3. Assembly - Console
700-012-153 Rev. D



Assembly - Console Parts List

26	5	WASHER, 5/16" FLAT, USS	STEEL	000-174-004
25	6	WASHER, 1/4" LOCK	STEEL	000-174-019
24	6	WASHER, 1/4" FLAT	STEEL	000-174-002
23	5	SCREW, 5/16"-18UNC x 5/8" LG. GRD. 5 HEX HEAD	STEEL	000-143-572
22	6	SCREW, 1/4"-20UNC x 0.75" LG. HEX HEAD	STEEL	000-143-001
21	2	RIVET, 1/8" X 1/4" LG. POP	ALUMINUM	000-140-015
20	1	PLATE, MACHINE SERIAL I.D.	1100-H14	000-105-012
19	1	NUT, 5/16"-18UNC HEX FLANGE	STEEL	000-094-078
18	1	INSERT, 1/2 HOSE X 3/8 SAE	STEEL	000-052-545
17	1	HOSE, 3/8" HI-TEMP x 76.5" LG. (REC TANK TO CHEMICAL PRIME)	RUBBER	000-068-1062
16	1	HOSE, 3/4" GREENSTRIPE x 20" LG. (MOTOR TO DUAL HX)	RUBBER	000-068-1083
15	1	HOSE, 3/4" GREENSTRIPE x 17.75' LG. (MOTOR TO GENERATOR)	RUBBER	000-068-1066
14	1	HOSE, 3/4" GREENSTRIPE x 15' LG. (VAN ENGINE TO DUAL HX)	RUBBER	000-068-1067
13	1	HOSE, 1/4" RUBBER x 20" LG. (WATER BOX OVERFLOW)	RUBBER	000-068-1084
12	1	HOSE, 1/2" RUBBER X 69" LG. (WB TO BYPASS VALVE)	RUBBER	000-068-969
11	1	HOSE, 1/2" RUBBER X 60" LG. (FRESH WATER IN TO WB)	RUBBER	000-068-682
10	1	HOSE, 1" SUCTION X 41" LG. (WB TO PUMP)	VARIOUS	000-068-1044
9	1	HOSE ASSEMBLY, 5/16" TEFLON x 66.5" LG. (DUAL HX TO BLOWER HX)	S. STEEL	000-068-1073
8	1	HOSE ASSEMBLY, 5/16" TEFLON x 59" LG. (DUAL HX TO BYPASS)	S. STEEL	000-068-511
7	1	HOSE ASSEMBLY, 3/16" TEFLON x 61" LG. (WB TO HI-PSI MANIFOLD)	S. STEEL	000-068-337
6	1	CLAMP, 1/2" HOSE-DBLE EAR, OETIKER # 1922	STEEL	000-033-031
5	2	CLAMP, 1-1/2" T-BOLT	S. STEEL	000-033-132
4	16	CLAMP, SIZE #5 HOSE	S. STEEL	000-033-005
3	12	CLAMP, SIZE #12 HOSE	S. STEEL	000-033-029
2	1	ASSEMBLY, RECOVERY TANK	VARIOUS	601-060-705
1	1	ASSEMBLY, POWER PACK	VARIOUS	601-004-705
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

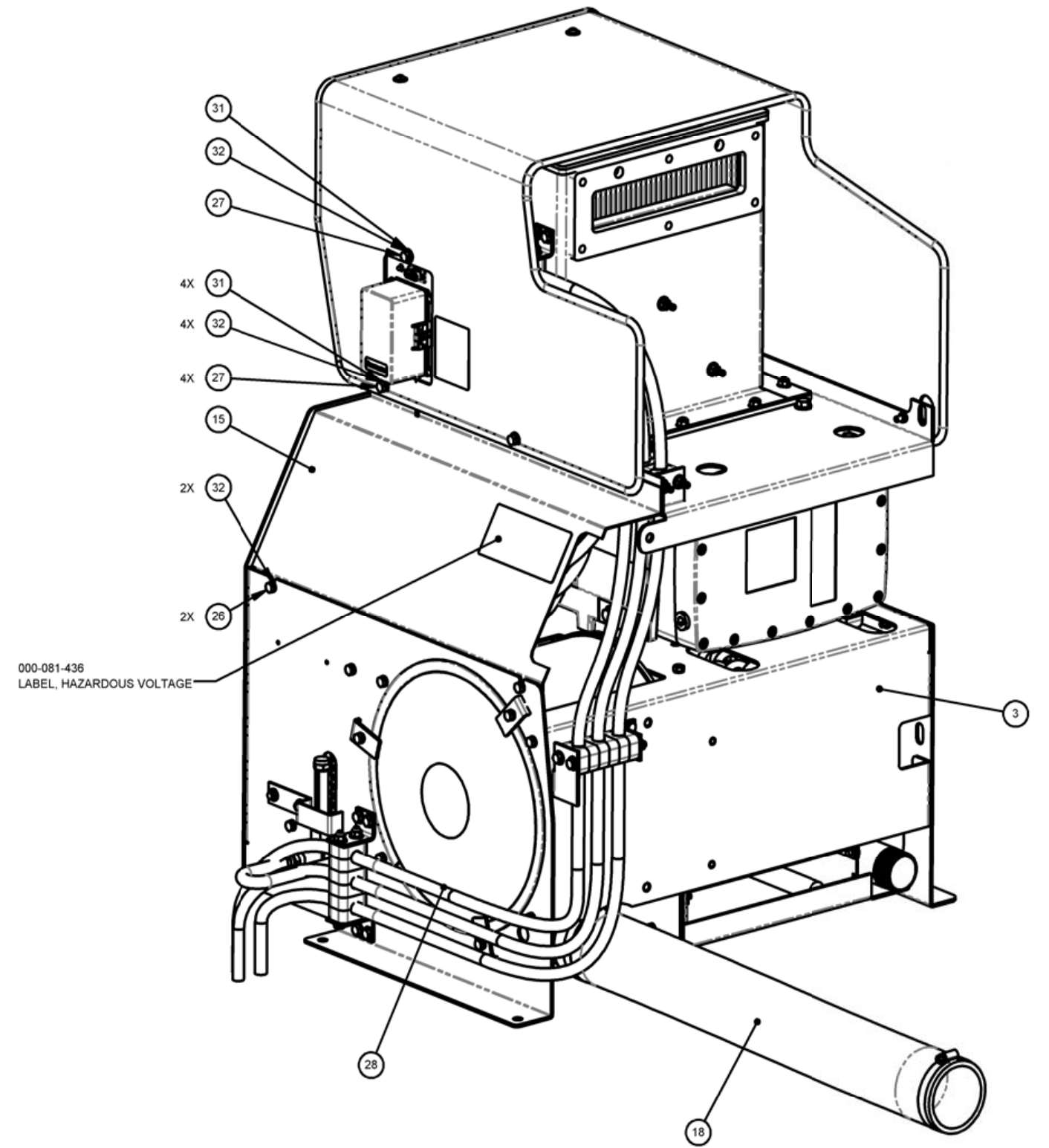
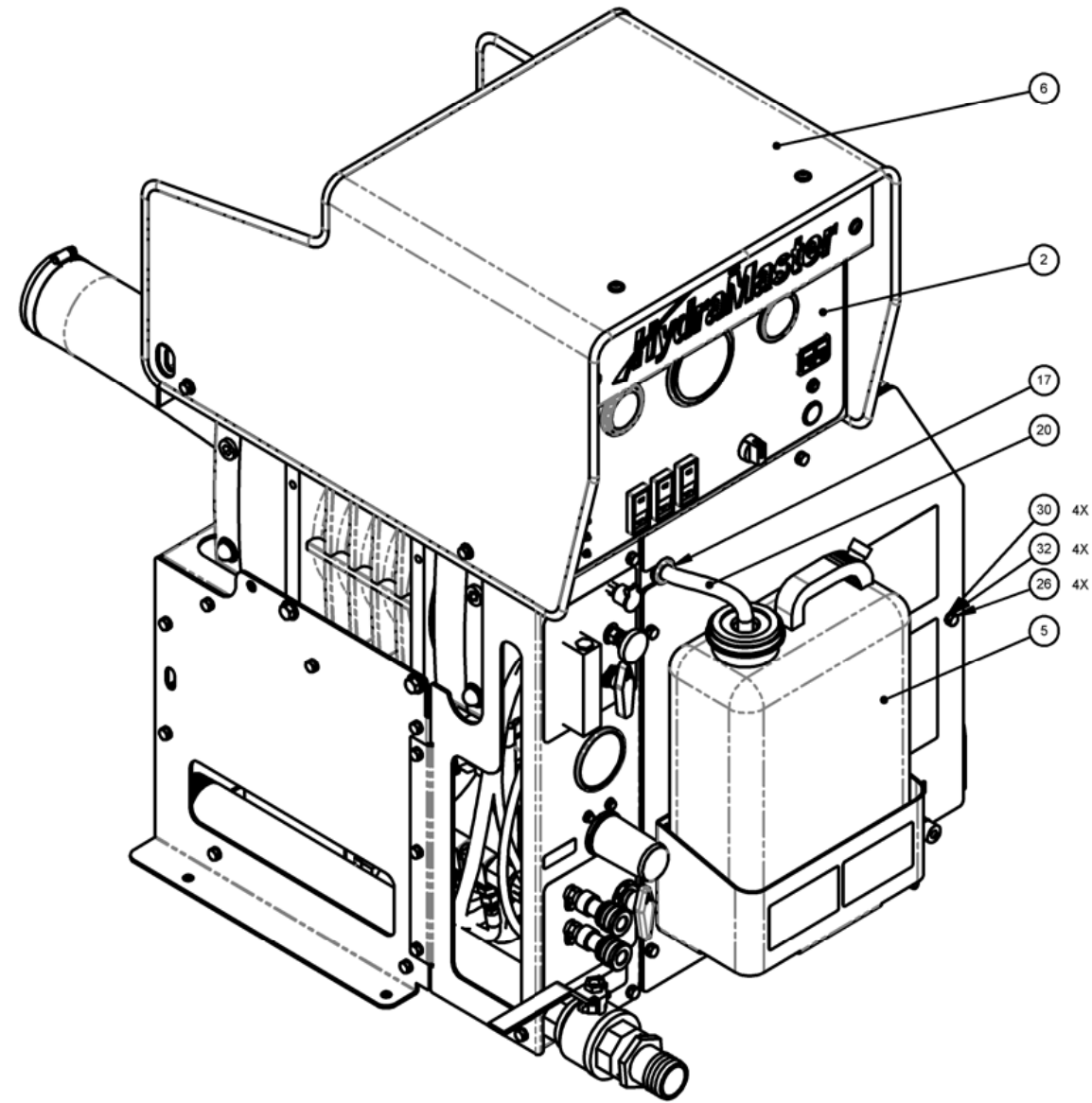
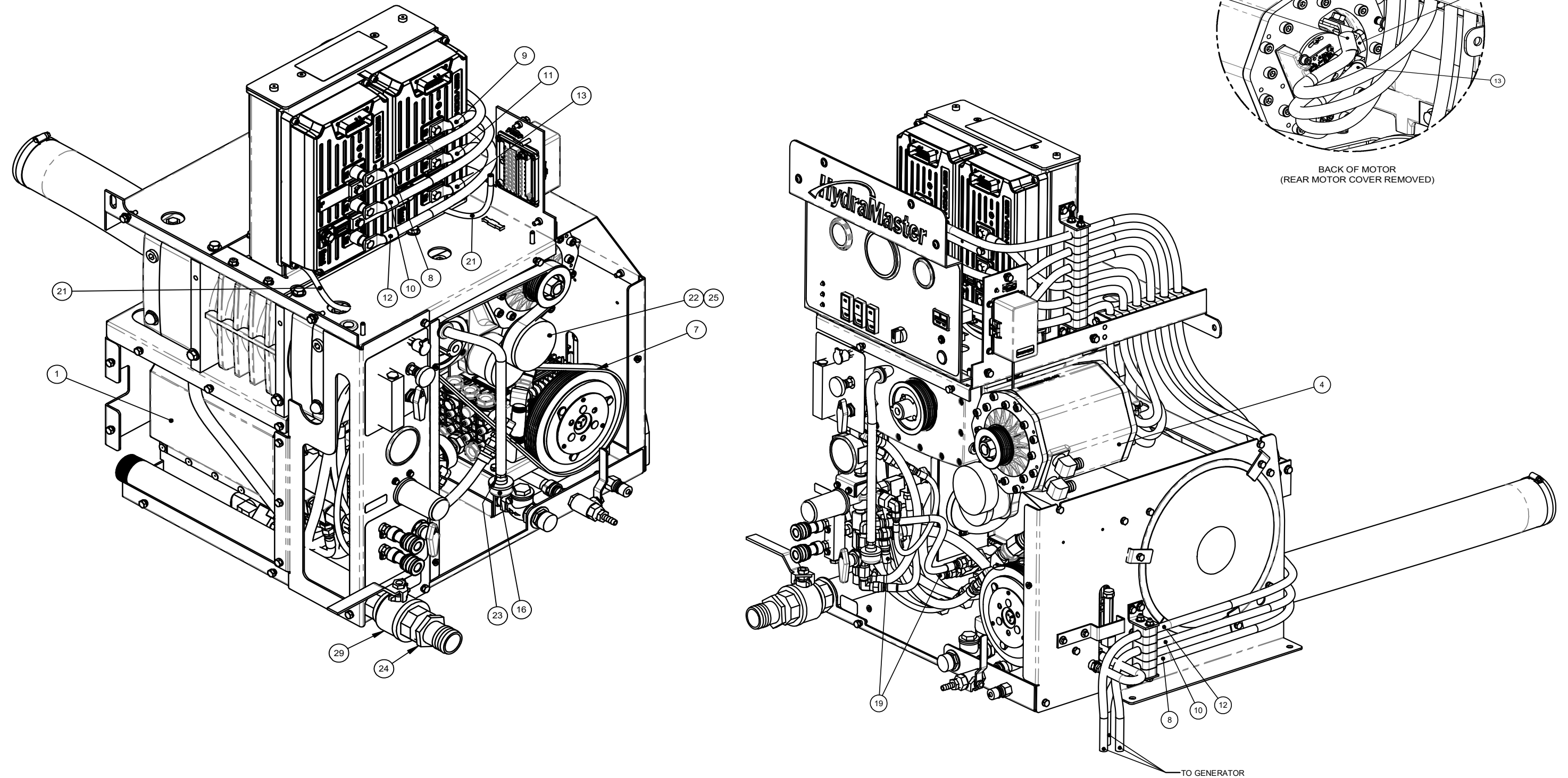


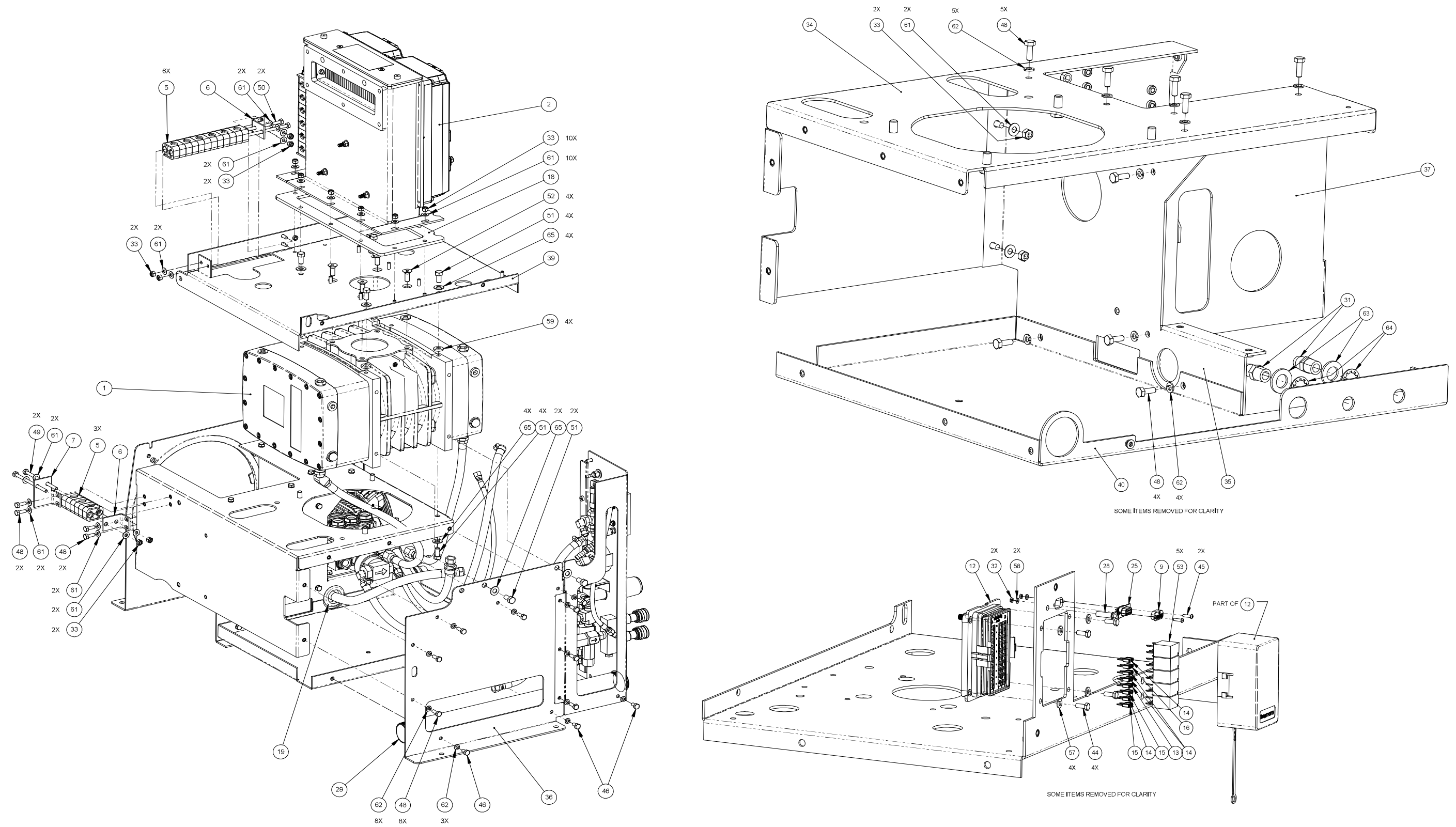
Figure 9-5. Assembly, Power Pack - CDS xDrive
601-004-705 Rev. E

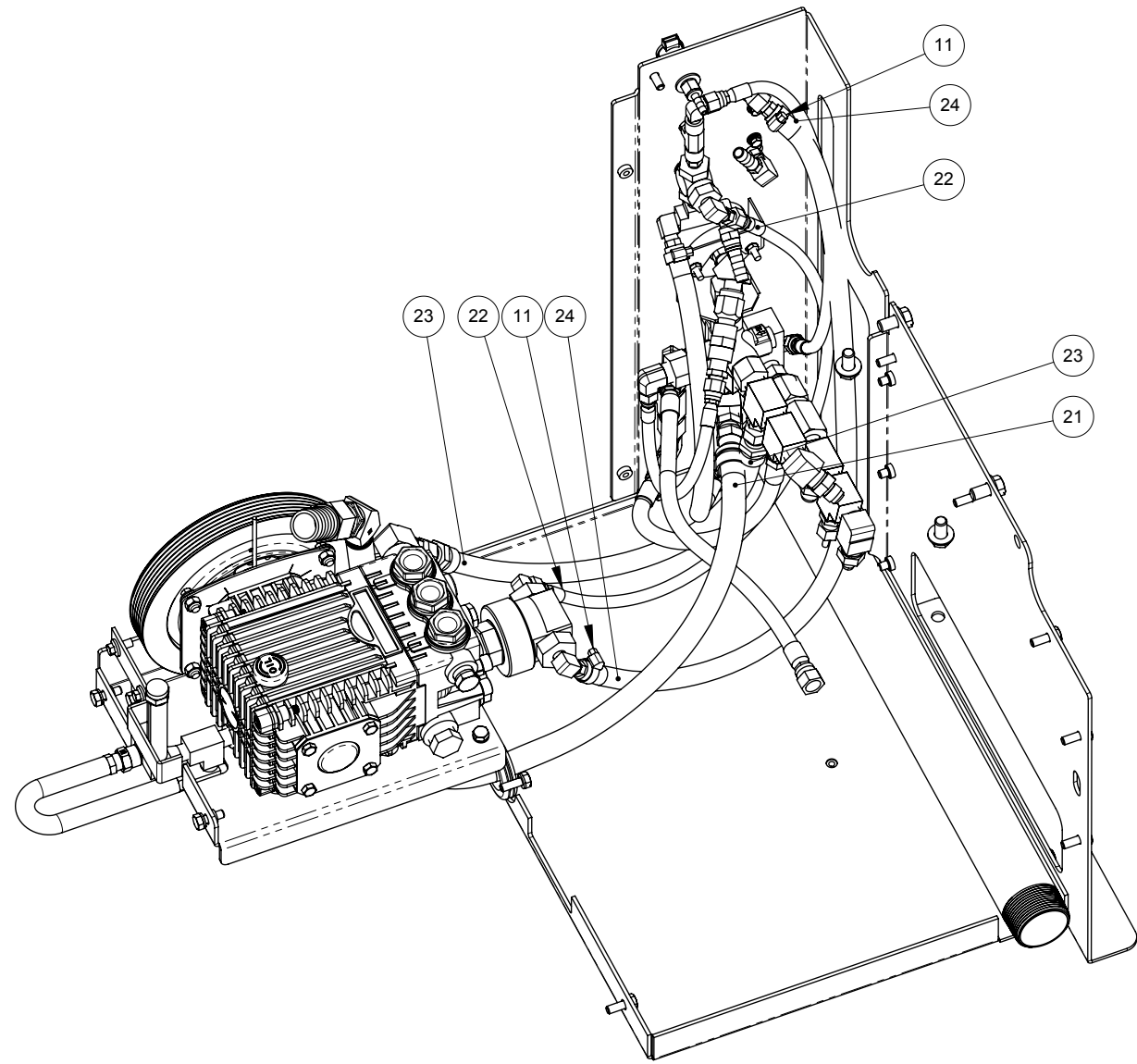


Assembly - Power Pack Parts List

32	11	WASHER, 1/4" LOCK	STEEL	000-174-019
31	5	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
30	4	WASHER, #10 FLAT	S. STEEL	000-174-001
29	1	VALVE, 1-1/2" FULL PORT BALL	BRASS	000-169-022
28	1	SILENCER, 3" IN/OUT RH - WELDED	ASTM A463	000-093-167
27	5	SCREW, 1/4"-20UNC x 1.00" LG. HEX HEAD	S. STEEL	000-143-002
26	6	SCREW, 1/4"-20UNC x 0.75" LG. HEX HEAD	S. STEEL	000-143-001
25	1	NUT, M12 X 1.75 HEX Z/P	STEEL	000-094-130
24	1	INSERT, 1-1/2" NPT x 1-1/2" BARB (GREY)	PVC	000-052-226
23	1	INSERT, #46 (1/4" NPT x 3/8" BARB)	BRASS	000-052-102
22	1	IDLER, SPRING - XDRIVE	VARIOUS	000-008-057
21	2	HOSE, 5/32" RUBBER x 12.5" LG.	RUBBER	000-068-314
20	1	HOSE, 3/8" I.D. CLEAR BRAID X 28.5" LG.	VARIOUS	000-068-980
19	1	HOSE ASSEMBLY, 5/16" TEFLON x 7" LG.	S. STEEL	000-068-1072
18	1	HOSE ASSEMBLY, 3" I.D. NITRILE X 30" LG.	VARIOUS	000-068-187
17	1	GROMMET, LARGE WIRING	RUBBER	000-060-002
16	1	FILTER, CHEMICAL INLET HIGH PRESSURE	VARIOUS	000-049-118
15	1	COVER, MOTOR - POWERPACK - COATED	ASTM A1008 CS TYPE B	000-041-888
14	1	CABLE, SHUTOFF TO CONTROL	VARIOUS	000-025-072
13	1	CABLE, M3 - MOTOR TO CONTROL	VARIOUS	000-025-067
12	1	CABLE, M3 - BOX TO CONTROL	VARIOUS	000-025-061
11	1	CABLE, M2 - MOTOR TO CONTROL	VARIOUS	000-025-066
10	1	CABLE, M2 - GENERATOR TO CONTACTOR	VARIOUS	000-025-068
9	1	CABLE, M1 - MOTOR TO CONTROL	VARIOUS	000-025-065
8	1	CABLE, M1 - BOX TO CONTROL	VARIOUS	000-025-064
7	1	BELT, K060630 - BLOWER DRIVE	VARIOUS	000-010-009
6	1	ASSEMBLY, TOP COVER - POWERPACK	VARIOUS	601-022-705
5	1	ASSEMBLY, RIGHT COVER	VARIOUS	601-024-705
4	1	ASSEMBLY, MOTOR - CDS xDRIVE	VARIOUS	601-030-705
3	1	ASSEMBLY, FRAME - CDS xDRIVE	VARIOUS	601-001-705
2	1	ASSEMBLY, DASH PANEL - CDS xDRIVE	VARIOUS	601-020-705
1	1	ASSEMBLY, BLOWER HEAT EXCHANGER	VARIOUS	601-005-705
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-6. Assembly, Frame - CDS xDrive
601-001-705 Rev. G





SOME ITEMS REMOVED FOR CLARITY

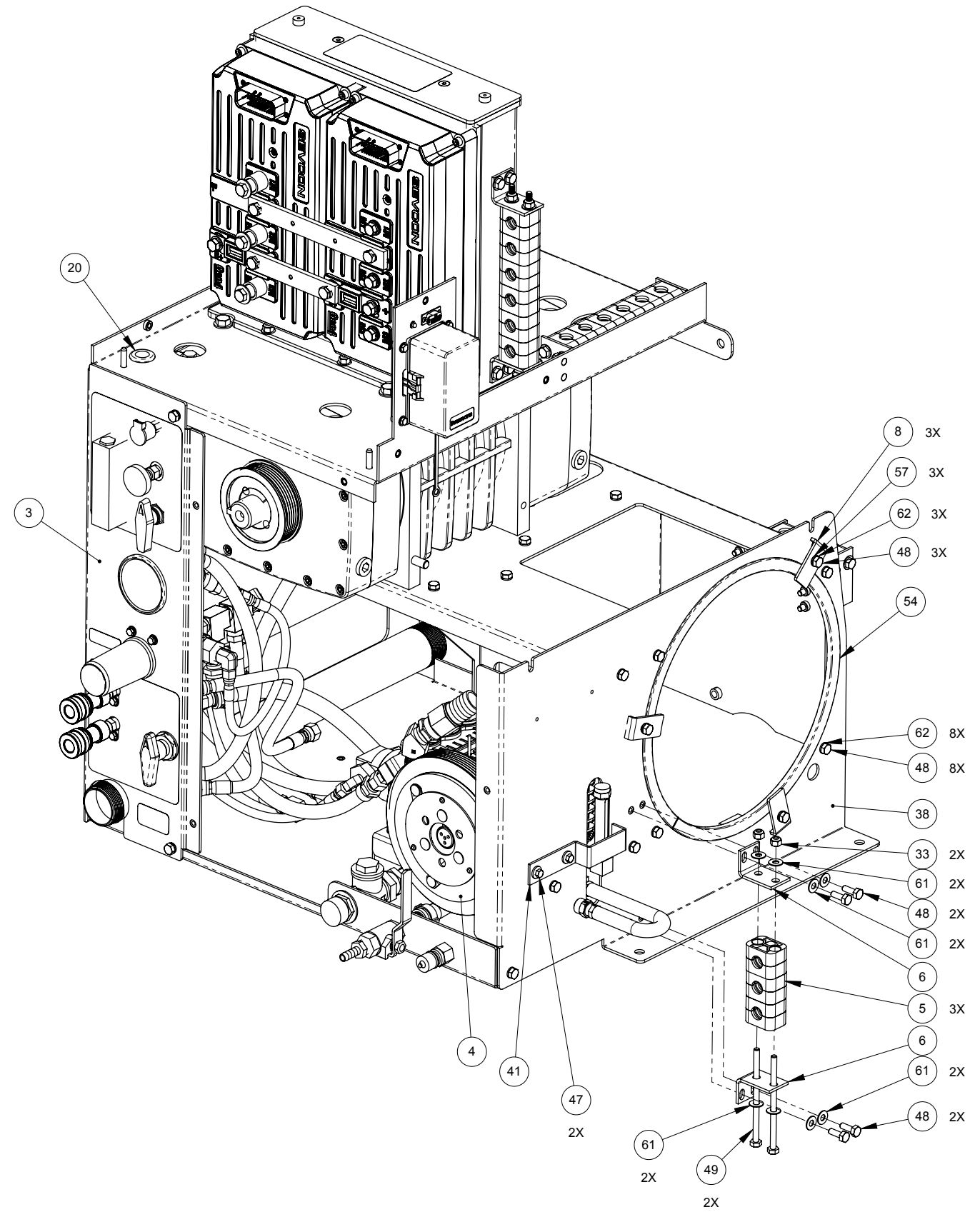
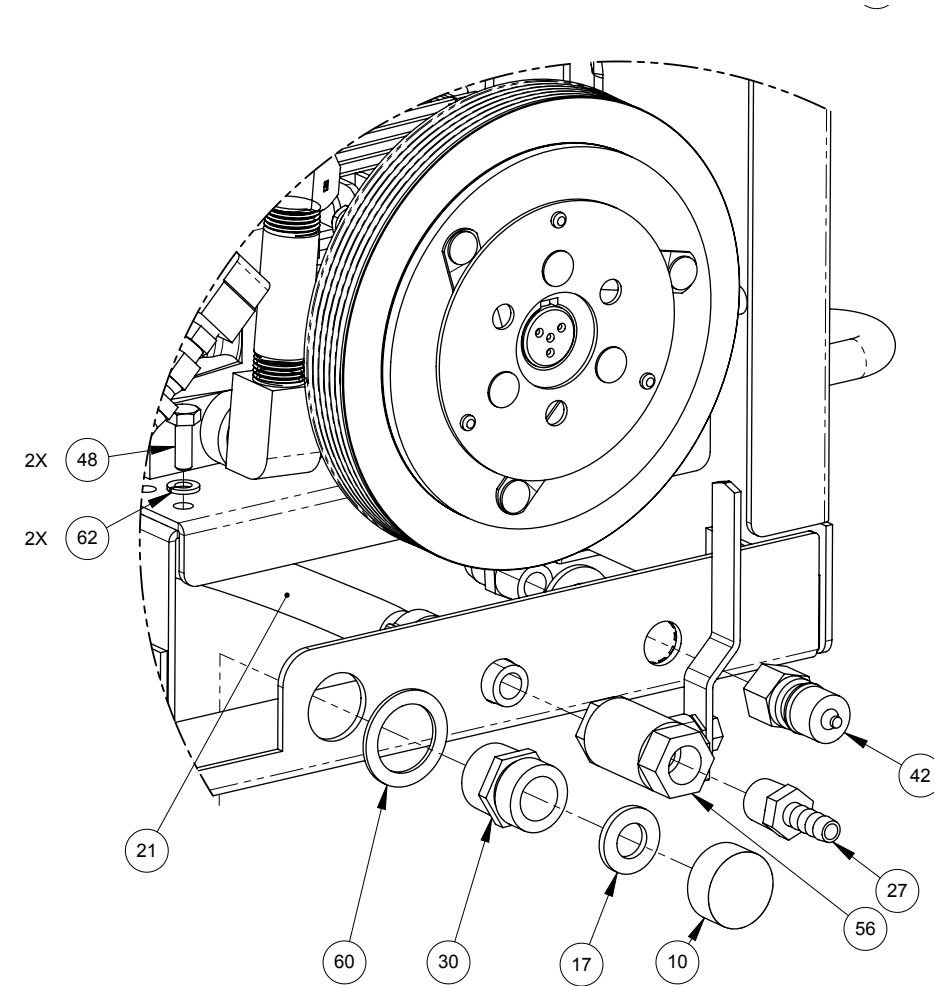
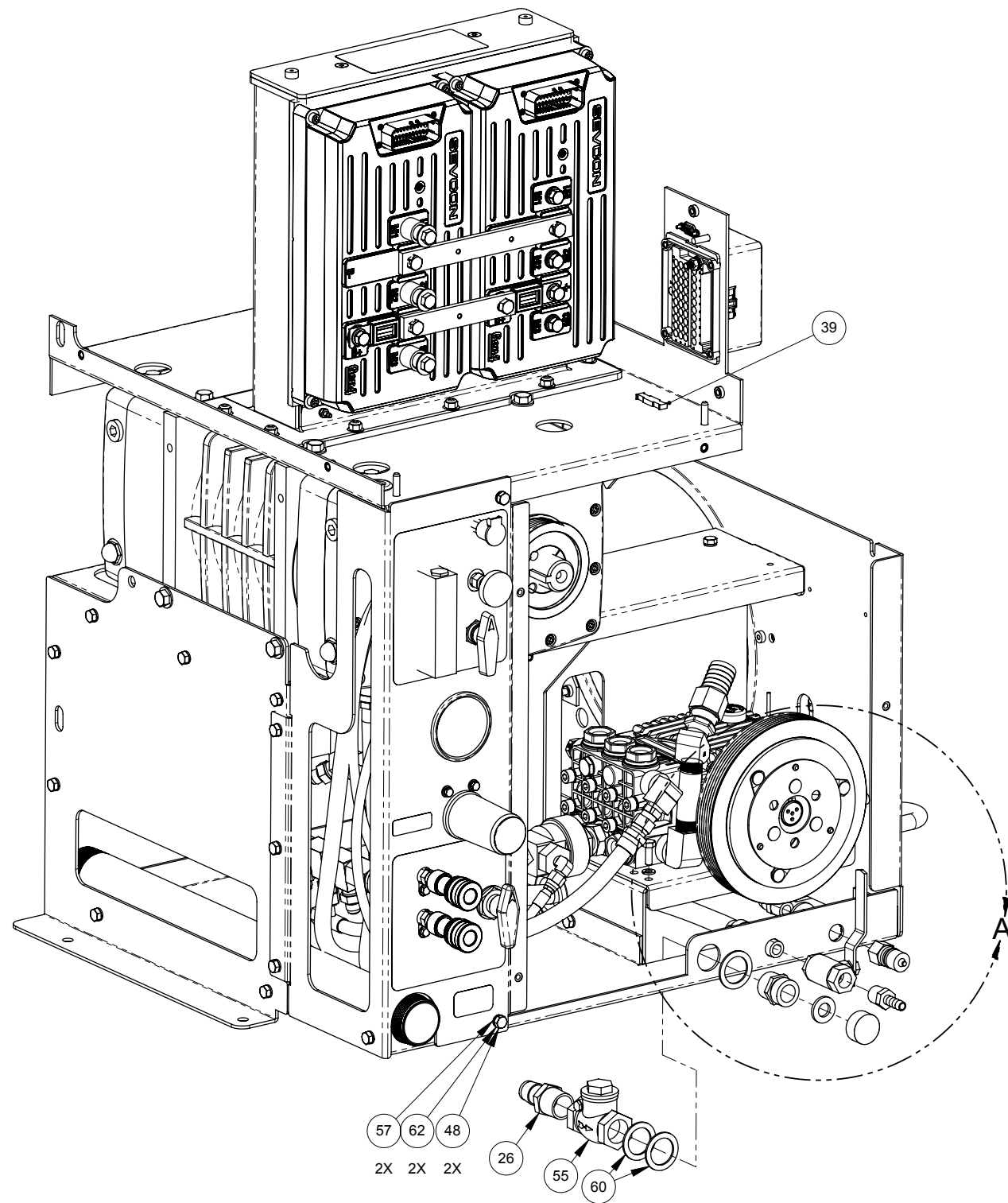


Figure 9-8. Assembly, Frame - CDS xDrive
601-001-705 Rev. G



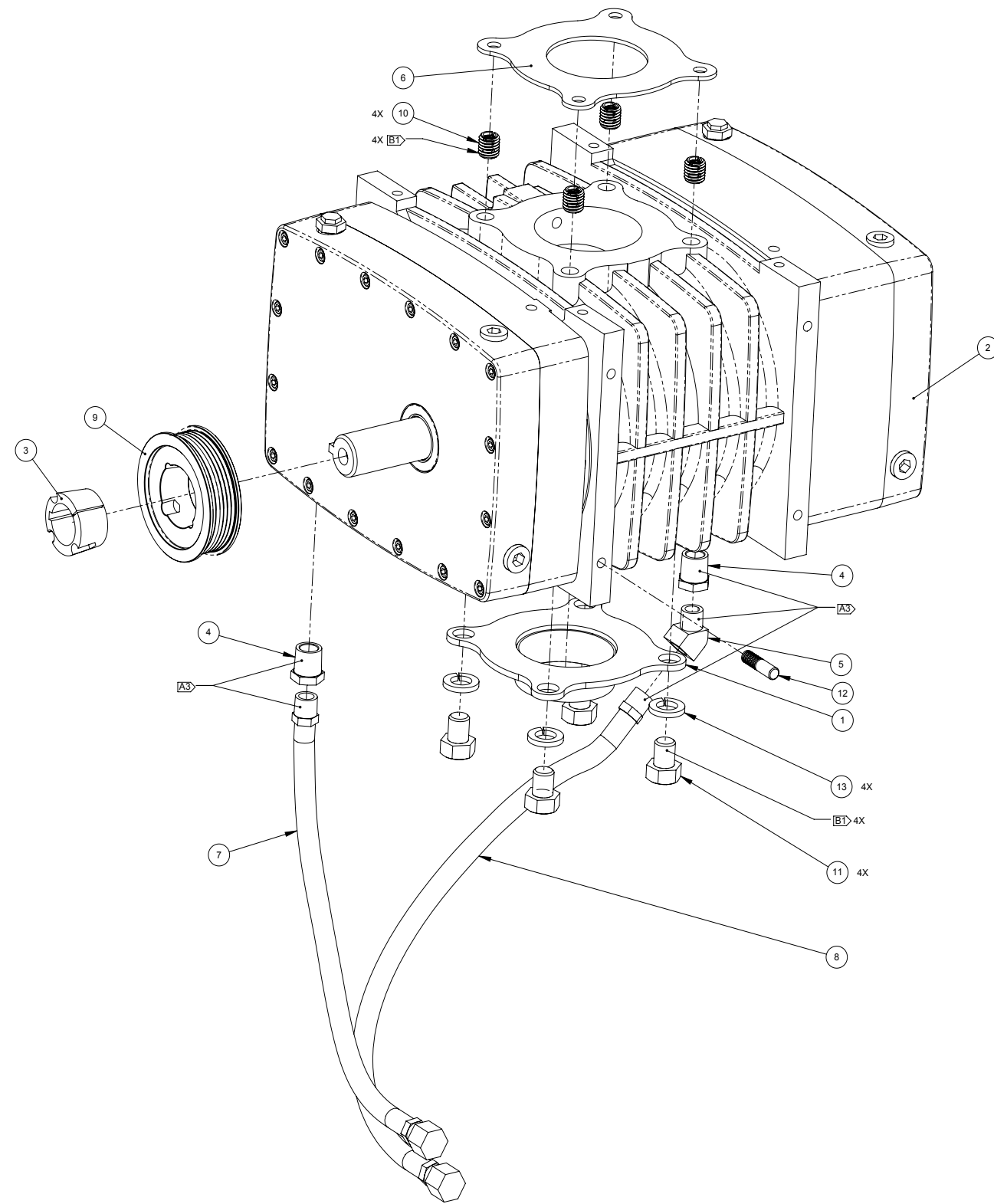
DETAIL A
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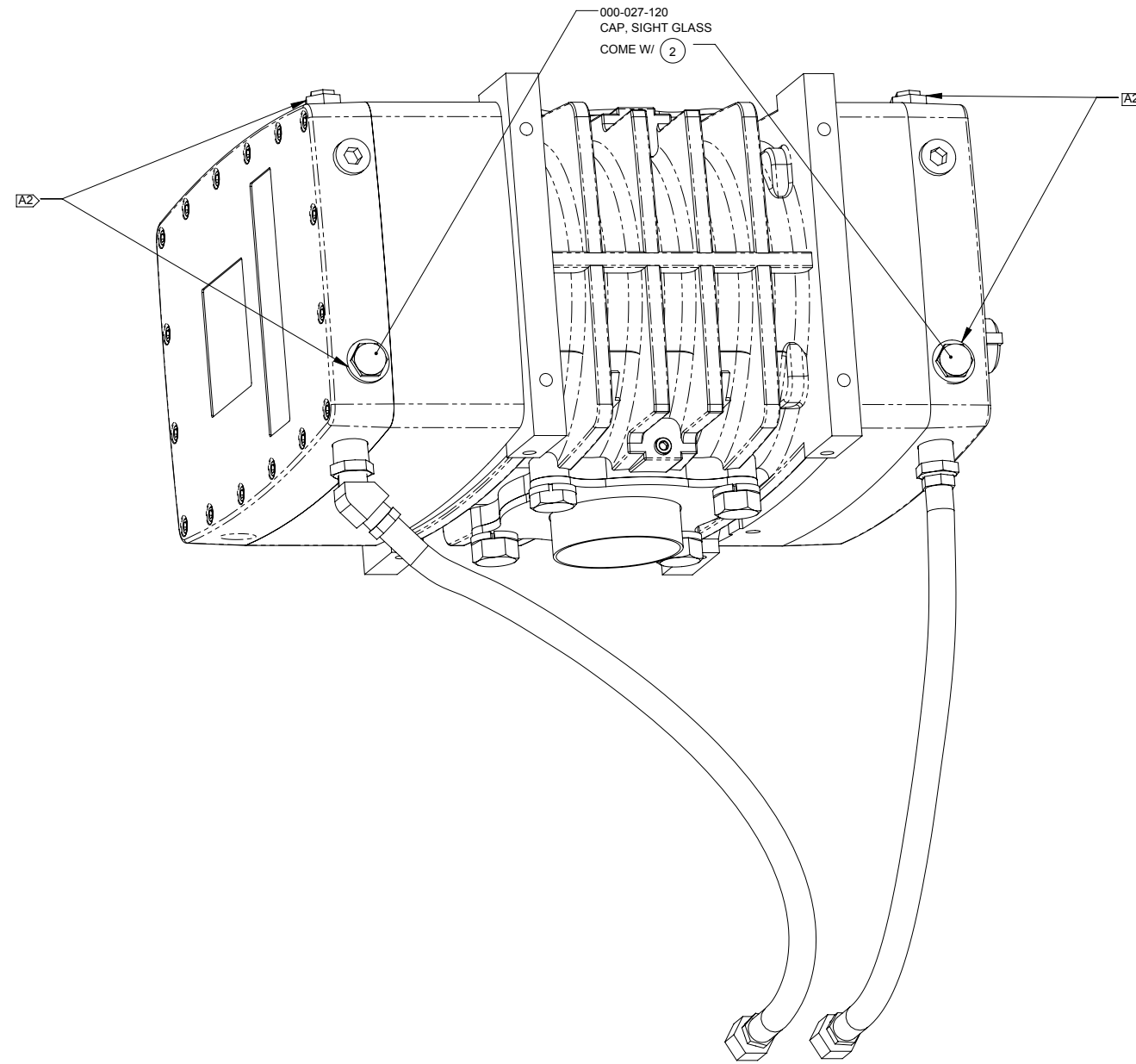
Frame Assembly Parts List

36	1	PANEL, LEFT - POWERPACK - COATED	ASTM A1008 CS TYPE B	000-100-357
35	1	PANEL, CENTER RIB	ASTM A653-G90	000-105-736
34	1	PANEL, BLOWER SHELF & BACK	ASTM A653-G90	000-105-734
33	20	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
32	2	NUT, #4-40UNC HEX	STEEL	000-094-044
31	2	NIPPLE, 3/8" MPT x 3/8" SAE FLARE	BRASS	000-052-128
30	1	NIPPLE, 3/4" NPT x 3/4" MALE GARDEN HOSE	BRASS	000-052-281
29	1	NIPPLE, 1-1/2" NPT x 22" LG. GALV,	STEEL	000-052-933
28	1	LIGHT, GREEN LED INDICATOR MINI	VARIOUS	000-084-010
27	1	INSERT, #66 (3/8" NPT x 3/8" BARB)	BRASS	000-052-104
26	1	INSERT, #1212 (3/4" NPT x 3/4" BARB)	NYLON	000-052-338
25	1	HOUSING, DSUB RECEPTACLE	VARIOUS	000-037-150
24	1	HOSE, 3/8" CLEAR BRAID - FLOW TO PUMP	VARIOUS	000-068-980
23	1	HOSE ASSEMBLY, 3/8" THROB x 17.5" LG.	VARIOUS	000-068-587
22	1	HOSE ASSEMBLY, 3/16" TEFLON x 26" LG.	S. STEEL	000-068-339
21	1	HOSE ASSEMBLY, 1/2" RUBBER X 28" LG.	VARIOUS	000-068-1080
20	1	GROMMET, LARGE WIRING	RUBBER	000-060-002
19	1	GROMMET, 1-5/16" I.D.	RUBBER	000-060-010
18	1	GASKET, HEAT SINK TO PLENUM	NEOPRENE /EPDM/SBR F0	000-057-244
17	1	GASKET, GARDEN HOSE	RUBBER	000-057-055
16	1	FUSE, 7.5A ATM MINI	VARIOUS	000-056-042
15	2	FUSE, 5A ATM MINI	VARIOUS	000-056-041
14	4	FUSE, 3A ATM MINI	VARIOUS	000-056-040
13	1	FUSE, 15A ATM MINI	VARIOUS	000-056-043
12	1	FUSE & RELAY PANEL	VARIOUS	000-056-045
11	2	CLAMP, SIZE #5 HOSE	S. STEEL	000-033-005
10	1	CAP, GARDEN HOSE	BRASS	000-027-014
9	1	CAP, D-SUB CONNECTOR DUST	VARIOUS	000-027-126
8	3	BRACKET, SILENCER SECURING	ASTM A653-G90	000-015-1291
7	1	BRACKET, CABLE CLAMP OFFSET	5052-H32	000-015-1367
6	4	BRACKET, CABLE CLAMP	5052-H32	000-015-1355
5	12	BLOCK, CABLE SUPPORT	SANTOPRENE	000-012-021
4	1	ASSEMBLY, PUMP	VARIOUS	601-007-705
3	1	ASSEMBLY, INSTRUMENT PANEL - CDS xDRIVE	VARIOUS	601-019-705
2	1	ASSEMBLY, HEAT SINK - CDS xDRIVE	VARIOUS	601-032-705
1	1	ASSEMBLY, BLOWER - CDS xDRIVE	VARIOUS	601-002-705
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

65	10	WASHER, 3/8" FLAT Z/P	STEEL	000-174-005
64	2	WASHER, 16MM INTERNAL TOOTH	S. STEEL	000-174-203
63	2	WASHER, 16MM FLAT S/S	S. STEEL	000-174-202
62	35	WASHER, 1/4" LOCK S/S	S. STEEL	000-174-019
61	34	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
60	3	WASHER, 1.5" O.D. x 1.073" I.D. x 0.075" THK.	S. STEEL	000-174-063
59	4	WASHER, 0.41" ID x 0.81" O.D. x 0.125 THK.	STEEL	000-174-196
58	2	WASHER, #4 FLAT	S. STEEL	000-174-182
57	9	WASHER, #10 FLAT	S. STEEL	000-174-001
56	1	VALVE, 3/8" NPT FULL PORT BALL	ALUMINUM BRONZE	000-169-064
55	1	VALVE, 3/4" FPT SWING CHECK	BRASS	000-169-009
54	3.5	TRIMLOK,	VARIOUS	000-131-027
53	5	SWITCH, RELAY 35A SPDT MICRO	VARIOUS	000-157-050
52	4	SCREW, 3/8"-16UNC x 1.00" LG FLAT HEAD SOCKET	STEEL	000-143-711
51	10	SCREW, 3/8"-16UNC x 0.75" LG. HEX HEAD GRD. 8	STEEL	000-143-017
50	2	SCREW, 1/4"-20UNC x 8.5" LG. HEX HEAD Z/P	STEEL	000-143-742
49	4	SCREW, 1/4"-20UNC x 4.50" LG. HEX HEAD	S. STEEL	000-143-610
48	40	SCREW, 1/4"-20UNC x 0.75" LG. HEX HEAD	S. STEEL	000-143-001
47	2	SCREW, 1/4"-20UNC x 0.50" LG. WHIZ LOCK	S. STEEL	000-143-141
46	3	SCREW, 1/4"-20UNC x 0.50" LG. S/S HEX HEAD	S. STEEL	000-143-333
45	2	SCREW, #4-40UNC X 7/16" LG. SS BUTTON HEAD	S. STEEL	000-143-351
44	4	SCREW, #10-32UNF x 0.50" LG. HEX HEAD	STEEL	000-143-327
43	1	RETAINER,WIRE LOOM	NYLON	000-138-005
42	1	QUICK CONNECT, 660 3/8" BRASS W/ EPDM O-RING	BRASS	000-052-052
41	1	PROTECTOR, PUMP DRIVE BELT - COATED	ASTM A1008 CS TYPE B	000-108-109
40	1	PLATE, BOTTOM & FRONT TIE	ASTM A653-G90	000-105-735
39	1	PLATE, BLOWER INLET	5052-H32	000-105-733
38	1	PANEL, RIGHT - POWERPACK - COATED	ASTM A1008 CS TYPE B	000-100-359
37	1	PANEL, PUMP BACK	ASTM A653-G90	000-105-737

Figure 9-9. Assembly, Blower - CDS xDrive
601-002-705 Rev. F

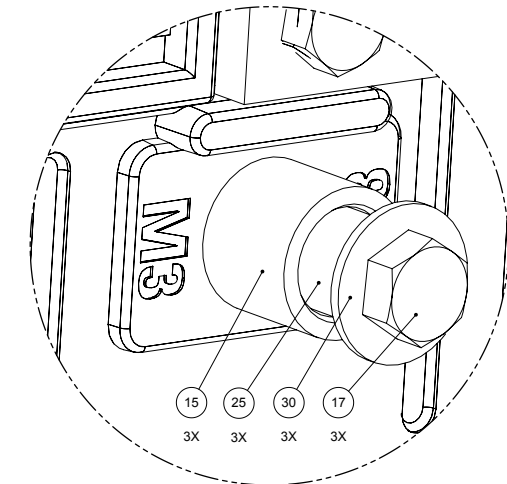
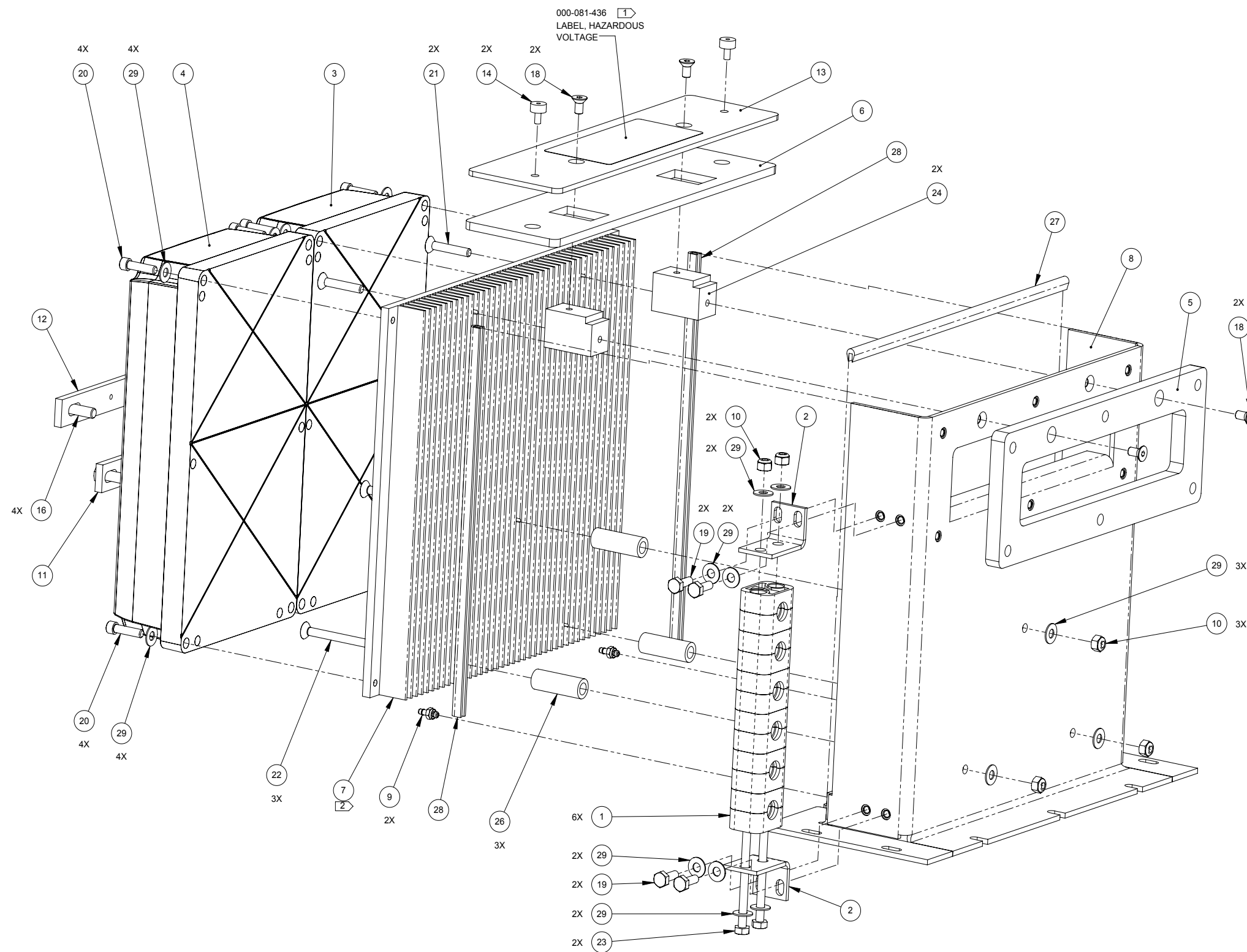




Blower Assembly Parts List

13	4	WASHER, 5/8" LOCK Z/P	STEEL	000-174-197
12	1	STUD, 3/8"-16UNC X 1.50" LG. Z/P	STEEL	000-156-045
11	4	SCREW, 5/8"-11UNC x 0.75" LG. HEX HEAD GRD 5 Z/P	STEEL	000-143-722
10	4	SCREW, INSERT 3/8"-16UNC ID X 5/8"-11UNC OD	STEEL	000-143-723
9	1	PULLEY, BLOWER - COATED	AISI 12L14	000-109-134
8	1	HOSE ASSEMBLY, 3/8" I.D. x 28" LG. DRAIN	VARIOUS	000-068-1075
7	1	HOSE ASSEMBLY, 3/8" I.D. x 21" LG. DRAIN	VARIOUS	000-068-1074
6	1	GASKET, BLOWER TO FRAME	SILICONE 1365 90A DUROMETER	000-057-246
5	1	ELBOW, 3/8" NPT STREET x 45°	BRASS	000-052-083
4	2	BUSHING, 1/2 M X 3/8 F	BRASS	000-052-064
3	1	BUSHING, 1-1/4" TAPERLOCK 1210	STEEL	000-020-075
2	1	BLOWER, GD 408 TRIFLOW	STEEL	000-111-218
1	1	ADAPTER GD BLOWER OUT - COATED	STEEL	000-001-866
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-11. Assembly, Heat Sink - CDS xDrive
601-032-705 Rev. E

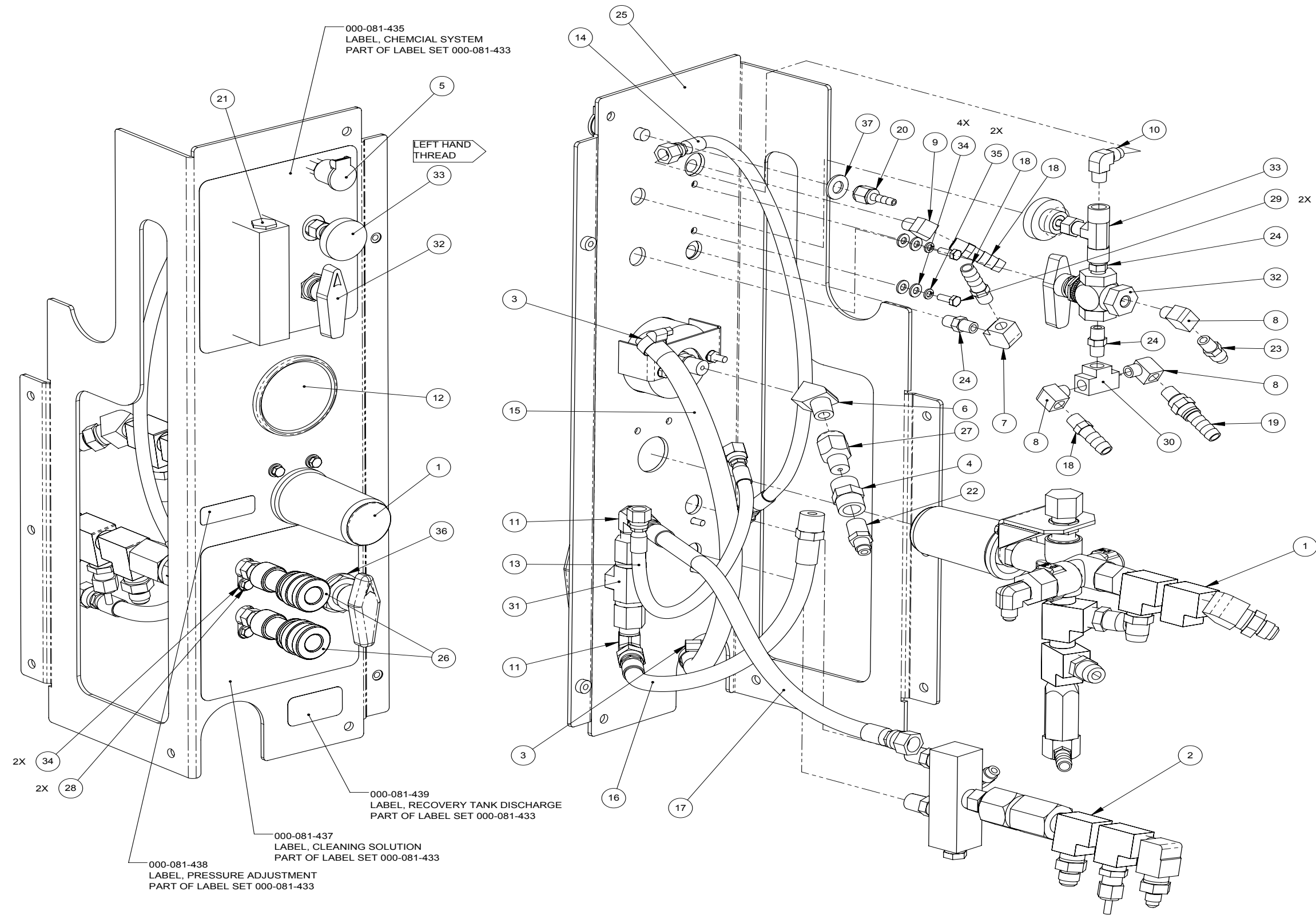


DETAIL A
SCALE 2:1

Heat Sink Assembly Parts List

30	3	WASHER, 5/16" X 7/8" OD COPPER	COPPER	000-174-198
29	19	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
28	2.04	TRIMLOK, 5/8" X 1/8" SLOT RUBBER	VARIOUS	000-131-021
27	1.04	TRIMLOK, 3/8" X 1/8" RUBBER EDGE	RUBBER	000-131-131
26	3	SPACER, Ø3/8" I.D. x 1.75" LG.	6061-T1	000-154-215
25	3	SPACER, MOTOR/GENERATOR CABLE	COPPER	000-154-213
24	2	SPACER, HEAT SINK ATTACHMENT	6061-T6	000-154-210
23	2	SCREW, 1/4"-20UNC x 8.5" LG. HEX HEAD Z/P	STEEL	000-143-742
22	3	SCREW, 1/4"-20UNC x 4" LG. FLAT HEAD S/S	S. STEEL	000-143-726
21	2	SCREW, 1/4"-20UNC x 1.50" LG. FLAT HEAD SOCKET	S. STEEL	000-143-709
20	8	SCREW, 1/4"-20UNC x 1.00" LG. SOCKET HEAD	S. STEEL	000-143-080
19	4	SCREW, 1/4"-20UNC x 0.75" LG. HEX HEAD	S. STEEL	000-143-001
18	4	SCREW, 1/4"-20UNC x 0.50" LG, FLAT HEAD	S. STEEL	000-143-596
17	3	SCREW, M8 x 45mm LG. HEX HEAD GRD. 10.9	STEEL	000-143-184
16	4	SCREW, M8 x 25MM HEX HEAD GRD 10.9	STEEL	000-143-187
15	3	PROTECTOR, PASS THRU STUD	VIRGIN PTFE	000-108-198
14	2	PROTECTOR, 5/8" BUMPER	VARIOUS	000-108-115
13	1	PLATE, TOP - HEAT SINK	5052-H32	000-105-742
12	1	PLATE, BUS BAR - 8.0" LG.	ASTM B512 / B187	000-105-754
11	1	PLATE, BUS BAR - 5.25" LG.	ASTM B512 / B187	000-105-753
10	5	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
9	2	INSERT, #10-32UNF X 5/32" BARB	S. STEEL	000-052-938
8	1	HOUSING, HEAT SINK - WELDMENT	5052-H32	000-042-099
7	1	HEAT SINK	6061-T6	000-038-083
6	1	GASKET, TOP - HEAT SINK	NEOPRENE /EPDM/SBR F0	000-057-243
5	1	GASKET, HEAT SINK DUCT	NEOPRENE /EPDM/SBR F0	000-057-245
4	1	CONTROLLER, XDRIVE - MOTOR - PRODUCT SUPPORT	VARIOUS	000-074-182
3	1	CONTROLLER, XDRIVE - GENERATOR - PRODUCT SUPPORT	VARIOUS	000-074-181
2	2	BRACKET, CABLE CLAMP	5052-H32	000-015-1355
1	6	BLOCK, CABLE SUPPORT	SANTOPRENE	000-012-021
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-12. Assembly, Instrument Panel - CDS xDrive
601-019-705 Rev. F



Intrument Panel Assembly Parts List

37	1	WASHER, 3/8" FLAT	S. STEEL	000-174-005
36	1	WASHER, 3/4" FLAT - BRASS	BRASS	000-174-027
35	2	WASHER, #10 LOCK	S. STEEL	000-174-014
34	6	WASHER, #10 FLAT	S. STEEL	000-174-001
33	1	VALVE, CHEMICAL METERING	S.STEEL	000-169-160
32	1	VALVE, 3 WAY	BRASS	000-169-242
31	1	VALVE, 2 WAY CHEM PUMP	BRASS	000-169-176
30	1	TEE, 1/8" FPT	BRASS	000-052-092
29	2	SCREW, #10-32UNF x 0.50" LG. HEX HEAD	STEEL	000-143-327
28	2	SCREW, #10-24UNC x 0.50" LG. HEX HEAD	S. STEEL	000-143-126
27	1	REGULATOR, HI PSI SNUBBER	BRASS	000-135-052
26	2	QUICK CONNECT, 440 FEMALE w/ EPDM O-RING	BRASS	000-052-051
25	1	PANEL, INSTRUMENT - COATED	ASTM A1008 CS TYPE B	000-100-353
24	3	NIPPLE, 1/8" NPT HEX	BRASS	000-052-069
23	1	NIPPLE, 1/4" SAE x 1/8" NPT	BRASS	000-052-530
22	1	NIPPLE, 1/4" SAE x 1/4" NPT	BRASS	000-052-527
21	1	METER, CHEMICAL FLOW RAW	ACRYLIC	000-074-030
20	1	INSERT, #F23 (1/8" FPT x 3/16" BARB)	BRASS	000-052-096
19	1	INSERT, #26 w/ SWIVEL - BRASS	BRASS	000-052-939
18	3	INSERT, #26 (1/8" NPT x 3/8" BARB)	BRASS	000-052-099
17	1	HOSE, 5/16" TEFLON x 18" LG.	S. STEEL	000-068-1048
16	1	HOSE, 5/16" TEFLON x 15" LG. M-F JIC ENDS	S. STEEL	000-068-092
15	1	HOSE, 3/8" I.D. HI TEMP RUBBER x 21" LG.	RUBBER	000-068-1061
14	1	HOSE ASSEMBLY, 3/16" TEFLON x 18.25 LG.	S. STEEL	000-068-518
13	1	HOSE ASSEMBLY, 3/16" TEFLON x 16.75" LG.	S. STEEL	000-068-1071
12	1	GAUGE, PRESSURE 0 -1500 PSI, UPC #401406.	VARIOUS	000-074-007
11	2	ELBOW, 3/8" JIC x 1/4" NPT	BRASS	000-052-751
10	1	ELBOW, 1/8" NPT x 1/4" SAE	BRASS	000-052-531
9	1	ELBOW, 1/8" NPT X 45° STREET	BRASS	000-052-078
8	3	ELBOW, 1/8" NPT STREET	BRASS	000-052-084
7	1	ELBOW, 1/8" NPT FEMALE	BRASS	000-052-089
6	1	ELBOW, 1/4" NPT STREET x 45°	BRASS	000-052-082
5	1	CUP, GRAVITY FEED OIL BLOWER LUBE PORT	S.STEEL	000-052-272
4	1	COUPLER, 1/4" FPT	BRASS	000-052-311
3	2	CLAMP, SIZE #5 HOSE	S. STEEL	000-033-005
2	1	ASSEMBLY, HI-PSI MANIFOLD	BRASS	601-008-705
1	1	ASSEMBLY, BY-PASS VALVE	VARIOUS	601-009-705
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-13. Assembly, Hi-PSI Manifold - CDS xDrive
601-008-705 Rev. D

HI-PSI Manifold Assembly Parts List

12	1	VALVE, DIFFERENTIAL	VARIOUS	000-169-236
11	2	TEE, 3/8" NPT MALE STREET	BRASS	000-052-023
10	1	SENDER, TEMPERATURE	BRASS	000-149-039
9	1	PLUG, 1/4" NPT HEX	BRASS	000-106-002
8	1	NIPPLE, 3/8" NPT x 1/4" M SAE	BRASS	000-052-662
7	1	NIPPLE, 3/8" NPT HEX	BRASS	000-052-074
6	1	NIPPLE, 3/8" M JIC x 3/8" NPT	BRASS	000-052-528
5	2	NIPPLE, 1/4" NPT HEX	BRASS	000-052-071
4	1	MANIFOLD, HIGH PRESSURE	UNS C36000 / ASTM B16 H02	000-090-008
3	1	ELBOW, 3/8" NPT STREET	BRASS	000-052-086
2	1	ELBOW, 1/8" NPT x 1/4" SAE	BRASS	000-052-531
1	1	BUSHING, 3/8" NPT x 1/4" FPT	BRASS	000-052-061
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

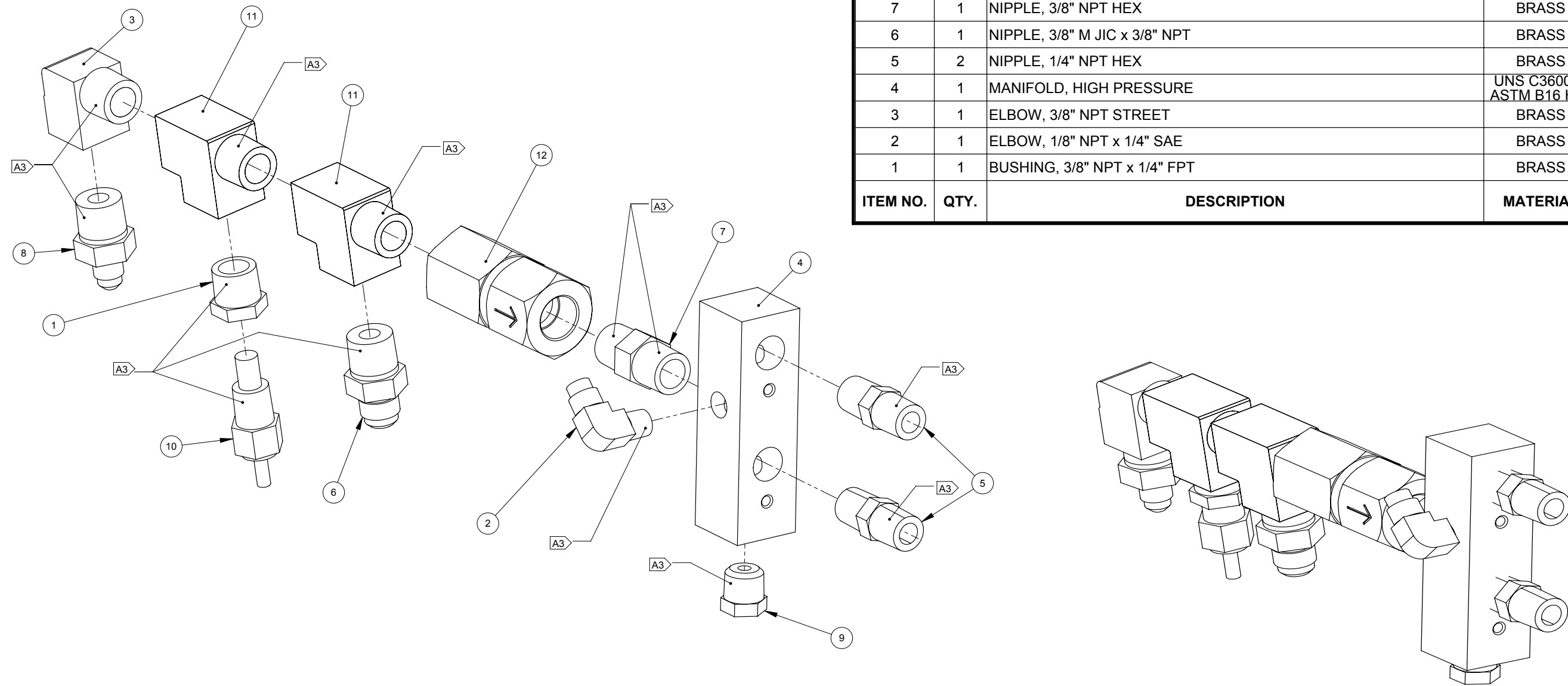
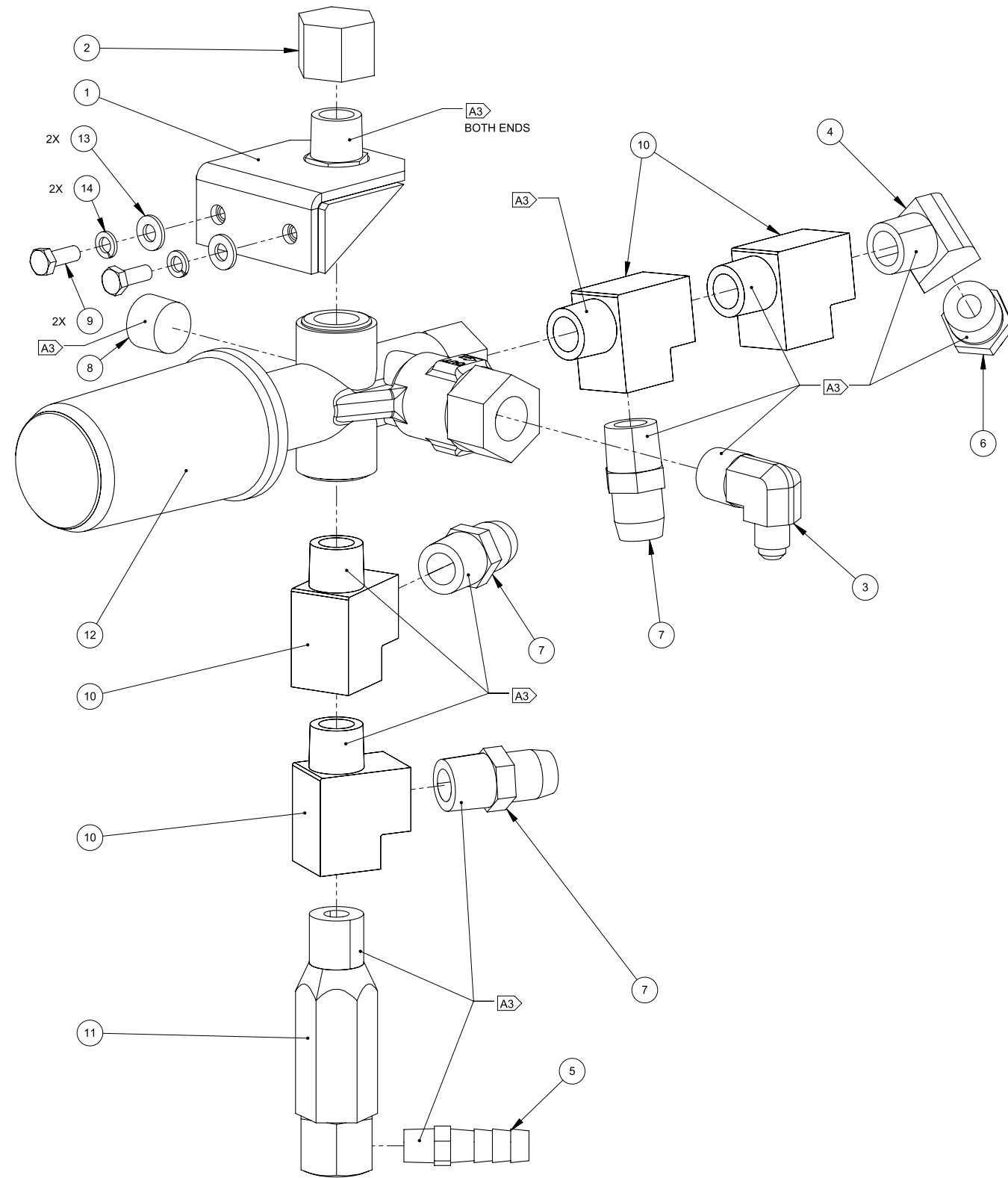


Figure 9-14. Assembly, Bypass Valve - CDS xDrive
601-009-705 Rev. A



Bypass Valve Assembly Parts List

14	2	WASHER, #10 LOCK	S. STEEL	000-174-014
13	2	WASHER, #10 FLAT	STEEL	000-174-001
12	1	VALVE, PRESSURE REGULATOR-MODIFIED	VARIOUS	000-169-351
11	1	VALVE, 165° F THERMAL	VARIOUS	000-169-027
10	4	TEE, 3/8" NPT MALE STREET	BRASS	000-052-023
9	2	SCREW, #10-24UNC x 0.50" LG. HEX HEAD	S. STEEL	000-143-126
8	1	PLUG, 3/8" NPT ALLEN HEAD	BRASS	000-106-008
7	3	NIPPLE, 3/8" MPT x 3/8" SAE FLARE	BRASS	000-052-128
6	1	NIPPLE, 3/8" M JIC x 3/8" NPT	BRASS	000-052-528
5	1	INSERT, #26 (1/8" NPT x 3/8" BARB)	BRASS	000-052-099
4	1	ELBOW, 3/8" NPT STREET x 45°	BRASS	000-052-083
3	1	ELBOW, 1/4" SAE x 3/8" MPT x 90°	BRASS	000-052-764
2	1	CAP, 3/8" BRASS PIPE	BRASS	000-027-008
1	1	BRACKET, BY-PASS VALVE MOUNT - WELDMENT	AISI 304 2B	000-015-515
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

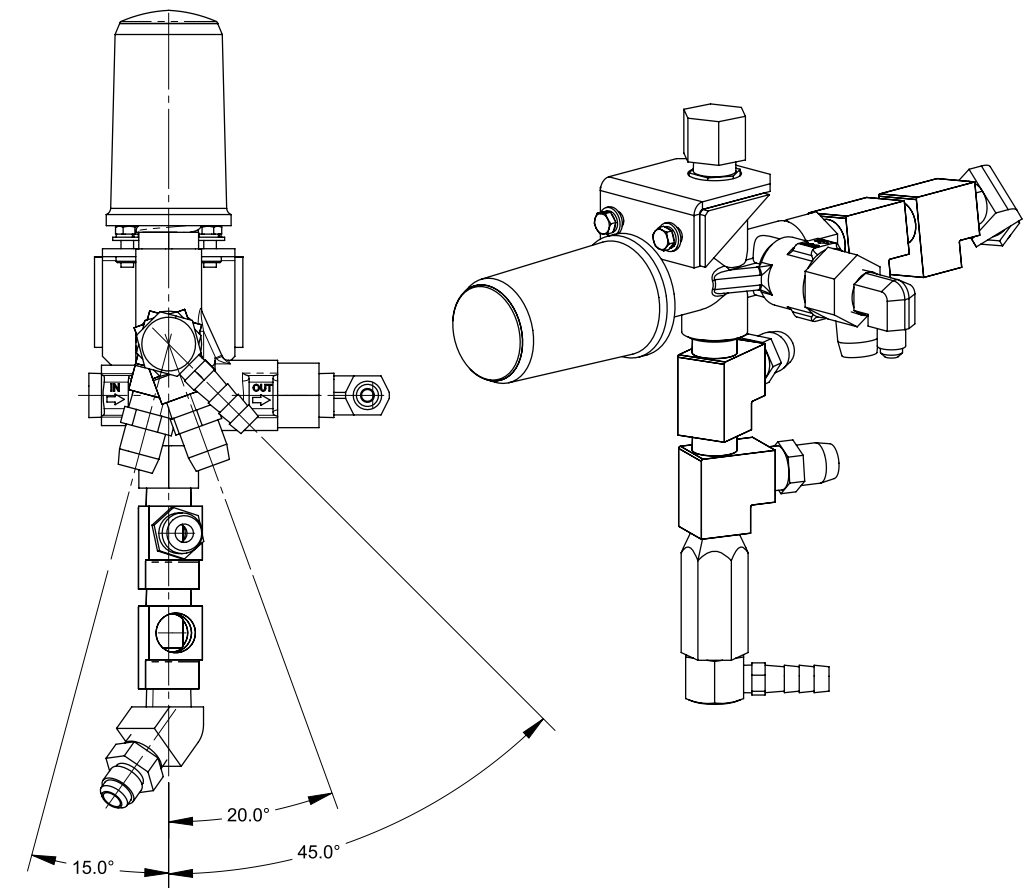
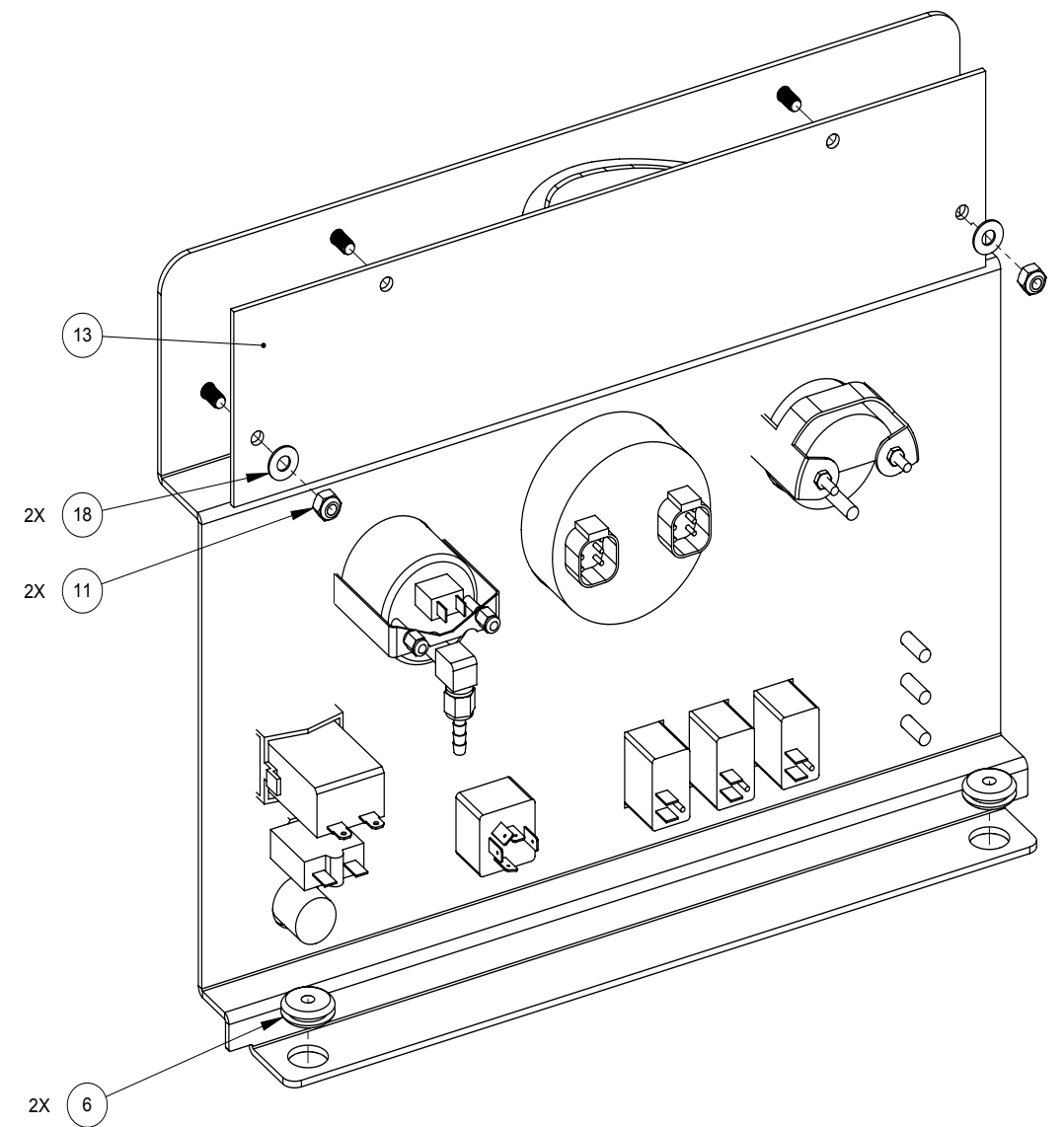
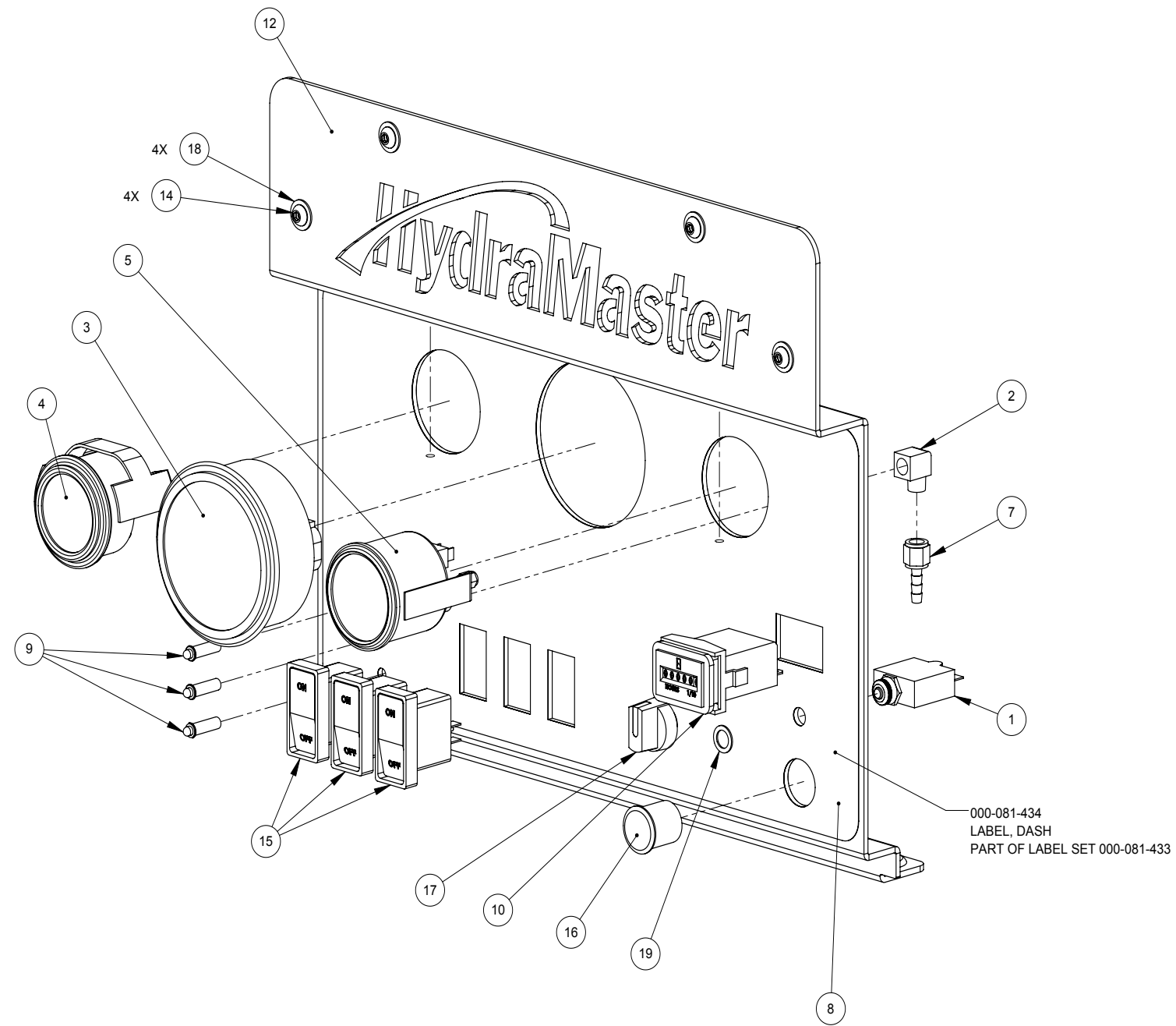


Figure 9-15. Assembly, Dash Panel - CDS xDrive
601-020-705 Rev. F



NOTES

Dash Panel Assembly Parts List

19	1	WASHER, 3/8" FLAT	NYLON	000-174-052
18	6	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
17	1	SWITCH, ROTARY, 4 POSITION	VARIOUS	000-157-060
16	1	SWITCH, PUSH BUTTON IGNITION	VARIOUS	000-157-168
15	3	SWITCH, 20 AMP ROCKER	VARIOUS	000-157-040
14	4	SCREW, 1/4"-20UNC X 0.625" LG. SHCS BUTTON	STEEL	000-143-206
13	1	REFLECTOR, 3.75" X 16" LG.	VARIOUS	000-084-020
12	1	PANEL, DASH - COATED	5052-H32	000-100-351
11	2	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
10	1	METER, RECTANGULAR W/O BEZEL	VARIOUS	000-074-170
9	3	LIGHT, RED LED INDICATOR MINI	VARIOUS	000-084-011
8	1	LABEL SET, CDS XDRIVE	POLYCARBONATE	000-081-433
7	1	INSERT, #F23 (1/8" FPT x 3/16" BARB)	BRASS	000-052-096
6	2	GROMMET, 3/4" ID X 1/8" GROOVE - BUNA	BUNA-N	000-060-020
5	1	GAUGE, VACUUM 10-30" - Ø2-1/16" CHROME BEZEL	VARIOUS	000-074-006
4	1	GAUGE, TEMPERATURE	VARIOUS	000-074-016
3	1	GAUGE, TACH - CAN BUS	VARIOUS	000-074-177
2	1	ELBOW, 1/8" NPT STREET	BRASS	000-052-084
1	1	BREAKER, 25 AMP CIRCUIT	VARIOUS	000-018-004
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.



Figure 9-16. Assembly, Pump - CDS xDrive
601-007-705 Rev. C

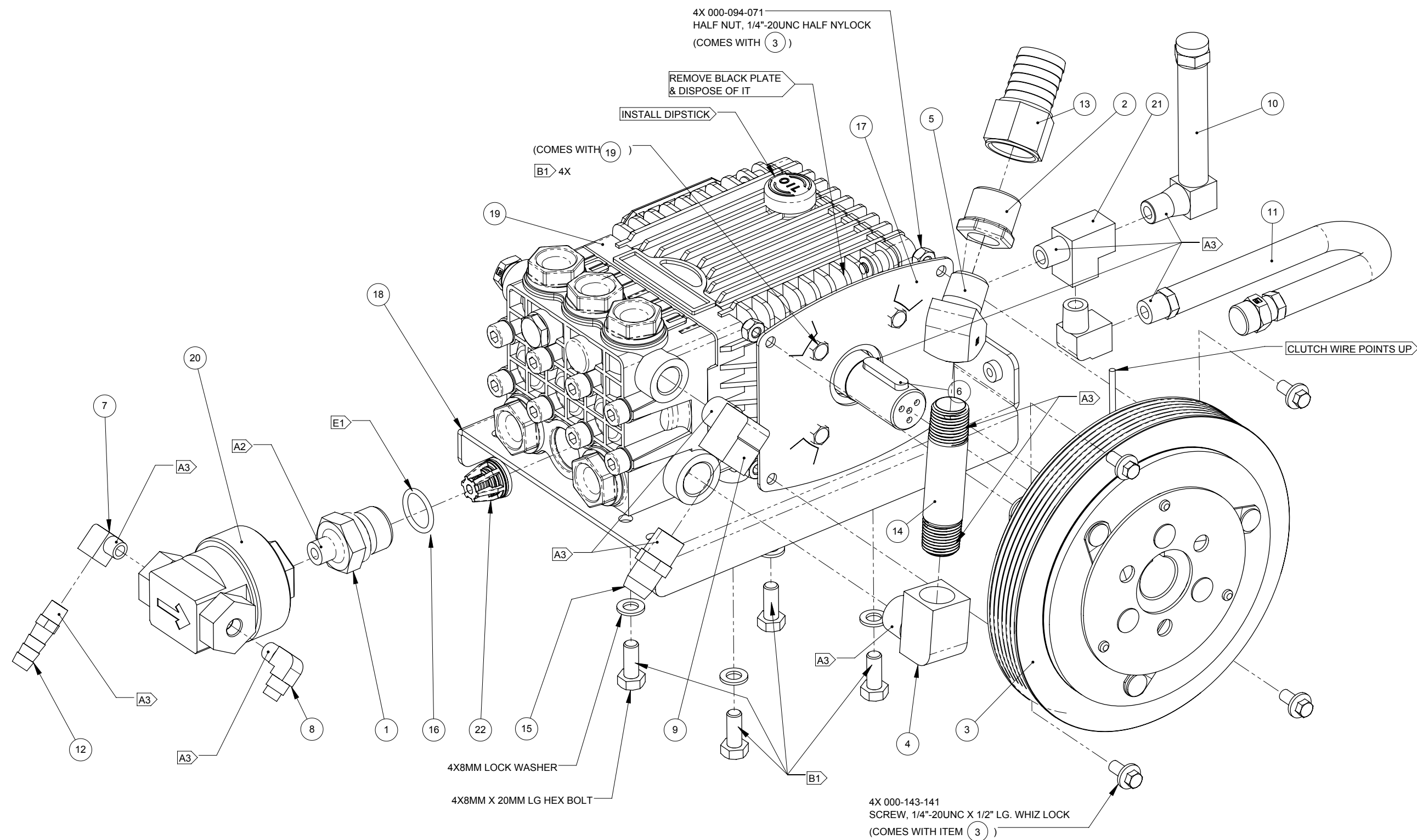
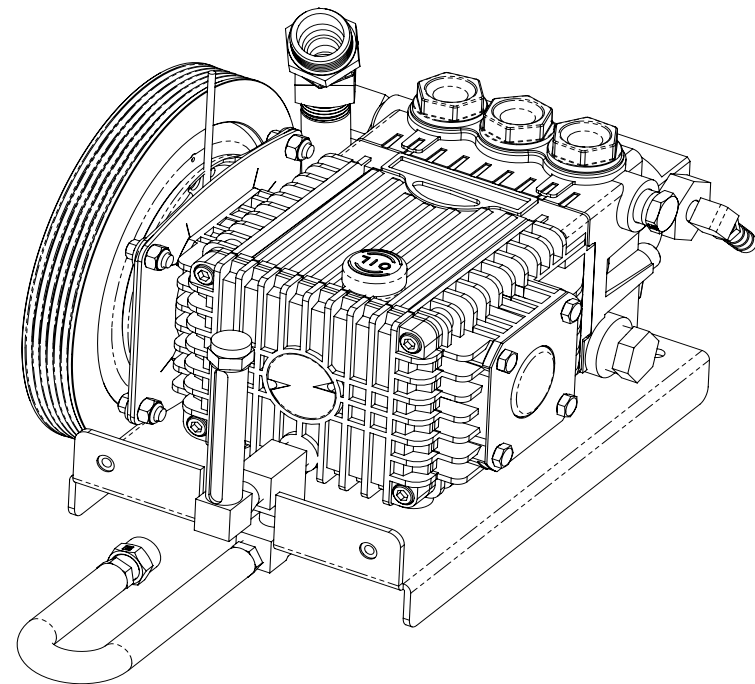
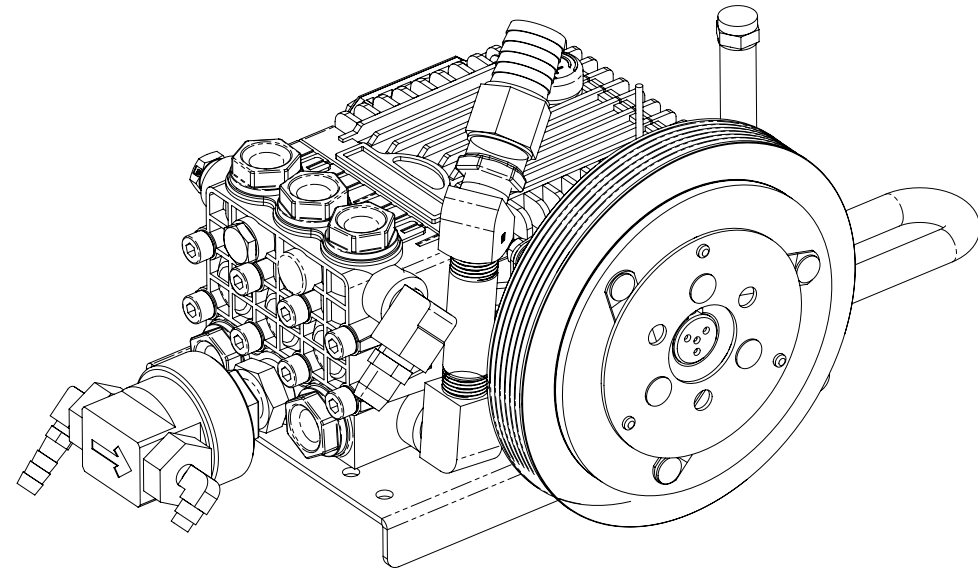


Figure 9-17. Assembly, Pump - CDS xDrive
601-007-705 Rev. C



Pump Assembly Parts List

22	1	VALVE, GP PUMP CHECK - MOD. - 4.0 GALLON	VARIOUS	000-169-216
21	1	TEE, 1/4" NPT BRANCH M-F-F	BRASS	000-052-090
20	1	PUMP, GP CHEMICAL	AISI 303	000-111-184
19	1	PUMP, 4.0 GMP GP	VARIOUS	000-111-188
18	1	PLATE, PUMP MOUNT	ASTM A653-G90	000-105-738
17	1	PLATE, PUMP CLUTCH - GP 4.0 GPM	STEEL	000-105-550
16	1	O-RING, ADAPTER - CHEMICAL PUMP	RUBBER	000-097-057
15	1	NIPPLE, 3/8" MPT x 3/8" SAE FLARE	BRASS	000-052-128
14	1	NIPPLE, 1/2" NPT x 3.5" LG.	BRASS	000-052-932
13	1	INSERT, #F1216 (3/4" FPT x 1" BARB)	BRASS	000-052-754
12	1	INSERT, #26 (1/8" NPT x 3/8" BARB)	BRASS	000-052-099
11	1	HOSE ASSEMBLY, 3/8" X 17" LG. DRAIN	VARIOUS	000-068-794
10	1	GAUGE, OIL SIGHT 1/4" NPT ELBOW	BRASS	000-074-184
9	1	ELBOW, 3/8" NPT STREET	BRASS	000-052-086
8	1	ELBOW, 1/8" NPT x 1/4" SAE	BRASS	000-052-531
7	1	ELBOW, 1/8" NPT STREET	BRASS	000-052-084
6	1	ELBOW, 1/4" NPT STREET	BRASS	000-052-085
5	1	ELBOW, 1/2" NPT STREET x 45°	BRASS	000-052-081
4	1	ELBOW, 1/2" NPT STREET	BRASS	000-052-087
3	1	CLUTCH, 7.315OD 24MM SERPENTINE	VARIOUS	000-036-011
2	1	BUSHING, 3/4" MPT X 1/2" FPT	BRASS	000-052-411
1	1	ADAPTER, GP TO CHEM PUMP S/S 4.0 GALLON	S. STEEL	000-001-154
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-18. Assembly, Blower HX - CDS xDrive
601-005-705 Rev. C

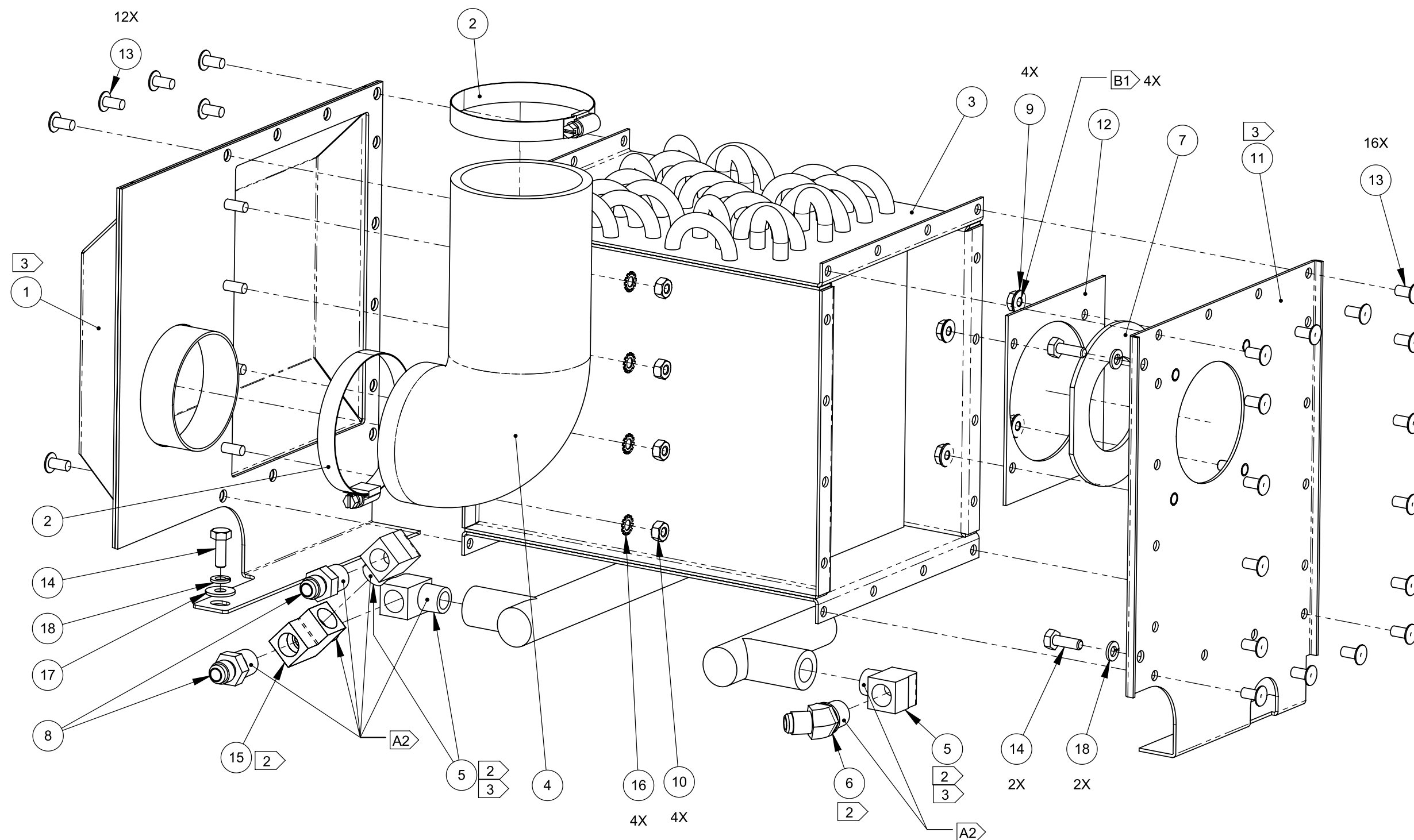


Figure 9-19. Assembly, Blower HX - CDS xDrive
601-005-705 Rev. C

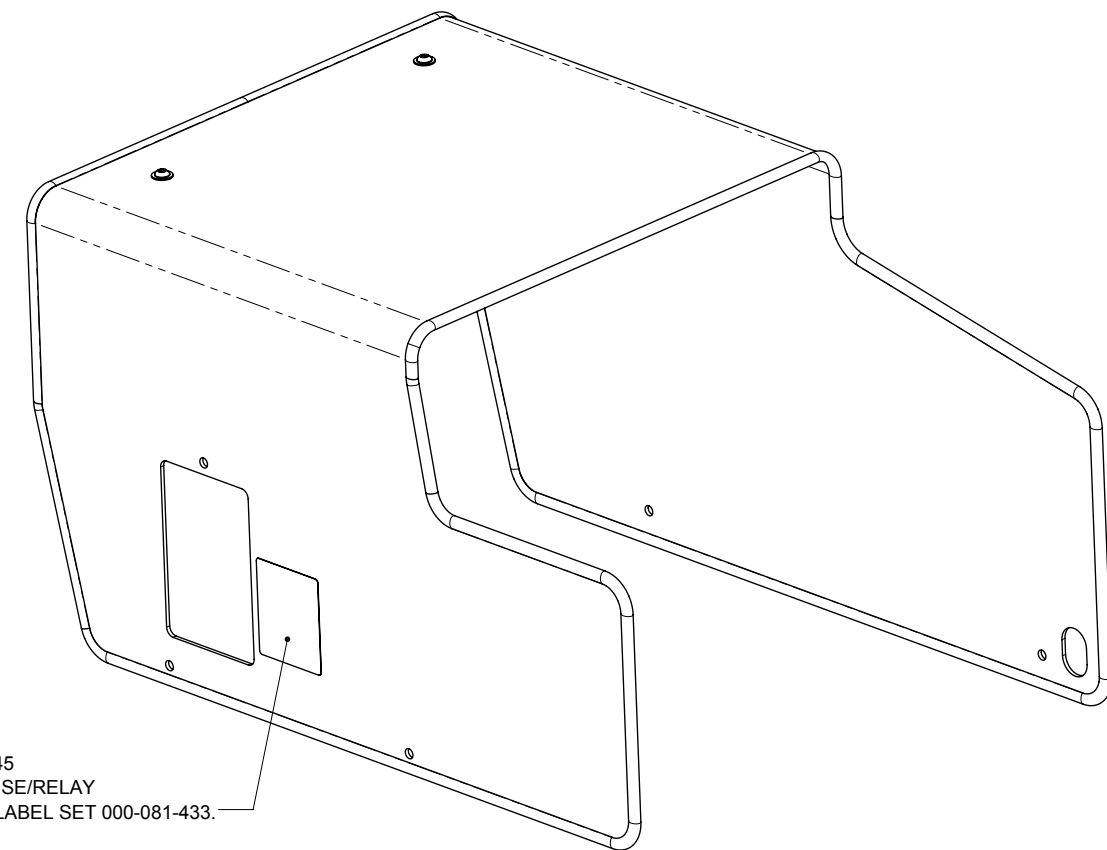
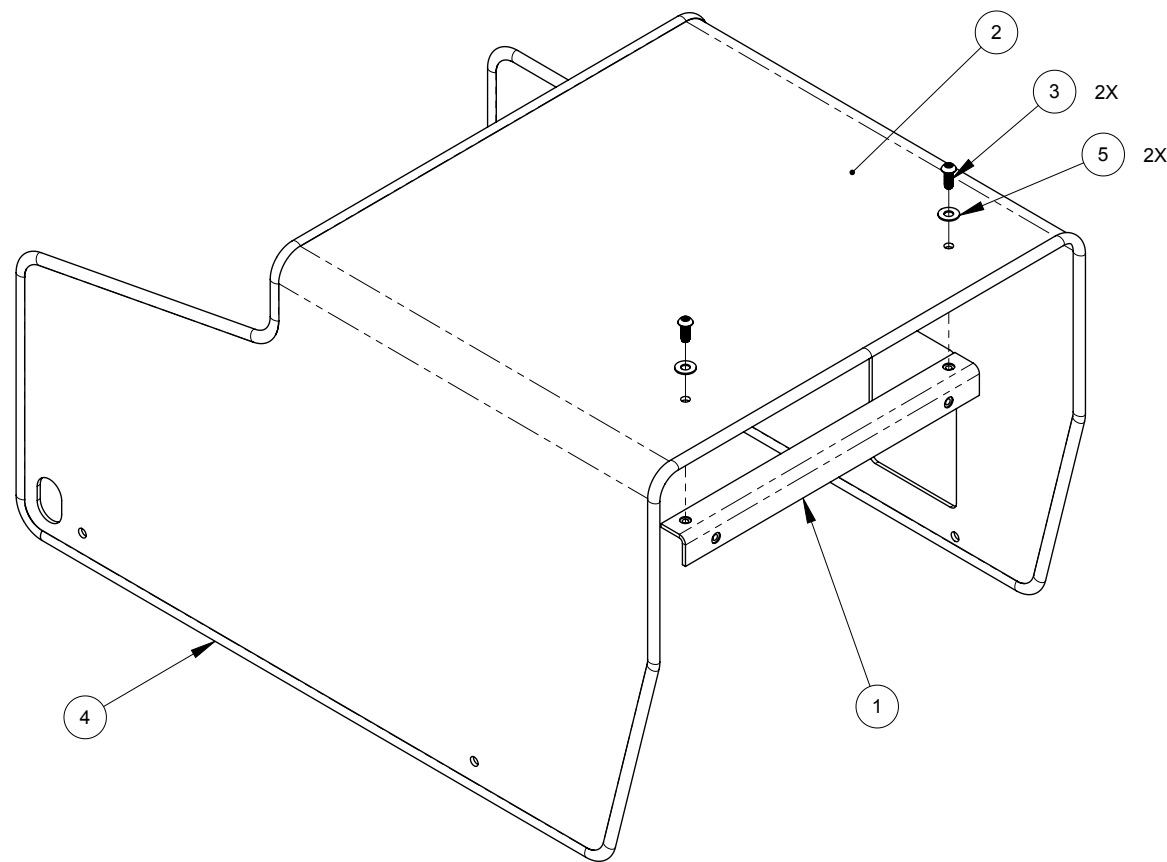
Blower HX Assembly Parts List

16	3	WASHER, 1/4" LOCK	STEEL	000-174-019
15	4	WASHER, 1/4" EXTERNAL STAR	STEEL	000-174-039
14	3	SCREW, 1/4"-20UNC x 0.75" LG. HEX HEAD	STEEL	000-143-001
13	28	RIVET, 1/4" BLIND x 0.50" LG.	ALUMINUM	000-140-021
12	1	PLATE, SILENCER SEAL RETAINER	ASTM A653-G90	000-105-744
11	1	PLATE, SALSA INTERFACE - FABRICATED	ASTM A653-G90	000-105-743
10	4	NUT, 1/4"-20UNC HEX Z/P	STEEL	000-094-008
9	4	NUT, 1/4"-20UNC HEX FLANGE	STEEL	000-094-007
8	1	NIPPLE, 3/8" M JIC x 3/8" NPT	BRASS	000-052-528
7	1	GASKET, HEAT EXCHANGER OUTLET	SILICONE 1365 90A DUROMETER	000-057-247
6	1	ELBOW, 3/8" NPT x 3/8" M JIC x 45°	BRASS	000-052-779
5	2	ELBOW, 3/8" NPT STREET	BRASS	000-052-086
4	1	ELBOW, 3" RUBBER EXHAUST - MODIFIED	RUBBER	000-052-934
3	1	CORE, BLOWER HEAT EXCHANGER	VARIOUS	000-038-053
2	2	CLAMP, SIZE #48 HOSE (3")	S.STEEL	000-033-013
1	1	BOX, INLET PLENUM - WELDMENT	ASTM A653-G90	000-013-124
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-20. Assembly, Top Cover - CDS xDrive
601-022-705 Rev. C

Top Cover Assembly Parts List

5	2	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
4	13'	TRIMLOK,	VARIOUS	000-131-027
3	2	SCREW, 1/4"-20UNC X 0.625" LG. SHCS BUTTON	STEEL	000-143-206
2	1	COVER, TOP - POWERPACK - COATED	5052-H32	000-041-886
1	1	BRACKET, DASH SUPPORT	5052-H32	000-015-1360
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.



Right Cover Assembly Parts List

ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.
5	4	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
4	1	TRAY, SOAP JUG - COATED	ASTM A1008 CS TYPE B	000-166-076
3	1	PANEL, FRONT - POWERPACK - COATED	5052-H32	000-100-355
2	4	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
1	1	JUG, 2.5 GALLON RECTANGLE - HDPE	HDPE	000-159-262

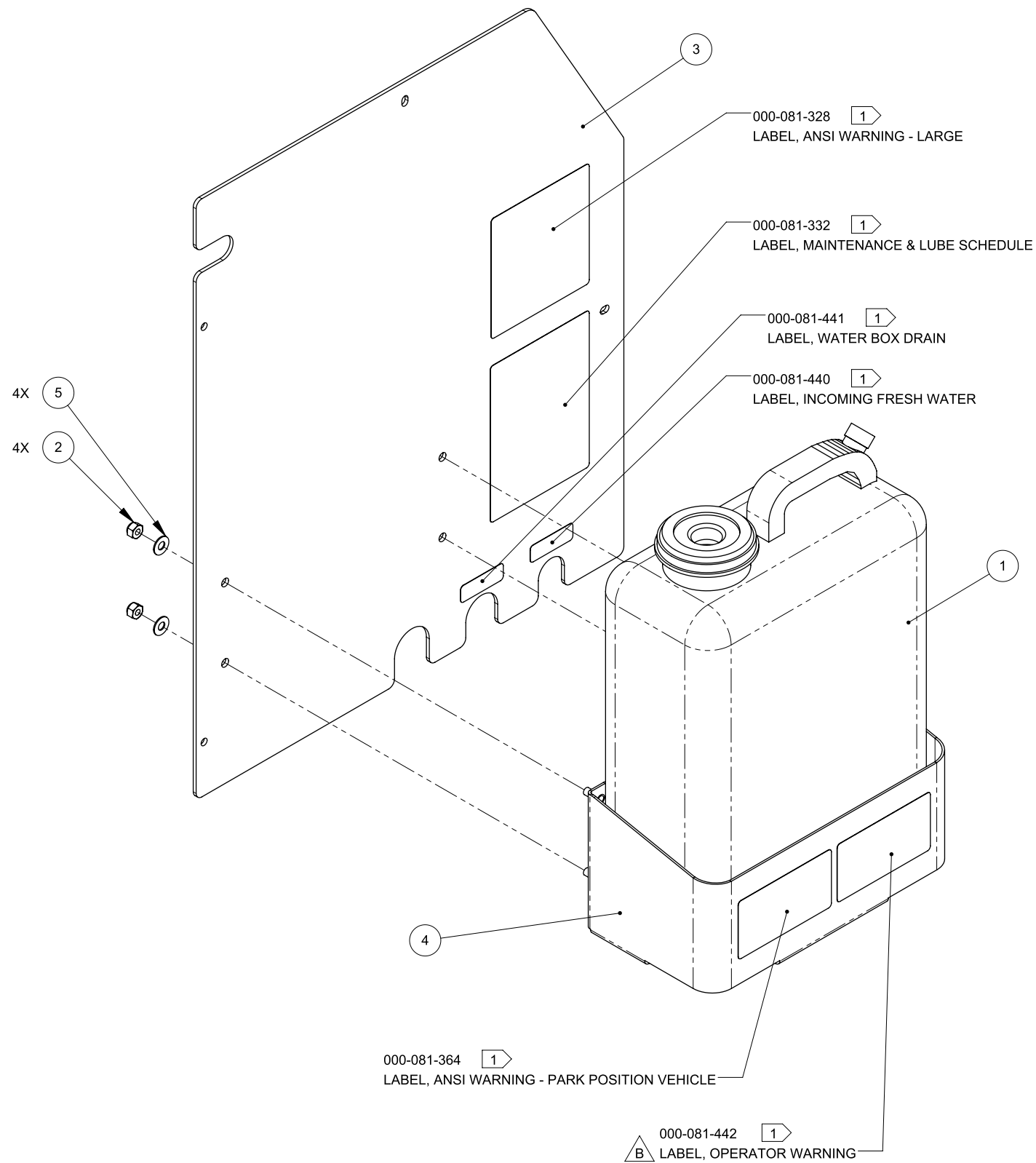


Figure 9-21. Assembly, Recovery Tank - CDS xDrive
601-060-705 Rev. B

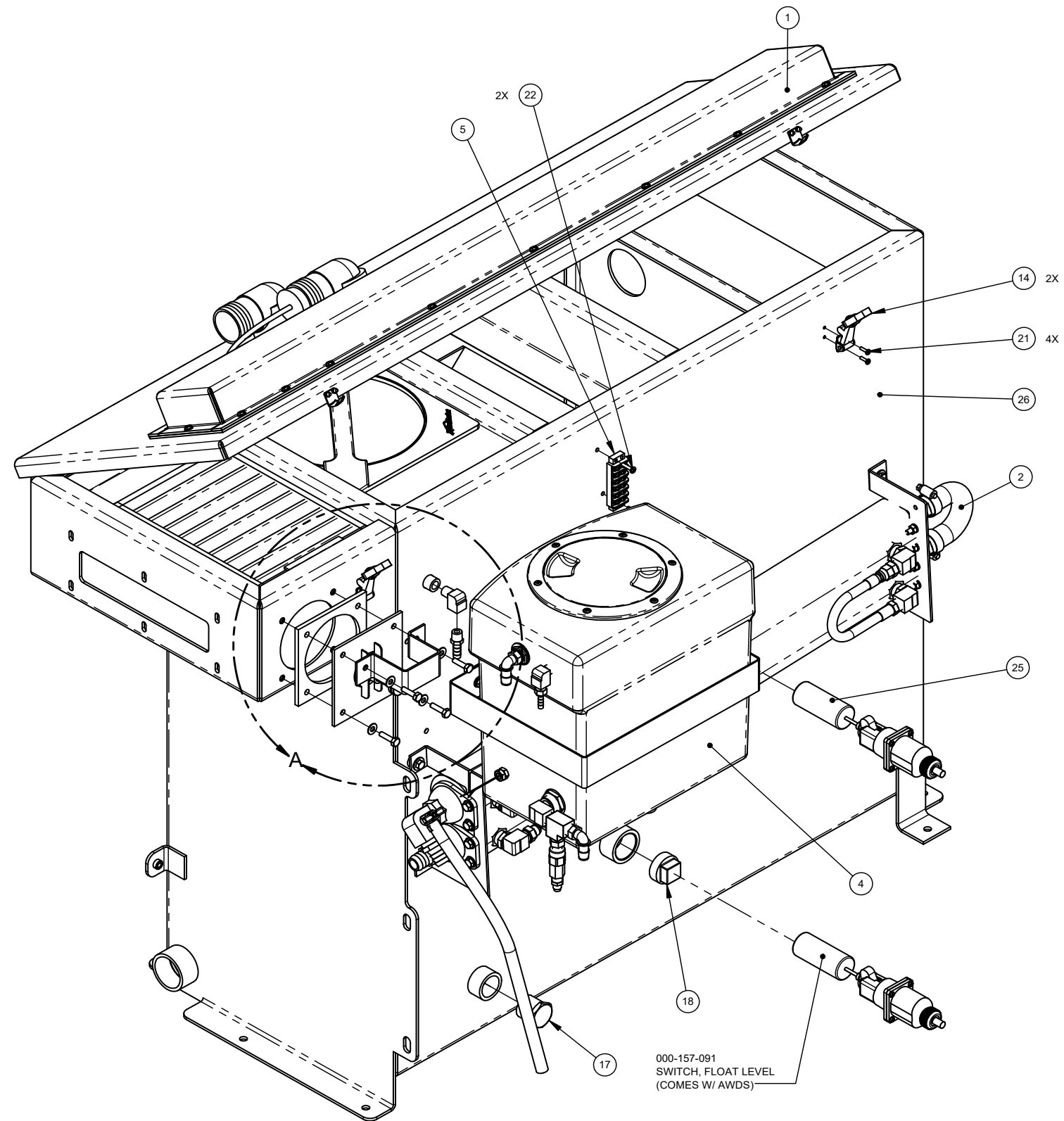
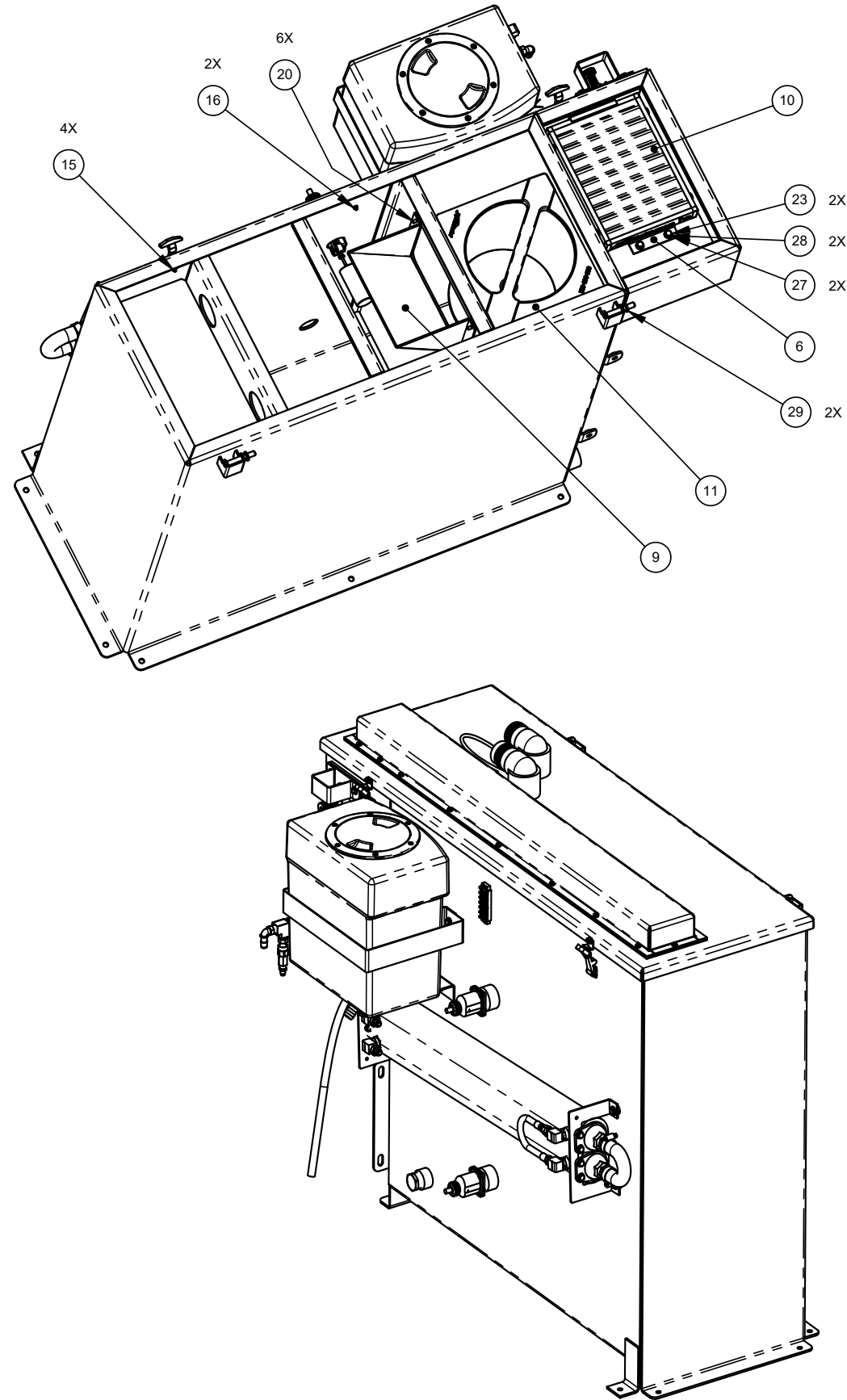


Figure 9-22. Assembly, Recovery Tank - CDS xDrive
601-060-705 Rev. B



Recovery Tank Assembly Parts List

29	2	WASHER, 3/8" FLAT RUBBER BACKED	S. STEEL	000-174-029
28	2	WASHER, 1/4" LOCK S/S	S. STEEL	000-174-019
27	6	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
26	1	TANK, RECOVERY - COATED CDS xDRIVE	ALUMINUM	000-159-261
25	1	SWITCH, FLOAT LEVER	VARIOUS	000-157-091
24	4	SCREW, 1/4"-20UNC x 1.00" LG. HEX HEAD	S. STEEL	000-143-002
23	2	SCREW, 1/4"-20UNC x 0.50" LG. S/S HEX HEAD	S. STEEL	000-143-333
22	2	SCREW, #8-32UNC x 0.75" LG. BINDER HEAD	S. STEEL	000-143-051
21	4	SCREW, #6-32UNC x 0.50" LG. BUTTON HEAD	S. STEEL	000-143-539
20	6	RIVET, AB8-6A ALUMINUM POP	ALUMINUM	000-140-023
19	1	PROTECTOR, VACUUM RELIEF - COATED	VARIOUS	000-108-179
18	1	PLUG, 1-1/4" NPT	ABS	000-106-046
17	1	PLUG, 1" NPT BLACK NYLON	NYLON	000-106-049
16	2	NUT, #8-32UNC HEX NYLOCK	AISI 304	000-094-059
15	4	NUT, #6-32UNC HEX NYLOCK	S. STEEL	000-094-063
14	2	LATCH, BUNGEE	VARIOUS	000-086-008
13	2	INSERT, #46 (1/4" NPT x 3/8" BARB)	BRASS	000-052-102
12	1	GASKET, ADAPTER - URT	RUBBER	000-057-206
11	1	FILTER, RECOVERY TANK BASKET	VARIOUS	000-049-152
10	1	FILTER, FLAT - UNIVERSAL RECOVERY TANK	VARIOUS	000-049-153
9	1	FILTER, AIR DEFLECTOR, URT - FABRICATED	5052-H32	000-049-154
8	1	ELBOW, 1/4" NPT STREET x 45°	BRASS	000-052-082
7	1	ELBOW, 1/4" NPT STREET	BRASS	000-052-085
6	1	BRACKET, FLAT FILTER SECURING - UNCOATED	5052-H32	000-015-932
5	1	BLOCK, 6 POST TERMINAL	VARIOUS	000-012-002
4	1	ASSEMBLY, WATER BOX	VARIOUS	601-010-705
3	1	ASSEMBLY, VACUUM RELIEF VALVE - URT	VARIOUS	610-026-724
2	1	ASSEMBLY, DUAL HEAT EXCHANGER	VARIOUS	601-006-705
1	1	ASSEMBLY, COVER - RECOVERY TANK	VARIOUS	601-029-705
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-23. Assembly, Dual Heat Exchanger - CDS xDrive
601-006-705 Rev. B

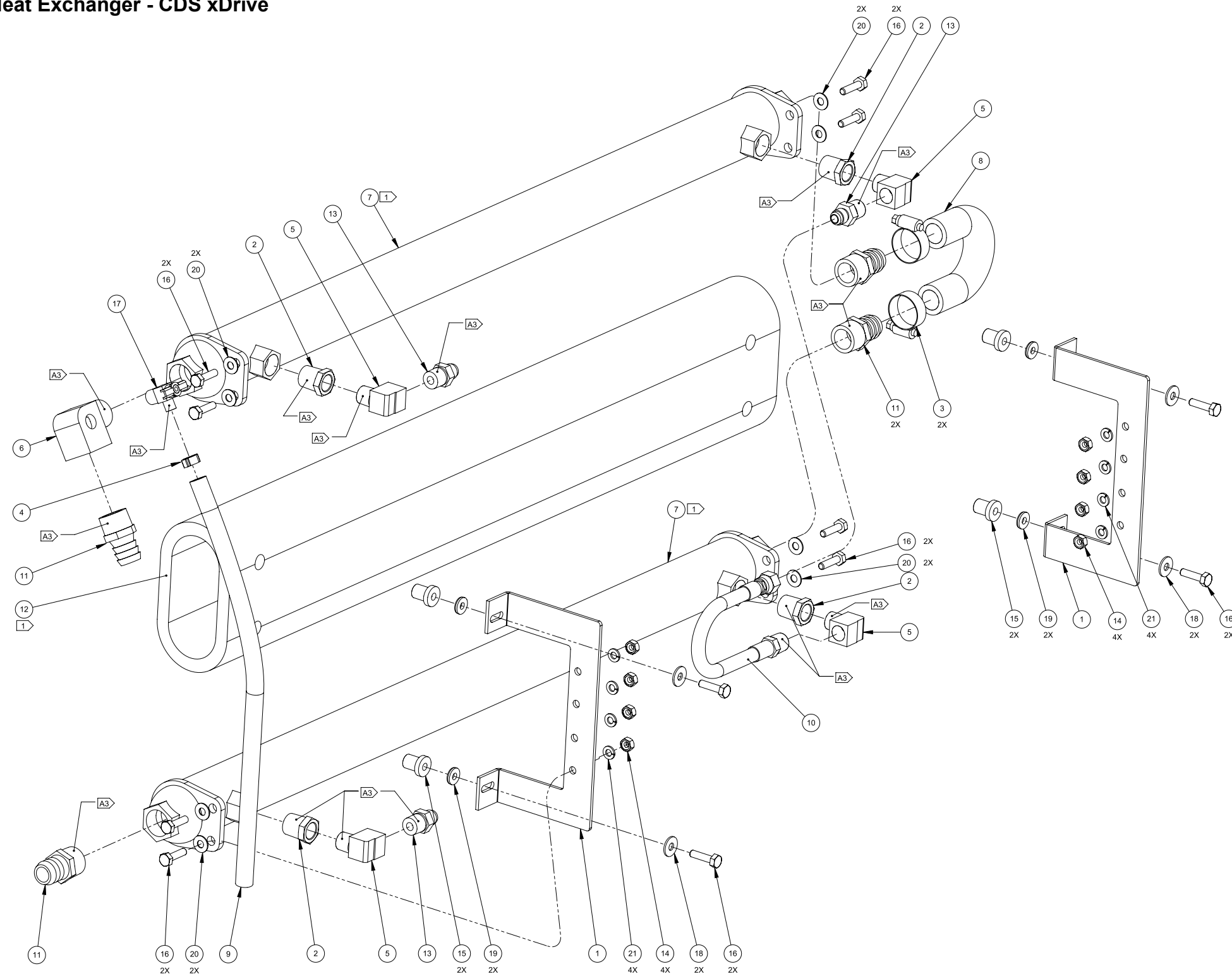
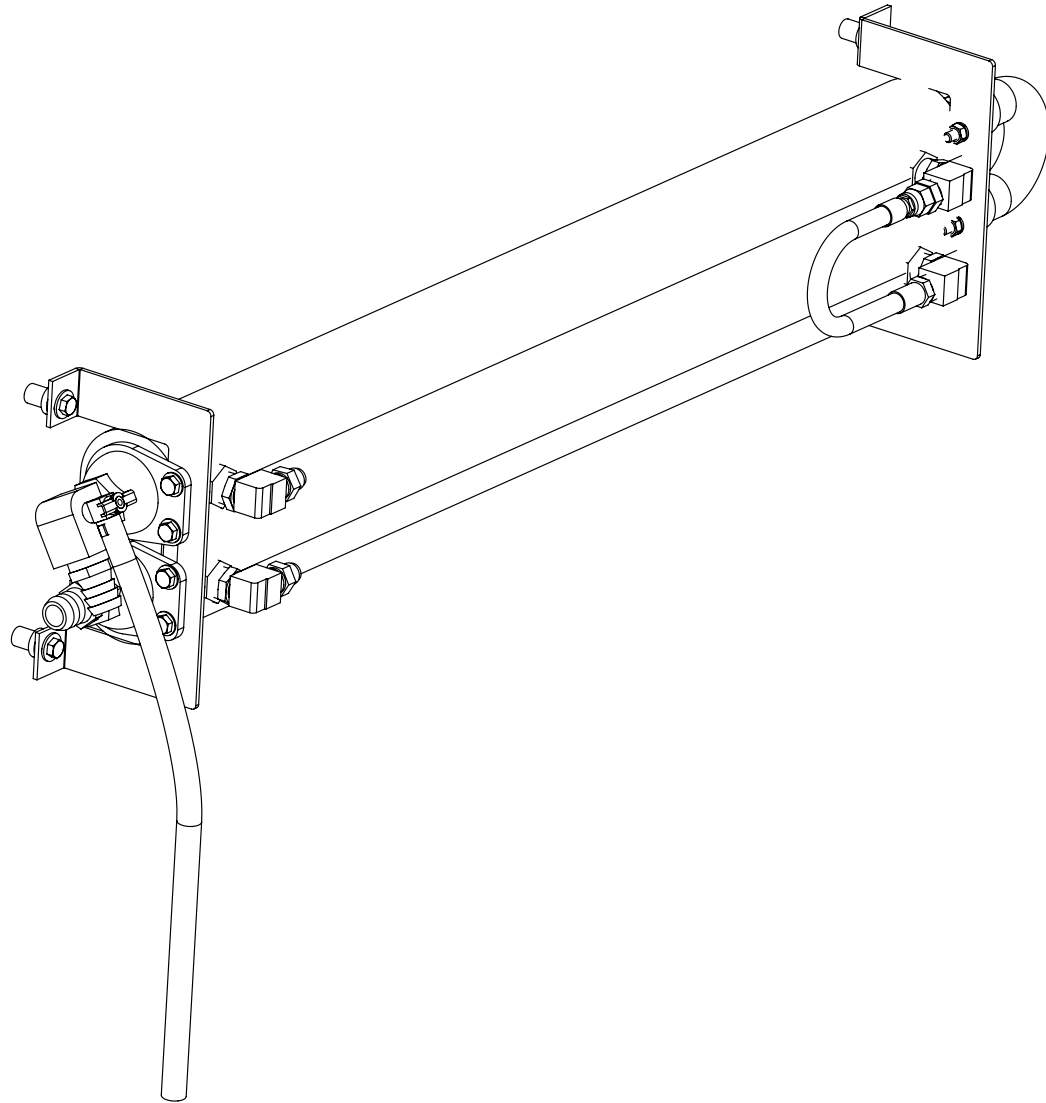


Figure 9-24. Assembly, Dual Heat Exchanger - CDS xDrive
601-006-705 Rev. B



Dual Heat Exchanger Assembly Parts List

21	8	WASHER, 1/4" LOCK	STEEL	000-174-019
20	8	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
19	4	WASHER, 1/4" FLAT RUBBER BACKED	18-8 S. STEEL	000-174-060
18	4	WASHER, 1/4" FLAT	STEEL	000-174-002
17	1	VALVE,PETCOCK 90 DEG	VARIOUS	000-169-205
16	12	SCREW, 1/4"-20UNC x 1.00" LG. HEX HEAD	STEEL	000-143-002
15	4	NUT, 1/4"-20UNC NEOPRENE WELLNUT	NEOPRENE	000-094-113
14	8	NUT, 1/4"-20UNC HEX S/S	S. STEEL	000-094-010
13	3	NIPPLE, 3/8" M JIC x 3/8" NPT	BRASS	000-052-528
12	3'	INSULATION, 4-1/8" x 1/2"	NEOPRENE	000-131-042
11	4	INSERT, #1212 BRASS	BRASS	000-052-602
10	1	HOSE, 3/8" x 12" LG. TEFLON w/ JIC ENDS	S.STEEL	000-068-196
9	2'	HOSE, 3/8" I.D. CLEAR - BULK	VARIOUS	000-068-091
8	1	HOSE, 3/4" I.D w/ 180° BEND FOR HX	RUBBER	000-068-066
7	2	HEAT EXCHANGER, WATER TO WATER HI-PSI 2"x36" 1" NPT ENDS	BRASS	000-038-046
6	1	FITTING, 3/4" NPT STREET ELBOW - MODIFIED	BRASS	000-052-733
5	4	ELBOW, 3/8" NPT STREET	BRASS	000-052-086
4	1	CLAMP, 1/4" I.D. HOSE	S. STEEL	000-033-017
3	2	CLAMP, SIZE #12 HOSE	S. STEEL	000-033-029
2	4	BUSHING, 1/2 M X 3/8 F	BRASS	000-052-064
1	2	BRACKET, HEAT EXCHANGER MOUNTING - COATED	STEEL	000-015-1159
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

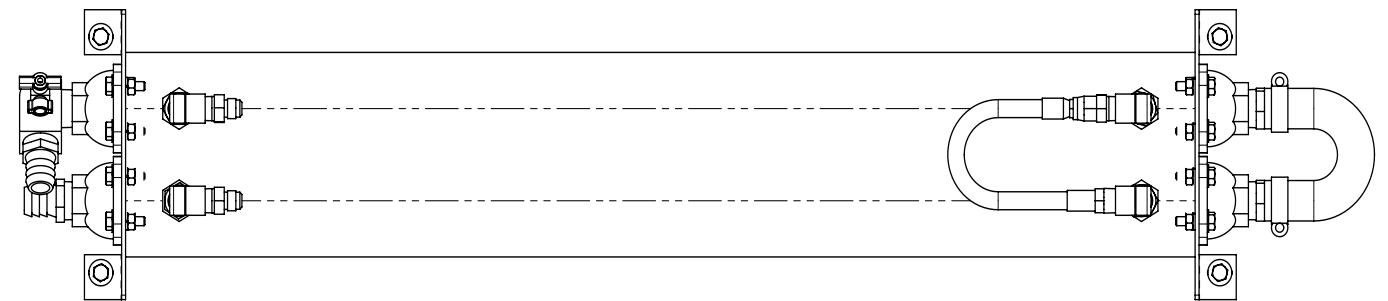
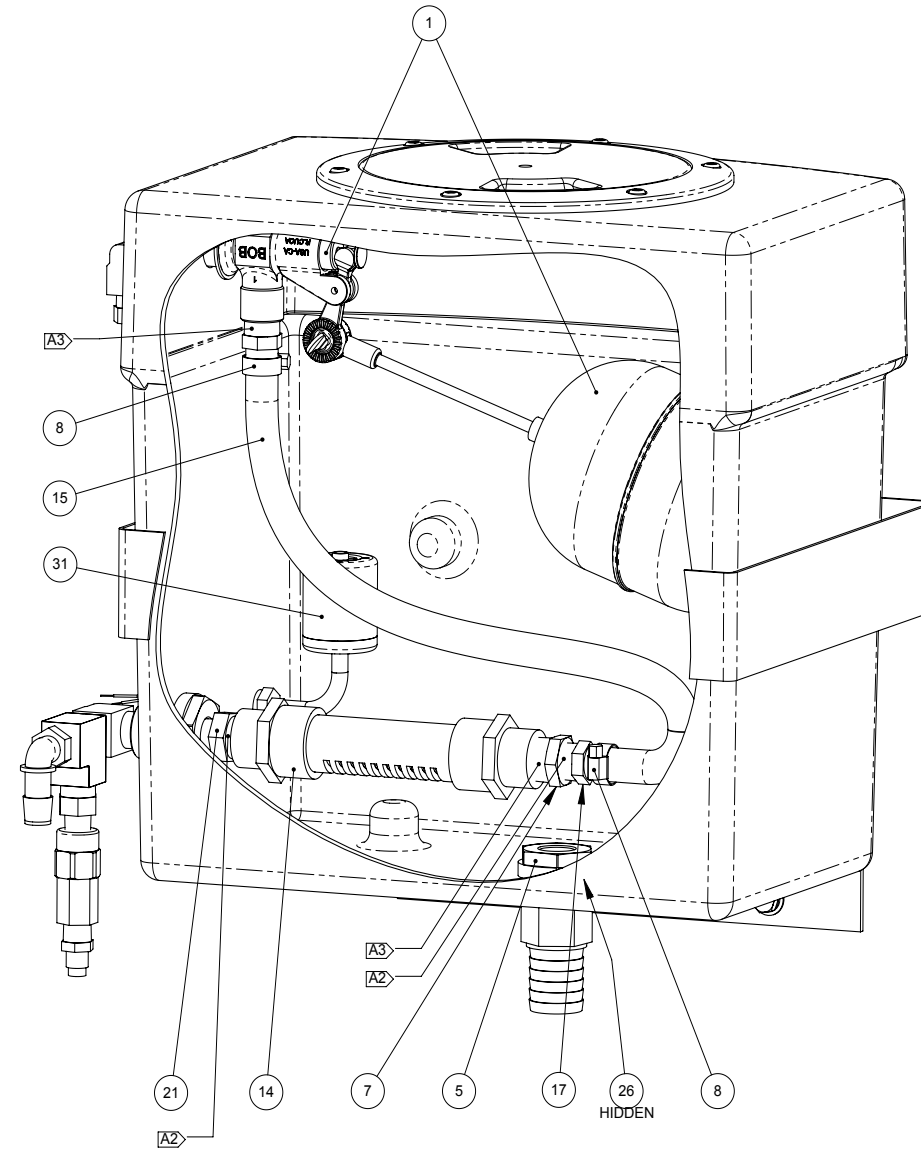
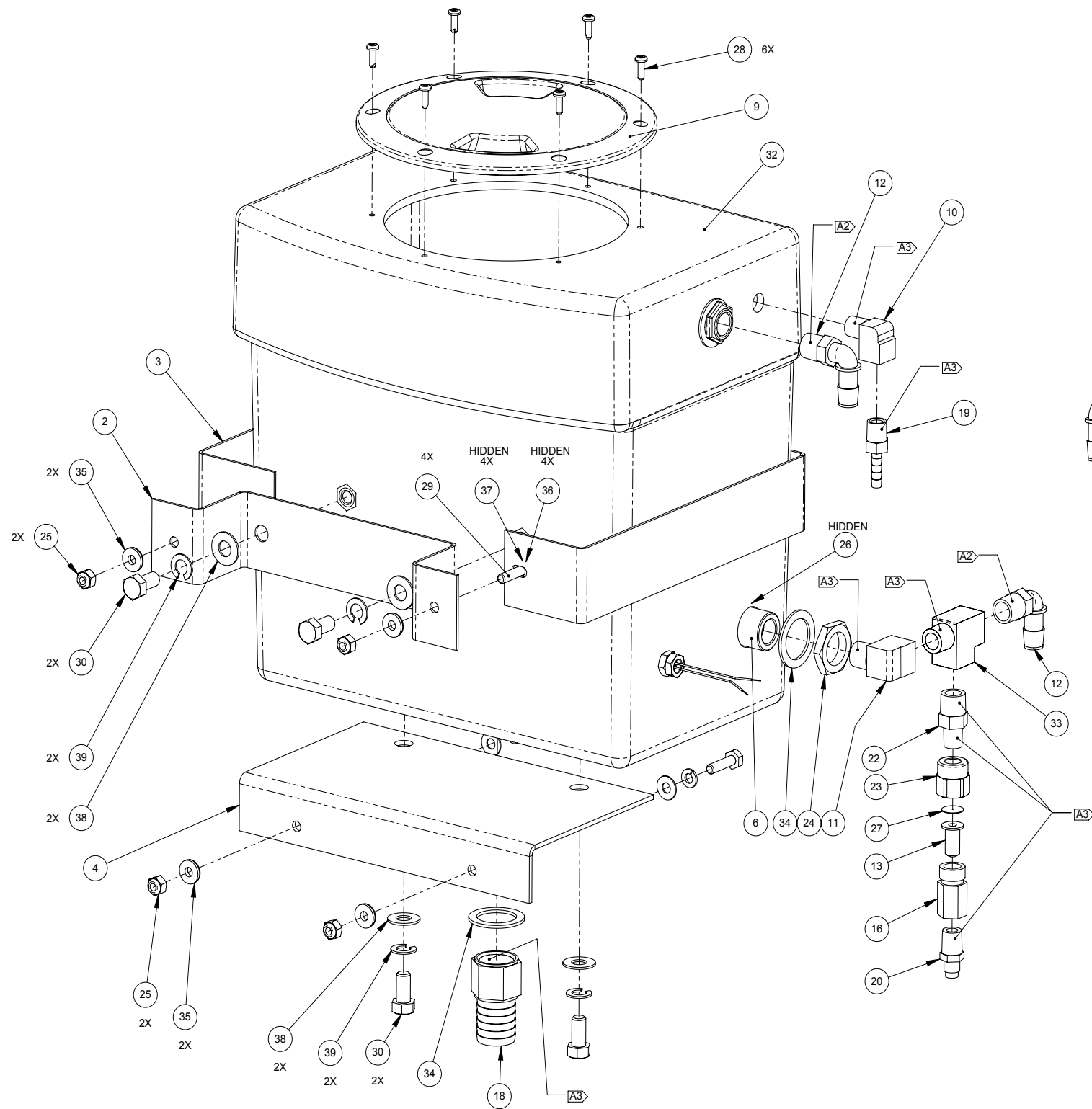


Figure 9-25. Assembly, Water Box - CDS xDrive
601-010-705 Rev. H

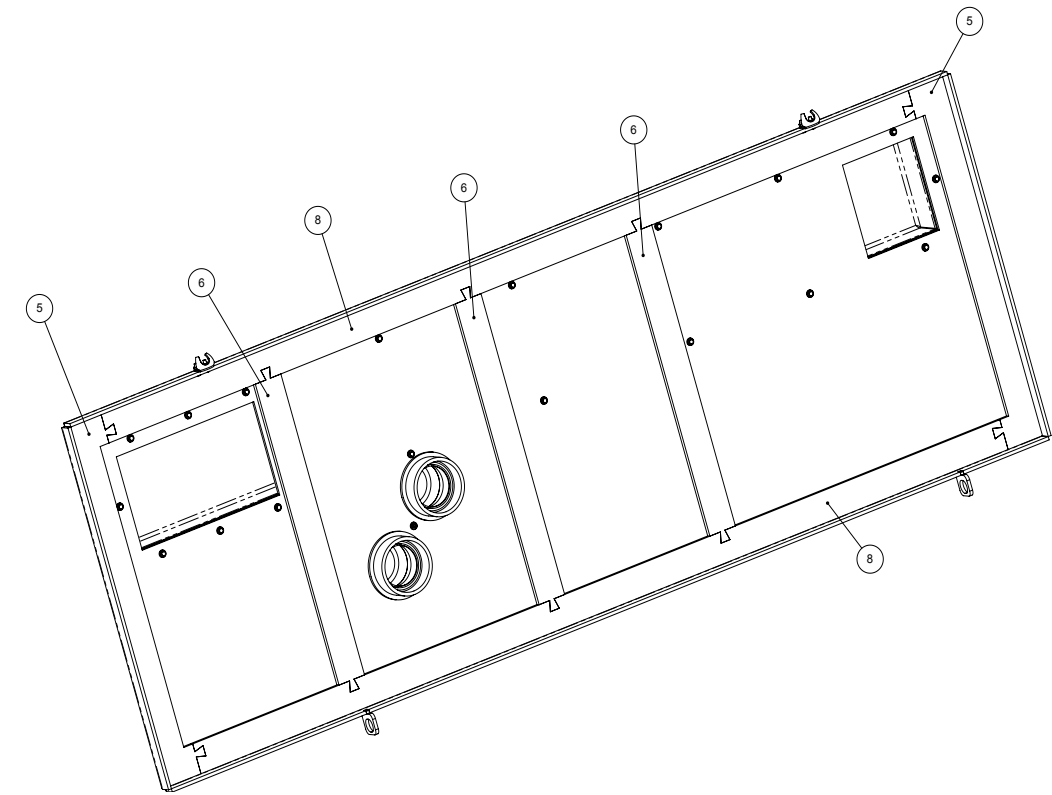
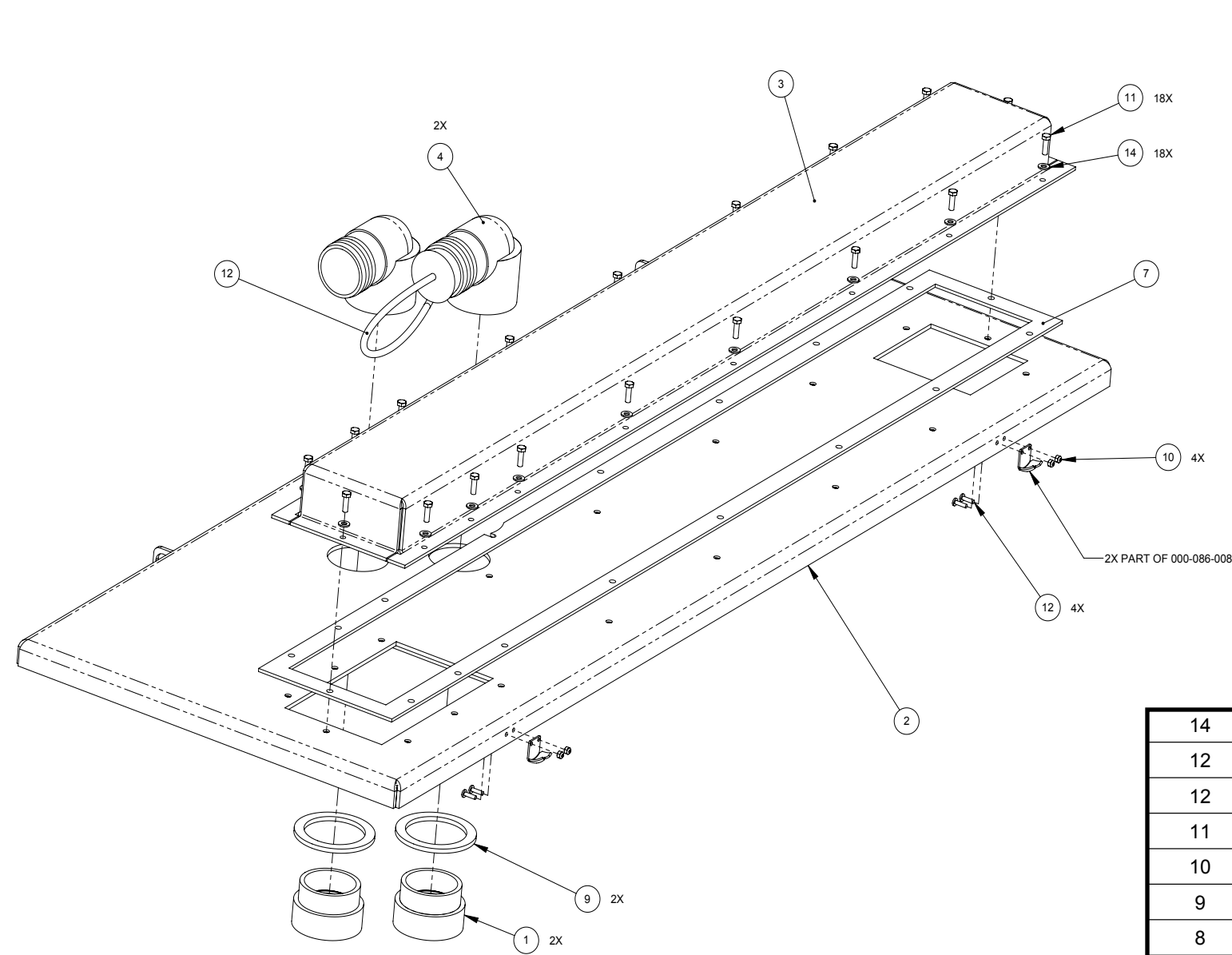


Water Box Assembly Parts List

25	4	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
24	1	NUT, 1"-14UNS BRASS	UNS#36000	000-094-097
23	1	NUT, BRASS JET X 1/4" FNPT	BRASS	000-094-118
22	1	NIPPLE, 3/8" NPT x 1/4" NPT HEX	BRASS	000-052-073
21	1	NIPPLE, 3/8" NPT x 1/2" NPT	BRASS	000-052-075
20	1	NIPPLE, 1/4" SAE x 1/4" NPT	BRASS	000-052-527
19	1	INSERT,#44	BRASS	000-052-100
18	1	INSERT, #F1216 (3/4" FPT x 1" BARB)	BRASS	000-052-754
17	1	INSERT, #66 (3/8" NPT x 3/8" BARB)	BRASS	000-052-104
16	1	HOUSING, 1/4" FPT FILTER - BRASS	BRASS	000-052-943
15	1	HOSE, 3/8" I.D. CLEAR w/ BRAID x 22.5" LG.	VARIOUS	000-068-1063
14	1	FILTER, DIFFUSER ASSEMBLY	PVC	000-049-176
13	1	FILTER CARTRIDGE,1/4"BRASS	BRASS	000-049-052
12	2	ELBOW, 3/8" NPT x 1/2" HOSE	GFBN	000-052-355
11	1	ELBOW, 3/8" NPT STREET	BRASS	000-052-086
10	1	ELBOW, 1/4" NPT STREET	BRASS	000-052-085
9	1	COVER, 6" ACCESS	POLYPROPYLENE	000-041-005
8	2	CLAMP, SIZE #5 HOSE	S. STEEL	000-033-005
7	1	BUSHING, 1/2 M X 3/8 F	BRASS	000-052-064
6	1	BULKHEAD, 3/8" FPT x 3/8" FPT	BRASS	000-052-660
5	1	BULKHEAD, 1/2" FPT	UNS C36000 / ASTM B16 H02	000-052-728
4	1	BRACKET, WATER BOX SUPPORT LOWER - COATED	ASTM A1008 CS TYPE B	000-015-1366
3	1	BRACKET, WATER BOX MOUNT OUTER - COATED	ASTM A1008 CS TYPE B	000-015-1364
2	1	BRACKET, WATER BOX MOUNT INNER - COATED	ASTM A1008 CS TYPE B	000-015-1362
1	1	ASSEMBLY, ROBERT FLOAT VALVE	VARIOUS	000-169-235
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

39	4	WASHER, 3/8" LOCK	S. STEEL	000-174-057
38	4	WASHER, 3/8" FLAT	AISI 304	000-174-032
37	4	WASHER, 1/4" LOCK	STEEL	000-174-017
36	4	WASHER, 1/4" FLAT S/S	S. STEEL	000-174-003
35	4	WASHER, 1/4" FLAT RUBBER BACKED	18-8 S. STEEL	000-174-060
34	2	WASHER, 1.5" O.D. x 1.073" I.D. x 0.075" THK.	S. STEEL	000-174-063
33	1	TEE, 3/8" NPT MALE STREET	BRASS	000-052-023
32	1	TANK, POLY WATER BOX - MODIFIED - xDRIVE	LINEAR LOW DENSITY POLYETHYLENE	000-159-191
31	1	SWITCH, w/PROTECTOR, POLYPROPELENE BARREL - NC	VARIOUS	000-157-0801
30	4	SCREW, 3/8"-16UNC x 0.75" LG. HEX HEAD GRD. 8	STEEL	000-143-017
29	4	SCREW, 1/4"-20UNC x 1.00" LG. HEX HEAD	S. STEEL	000-143-002
28	6	SCREW, #8 x 1/2" LG. PAN HEAD	S. STEEL	000-143-314
27	1	ORIFICE, 0.027" PLATE	S. STEEL	000-180-009
26	2	O-RING, 1/2" BULK HEAD	BUNA-N	000-097-041

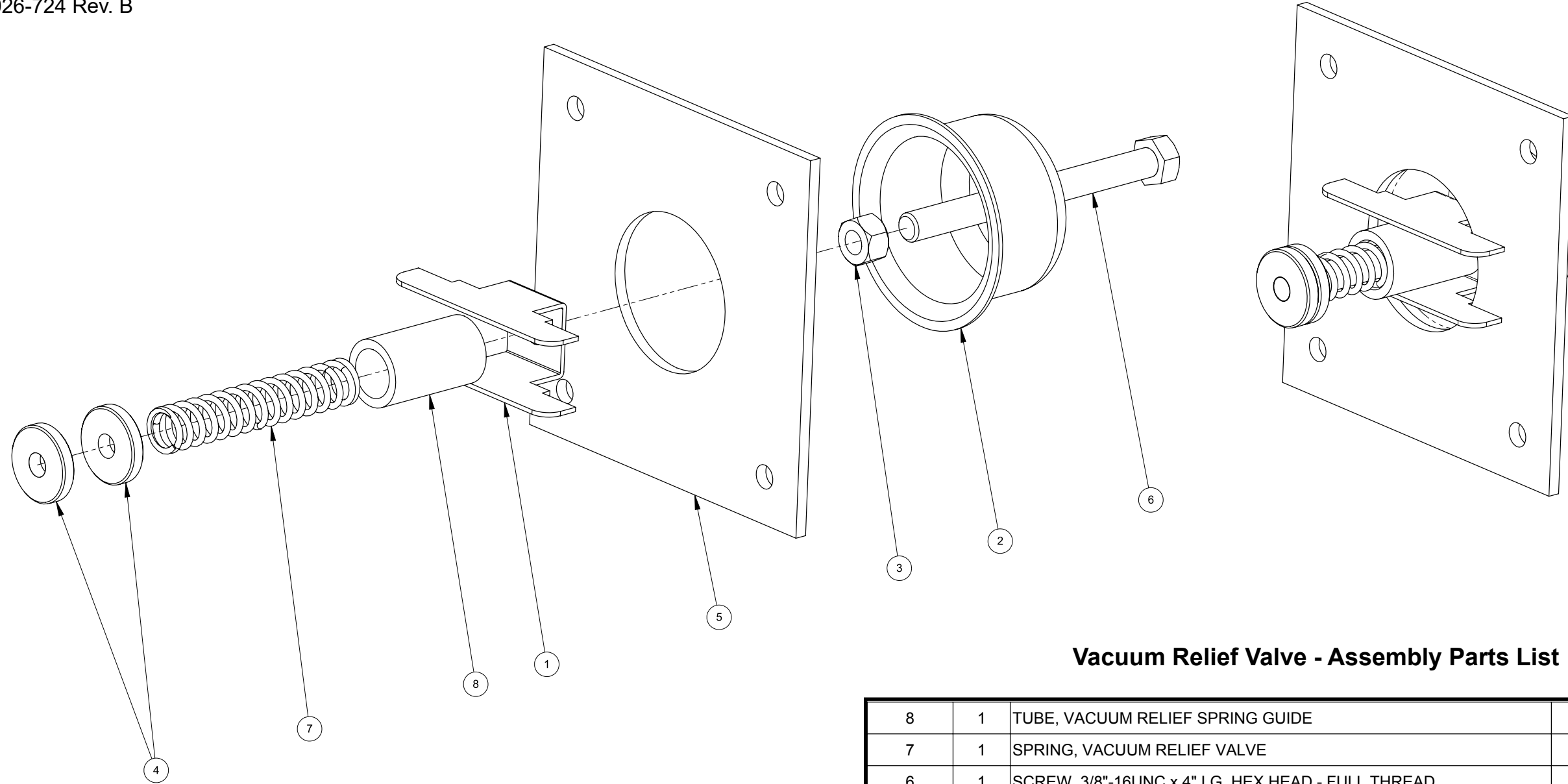
Figure 9-26. Assembly, Tank Cover - CDS xDrive
601-029-705 Rev. B



Tank Cover Assembly Parts List

14	18	WASHER, #10 FLAT	S. STEEL	000-174-001
12	1	VACUUM INLET STOPPER	VARIOUS	000-078-039
12	4	SCREW, #6-32UNC x 0.50" LG. BUTTON HEAD	S. STEEL	000-143-539
11	18	SCREW, #10-24UNC X 5/8" LG. HEX HEAD S/S	S. STEEL	000-143-736
10	4	NUT, #6-32UNC HEX NYLOCK	S. STEEL	000-094-063
9	2	GASKET, 1-1/2" BULKHEAD FITTING	VARIOUS	000-057-015
8	2	GASKET, SIDE - REC. TANK COVER	RUBBER	000-057-242
7	1	GASKET, RECOVERY TANK AIR DUCT	NEOPRENE 60 DUROMETER	000-057-248
6	3	GASKET, MIDDLE - REC. TANK COVER	RUBBER	000-057-241
5	2	GASKET, END - REC. TANK COVER	RUBBER	000-057-240
4	2	ELBOW, 2" BARB x 2" FPT	ABS	000-052-222
3	1	COVER, RECOVERY TANK AIR DUCT - COATED	5052-H32	000-041-884
2	1	COVER, RECOVERY TANK - COATED	5052-H32	000-041-732
1	2	ADAPTER, 2" NPT x 2" F SLIP	ABS	000-052-219
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

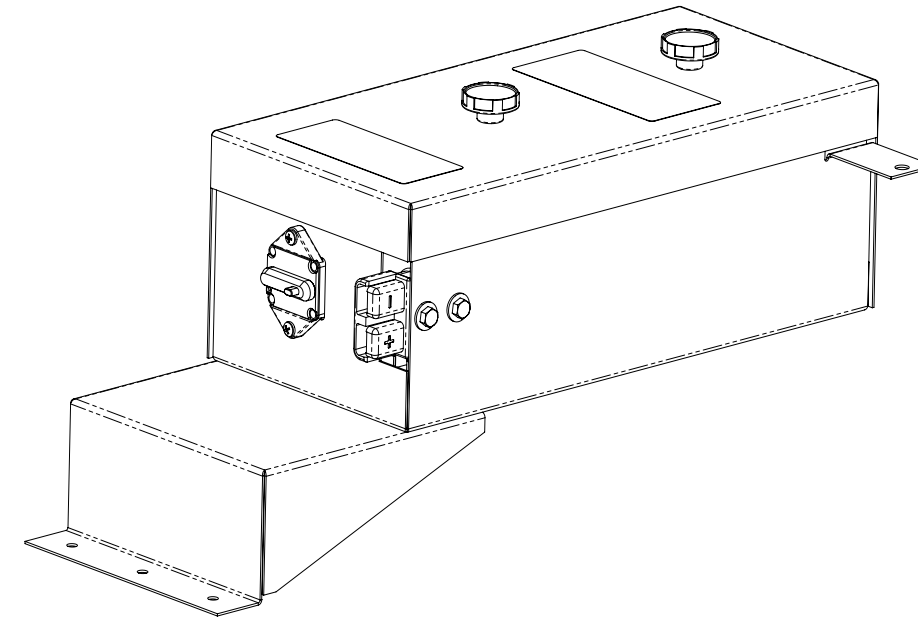
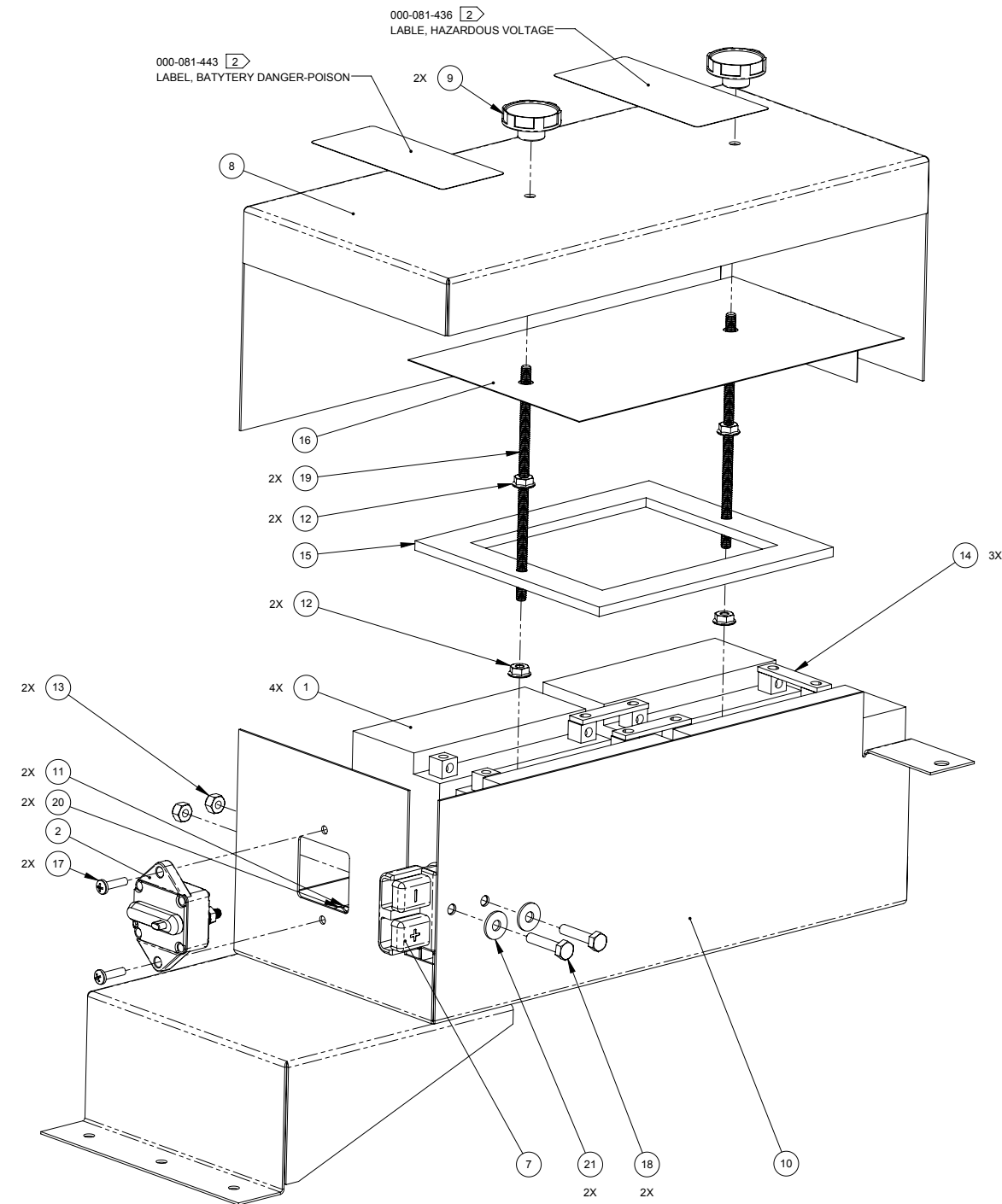
Figure 9-27. Assembly, Vacuum Relief Valve - URT - CDS xDrive
610-026-724 Rev. B



Vacuum Relief Valve - Assembly Parts List

8	1	TUBE, VACUUM RELIEF SPRING GUIDE	AISI 304	000-125-111
7	1	SPRING, VACUUM RELIEF VALVE	AISI 302	000-155-026
6	1	SCREW, 3/8"-16UNC x 4" LG. HEX HEAD - FULL THREAD	S. STEEL	000-143-198
5	1	PLATE, VACUUM RELIEF VALVE MOUNTING - COATED	ALUMINUM	000-105-332
4	2	NUT, 3/8"-16UNC x 1.00" O.D. KNURLED	UNS C36000 / ASTM B16 H02	000-094-077
3	1	NUT, 3/8"-16 UNC HEX JAM	S. STEEL	000-094-101
2	1	CAP, SPUN VACCUM RELIEF VALVE	AISI 304	000-027-032
1	1	BRACKET, VACUUM RELIEF VALVE - FABRICATED	AISI 304 2B	000-015-182
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

Figure 9-28. Assembly, Battery - CDS xDrive
000-009-002 Rev. C



Battery Assembly Parts List

21	2	WASHER, 1/4" FLAT	STEEL	000-174-002
20	2	WASHER, #10 FLAT	S. STEEL	000-174-001
19	2	STUD, 1/4"-20UNC x 6.25" LG.	S. STEEL	000-156-046
18	2	SCREW, 1/4"-20UNC x 1.25" LG. HEX HEAD	STEEL	000-143-003
17	2	SCREW, #10-24UNC x 0.75" LG. PAN HEAD PHILIPS	S.STEEL	000-143-062
16	1	PROTECTOR, BATTERY TOPS	POLYCARBONATE CLEAR	000-108-214
15	1	PLATE, BATTERY HOLD DOWN - COATED	STEEL	000-105-757
14	3	PLATE, BATTERY BUS BAR	ASTM B512 / B187	000-105-749
13	2	NUT, 1/4"-20UNC NYLOCK	S STEEL	000-094-009
12	4	NUT, 1/4"-20UNC HEX FLANGE	STEEL	000-094-007
11	2	NUT, #10-24UNC HEX NYLOCK	S. STEEL	000-094-034
10	1	MOUNT, BATTERY BOX - COATED	STEEL	000-092-053
9	2	KNOB, 1/4"-20 x Ø1.5" FLUTED	VARIOUS	000-061-196
8	1	COVER, BATTERY BOX - COATED	STEEL	000-041-895
7	1	CONNECTOR, 4 AWG GRAY	VARIOUS	000-037-132
6	1	CABLE, SHUTOFF TO PLUG - RED	VARIOUS	000-025-079
5	1	CABLE, BATTERY TO SHUTOFF	VARIOUS	000-025-070
4	1	CABLE, BATTERY TO PLUG - BLACK	VARIOUS	000-025-080
3	1	CABLE, BATTERY BOX TO CONTROL - BLACK	VARIOUS	000-025-071
2	1	BREAKER, 100 AMP PANEL MOUNT	VARIOUS	000-018-011
1	4	BATTERY, CDS XDRIVE	VARIOUS	000-009-001
ITEM NO.	QTY.	DESCRIPTION	MATERIAL	PART NO.

10 - Troubleshooting

This section covers:

System Troubleshooting

- 1.0 CDS xDrive will not turn on
- 2.0 CDS xDrive shuts off during operation
- 3.0 Van engine will not increase to high idle
- 4.0 Blower will not change speeds
- 5.0 Pump clutch will not come on
- 6.0 Blower will not maintain requested speed
- 7.0 Blower speed reduces after extended operation
- 8.0 Blower shuts off during ramp up
- 9.0 Blown controller fuse
- 10.0 Blown Fuse

Controller Codes

Chemical System Troubleshooting

- 1.0 System will not prime
- 2.0 Chemical flow is unstable or low
- 3.0 Chemical jug fills with water
- 4.0 Chemical in water box

Water Pump Troubleshooting

- 1.0 Will not come up to normal cleaning pressure
- 2.0 No pressure reading on PSI gauge
- 3.0 PSI gauge reads normal; low pressure from tool/wand
- 4.0 Pressure pulsation
- 5.0 Water box empty or fills slowly

Vacuum Blower Troubleshooting

- 1.0 Weak vacuum at tool/wand. Gauge reads normal (10" Hg to 14" Hg)
- 2.0 Vacuum gauge will not come up to 14" Hg
- 3.0 Vacuum gauge reads high with no hoses attached

Heating System Troubleshooting

- 1.0 Vehicle overheats and shuts off CDS xDrive
- 2.0 Vehicle overheats
- 3.0 Unable to achieve normal cleaning temperature
- 4.0 System attains normal heat but drops off sharply

SYSTEM TROUBLESHOOTING

1.0 CDS xDrive will not turn on

WHERE TO LOOK	EXPLANATION	HOW TO FIX
1.1 Van ignition	CDS xDrive will not function if engine not running	Start van engine
1.2 Van fuse	CDS xDrive power is drawn from the accessory fuse box under drivers seat	Check fuse panel below drivers seat for blown fuse. This would indicate a load beyond the rated fuse value, possibly from electrical short in wiring from van battery to CDS xDrive unit
1.3 CDS xDrive dash circuit breaker	The circuit breaker on the dash of the CDS xDrive protects the 12v power wire from the power access point below the passenger seat to the circuit breaker	Check wiring from below passenger seat to dash for damage
1.4 CDS xDrive battery circuit breaker	The circuit breaker on the CDS xDrive battery assembly protects the batteries from being drained too quickly	Attempting to operate the unit without the van engine running or without the parking brake set
1.5 Start switch	The start switch is powered from the CDS xDrive dash circuit breaker and provides power to CR-9	Check circuit breaker Check Relay CR9 Replace start switch
1.6 Parking Brake	Without the parking brake set the light in the start switch and the lights on the dash will flash	Set the parking brake

2.0 CDS xDrive shuts off during operation

WHERE TO LOOK	EXPLANATION	HOW TO FIX
2.1 Recovery tank is full	The upper float switch in the recovery tank shuts the unit off when the water level in the tank gets too high.	Drain recovery tank. Check float switch for correct operation.
	The van engine must be running at 2000 rpm for the CDS xDrive to operate correctly	Van engine off - restart van engine and CDS xDrive unit <hr/> Van engine at idle - check that none of the SEIC parameters have been violated. Restart CDS xDrive unit.
2.2 Van engine	The van engine must be running at 2000 rpm for the CDS xDrive to operate	Restart van engine
2.3 Controller fault	One of the controllers may experience a situation beyond an operational parameter	Read controller LED flash code (see page 10-10 for flash code definition)

SYSTEM TROUBLESHOOTING

3.0 Van engine will not increase to high idle

WHERE TO LOOK	EXPLANATION	HOW TO FIX
3.1 Parking brake	The van engine will only increase in idle speed under certain preset conditions, engine temperature, parking brake, gear selector	Set Parking brake Check Fuse FU-2

4.0 Blower will not change speeds

WHERE TO LOOK	EXPLANATION	HOW TO FIX
4.1 Speed selection switch	The speed selection switch sends a signal to the motor controller to change speeds	Check electrical connections on the back of the speed control switch for integrity
4.2 Faulty electrical connection at speed control switch		Check speed control switch for correct operation
4.3 Faulty electrical connection on controller		1. The speed control wires connect to the generator controller on pins 18, 19, 30 and 31. Check continuity on all wires. 2. The (+) terminal on speed switch attaches to generator controller buss bar (B-)

5.0 Pump clutch will not come on

WHERE TO LOOK	EXPLANATION	HOW TO FIX
5.1 Water box	The water level in the water box must be above the float switch before the clutch on the high pressure pump will activate.	No water in water box (dash light illuminated) Check incoming water pressure
		Water in the water box (dash light illuminated) Check float valve operation
5.2 Poor connection at pump clutch	The pump clutch is fed power from FU-6 and FU-7 and CR-5	Check crimp terminals on pump clutch wire for integrity
5.3 Failed pump clutch	The pump clutch is an electromagnetic clutch. Power is delivered through the single electrical wire, and the clutch coil is grounded internally.	Replace

SYSTEM TROUBLESHOOTING

6.0 Blower will not maintain requested speed

To maintain the correct blower speed the electric motor must have a constant and un-interrupted flow of electricity

WHERE TO LOOK	EXPLANATION	HOW TO FIX
6.1 Contactors	The contactors are located behind and forward of the passenger tire. They open and close connection on phases 1 and 3 in order to control the flow of electricity	With the CDS xDrive running, unplug one of the electrical connection at the contactor. Check the female plug for 24Vdc. If voltage is correct turn off the CDS xDrive and the Van. At the contactor remove the cable coming from the generator and attach to the opposite side of the contactor. The contactor has now been bypassed. Restart the van and the CDS xDrive and check for proper operation. Repeat process with other contactor if no change. Replace contactors as necessary. If voltage at plug is not correct check continuity of wires from female plug at contactor to pins 3, 4, 11, and 12 at the generator controller. Repair as needed.
6.2 Generator	The CDS xDrive generator supplies the power to the system and is driven by the van engine. The generator has 3 phases, or electrical circuits. Each circuit must be balanced with the other two to operate correctly.	With the CDS xDrive unit and the van engine off, check each of the three phase cables for continuity to ground. If phase cables are grounded the generator will need repair or replacement
6.3 Phase cables	The phase cables carry the power from the generator to the controllers and to the blower motor. The phase cables are high temperature fiberglass covered wire.	Check the phase cables along their length for abrasion or damage. Repair or replace as necessary
6.4 Controller	The controllers regulate the power coming from the generator and supply power to the blower motor	Each controller has an LED on the case. With the CDS xDrive on, read the number of flashes being displayed on each controller and check the error code message page 10-10

SYSTEM TROUBLESHOOTING

6.5 Vacuum level	The vacuum level is controlled by the relief valve behind the passenger seat	Check the vacuum level as shown on the dash gauge. Extended operation at 14" Hg and Boost mode will cause the blower motor controller to reduce the power available to the motor, causing the rpm to drop. Reduce the vacuum load.
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7.0 Blower speed reduces after extended operation

WHERE TO LOOK	EXPLANATION	HOW TO FIX
7.1 Vacuum level	Both the motor control and the generator control are air cooled. They must be kept below a certain temperature in order to deliver full power to the motor driving the blower.	Remove load on blower for several minutes Reduce blower speed to next lower speed
		Check the vacuum level as shown on the dash gauge. Extended operation at 14" Hg and Boost mode will cause the blower motor controller to reduce the power available to the motor, causing the rpm to drop. Reduce the vacuum load.
7.2 Coolant Pump	Engine coolant is circulated by a booster pump in the engine compartment	Check Fuse FU-1 Check the circulation pump for proper operation

SYSTEM TROUBLESHOOTING

8.0 Blower shuts off during ramp up

WHERE TO LOOK	EXPLANATION	HOW TO FIX
8.1 CDS xDrive Battery	The battery pack on the CDS xDrive is made up of 4 individual 12v AGM batteries. All four batteries must be in the same operational condition in order for the system to function correctly	Check each 12v battery for correct voltage. Each battery should be at least 12.5v and all batteries should be within 0.2v of each other. Replace as necessary Note: When replacing or charging batteries, replace or charge all four. Do not replace or charge less than all four
8.2 Controller	The controllers regulate the power coming from the generator and supply power to the blower motor	Each controller has an LED on the case. With the CDS xDrive on, read the number of flashes being displayed on each controller and check the error code message page 10-10

9.0 Blown controller fuse

WHERE TO LOOK	EXPLANATION	HOW TO FIX
9.1 CDS xDrive Motor	Each controller is protected by a 750amp fuse	Check phase cables and battery cables Repair as necessary Replace Fuse

SYSTEM TROUBLESHOOTING

10.0 Blown Fuse - CDS xDrive Dash

WHERE TO LOOK	EXPLANATION	HOW TO FIX
FU-1 (5A)	wiring harness from dash to recirculation pump	Check for continuity to ground which may indicate short circuit
FU-2 (3A)	wiring harness from dash to engine SEIC connection	Check for continuity to ground which may indicate short circuit
FU-3 (5A)	dash wiring	Check for continuity to ground which may indicate short circuit
FU-4 (15A)	wiring to Pump in Pump	Check pump for correct operation
	pump in pump	Most pump in pumps are independantly fused. Check fuse at pump. If the pump is getting correct power, replace pump
FU-5 (3A)	wiring harness up to recovery tank float	Check for continuity to ground which may indicate short circuit
	float switch	Check for continuity to ground which may indicate short circuit
FU-6 (3A)	wiring to pump clutch switch	Check for continuity to ground which may indicate short circuit
FU-7 (7.5A)	wiring to Pump clutch	Check for continuity to ground which may indicate short circuit
	pump clutch	An over loaded, over heated, or failed pump clutch may draw too much power and blow the fuse
FU-8 (3A)	wiring to APO switch	Check for continuity to ground which may indicate short circuit
FU-9 (25A)	wiring to APO pump	Check for continuity to ground which may indicate short circuit
	APO pump	Pump motor not turning may indicate failed pump motor.
		Pump motor trying to move may indicate a plugged pump head or failed pump impeller
		Motor spinning freely but no fluid being passed may indicate a plugged pump outlet.

CONTROLLER CODES

⚠ WARNING

*Removal of top cover required for reading controller LED codes live electrical wiring may be exposed.
Do not touch any electrical components or wiring.*

WARNING: For informational purpose only. May lead to long term issue. Will not cause shut down.

SEVERE: Will cause shut down. Repairable:

VERY SEVERE: Will cause shut down. May not be repairable.

LED Flashes	Type	Message	Description	Recommended Action
4	Very Severe	Line contactors	Line contactor did not close when coil is energized.	Check line contactor and wiring
			Line contactor closed when coil is deenergized.	
5	Warning	Motor open circuit	Pump motor is not drawing sufficient current	Check pump motor is connected
	Severe		Motor terminal is open circuit or disconnected from controller	Check motor wiring. Check controller condition
6	Warning	Analogue output	Contactactor driver over current	Ensure contactor doesn't exceed maximum current and check contactor wiring
			Contactactor driver over temperature	
			Contactactor driver over current	
			Contactactor driver over temperature	
	Very Severe		Contactactor driver not working	Internal hardware fault
			Internal hardware failsafe circuitry not working	
			Contactactor driver not working	
			Contactactor driver short circuit detected	
		Contactactor driver unable to achieve current target in current mode	Ensure contactor driver current target is within range	

CONTROLLER CODES
Controller Codes

LED Flashes	Type	Message	Description	Recommended Action
7	Warning	Battery or Capacitor Voltage	Motor control has entered low voltage cutback region.	This is normal
			Motor control has entered high voltage cutback region.	
	Severe		Battery voltage has dropped below critical level	Check battery voltage
	Very Severe		Capacitor voltage did not rise above 5V at power up	Check cables from battery to controllers for loose or damaged connections.
8	Warning	Temperature	Low heatsink temperature has reduced power to motor	Allow controller to warm up to normal operating temperature.
			High heatsink temperature has reduced power to motor	
	Very Severe		Controller heat sink has reached critical high temperature, and has shut down.	
	Warning		High measured or estimated motor temperature has reduced power to motor	Allow motor to cool down to normal operating temperature.
			Low Measured temperature has reached -30deg	Check motor thermistor connection or allow motor to warm up.
10	Warning	Controller State	Controller is in pre-operational state	If configured and ready for use, change state to operational.
11	Warning	Encoder	Encoder is not aligned properly.	Ensure encoder offset is correctly set or re-align encoder
			SinCos Encoder Values are heading towards a voltage rail or converging together.	Thermal or mechanical variation is causing the sincos encoder to deviate from the cold factory commissioned values.
	Very Severe		Encoder input wire-off is detected.	Check encoder wiring
			Motor current exceeded controller rated maximum	Check motor configuration and wiring
			Encoder is not aligned properly.	Ensure encoder offset is correctly set or re-align encoder

CONTROLLER CODES

LED Flashes	Type	Message	Description	Recommended Action
12	Severe	CAN communication	Internal software fault	Internal software fault
	Very Severe		Internal CANbus fault	Check CANbus wiring
			CANbus fault condition detected on multinode system.	
			CANbus fault condition detected on multinode system.	
			CANopen slave has not transmitted boot up message at power up	
			Heartbeat not received within configured time out (0x1016)	Check status of all nodes on CANbus.
			CANopen slave has changed to unexpected state	
	Motor slave in wrong state		Check status of all nodes on CANbus controlling motor slaves. Check local motor slaves on master. Ensure configuration is correct.	
13	Severe	Internal Fault	Internal software fault	Internal software fault
14	Warning	24v supply	Circuit below 24 volts	Check battery voltage
		CAN Emergency message	EMCY message received from non-Sevcon node and anonymous EMCY level is set to 1.	Check status of non-Sevcon nodes on CANbus
	EMCY message received from non-Sevcon node and anonymous EMCY level is set to 2.			
Severe	EMCY message received from non-Sevcon node and anonymous EMCY level is set to 3.			

CHEMICAL SYSTEM TROUBLESHOOTING

1.0 System will not prime

POSSIBLE CAUSE	SOLUTION
1.1 Check valves in chemical pump are faulty.	Remove valves and inspect. Clean or replace as necessary.
1.2 Chemical pump diaphragm is faulty.	Remove and inspect. Replace as necessary.
1.3. Check valve in high pressure pump (the one that the chemical pump attaches to) is faulty.	Remove valve and inspect. Clean or replace as necessary.
1.4 Filter on feed line in chemical jug is clogged.	Inspect and clean.
1.5 Feed line from chemical jug is loose, pinched or cut.	Inspect and repair.
1.6 Three-way prime valve is faulty.	Check valve for leaks between ports. Replace as necessary.

NOTICE

If the chemical system has been run dry, it may be necessary to prime the chemical system to purge all of the air from the system.

2.0 Chemical flow is unstable or low

POSSIBLE CAUSE	SOLUTION
2.1 Air in lines.	Check that all fittings and connections are tight and in good condition. Repair or replace as necessary.
2.2 Filter screen in chemical jug is partially clogged.	Inspect and clean.
2.3 Three-way chemical valve is faulty.	Inspect valve for leaks between ports. Replace as necessary.
2.4 Chemical metering valve is faulty or partially obstructed.	Inspect valve and clean or replace as necessary.
2.5 High pressure check valve is faulty.	Remove and inspect. Clean or replace as necessary.

CHEMICAL SYSTEM TROUBLESHOOTING

3.0 Chemical jug fills with water

POSSIBLE CAUSE	SOLUTION
3.1 Three-way chemical valve is defective.	Inspect valve for leaks between ports. Replace as necessary.
3.2 Inlet check valve in chemical pump is faulty.	Remove and inspect valve. Clean or replace as necessary.

4.0 Chemical in water box

POSSIBLE CAUSE	SOLUTION
4.1 Chemical pump diaphragm is faulty.	Remove and inspect. Replace as necessary.
4.2 High-pressure check valve is faulty.	Remove and inspect. Clean or replace as necessary.

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 Primary system control orifice is missing or loose.	Remove filter and inspect. Tighten or replace as necessary.
1.4 Primary orifice is worn.	Measure orifice size and replace as necessary.

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 5 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.	<ol style="list-style-type: none"> 1. Check for 12V at clutch. If 12V is present, replace clutch. 2. 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. 3. If low water switch has no continuity when float is up, replace the switch. If switch is good, replace the low water relay.

WATER PUMP TROUBLESHOOTING

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.

WATER PUMP TROUBLESHOOTING

6.0 Water box overflows

POSSIBLE CAUSE	SOLUTION
6.1 There is either debris caught in the valve or the valve seal is bad.	Replace
6.2 The float has absorbed water and has lost buoyancy.	Replace
6.3 The float has come out of adjustment.	Re-adjust float as necessary.

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.
1.3 Clogged heat exchanger restricts vacuum.	See qualified service technician.

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 xDrive's dash. 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.

HEATING SYSTEM TROUBLESHOOTING

1.0 Vehicle overheats while the CDS xDrive is in operation

Refer to vehicle dealer for diagnosis and repair.

POSSIBLE CAUSE	SOLUTION
1.1 Blown fan fuse	Locate fuses F30 and F31 in engine compartment fuse box. Check for blown fuses - replace as necessary.

2.0 Vehicle overheats while driving

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, 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.
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.

HEATING SYSTEM TROUBLESHOOTING

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 system as directed in this Owner's Manual (see page 11-2).

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.

11 - 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
- Long-Term Maintenance Schedule

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 vehicles "special operating conditions" 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.

Perform Descaling as Required

Scale deposits on the interior of the heating system can cause a noticeable loss in heating performance. Deposits of this kind result from hard water deposits, excessive chemical use or improper chemicals. The frequency with which descaling procedures are required will vary. If your area has particularly hard water or you see evidence of deposits in the water system, you may have to descale monthly.

To descale your system:

1. Add an appropriate descaler chemical to your water box.
2. Circulate it through the heating system. Let it stand.
3. Flush and repeat as necessary.
4. Clean all screens and strainers, and check them frequently following descaling.

NOTICE

If you are circulating a descaler through the flowmeter, make sure to run clean water through the flowmeter after you perform this procedure.

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.

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 (<i>Replace with genuine Ford part</i>)	2,000 / 24
Vehicle engine accessory drive belt	2,000 / 24
CDS xDrive blower silencer and exhaust plumbing	4,000 / 48
CDS xDrive and vehicle heater hoses	4,000 / 48
CDS xDrive wire harness	4,000 / 48

12 - 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 us 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 the Customer Service Department at (800) 426-1301, 8 a.m. to 5 p.m. Monday through Friday (PT).

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

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

13 - Warranty Information

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

BLOWER

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

HIGH PRESSURE WATER PUMP

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

VACUUM TANK

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

CHEMICAL SYSTEM

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

CONTROL PANEL

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

VACUUM AND SOLUTION HOSES

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

CLEANING WAND AND TOOL

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

WATER HEATING SYSTEM

- Over-pressurization of the system
(recommended maximum working pressure - 1200 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).

WARRANTY PROCEDURE

Warranty coverage is available to you through your local distributor.

If you have moved to a new area or have purchased a used machine and need information regarding your local distributor, call HydraMaster at (800) 426-1301 or email us at:
custsvc@hydramaster.com.

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

FOR YOUR REFERENCE:

Model No. _____

Serial No. _____

Date of Purchase: _____

Purchased From (Distributor): _____

14 - Accessories and Chemical Solutions

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

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

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

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

For more information, visit our website at: <http://www.hydramaster.com/>

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