HYDRAMASTER

Corporation
11015 47th Avenue W, Mukilteo, WA 98275

CDS 4.6
Overdrive

Machine Serial Number_____

D-182-012

Revised January 25, 2001

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Introduction

CDS 4.6
Section 1-1

This manual contains operating instructions as well as information required for proper maintenance, adjustment and repair of this unit. Since the first and most important part of repair work is the correct diagnosis of the problem, component manual troubleshooting charts have been included for your convenience.

Unlike a garden tractor, lawn mower or cement mixer, all having one or two functions to perform, the truckmounted carpet cleaning plant has many functions to perform simultaneously.

- The engine has to run at a consistent RPM.
- The vacuum has to pull air and dirty water back from cleaning site.
- The water pump must provide a stable pressure at proper water flow for cleaning.
- The chemical has to be injected into the water stream at the right concentration.
- The heating system must provide a consistant water temperature.
- The vacuum tank must store dirty water until drained.

As you can see, it is not just a turn-key operation with one thing to worry about, **Does it start?**!

♦ WARNING ♦

The manufacturer uses this symbol throughout the manual to warn of possible injury or death.

♦ CAUTION ♦

This symbol is used to warn of possible equipment damage.

Business Hours and Telephone Numbers

Monday - Friday	(425) 775-7276 Parts
8:00 am to 5:00 pm	(425) 775-7275 Service
PACIFIC STANDARD TIME	800) 426-4225 Parts / Service FAX

Precautions

Although this unit has been factory adjusted, it may require additional ad adjustments to achieve optimum performance, for instance altitude may require carburetor adjustment and ambient temperatures may require heat control adjustment. When required, consult an authorized representative.

♦ 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. (See Product Support Bulletins 92102, 94062 and 94063 at the end of the manual.)

♦ CAUTION ♦

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

♦ WARNING ♦

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

♦ CAUTION ♦

ACID RINSE AGENTS: The increased demand for "clear water" rinsing results in the need for special care when using these acid based chemicals in your equipment. The negative side of these products is the corrosive effects the acid can have on metals, including swivels, 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 unprotected acid products that have obviously caused failures.

♦ 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" (3.5 grains or more per gallon), use a water softening system.

♦ CAUTION ♦

FREEZE PROTECTION: There is often little warning before a cold spell. Therefore, not protecting this equipment from freezing will result in costly downtime. Placing an electric heater in the truck or parking the truck indoors will help to insure against freezing, but should not be the primary method of freeze protection.

♦ **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 heater, engine, exhaust, etc.

♦ **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.

♦ **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 ♦

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

♦ WARNING ♦

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

♦ WARNING ♦

TRANSPORTATION OF FUEL CONTAINERS: Transportation in a vehicle of any vented fuel container that presently has or has ever contained a flammable liquid is strictly forbidden by HydraMaster Corporation and by federal and state regulation.

System Overview

The HydraVan CDS machines are highly engineered cleaning plants designed by HydraMaster Corporation. The system utilizes the most current technology available in water heating and water recovery systems.

The water flow is as follows:

Water is fed into the machine under tap pressure. The water enters the machine and is combined with cleaning solution as it enters the mix tank. The cleaning solution is picked up from the mix tank by the high pressure pump and pumped under pressure through the heating system and then out to the cleaning tool.

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

As there is no guess work in the manufacture of these highly advanced cleaning plants, there must be none in preparing it to get the job done in the field. It is the purpose of this manual to help you properly understand, maintain and service your cleaning plant. Follow the directions carefully and you will be rewarded with years of profitable, trouble-free operation.

It is imperative that no section be overlooked when preparing for operation of this equipment.

Machine Specifications

Frame: 13"W x 68"L x 38"H

Weight: 575 lbs.

Construction: Tank: Marine Aluminum with Baked-on Epoxy Finish
Chassis: Painted Steel
Cowling: Fiberglass

Power Transfer: Electric Clutch-driven shaft, Key Activated

Vacuum Blower: 45 WhispAir™, Dual Shaft

Water Pump: CAT® Triple Plunger 4 gallons per minute

Chemical System: Electro-mechanical, Meter Controlled

Heating System: Multiple Heat Exchanger (600 PSI pressure)
Dual Shell and Tube Exchangers

Instruments:

Main Panel:

Electronic Tachometer, 0-3000 RPM
Water Temperature Gauge, 0-320° F
Vacuum Gauge, 0-30 in Hg
Hour Meter, Machine Run-Time
Keyed Ignition, Start/Stop
Electronic Circuit Protection Breaker, Re-settable
Machine Status Indicator Lamps

Side Panel: Chemical Flowmeter, 0-10 GPH
Water Pressure Gauge, Liquid Filled, 0-1000 PSI
Water Pressure Adjustment
Blower Lubrication Port
Water Temperature Adjustment Knob and (Exchanger By-pass)
High Pressure Solution Outlets, Quick-Disconnect (2)
Fresh Water Inlet Fitting, Quick-Disconnect
Mix Tank Drain Valve

Recovery Tank: 120 gallon Aluminum

Cleaning Wand: Stainless Steel Wand.
Stainless Steel Solution Valve and Tube
Jet Splash Guards Insulated Handle Sleeves
Height Adjustable Handles

Standard Equipment: Power Transfer Package
Component Power Pack
Equipment Cowling with Armrests
Vacuum Recovery Tank
Control Console
Dual Wand Hook-up
HydraMaster Heat Exchanger System
Freeze Guard System
Wheel Chock Set
Carpet Wand
150', 2" Vacuum Hose
10' 1½" Vacuum Hose
150', HP Solution Line
50' Fresh Water Hose
10' 1½" Drain Line

Standard Equipment (cont.):

5 gallon Chemical Jug
Chemical Jug Holder
Chemical Jug Fill Line
Van Finish Package
Van-Sentry Package
Van Decal Package
Monogrammed Jacket
Operation Manual
Custom Equipment Color
Oversize Air Handling Package
Expanded Vacuum Recovery Tank Capacity

Spare Parts

Down-time on the unit can be very expensive, because your truck-mounted unit is capable of generating several hundred dollars per day. In order to minimize such down-time, it is strongly recommended by the manufacturer that you purchase and keep in your truck the parts listed below.

Parts Orders

To expedite your parts needs, please call your sales representative. In most instances, he either stocks or has access to parts through a regional service center. If further assistance is needed, contact the factory and coordinate your needs. If this becomes necessary, always indicate the method of shipment you desire, i.e. UPS, Blue Label, Air Freight, Air Express, etc.

HydraMaster Parts Dept. Phone ..... (425) 775-7276
HydraMaster Parts Dept. Toll Free Fax 1-800-426-4225

CDS 4.6 Spare Parts List

PART NO	DESCRIPTION	QTY
049-023	Screen, Garden Hose	6
052-050	Quick Connect, 440 Male	2
052-051	Quick Connect, 440 Female	2
052-052	Quick Connect, 660 Male	1
052-053	Quick Connect, 660 Female	1
076-005	Spray Jet 8006E	1
078-015	Kit, Flow Meter	1
078-019	Kit, Wand Valve Plunger	1

CDS 4.6 Spare Parts List

PART NO	DESCRIPTION	QTY
078-102	Kit, Pressure By-pass Valve	1
078-270	Kit, Valve for 3CP Cat Pump	2
078-271	Kit, Seals for 3CP Cat Pump	1
157-0012	Switch, Tethered Float	
157-022	Switch, Relay	1
157-040	Switch, 12 VDC Lighted	2
169-022	Valve, 1½" Full Port Ball	1

Responsibilities

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

Purchaser's Responsibility:

It is the purchaser's responsibility to **Read the Owner's Manual** and to familiarize yourself with the information contained therein. *Special attention should be paid to all **Cautions** and **Warnings.***

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 salesman from whom you purchased your unit is responsible for supervising the correct installation of the unit in your vehicle and thoroughly training you in its operation, maintenance and precautions.

Installation

- Correctly installing the unit and recovery tank in your vehicle and securing them with bolts and tie down washers.

- Checking the pump, vacuum blower and engine oil levels prior to starting the unit.

- Starting the unit to check the drive system and see that all other systems function normally.

- Checking all hoses, wands, etc. for correct operation.

Training

- A thorough review of the operation manual with the purchaser.
- Instruction and familiarization in: how to correctly start up and shut down the unit, how to correctly clean with the unit, where and how often to check and change component oil levels, how the unit's systems work, how to troubleshoot the unit, how to do basic repairs, safety precautions and their importance, freezing damage and how to avoid it, hard water damage and how to avoid it.
- A thorough review of the unit warranty and warranty procedures.
- A thorough review of hard water precautions and warnings.
- How to determine hard water areas.
- Use of water softening systems.

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" (3.5 grains or more per gallon) be fitted with a water softening system or a properly installed magnetic-type de-scaler must be used and maintained. Periodic de-scaling 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 de-scalers or softeners may require additional periodic use of de-scaling 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.

HydraMaster has included five hard water test strips with your machine. These can be used to test the water in your immediate and surrounding areas as they can vary greatly. Assume all water obtained from wells is hard.

♦ 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 following map defines areas in the 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.

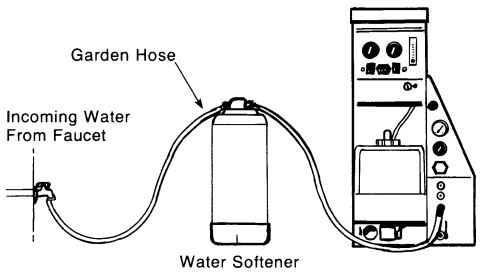
WATER SOFTENER

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. The manufacturer strongly urges the use of water softener units in areas exceeding 3½ grains per gallon. Failure to use a water softener in these areas will invalidate the machine's warranty. Using a hard water area map as a reference, determine the quality of water in your area and take action immediately, if necessary.

Reports from several of our machine users commending the results of the use of water softeners in conjunction with their machines prompts us to recommend the procedure to everyone in a "hard water" area.

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.

Figure 1-1 **Location of Water Softener**



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.

This cleaning rinse water, recovered into your unit's vacuum tank, contains materials such as detergents. These must be processed before being safe for streams, rivers and reservoirs.

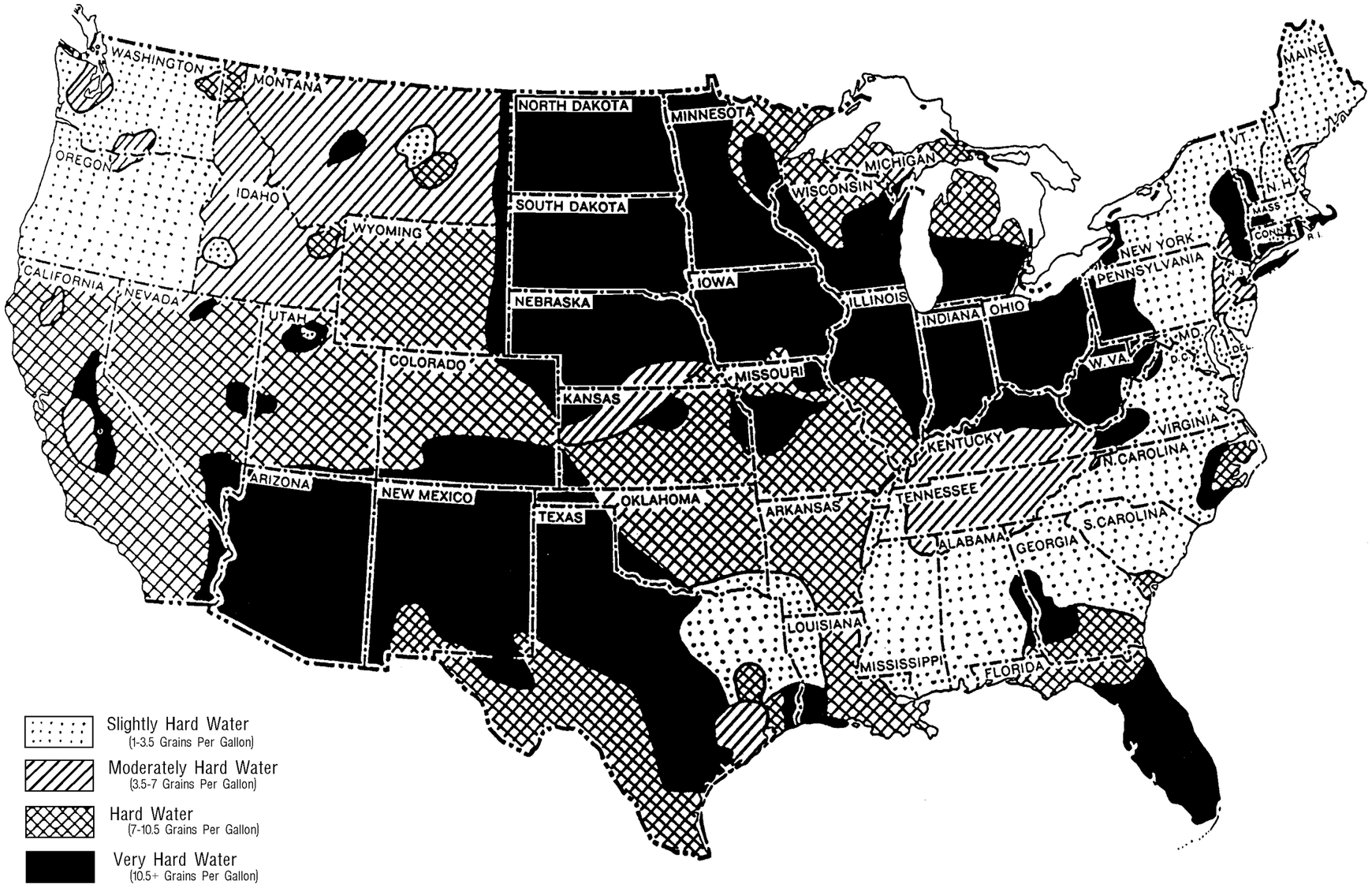
IN ACCORDANCE WITH THE EPA, STATE AND LOCAL LAWS, DO NOT DISPOSE OF WASTE WATER INTO GUTTERS, STORM DRAINS, STREAMS, RESERVOIRS, ETC.

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 yourself with an Automatic Pump-Out System. 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. Properly designed, they will continuously monitor the level of waste water and pump it out simultaneously to the cleaning operation. The hidden benefit of this process is that the technician does not have to stop his cleaning to empty the recovery tank. HydraMaster makes an A.P.O. System available which can be ordered with new equipment or installed later.

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

Figure 1-2 **Hard Water Map**



Source: Water Treatment Fundamentals, Water Quality Association, 1996.

Cleaning and Chemicals

CDS 4.6
Section 2-1

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

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.

The use of some chemicals through your mobile carpet cleaning plant can seriously damage the internal plumbing, high pressure pump and heater. These harmful chemicals include concentrated acid (see the pH chart at the end of this section), solvents, and some paint, oil, and grease removers with a high concentration of solvents.

The manufacturer 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 ♦

The increased demand for "clear water" rinsing results in the need for special care when using these acid based chemicals in your equipment. The negative side of these products is the corrosive effects the acid can have on metals, including swivels, 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 unprotected acid products that have obviously caused failures.

The use of detergents and chemicals which create foam when agitated should be avoided. Foam passing through the blower could lead to serious problems. HydraMaster and SafeClean chemicals are formulated with built in anti-foaming agents. When cleaning surfaces with excessive foaming residue use HydraMaster Powder Defoam as directed.

CLEANING STROKE PROCEDURE

Purpose:

To eliminate excess moisture remaining in the carpet fiber and the sawtooth appearance which results from diagonal movement of the cleaning tool on all types of carpet.

Procedure:

Always move the cleaning tool in smooth, forward and backward strokes. Apply slight pressure to the forward stroke while the solution is injected into the carpet. 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. During the forward and reverse strokes, movement to the right or left should only be accomplished at the extreme rear of the stroke. Overlapping is also important to ensure even application of solution and prevent saturation when cleaning wand is stopped twice at the same point at the rear of the cleaning stroke. This is illustrated at the end of this section.

Failure to adopt this procedure can result in increased chance of "clean streaks," fiber shrinkage, brown-out and longer drying periods.

OVER-WETTING

Over-wetting is annoying to all concerned, and sometimes leaves a bad impression of the cleaning process used.

These are Several Areas That Will Cause Over-wetting:

1. Too few vacuum strokes or improper saw-tooth vacuum strokes as shown in the following illustration.
2. Obstructed, cut or kinked hoses.
3. Vacuum tank drain valve left partially open.
4. Clogged vacuum blower filter or vacuum tank lid not sealing properly.
5. Cleaning a heavily foam-saturated carpet without defoamer. (We recommend crystal type.)

Figure 2-1: pH Chart

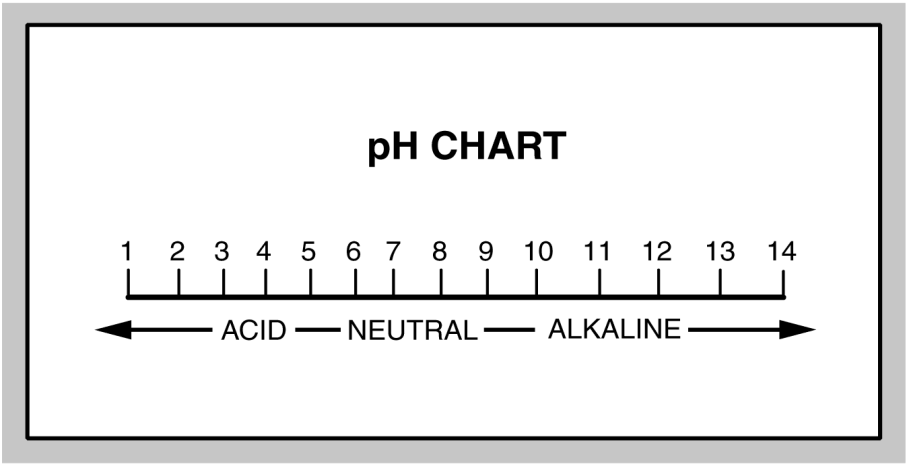
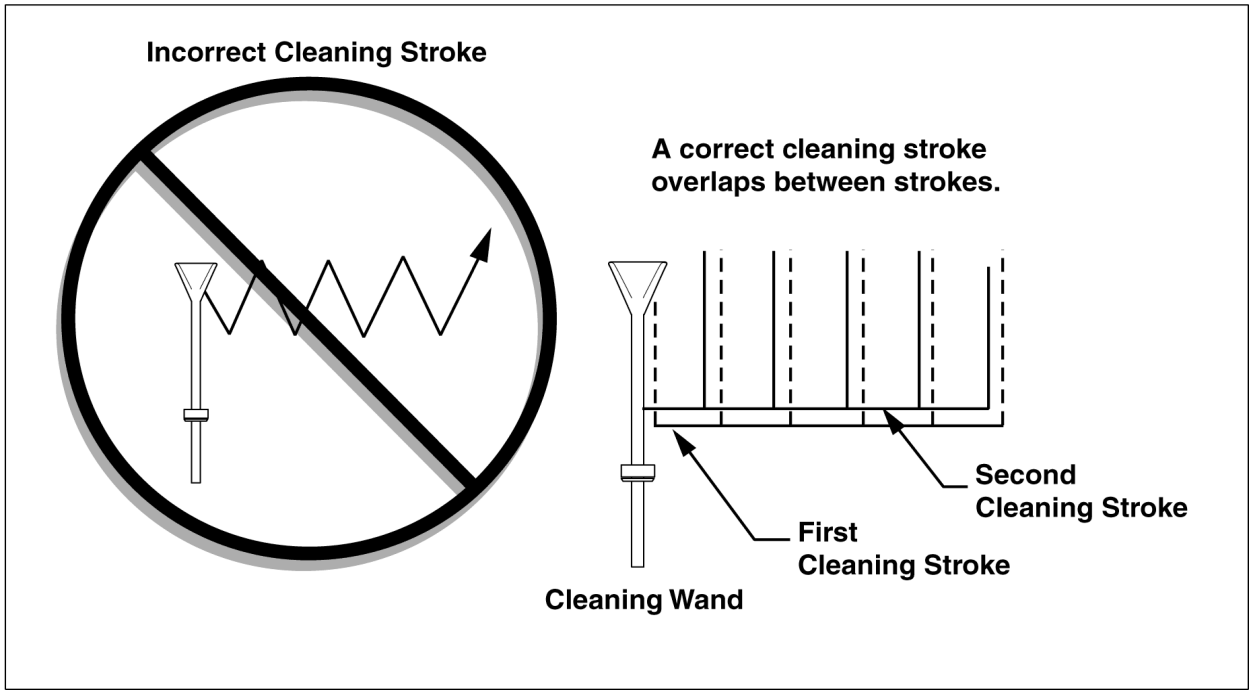


Figure 2-2: Cleaning Stroke Procedure



Operating Instructions

CDS 4.6
Section 3-1

BEFORE OPERATING THE UNIT

1. Operate the unit and equipment only in a well ventilated area.

♦ CAUTION ♦

Exhaust fumes contain carbon monoxide and may be hazardous to your health. *Do not operate* this truck where the exhaust may enter any building doorway, window, vent, or opening of any kind.

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 the unit.

5. Check your chemical jug to see if you have enough concentrated chemical to finish the job. If not, mix and fill a five 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 insures that you have the proper length of hose required to perform the cleaning.

START UP

1. Make sure the van gear select lever is in the Park position and the emergency brake is set.

2. Start the van engine.

3. Turn key on CDS Dash. The RPM will automatically increase to the proper running speed. Engine RPM should be as noted in the Maintenance Section.

4. Pull the heat control valve open only if you will be using water. **Do not activate the heat exchanger during flood extraction work.** When the mix tank begins a fill cycle, the chemical flowmeter may be adjusted to your desired setting. Set your cleaning pressure at 300 PSI.

NOTE: A chemical flowmeter set at 5 GPH is a 1 to 30 mix ratio and 10 GPH is a 1 to 15 ratio.

5. Turn the APO switch 'ON' if using the auto pump-out feature.

6. Now proceed with the cleaning operation.

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

FLOOD DAMAGE WORK

When using equipment for flood damage, turn the cleaning water pressure down to zero. This will reduce the engine power load and save on fuel consumption. Also, de-activate the heat exchangers to help prevent engine overheat problems.

SHUT DOWN

1. Shut off the knob on the chemical flowmeter. NOTE: If freeze guarding is necessary, perform the freeze guard procedure at this time. Draining the mix tank to ½ full or less is recommended to reduce spillage inside the vehicle.

2. Open the mix tank drain and actuate the wand valve to run fresh water through the chemical mix tank, heat exchangers and cleaning tools.

NOTE: Vinegar should be rinsed through the system weekly. De-scaler should be rinsed through the entire system monthly.

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. Next plug the vacuum inlets. Spray lubricant into the lube port located on the front panel above the pressure gauge while the unit is running.

Spray for about 5 to 10 seconds. This will lubricate the vacuum pump and prevent it from rusting.

7. Remove the inlet plugs, then turn the machine off.

8. Before draining, it is recommended that the heat control knob be moved to the 'OFF' position. This will help to avoid potential engine overheat problems due to reduced coolant flow through the radiator.

9. Drain the waste tank. Do not dump waste in any area which might violate local, state or federal law. The pump-out system may be used to drain the waste tank into a sanitary drain system. When the waste tank is drained, lift waste tank lid and remove the filter screens. Clean out any accumulated debris. Rinse. Re-install.

Freeze Guard

CDS 4.6
Section 4-1

Any freezing of this machine is not covered by warranty and during the colder months of operation, careful protection should be of utmost concern.

The following precautions are recommended prior to and during cleaning:

1. Run the machine before leaving for the first job to insure nothing has frozen the night before, including hoses and wand.

2. Insulate the garden hose from the cold ground by running it through an extra 1½ inch vacuum hose.

3. Leave truck doors closed until time cleaning begins, afterwards open slightly.

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

5. 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.

6. Whenever possible, the truck should be stored in a heated garage at night or over the weekend. If not possible, place a 1500 watt electric heater inside the truck, aimed directly at the machine. Never use a propane heater. It causes excessive moisture on the truck ceiling and the possibility of it going out is higher. If the machine and truck are left outside with a heater, you should drain water from the machine cleaning tools and hoses. (They freeze also.)

To Drain the Machine, Follow These Steps:

A. Before shutting off the machine, remove the chemical line from the chemical jug and place in a mixture of 50/50 antifreeze and water. With the cleaning tool on, allow mixture to fill chemical system back to the chemical mix tank.

B. Open the mix tank drain valve and allow the water to drain thoroughly from the mix tank.

C. Close the mix tank drain and fill the mix tank 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 mix tank shut-off switch activates (pump stops). This freeze guards the high-pressure circuit.

D. Open the mix tank 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).

♦ CAUTION ♦

One manufacturer of antifreeze cautions: "WHEN DISPOSING OF USED ANTI-FREEZE 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."

BE SURE YOUR MACHINE IS PROTECTED!
Freezing will cause GRIEF, MONEY, and DOWN-TIME.

FREEZE PROTECTION OF THE PUMP-IN SYSTEM

1. Drain the fresh water tank.

2. Remove the garden hose adapter from the pump-in pump hose and position the hose so it is pointing outside the van.

3. Turn on the pump-in pump and run for 1-2 minutes till all the water is purged from the hose.

NOTE: The next time the unit is used it may take a few minutes before the mix tank begins to fill.

Water and Chemical System

CDS 4.6
Section 5-1

This electro-mechanical system has been designed to be simple and trouble free.

WATER AND CHEMICAL FLOW OPERATION

Incoming water flows first through the solenoid control valve and the low pressure chemical injector which are both mounted on the exterior of the mix tank. As the water passes through the chemical injector, it is automatically proportioned with a quantity of detergent that is adjusted with the flowmeter knob. The mix tank is equipped with two different float switches, the water level float responds to the level in the tank and will maintain the proper volume of solution to be reserved for the water pump. The secondary, low water float switch 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 mix tank would drop, activating the secondary switch, which automatically disengages the system and prevents the water pump from running dry.

The desired chemical injection ratio may be obtained by an adjustment of the chemical flowmeter during the fill cycle of the mix tank. Water must be flowing into the mix tank in order to adjust the chemical mix. The chemical will flow from the chemical jug to the chemical flowmeter, then to the chemical injector where it is proportioned into the mix tank at the desired chemical setting.

NOTE: With this unique chemical system, the chemical flow is proportioned only during the filling cycles of the mix tank, not during the direct spraying of the wand. Therefore, it is possible that as your wand is spraying, you may have no chemical flow. Also, the converse is true in that you may not be spraying your wand, but if the mix tank is in a filling cycle, your chemical flowmeter may be active at the desired flow rate.

The chemical proportioning system will mix chemical with water at a 1 to 30 ratio when the flowmeter is set at 5 GPH, or a 1 to 15 ratio when the flowmeter is set at 10 GPH.

CHEMICAL SYSTEM MAINTENANCE

The chemical lines may need to be flushed with vinegar periodically to prevent abnormal chemical build-up. This flushing may be done by removing the clear plastic hose from the chemical jug and inserting it into a one quart container of vinegar. This should be done with the chemical flowmeter setting 10 GPH. Simply spray water from the wand until the quart of vinegar is exhausted. Then repeat the process with one quart of clear water to void all lines of vinegar.

Figure 5-1 **Water Flow Diagram**

D4497 Rev A

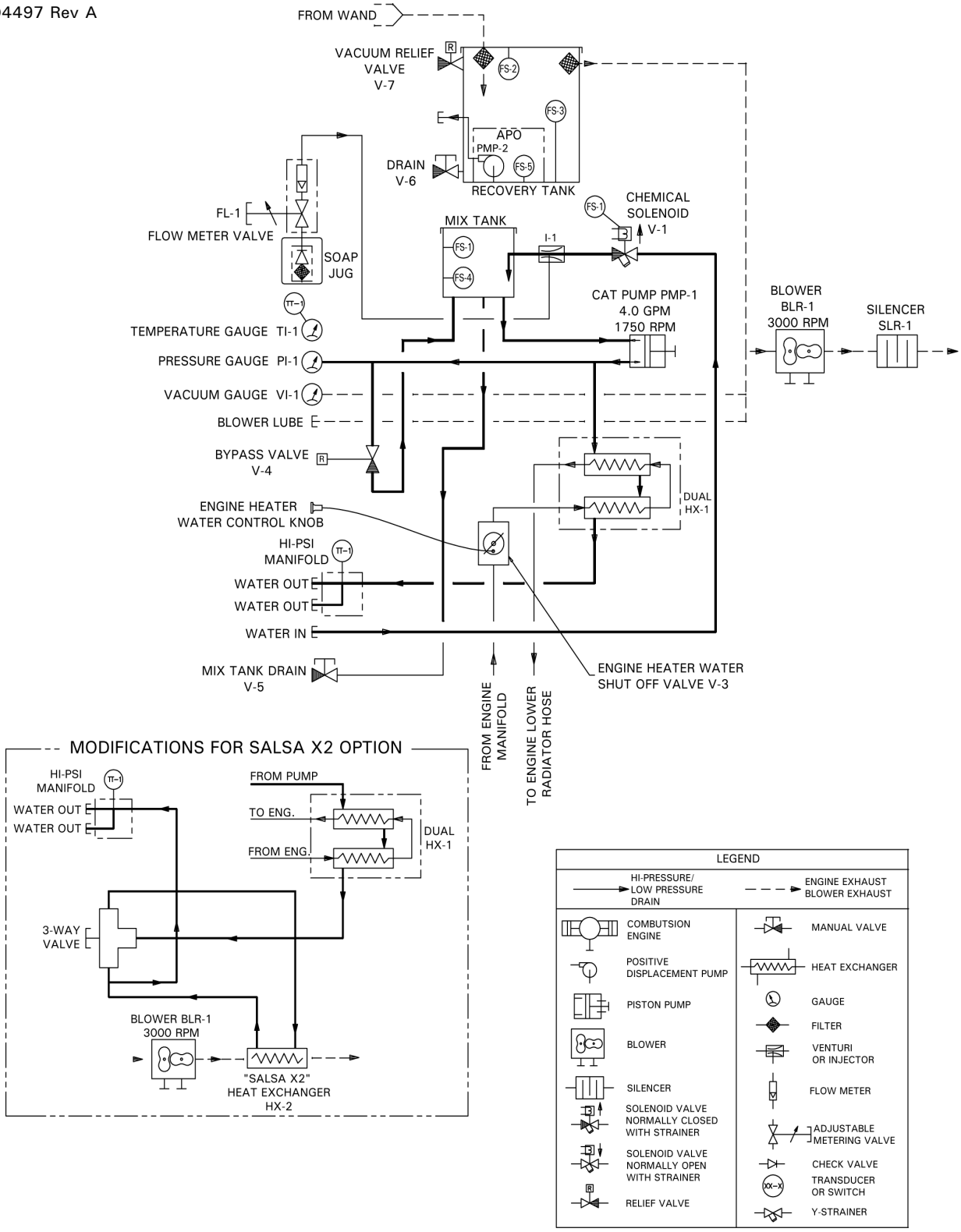
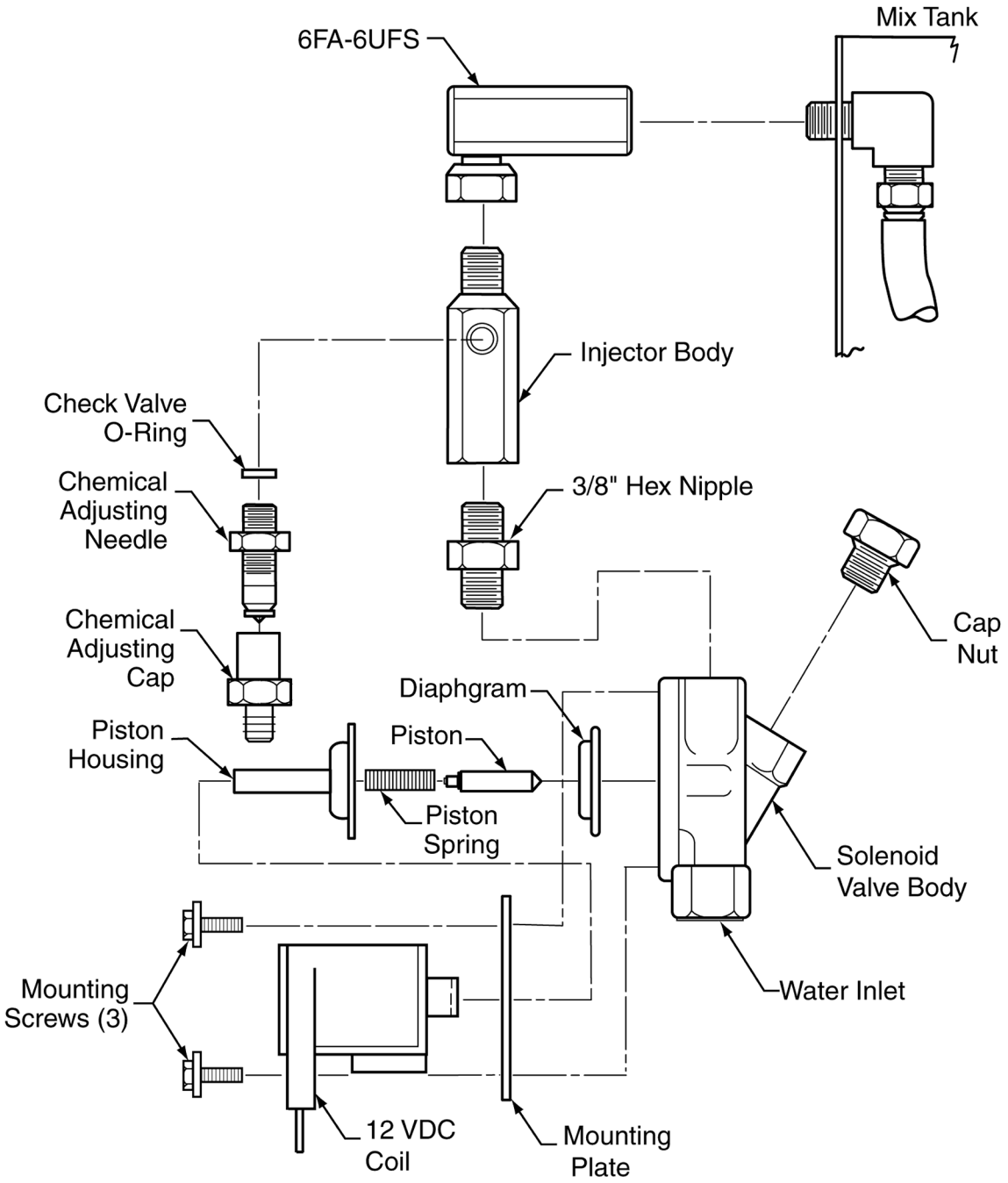


Figure 5-2 **Proportioner Diagram**



Chemical Tank Troubleshooting

No.	Problem/Possible Cause	Solution
1.0	**There is a loss of, or erratic, chemical flow.**	
1.1	The *anti-siphon foot valve* is clogged or missing causing the solution to flow in reverse from the mix tank to the chemical jug.	Inspect the anti-siphon screen and remove any debris. Rinse it out in warm water or a vinegar solution.
1.2	The *flowmeter* is cracked allowing air intake which causes a loss of chemical suction.	Check for hairline cracks in the flowmeter. Fittings in the back of the meter can be tightened too much causing a crack. Freezing can also cause cracks. Replace the flowmeter if necessary.
1.3	The *water pressure* to the machine is too low causing a loss of chemical suction. The volume of water entering the mix tank is not be enough to siphon the chemical.	Unscrew the spring from the foot valve if you are in a low water pressure area. After removing the spring, the chemical hose must sit vertically in the jug enabling the ball in the foot valve to seat by gravity. (This is only a temporary fix.) Also check the incoming garden hose filter.
1.4	The *chemical feed hose* is cracked or split causing a loss of chemical suction.	If given the opportunity, the chemical venturi will suck air rather than water. Check for air leaks in the upper and lower hoses. Replace any defective hoses.

No.	Problem/Possible Cause	Solution
1.5	The *proportioning venturi* is clogged causing a loss of chemical suction.	Remove the venturi and soak it in warm water or a vinegar solution.
1.6	The *mix tank supply* hose is internally collapsed causing reduced flow of inlet water or reversed flow of solution from mix tank to chemical jug.	Replace the hose.

Pump Maintenance

CDS 4.6
Section 6-1

DAILY

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.

   Use a 30 weight, non-detergent oil.

♦ CAUTION ♦

If the oil becomes discolored and contaminated, one of the oil seals may be damaged. Refer to the Service Section.

Do not operate the pump if the crankcase has been contaminated with water.

♦ 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.

PERIODICALLY

1. Change the oil after the first 100 hours of operation, and every 400 operating hours thereafter. When changing, remove the drain plug on the oil drain hose so all oil and accumulated sediment will drain out.

♦ CAUTION ♦

Do not turn the drive shaft while the oil reservoir is empty.

♦ CAUTION ♦

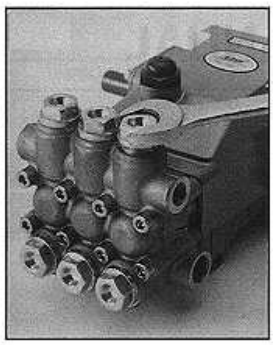
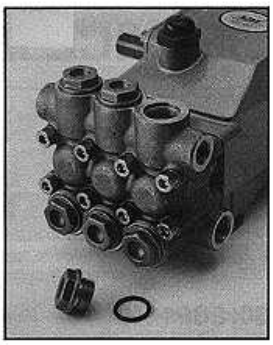
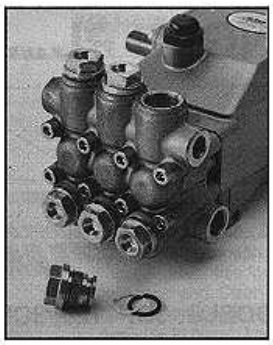
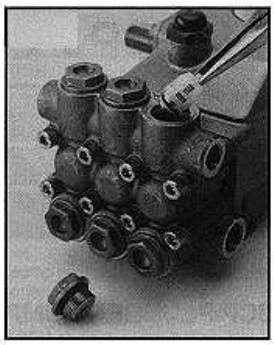
Protect the pump from freezing.

Pump Service

The next few pages explain how to disassemble and inspect all easily serviceable parts of the pump.

♦ CAUTION ♦

Do not disassemble the hydraulic end unless you are a skilled mechanic. For assistance, contact HydraMaster (425-775-7275) or the distributor in your area.

1.0 Servicing the Valves (See illustrations above.)

A. Remove the hex valve plugs (top-discharge, bottom-inlet).
B. Unthread the valve plug and examine the o-ring under the plug for cuts or distortion. Replace it if it is worn. Lubricate new o-rings before installing.
C. Grasp the valve retainer by the tab at the top with needle-nose pliers, then remove the o-ring at the bottom of the valve chamber.
D. Inspect all valve parts for pitting, gouges, or wear. If wear is excessive, replace valve assembly.
E. Reinstall valve assemblies:
   1. Using a clean towel, clean the valve chamber.

2. Install the o-ring into the high pressure manifold.
3. Install the valve assemblies into the high pressure manifold (the metal side of the valve faces the manifold).
4. Replace the o-ring on the hex valve plug.
5. Torque the plug to 72 foot pounds.

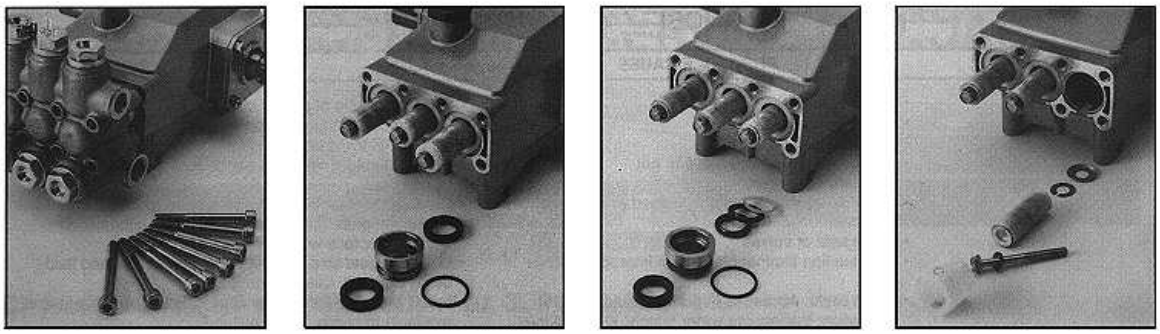
2.0 Removing the High Pressure Manifold

A. Using an M6 allen wrench, remove all eight of the socket head bolts.
B. Rotate the crankshaft by hand to start separation of the manifold head from the crankshaft.
C. Insert two flat-head screwdrivers on opposite sides to further separate the manifold from the crankshaft.

♦ CAUTION ♦

To avoid damage to either plunger or seal, keep the manifold properly aligned with the ceramic plungers when removing it.

D. Remove the seal retainer from the manifold and inspect for wear.
E. Examine the ceramic plunger for cracks or scoring (refer to Servicing the Plungers for replacement).



3.0 Servicing the Low Pressure Seals and High Pressure Seals (See illustrations above.)

A. Remove the low pressure seal from the seal retainer using a 90 degree pick tool.

B. Remove the high pressure seal from the manifold.

C. Inspect the low pressure seal and high pressure seal for wear and replace if necessary.

D. Reinstall the low pressure seal:

1. Install the low pressure seal into the seal retainers with the garter spring down.

E. Reinstall the high pressure seal:

1. Lubricate the seal chamber in the manifold.
2. Carefully square the high pressure seal into position by hand with the grooved side down (metal back facing out).
3. Examine the seal retainer's o-ring and replace if worn. Lubricate the new o-ring before installing.
4. Next, press the seal retainers into the manifold until completely seated.

4.0 Servicing the Plungers (See illustrations above Step 3.)

A. Using a hex tool, loosen the plunger retainer about three to four turns. Push the plunger back to separate it from the retainer and finish unthreading the plunger retainer by hand.

B. Unthread the plunger retainer with sealing washer.

C. Remove the ceramic plunger, keyhole washer and barrier slinger from the plunger rod.

D. Reinstall the ceramic plungers:

1. Examine the sealing washer on the plunger retainer and replace it if it is cut or worn. Lubricate the new sealing washer for ease of installation and to avoid damage.
2. Apply Loctite 242™ to the threads of the plunger retainer and press it into the ceramic plunger. Thread hand tight, then torque the bolt to 4.4 foot pounds.
3. Install the seal retainer with holes to the top and bottom, and forward.

5.0 Reinstall High Pressure Manifold

A. Slip the seal retainer over the ceramic plungers with the holes to the top and bottom and forward.
B. Turn the shaft by hand to line up the plungers so that the end plungers are parallel.
C. Lightly lubricate the plungers and carefully slide the manifold head onto the plungers while supporting it from the underside to avoid damaging the plungers.
D. Reinstall the socket head bolts and torque to 4.4 foot pounds.

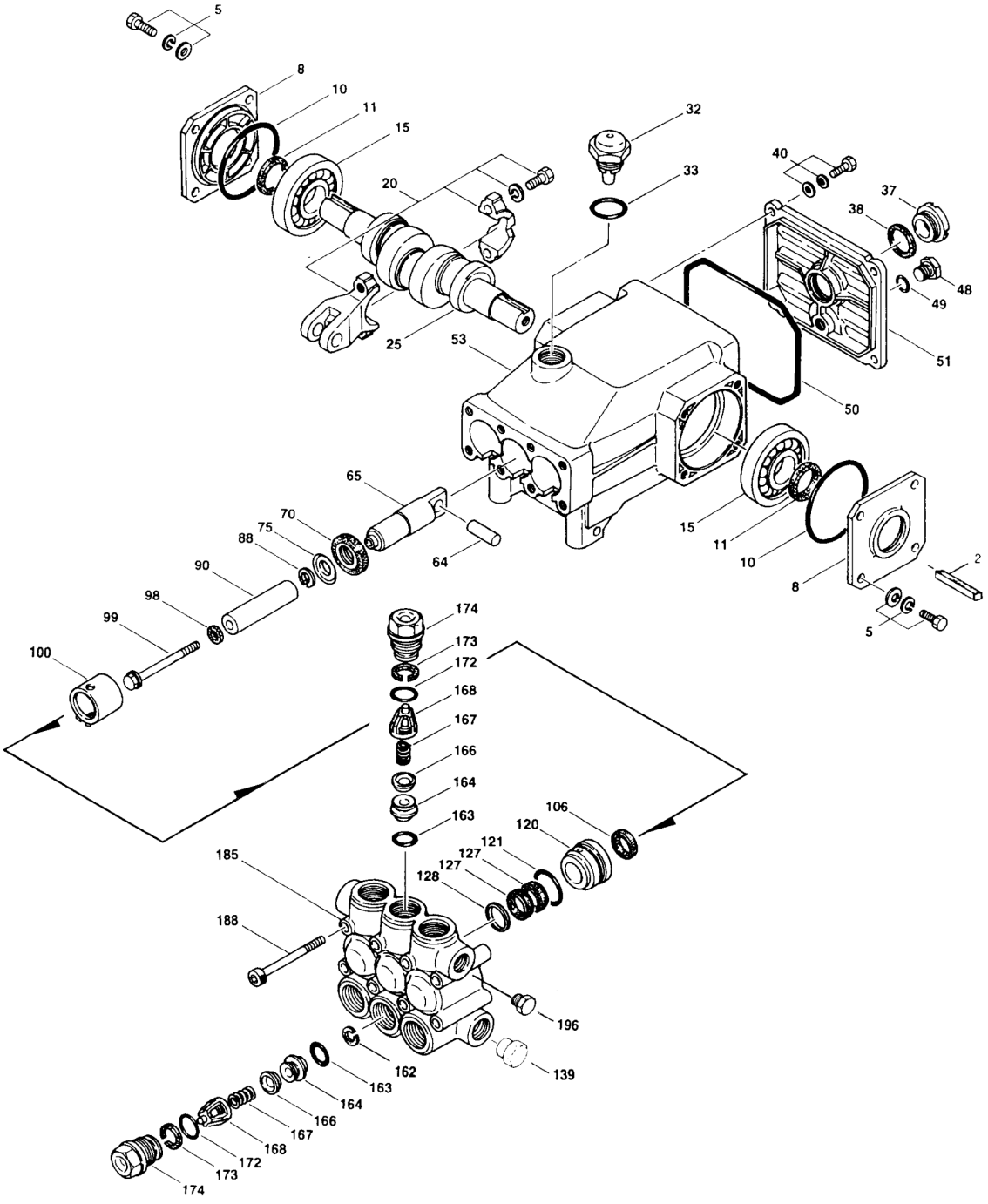
6.0 Servicing the Crankcase

A. While manifold, plungers, and seal retainers are removed, examine the crankcase seals for wear.
B. Rotate the crankshaft oil seal externally for drying, cracking or leaking.
C. Consult your HydraMaster distributor if crankcase servicing is necessary.

Torque Chart

		Torque		
Pump Item	**Thread**	**Inch Pounds**	**Foot Pounds**	**Nm**
Plunger Retainer	M6	55	4.4	6.2
Manifold Bolt	M6	55	4.4	6.2
Valve Plugs	M22	870	72.3	100.0
Bearing Case Screws	M6	50	4.0	6.0
Crankcase Cover	M6	50	4.0	6.0
Bubble Oil Gauge	M28	45	3.6	5.0
Mounting Bolts	M8	115	9.4	13.0

Figure 6-3 **Cat Pump**



Cat Pump Parts List

ITEM	PART NO.	DESCRIPTION	QTY
2	30057	Key (M6)	1
5	96031	Screw, Sems HHC, Bearing Cover (M8x16)	8
8	46910	Cover, Bearing	2
10	14028	O-Ring, Bearing Cover	1
11	43222	Seal, Oil, Crankshaft	2
15	14480	Bearing	
20	46743	Rod, Connecting, Assembly	2
25	46928	Crankshaft, Dual End	3
32	46798	Cap, Oil Filler	1
33	14179	O-Ring, Oil Filler Cap	1
37	43987	Gauge, Oil, Bubble	1
38	44428	Gasket, Flat, Oil Gauge	1
40	92519	Screw, Sems HHC, Crankcase Cover (M6x16)	4
48	25625	Plug, Drain (¼" x 11)	1
49	23170	O-Ring, Drain Plug	1
50	46940	Cover, Crankcase	1
51	14044	O-Ring, Crankcase Cover	1
53	46912	Crankcase	1
64	46746	Pin, Plunger Rod	3
65	46747	Rod, Plunger	3
70	147-013	Seal, Crankcase Oil for 3CP Cat Pump	3
75	43900	Slinger, Barrier	3
88	45697	Washer, Keyhole	3
90	46893	Plunger (M50)	3
98	46730	Seal, Washer	3
99	46729	Retainer, Plunger with Stud (M7)	3
100	46749	Retainer, Seal	3

ITEM	PART NO.	DESCRIPTION	QTY
106	43243	Seal, LPS with Spring	3
120	46896	Case, Seal	
121	13976	O-Ring, Seal case	3
127	44549	V Packing	6
128	44548	Adapter, Male	3
139	22179	Plug, Inlet ½"	1
163	17547	O-Ring 85, Valve Seat	6
164	46658	Seat	6
166	46429	Valve	6
167	43750	Spring	6
168	46583	Retainer, Spring	6
172	17549	O-Ring, Valve Plug	6
173	48365	Back up Ring, Valve Plug	6
174	45900	Plug, Valve	6
185	46895	Manifold, Head	1
193	87872	Bolt, HSH, Manifold Head (M8x70)	8
196	22187	Plug, Discharge $^{3}/_{8}$"	1
129	814843	Complete Head	1
300	078-271	Kit, Seal for 3CP Cat Pump	1
310	078-270	Kit, Valve for 3CP Cat Pump	1
350	30696	Valve Seal Removal Tool	1

Pump Troubleshooting

Cavitation

- Inadequate fluid supply because of:
  - -Inlet line collapsed or clogged.
  - -Air leak in inlet line.
  - -Worn or damaged inlet hose.
- Fluid too hot for inlet suction piping system.
- Air entrained in fluid piping system.
- Aeration and turbulence in supply tank.
- High pressure seals worn.

Symptoms of Cavitation:

- Excessive pump valve noise (chattering)
- Premature failure of spring or retainer
- Volume or pressure drop
- Rough-running pump.

Drop in Volume or Pressure

- Air leak in suction piping.
- Clogged suction line.
- Pressure gauge inoperative or not registering accurate.
- Suction line inlet above fluid level in tank.
- Inadequate fluid supply.
- Pump not operating at proper RPM.
- Worn pump valve parts.
- Foreign material in inlet or outlet valves.
- Worn low pressure seals.
- Cavitation.
- Belt slippage.

Water Pulsations

- Foreign object lodged in pump valve.
- Air in suction line.
- Valve spring broken.
- Cavitation.
- Aeration or turbulence in supply tank.
- Stuck inlet or discharge valve.

Valve Wear

- Normal wear.

Loss of Oil

- External seepage.
- Frozen pump.
- Worn crankshaft seal.
- Oil drain piping or fill cap loose.

Premature Failure of Valves or Seals

- Excessive cavitation.
- Foreign object in the pump.
- Pump running too fast.
- Valve or seal material incompatible with fluid being pumped.
- Excessive inlet pressure.
- Scored plungers.
- Running pump dry for excessive periods of time.
- Excessive temperatures of fluid being pumped.

Machine Assemblies and Parts Lists

CDS 4.6

Section 7-1

Figure 7-1 **CDS 4.6 Machine Assembly**
D4429 Sht 1, Rev A

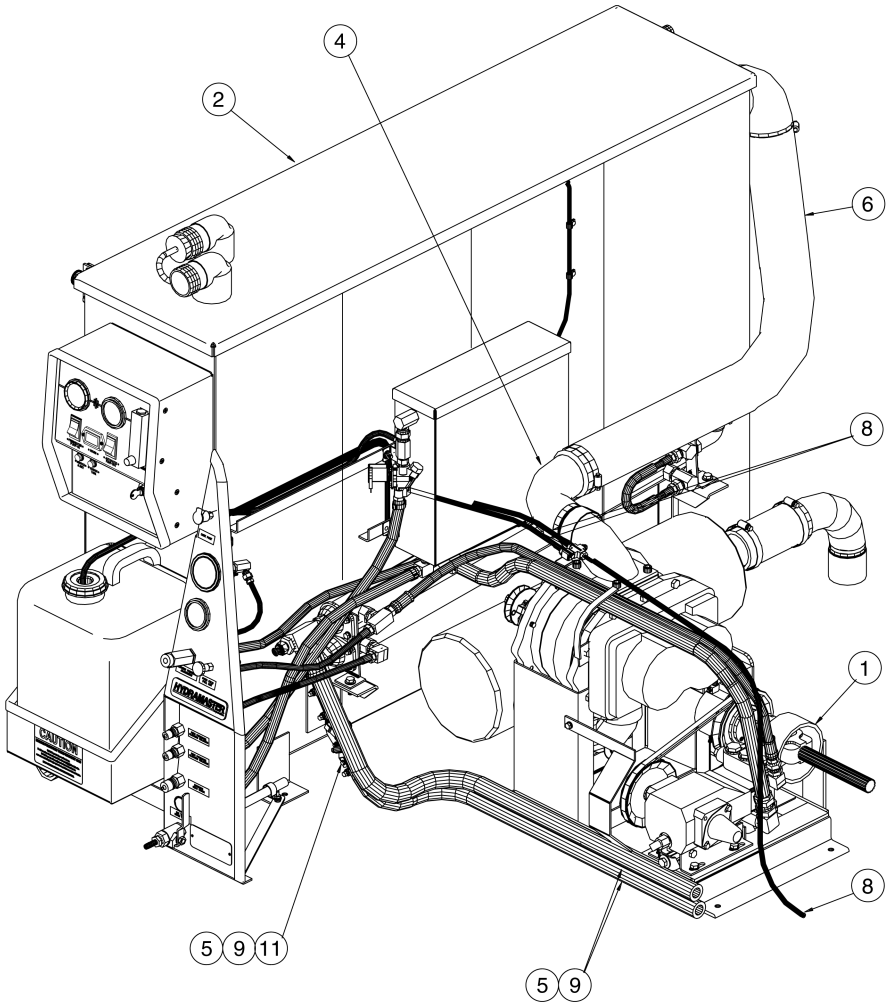


Figure 7-2 **CDS 4.6 Machine Assembly-Rear View**
D4429 Sht 2, Rev A

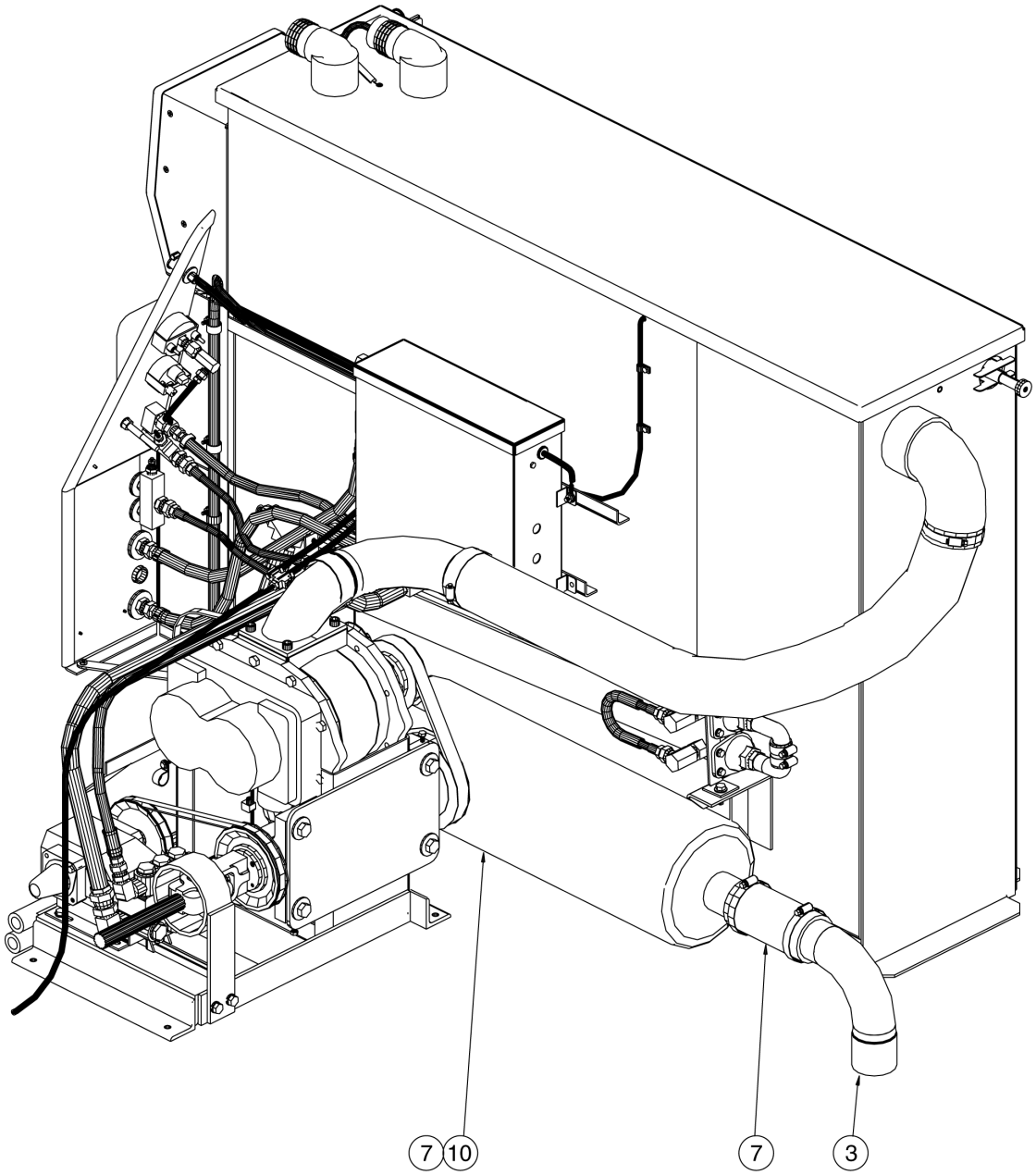


Figure 7-3 **CDS 4.6 Machine Assembly-Top and Front Views**
D4429 Sht 3 & 4, Rev A

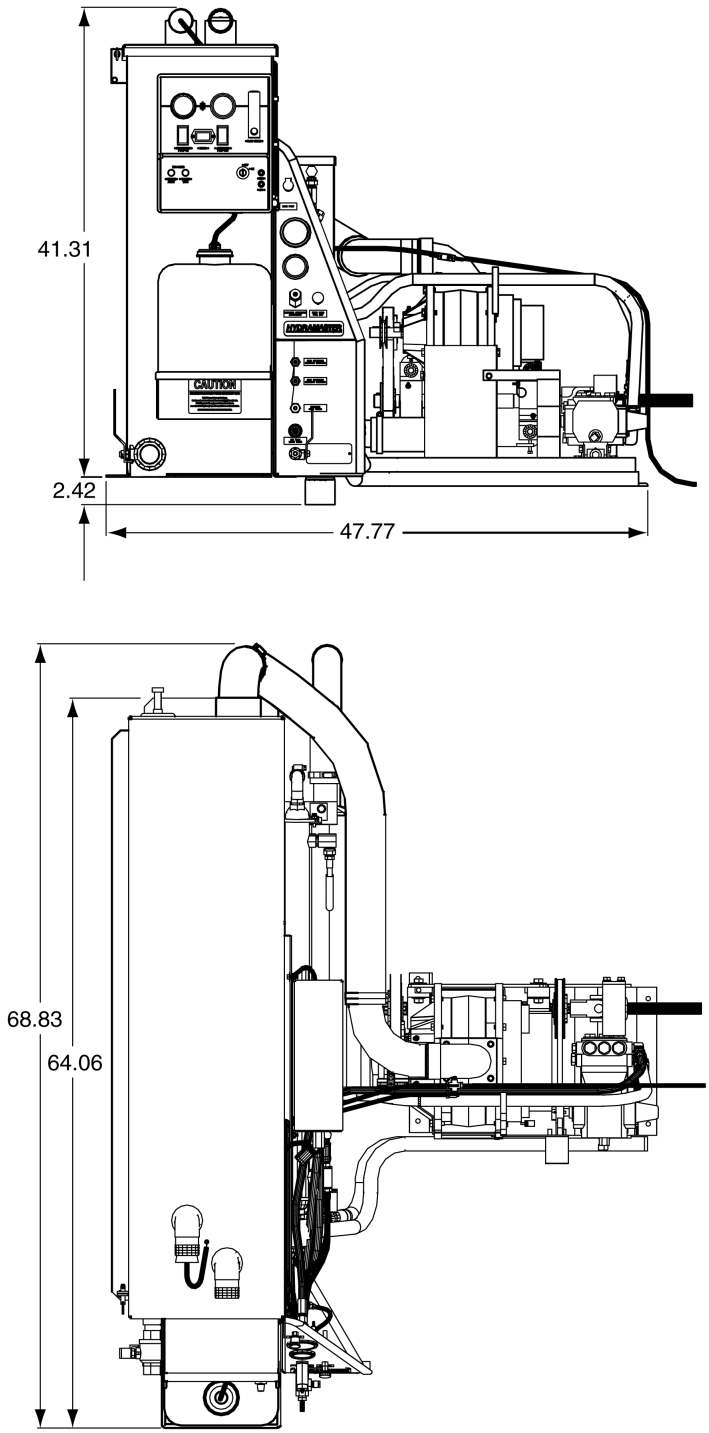


Figure 7-4: **Recovery Tank Assembly - Front View**

D4430 Sht 1, Rev —

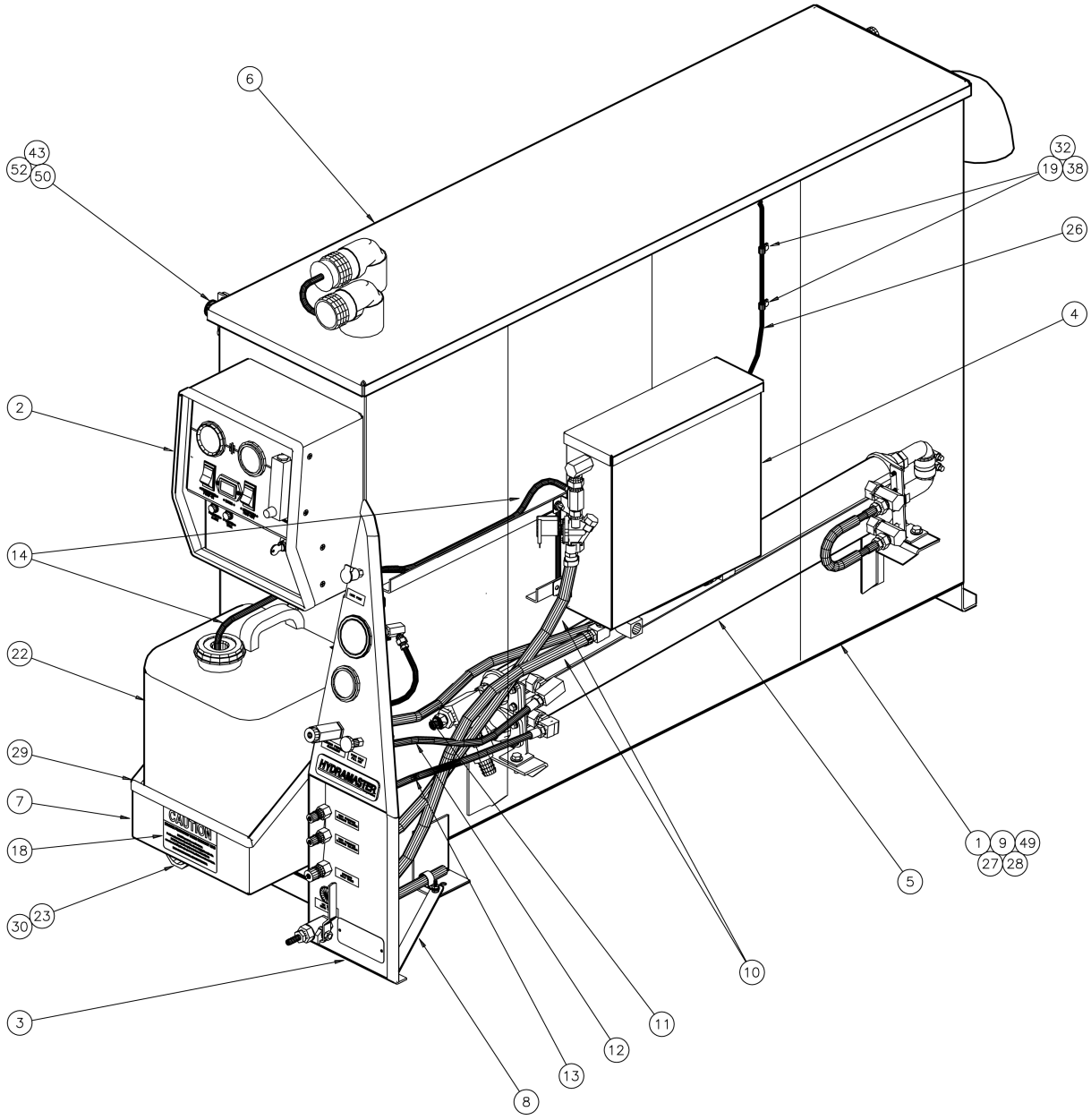
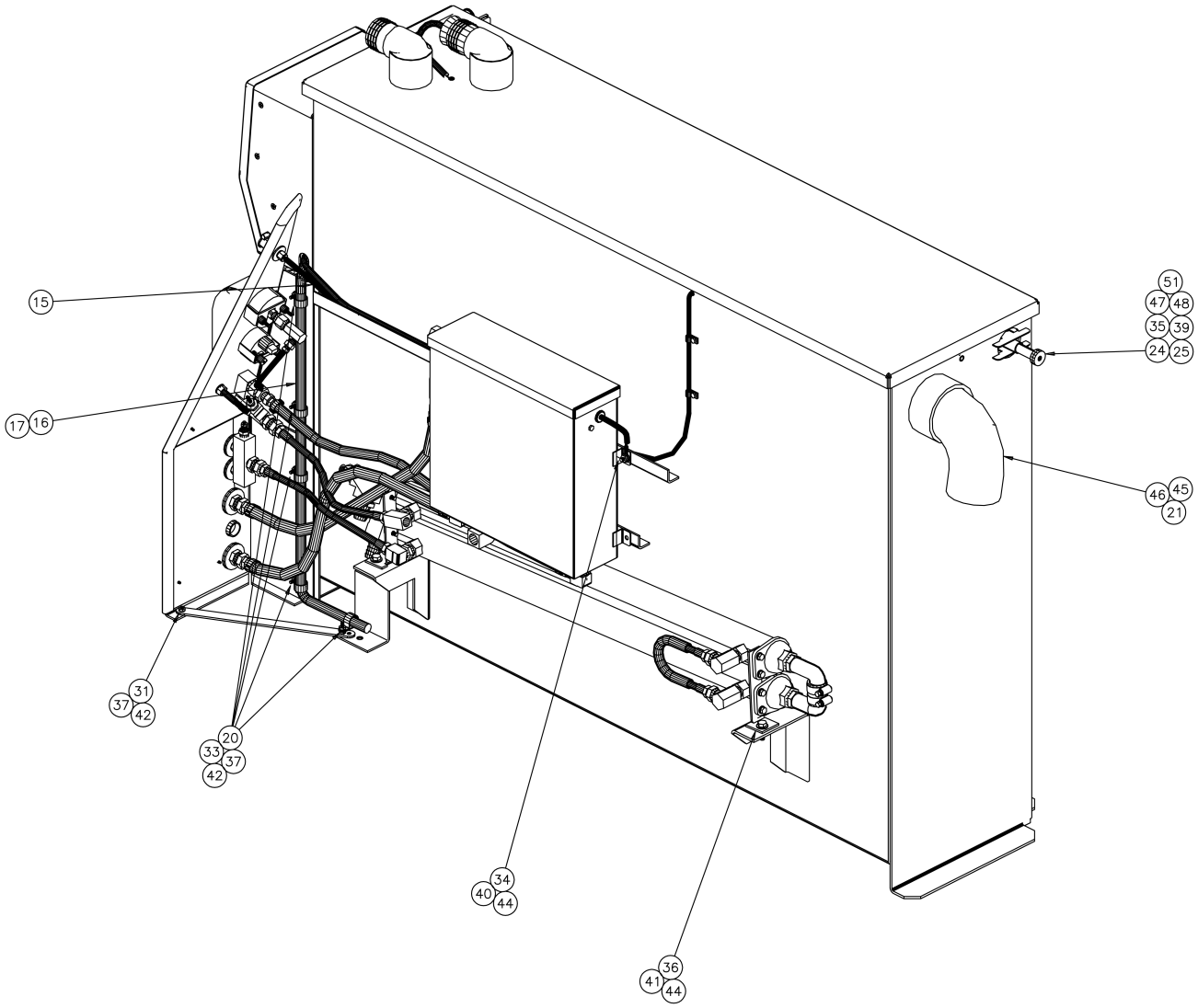


Figure 7-5 **Recovery Tank Assembly-Rear View**

D4430 Sht 1, Rev —



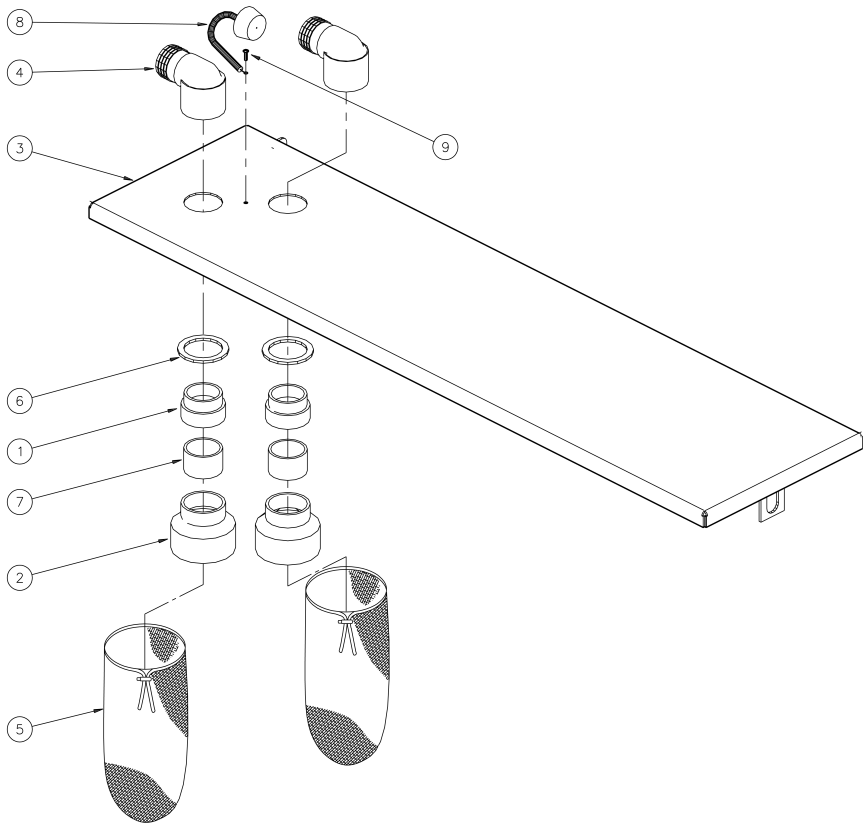
Recovery Tank Assembly Parts List

REF. NO.	PART NO.	DESCRIPTION	QTY
1	159-031	Recovery Tank	1
2	————	Dash Box Assembly	1
3	————	Instrument Panel Assembly	1
4	————	Mix Tank Assembly	1
5	————	Dual Heat Exchanger Assembly	1
6	————	Cover Assembly, Recovery Tank	1
7	166-002	Soap Jug Tray	1
8	601-013-001	Instrument Panel to Vacuum Tank Stabilizer	1
9	105-011	Plate, Filter Bag Support	1
10	068-152	Hose Assembly, Mix Tank Control Panel	2
11	068-150	Hose Assembly, Bypass	1
12	068-089	Hose Assembly, $^{3}/_{8}$"x24" Lg Teflon	1
13	068-094	Hose Assembly, $^{3}/_{8}$"x16" Lg. Teflon	1
14	068-025	Hose, 1.4" Clear	A/R
15	068-030	Hose, $^{5}/_{32}$" Vacuum	A/R
16	063-007	Harness, CDS Wire-Primary	1
17	063-008	Wire Harness Wrap, Split Seam	A/R
18	081-070	Label, Small CAUTION	1
19	033-021	Clamp, $^{1}/_{4}$" Nylon Hose	3
20	033-023	Clamp, $^{3}/_{4}$" Nylon Hose	5
21	049-013	Filter, Vacuum Pump Blower	1
22	159-016	Jug, 5 Gallon Chemical	1
23	052-182	Nipple, 1.50" NPT Close Galvinized	1
24	125-111	Pipe, Vacuum Relief Spring Guide	1
25	155-026	Spring, Vacuum Relief	1
26	157-012	Switch, Heavy Duty Liquid Level Float	1
27	131-027	Trimlok, Crossfire Brow Trim $^{3}/_{8}$"	A/R
28	131-028	Trimlok, Recovery Tank Gasket $^{3}/_{4}$"	A/R
29	131-003	Trimlok, CDS Trim $^{3}/_{4}$"	A/R
30	169-022	Valve, 1.50" NPT Full Port	1

Recovery Tank Assembly Parts List

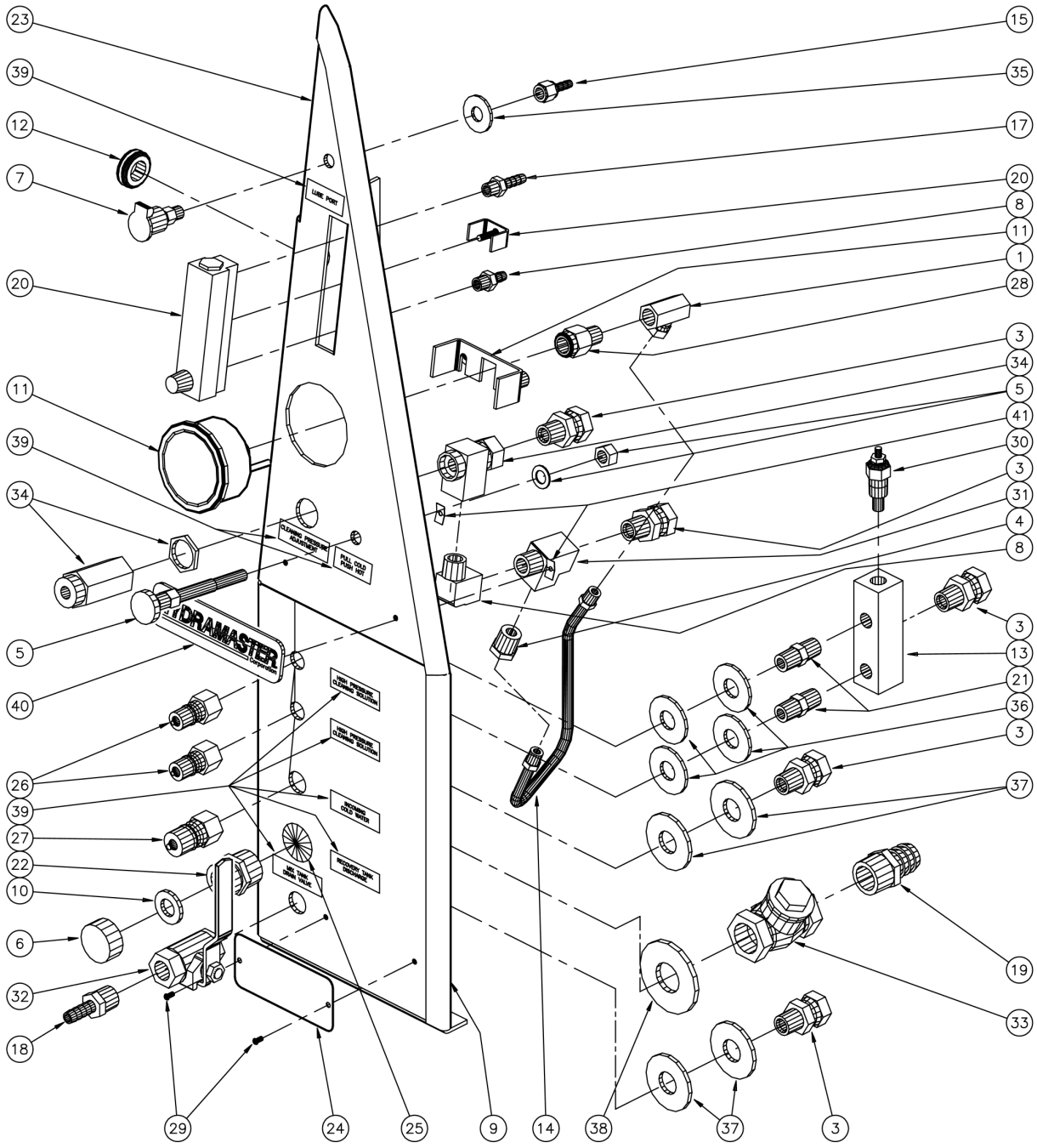
REF. NO.	PART NO.	DESCRIPTION	QTY
31	143-114	Flat Head Machine Screw, #10-24UNC x 0.50" LG.	1
32	143-132	Hex Head Machine Screw #10-24UNC x 0.75" LG.	2
33	143-064	Flat Head Machine Screw, #10-24UNC x 1.00" LG	5
34	143-115	Hex Head Machine Screw, 1/4"-20UNC x 0.75" LG	2
35	143-198	Hex Head Machine Screw, 3/8"-16UNC x 4" LG.	1
36	143-143	Hex Head Machine Screw, 5/16"18UNC x 1.00" LG	2
37	094-004	Hex Nut, #10-24UNC	11
38	094-034	Hex Nut, #10-24UNC Nylock	2
39	094-077	Nut, 3/8"-18UNC x 1.00" O.D. Knurled	2
40	094-007	Whiz Nut, 1/4"-20UNC	2
41	094-023	Whiz Nut, 5/16"-18UNC	2
42	174-015	Washer, #10 Outside Star	11
43	174-001	Washer, #10 Flat	1
44	174-003	Washer, 1/4" Flat	4
45	052-360	Adapter, 3" FPT x 3" M Slip	1
46	052-361	Elbow, 3" F Slip x 3" M Slip	1
47	015-182	Bracket, Vacuum Relief Valve	1
48	027-031	Cap, Vacuum Relief	1
49	081-056	Label, H/M Lubrication Schedule	1
50	103-028	Locking Pin Assembly	1
51	174-032	Washer, 3/8" Flat	1
52	143-126	Hex Head Machine Screw #10-24UNC x 0.50" LG.	1

Figure 7-6 **Recovery Tank Lid Assembly**
D4456, Rev—



REF. NO.	PART NO.	DESCRIPTION	QTY
1	052-219	Adapter, 2″NPT x 2″ S Slip	2
2	052-404	Adapter, 3″ F Slip x 2″ F Slip	2
3	041-228	Cover, Recovery Tank-Painted	1
4	052-222	Elbow, 2″ Barb x 2″ FPT	2
5	049-030	Filter Bag	2
6	052-015	Gasket, 1-1/2″ Bulkhead Fitting	2
7	125-052	Tube, 2″x1.5″ Lg. Filter Bag Adapter Sleeve	2
8	078-039	Vacuum Inlet Stopper Assembly	1
9	143-158	Button Head Machine Screw #10-25UNC x .63″ Lg	1

Figure 7-7 **Instrument Panel Assembly**
D4149, Rev B



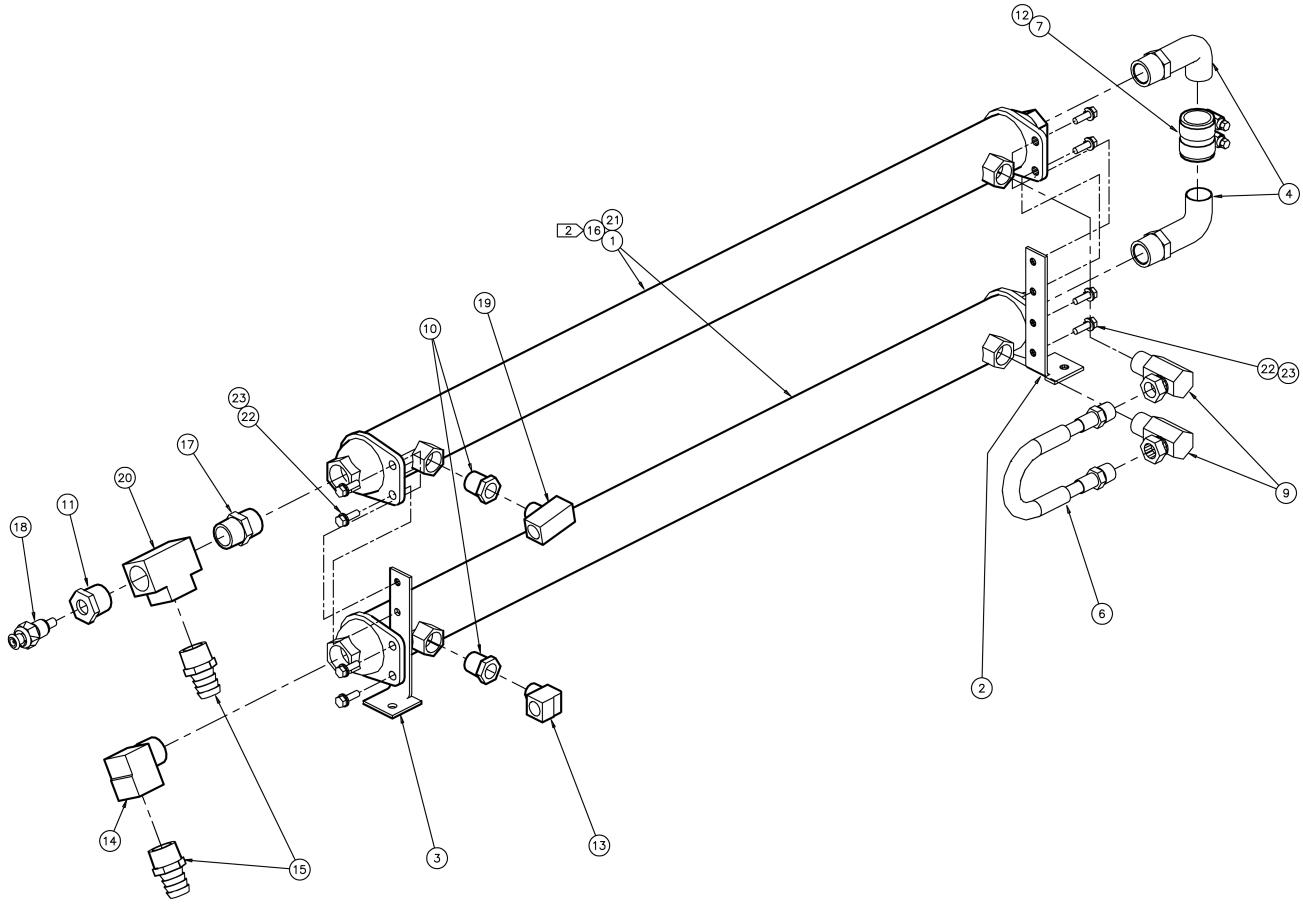
Instrument Panel Assembly Parts List

REF. NO.	PART NO.	DESCRIPTION	QTY
1	052-010	4FA-2UFS	1
2	————	————	—
3	052-019	6M-6UFS	5
4	052-060	3/8" NPT x 1/8" NPT Bushing	1
5	025-002	Choke 3" Cable	1
6	027-014	Garden Hose Cap	1
7	052-272	Gravity Feed Oil Blower Lubrication Port Cup	1
8	052-086	3/8" NPT Street Elbow	1
9	131-003	CDS Trim ¾" Gasket	4'
10	057-055	Garden Hose Gasket	1
11	074-003	HI PSI (0-1000) Gauge	1
12	060-002	Large Wiring Grommet	1
13	090-008	High Pressure Manifold	1
14	068-285	3/16" x 8.5" Lg Teflon Hose Assembly	1
15	052-096	No. F23 Insert	1
16	052-487	No. 24 Modified Insert	1
17	052-097	No. 24 Insert	2
18	052-104	No. 66 Insert	1
19	052-338	No. 1212 Insert	1
20	074-020	Chemical Flow Meter	1
21	052-071	¼" NPT Hex Nipple	2
22	052-281	¾" NPT x ¾" M Garden Hose Nipple	1
23	100-173	Instrument Panel	1
24	105-012	Machine Serial I.D. Plate	1
25	106-029	1" Hole Plug	1
26	052-050	440 Male Quick Connect	2
27	052-052	660 Male Quick Connect	1
28	135-052	Hi PSI Snubber Regulator	1
29	140-015	1 1/8" x ¼" LG Pop Rivet	2

Instrument Panel Assembly Parts List

REF. NO.	PART NO.	DESCRIPTION	QTY
30	149-039	Water Temperature Sender	1
31	052-023	3/8"NPT Male Street Tee	1
32	169-064	3/8"NPT Full Port Ball Valve	1
33	169-009	¾" FPT Swing Check Valve	1
34	169-101	By-Pass Valve	1
35	174-005	3/8" Flat Washer	1
36	174-040	9/16" Flat Washer	4
37	174-040	5/8" Flat Washer	4
38	174-050	1" Flat Washer	1
39	081-099	Label Set	1
40	105-020	HydraMaster Cast Name Plate	1
41	139-023	Push-on Retainer Ring	2

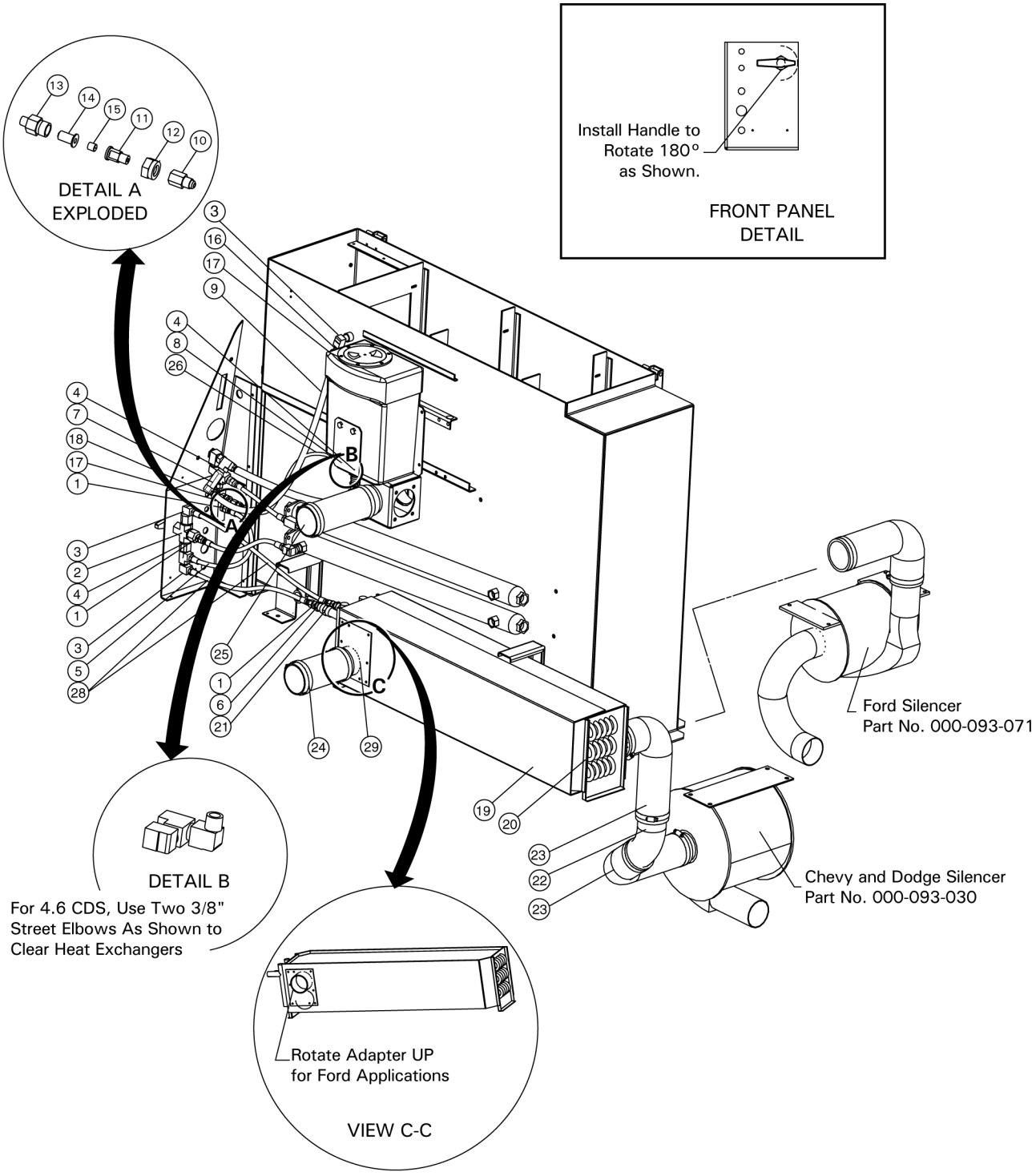
Figure 7-8 **Dual Heat Exchanger Assembly**
D3803, Rev B



Dual Heat Exchanger Assembly Parts List

ITEM	PART NO	DESCRIPTION	QTY
1	038-011	Heat Exchanger Core	2
2	015-171	Bracket, Dual Heat Exchanger Mounting-R/H	1
3	015-172	Bracket, Dual Heat Exchanger Mounting-I/H	1
4	052-477	Elbow, Heat Exchanger Connector	2
5	————	————	
6	068-071	Hose Assembly, 3/8" x 12" Lg	1
7	068-087	1" X 1.5" Lg Red Hose	1
8	————	————	
9	052-033	8MA-6UFS	2
10	052-064	1/2" NPT x 3/8" FPT Bushing	2
11	052-259	3/4" NPT x 3/8" FPT Bushing	1
12	033-020	No. 16 Hose Clamp	2
13	052-086	3/8" NPT Street Elbow	2
14	052-340	3/4" NPT Street Elbow	1
15	052-338	No. 1212 Insert	2
16	131-042	4.13" I.D. x .50" Wall x 33" Lg Insulation	1
17	052-330	3/4" NPT Hex Nipple	1
18	149-021	Hi Temp Limit 218° F Sensor	1
19	052-447	3/8" NPT Male Branch Tee	1
20	052-336	3/4"FPT x FPT x FPT Tee	1
21	162-006	15.5" Lg Tie Wrap	6
22	143-115	Lg Hex Head Machine Screw 1/4"—20UNC x 3/4"	8
23	174-019	1/4" Lock Washer	8

Figure 7-9 **Salsa X Assembly**
D4801 Rev C

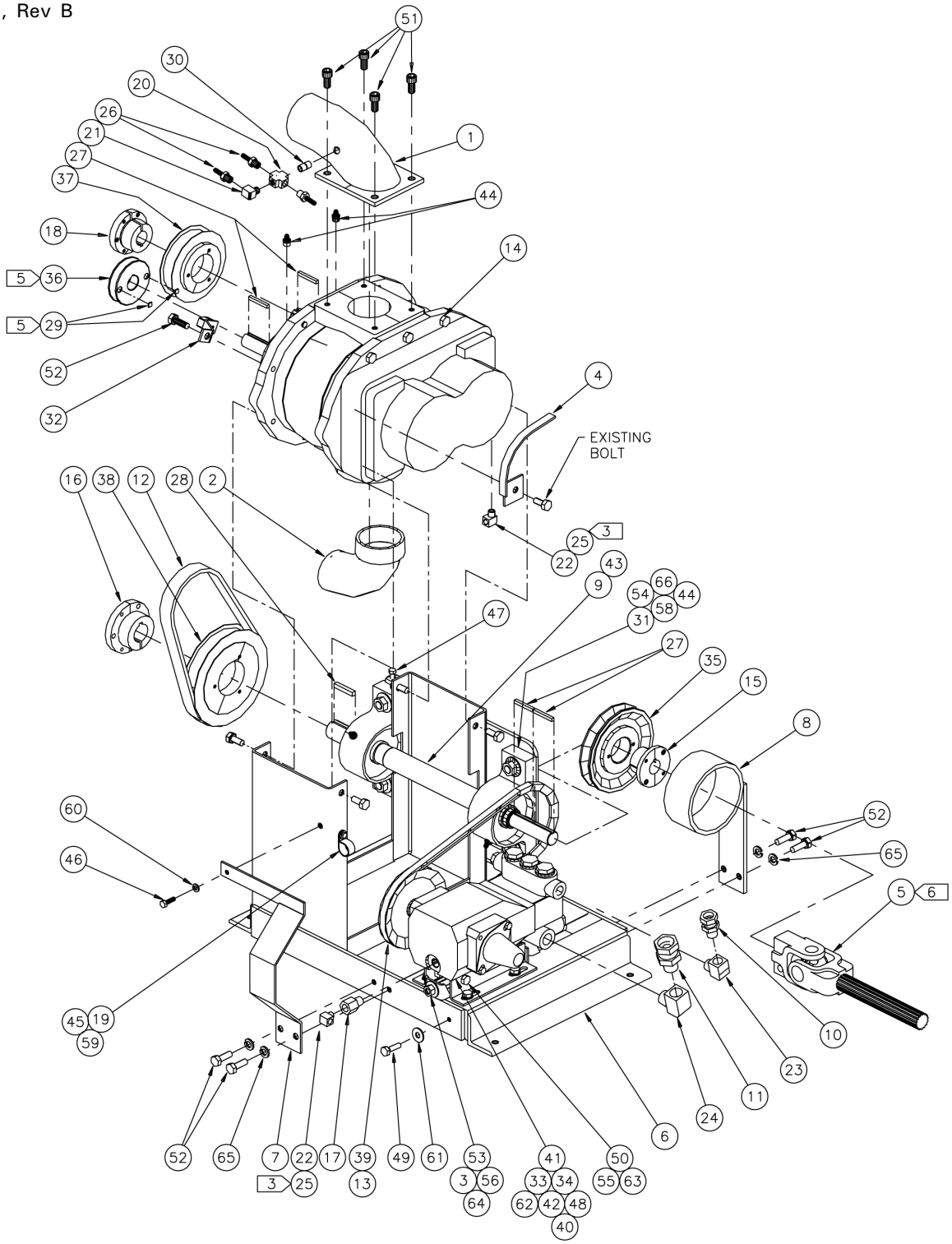


Salsa X Assembly Parts List

ITEM	PART NO	DESCRIPTION	QTY
1	052-528	Nipple, 3/8" M JIC x 3/8" NPT	4
2	169-172	Valve, 3-Way 3/8 NPT	1
3	052-086	Elbow, 3/8" NPT Street	3
4	052-023	Tee, 3/8" NPT Male Street	3
5	068-245	Hose, 3/8 x 12 Teflon	1
6	052-064	Bushing, ½" x 3/8" FPT	2
7	169-027	Valve, Thermal Relief	1
8	068-257	Hose, 3/16 Teflon x 24	1
9	068-017	Hose, 3/8 x 32"	1
10	052-586	Nipple, 1/8 FPT x ¼ SAE	1
11	052-585	Nipple, Tee Jet Modified	1
12	094-028	Nut, Brass Jet Assembly	1
13	052-153	Housing, Stabilizer Nozzle	1
14	049-052	Filter Cartridge, ¼"	1
15	180-007	Orifice, Salsa X	1
16	052-104	Insert #66	1
17	033-004	Clamp, Size 6	2
18	052-099	Insert #26	1
19	108-111	Protector, Insulation Blanket, Salsa X x 36"	1
20	038-052	Core Assembly, Salsa X	1
21	052-669	Coupler, ½" FPT	2
22	052-675	Elbow, 3" Steel Modified	1
23	052-674	Elbow, 3" Rubber Assembly	2
24	068-617	Hose, 3" Silicone x 7" Assembly	1
25	068-616	Hose, 3: Nitrile x 9" Assembly	1
26	052-061	Bushing, 3/8" NPT x ¼" FPT	1
27	052-172	Insert, ¼" NPT x 3/16" Hose	1
28	068-618	Hose, 3/8" x 19 Teflon	2
29	001-094	Adapter, Blower to Salsa X	1

Figure 7-10 **CDS 4.6 Pump and Blower Assembly**

D4431, Rev B



Pump and Blower Assembly Parts List

ITEM	PART NO	DESCRIPTION	QTY
1	001-041	Adapter, Blower Inlet	1
2	001-042	Adapter, Blower Outlet	1
3	015-173	Bracket, Cat Pump Tensioner Plate	1
4	015-174	Bracket, Hose Holding	1
5	————	Drive Shaft Assembly	1
6	055-037	Frame, Pump and Blower	1
7	108-061	Protector, Cat Pump Belt Guard	1
8	108-060	Protector, Cat Pump Head	1
9	150-040	Shaft, Drive Sprocket	1
10	052-019	6M-6UFS	1
11	052-038	8M-UFS	1
12	010-052	Belt, Polychain GT Blower Drive	1
13	010-012	Belt, Pump Drive Gates #9325	1
14	111-012	Blower, 4.2 Hydra Whisper	1
15	020-019	Bushing, #H x $^{7}/_{8}$"	1
16	020-036	Bushing, SDS 1-$^{1}/_{8}$"	1
17	052-062	Bushing, ¼" NPT x $^{3}/_{8}$" FPT	1
18	020-001	Bushing, $^{3}/_{8}$" Vac Pump Hub	1
19	033-023	Clamp, ¾" Hose	1
20	052-079	Cross, $^{3}/_{8}$" FPT	1
21	052-084	Elbow, $^{3}/_{8}$" NPT Street	1
22	052-085	Elbow, ¼" Street	2
23	052-086	Elbow, $^{3}/_{8}$" NPT Street	1
24	052-087	Elbow, ½" NPT Street	1
25	068-149	Hose Assembly, CDS Blower Oil Drain	2
26	052-293	Insert, #23	3
27	077-001	Key, #3 and #4 Vacuum Pump Drive	4
28	077-006	Key, Blower Drive x ¼"	1
29	————	Magnet, Tachometer Sensor	2
30	052-057	Nipple, $^{3}/_{8}$" NPT Close	1

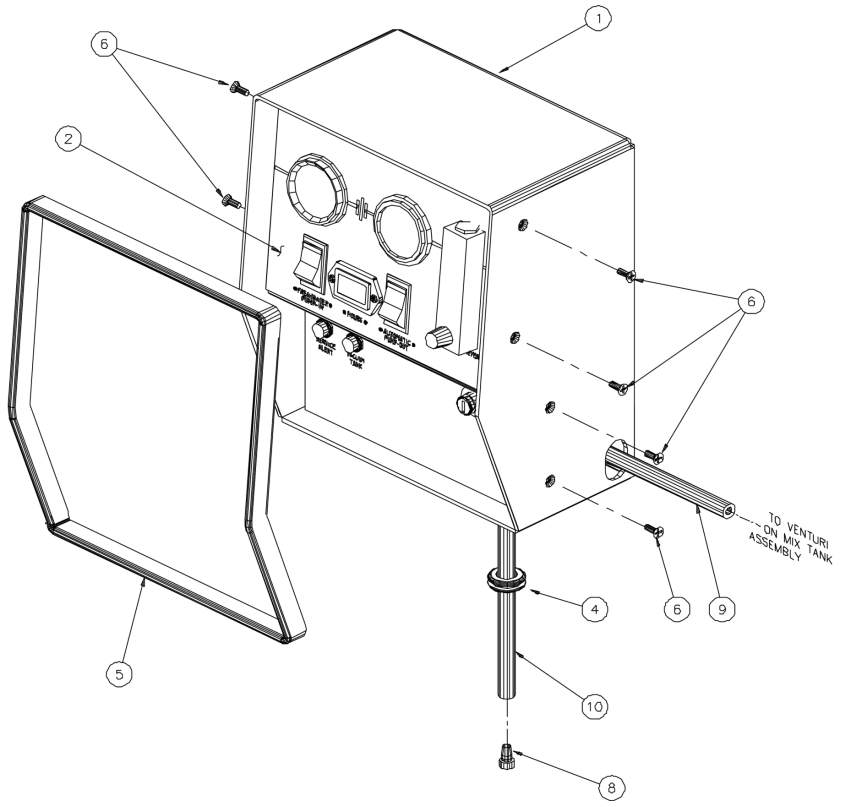
Pump and Blower Assembly Parts List

ITEM	PART NO	DESCRIPTION	QTY
31	088-020	Pillow Block Bearing, 1-3/16" Bore	2
32	————	Tachometer Sensor/Bracket Assembly	1
33	106-003	Plug, 3/8" NPT	1
34	106-004	Plug, ½" NPT	1
35	109-022	Pulley, #AK 54 H	1
36	109-009	Pulley, 2—¾" x 7/8" Pump Drive-Modified	1
37	109-055	Pulley, 40 Tooth Sprocket Poly Chain	1
38	109-056	Pulley, 56 Tooth Sprocket Poly Chain	1
39	109-042	Pulley, 5" Pump	1
40	108-055	Protector, 3CP Cat Pump Shaft	1
41	111-070	Pump, 4GPM Cat Hi Temp, Plunger	1
42	114-003	Pail, Angle, 3CP Cat Pump (Set)	1
43	139-021	Snap Ring, 1—¾" I.D. Drive Shaft	2
44	052-505	Zerk Grease Fitting, 1/8" NPT Straight	4
45	143-126	Hex Head Machine Screw, #10—20UNC x 0,50" Lg.	1
46	143-115	Hex Head Machine Screw, ¼"—20UNC x 0.74" Lg.	1
47	143-002	Hex Head Machine Screw, ¼"—20UNC x 1.00" Lg.	2
48	143-148	Hex Head Machine Screw, 5/16"—18UNC x 0.50" Lg.	4
49	143-013	Hex Head Machine Screw, 5/16"—18UNC x 1.00" Lg.	1
50	143-016	Hex Head Machine Screw, 5/16"—18UNC x 2.50" Lg.	2
51	143-094	Socket Head Machine Screw, 3/8"—16UNC x 0.75" Lg.	4
52	143-096	Hex Head Machine Screw, 3/8"—16UNC x 1.00" Lg.	5

Pump and Blower Assembly Parts List

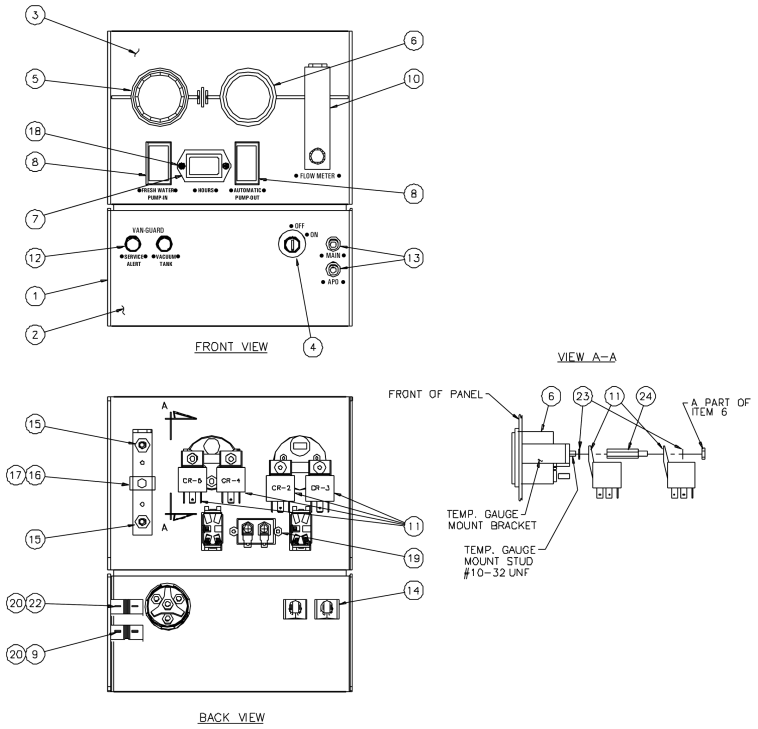
ITEM	PART NO	DESCRIPTION	QTY
53	143-260	Hex Head Machine Screw, $^{3}/_{8}$" — 16UNC x 8.00" Lg.	1
54	143-240	Hex Head Machine Screw, ½"—13UNC x 1.75" Lg. Grade 5	5
55	094-012	Nut, $^{5}/_{16}$"—18UNC Hex	2
56	094-015	Nut, $^{3}/_{8}$"—16UNC, Two-Way Locking	1
57	094-016	Nut, $^{3}/_{8}$"—16UNC Whiz	2
58	094-020	Nut, ½"—13UNC Whiz	4
59	174-001	Washer, #10 Flat	1
60	174-017	Washer, ¼" Lock	1
61	174-004	Washer, $^{5}/_{16}$" Flat	1
62	174-020	Washer, $^{5}/_{16}$" Cam Lock	4
63	174-018	Washer, $^{5}/_{16}$" Lock	2
64	174-032	Washer, $^{3}/_{8}$" Flat	1
65	174-057	Washer, $^{3}/_{8}$" Lock	4
66	174-007	Washer, ½" Flat	4

Figure 7-11 **Dash Box Assembly**
C2712, C3466, Rev B



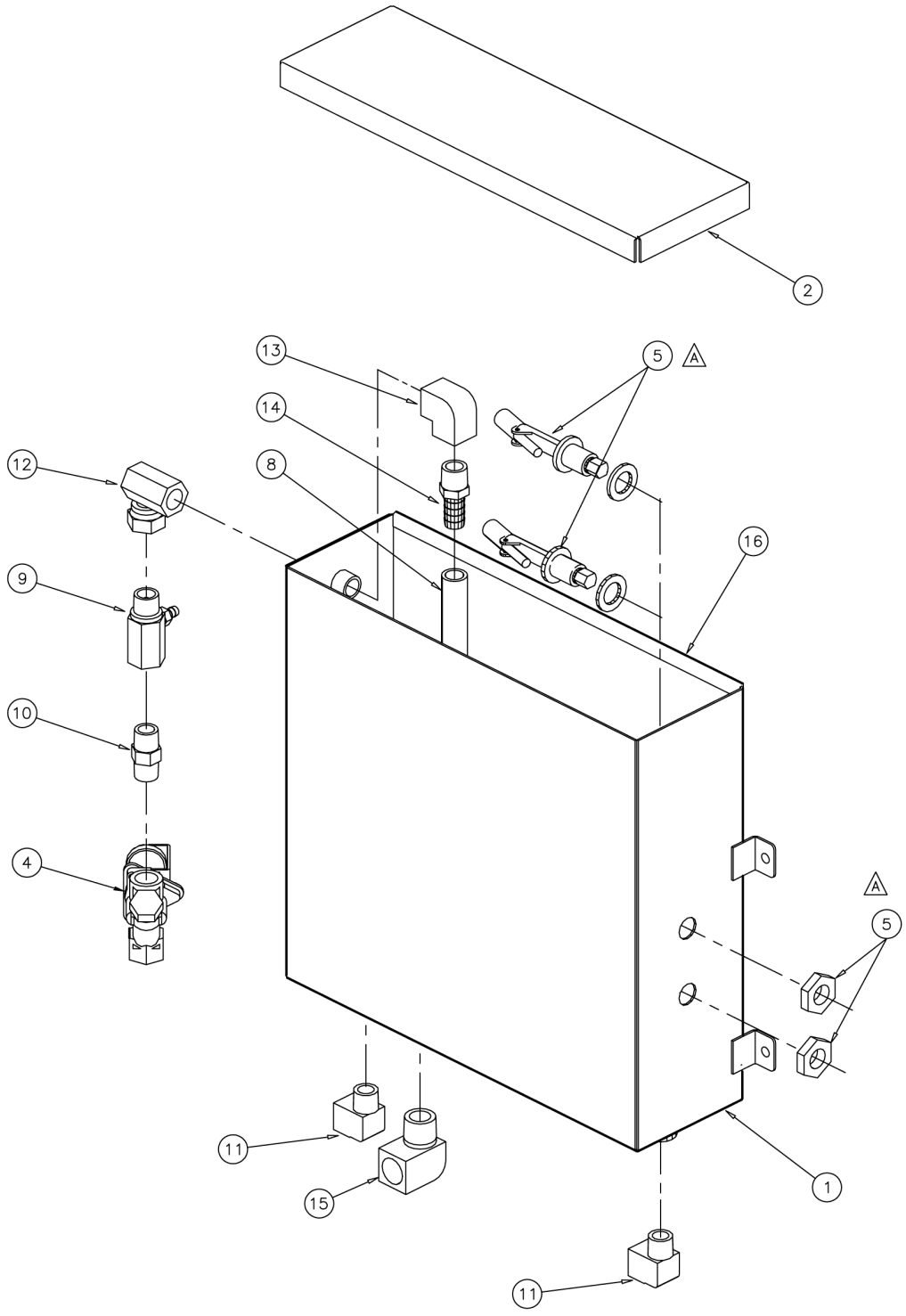
ITEM	PART NO	DESCRIPTION	QTY
1	013-006	Box, CDS Dash	1
2	Figure 7-11	Dash Panel Assembly	1
4	060-002	Grommet, Large Wiring	1
5	131-003	Gasket, CDS Trim	45″
6	143-114	Screw, 10—24 x 1/2″ FHM Phillips s/s	8
7	094-034	Nut, 10-24 s/s Nylock	8
8	169-062	Valve, 1/4″ Anti-Siphon	1
9	068-025	Hose, 1/4″ Clear	30″
10	068-025	Hose, 1/4″ Clear	30
Not Shown:			
	178-090	Wire Assembly, Vanguard High Temp. Switch	1

Figure 7-12 **Dash Panel Assembly**
C3465, Rev B



ITEM	PART NO	DESCRIPTION	QTY
1	018-004	25 AMP Circuit Breaker	1
2	100-071	Painted Dash Panel	1
3	074-019	Engine Tachometer Gauge	1
4	074-018	Rectangular Hour Meter Gauge	1
5	074-016	Temperature Gauge	1
6	074-006	Vacuum Gauge	1
7	084-015	12V, 2W Round Red Indicator Lamp	5
8	084-004	Replacement Gauge Lamp	3
9	084-009	Socket-Dashboard Lamp	3
10	157-040	20 AMP Rocker Switch	3
11	157-008	Ignition Switch	1
12	033-049	Indicator Light Clamp	5
13	052-084	$^1/_8$" NPT Street Elbow	1
14	052-096	No. F23 Insert	1
15	174-052	$^1/_8$" Flat Washer	1

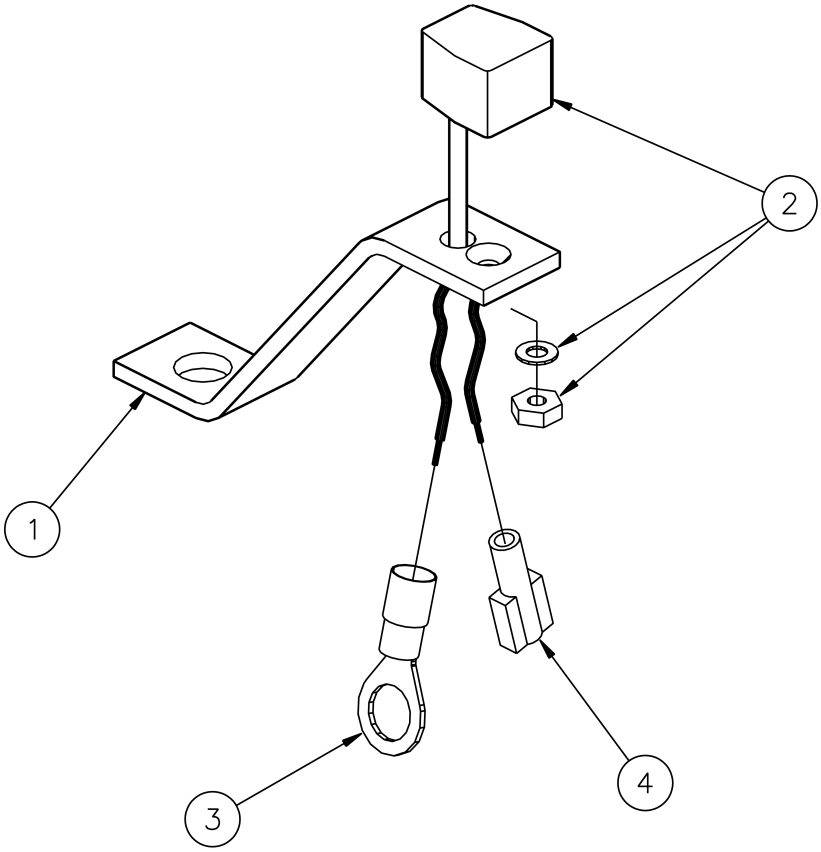
Figure 7-13 **Mix Tank Assembly**
D4457, Rev A



Mix Tank Assembly Parts List

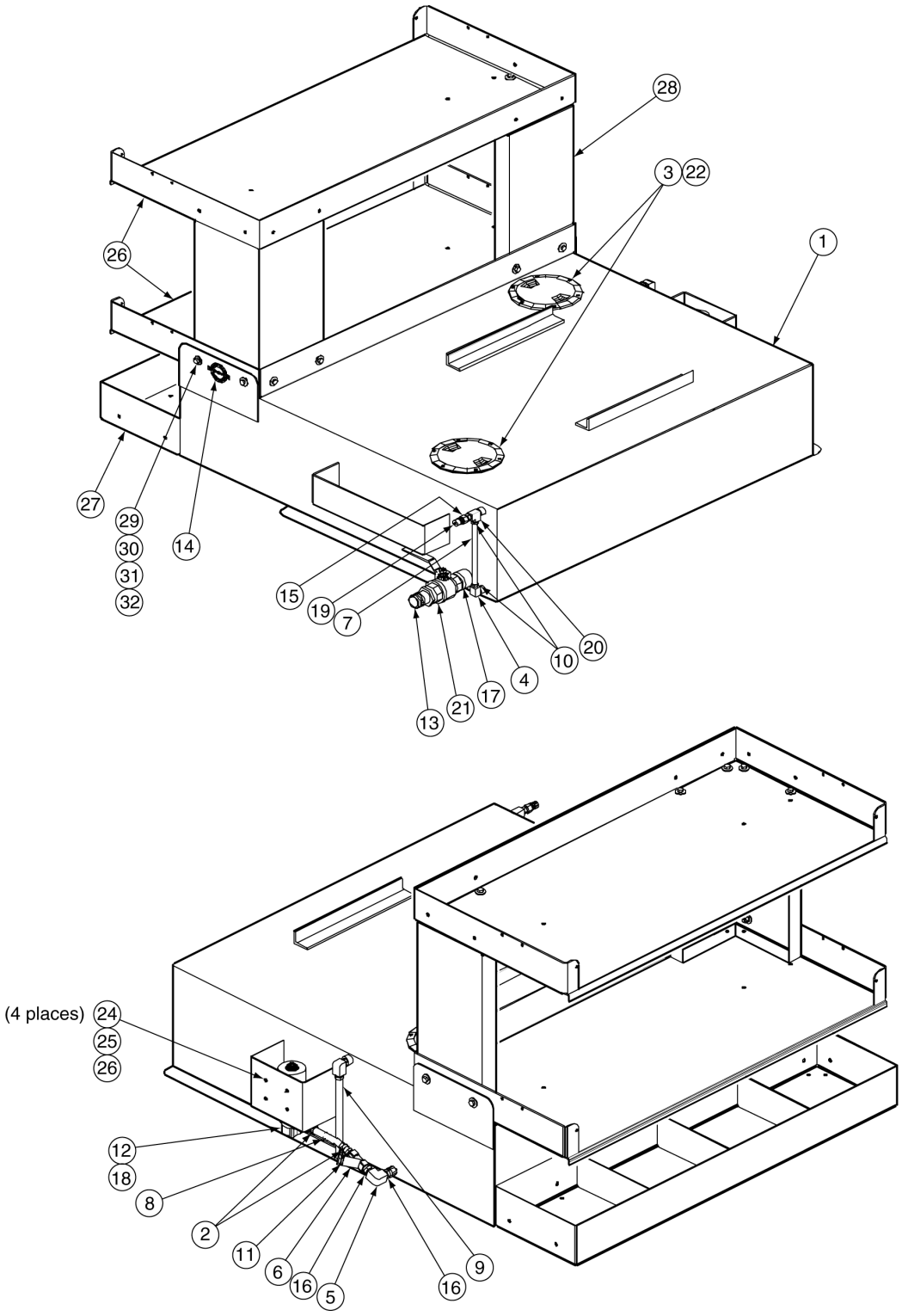
ITEM	PART NO	DESCRIPTION	QTY
1	159-032	Tank, CDS Chemical Mix	1
2	041-038	Cover, CDS Chemical Mix Tank	1
3	———	Part Deleted	-
4	169-120	Valve, Chemical System Solenoid - 12 Volt	1
5	157-012	Switch, Side Mount w/ Bulkhead Fitting	2
6	———	Part Deleted	-
7	———	Part Deleted	-
8	068-327	Hose, $^1/_2$" x 69.5 " Lg. Clear Braid	1
9	181-008	Venturi, Low Pressure Injector-Modified	1
10	052-074	Nipple, $^3/_8$" NPT Hex	1
11	052-086	Elbow, $^3/_8$" NPT Street	2
12	052-026	6FA-6UFS	1
13	052-142	Elbow, $^3/_8$ " NPT Female	1
14	052-105	Insert, #68	1
15	052-087	Elbow, $^1/_2$" NPT Street	1
16	131-027	Trimlok, 12.75" Lg. CrossFire Brow	1
17	———	Part Deleted	-
18	———	Part Deleted	-
19	———	Part Deleted	-
20	———	Part Deleted	-

Figure 7-14 **Tachometer Sensor and Bracket Assembly**
B3237, Rev—



ITEM	PART NO	DESCRIPTION	QTY
1	015-060	Bracket, CDS Tachometer Magnet Extension	1
2	149-010	Sensor, CDS Magnet Tachometer (only parts shown are used here)	1
3	037-017	Terminal, $^{3}/_{8}$" Stud, 10GA Wire, Vinyl Insulated	1
4	037-012	Terminal, Fully Insulated Female QC	1

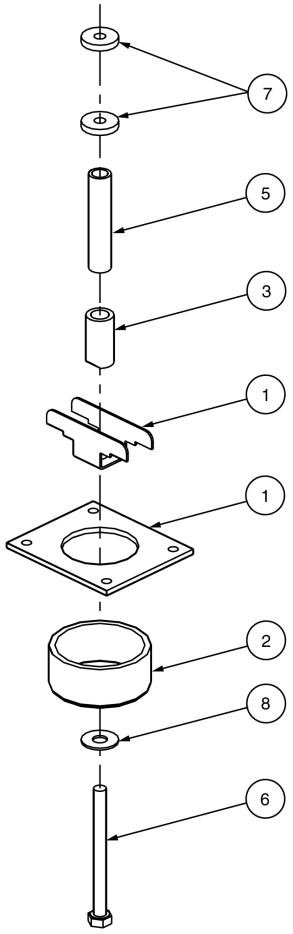
Figure 7-15 **Horizontal Pump in Tank Assembly**
D3700, Rev A



Horizontal Pump in Tank Assembly Parts List

ITEM	PART NO	DESCRIPTION	QTY
1	159-005	Tank, 120 Gallon Horizontal	1
2	033-004	Clamp, #6 Mini Hose	2
3	041-005	Cover, 6" Pump-In Tank	2
4	052-086	Elbow, ⅜" Brass Street	1
5	052-143	Elbow, ½" F x F Brass	1
6	049-006	Filter, ½" Inline Y - Cat Pump	1
7	068-025	Hose, ¼" Clear	9⅝"
8	068-327	Hose, ½" Clear Braid	6½"
9	068-165	Hose, Pump-In Overflow	1
10	052-103	Insert, #64	2
11	052-107	Insert, #88	1
12	052-313	Insert, ½" Plastic Swivel Straight	2
13	052-226	Insert, 1½" NPT x 1½" Barb	1
14	081-173	Label, "HydraMaster" Accessory	1
15	052-074	Nipple, ⅜" Brass Hex	1
16	052-076	Nipple, ½" Brass Hex	2
17	052-182	Nipple, 1½" Close - Galv. Steel	1
18	111-010	Pump, 35 PSI Elect. Pump-In with M Threads	1
19	052-052	Quick Connect, 660 Male with Viton	1
20	052-023	Tee, 5/16" Male Street - Brass	1
21	169-022	Valve, 1½" Full Port Brass Dump	1
22	143-114	Screw, 10-24 x ½" FHM Phillips s/s	12
23	143-113	Screw, 10-24 x 1½" FHM s/s	4
24	094-034	Nut, 10-24 s/s Nylock	4
25	174-001	Washer, #10 s/s Flat	4
26	166-012	Tray, Air Mover - Removable	2
27	166-014	Tray, 4-Bin Storage - Removable	1
28	083-002	Leg, Tray Support	2
29	143-019	Screw, ⅜"- 16 x 1¼" HHC Grade 5 Zinc	16
30	094-014	Nut, ⅜" - 16 Hex	16
31	174-005	Washer, ⅜" Flat	32
32	174-021	Washer, Lock	16

Figure 7-16 **Vacuum Relief Valve Assembly**
C4237, Rev—



ITEM	PART NO	DESCRIPTION	QTY
1	015-182	Bracket, Vacuum Relief	1
2	027-031	Cap, Vacuum Relief	1
3	125-111	Pipe, Vacuum Relief Spring Guide	1
4	105-068	Plate, Vacuum Relief Valve Mounting	1
5	155-026	Spring, Vacuum Relief	1
6	143-198	Hex Head Machine Screw, $^3/_8$"-16UNC x 4" Lg Full Thread	1
7	094-077	Nut, $^3/_8$"-16UNC x 1.00 O.D. Knurled	2
8	174-032	Washer, $^3/_8$" Flat	1

CDS Belts
Item No. 20

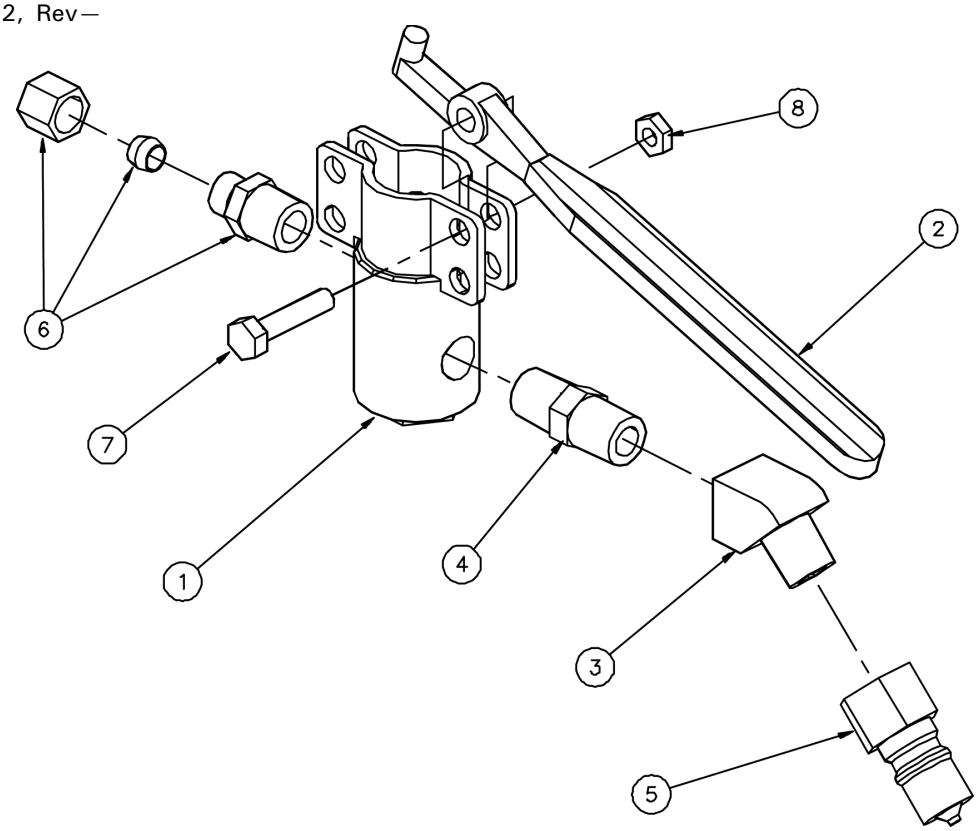
PART NO.	DESCRIPTION
	All Vans
010-051	Belt, Cat Pump Drive
010-015	Belt, CDS 4.8 APO Drive
010-052	Belt, Polychain GT Blower Drive
	Chevrolets
010-001	Belt, '85 Chev 8 Drive
010-002	Belt, '85-86 Chev 8 Water Pump
010-032	Belt, '86 Chev 8 Drive
010-034	Belt, '87-91 Chev 8 Drive
010-010	Belt, '92+ Chev Drive
010-039	Belt, '97+ Chev 8 with AC
010-046	Belt, '97+ Chev 8 Main Drive
	Ford 6
010-004	Belt, '86 Ford 6
010-028	Belt, '86 Ford 6 Alternator Drive
010-035	Belt, '87-93 Ford 6 Drive
010-040	Belt, '87-93 Ford 6 Drive (with Factory Air)
010-036	Belt, All Ford 6 AC Drive
	Ford 8
010-031	Belt, '86 Ford 8 Drive
010-030	Belt, '87 Ford 8 Drive
	Ford 302
010-029	Belt, '87-89 Ford 302 Drive
	Ford 351
010-008	Belt, '90 Ford 351 Drive
010-029	Belt, '91-93 Ford 351 Drive
	Ford Diesel
010-006	Belt, '91 Ford Diesel Drive
010-037	Belt, '92-93 Ford Diesel Drive

CDS Belts
Item No. 20

PART NO.	DESCRIPTION
	Astro
010-004	Belt, '85 Astro Drive
010-026	Belt, '85 Astro Alternator Drive
010-027	Belt, '85 Astro Drive
010-032	Belt, '86 Astro Drive
010-033	Belt, '87 Astro Drive
010-034	Belt, '87-91 Astro Drive
	Dodge
010-038	Belt, '91-93 Dodge 360 Drive with V-Belt (2 per mach.)
010-047	Belt, '92+ Dodges Poly-V

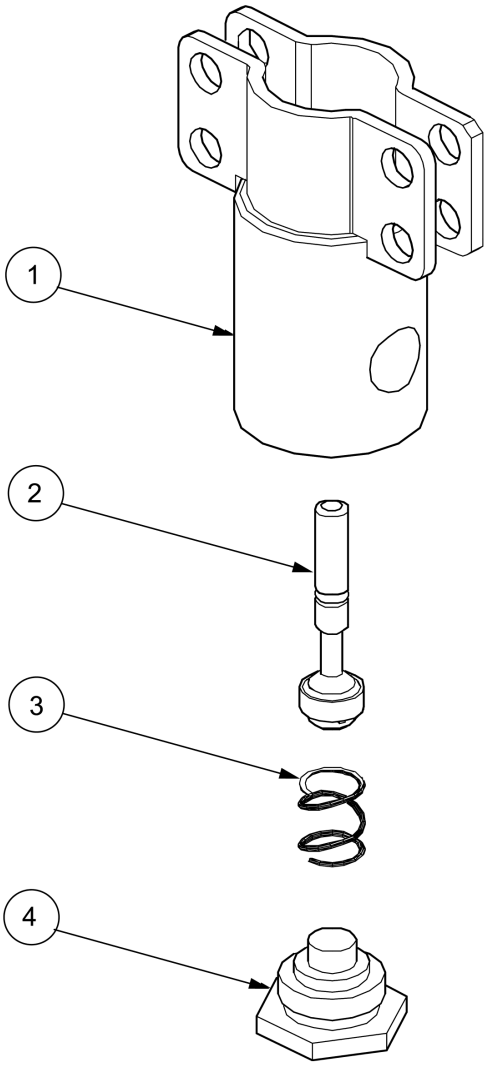
Cleaning Wand Assemblies and Parts Lists

Figure 7-17 **Valve Assembly**
C3652, Rev—



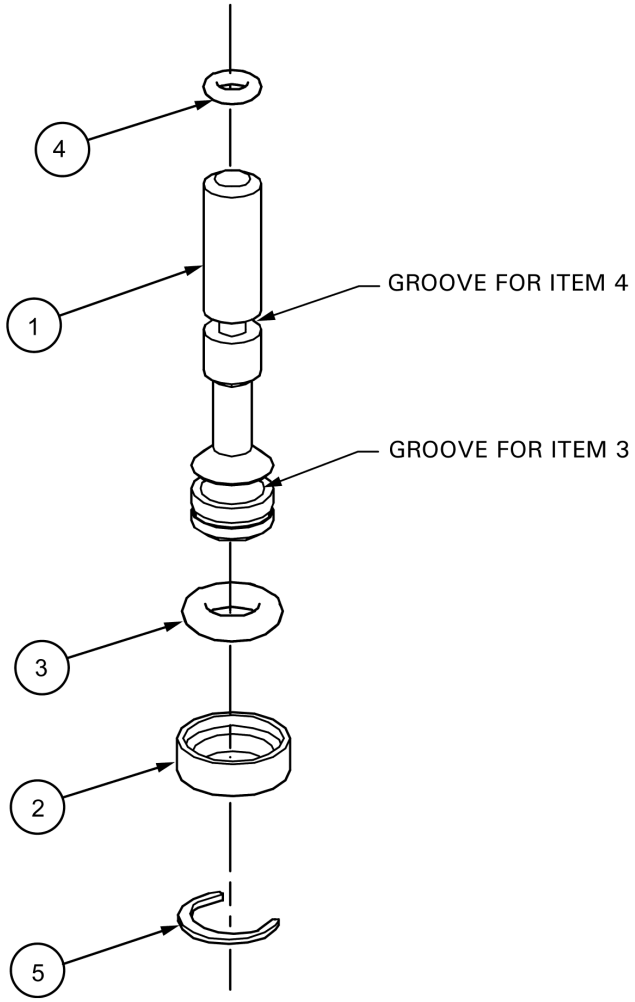
ITEM	PART NO.	DESCRIPTION	QTY
1	169-058	Valve, s/s HM Solution	1
2	167-013	Trigger, Hydra Hoe Valve - Brass	1
3	052-082	Elbow, ¼" Brass 45 Street	1
4	052-095	Nipple, ¼" s/s Hex	1
5	052-050	Quick Connect, 440 M with Viton	1
6	052-152	Compression, ¼" Male Hydra Hoe Fitting	1
7	143-002	Screw, ¼—20 x 1" HHC s/s	1
8	094-009	Nut, ¼—20 s/s Nylock	1

Figure 7-18 **Solution Valve Assembly**
B1234, Rev A



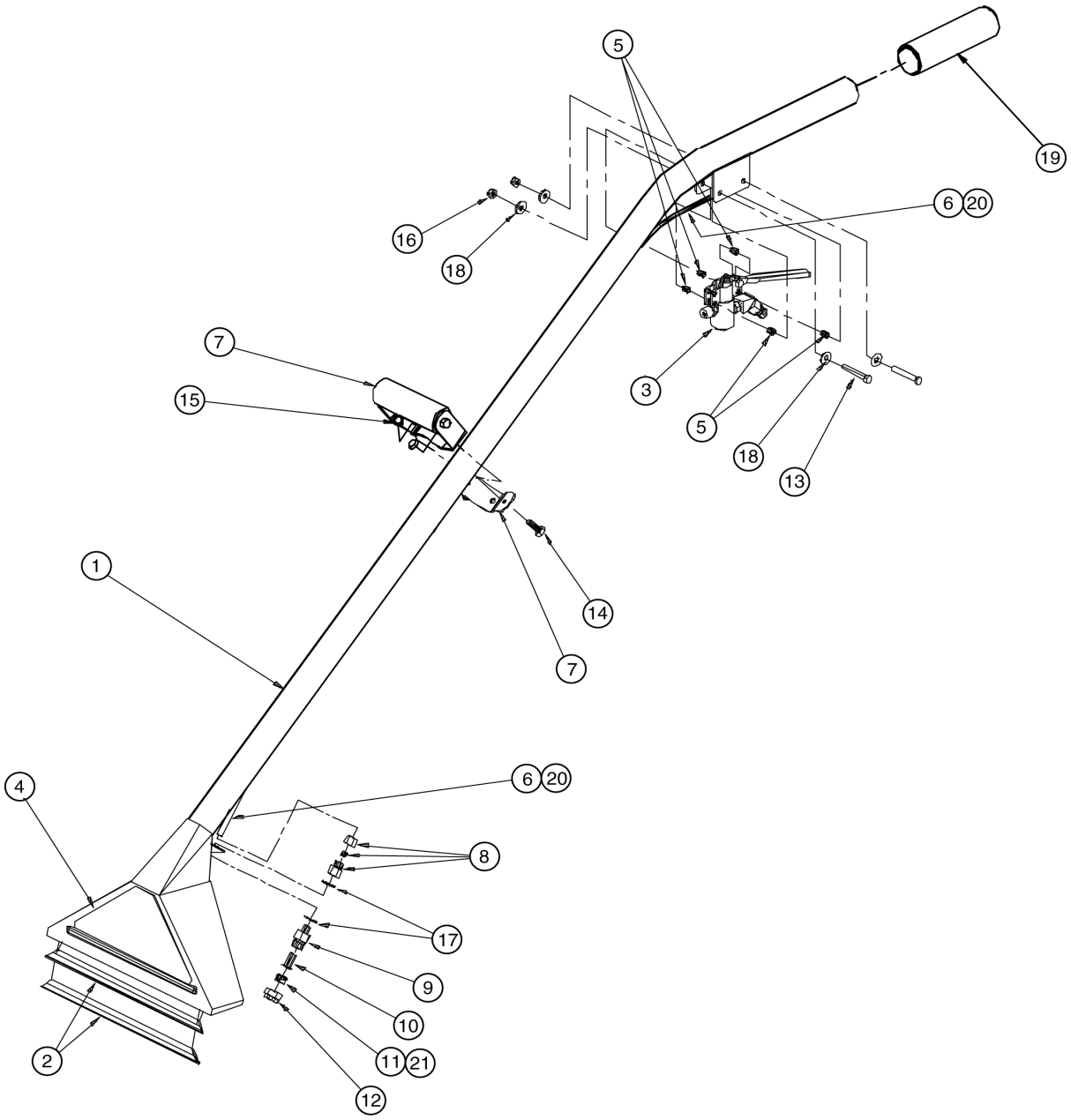
ITEM	PART NO.	DESCRIPTION	QTY
1	600-012-001	Valve Body Sub Assembly	1
2	600-012-002	Valve Stem Sub Assembly	1
3	155-003	Spring, HM Solution Valve	1
4	027-001	Cap, Brass	1

Figure 7-19 **Valve Stem Assembly**
B3743, Rev —



ITEM	PART NO.	DESCRIPTION	QTY
1	107-129	Plunger, HM Solution Valve	1
2	139-003	Ring Keeper, HM Solution Valve	1
3	097-010	O-Ring, HM Valve Plunger - Large	1
4	097-022	O-Ring, Solution Valve Flow Meter - Small	1
5	139-004	Ring, Solution Valve Stem Snap	1

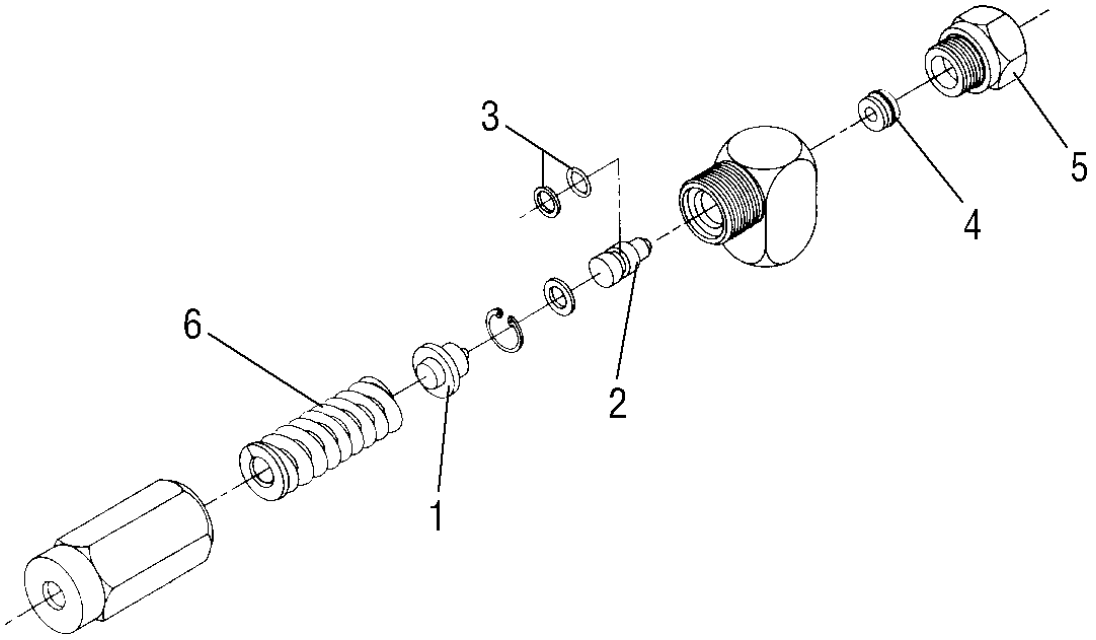
Figure 7-20 **Hydra Hoe Wand Assembly**
C2660, Rev —



Hydra Hoe Wand Assembly Parts List

ITEM	PART NO.	DESCRIPTION	QTY
1	173-001	Wand Kit, 12" s/s Truckmount	1
2	082-004	Lips, 12" s/s HM Wand (2 Pieces)	1
3	169-055	Valve Assembly, s/s Hydra Hoe w/ Trigger	1
4	081-015	Label, "HydraMaster" Wand	1
5	154-001	Spacer, ¼" x 5/16" s/s Solution Valve	5
6	168-001	Tube, Hydra Hoe Solution - ¼" OD s/s	1
7	061-006	Handle, Pressure Guide	1
8	052-151	Compression, ⅛" Female Hydra Hoe Fitting	1
9	052-153	Housing, Brass Stabilizer Wand Nozzle Fitting	1
10	186-001	Stabilizer - Jet Assembly Group	1
11	076-005	Jet, No.6 s/s Hydra Hoe	1
12	094-028	Nut, Brass Jet Assembly Group	1
13	143-005	Screw, ¼—20 x 1¾" HHC	2
14	143-012	Screw, 5/16—18 x ¾" HHC s/s	2
15	094-035	Nut, 5/16—18 s/s Nylock Half	2
16	094-009	Nut, ¼—20 s/s Nylock	2
17	174-032	Washer, ⅜" s/s Flat	2
18	174-003	Washer, ¼" s/s Flat	4
19	061-007	Handle Grip Hydra Hoe	1
20	063-003	Harness Wrap, High Temp. ¼" - Gray	4
21	076-045	Jet, 8004E s/s T	1

Figure 7-21 **Bypass Valve Assembly**



169-101 Valve, Bypass Truckmount

ITEM	PART NO	DESCRIPTION	QTY
1	105-101	Thrust Plate, Bypass Valve	1
2	105-102	Piston Plate, Bypass Valve	1
3	097-028	Seal Set for Bypass Valve	1
4	148-044	Seat and O-Ring, Bypass Valve	1
5	097-005	O-Ring, Bypass Valve Fitting	1
6	155-019	Spring, High PSI Bypass	1
Not Shown:			
	078-102	Kit, Bypass Repair (Complete, Incl. 078-101)	1
	078-101	Kit, Seal and Spring High PSI Bypass (Includes Items 3 and 6)	1

Vacuum System

CDS 4.6
Section 8-1

The vacuum blower in this machine is a positive displacement lobe type. The performance and life of this unit is greatly dependent on the care and proper maintenance it receives.

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

To prevent this, a stainless steel filter screen has been placed at the vacuum blower intake inside the vacuum recovery tank. This stainless steel screen is drop-in style and should be removed for cleaning daily.

♦ CAUTION ♦

When machine is being run for test purposes and the vacuum inlet on top of the machine is open, caution should be used.

To protect the vacuum blower from overloading and damaging itself, there is a vacuum relief system installed on the vac tank. When the vacuum tank inlet is completely sealed off, a maximum of 12 HG will be attained. At the end of each day, an oil based lubricant should be sprayed into the blower lubrication port before shutting down the machine. If you fail to lubricate the vacuum blower daily, rust deposits and moisture will 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 vacuum tank foam free. HydraMaster and SafeClean chemicals are formulated with built in anti-foaming agents. When cleaning surfaces with excessive foaming residue use HydraMaster Powder Defoamer as directed.

Read the vacuum blower manual carefully for proper oil change and grease application. The maintenance log may differ slightly from the manual, but the truck-mounted carpet cleaning machine application is very demanding of the vacuum blower and therefore it should be maintained more regularly.

♦ CAUTION ♦

The vacuum tank is protected from overflowing by a vacuum tank float kill switch. The switch is not activated by foam, only by liquid.

VACUUM 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 vacuum tank. The use of this screen, if emptied at the end of each job, will eliminate the build-up of much of the debris in the tank.

BLOWER LUBRICATION

At the gear end the timing gear teeth are lubricated by being partially submerged in oil. The gear teeth serve as oil slingers for gear end bearings. At the drive end the bearings are grease lubricated.

FILLING PROCEDURE

Remove square head vented oil fill plug on gear end. Remove oil level plug located in the head plate. Fill gear case until oil drips out of the oil level hole. Use lubricants as listed below.

Add fresh oil as required to maintain proper level. The oil should be drained, flushed and replaced every 300 hours. The oil drain plug is under the head plate, on the end of the oil drain hose.

Bearings on drive end of blower require grease lubrication every 300 hours of operation. Bearings which require grease lubrication will have a grease fitting at each bearing. When regreasing, the old grease will be forced out of the vents during operation. To prevent damage to seals, these vents must be kept open at all times. Placing a paper towel under these vents prior to pumping grease will help reduce the grease and dirt build-up on the machine.

INSTRUCTIONS FOR OIL LUBRICATED GEARS AND BEARINGS

*Ambient Temperature**	*Oil Grade USA*	*Oil Viscosity, Centistokes at 40E*
below 32° F (below 0° C)	SAE 20	100
32° to 100° F (0° to 38° C)	SAE 40	200
over 100° F (38° C)	SAE 50	250

*refers to ambient air temperature at the cleaning tool

In applications with extreme variations in ambient temperature a 20W - 50W multiple viscosity oil is recommended.

GREASE LUBRICATED BEARINGS

Blower Discharge Temperature	*Grease Type*
-40°to 275° F (-40° to 120° C)	No. 2 Bearing Grease

Blower Troubleshooting

No.	Problem/Possible Cause	Solution
1.0	**There is no vacuum or a loss of vacuum**	
1.1	The *stainless steel filter* is clogged.	Clean or replace the filter.
1.2	The *intake screen* is clogged	Clean or replace the intake screen.
1.3	The *vacuum tank dump valve* is "open" or defective.	If water drips from the valve when the machine is not running, the valve will cause a vacuum loss when the machine is running. Replace it if it is defective.
1.4	The *hose* on the live reels is collecting water.	Unroll the entire length of the hose each time you use it.
1.5	The *hose* is plugged.	Remove the obstruction by reversing the vacuum hose.
1.6	There is a restriction in the *cleaning tool.*	Remove the obstruction.
1.7	The *vacuum tank seal* is defective.	Replace the seal.
1.8	The *hose* from the blower to the recovery tank is kinked or has collapsed.	Replace or reshape the hose. **NOTE:** A special reinforced hose is required for replacement.
1.9	There is a hole in the *recovery tank*.	Inspect the tank for leaks using smoke and weld the tank if it is required.

No.	Problem/Possible Cause	Solution
1.10	There is a hole in the *vacuum hose*.	Repair or replace the hose.
1.11	The *vacuum release* is loose.	Readjust the vacuum release.
1.12	The *engine speed* is too low.	Adjust the speed.
1.13	The vacuum blower's *end plates* or lobes are worn.	Replace the worn components. **NOTE:** This must be accomplished by a qualified technician.
1.14	There are *vacuum leaks* around the top collector box.	A vacuum leak can usually be detected by spraying a mist of WD40 or blowing smoke towards the leak. The mist or smoke will be sucked into the leak. When you find the leak, repair it.

No.	Problem/Possible Cause	Solution
2.0	**The blower is noisy.**	
2.1	There is an *exhaust leak* between the blower and the silencer.	Inspect the fittings to determine where the air leak is. Repair as necessary.
2.2	The blower is out of oil or the gears may be bad. **NOTE:** Permanent damage may result from a lack of lubrication.	Add oil. If the noise continues, replace the gears or blower. **NOTE:** Replacement of the gears must be accomplished by a qualified technician.
2.3	The *silencer* is bad.	Inspect it for an external hole. Repair or replace the silencer.
2.4	The *lobes* are hitting.	Replace the blower.
2.5	The *engine* is running at the wrong speed. This is noticeable because the blower noise increases with speed.	Adjust the engine to run at the speed.
2.6	The *bearings* are worn.	Remove and replace the bearings as required. **NOTE:** This process must be accomplished by a qualified technician.

No.	Problem/Possible Cause	Solution
3.0	**The blower will not turn.**	
3.1	The *lobes* are locked up because of rust, burnt chemical foam, or a sugar-like substance has been vacuumed up from the carpet.	a. Most *burnt foam* and *rust* can be removed by soaking the lobes with liquid wrench. After soaking the lobes, with the machine running, pour a half gallon of hot water into the top of the blower. Then spray WD40 or Pennz Lube into the top of the blower to displace the water. b. Any *sugar-like substances* can be removed by soaking the lobes with hot water.
3.2	There is debris in the *blower*.	Remove the debris. A stainless steel filter is provided at the vacuum inlet in the vacuum tank to prevent this problem.
3.3	The blower has broken *gears* or shattered *lobes*.	Rebuild or replace the blower. **NOTE:** Rebuilding the blower must be accomplished by a qualified technician.

No.	Problem/Possible Cause	Solution
4.0	**The shaft turns, but the lobes do not.**	
4.1	The *shaft* is broken inside the blower.	Replace the blower.

Electrical System

CDS 4.6
Section 9-1

The CDS 4.6 electrical system has been specifically designed with the technician in mind. Often the most difficult problem to trace is an electrical failure.

The entire electrical system operates on 12 volts DC which is provided by a battery. Battery levels are sustained by a belt driven alternator on the front of the engine.

VANGUARD SYSTEM

This unit is equipped with a Vanguard System. The Vanguard System monitors coolant temperature with a temperature switch.

The *temperature switch* is a normally open switch. The contacts in the switch, if you were to check them 'off the shelf,' would be open. When the switch reaches its preset limit it will close the contacts and allow the wire connected to it (green and white) to be grounded. In other words a failure (high temperature situation) would be sensed by the system, resulting in the clutch drive being deactivated. The drive remains de-activated until power is cycled ON/OFF via the key switch.

♦ CAUTION ♦

It is very important to tie up any loose wires or hoses near the drive shaft area. Tie wraps are sufficient for wires and small hoses.

Tie wraps are sufficient for wires and smalll hoses. When securing large hoses or wiring harnesses in the area of the drive shaft, a hose clamp with a clear vinyl hose inserted onto the clamp should be used to tie down these

components. For example, on Dodge installations, if the fuel injector wires are not properly secured the wires could rub against the CDS drive shaft causing a short in the electrical system of the van.

Figure 9-1 **Wiring Schematic**
D2800 Rev H

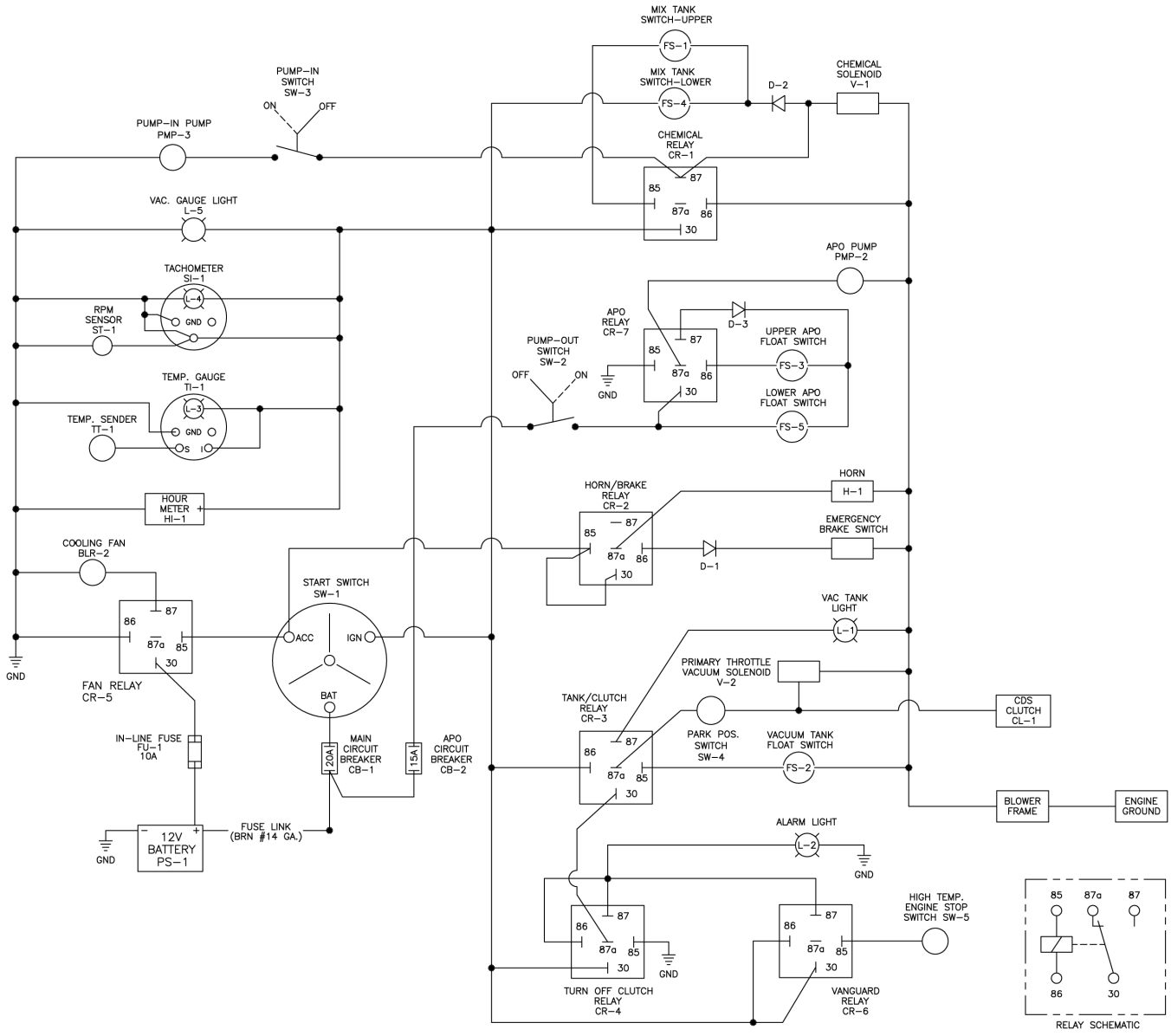


Figure 9-2 **Wiring Diagram**

D2953 Sht 1, Rev H

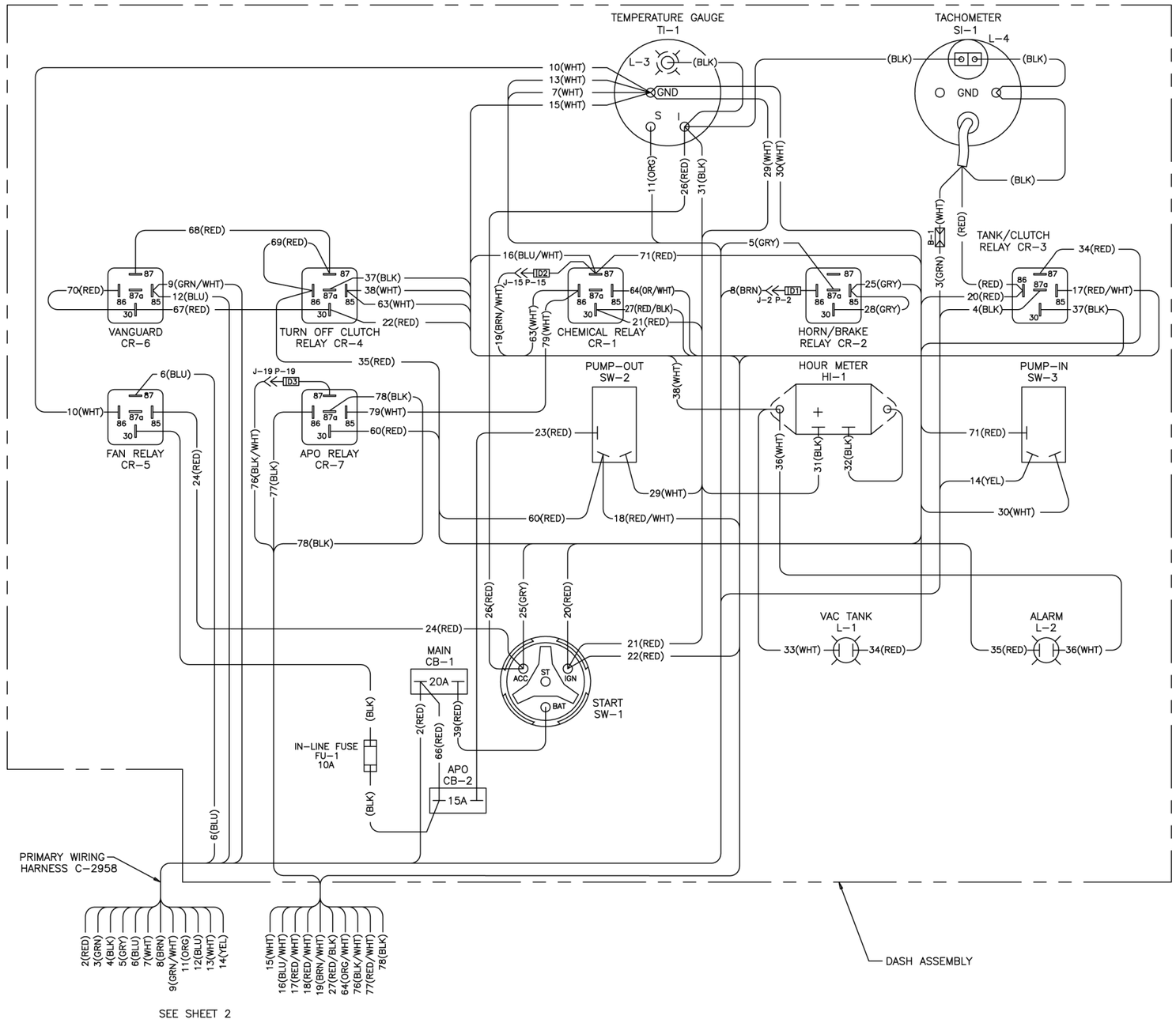
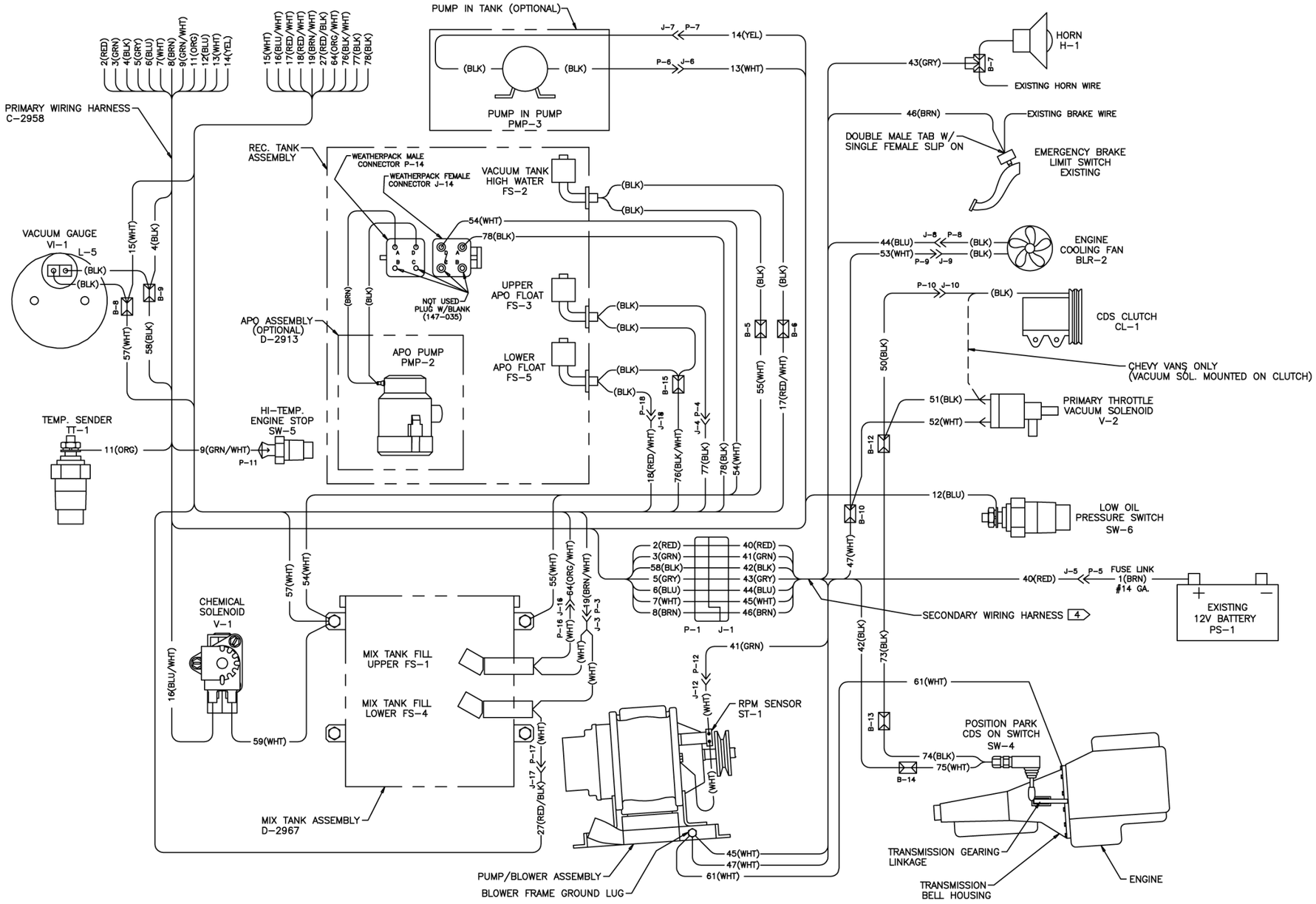


Figure 9-3 **Wiring Diagram**
D2953 Sht 2, Rev H



Electrical Troubleshooting

No.	Problem/Possible Cause	Solution
1.0	**The battery voltage is low.**	
1.1	Defective battery.	Remove and replace.
1.2	Corroded battery terminals.	Clean terminals and battery posts.
1.3	Low battery fluid.	Add water to appropriate level.
1.4	Loose wiring within electrical system.	Examine all terminal connections and verify that they are secure.
1.5	Electrical short in the wiring system.	Examine electrical systems for bare wire.
1.6	Poor ground connection.	Examine terminal and remove corrosion if necessary

No.	Problem/Possible Cause	Solution
2.0	**The hour meter is inoperative**	
2.1	Time is not advancing correctly.	a. Verify 12 volts DC is available at the hour meter with the ignition switch turned on. This can be accomplished with a volt meter or a test lamp. b. Remove and replace hour meter if 12 volts is available. c. A nylon gear within the clock may have been jammed due to a sudden jolt of the machine or truck. You may try simply tapping on the meter to try to free the nylon gear.

Machine Maintenance

CDS 4.6
Section 10-1

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 below. All recommended maintenance must be performed by competent service personnel.

This chapter is broken into six sections: Operational Maintenance, Appearance Maintenance, Long Term Maintenance, Drive Shaft Maintenance, Troubleshooting, and Maintenance Log.

The *Operational Maintenance* section contains maintenance items that are performed to ensure that your machine continues to function properly.

The *Appearance Maintenance* section contains recommendations of things that can be done to maintain the overall appearance of the equipment.

The *Long Term Maintenance* section contains recommendations for the replacement of critical components at specific intervals to ensure the maximum service life of this equipment.

The *Drive Shaft Maintenance* section contains recommendations for the proper service intervals of the CDS drive shaft.

The *Troubleshooting* section will aid you, or your mechanic, to quickly evaluate a problem with the equipment.

The *Maintenance Log* is designed to aid you in keeping track of the maintenance you have performed on your machine.

> **Important:** Record the date and machine hours on the maintenance log. We have provided a maintenance log for your convenience at the end of this section. *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.

DAILY:

- Check engine oil level.
- Inspect garden hose screen. Clean as needed.
- Empty waste tank inlet filter.
- Visually inspect machine for loose wires, oil leaks, water leaks, etc.
- Inspect vacuum tank s/s filter and garden hose inlet screen for clogging or damage. Clean, repair or replace as needed.
- Inspect and clean the vacuum slot on the cleaning wand. Watch for sharp edges that may tear the carpet, remove any sharp edges as required.
- Lubricate blower with an oil based lubricant through blower inlet.
- Perform freeze guard procedure as weather dictates

WEEKLY:

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

♦ CAUTION ♦

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

- Check high pressure pump oil. Add as necessary.
- Check pump drive belts for wear.
- Check pump pulleys.
- Check internal machine high pressure water lines for wear or chafing.
- Remove the stainless steel blower inlet filter inside the recovery tank and thoroughly clean, removing all lint build-up. Inspect for damage and reinstall.
- Remove the filter screen from the garden hose inlet fitting. Thoroughly clean and reinstall.
- Empty chemical from the chemical container. Wash out thoroughly to remove any chemical build-up.
- Inspect vacuum relief valve. Clean and lubricate as necessary.

- Inspect all external solution hoses, vacuum hoses, and quick connects for wear or damage that may cause premature failure, replace as needed.
- Clean vacuum tank thoroughly with high pressure washer.
- Flush water and chemical system with 50/50 white vinegar solution.
- Check vehicle engine rpm on CDS tachometer.

Chevy:	1400 to 1600 RPM (Engine)
Dodge:	1550 to 1750 RPM (Engine)
Ford:	1400 to 1600 RPM (Engine)

MONTHLY:

- Change engine oil.
- Check engine air cleaner filter. Clean as necessary.
- Clean battery connections as needed.
- Grease drive shaft u-joints. Inspect for wear. (See Drive Shaft Maintenance at the end of this chapter.)

QUARTERLY:

- Change oil in blower.
- Change oil in pump.
- Grease blower bearing fittings.
- Check the vehicle fuel lines for any chafing or wear, especially in the engine compartment or near any rotating parts.
- Check the CDS wiring harness for any chafing or wear, especially in the vehicle engine compartment or near any rotating parts.
- Check the vehicle wiring harness for any chafing or wear, especially in the vehicle engine compartment or near any rotating parts.
- Check CDS blower mounting fasteners, drive shaft clamping collar fasteners, and CDS front end component fasteners, tighten as needed.
- Grease the drive shaft spline if so equpped.
- Grease the power pack pillow block bearings.

YEARLY:

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

AS REQUIRED: DE-SCALING:
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, improper chemicals, etc. The frequency with which de-scaling 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 de-scale monthly.

To de-scale your system, add an appropriate de-scaler chemical to your mix tank. Circulate it through the heating system. Let it stand. Flush and repeat as necessary. Clean all screens and strainers, and check them frequently following de-scaling.

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 is not 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 facets 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.

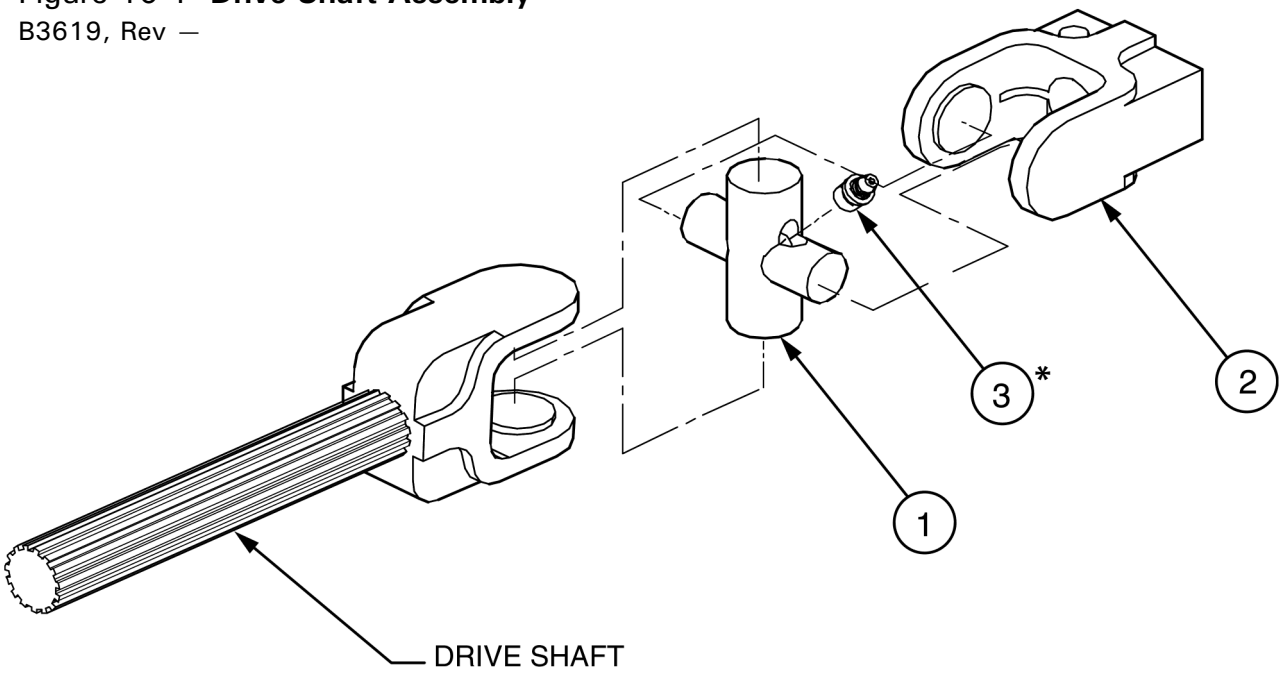
Long Term Maintenance Schedule

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

Component	Interval (Interval is in Machine hours / months of service)
High pressure water pump rebuild	2000/24
Vehicle engine thermostat	2000/24
Vehicle engine accessory drive belt	2000/24
CDS clutch	3000/36
CDS drive shaft	3000/36
CDS blower silencer and exhaust plumbing	4000/48
CDS and vehicle heater hoses	4000/48
CDS wire harness	4000/48
CDS clutch housing drive bearings	4000/48

Drive Shaft Maintenance

Figure 10-1 **Drive Shaft Assembly**
B3619, Rev —



ITEM	PART NO	DESCRIPTION	QTY
1	039-011	Replacement U-Joint for CDS Drive Shaft	1
2	039-012	Replacement Yoke for CDS Drive Shaft	1
3	————	Zerk Grease Fitting, c" NPT	1

LUBRICATE ZERK FITTINGS

Apply grease to zerk fittings (item 3) at clutch and at blower flange U-joints every 100 operating hours.

Note: HydraMaster flexible drive shaft assemblies have two universal joints, one on either end of the drive shaft. The above mentioned lubrication interval refers to both universal joints.

* If your machine is equipped with permanently lubricated u-joints on the drive shaft, lubricate the drive shaft spline at 400 hours.

Troubleshooting

No.	Problem/Possible Cause	Solution
1.0	**The radiator overflows.**	
1.1	The *CDS heat exchanger* has developed an interior leak.	Test each heat exchanger separately with pressurized water or air. Replace the bad one.
1.2	The *radiator cap* is faulty	Test the cap for pressure. Replace it if necessary.
1.3	The engine is overheating because the *engine thermostat* is mal-functioning.	See an authorized dealer to check the engine thermostat for proper operation. Replace it if necessary.
1.4	The engine is overheating because the *engine water pump* is mal-functioning	At the heater core, remove the return line from the heat exchanger to the heater core. Remove the radiator cap and hold the hose in the radiator. Replace the water pump if the water volume is below five gallons per minute at the van's idle speed.
1.5	The engine is overheating because the *engine fan clutch* is slipping or not engaged.	See an authorized dealer to check the fan clutch and replace it if necessary.
1.6	The *heat exchanger* is restricted or plugged.	See an Authorized HydraMaster Dealer.

No.	Problem/Possible Cause	Solution
2.0	**The van engine sputters, then dies.**	
2.1	The *van engine* is in need of a tune up.	See an authorized dealer.
2.2	The *van* is overheating.	Please refer to Problems 1.3 – 1.6 in this chapter. Also see an authorized dealer.

No.	Problem/Possible Cause	Solution
3.0	**When the CDS is turned on, nothing happens**	
3.1	The *circuit breaker* is blown (the button has popped out)	a. Replace the weak breaker b. There is a short in the wiring. See 3.3 in this chapter.
3.2	The *fuse link* is blown.	a. Replace the link. b.There is a short in the wiring between the battery and the breaker. See 3.3 in this chapter
3.3	There is a short in the *system*.	Unplug each individual wire, one at a time (i.e. The clutch, the horn circuit), until the breaker does not blow. Replace the shorted wire or part. See Electrical, Chapter 9.
3.4	There is a bad *ignition switch*.	With the key in the "ON" position, test the switch with a V.O.M. or a 12 V.D.C. test light for voltage on the accessory or ignition post. If there is no voltage, replace the switch.
3.5	The *recovery tank* is full of water. (vacuum tank light is on)..	Empty all the water from the recovery tank.
3.6	There is a *bad float in the recovery tank*.	Disconnect one of the wires on the recovery tank float switch and turn the CDS on. If the unit starts with the float disconnected the replace the defective float.
3.7	The *engine temperature light* comes on.	Determine if the sensor is sending a true signal or if the sensor is defect-ive. Correct engine overheat problems as noted in Section 1.

No.	Problem/Possible Cause	Solution
4.0	**The tachometer is reading incorrectly or bounces.**	
4.1	There is a bad *ground wire connection* on the gauge.	Check the ground wire to make sure all of the connections are secure and clean.
4.2	The *gauge* is bad.	Check the wires going to the gauge for cuts, abrasions and bad connections With the CDS ignition on, the red wire should have +12 volts on it. The white wire should have a ground common to the sensor ground and the green wire should go to the engine. Replace the gauge if necessary.

No.	Problem/Possible Cause	Solution
5.0	**The engine RPM is too high or too low.**	
5.1	The *vacuum throttle booster cable* is stretched or broken	Replace the cable and readjust The pods. See your nearest HydraMaster Service Center.
5.2	The *vacuum throttle booster* (pod) is out of adjustment.	Readjust the pods. See your nearest HydraMaster Service Center...
5.3	The *vacuum solenoid* is bad.	The vacuum solenoid is normally a closed valve. The valve will open to allow vacuum through when 12 volts are present across its terminals. Replace the solenoid if necessary.
5.4	The *vacuum hose* going to the solenoid valve or throttle booster is clogged, pinched or cut.	Replace the hose.
5.5	The *vacuum throttle cable* is catching on something.	Replace the cable or add a protective cover.
5.6	The vacuum solenoid is not getting *power*.	Trace the wiring and locate the electrical problem.
5.7	The *vacuum throttle booster* does not engage.	Check the vacuum at your vacuum hose. If there is vacuum but the pod does not engage, replace the vacuum pod.

No.	Problem/Possible Cause	Solution
6.0	**The van engine is overheating**	
6.1	See Problems 1.3 – 1.6 in this chapter.	

No.	Problem/Possible Cause	Solution
7.0	**The front end clutch will not work.**	
7.1	The *recovery tank* is full (tank light is on).	Empty the tank.
7.2	The *float switch* in the recovery tank is defective.	When the float is down, the circuit is open. When the float is up, the circuit is closed. If necessary, replace the switch.
7.3	There is no *power* getting to the clutch.	See Problem 9 in this chapter.
7.4	The *clutch* is burnt and slipping.	Locate any burnt, broken, or cut wire and repair as necessary.
7.5	See Section 3 of this manual also....	

No.	Problem/Possible Cause	Solution
8.0	**The drive clutch is burnt and slipping.**	
8.1	The *clutch housing* is defective (bad bearings or worn shaft)	This allows the clutch pulley to rub on the coil of the clutch. Replace the clutch housing. And, if the clutch is burnt, replace it.
8.2	There is too much blower load due to excessive *vacuum*.	Clean and adjust the vacuum relief valve. Readjust the vacuum to be 12Hg when under a full load. Replace the clutch.

CDS 4.6 MAINTENANCE LOG

MAX HRS	DAILY SERVICE
8	ENGINE OIL - check
8	GARDEN HOSE SCREEN -inspect, clean
8	MACHINE - general inspection
8	VACUUM TANK INLET FILTER - clean
8	BLOWER INLET - spray with lubricant

OIL RECOMMENDATIONS	
BLOWER	40 weight non-detergent
PUMP	5 - 30 weight synthetic motor oil
ENGINE	30 weight motor oil NOTE: Overhead valve engines can use multi-viscosity oil, but will experience increased oil consumption

	WEEKLY SERVICE	DATE & HOURS						
25	VEHICLE/CDS- check for leaks							
25	PUMP OIL - check							
25	BELTS & PULLEYS - check for wear							
25	HIGH PRESS. LINES-INTERNAL - check for chafing							
25	BLOWER INLET FILTER - remove and clean							
25	GARDEN HOSE SCREEN -inspect, clean							
25	CHEMICAL CONTAINER- remove & clean							
25	VAC. RELIEF VALVE - inspect, clean, lube							
25	VACUUM TANK - clean							
25	CHEMICAL SYSTEM - flush with vinegar							
25	ENGINE RPM- check with CDS unit operating							
	MONTHLY SERVICE							
100	ENGINE OIL - change							
100	ENGINE AIR CLEANER - inspect							
100	BATTERY TERMINALS -clean as needed							
100	DRIVE SHAFT -grease u-joints (if so equipped)							
	QUARTERLY SERVICE (3 MONTHS)							
400	BLOWER OIL - change							
400	PUMP OIL - change							
400	BLOWER BEARING - grease							
400	VEHICLE FUEL LINES - check for chaffing or wear.							
400	CDS WIRING HARNESS - check for chafing or wear							
400	VEHICLE WIRING HARNESS - check for chafing or wear							
400	CDS FASTENERS - check blower, drive shaft, front end.							
400	DRIVE SHAFT - grease spline (if so equipped)							
400	BEARINGS/POWER PACK PILLOW BLOCK - grease							
	YEARLY							
	VEHICLE - complete service							
	COOLING SYSTEM - flush							
	TRANSMISSION FLUID - change							

How to Order Parts

CDS 4.6

Section 11-1

To obtain a proper diagnosis of your malfunction, and to order warranty replacement parts or repairs, it is important that you proceed in the following manner:

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.

ONE FINAL NOTE

Any questions you have regarding the warranty program should be directed to the

HydraMaster
Customer Service Department
(425) 775-7275
8 a.m. to 5 p.m. Monday through Friday (PST).

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. **Labor and/or diagnostic reimbursement is specifically excluded.**

Warranty Information

CDS 4.6

Section 12-1

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

BLOWER:

- Failure to lubricate impellers daily with an oil based lubricant.
- Failure to lubricate bearings as recommended in blower manual.
- Failure to maintain proper oil levels in the blower.
- Failure 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 relief valve.
- Use of improper chemicals.

CHEMICAL PROPORTIONER:

- 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/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:

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

WATER HEATING SYSTEM:

- Over pressurization of the system (recommended maximum working pressure - 800 PSI).
- Failure to protect against freezing.

HARD WATER DEPOSITS:

- Failure to use or maintain a water softening system or a properly installed magnetic-type de-scaler with machine operating in designated 'Hard Water Areas' (3.5 grains or more per gallon).

WARRANTY PROCEDURE

Contact your authorized HydraMaster distributor regarding warranty service.

Accessories

CDS 4.6

Section 13-1

Genuine HydraMaster
Accessories & Detergents

This section of your Owners Manual is devoted to Accessories and Detergents which we have found to be helpful and useful. *These products can enhance your cleaning and reduce your labor costs!*

HydraMaster Machine accessories are the most innovative collection available in the cleaning industry. Our patented **RX-20 Rotary Extractors** have changed the shape of steam cleaning. Our hoses and tanks are of the finest quality construction.

SafeClean Detergents have been specially prepared, not only to give you exceptional cleaning, but also to optimize your truckmount's operation and reliability. *Most detergents don't work well under the high heat, high pressure conditions of truckmount use.* **SafeClean** will maintain your machines's water pump and water heating systems at peak efficiency and help ensure fewer breakdowns.

For more information, or to order
Genuine HydraMaster Accessories and Detergents

Call your nearest authorized HydraMaster Distributor.

Product Support Bulletins

CDS 4.6
Section 14-1

HYDRAMASTER
Corporation
11015 47th Avenue W, Mukilteo, WA 98275

PRODUCT SUPPORT BULLETIN

TO: All CDS Installers DATE: 27 Oct 1992

RE: 1993 Chev Brake Lines PSB #: 92102

Chevrolet cargo vans for 1993 have a new routing for their brake lines. They now travel directly over top of the transmission.

Caution is required when drilling the mounting hole on the passenger side of the blower frame. The brake lines can be lowered out of the way by unbolting two (2) mounting brackets that hold the lines in position.

The blower mounting bolt for this foot should go in from the bottom. Then the brake lines can be reattached.

HYDRAMASTER
Corporation
11015 47th Avenue W, Mukilteo, WA 98275

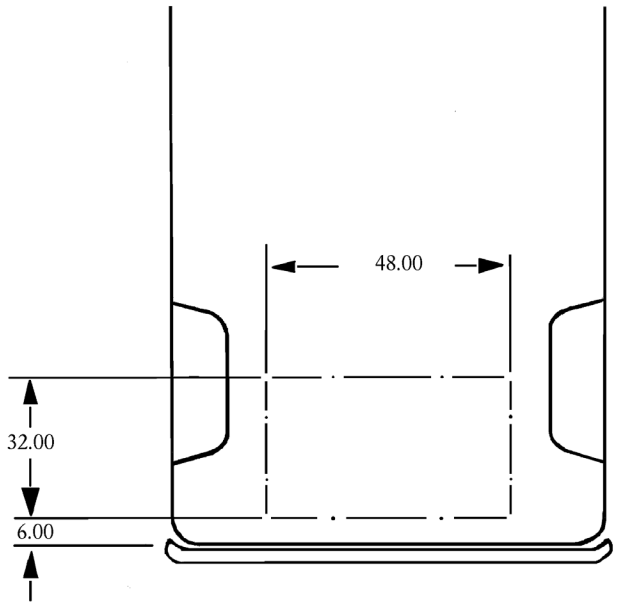
PRODUCT SUPPORT BULLETIN

TO: All HydraMaster Distributors DATE: 14 Jun 1994

RE: '93 Dodge Vans PSB #: 94062
Location of Fuel Tanks

It has come to our attention that the fuel tanks on 1993 and newer Dodge vans are located directly against the floor of the van. Caution must be used when drilling any holes through the floor. The attached illustration indicates the area in the rear of the van where no screws may penetrate the floor.

Anyone who has installed flooring in a 1993 or newer Dodge van may need to check to see that no damage was done to the fuel tank. The fuel tanks are rotationally molded polyethylene plastic. If any holes were made in the tank they can be easily sealed with a hot knife. Please do not use an open flame.



HYDRAMASTER
Corporation
11015 47th Avenue W, Mukilteo, WA 98275

PRODUCT SUPPORT BULLETIN

TO: All HydraMaster Distributors that Install Equipment

DATE: 14 Jun 1994

RE: Chevrolet CDS Installations

PSB #: 94063

This is just a reminder...

When installing CDS or slide-in units in Chevrolet vans, caution must be used while drilling holes through the floor.

There are two areas in which to be cautious. The brake lines, which travel up over the transmission, are close to the blower mounting location. (See Product Support Bulletin 92102.) Also behind the passenger seat, below the floor, is the ABS control unit.

Please check below the van before drilling any holes. This will minimize costly mistakes.

HYDRAMASTER

Corporation
11015 47th Avenue W, Mukilteo, WA 98275

PRODUCT SUPPORT BULLETIN

TO: HM Distributors DATE: 11 Jun 1998

RE: CDS Maintenance and Wear PSB #: 98061

The 'Wear Effect' of a CDS on Its Host Vehicle

Fiction: It is sometimes said, usually by those promoting competitive systems, that each hour on the CDS hour meter is equivalent to running the vehicle at 50 mph, therefore 1,000 machine hours in a year would be equivalent to putting 50,000 miles on the vehicle. 15 years of experience teaches us that this calculation is inaccurate. In fact, *the 'wear effect' of a CDS on the engine is less than 10 miles for each machine hour.*

Fact*: History has proven that the engine of a CDS vehicle which is kept well lubricated and cooled, is typically able to transport the van over 100,000 miles on the odometer while also running the CDS System for 4,000 to 5,000 hours before any major engine work is required.

Fact: The CDS System's horsepower demand on the vehicle's engine is only a small percentage of the engine's capability. This low stress is a key to the excellent reliability and longevity of the engine system.

Fact: The light payload weight of the CDS when compared to other machines, puts less wear on the vehicle's other systems (i.e. brakes, differential, drive line, transmission, suspension, body, etc.). The lighter weight also contributes to improved gas mileage during transportation.

*Hours and miles are based upon actual reports. They do not constitute a guarantee and do not in any way modify the standard warranties of the vehicle or the CDS System. **Recommended CDS/Vehicle Maintenance**

The relatively light 20 to 25 horsepower load that a CDS System places upon its host vehicle will not create a need for any dramatic changes in the vehicle's maintenance processes.

HydraMaster recommends that a CDS equipped vehicle be serviced at the lowest recommended mileage limit specified in the vehicle's manual or no less than once a month for a regularly used CDS System.

Note: Operation in climates of severe heat, cold or dust may additionally shorten time between service intervals.

HYDRAMASTER

Corporation
11015 47th Avenue W, Mukilteo, WA 98275

PRODUCT SUPPORT BULLETIN

TO: All HydraMaster Distributors DATE: 05 May 1999

RE: CDS 4.8 Overdrive Drive Shaft and Blower Installation PSB #: 99051

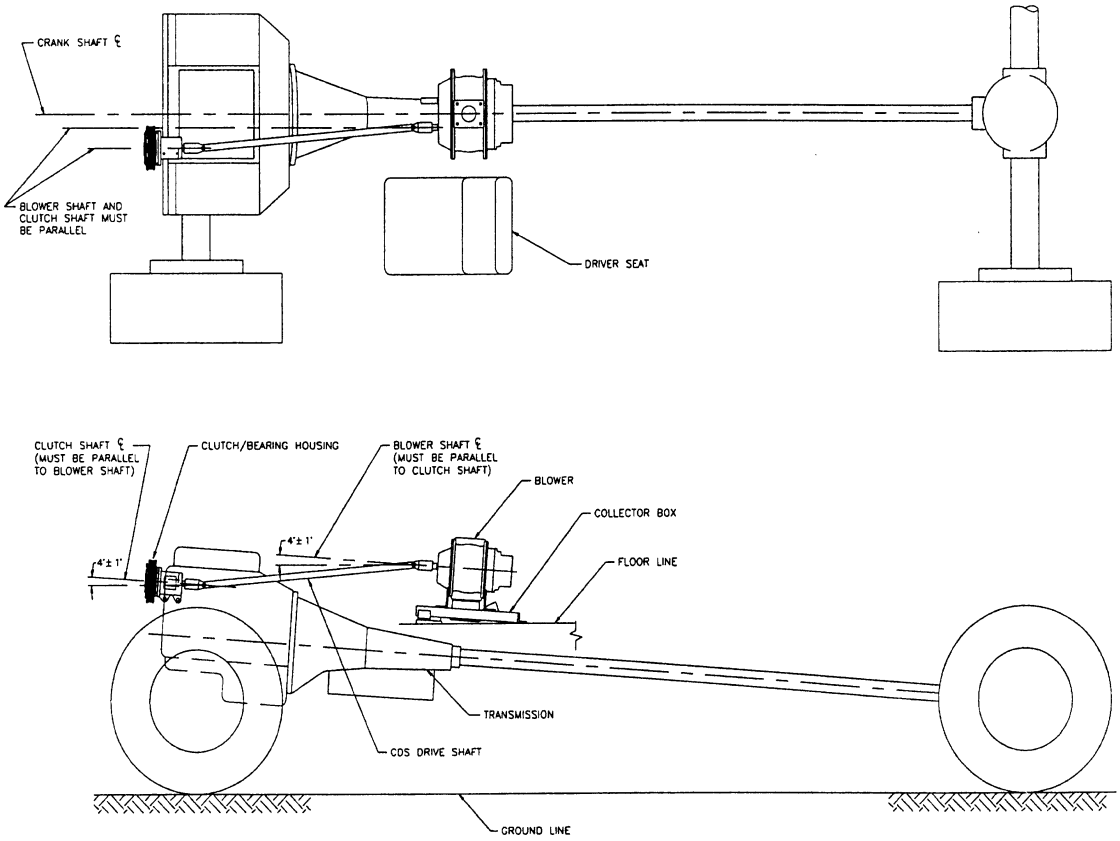
HydraMaster would like to reemphasize the importance of proper drive shaft and blower alignment when installing CDS units. HydraMaster has experienced very good success with its flexible drive shaft technology. In order to maintain this fine record of reliability, standards of alignment during installation must be maintained.

According to the drive line manufacturer, input and output shafts must be at equal angles or, in other words, parallel with each other. When viewed from the side a typical van engine is three to five degrees off horizontal (see illustration on following page). This can be measured along the valve cover with an angle finder. This is also the angle of the input shaft, the shaft which extends off the back of the clutch housing. The blower shaft must be at this same angle. When viewed from the top the input shaft is parallel with the engine crank shaft. The blower shaft must be parallel with the engine crank also.

To achieve parallel shafts on 1997 or newer Chevrolet with air conditioning installations, a 1" spacer, included in the parts kit, is required, under the blower frame's front feet. Chevrolet without a/c and Dodge installations require no additional spacers.

The blower frames are designed to sit on the van's floor, not on a raised plywood floor. Placing the rear of the blower frame on the plywood flooring may result in a misaligned drive shaft. A misaligned drive shaft may exhibit excessive vibration and result in reduced service life.

If you are not sure if the angles of the engine and blower match, an inexpensive angle finder gauge would be a good investment. If you can not locate one in your area, contact HydraMaster.



The drive shaft's recommended lubrication interval is now 100 hours. HydraMaster recommends that you lubricate with grade 2 bearing grease.