

HYDRAMASTER

Corporation
11015 47th Avenue W, Mukilteo, WA 98275

CDS 4.8™
OVERDRIVE

CDS 4.6™
OVERDRIVE

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HYDRAMASTER® Corporation
Mukilteo, Washington

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Introduction

CDS 4.6/4.8

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 consistent 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.

◆ Notice ◆

If you have any questions regarding the operation, maintenance, or repair of this machine. Please contact your local distributor. If your question cannot be resolved by your distributor or by the information within this manual, you may contact HydraMaster Customer Service direct using the following phone numbers.

Hours	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

♦ 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 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 down-time. 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.

◆ CAUTION ◆

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

System Operation

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 to the water box. The water is then picked up from the water box 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:	4.6 - 45 Tuthill/M-D Tri-Lobe 4.8 - 47 Tuthill/M-D Tri-Lobe
Water Pump:	CAT® 4.2 GPM Triple Plunger 4 gallons per minute
Chemical System:	Mechanical, Meter Controlled
Heating System:	Multiple Heat Exchanger (1000 PSI pressure) Dual Shell and Tube Exchangers Optional Salsa Heat Package
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 Chemical Flowmeter, 0-10 GPH Water Pressure Gauge, Liquid Filled, 0-1000 PSI

Instruments (cont.) :

Side Panel:

- Water Pressure Adjustment
- Blower Lubrication Port
- Water Temperature Adjustment Knob
- High Pressure Solution Outlets, Quick-Disconnect 2
- Fresh Water Inlet Fitting, Quick-Disconnect
- Water Box Drain Valve
- Chemical Controls

Recovery Tank: 100 gallon Aluminum

Cleaning Wand: Stainless Steel
Replacement Grip
Rebuildable Solution Valve

High Pressure Hose:

1/4" High Temperature, Lined, Vinyl Covered
Hose rated to 2200 PSI, 250° F

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' Solution Hose
- 150', 2" Vacuum Hose
- 10'. 1 ½" Vacuum Hose
- 50', Fresh Water Hose
- 10', 1 ½" Drain Line
- 5 gallon Chemical Jug
- Chemical Jug Holder
- Chemical Jug Fill Line

Standard Equipment (cont.) :

- Van Finish Package
- Van Decal Package
- Monogrammed Jacket
- Operation Manual
- Custom Equipment Color
- Oversize Air Handling Package
- 475 CFM High-Output Vacuum System (4.8)
- Expanded Vacuum Recovery Tank Capacity
- Hushkit* Silenced System (4.8)

*The 4.8 CDS tachometer with the mag pick up located on the power pack has been calibrated to represent the engine speed of the vehicle.

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 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
078-019	Kit, Wand Valve Plunger	1

CDS Spare Parts List (cont.)

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
157-022	Switch, Relay	1
157-040	Switch, 12 VDC Lighted	2
169-022	Valve, 1 ½" 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

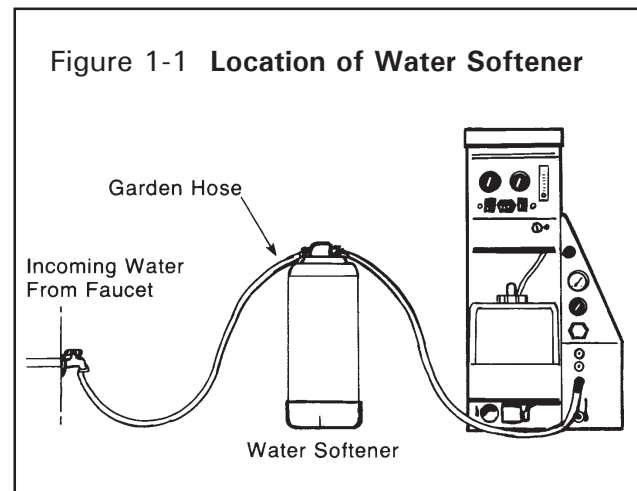
The following map defines areas in the United States which compromise fluid related components such as hoses, fittings, heaters, pumps, valves and water cooled engines. For other countries, hard water area maps can be obtained from geological societies.

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 3 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.

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.

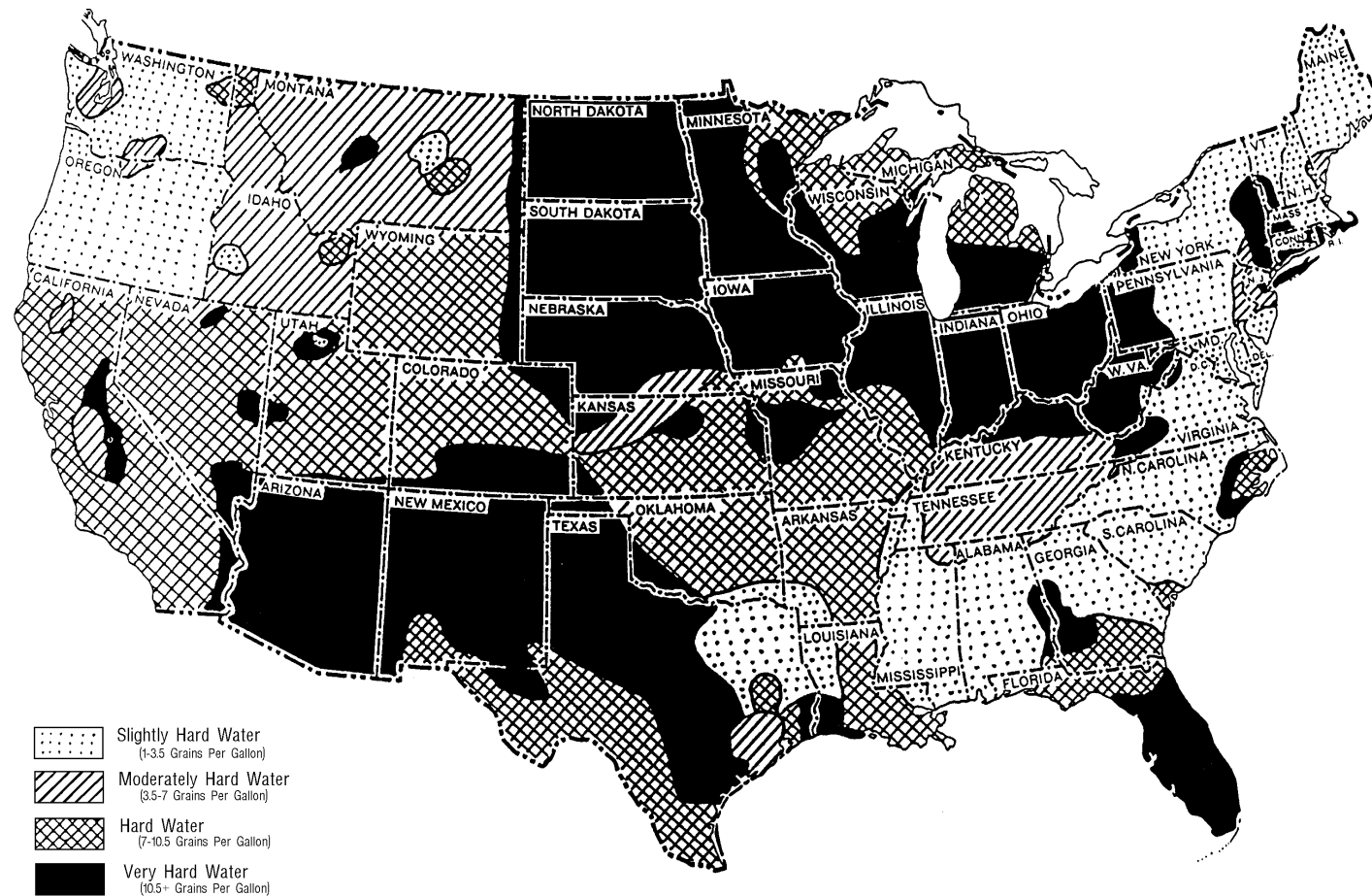
In most cases, an acceptable method of waste water disposal is to discharge into a municipal sewage treatment system after first filtering out solid material such as carpet fiber. Access to the sanitary system can be obtained through a toilet, laundry drain, RV dump, etc. Permission should first be obtained 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 4.6/4.8

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.

♦ CAUTION ♦

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

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.

Figure 2-1: pH Chart

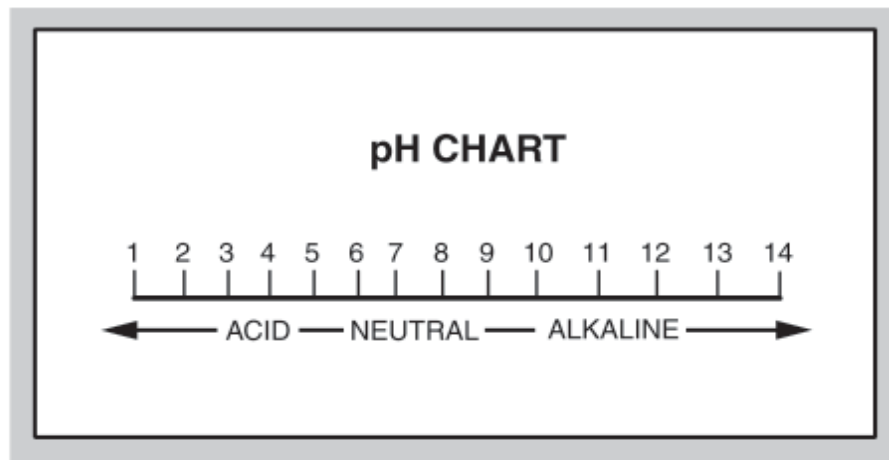
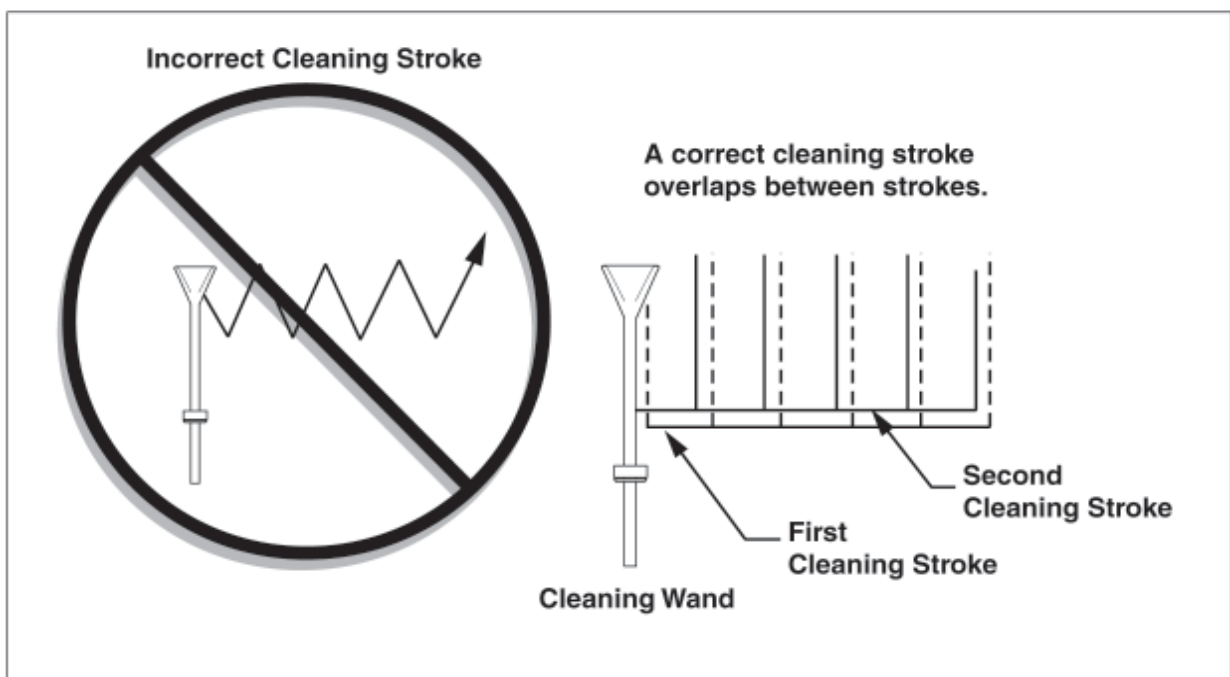


Figure 2-2: Cleaning Stroke Procedure



Operating Instructions

CDS 4.6/4.8
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 to 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.
Note: *The 4.8 CDS with the tachometer mag pick up located on the power pack has been calibrated to represent the engine speed of the vehicle.*
4. Turn on the Pump clutch switch
5. Turn on the Pump in switch
6. Turn the heat control valve to "Max" only if you will be using water. **Do not activate the heat exchanger during flood extration work.**
7. Turn the chemical selector valve to the "PRIME" position to purge any air from the system.
Note: The prime hose is plumbed into the recovery tank. Leaving the valve in the "PRIME" position will cause excessive chemical usage.
 - a. When the chemical begins to flow through the flowmeter, with the flow indicator reading maximum flow and the PRIME line pulsing, turn the chemical selector valve to "ON". Cap off vacuum if necessary.
 - b. While spraying the solution from the cleaning tool, adjust the chemical flow by turning the chemical adjustment knob to the desired level.
8. Turn the APO switch 'ON' if using the auto pump-out feature.
NOTE: The pump will not engage until the water level rises inside the waste tank.
9. 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 off the high pressure pump. 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. Flush clear water through the chemical system for 10 seconds.
Note: If freeze guarding is necessary, perform the freeze guard procedure at this time. Draining the water box to ½ full or less is recommended to reduce spillage inside the vehicle.
2. Open the mix tank drain and actuate the wand valve to run fresh water through the water box, 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 4.6/4.8

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 1 ½ 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. Turn the chemical control valve to the "PRIME" position until coolant registers in the flow meter. With the cleaning tool on, allow mixture to fill the remainder of the chemical system.
- B. Open the water box drain valve and allow the water to drain thoroughly from the water box.

To Drain the Machine, Follow These Steps (cont.):

- C. (If equipped) Turn the heat exchanger valve to "SALSA SYSTEM"
- D. Close the water box 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
- E. Open the water box drain and drain out the residual fluid into a suitable container. This antifreeze solution may be retained for reuse (attach freeze guard fitting to inlet quick connect and vacuum water out of the inlet line).

♦ CAUTION ♦

One manufacturer of antifreeze cautions:

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

♦ WARNING ♦

This warning appears on the label of one brand of antifreeze:

"HARMFUL OR FATAL IF SWALLOWED. Do not drink antifreeze coolant or solution. If swallowed, induce vomiting immediately. Call a physician. Contains Ethylene Glycol which caused birth defects in animal studies. Do not store in open or unlabeled containers.

"KEEP OUT OF REACH OF CHILDREN AND ANIMALS."

BE SURE YOUR MACHINE IS PROTECTED! Freezing will cause GRIEF, LOST 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 water box begins to fill.

Water and Chemical System

CDS 4.6/4.8

Section 5-1

This high pressure chemical system has been designed to be simple and trouble free.

WATER AND CHEMICAL FLOW OPERATION

The chemical pump draws the chemical from the inlet filter which is in the chemical container. It flows through the flow meter indicating the GPH's of chemical being used. The chemical then flows through the chemical pump to the chemical selector valve. The chemical valve can be used to prime the pump (evacuate air from the system), inject chemical into the system or turn the chemical flow off. In the "ON" position, chemical flows through the metering valve, and is injected into the heated water path just prior to its leaving the machine.

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

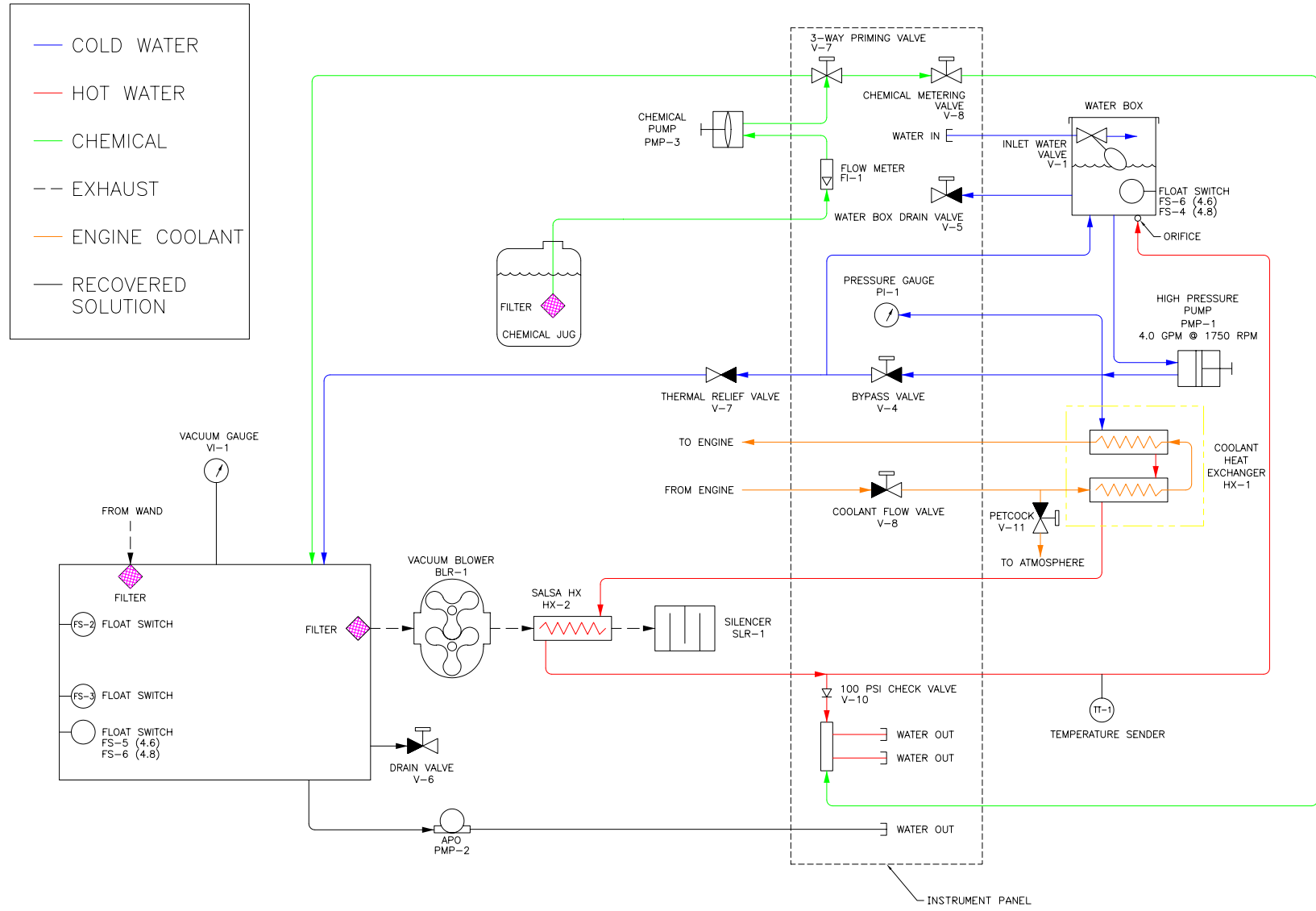
The desired chemical injection ratio may be obtained by an adjustment of the chemical metering valve during the spraying of water through the cleaning tool.

CHEMICAL SYSTEM MAINTENANCE

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

D-4002 Rev D



Chemical System Troubleshooting

1.0. System will not prime

1.1. **Check valves in chemical pump are faulty.** Remove valves and inspect. Clean or replace as necessary.

1.2. **Chemical pump diaphragm is faulty.** Remove and inspect. Replace as necessary.

1.3. **Check valve in high pressure pump (the one that the chemical pump attaches to) is faulty.** Remove valve and inspect. Clean or replace as necessary.

1.4. **Filter on feed line in chemical jug is clogged.** Inspect and clean.

1.5. **Feed line from chemical jug is loose, pinched or cut.** Inspect and repair.

1.6. **Three-way prime valve is faulty.** Check valve for leaks between ports. Replace as necessary. *Note: if the chemical system has been run dry, it is frequently necessary to insert the prime hose from the chemical jug into the vacuum inlet for a "boost" to purge all of the air from the system. Machines produced after April, 2001 will have the prime hose connected directly to the vacuum system.*

2.0. Chemical flow is unstable or low

2.1. **Air in lines.** Check that all fittings and connections are tight and in good condition. Repair or replace as necessary.

2.2. **Filter screen in chemical jug is partially clogged.** Inspect and clean.

2.3. **Three-way chemical valve is faulty.** Inspect valve for leaks between ports. Replace as necessary.

2.4. Chemical metering valve is faulty or partially obstructed. Inspect valve and clean or replace as necessary.

2.5. High pressure check valve is faulty. Remove and inspect. Clean or replace as necessary.

3.0. Solution jug fills with water

3.1. Three-way chemical valve is defective. Inspect valve for leaks between ports. Replace as necessary.

3.2. Inlet check valve in chemical pump is faulty. Remove and inspect valve. Clean or replace as necessary.

4.0. Chemical in water box

4.1. Chemical pump diaphragm is faulty. Remove and inspect. Replace as necessary.

4.2. High-pressure check valve is faulty. Remove and inspect. Clean or replace as necessary.

Pump Maintenance

CDS 4.6/4.8

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 ♦

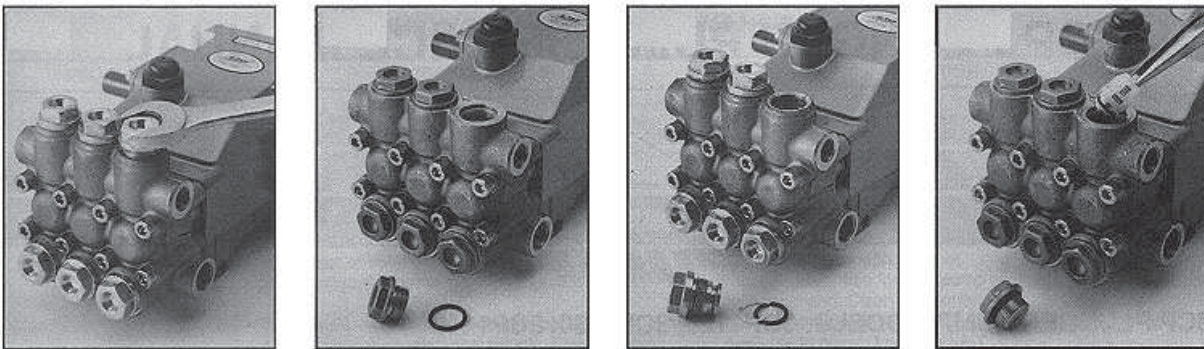
Protect the pump from freezing.

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. 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.

1. Servicing the Valves (cont.)

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.

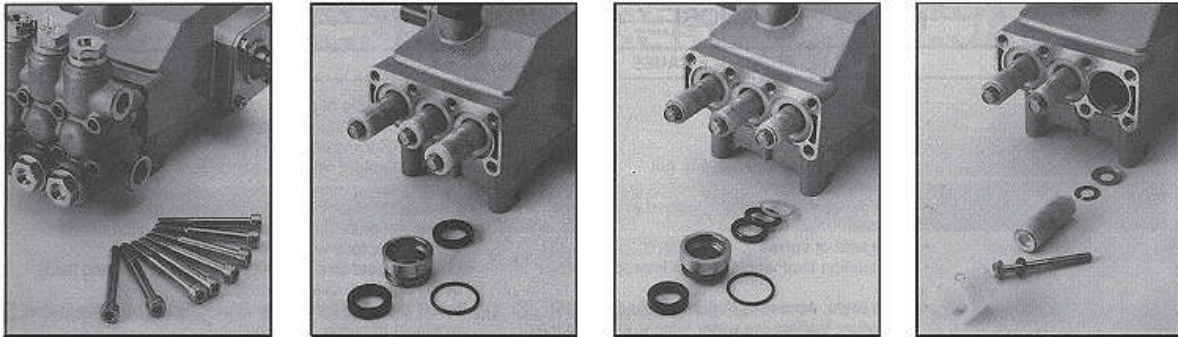
2. Removing the High Pressure Manifold

- 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. 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. 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. 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.

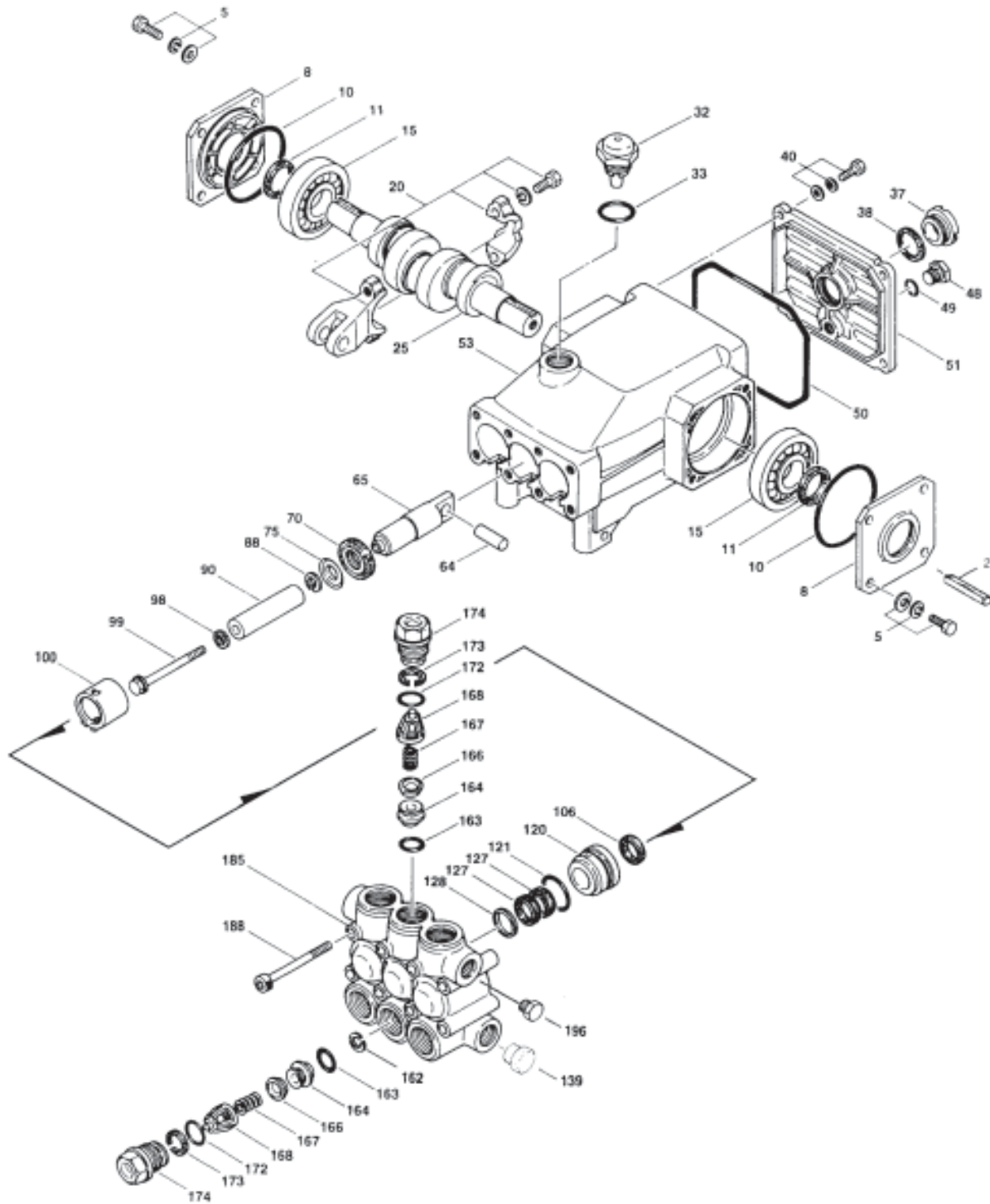
6. Servicing the Crankcase

- 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

Figure 6-1: Cat Pump

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

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	2
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 (3" 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
106	43243	Seal, LPS with Spring	3
120	46896	Case, Seal	3

Cat Pump Parts List

ITEM	PART NO.	DESCRIPTION	QTY
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 d"	1
299	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

High Pressure System Troubleshooting

1.0. Will not come up to normal cleaning pressure

- 1.1. **Pressure adjusting valve is defective or dirty.** Disassemble valve. Repair or replace as necessary.
- 1.2. **Worn seals or valves in pump.** Test pump output volume directly from pump at normal operating RPM. If volume is below manufacturers specifications, replace seals and inspect for defective valves.
- 1.3. **Pump RPM is too low.** Check engine RPM and adjust as necessary. Check for loose pump belt. Adjust tension as necessary.
- 1.4. **High temperature dump solenoid is activated.** Refer to Heating System section IV.
- 1.5. **Primary system control orifice is missing or loose.** Remove filter and inspect. Tighten or replace as necessary.
- 1.6. **Primary system control orifice has been exchanged with secondary (hot water dump) orifice.** Inspect and reverse as necessary.
- 1.7. **Primary orifice is worn.** Measure orifice size and replace as necessary.

2.0. No pressure reading on PSI gauge

- 2.1. **Pump switch is not turned on.** Turn on switch
- 2.2. **No water in mix tank.** Refer to section 5.0
- 2.3. **Pump belt is broken.** Replace belt.
- 2.4. **Pump clutch is not activated. There *is no* water in water box.** Check system back to source to locate cause of interruption to water flow.

2.5. Pump clutch is not activated. There *is* water in the water box. Check for 12 volts at clutch. If 12 volts is present, replace clutch.

2.5.1. If 12 volts is not present, check fuse that supplies power to the low-water relay. If fuse is good and there is 12 volts at the relay, check low water switch in water box.

2.5.2. If low water switch has no continuity when float is up, replace the switch. If switch is good, replace the low water relay.

3.0. PSI gauge reads normal; low pressure from wand

3.1. There is a restriction in the cleaning tool. Inspect tool jet and clean or replace as necessary. Inspect any filters in the cleaning tool and clean or replace as necessary.

3.2. There is a defective quick connect in the system. Inspect each quick connect and replace as necessary.

3.3. There is a restriction in one of the solution hoses. Remove quick connects and inspect hoses. Clean or replace as necessary.

3.4. There are hard water deposits restricting the system between the afterburner heat exchanger and the high-pressure solution connection at the front of the machine. Descale the machine. If this doesn't solve the problem, disassemble this portion of the system and locate restriction.

4.0. Pressure pulsation

4.1. Water in the water-box is too hot and is approaching boiling point. Check temperature of water in the water-box.

4.2. There is an air leak between the water box outlet and the pump inlet. Physically check all hoses and fittings for cuts, breaks, cracks or tightness. Repair as necessary.

- 4.3. **One of the intake or outlet valves in the high-pressure pump is defective or is being held open by debris.** Remove each valve and inspect for correct operation.

5.0. Water box empty or fills slowly

- 5.1. **There is a restriction in the water supply system.** Inspect the supply system from the source through the incoming quick connect for kinks, clogs or restricted filters. Clean or repair as necessary.
- 5.2. **The float valve in the water box is defective.** If there is adequate water flow to the incoming valve in the water box, disassemble and inspect the valve. Repair or replace as necessary.

6.0. Water box overflows

- 6.1. **There is either debris caught in the valve or the valve seal is bad.** Disassemble valve and repair or replace as necessary.
- 6.2. **The float has absorbed water and has lost buoyancy.** Detach float and check to see if it will float to the surface. Replace as necessary.
- 6.3. **The float has come out of adjustment.** Readjust float as necessary.

CP PLUNGER PUMP SERVICE MANUAL



3CP MODELS: 3CP1120, 3CP1130, 3CP1140

5CP MODELS: 5CP2120W, 5CP2140WCS, 5CP2150W, 5CP3120, 5CP3120G1, 5CP3130G1, 5CP5120, 5CP5150G1, 5CP6120, 5CP6120G1, 5CP6140, 5CP6150

7CP MODELS: 7CP6170

INSTALLATION AND START-UP INFORMATION

Optimum performance of the pump is dependent upon the entire liquid system and will be obtained only with the proper selection, installation of plumbing, and operation of the pump and accessories.

SPECIFICATIONS: Maximum specifications refer to individual attributes. It is **not** implied that **all maximums** can be performed **simultaneously**. If more than one maximum is considered, check with your CAT PUMPS supplier to confirm the proper performance and pump selection. Refer to individual pump Data Sheet for complete specifications, parts list and exploded view.

LUBRICATION: Fill crankcase with special CAT PUMP oil per pump specifications (3CP-10 oz., 5CP-17 oz., 7CP-38 oz.). **DO NOT RUN PUMP WITHOUT OIL IN CRANKCASE.** Change initial fill after 50 hours running period. Thereafter, change oil every **3 months or 500 hour intervals**. Additional lubrication may be required with increased hours of operation and temperature.

PUMP ROTATION: Pump was designed for forward rotation to allow optimum lubrication of the crosshead area. Reverse rotation is acceptable if the crankcase oil level is increased slightly above center dot to assure adequate lubrication.

PULLEY SELECTION: Select size of motor pulley required to deliver the desired flow from Horsepower Requirement and Pulley Selection Chart (refer to Tech Bulletin 003 or individual Data Sheet).

DRIVE SELECTION: The motor or engine driving the pump must be of adequate horsepower to maintain full RPM when the pump is under load. Select the electric motor from the Horsepower Requirement Chart according to required pump discharge flow, maximum **pressure at the pump** and drive losses of approximately 3-5%. Consult the manufacturer of gas or diesel engine for selection of the proper engine size.

MOUNTING: Mount the pump on a rigid, horizontal surface in a manner to permit drainage of crankcase oil. An uneven mounting surface will cause extensive damage to the pump base. To minimize piping stress, **use appropriate flexible hose to inlet and discharge ports**. Use the correct belt; make sure pulleys are aligned. Excessive belt tension may be harmful to the bearings. Hand rotate pump before starting to be certain shaft and bearings are free moving.

LOCATION: If the pump is used in extremely dirty or humid conditions, it is recommended pump be enclosed. Do not store or operate in excessively high temperature areas or without proper ventilation.

INLET CONDITIONS: Refer to complete **Inlet Condition Check-List** in this manual before starting system. **DO NOT STARVE THE PUMP OR RUN DRY.** Temperatures above 130°F are permissible. Add 1/2 PSI inlet pressure per each degree F over 130°F. Elastomer or RPM changes may be required. See Tech Bulletin 002 or call CAT PUMPS for recommendations.

C.A.T.: Installation of a C.A.T. (Captive Acceleration Tube) is recommended in applications with stressful inlet conditions such as high temperatures, booster pump feed, long inlet lines or quick closing valves.

DISCHARGE CONDITIONS: OPEN ALL VALVES BEFORE STARTING SYSTEM to avoid deadhead overpressure condition and severe damage to the pump or system.

Install a **Pulsation Dampener** on the discharge head or in the discharge line as close to the head as possible. Be certain the pulsation dampener (Prrrrr-o-lator) is properly precharged for the system pressure (see individual Data Sheet).

A **reliable Pressure Gauge** should be installed near the discharge outlet of the high pressure manifold. This is extremely important for adjusting pressure regulating devices and also for proper sizing of the nozzle or restricting orifice. The pump is rated for a maximum pressure; this is the **pressure** which would be **read at the discharge manifold of the pump, NOT AT THE GUN OR NOZZLE.**

Use PTFE liquid (sparingly) or tape to connect accessories or plumbing. Exercise caution not to wrap tape beyond the last thread to avoid tape from becoming lodged in the pump or accessories. This condition will cause a malfunction of the pump or system.

PRESSURE REGULATION: All systems require both a primary pressure regulating device (i.e., regulator, unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve). The primary pressure device must be installed on the discharge side of the pump. The function of the primary pressure regulating device is to protect the pump from over pressurization, which can be caused by a plugged or closed off discharge line. Over pressurization can severely damage the pump, other system components and can cause bodily harm. The secondary safety relief device must be installed **in-line** between the primary device and **the pump or on the opposite side of the manifold head**. This will ensure pressure relief of the system if the primary regulating device fails. Failure to install such a safety device will void the warranty on the pump.

When the high pressure system is left running with the trigger gun off, the by-pass liquid can be routed to drain or to the pump inlet. If routed to the pump inlet, the **by-pass liquid can quickly develop excessive heat and result in damage to the pump.** A THERMO VALVE installed in the by-pass line is recommended to protect the pump. An AUTO SHUT-OFF ASSEMBLY may also be used.

NOZZLES: A worn nozzle will result in loss of pressure. Do not adjust pressure regulating device to compensate. Replace nozzle and reset regulating device to system pressure.

PUMPED LIQUIDS: Some liquids may require a **flush between operations or before storing.** For pumping liquids other than water, contact your CAT PUMPS supplier.

STORING: For extended storing or between use in cold climates, drain all pumped liquids from pump and **flush with antifreeze solution to prevent freezing and damage to the pump.** **DO NOT RUN PUMP WITH FROZEN LIQUID** (refer to Tech Bulletin 083).

⚠ WARNING

All systems require both a primary pressure regulating device (i.e., regulator, unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve). Failure to install such relief devices could result in personal injury or damage to the pump or to system components. CAT PUMPS does not assume any liability or responsibility for the operation of a customer's high pressure system.

Products described hereon are covered by one or more of the following U.S. patents 3558244, 3652188, 3809508, 3920356, 3930756 and 5035580

World Headquarters CAT PUMPS

1681 - 94th Lane N.E. Minneapolis, MN 55449-4324

Phone (763) 780-5440 — FAX (763) 780-2958

e-mail: techsupport@catpumps.com
www.catpumps.com

International Inquiries FAX (763) 785-4329

e-mail: intlsales@catpumps.com



The Pumps with Nine Lives

CAT PUMPS (U.K.) LTD.

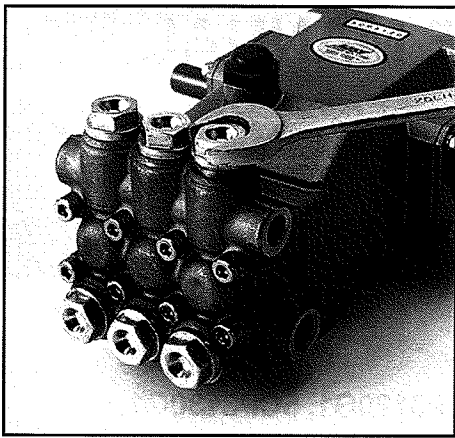
1 Fleet Business Park, Sandy Lane, Church Crookham, Fleet
Hampshire GU52 8BF, England
Phone Fleet 44 1252-622031 — Fax 44 1252-626655
e-mail: sales@catpumps.co.uk

N.V. CAT PUMPS INTERNATIONAL S.A.

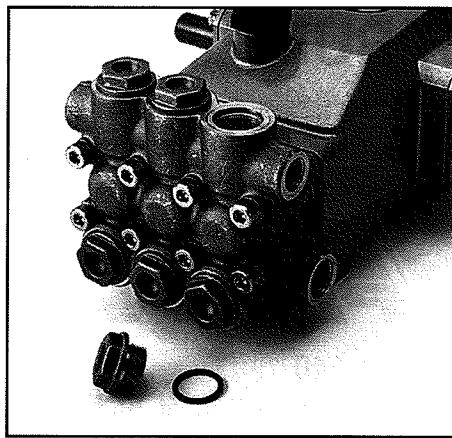
Heiveldekens 6A, 2550 Kontich, Belgium
Phone 32-3-450.71.50 — Fax 32-3-450.71.51
e-mail: cpi@catpumps.be www.catpumps.be

CAT PUMPS DEUTSCHLAND GmbH

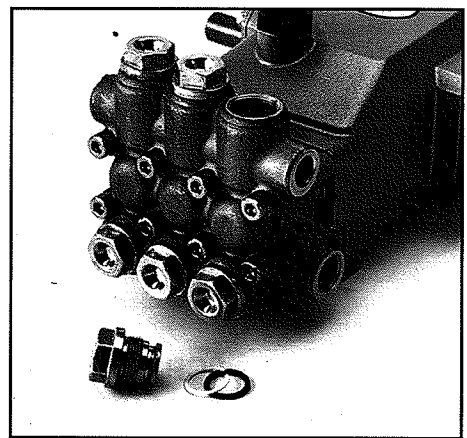
Buchwiese 2, D-65510 Idstein, Germany
Phone 49 6126-9303 0 — Fax 49 6126-9303 33
e-mail: catpumps@t-online.de www.catpumps.de



All Models
Removal of Valve Plugs



3CP1120, 5CP2120W, 7CP6170
Valve Plug and O-Ring



5CP3120, 5CP5120, 5CP5150
Valve Plug, O-Ring and Back-up Ring

CAUTION: Before commencing with service, shut off drive (electric motor, gas or diesel engine) and turn off water supply to pump. Relieve all discharge line pressure by triggering gun or opening valve in discharge line.

After servicing is completed, turn on water supply to pump, start drive, reset pressure regulating device and secondary valve, read system pressure on the gauge at the pump head. Check for any leaks, vibration or pressure fluctuations and resume operation.

SERVICING THE VALVES

1. Remove the hex Valve Plugs (top discharge, bottom inlet).
2. Examine the O-Ring under the plug for cuts or distortion. Replace if worn. Lubricate new O-Rings before installing.

NOTE: The 5CP3120, 5CP5120 and 5CP5150 have both an O-Ring and Back-up Ring on the Valve Plug.

3. Grasp Spring Retainer by the tab at the top with a pliers and remove from each valve chamber. Usually the valve assembly will remain together while being removed. To separate the valve assembly, insert a screw-driver into the side of the Spring Retainer and press on the back side of the Valve to begin separation, then between the Spring Retainer and Seat to separate completely. If the valve assembly separates during removal, remove the Spring and Valve with a needle nose pliers. With a reverse pliers, remove the Seat from each valve chamber. Then, with a small screwdriver, carefully remove the O-Ring at the bottom of the valve chamber.

NOTE: The 5CP2120W, 5CP6120 and 7CP6170 have an O-Ring and Back-up Ring on each Seat.

4. Examine all valve parts for pitting, gouges or wear and replace with preassembled Valve Assembly. Service kit contains Spring Retainers, Springs, Valves, Seats, Back-up Rings and O-Rings.

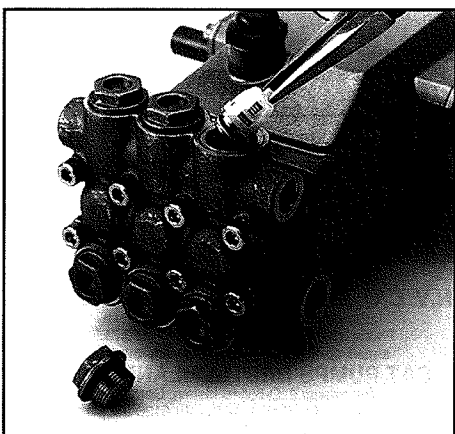
NOTE: Inlet and discharge valve parts are interchangeable. Two Valve Kits are needed for complete valve change.

5. Grasp new Valve Assembly by the tab at the top with a pliers, immerse in oil and push into each valve chamber. Be certain valve assembly is completely seated in valve chamber.

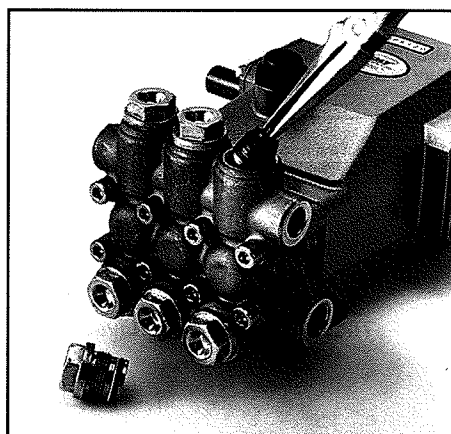
NOTE: For certain applications apply liquid gasket to the o-ring crevices and seal surfaces. See Tech Bulletin 053 for model identification.

NOTE: EPDM elastomers require Silicone-base lubricant.

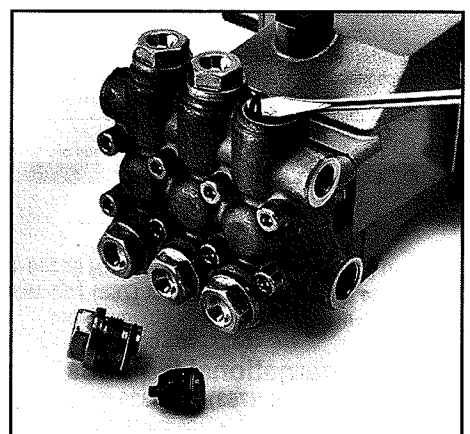
6. Apply Loctite 242 to the threads of each Valve Plug, thread into valve port and torque per chart.



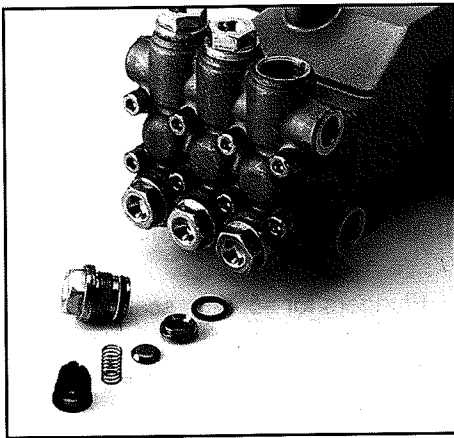
3CP1120, 5CP2120W, 7CP6170
Removal of Valve Assembly



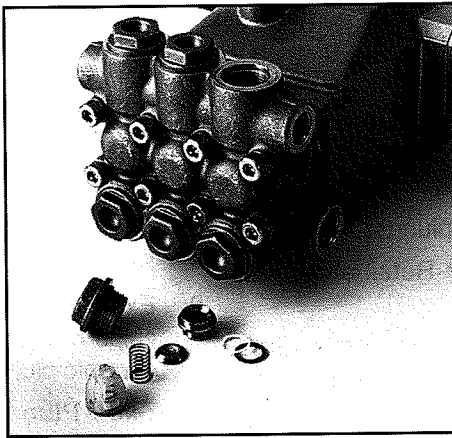
5CP3120, 5CP5120, 5CP5150
Removal of Valve Assembly



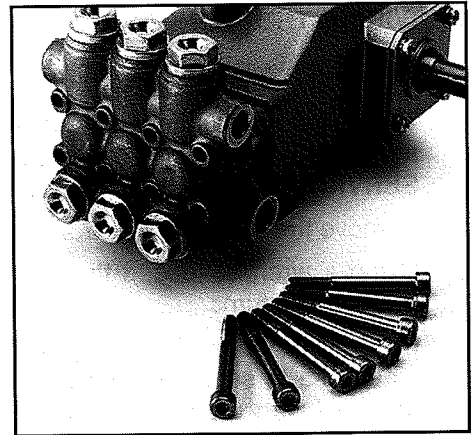
All Models
Removal of Valve Seat O-Ring



3CP1120, 5CP3120, 5CP5120
Complete Valve Assembly



5CP2120W, 5CP6120, 7CP6170
Complete Valve Assembly



All Models
Removal of Socket Head Screws

SERVICING THE PUMPING SECTION

Disassembly

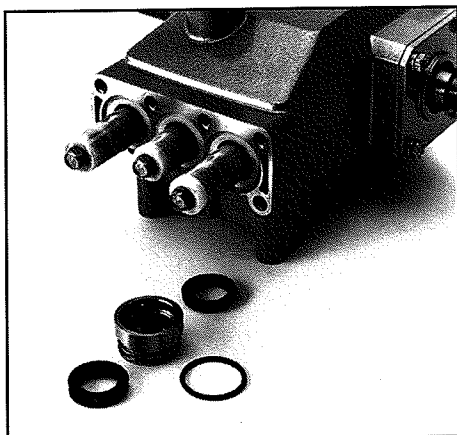
1. Using an allen wrench, remove the Socket Head Screws from the Manifold Head.
2. Rotate Crankshaft by hand to start separation of Manifold Head from Crankcase.
3. Insert two flat head screwdrivers on opposite sides to further separate Manifold Head from Crankcase. Support the underside of the Manifold Head and tap lightly with a mallet on the backside of the Manifold Head.

CAUTION: KEEP MANIFOLD PROPERLY ALIGNED WITH CERAMIC PLUNGERS WHEN REMOVING TO AVOID DAMAGE TO THE PLUNGERS.

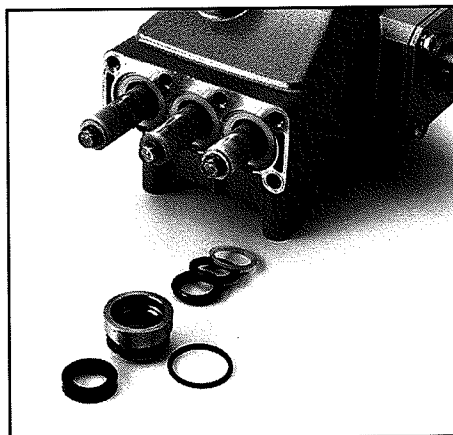
4. Remove the Seal Retainer from each plunger rod and examine for wear.
5. Examine Ceramic Plunger for cracks or scoring. Refer to **SERVICING THE PLUNGERS** if replacement is needed.

Reassembly

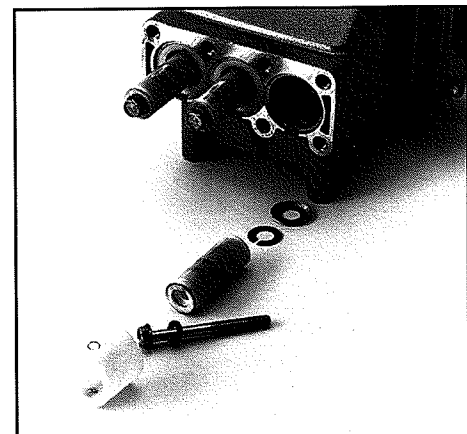
1. Generally Plungers do not need to be replaced. Clean plungers and remove any foreign material with a non-abrasive cleaner.
2. Install Seal Retainer over Plungers with small tab facing down and holes facing forward towards manifold head.
3. Rotate the crankshaft so the two outside plungers are extended the same distance.
4. Lightly lubricate the Plungers and carefully slide the Manifold Head onto the Plungers supporting from the underside. On the high pressure V-Packing models or larger manifolds, it may be necessary to gently tap with a soft mallet until the Manifold Head is flush with the Crankcase.
5. Replace Socket Head Screws and torque per chart.



3CP1120, 5CP2120W, 5CP6120
Seal Arrangement



5CP3120, 5CP5120, 5CP5150, 7CP6170
Seal Arrangement



All Models except 7CP6170
Plunger Arrangement

SERVICING THE PLUNGERS

Disassembly

1. To service the plungers, it is necessary to remove the manifold head. Follow disassembly procedure for **SERVICING THE PUMPING SECTION.**
2. Remove the Seal Retainer from each plunger rod.
3. Using a wrench, loosen the Plunger Retainer about three to four turns.
4. Push the Ceramic Plunger back towards the crankcase to separate from the Plunger Retainer and proceed with unthreading the Plunger Retainer by hand.
5. Remove the Plunger Retainer, Seal Washer, Ceramic Plunger, Keyhole Washer and Barrier Slinger from each Plunger Rod.
6. On the model 7CP6170 remove the Plunger Retainer, Stud, Gasket, O-Ring, Back-up Ring, Ceramic Plunger and Barrier Slinger from each Plunger Rod.

Reassembly

1. Visually inspect Crankcase Oil Seals for deterioration or leaks and contact factory for assistance with replacement.
2. Replace Barrier Slinger if damaged and slide onto Plunger Rod **with concave side away from Crankcase.**
3. Examine Sealing Washer for cuts or wear and replace as needed.
4. On the model 7CP6170 examine Gaskets, O-Rings and Back-up Rings for cuts or wear and replace as needed.
5. Examine Plunger Retainers and Studs for wear or damaged threads and replace as needed.
6. On the model 7CP6170 install Gaskets first, then O-Rings and Back-up Rings onto the Plunger Retainer.

NOTE: Lubricate O-Rings and Back-up Rings for ease in installation and to reduce possible damage.

7. All other models, lubricate and install Sealing Washer onto Plunger Retainer.
8. On the model 7CP6170 apply Loctite 242 to one end of threaded Plunger Retainer Stud and secure to Plunger Retainer.
9. Examine Ceramic Plungers for scoring, scale build-up, chips or cracks and replace as needed. Generally the ceramic plungers do not need to be replaced.
10. Slide Plunger Retainer Assembly into flat end of Ceramic Plunger.
11. Apply Loctite 242 to exposed threaded end of Plunger Retainer.
12. Install Ceramic Plunger with Plunger Retainer onto each Plunger Rod shoulder and thread Plunger Rod. Torque to specifications per chart.

NOTE: Ceramic Plungers can only be installed in one direction. Counterbore end of Ceramic Plunger to fit over Plunger Rod shoulder.

13. Install Seal Retainers with small tabs facing down and holes facing forward towards manifold head.
14. Proceed with servicing the seals or remounting of Manifold Head as described.

SERVICING THE SEALS AND V-PACKINGS

Disassembly

1. Remove the Manifold Head as described in **SERVICING THE PUMPING SECTION**.
2. Place the **Crankcase side of manifold facing up** and with a reverse pliers, remove the Lo-Pressure Seal from the Seal Case.
3. Using a reverse pliers, remove the press-in style Seal Case from the Manifold Head.
4. Remove the O-Ring from O.D. of Seal Case.
5. **Hi-Pressure Seal Models:** The Hi-Pressure Seal is generally easily removed from the manifold without any tools. If extremely worn, a reverse pliers may be used.
6. **V-Packing Models:** The V-Packings and Male Adapter are easily removed from the manifold without any tools. If extremely worn, a reverse pliers may be used.

Reassembly

NOTE: If your pump has been built with special seals and O-Rings, service with same type. Refer to pump Data Sheet for correct parts or kits.

V-Packing Models:

1. Lubricate each seal chamber in manifold head.
NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin 053 for model identification.
NOTE: EPDM elastomers require silicone-base lubricant.
2. Insert Male Adapter with **notches down** and **"v" side up** and press completely into each seal chamber by hand.
3. Lubricate V-Packings and install one at a time with **grooved side down** into each seal chamber.
4. Examine Seal Case O-Ring and replace if worn. Lubricate new O-Rings before installing.
5. Press Seal Case into each seal chamber until completely seated.

Hi-Pressure Seal Models:

1. Lubricate each seal chamber in manifold head.
NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin 053 for model identification.
NOTE: EPDM elastomers require silicone-base lubricant.
2. Carefully square Hi-Pressure Seal into position by hand with the **grooved side down** (metal back facing out) and press into each seal chamber until completely seated.
3. Examine Seal Case O-Rings and replace if worn. Lubricate new O-Ring before installing.
4. Press the Seal Case into each seal chamber until completely seated.

Lo-Pressure Seal-All Models:

1. Examine Lo-Pressure Seals for wear to the internal ridges, outer surfaces or for broken springs and replace as needed.
2. Install Lo-Pressure Seal into Seal Case with **garter spring down**.
3. All Models: Install Seal Retainer over Plungers with small tabs facing down and holes facing forward towards manifold head.
4. Replace Manifold Head onto pump as described under **SERVICING THE PUMPING SECTION** and torque per chart.

SERVICING THE CRANKCASE SECTION

1. While Manifold Head, Plungers and Seal Retainers are removed, examine Crankcase Oil Seals for leaking and wear.
2. Check for any signs of leaking at Rear Cover, Drain Plug, Bubble Gauge and Dipstick (7CP6170).
3. Check oil level and for evidence of water in oil. Change crankcase oil on a regular schedule. See Preventative Maintenance Check-List.
4. Rotate Crankshaft by hand to feel for smooth bearing movement.
5. Examine Crankshaft Oil Seal externally for drying, cracking or leaking.
6. Contact CAT PUMPS or your local distributor if crankcase service is evidenced.

PREVENTATIVE MAINTENANCE CHECK-LIST

Check	Daily	Weekly	50 hrs.	500 hrs.*	1500 hrs.**	3000 hrs.**
Clean Filters	x					
Oil Level/Quality	x					
Oil Leaks	x					
Water Leaks	x					
Belts, Pulley		x				
Plumbing		x				
Initial Oil Change			x			
Oil Change				x		
Seal Change					x	
Valve Change						x
Accessories					x	

* If other than CAT PUMPS special multi-viscosity ISO68 oil is used, change cycle should be every 300 hours.

** Each system's maintenance cycle will be exclusive. If system performance decreases, check immediately. If no wear at 1500 hours, check again at 2000 hours and each 500 hours until wear is observed. Valves typically require changing every other seal change.

Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all effect the life of pump wear parts and service cycle.

** Remember to service the regulator/unloader at each seal servicing and check all system accessories and connections before resuming operation.

Refer to video for additional assistance.

INLET CONDITION CHECK-LIST

Review Before Start-Up

Inadequate inlet conditions can cause serious malfunctions in the best designed pump. Surprisingly, the simplest of things can cause the most severe problems or go unnoticed to the unfamiliar or untrained eye. REVIEW THIS CHECK-LIST BEFORE OPERATION OF ANY SYSTEM. Remember, no two systems are alike, so there can be no **ONE** best way to set-up a system. All factors must be carefully considered.

INLET SUPPLY should exceed the maximum flow being delivered by the pump to assure proper performance.

- ☐ Open inlet shut-off valve and turn on water supply to avoid starving pump. **DO NOT RUN PUMP DRY.**
- ☐ Temperatures above 130°F are permissible. Add 1/2 PSI inlet pressure per each degree F over 130°F. Elastomer or RPM changes may be required. See Tech Bulletin 002 or call CAT PUMPS for recommendations.
- ☐ Avoid closed loop systems especially with high temperature, ultra-high pressure or large volumes. Conditions vary with regulating/unloader valve.
- ☐ Low vapor pressure liquids, such as solvents, require a booster pump and C.A.T. to maintain adequate inlet supply.
- ☐ Higher viscosity liquids require a positive head and a C.A.T. to assure adequate inlet supply.
- ☐ Higher temperature liquids tend to vaporize and require positive heads and C.A.T. to assure adequate inlet supply.
- ☐ When using an inlet supply reservoir, size it to provide adequate liquid to accommodate the maximum output of the pump, generally a minimum of 6-10 times the GPM (however, a combination of system factors can change this requirement); provide adequate baffling in the tank to eliminate air bubbles and turbulence; install diffusers on all return lines to the tank.

INLET LINE SIZE should be adequate to avoid starving the pump.

- ☐ Line size must be a minimum of one size larger than the pump inlet fitting. Avoid tees, 90 degree elbows or valves in the inlet line of the pump to reduce the risk of flow restriction and cavitation.
- ☐ The line **MUST** be a FLEXIBLE hose, NOT a rigid pipe, and reinforced on SUCTION systems to avoid collapsing.
- ☐ The simpler the inlet plumbing the less the potential for problems. Keep the length to a minimum, the number of elbows and joints to a minimum (ideally no elbows) and the inlet accessories to a minimum.
- ☐ Use pipe sealant to assure air-tight, positive sealing pipe joints.

INLET PRESSURE should fall within the specifications of the pump.

- ☐ Acceleration loss of liquids may be increased by high RPM, high temperatures, low vapor pressures or high viscosity and may require pressurized inlet and C.A.T. to maintain adequate inlet supply. **DO NOT USE C.A.T. WITH SUCTION INLET.**
- ☐ Optimum pump performance is obtained with +20 PSI (1.4 BAR) inlet pressure and a C.A.T. for certain applications. With adequate inlet plumbing, most pumps will perform with flooded suction. Maximum inlet pressure is 60 PSI (4 BAR).
- ☐ After prolonged storage, pump should be rotated by hand and purged of air to facilitate priming. Disconnect the discharge port and allow liquid to pass through pump and measure flow.

INLET ACCESSORIES are offered to protect against over pressurization, contamination or temperature and control flow.

- ☐ A shut-off valve is recommended to facilitate maintenance.
- ☐ Installation of a C.A.T. is essential in applications with stressful conditions such as high temperatures, booster pump feed or long inlet lines. **Do not use C.A.T. with negative inlet pressure.**
- ☐ A stand pipe can be used in some applications to help maintain a positive head at the pump inlet line.
- ☐ Inspect and clean inlet filters on a regular schedule to avoid flow restriction.
- ☐ A pressure transducer is necessary to accurately read inlet pressure. **Short term, intermittent cavitation will not register on a standard gauge.**
- ☐ All accessories should be sized to avoid restricting the inlet flow.
- ☐ All accessories should be compatible with the solution being pumped to prevent premature failure or malfunction.
- ☐ Optional inlet protection can be achieved by installing a pressure cut off switch between the inlet filter and the pump to shut off pump when there is no positive inlet pressure.

BY-PASS TO INLET Care should be exercised when deciding the method of by-pass from control valves.

- ☐ It is recommended the by-pass be directed to a baffled reservoir tank, with at least one baffle between the by-pass line and the inlet line to the pump.
- ☐ Although not recommended, by-pass liquid may be returned to the inlet line of the pump if the system is properly designed to protect your pump. When a pulsation dampener is used, a PRESSURE REDUCING VALVE must be installed on the inlet line (**BETWEEN THE BY-PASS CONNECTION AND THE INLET TO THE PUMP**) to avoid excessive pressure to the inlet of the pump. It is also recommended that a THERMO VALVE be used in the by-pass line to monitor the temperature build-up in the by-pass loop to avoid premature seal failure.
- ☐ A reinforced, flexible, low pressure hose rated up to 300 PSI should be used for routing by-pass back to the pump inlet.
- ☐ Caution should be exercised not to undersize the by-pass hose diameter and length. Refer to Technical Bulletin 064 for additional information on the size and length of the by-pass line.
- ☐ Check the pressure in the by-pass line to avoid over pressurizing the inlet.
- ☐ The by-pass line should be connected to the pump inlet line at a gentle angle of 45° or less and no closer than 10 times the pump inlet port diameter e.g. 1-1/2" port size = 15" distance from pump inlet port.

TORQUE CHART

Pump Item Pump Model	Thread	Tool Size [P/N]	Torque in.lbs. ft.lbs. Nm		
Plunger Retainer	M6	M10 Hex [25082]	55	4.4	6.2
Manifold Screw	M8	M6 Allen [30941]	115	9.58	13
Valve Plugs					
3CP, 5CP	M22	M24 Hex [44046]	870	72.5	98
7CP	M26	M27 Hex [44045]	870	72.5	98
Bearing Cover Screws					
3CP	M6	M10 Hex./Phil. [25082]	50	4.0	5.4
5CP, 7CP	M8	M13 Hex [25324]	115	9.58	13
Rear Cover Screws	M6	M10 Hex./Phil. [25082]	50	4.0	5.4
Connecting Rod Screws	M7	M10 Hex [25082]	95	8.0	11
Bubble Oil Gauge	M28	Oil Gauge Tool [44050]	45	3.8	5
Direct Mount Bolts	M8	M13 Hex [25324]	115	9.58	13

TECHNICAL BULLETIN REFERENCE CHART

No.	Subject	Models
002	Inlet Pressure VS Liquid Temperature	All Models
003	Power Unit Drive Packages	3PFR - 68PFR, 10FR - 60FR
024	Lubrication of Lo-Pressure Seals	All Models
036	Cylinder and Plunger Reference Chart	All Models
043	LPS and HPS Servicing	All Plunger Models
060	Baffle Assembly	34170
064	By-Pass Hose Sizing	All Unloaders/Regulators
074	Torque Chart	Piston and Plunger Pumps
077	Oil Drain Kit	All Models (except 2SF/4SF)
078	Field Retrofit Mounting	5CP
083	Winterizing a Pump	All Models

HOSE FRICTION LOSS

Water* Flow Gal/Min	PRESSURE DROP IN PSI PER 100 FT OF HOSE WITH TYPICAL WATER FLOW RATES Hose Inside Diameters, Inches						
	1/4	5/16	3/8	1/2	5/8	3/4	1"
0.5	16	5	2				
1	54	20	7	2			
2	180	60	25	6	2		
3	380	120	50	13	4	2	
4		220	90	24	7	3	
5		320	130	34	10	4	
6			220	52	16	7	1
8			300	80	25	10	2
10			450	120	38	14	3
15			900	250	80	30	7
20			1600	400	121	50	12
25				650	200	76	19
30					250	96	24
40					410	162	42
50					600	235	62
60						370	93

*At a fixed flow rate with a given size hose, the pressure drop across a given hose length will be directly proportional. A 50 ft. hose will exhibit one-half the pressure drop of a 100 ft. hose. Above values shown are valid at all pressure levels.

WATER LINE PRESSURE LOSS PRESSURE DROP IN PSI PER 100 FEET

Water GPM	Steel Pipe—Nominal Dia.					Brass Pipe—Nominal Dia.					Copper Tubing O.D. Type L				
	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
1	8.5	1.9						6.0	1.6						120
2	30	7.0	2.1					20	5.6	1.8					400
3	60	14	4.5	1.1				40	11	3.6					94
5	150	36	12	2.8				100	28	9.0	2.2				230
8	330	86	28	6.7	1.9			220	62	21	5.2	1.6			500
10	520	130	43	10	3.0			320	90	30	7.8	2.4			180
15	270	90	21	6.2	1.6			190	62	16	5.0	1.5			120
25	670	240	56	16	4.2	2.0		470	150	40	12	3.8	1.7		330
40			66	17	8.0				39	11	5.0				550
60															
80															
100															

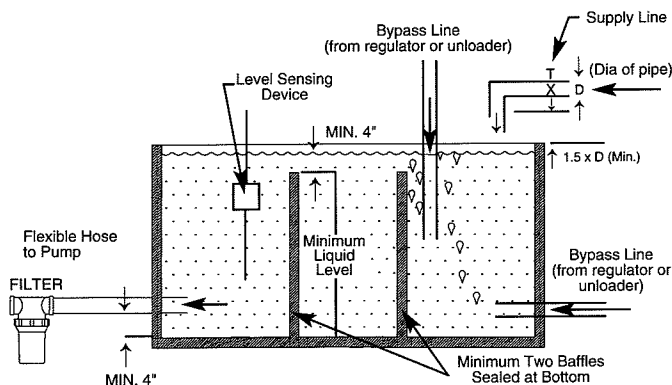
RESISTANCE OF VALVES AND FITTINGS

Nominal Pipe Size Inches	Inside Diameter Inches	Equivalent Length of Standard Pipe in Feet							
		Gate Valve	Globe Valve	Angle Valve	45° Elbow	90° Elbow	180° Close Ret	Tee Thru Run	Tee Thru Branch
1/2	0.622	0.41	18.5	9.3	0.78	1.67	3.71	0.93	3.33
3/4	0.824	0.54	24.5	12.3	1.03	2.21	4.90	1.23	4.41
1	1.049	0.69	31.2	15.6	1.31	2.81	6.25	1.56	5.62
1 1/4	1.380	0.90	41.0	20.5	1.73	3.70	8.22	2.06	7.40
1 1/2	1.610	1.05	48.0	24.0	2.15	4.31	9.59	2.40	8.63
2	2.067	1.35	61.5	30.8	2.59	5.55	12.30	3.08	11.60
2 1/2	2.469	1.62	73.5	36.8	3.09	6.61	14.70	3.68	13.20
3	3.068	2.01	91.5	45.8	3.84	8.23	18.20	4.57	16.40
4	4.026	2.64	120.0	60.0	5.03	10.80	23.90	6.00	21.60

Arriving at a total line pressure loss, consideration should then be given to pressure loss created by valves, fittings and elevation of lines.

If a sufficient number of valves and fittings are incorporated in the system to materially affect the total line loss, add to the total line length, the equivalent length of line of each valve or fitting.

TYPICAL RESERVOIR TANK RECOMMENDED 6 TO 10 TIMES SYSTEM CAPACITY



Handy Formulas to Help You

Q. How can I find the RPM needed to get specific GPM (Gallons Per Minute) I want?

$$A. \text{Desired RPM} = \text{Desired GPM} \times \frac{\text{Rated RPM}}{\text{Rated GPM}}$$

Q. I have to run my pump at a certain RPM. How do I figure the GPM I'll get?

$$A. \text{Desired GPM} = \text{Desired RPM} \times \frac{\text{Rated GPM}}{\text{Rated RPM}}$$

Q. Is there a simple way to find the approximate horsepower I'll need to run the pump?

$$A. \text{Electric Brake Horsepower Required} = \frac{\text{GPM} \times \text{PSI}}{1460} \quad (\text{Standard 85\% Mech. Efficiency})$$

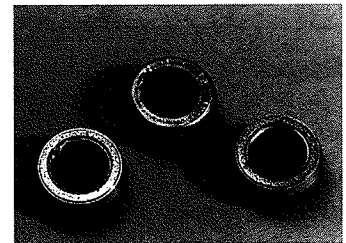
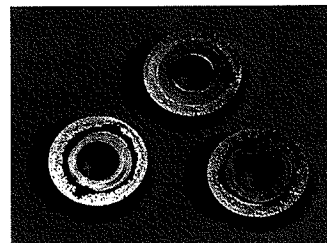
Q. What size motor pulley should I use?

$$A. \text{Pump Pulley (Outer Diameter)} \times \frac{\text{Pump RPM}}{\text{Motor/Engine RPM}} \quad (\text{Consult Engine Mfr.})$$

Q. How do I calculate the torque for my hydraulic drive system?

$$A. \text{Torque (ft. lbs.)} = 3.6 \left(\frac{\text{GPM} \times \text{PSI}}{\text{RPM}} \right)$$

Avoid Cavitation Damage



One or several of the conditions shown in the chart below may contribute to cavitation in a system resulting in premature wear, system downtime and unnecessary operating costs.

CONDITION	SOLUTION
Inadequate inlet line size	• Increase line size to the inlet port or one size larger
Water hammering liquid acceleration/deacceleration	• Install C.A.T. Tube • Move pump closer to liquid supply
Rigid Inlet Plumbing	• Use flexible wire reinforced hose to absorb pulsation and pressure spikes
Excessive Elbows in Inlet Plumbing	• Keep elbows to a minimum and less than 90°
Excessive Liquid Temperature	• Use Thermo Valve in bypass line • Do not exceed pump temperature specifications • Substitute closed loop with baffled holding tank • Adequately size tank for frequent or high volume bypass • Pressure feed high temperature liquids • Properly ventilate cabinets and rooms
Air Leaks in Plumbing	• Check all connections • Use Teflon tape
Agitation in Supply Tank	• Size tank according to pump output — Minimum 6-10 times system GPM • Baffle tank to purge air from liquid and separate inlet from discharge
High Viscosity Liquids	• Verify viscosity against pump specifications before operation • Elevate liquid temperature enough to reduce viscosity • Lower RPM of pump • Pressure feed pump • Increase inlet line size
Clogged Filters	• Perform regular maintenance or use clean filters to monitor build up • Use adequate mesh size for liquid and pump specifications

DIAGNOSIS AND MAINTENANCE

One of the most important steps in a high pressure system is to establish a regular maintenance program. This will vary slightly with each system and is determined by various elements such as the duty cycle, the liquid being pumped, the actual specifications vs rated specifications of the pump, the ambient conditions, the inlet conditions and the accessories in the system. A careful review of the necessary inlet conditions and protection devices required before the system is installed will eliminate many potential problems.

CAT PUMPS are very easy pumps to service and require far less frequent service than most pumps. Typically, only common tools are required, making in-field service convenient, however, there are a few custom tools, special to certain models, that do simplify the process. This service manual is designed to assist you with the disassembly and reassembly of your pump. The following guide will assist in determining the cause and remedy to various operating conditions. You can also review our **FAQ** or **SERVICE** sections on our **WEB SITE** for more facts or contact CAT PUMPS directly.

PROBLEM	PROBABLE CAUSE	SOLUTION
Low pressure	<ul style="list-style-type: none"> •Worn nozzle. •Belt slippage. •Air leak in inlet plumbing. •Pressure gauge inoperative or not registering accurately. •Relief valve stuck, partially plugged or improperly adjusted. •Inlet suction strainer (filter) clogged or improperly sized. •Abrasives in pumped liquid. •Leaky discharge hose. •Inadequate liquid supply. •Severe cavitation. •Worn seals. •Worn or dirty inlet/discharge valves. 	<ul style="list-style-type: none"> •Replace with properly sized nozzle. •Tighten belt(s) or install new belt(s). •Tighten fittings and hoses. Use PTFE liquid or tape. •Check with new gauge. Replace worn or damaged gauge. •Clean/adjust relief valve. Replace worn seats/valves and o-rings. •Clean filter. Use adequate size filter. Check more frequently. •Install proper filter. •Replace discharge hose with proper rating for system. •Pressurize inlet and install C.A.T. •Check inlet conditions. •Install new seal kit. Increase frequency of service. •Clean inlet/discharge valves or install new valve kit.
Pulsation	<ul style="list-style-type: none"> •Faulty Pulsation Dampener. •Foreign material trapped in inlet/discharge valves. 	<ul style="list-style-type: none"> •Check precharge. If low, recharge, or install a new dampener. •Clean inlet/discharge valves or install new valve kit.
Water leak		
•Under the manifold	<ul style="list-style-type: none"> •Worn V-Packings, Hi-Pressure or Lo-Pressure Seals. •Worn adapter o-rings. 	<ul style="list-style-type: none"> •Install new seal kit. Increase frequency of service. •Install new o-rings.
•Into the crankcase	<ul style="list-style-type: none"> •Humid air condensing into water inside the crankcase. •Excessive wear to seals and V-Packings. 	<ul style="list-style-type: none"> •Install oil cap protector. Change oil every 3 months or 500 hours. •Install new seal kit. Increase frequency of service.
Knocking noise		
•Inlet supply	<ul style="list-style-type: none"> •Inadequate inlet liquid supply. 	<ul style="list-style-type: none"> •Check liquid supply. Increase line size, pressurize or install C.A.T.
•Bearing	<ul style="list-style-type: none"> •Broken or worn bearing. 	<ul style="list-style-type: none"> •Replace bearing.
•Pulley	<ul style="list-style-type: none"> •Loose pulley on crankshaft 	<ul style="list-style-type: none"> •Check key and tighten set screw.
Oil leak		
•Crankcase oil seals.	<ul style="list-style-type: none"> •Worn crankcase oil seals. 	<ul style="list-style-type: none"> •Replace crankcase oil seals.
•Crankshaft oil seals and o-rings.	<ul style="list-style-type: none"> •Worn crankshaft oil seals or o-rings on bearing cover. 	<ul style="list-style-type: none"> •Remove bearing cover and replace o-rings and/or oil seals.
•Drain plug	<ul style="list-style-type: none"> •Loose drain plug or worn drain plug o-ring. 	<ul style="list-style-type: none"> •Tighten drain plug or replace o-ring.
•Bubble gauge	<ul style="list-style-type: none"> •Loose bubble gauge or worn bubble gauge gasket. 	<ul style="list-style-type: none"> •Tighten bubble gauge or replace gasket.
•Rear cover	<ul style="list-style-type: none"> •Loose rear cover or worn rear cover o-ring. 	<ul style="list-style-type: none"> •Tighten rear cover or replace o-ring.
•Filler cap	<ul style="list-style-type: none"> •Loose filler cap or excessive oil in crankcase. 	<ul style="list-style-type: none"> •Tighten filler cap. Fill crankcase to specified capacity.
Pump runs extremely rough		
•Inlet conditions	<ul style="list-style-type: none"> •Restricted inlet or air entering the inlet plumbing 	<ul style="list-style-type: none"> •Correct inlet size plumbing. Check for air tight seal.
•Pump valves	<ul style="list-style-type: none"> •Stuck inlet/discharge valves. 	<ul style="list-style-type: none"> •Clean out foreign material or install new valve kit.
•Pump seals	<ul style="list-style-type: none"> •Leaking V-Packings, Hi-Pressure or Lo-Pressure seals. 	<ul style="list-style-type: none"> •Install new seal kit. Increase frequency of service.
Premature seal failure	<ul style="list-style-type: none"> •Scored plungers. •Over pressure to inlet manifold. •Abrasive material in the liquid being pumped. •Excessive pressure and/or temperature of pumped liquid. •Running pump dry. •Starving pump of adequate liquid. •Eroded manifold. 	<ul style="list-style-type: none"> •Replace plungers. •Reduce inlet pressure per specifications. •Install proper filtration at pump inlet and clean regularly. •Check pressure and inlet liquid temperature. •DO NOT RUN PUMP WITHOUT LIQUID. •Increase hose one size larger than inlet port size. Pressurize and install C.A.T. •Replace manifold. Check liquid compatibility.

CAT PUMPS WARRANTY

This pump is warranted by the manufacturer to be free from defects in **workmanship** and **material** for ONE YEAR from date of manufacturer's shipment except:

- FIVE YEARS for 2SF, 4SF and 66DX pumps and all portable fresh water PRESSURE WASHER pumps.
- TWO YEARS for 2DX, 3DX, 3SP and all CAR WASH pumps except FIVE YEARS for 5CP2120W, 5CP2140WCS, 5CP2150W.
- SIX MONTHS for 1LX and all rebuilt pumps.
- 90 DAYS on Accessories.

The sole responsibility for warranty on all motors is that of their original manufacturers.

This warranty DOES NOT APPLY to malfunctions caused by the FAULT or NEGLIGENCE of the buyer or third party, including failure to perform periodic maintenance (oil, seal and valve change), to the IMPROPER USE of the pump as a component part, to failures reported to the manufacturer AFTER the WARRANTY PERIOD has EXPIRED, or to the NORMAL WEAR of standard wear items in the pump such as V-packings, seals, cups, o-rings, valves, etc.

This express warranty is in substitution for and in lieu of all other warranties, whether expressed or implied, including, without limitation, any warranties or merchantability or fitness for a particular purpose and all such warranties are hereby disclaimed and excluded by the manufacturer.

In order to take advantage of this warranty, you must first contact your local CAT PUMPS supplier for a Return Goods Authorization Number (763•780•5440,

Fax 763•780•2958). Any defective product must be returned **FREIGHT PREPAID** to CAT PUMPS, 1681 94th Lane N.E., Minneapolis, MN 55449 (or international office of origin) for examination and disposition. CAT PUMPS agrees to be responsible for return shipping costs on any approved warranty repair or replacement product with a carrier selected by CAT PUMPS. (Use original or comparable carton to avoid damage in shipment.) The serial number of the product will determine warranty date unless original purchase invoice can be provided.

The buyer agrees that the sole and exclusive remedy in law or in equity for breach of any and all warranties and the sole and exclusive remedy for the manufacturer's liability of any kind (including, without limitation, liability for negligence) with respect to the product and all other performance by the manufacturer will be limited to the REPAIR OF, OR AT MANUFACTURER'S OPTION, THE REPLACEMENT OF THE PRODUCT. Buyer further agrees that manufacturer will, in no event, have any responsibility or bear any liability for (a) the cost of labor for the removal of any defective product or the installation of any replacement product, or (b) the cost of transportation to the manufacturer of the defective products returned for evaluation. Finally, buyer agrees that the manufacturer shall not be liable for any other loss, damage or expense, including any special, incidental or consequential loss or damage (including, without limitation, lost profits), even if the manufacturer has been advised of the possibility of such potential loss or damage.

THIS WARRANTY IS SUBJECT TO THE FOLLOWING CONDITIONS:

- SPECIFICATIONS:** Pump operation must be within **RPM, Discharge Pressure and Inlet Pressure** specifications. **A pressure relief valve must be correctly installed in the system.**
- PUMPED LIQUIDS:** The warranty is VOID if pump operation commences without sufficient liquid to the pump. **Do not pump harsh acids or alkalines or abrasive liquids.** For pumped liquids below 5 pH or above 9 pH, liquids above 130°F or other questionable liquids, contact CAT PUMPS for additional information on alternative construction and installation.
- LUBRICATION:** The warranty is VOID if pump operation commences **without the proper amount of oil** in the crankcase, oil becomes **contaminated** or pump operates **without periodic oil changes as recommended.** Fill Gearboxes with required lubricant before initial start-up. Review individual service manual and data sheet for required amount of oil (lubricant) and maintenance cycle.
- TEMPERATURE:** Protect pump from freezing. Do not store in area with freezing conditions. Drain completely of pumped liquid. Flush with antifreeze. Do not operate pump which contains frozen liquid. Do not store or operate in excessively high temperature areas or without proper ventilation.

USE OF OTHER THAN CAT PUMPS PARTS VOIDS THE WARRANTY

This supercedes any and all previous warranty statements.

PREVENTATIVE MAINTENANCE CHECK-LIST

Check	Daily	Weekly	50 hrs.	500 hrs.*	1500 hrs.**	3000 hrs.**
Clean Filters	x					
Oil Level/Quality	x					
Oil Leaks	x					
Water Leaks	x					
Belts, Pulley		x				
Plumbing		x				
Initial Oil Change			x			
Oil Change				x		
Seal Change					x	
Valve Change						x
Accessories					x	

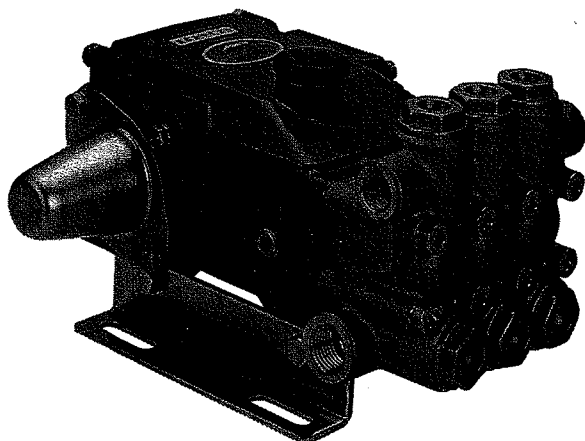
* If other than CAT PUMPS special multi-viscosity ISO68 oil is used, change cycle should be every 300 hours.

** Each system's maintenance cycle will be exclusive. If system performance decreases, check immediately. If no wear at 1500 hours, check again at 2000 hours and each 500 hours until wear is observed. Valves typically require changing every other seal change.

Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all effect the life of pump wear parts and service cycle.

** Remember to service the regulator/unloader at each seal servicing and check all system accessories and connections before resuming operation.

Refer to Service Manual and video for additional assistance.



FEATURES

Superior Design

- Triplex plunger design delivers smoother liquid flow.
- Hi-Pressure Seals are completely lubricated and cooled by the liquid being pumped.
- Inlet and discharge valve assemblies interchange for easier maintenance.
- Lubricated Lo-Pressure Seal provides double protection against external leakage.
- Oil bath crankcase assures optimum lubrication.
- Close tolerance concentricity of the ceramic plunger maximizes seal life.

Quality Materials

- Precision design 304 stainless steel valves and seats are hardened and polished for ultimate seating and extended valve life.
- Forged brass manifolds for strength and corrosion resistance.
- Special concentric, high-density, polished, solid ceramic plungers provide a true wear surface and extended seal life.
- Specially formulated, CAT PUMP exclusive, Hi-Pressure Seals offer unmatched performance and seal life.
- Die cast aluminum crankcase provides high strength, minimum weight and precision tolerance control.
- Chrome-moly crankshaft gives unmatched strength and surface hardness.
- Oversized crankshaft bearings with greater capacity mean longer bearing life.

Easy Maintenance

- Wet-end is easily serviced without entering crankcase, requiring less time and effort.
- Valve assemblies are accessible without disturbing piping, for quick service.
- Preset packings mean no packing gland adjustment is necessary, reducing maintenance costs.

⚠ WARNING

All systems require both a primary pressure regulating device (i.e., regulator, unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve). Failure to install such relief devices could result in personal injury or damage to the pump or to system components. CAT PUMPS does not assume any liability or responsibility for the operation of a customer's high pressure system.

3CP Plunger Pump

Models **3CP1120**
3CP1130
3CP1140

SPECIFICATIONS

U.S. Measure

Metric Measure

MODEL 3CP1120

Flow 4.2 GPM (16 L/M)
Pressure Range 100 to 2200 PSI (7 to 155 BAR)
RPM 1725 RPM (1725 RPM)
Stroke 0.500" (12.7 mm)

MODEL 3CP1120G — GEARBOX

Flow 3.5 GPM (13.2 L/M)
Pressure Range 100 to 2200 PSI (7 to 155 BAR)
RPM 3600 RPM (3600 RPM)
Stroke 0.512" (12.7 mm)

MODEL 3CP1130

Flow 2.4 GPM (9 L/M)
Pressure Range 100 to 2200 PSI (7 to 155 BAR)
RPM 1725 RPM (1725 RPM)
Stroke 0.276" (7 mm)

MODEL 3CP1140

Flow 3.6 GPM (13.6 L/M)
Pressure Range 100 to 2200 PSI (7 to 155 BAR)
RPM 1725 RPM (1725 RPM)
Stroke 0.433" (11 mm)

COMMON SPECIFICATIONS

Inlet Pressure Range Flooded to 70 PSI (Flooded to 4.9 BAR)
Bore 0.709" (18 mm)
Crankcase Capacity 11.8 oz. (0.35 L)
Maximum Liquid Temperature 160°F (71°C)
Above 130°F call CAT PUMPS for inlet conditions and elastomer recommendations.
Inlet Ports (2) 1/2" NPTF (1/2" NPTF)
Discharge Ports (2) 3/8" NPTF (3/8" NPTF)
Pulley Mounting Either Side (Either Side)
Shaft Diameter 0.650" (16.5 mm)
Weight 14.84 lbs. (6.7 kg)
Dimensions 9.1 x 8.77 x 5.47" (231 x 223 x 139 mm)

ELECTRIC HORSEPOWER REQUIREMENTS

MODEL	FLOW		PRESSURE				MOTOR PULLEY SIZE	
			PSI 1200	PSI 1500	PSI 2000	PSI 2200	Using 1750 RPM Motor 5.0" Pump Pulley O.D.	
	U.S. GPM	L/M	BAR 85	BAR 105	BAR 140	BAR 155	RPM	Pulley O.D.
3CP1120	4.2	16					1725	5.0
	3.5	13.2					1531	4.4
	3.0	11.4					1313	3.8
3CP1130	2.4	9					1725	Direct Drive
3CP1140	3.6	13.6					1725	Direct Drive
3CP1120G	3.5	13.2					1420	Gearbox

DETERMINING THE PUMP R.P.M.	Rated G.P.M.	=	"Desired" G.P.M.
	Rated R.P.M.	=	"Desired" R.P.M.
DETERMINING THE REQUIRED H.P.	GPM x PSI	=	Electric Brake
	1460	=	H. P. Required
DETERMINING MOTOR PULLEY SIZE	Motor Pulley O.D.	=	Pump Pulley O.D.
	Pump R.P.M.	=	Motor R.P.M.

See complete Drive Packages [Includes: Pulleys, Belts, Hubs, Key] Tech Bulletin 003.
Refer to pump **Service Manual** for repair procedure, additional technical information and **pump warranty**.

"Customer confidence is our greatest asset"

PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY
2	30047	STL	Key (M5x5x24)	1
5	92519	STZP	Screw, HHC Sems (M6x16)	8
8	46901	AL	Cover, Bearing	2
	48259	AL	Cover, Blind - 3CP1120G	1
10	14028	NBR	O-Ring, Bearing Cover - 70D	2
11	43222	NBR	Seal, Oil, Crankshaft	1/2
15	14480	STL	Bearing, Ball	2
20	48730	TNM	Rod, Connecting, Assembly [5/01]	3
25	46927	FCM	Crankshaft, Dual End - 3CP1120 (M12.7)	1
	46994	FCM	Crankshaft, Dual End - 3CP1130 (M7)	1
	46991	FCM	Crankshaft, Dual End - 3CP1140 (M11)	1
	48257	FCM	Crankshaft, Single End - 3CP1120G (M12.7)	1
32	46798	RTP	Cap, Oil Filler	1
33	14179	NBR	O-Ring, Oil Filler Cap - 70D	1
37	92241	—	Gauge, Oil, Bubble w/Gasket	1
38	44428	NBR	Gasket, Flat, Oil Gauge - 80D	1
40	92519	STZP	Screw, HHC Sems (M6x16)	4
48	25625	STCP	Plug, Drain (1/4"x19BSP)	1
49	23170	NBR	O-Ring, Drain Plug - 70D	1
50	46939	AL	Cover, Rear	1
51	14041	NBR	O-Ring, Rear Cover - 70D	1
53	48644	AL	Crankcase	1
64	46615	CM	Pin, Crosshead	3
65	48459	BBNP	Rod, Plunger	3
70	46839	NBR	Seal, Oil, Crankcase	3
75	43900	S	Slinger, Barrier	3
88	45697	S	Washer, Keyhole	3
90	46976	CC	Plunger (M18x43)	3
98	46730	NBR	Washer, Seal - 90D	3
	48394	FPM	Washer, Seal - 90D	3
99	48201	SSL	Retainer, Plunger w/Stud (M6)	3
100	46541	PVDF	Retainer, Seal	3
106	43243	NBR	Seal, LPS w/S-Spg	3
	44926	FPM	Seal, LPS w/SS-Spg	3
120	46625	BB	Case, Seal	3
121	13976	NBR	O-Ring, Seal Case - 70D	3
	48522	FPM	O-Ring, Seal Case	3
125	43245	SNG	Seal, HPS w/S	3
	44925	FPM	Seal, HPS w/SS	3
	46652	HT	Seal, HPS w/SS	3
139	43448	BB	Plug, Inlet (1/2"NPT)	1
163	17547	NBR	O-Ring, Seat - 85D	6
	11685	FPM	O-Ring, Seat - 85D	6
164	45790	S	Seat	6
166	43723	S	Valve	6
167	43750	S	Spring	6
168	44565	PVDF	Retainer, Spring	6
172	17615	NBR	O-Ring, Valve Plug - 75D	6
	15855	FPM	O-Ring, Valve Plug - 70D	6
174	46756	BB	Plug, Valve	6
185	46616	FBB	Manifold, Head	1
193	87870	STZP	Screw, HSH (M8x65)	8
196	22187	BBCP	Plug, Discharge (3/8"NPT)	1
250	118672	STCP	Protector, Shaft	1
260	30612	STZP	Mount, Rail Assy (Incls: 26246, 30901, 30910, 30920)	1
265	30641	—	Mount, Assy (Incls: 30612, 30032, 30047, 118672)	1
270	30246	STL	Assy, Pulley & Key (Incls: 30032, 30047)	1
			[See Drive Packages, Tech Bulletin 003]	
283	34334		Kit, Oil Drain	1
299	814841	FBB	Head, Complete	1
300	33983	NBR	Kit, Seal (Incls: 98, 106, 121, 125)	1
	33257	FPM	Kit, Seal (Incls: 98, 106, 121, 125)	1
	31983	HT	Kit, Seal (Incls: 98, 106, 121, 125)	1
310	33062	NBR	Kit, Valve (Incls: 163, 164, 166, 167, 168, 172)	2
	33258	FPM	Kit, Valve (Incls: 163, 164, 166, 167, 168, 172)	2
350	30696	STZP	Plier, Reverse	1
500	8075	—	Gearbox (See Individual Data Sheet)	1
—	6107	—	Oil, Bottle (21 oz.) ISO 68 Multi-viscosity Hydraulic (Fill to specified crankcase capacity prior to start-up)	1

Bold print part numbers are unique to a particular pump model. Italics are optional items. [] Date of latest production change.

See Tech Bulletins 002, 003, 024, 036, 064, 073, 074, 077 and 083 for additional information.

For motorized versions see BD motor data sheet. For Gearbox version see 8075 data sheet.

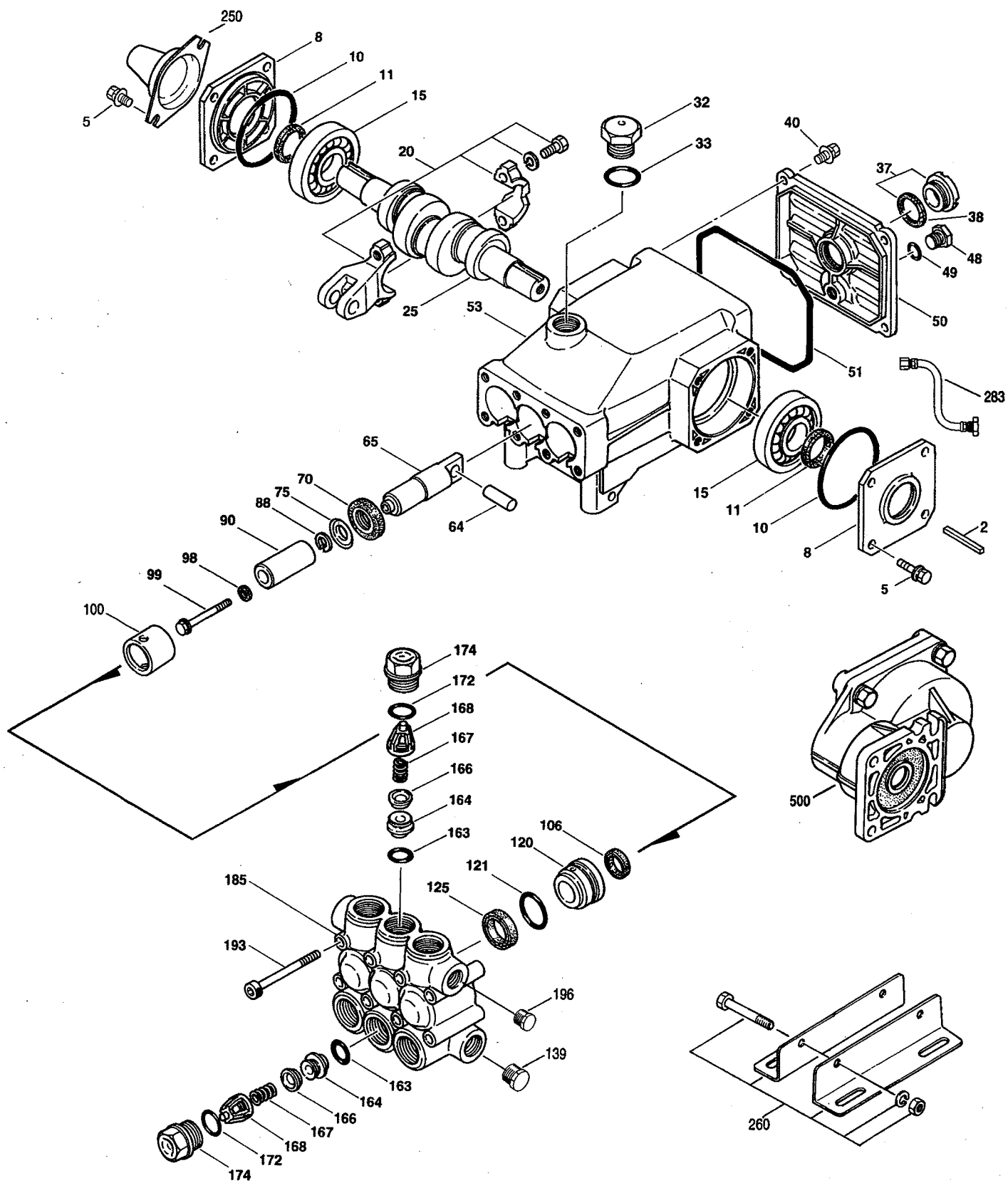
MATERIAL CODES (Not Part of Part Number): AL=Aluminum BB=Brass BBBCP=Brass/Chrome Plated BBNP=Brass Nickel Plated CC=Ceramic CM=Chrome-moly

FBB=Forged Brass FCM=Forged Chrome-Moly FPM=Fluorocarbon HT=Hi-Temp (EPDM Alternative)

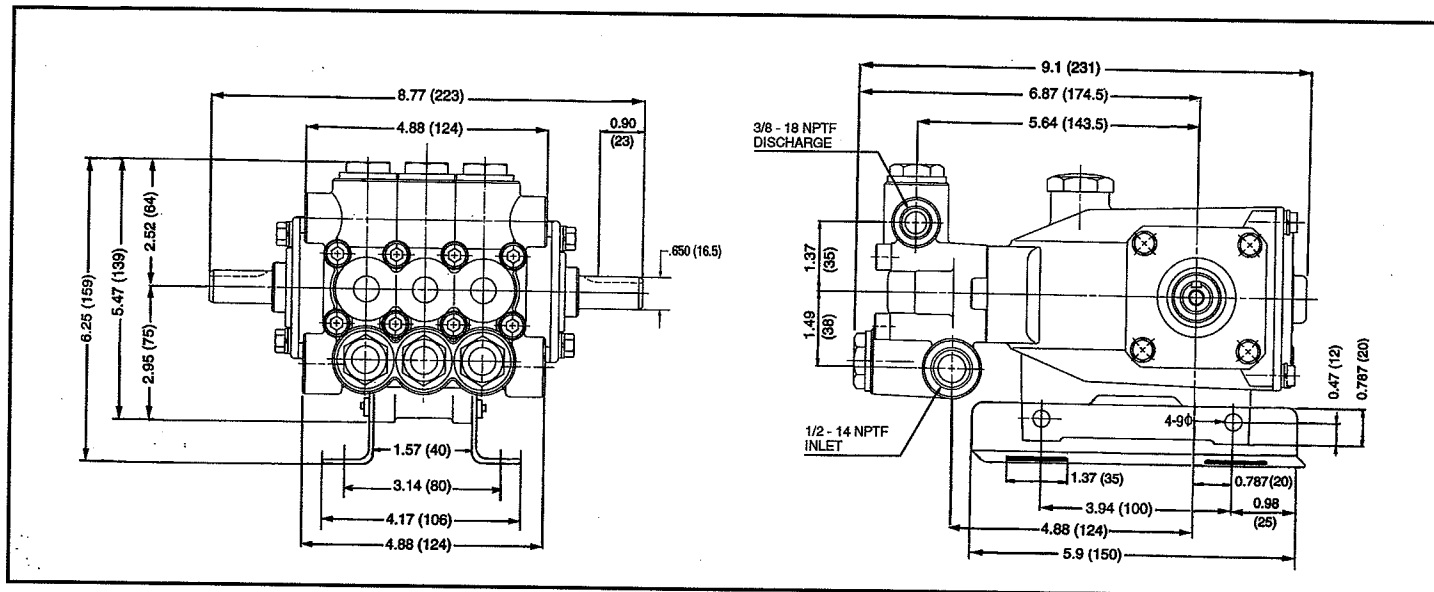
NBR=Medium Nitrile (Buna-N) PVDF=Fluoroplastic (High Strength) RTP=Reinforced Composite S=304SS SNG=Special Blend (Buna)

SSL=316SS/Low Carbon STL=Steel STCP=Steel/Chrome Plated STZP=Steel/Zinc Plated TNM=Special High Strength

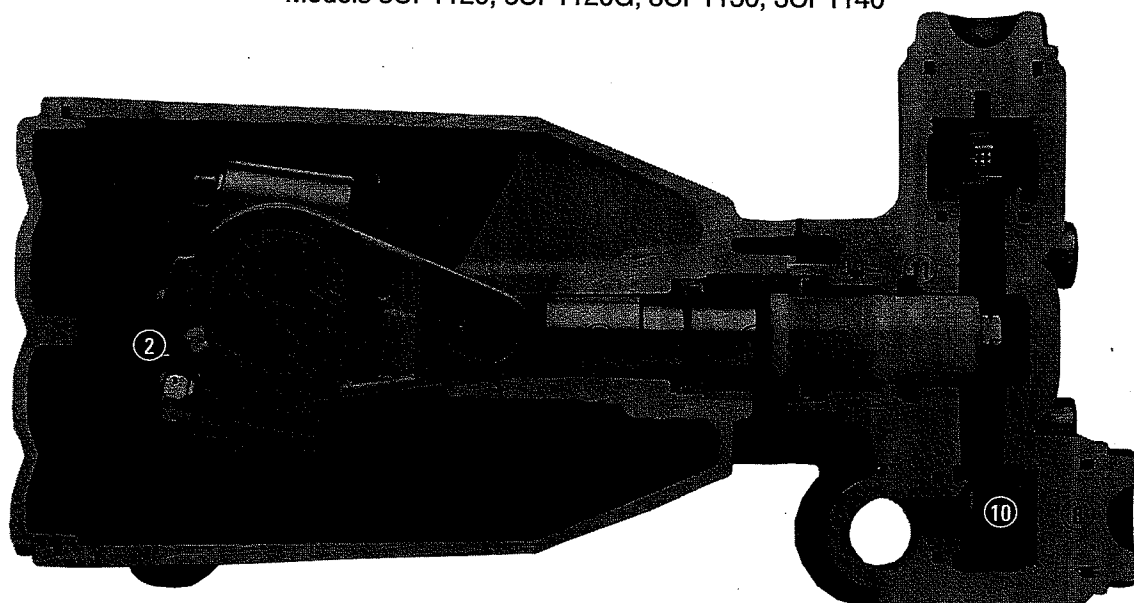
EXPLODED VIEW



Models
3CP1120, 3CP1120G,
3CP1130, 3CP1140
August 2005



Models 3CP1120, 3CP1120G, 3CP1130, 3CP1140



- 1 Die cast aluminum **crankcase** means high strength, lightweight, and excellent tolerance control.
- 2 Oversized crankshaft **bearings** provide extended bearing life and pump performance.
- 3 Chrome-moly **crankshaft** provides unmatched strength and surface hardness for long life.
- 4 Matched oversized TNM **connecting rods** noted for superior tensile strength and bearing quality.
- 5 The **plunger rods** are hardened, surface plated for wear resistance, with high load capacity.
- 6 The stainless steel **slinger** provides back-up protection for the crankcase seal, keeping pumped liquids out of the crankcase.
- 7 Special concentric, high-density, polished, solid ceramic **plungers** provide a true wear surface and extended seal life.
- 8 **Manifolds** are a high tensile strength forged brass for long term, continuous duty.
- 9 100% wet **seal** design adds to service life by allowing pumped liquids to cool and lubricate on both sides of the seals.
- 10 Stainless steel **valves, seats and springs** provide corrosion-resistance, ultimate seating and extended life.
- 11 Specially formulated, CAT PUMP exclusive, **Hi-Pressure Seals** offer unmatched performance and seal life.

Products described hereon are covered by one or more of the following U.S. patents 3558244, 3652188, 3809508, 3920356, 3930756 and 5035580

World Headquarters

CAT PUMPS

1681 - 94th Lane N.E. Minneapolis, MN 55449-4324

Phone (763) 780-5440 — FAX (763) 780-2958

e-mail: techsupport@catpumps.com

www.catpumps.com

International Inquiries

FAX (763) 785-4329

e-mail: intlsales@catpumps.com



The Pumps with Nine Lives

CAT PUMPS (U.K.) LTD.

1 Fleet Business Park, Sandy Lane, Church Crookham, Fleet

Hampshire GU52 8BF, England

Phone Fleet 44 1252-622031 — Fax 44 1252-626655

e-mail: sales@catpumps.co.uk

N.V. CAT PUMPS INTERNATIONAL S.A.

Heveldekens 6A, 2550 Kontich, Belgium

Phone 32-3-450.71.50 — Fax 32-3-450.71.51

e-mail: cpi@catpumps.be www.catpumps.be

CAT PUMPS DEUTSCHLAND GmbH

Buchwiese 2, D-65510 Idstein, Germany

Phone 49 6126-9303 0 — Fax 49 6126-9303 33

e-mail: catpumps@t-online.de www.catpumps.de

CDS 4.8 Machine Assemblies & Parts

CDS 4.8

Section 7-1

Figure 7-1 CDS 4.8 Machine Assembly - Front View

D-7145 Rev -

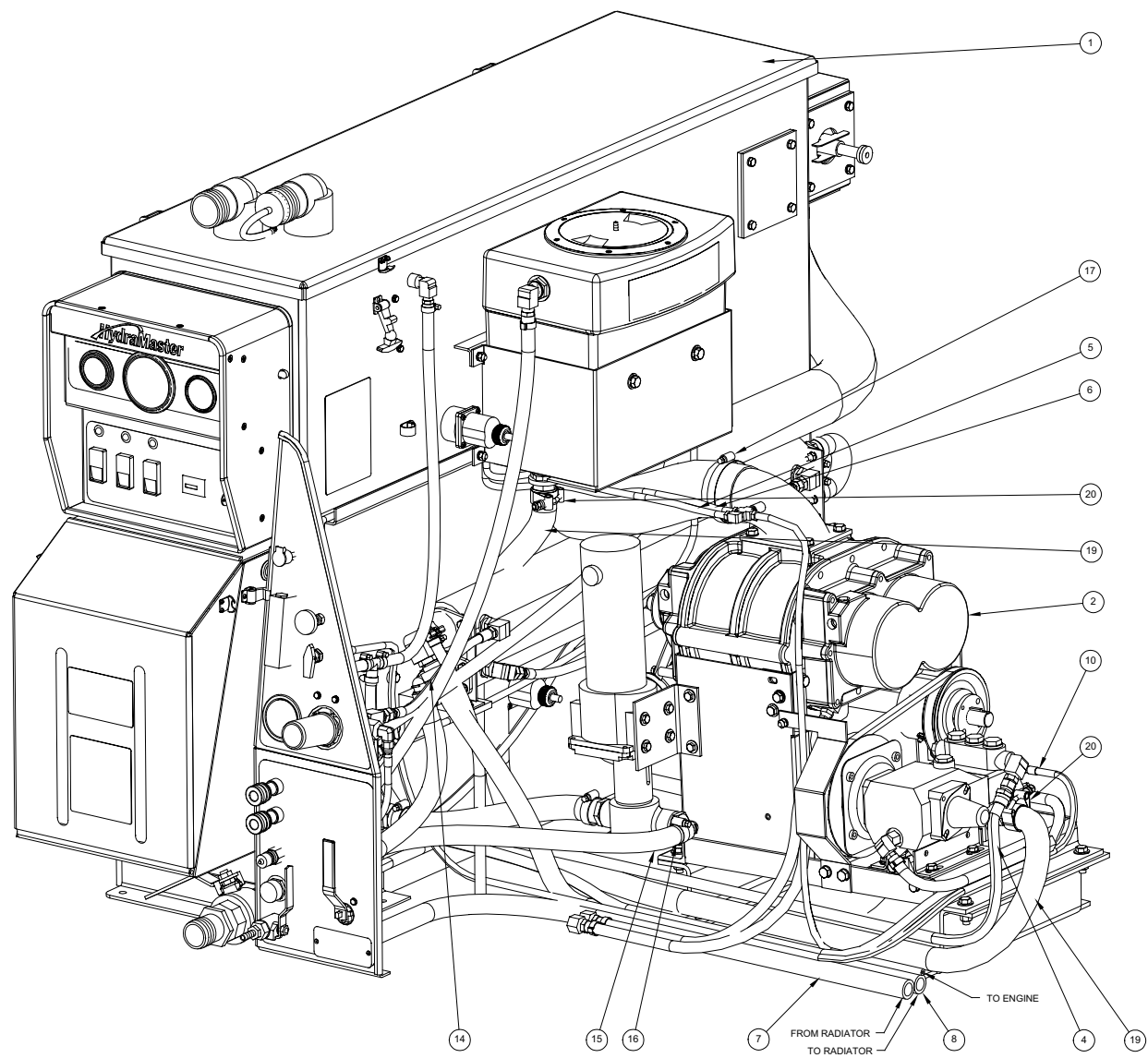
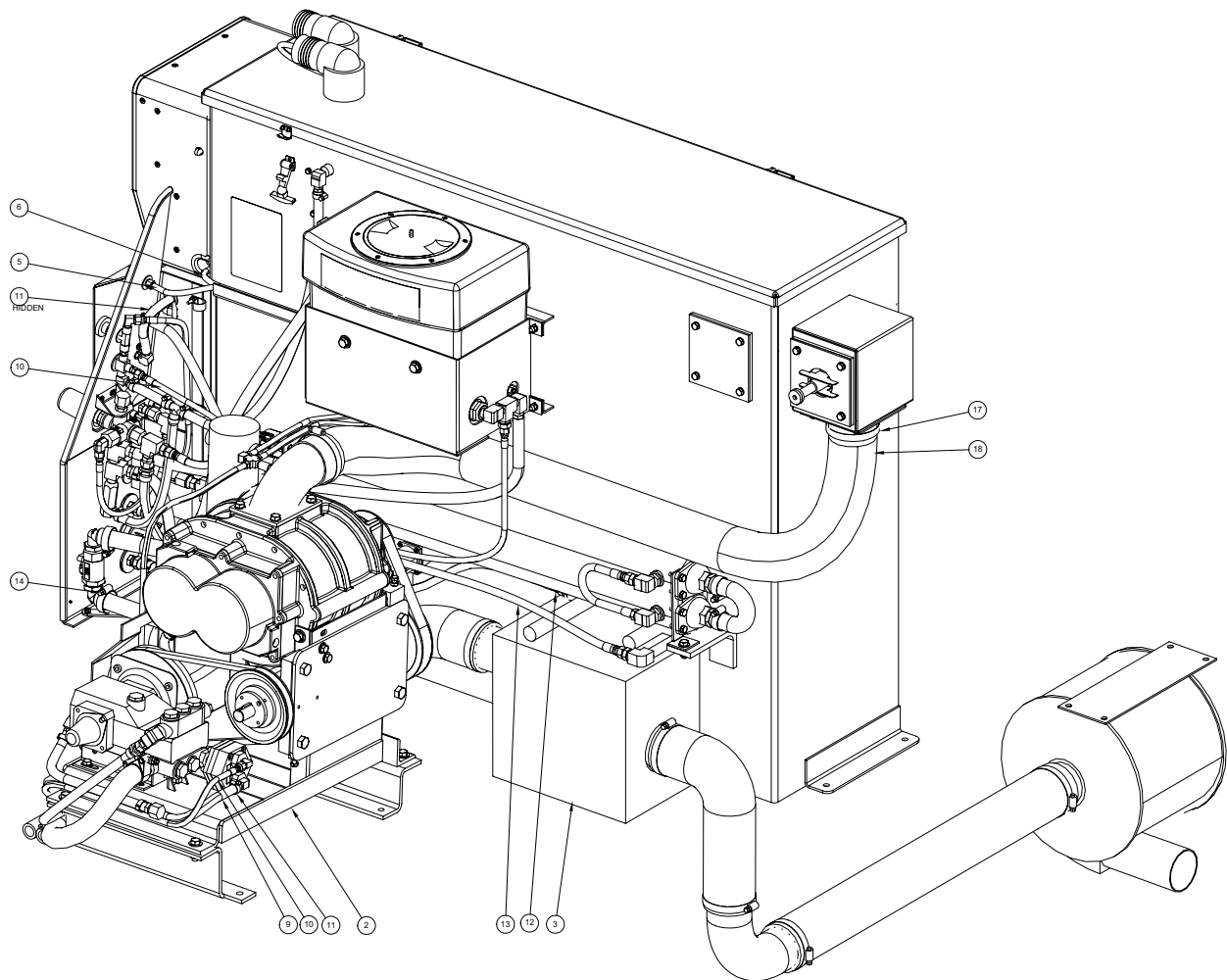


Figure 7-2 CDS 4.8 Machine Assembly - Rear View
D-7145 Rev -



CDS 4.8 Machine Assembly Parts List

Item	Part Number	Description	Qty
1	Fig. 7-3 & 7-4	Assembly, Recovery Tank - CDS 4.8	1
2	Fig. 7-11	Assembly, Pump & Blower - CDS 4.8	1
3	000-079-077	Assembly, Salsa 2005+ CDS (Fig. 7-21)	1
4	000-052-756	Hose, 3/8" x 36" Lg. Throb - CDS	1
5	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
6	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
7	000-068-459	Hose, 3/4" I.D. Green Stripe - Bulk	1
8	000-068-459	Hose, 3/4" I.D. Green Stripe - Bulk	1
9	000-068-085	Hose, 3/8" Hi Temp Black - Bulk	1
10	000-068-706	Hose, 3/16" x 70" Lg. Teflon w/ F JIC Ends	1
11	000-033-005	Clamp, Size #5 Hose	2
12	000-068-755	Hose, 3/8" x 31" Lg. Teflon w/ 3/8" JIC Ends	1
13	000-068-755	Hose, 3/8" x 31" Lg. Teflon w/ 3/8" JIC Ends	1
14	000-033-020	Clamp, Size #16 Hose	2
15	000-068-069	Hose, 3/4" I.D. Parker Gst II - Bulk	1
16	000-033-026	Clamp, Size #10 Hose	2
17	000-033-013	Clamp, Size #48 Hose	2
18	000-068-773	Hose, Ø3.0" x 15" Lg. Flexible Wire Reinforced	1
19	000-068-777	Hose, 1" x 45" Lg. Suction	1
20	000-033-132	Clamp, 1-1/2" T-Bolt	2

Figure 7-3 CDS 4.8 Recovery Tank Assembly - Rear View
D-6977 Rev -

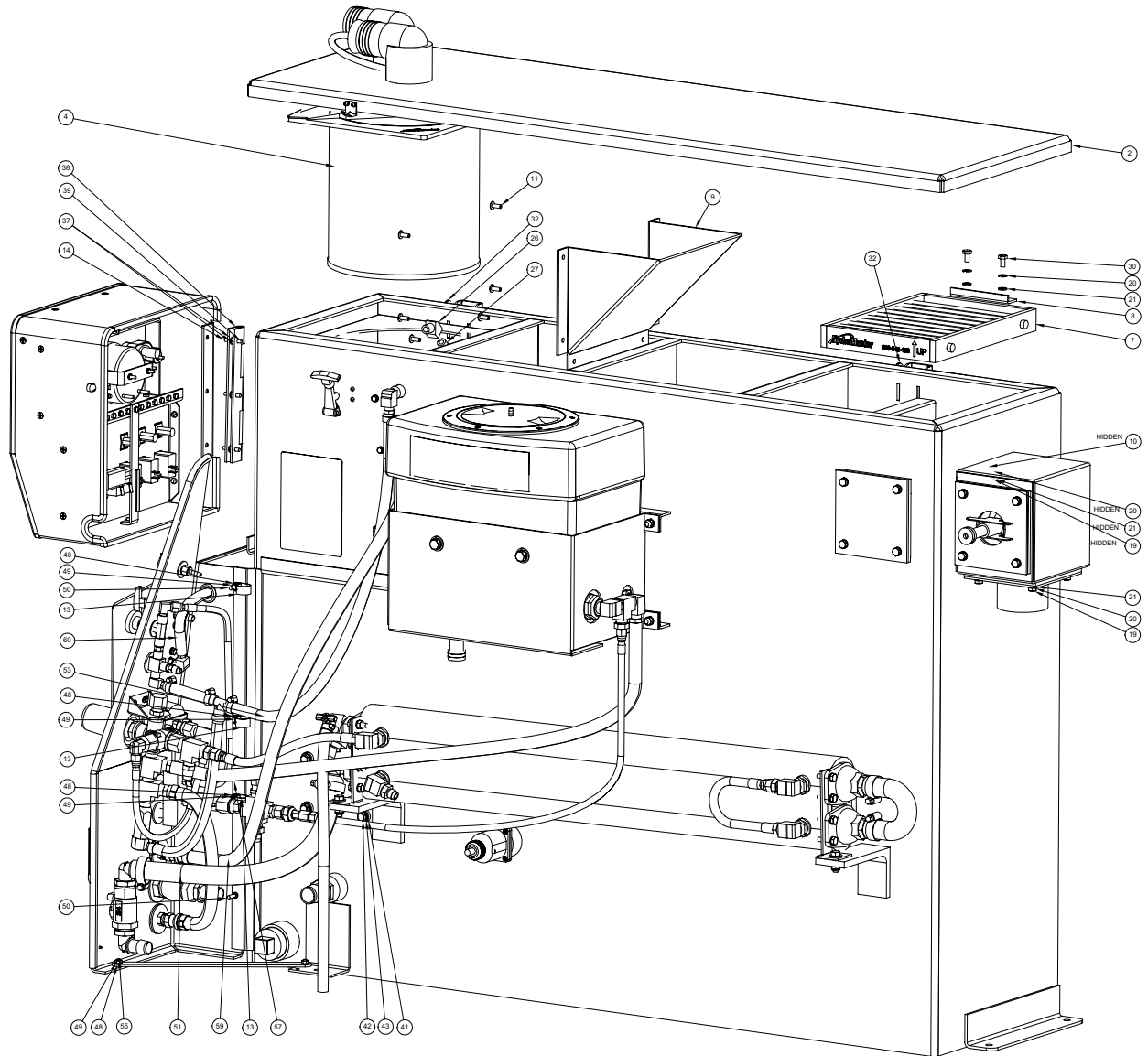
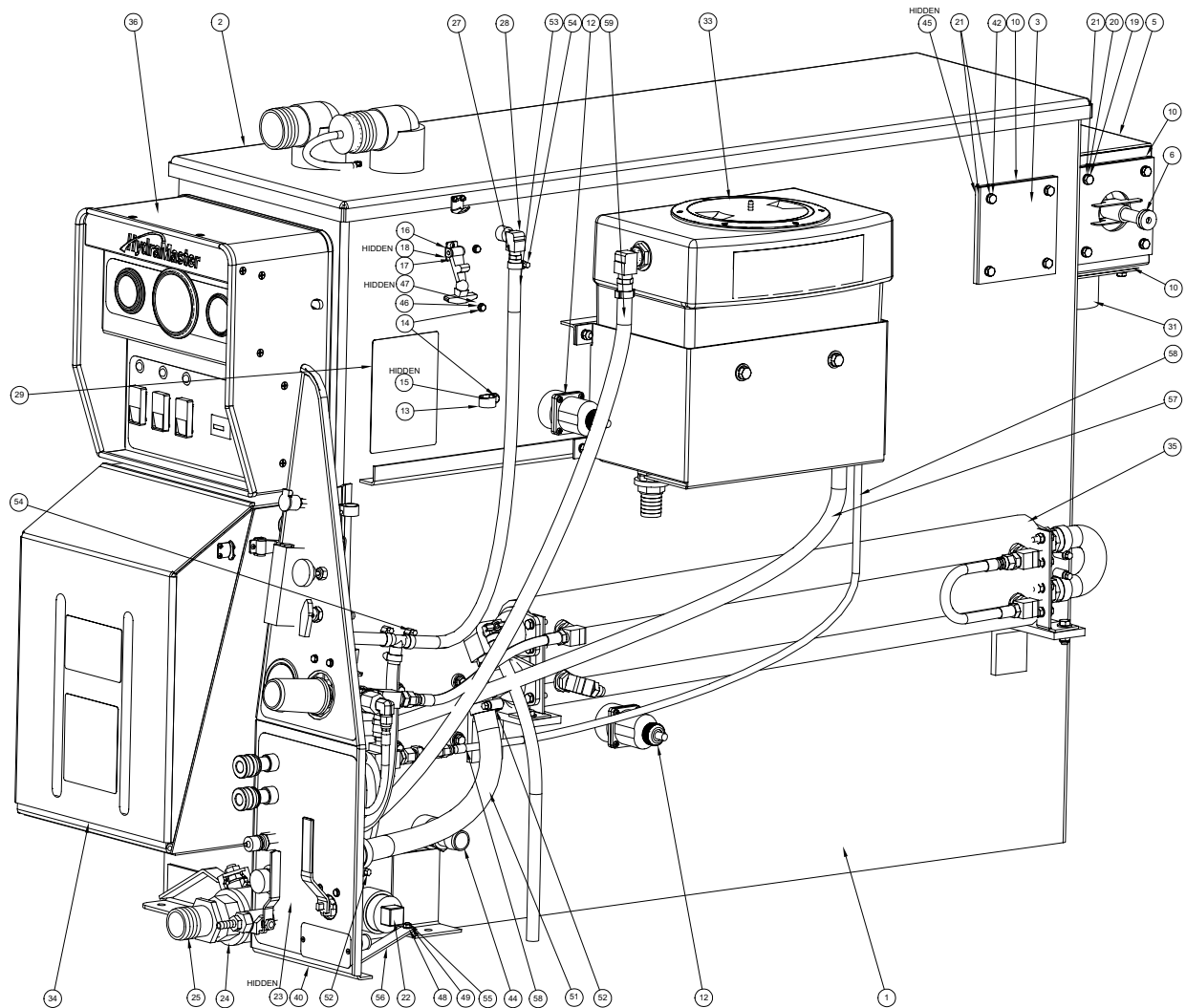


Figure 7-4 CDS 4.8 Recovery Tank Assembly - Front View
D-6977 Rev -



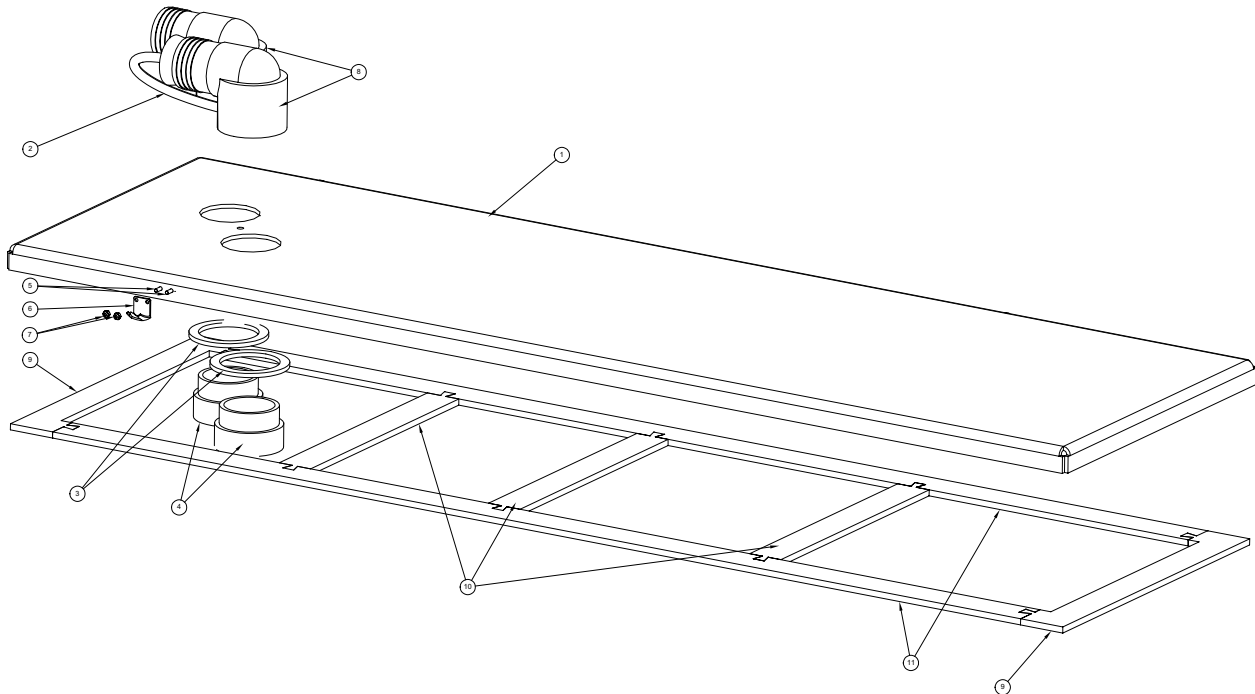
CDS 4.8 Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-130	Tank, 100 Gallon CDS Universal Recovery - Weldment	1
2	Fig. 7-5	Assembly, Recovery Tank Cover - 100 Gallon CDS	1
3	000-105-336	Plate, Vacuum Port Cover - 100 Gallon Universal Recov	1
4	000-049-152	Filter, Recovery Tank Basket	1
5	000-013-070	Box, Vacuum Relief Valve - Universal Recovery Tank	1
6	Fig. 7-20	Assembly, Vacuum Relief Valve	1
7	000-049-153	Filter, Flat - Recovery Tank	1
8	000-015-932	Bracket, Flat Filter Securing - Universal Recovery Tank	1
9	000-049-154	Deflector, Air - Univeral Recovery Tank	1
10	000-057-206	Gasket, Adapter - Universal Recovery Tank	4
11	000-140-023	Rivet, AB8-6A Aluminum Pop	6
12	000-157-090	Float, Lever Switch	2
13	000-033-023	Clamp, 3/4" Nylon Hose	4
14	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	6
15	000-094-059	Nut, #8-32UNF Nylock	1
16	000-086-008	Latch, Bungie	1
17	000-143-539	Screw, #6-32UNC x 0.50" Lg. Button Head Allen	2
18	000-094-063	Nut, #6-32UNC Nylock	2
19	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	12
20	000-174-019	Washer, 1/4" Lock	14
21	000-174-003	Washer, 1/4" Flat	22
22	000-106-019	Plug, 1-1/2" NPT	1
23	000-052-763	Nipple, 1-1/2" IPS Close s/s	1
24	000-169-022	Valve, 1-1/2" Full Port Ball	1
25	000-052-226	Insert, 1-1/2" NPT x 1-1/2" Barb (Grey)	1
26	000-052-082	Elbow, 1/4" NPT Street x 45°	1
27	000-052-102	Insert, #46 (1/4" NPT x 3/8" Barb)	2
28	000-052-085	Elbow, 1/4" NPT Street	1
29	000-081-252	Label, Maintenance & Lubrication Schedule	1
30	000-143-333	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head	2

CDS 4.8 Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
31	000-001-132	Adapter, Tank To Ø3.0" Blower Hose - Universal Recov	1
32	000-174-029	Washer, 3/8" Rubber Back	2
33	Fig. 7-17	Assembly, Water Box	1
34	000-166-033	Assembly, Soap Jug Tray - CDS 4.8 (Fig. 7-19)	1
35	Fig. 7-10	Assembly, Dual Heat Exchanger	1
36	Fig. 7-15	Assembly, Dash - CDS 4.8	1
37	000-174-001	Washer, #10 Flat	6
38	000-067-031	Hinge, Dash Box	1
39	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	3
40	Fig. 7-6 & 7-7	Assembly, Instrument Panel	1
41	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
42	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	8
43	000-174-060	Washer, 1/4" Flat Rubber Backed	4
44	000-052-758	Insert, 1" NPT x 1" Barb	1
45	000-094-009	Nut, 1/4"-20UNC Hex Nylock	4
46	000-174-036	Washer, #10 Flat Rubber Backed	2
47	000-094-034	Nut, #10-24UNC Nylock	2
48	000-174-015	Washer, #10 Outside Star	5
49	000-094-004	Nut, #10-24UNC Hex	5
50	000-143-064	Screw, #10-24UNC x 1.00" Lg. Flat Head Phillips	4
51	000-068-459	Hose, 3/4" I.D. Green Stripe	1
52	000-033-020	Clamp, Size #16 Hose	2
53	000-068-017	Hose, 3/8" Bulk	1
54	000-033-005	Clamp, Size #5 Hose	2
55	000-143-114	Screw, #10-24UNC x 0.50" Lg. Flat Head	2
56	601-013-001	Stabilizer, Instrument Panel To Recovery Tank	1
57	000-068-018	Hose, 1/2" I.D. Rubber - Bulk	1
58	000-068-203	Hose, 3/16" x 34" Lg. 1/4" FJIC x 1/4" FJIC	1
59	000-068-734	Hose, 1/2" x 42.5" Lg. w/ 3/8" NPT & 3/8" SAE F Ends	1
60	000-068-326	Hose, 3/8" I.D. Clear w/ Braid	1

Figure 7-5 **CDS 4.8 Recovery Tank Cover Assembly**
D-7151 Rev -



CDS 4.8 Recovery Tank Cover Assembly Parts List

Item	Part Number	Description	Qty
1	000-041-447	Cover, 100 Gallon Universal Recovery Tank - Weldment	1
2	000-078-039	Vacuum Inlet Stopper Assembly - Recovery Tank	1
3	000-057-015	Gasket, 1-1/2" Bulkhead Fitting	2
4	000-052-219	Adapter, 2" NPT x 2" F Slip	2
5	000-143-539	Screw, #6-32UNC x 0.50" Lg. Button Head Allen	2
6	000-086-008	Latch, Bungie - Strike	1
7	000-094-063	Nut, #6-32UNC Nylock	2
8	000-052-222	Elbow, 2" Barb x 2" FPT	2
9	000-057-202	Gasket, End - Recovery Tank	2
10	000-057-203	Gasket, Middle - Recovery Tank	3
11	000-057-205	Gasket, Side - Recovery Tank - 100 Gallon	2

Figure 7-6 **CDS 4.6/4.8 Instrument Panel Assembly**
D-6988 Rev A

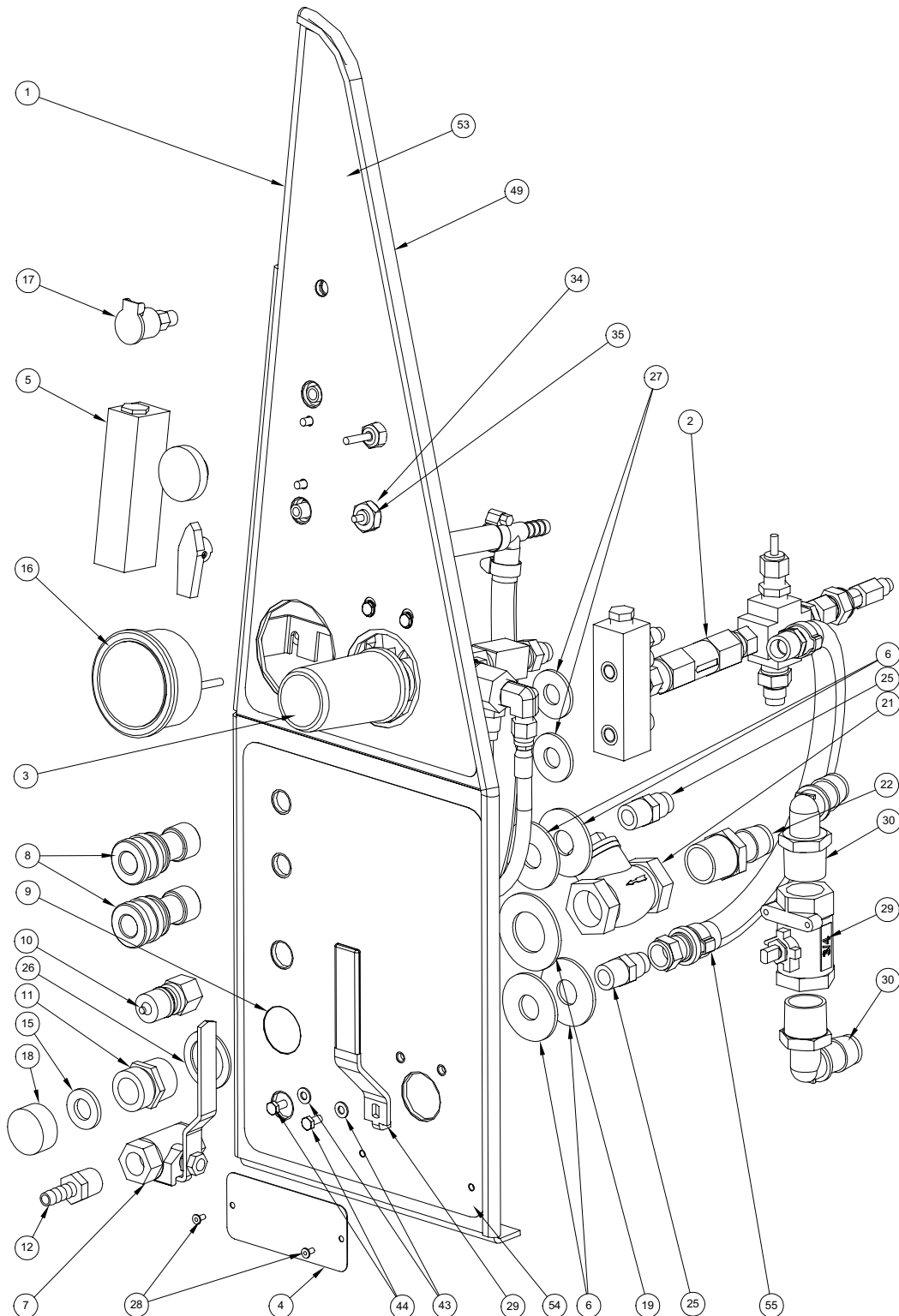
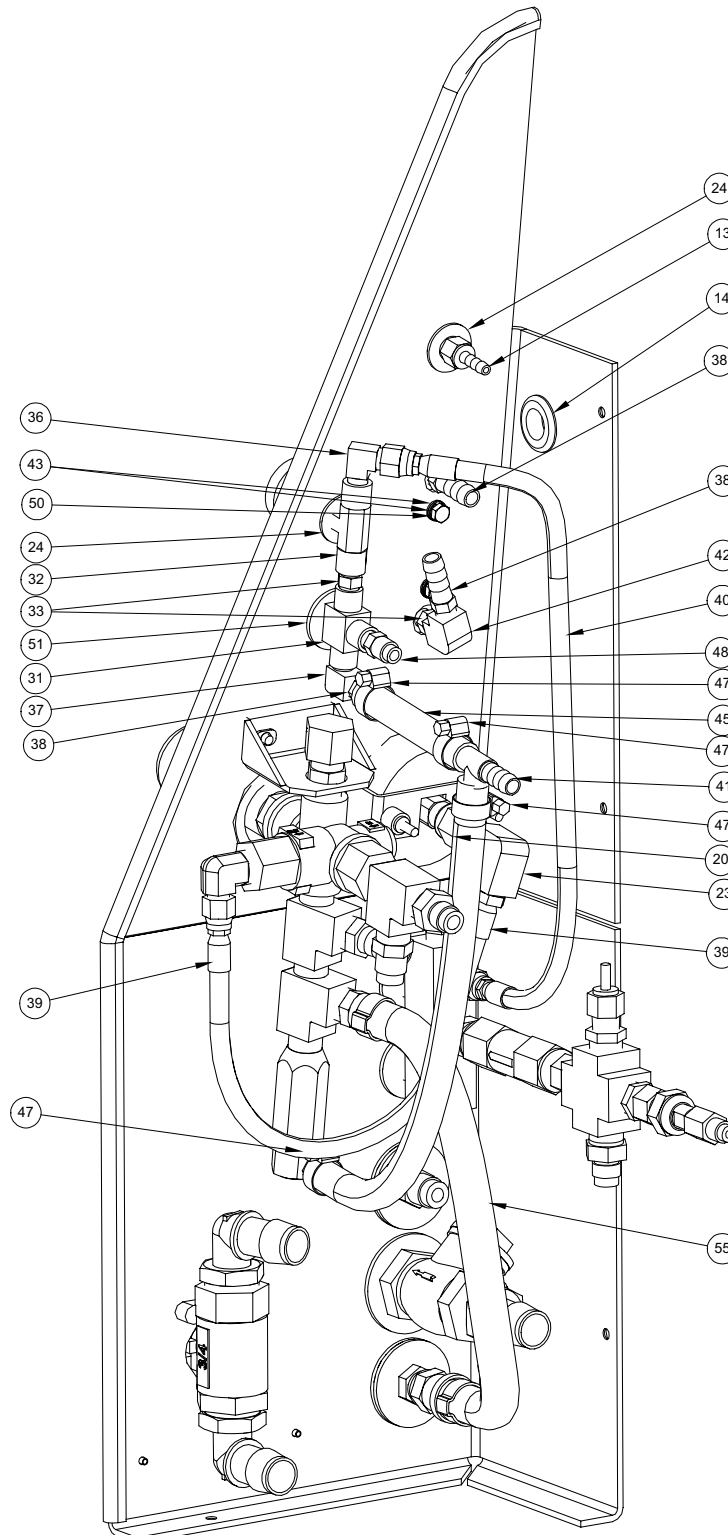


Figure 7-7 CDS 4.6/4.8 Instrument Panel Assembly
D-6988 Rev A



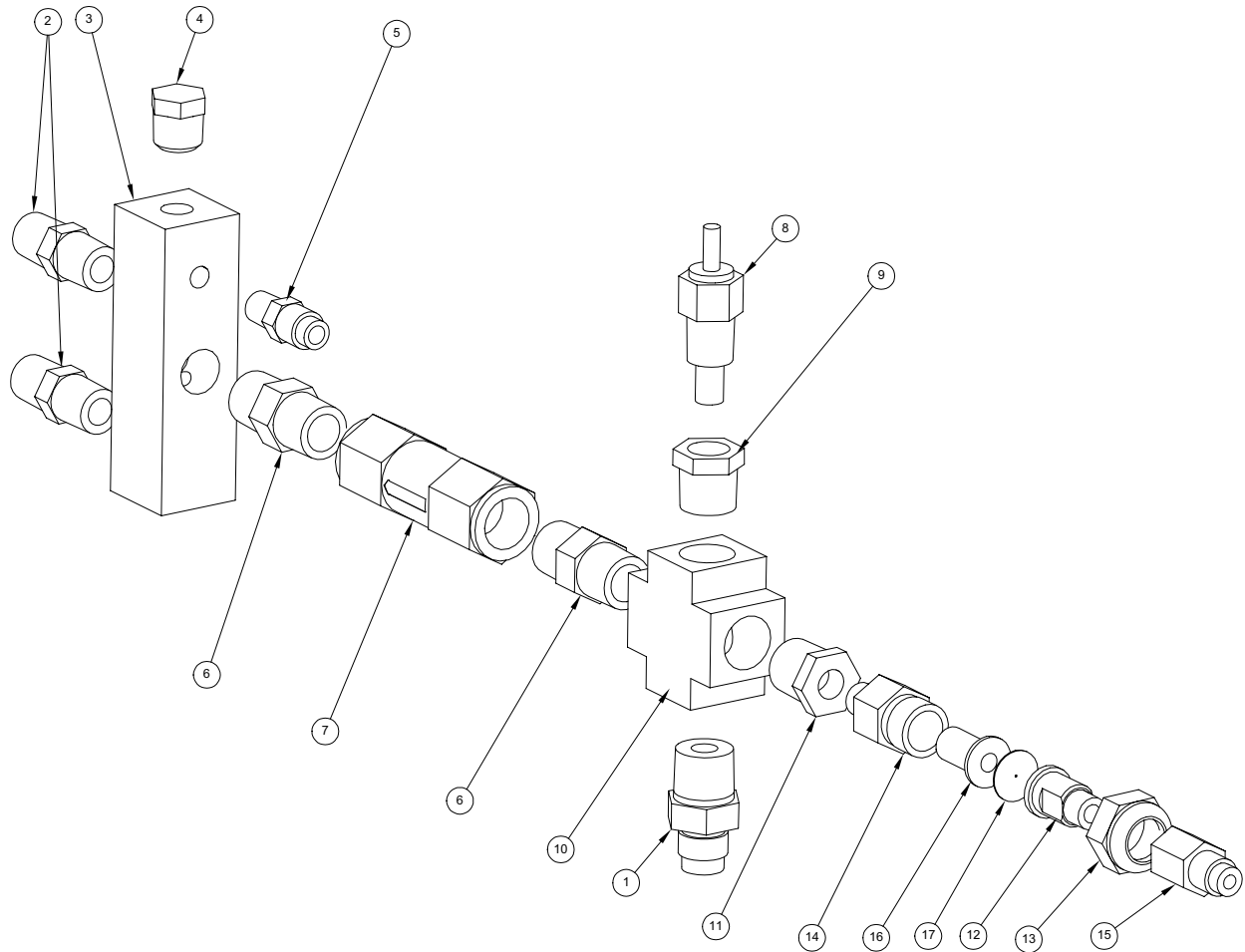
CDS 4.6/4.8 Instrument Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-168	Panel, Instrument	1
2	Fig. 7-8	Assembly, Hi-PSI Manifold	1
3	Fig. 7-9	Assembly, By-Pass Valve	1
4	000-105-012	Plate, Machine Serial I.D.	1
5	000-074-030	Meter, Chemical Flow Raw	1
6	000-174-008	Washer, 5/8" Flat	4
7	000-169-064	Valve, 3/8" NPT Full Port Ball	1
8	000-052-051	Quick Connect, 440 Female w/ EPDM O-Ring	2
9	000-106-029	Plug, 1" Hole	1
10	000-052-052	Quick Connect, 660 Male w/ Viton Standard	1
11	000-052-281	Nipple, 3/4" NPT x 3/4" Male Garden Hose	1
12	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1
13	000-052-096	Insert, #F23 (1/8" FPT x 3/16" Barb)	1
14	000-060-002	Grommet, Large Wiring	1
15	000-057-055	Gasket, Garden Hose	1
16	000-074-003	Guage, Hi-PSI (0-1000)	1
17	000-052-272	Cup, Gravity Feed Oil Blower Lubrication Port	1
18	000-027-014	Cap, Garden Hose	1
19	000-174-050	Washer, 1" Flat	1
20	000-135-052	Regulator, Hi PSI Snubber	1
21	000-169-009	Valve, 3/4" FPT Swing Check	1
22	000-052-338	Insert, #1212 (3/4" NPT x 3/4" Barb)	1
23	000-052-088	Elbow, 1/4" FPT x FPT	1
24	000-174-005	Washer, 3/8" Flat	2
25	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	2
26	000-174-063	Washer, 1.5" O.D. x 1.073" I.D. x 0.075" Thk.	1
27	000-174-012	Washer, 1/2" SAE H/D Flat	2
28	000-140-015	Rivet, 1/8" x 1/4" Lg. Pop	2
29	000-169-201	Valve, 3/4" Heater Panel Mount	1
30	000-052-756	Insert, 3/4" NPT x 3/4" Elbow	2

CDS 4.6/4.8 Instrument Panel Assembly Parts List

Item	Part Number	Description	Qty
31	000-169-0171	Valve, 3-Way Ball O-Ring Style	1
32	000-169-160	Valve, Chemical Metering	1
33	000-052-069	Nipple, 1/8" NPT Hex	2
34	000-174-030	Washer, 5/8" I.D. x 7/8" O.D. x 0.010" Thk.	1
35	000-094-098	Nut, 7/16"-24UNF - 2 Way Metering Valve	1
36	000-052-531	Elbow, 1/8" NPT x 1/4" SAE	1
37	000-052-084	Elbow, 1/8" NPT Street	1
38	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	3
39	000-068-491	Hose, 3/16" x 10" Lg. Teflon 1/4" NPT x 1/4" JIC F	1
40	000-068-518	Hose, 3/16" x 18.25" Lg. Teflon w/ F JIC Ends	1
41	000-052-022	Tee, 3/8" Insert	1
42	000-052-089	Elbow, 1/8" NPT Female	1
43	000-174-001	Washer, #10 Flat	6
44	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	2
45	000-068-017	Hose, 3/8" Bulk	1
46	000-068-017	Hose, 3/8" Bulk	1
47	000-033-005	Clamp, Size #5 Hose	4
48	000-052-530	Nipple, 1/8" MNPT x 1/4" SAE	1
49	000-131-027	Trimlok, 1/8" x 3/8" Lg.	1
50	000-174-014	Washer, #10 Lock	2
51	000-174-007	Washer, 1/2" Flat	1
52	000-143-327	Screw, #10-32UNF x 0.50" Lg. Hex Head	2
53	000-081-252	Label, Instrument Panel - CDS 4.6 / 4.8	1
54	000-081-252	Label, Bottom - Instrument Panel - CDS 4.6/4.8	1
55	000-068-757	Hose, 1/2" x 20.5" Lg. Rubber w/ 3/8" NPT x 3/8" SAE Femal	1

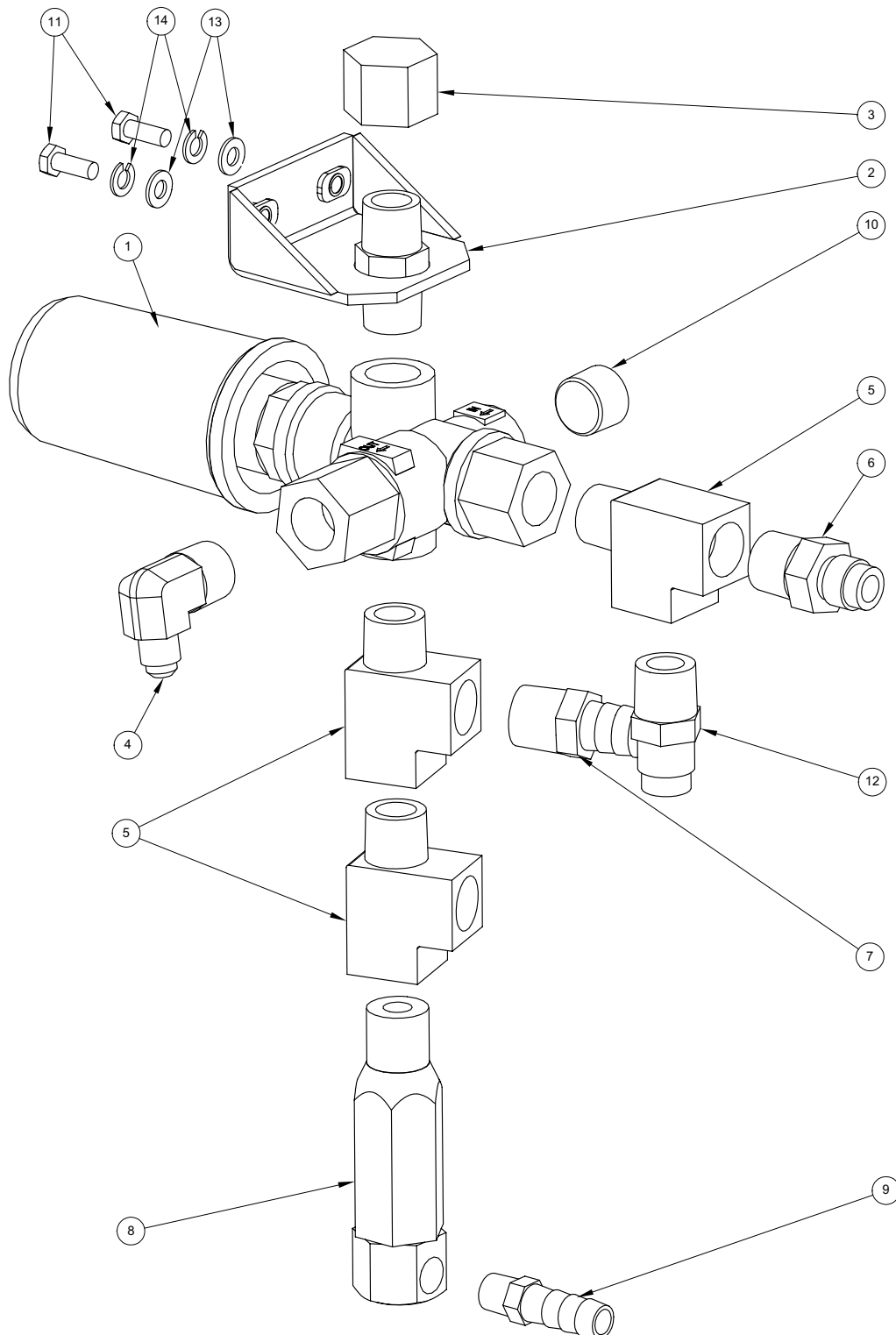
Figure 7-8 **CDS 4.6/4.8 Hi-PSI Manifold Assembly**
D-6091 Rev B



CDS 4.6/4.8 Hi-PSI Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
2	000-052-071	Nipple, 1/4" NPT Hex	2
3	000-090-008	Manifold, Hi Pressure	1
4	000-106-002	Plug, 1/4" NPT Hex	1
5	000-052-530	Nipple, 1/8" MNPT x 1/4" SAE	1
6	000-052-074	Nipple, 3/8" NPT Hex	2
7	000-169-186	Valve, 3/8" FPT x 3/8" FPT 100 PSI Check	1
8	000-149-039	Sender, Temperature	1
9	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	1
10	000-052-113	Cross, 3/8" FPT	1
11	000-050-060	Bushing, 3/8" NPT x 1/8" FPT	1
12	000-052-582	Nipple, Tee Jet Style Collar x 1/8" NPT	1
13	000-094-028	Nut, Brass Jet Assembly	1
14	000-052-153	Housing, Stabalizer Nozzle	1
15	000-052-586	Nipple, 1/8" FPT x 1/4" SAE	1
16	000-049-052	Filter Cartridge, 1/4"	1
17	000-180-009	Orifice, 0.027" Plate	1

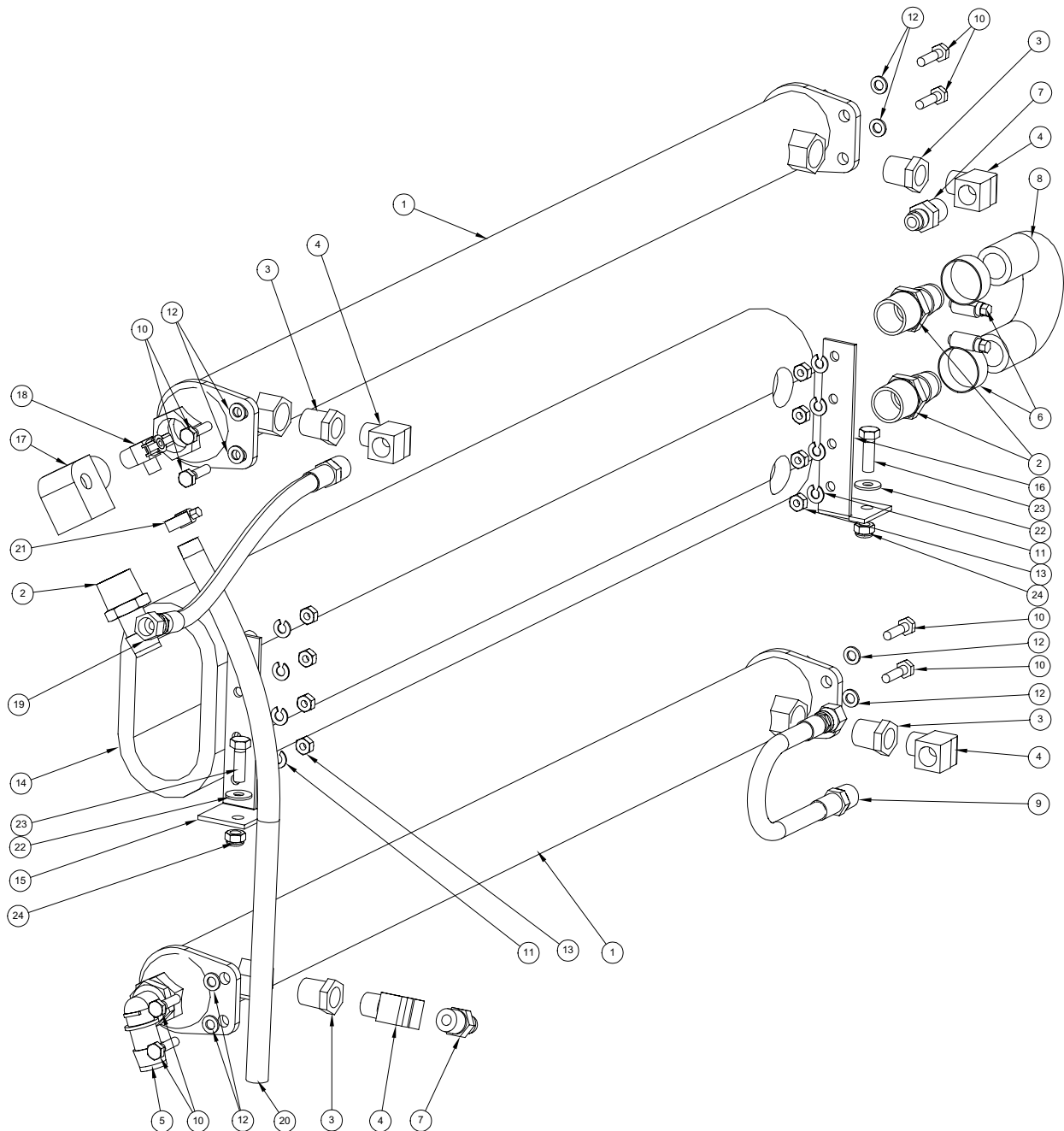
Figure 7-9 **CDS 4.6/4.8 By-Pass Valve Assembly**
C-6989 Rev A



CDS 4.6/4.8 By-Pass Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-169-188	Valve, PSI Regulator 0-1500PSI - Modified	1
2	000-015-515	Bracket, By-Pass Valve Mounting	1
3	000-027-008	Cap, 3/8" FPT	1
4	000-052-764	Elbow, 1/4" SAE x 3/8" MNPT x 90°	1
5	000-052-023	Tee, 3/8" NPT Male Street	3
6	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	1
7	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
8	000-169-027	Valve, Thermal Relief 165° F	1
9	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
10	000-106-008	Plug, 3/8" NPT Allen Head	1
11	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	2
12	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	1
13	000-174-001	Washer, #10 Flat	2
14	000-174-014	Washer, #10 Lock	2

Figure 7-10 **CDS 4.6/4.8 Dual Heat Exchanger Assembly**
D-3803 Rev H

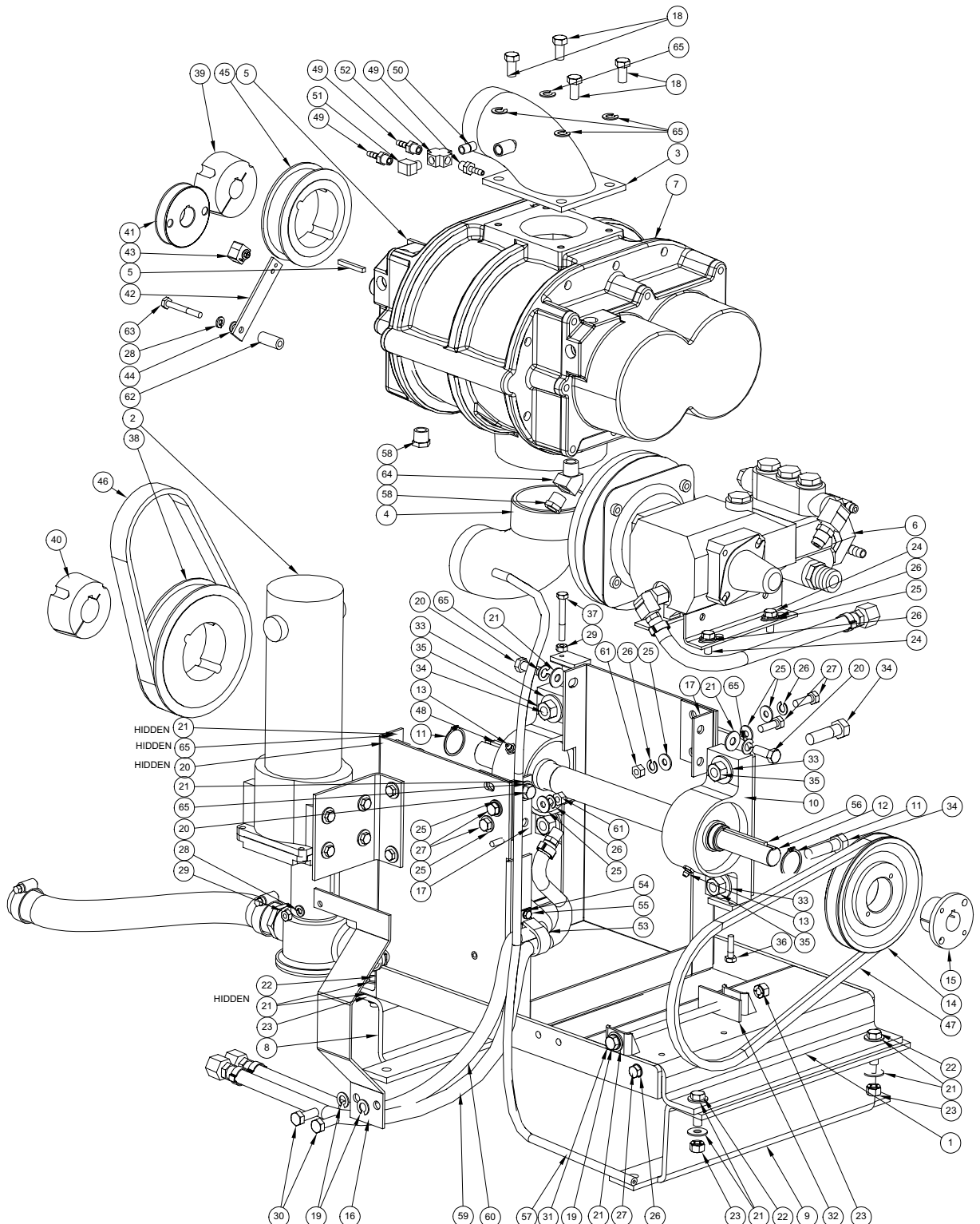


CDS 4.6/4.8 Dual Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-038-046	Heat Exchanger, Water To Water Hi-PSI 2"X36" 1" NPT End	2
2	000-052-338	Insert, #1212 (3/4" NPT x 3/4" Barb)	3
3	000-052-064	Bushing, 1/2" NPT x 3/8" FPT	4
4	000-052-086	Elbow, 3/8" NPT Street	4
5	000-052-756	Insert, 3/4" NPT x 3/4" Elbow	1
6	000-033-029	Clamp, Size 12 Hose	2
7	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	2
8	000-068-066	Hose, 3/4" I.D w/ 180° Bend For HX	1
9	000-068-070	Hose, 3/8" x 12" Lg. Teflon w/ JIC Ends	1
10	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	8
11	000-174-019	Washer, 1/4" Lock	8
12	000-174-003	Washer, 1/4" Flat	8
13	000-094-010	Nut, 1/4"-20UNC Hex	8
14	000-131-042	Insulation, 4-1/8" x 1/2"	1
15	000-015-172	Bracket, Dual Heat Exchanger Mounting - Left	1
16	000-015-171	Bracket, Dual Heat Exchanger Mounting - Right	1
17	000-052-733	Elbow, 3/4" NPT Street - Modified	1
18	000-169-205	Petcock, Coolant 1/4" NPT	1
19	000-068-196	Hose, 3/8" I.D. x 11" Lg w/ 3/8" MNPT & 3/8" JIC Ends	1
20	000-068-091	Hose, 3/8" I.D. Clear - Bulk	1
21	000-033-003	Clamp, Size #4 Mini	1
22	000-174-002	Washer, 1/4" Flat	2
23	000-143-013	Screw, 5/16"-18UNC x 1.00" Lg. Grade 8	2
24	000-094-038	Nut, 5/16"-18UNC Nylock	2

Figure 7-11 CDS 4.8 Pump & Blower Assembly

D-3802 Rev L



CDS 4.8 Pump & Blower Assembly Parts List

Item	Part Number	Description	Qty
1	000-055-028	Frame, Pump And Blower	1
2	000-079-097	Assembly, Duraflow APO Pump - CDS (Fig. 7-14)	1
3	000-001-041	Adapter, Blower Inlet	1
4	000-001-042	Adapter, Blower Outlet - CDS 4.8	1
5	000-077-001	Key, #3 & #4 Vacuum Pump Drive	2
6	Fig. 7-12	Assembly, Pump - CDS 4.8	1
7	000-111-147	Blower, MD 4007	1
8	000-154-147	Spacer, Power Pack - Rear - CDS 4.8 Ford 2005+	1
9	000-154-146	Spacer, Power Pack - Front - CDS 4.8 Ford 2005+	1
10	000-008-020	Bearing, Pillow Block - 1-3/16" Bore	2
11	000-139-021	Snap Ring, 1-3/16" Shaft	2
12	000-150-040	Shaft, Drive Sprocket - CDS 4.8	1
13	000-052-505	Zerk Fitting, 1/8" MNPT Grease Fitting-Straight	2
14	000-109-022	Pulley, AK54 H Pump	1
15	000-020-019	Bushing, #H x 7/8" Bore	1
16	000-108-065	Protector, CAT Pump Belt Shield	1
17	000-015-801	Bracket, Blower Mounting - CDS 4.8	2
18	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
19	000-174-057	Washer, 3/8" Lock	3
20	000-143-018	Screw, 3/8"-16UNC x 1.00" Lg. Grade 8	4
21	000-174-004	Washer, 5/16" Flat	13
22	000-143-025	Screw, 3/8"-16UNC x 1.25" Lg. Hex Head Grd 8	4
23	000-094-100	Nut, 3/8"-16UNC Hex Nylock	5
24	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	4
25	000-174-002	Washer, 1/4" Flat	10
26	000-174-018	Washer, 5/16" Lock	9
27	000-143-013	Screw, 5/16"-18UNC x 1.00" Lg. Grade 8	5
28	000-174-017	Washer, 1/4" Lock	2
29	000-094-010	Nut, 1/4"-20UNC Hex	2
30	000-143-096	Screw, 3/8"-16UNC x 1.00" Lg. Hex Head	2

CDS 4.8 Pump & Blower Assembly Parts List

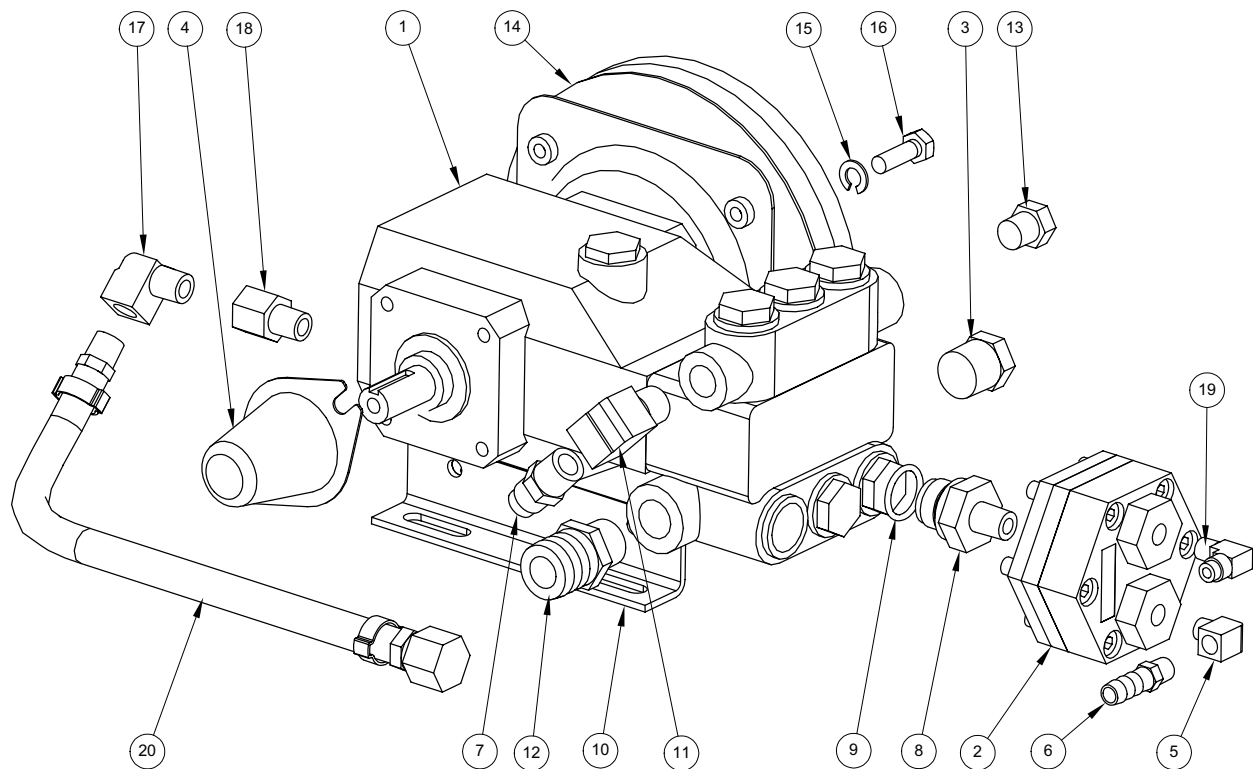
Item	Part Number	Description	Qty
31	000-143-260	Screw, 3/8"-16UNC x 8.00" Lg. Hex Head w/ 6" Threads	1
32	000-015-173	Bracket, CAT Pump Tensioner Plate	1
33	000-174-012	Washer, 1/2" SAE H/D Flat	4
34	000-143-240	Screw, 1/2"-13UNC x 1.75" Lg. Hex Head - Grade 5	4
35	000-094-037	Nut, 1/2"-13UNC Hex 2-Way Locking - Z/P	4
36	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	1
37	000-143-548	Screw, 1/4"-20UNC x 2.00" Lg. Hex Head	1
38	000-109-058	Pulley, 56 Tooth GT2 8MX-56S-21 Engine & Blower	1
39	000-020-020	Bushing, 7/8" Taper-Lock	1
40	000-020-026	Bushing, 1-1/8" Taper-Lock	1
41	000-109-009	Pulley, 2.75" x 0.88" Pump Drive	1
42	000-015-930	Bracket, Tach. Magnetic Extension N/S - CDS 4.6	1
43	000-149-010	Sensor, CDS Magnetic Tach.	1
44	000-174-003	Washer, 1/4" Flat	1
45	000-109-057	Pulley, 40 Tooth GT2 8MX-40S-21 Engine & Blower	1
46	000-010-052	Belt, Polychain GT	1
47	000-010-051	Belt, #9380 CAT Pump Drive	1
48	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
49	000-052-293	Insert, #23 (1/8" NPT x 3/16" Barb)	3
50	000-052-057	Nipple, 1/8" NPT Close	1
51	000-052-084	Elbow, 1/8" NPT Street	1
52	000-052-079	Cross, 1/8" FPT	1
53	000-033-057	Clamp, 1" Cushion Loop	1
54	000-174-001	Washer, #10 Flat	1
55	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	1
56	000-077-012	Key, 3/16" x 2.5" Lg. Class 2 Fit	1
57	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
58	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	2
59	000-068-149	Hose, CDS Blower Oil Drain	1
60	000-068-149	Hose, CDS Blower Oil Drain	1

CDS 4.8 Pump & Blower Assembly Parts List

Item	Part Number	Description	Qty
61	000-094-012	Nut, 5/16-18"UNC Hex	2
62	000-154-153	Spacer, Tach. Sensor - CDS 4.8	1
63	000-143-373	Screw, 1/4"-20UNC x 2" Lg. Hex Head Grd 5	1
64	000-052-083	Elbow, 3/8" NPT Street x 45°	1
65	000-174-021	Washer, 3/8" Lock	8

Figure 7-12 CDS 4.6/4.8 Pump Assembly

C-5493 Rev A

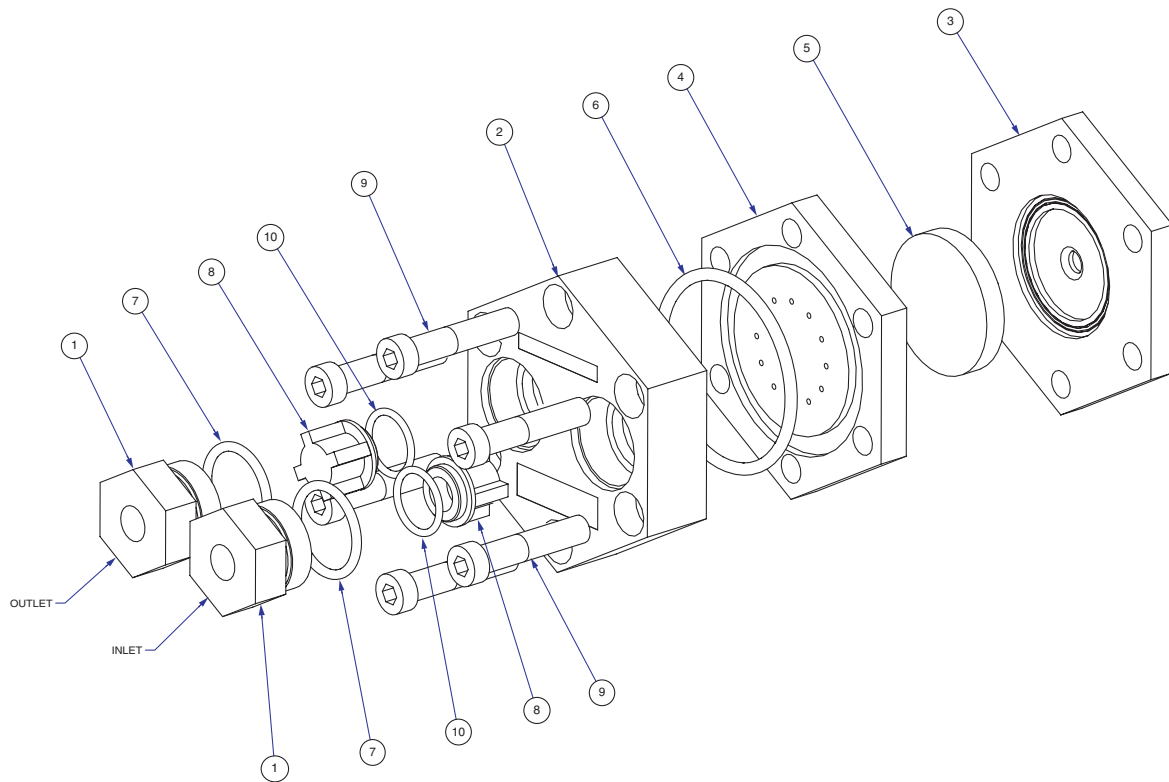


CDS 4.6/4.8 Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-070	Pump, 4 GPM CAT Hi Temp. Plunger	1
2	000-111-035	Assembly, Chemical Pump (Fig. 7-13)	1
3	000-106-004	Plug, 1/2" NPT Hex	1
4	000-108-055	Protector, CAT 3CP Shaft	1
5	000-052-084	Elbow, 1/8" NPT Street	1
6	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
7	000-052-128	Nipple, 3/8" NPT x 3/8" Male Propane	1
8	000-001-082	Adapter, Chemical Pump To CAT 3CP	1
9	000-097-057	O-Ring, Adapter - Chemical Pump	1
10	000-114-003	Rail, Angle CAT 3CP	1
11	000-052-086	Elbow, 3/8" NPT Street	1
12	000-052-753	Insert, #816 (1/2" NPT x 1" Barb)	1
13	000-106-003	Plug, 3/8" NPT Hex	1
14	000-036-006	Clutch, Pump - CDS 4.8/ Maxx	1
15	000-174-018	Washer, 5/16" Lock	1
16	000-143-187	Screw, 8mm x 25mm Lg. Grade. 10.9 Hex Head	1
17	000-052-085	Elbow, 1/4" NPT Street	1
18	000-052-062	Bushing, 1/4" NPT x 1/4" FPT	1
19	000-052-531	Elbow, 1/8" NPT x 1/4" SAE	1
20	000-068-149	Hose, CDS Blower Oil Drain	1

Figure 7-13 CDS 4.6/4.8 Chemical Pump Assembly

C-4416 Rev B

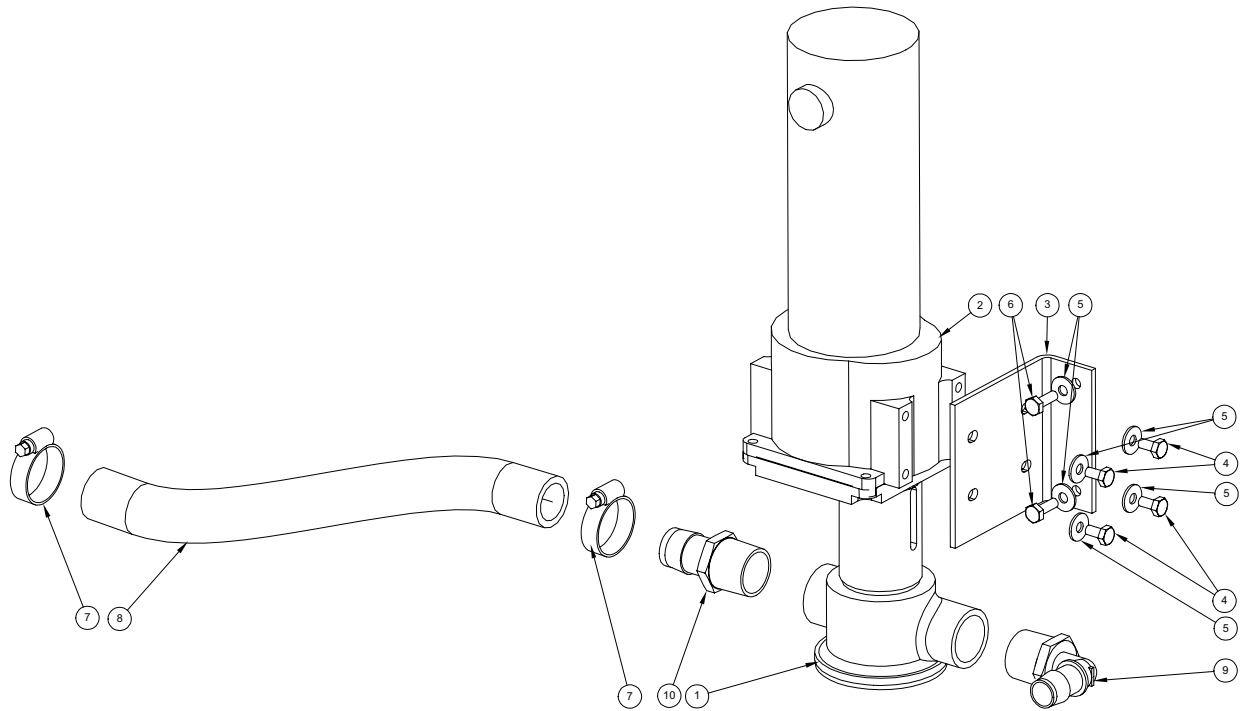


CDS 4.6/4.8 Chemical Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-106-110	Plug, Check Valve - Chemical Pump	2
2	000-064-015	Cover, Chemical Pump	1
3	000-111-030	Body, Chemical Pump	1
4	000-105-071	Mid Plate, Chemical Pump	1
5	000-046-010	Diaphragm, Chemical Pump	1
6	000-097-055	O-Ring, Chemical Pump Midplate An Size -227 Viton	1
7	000-097-056	O-Ring, Check Valve Plug - Chemical Pump	2
8	000-169-155	Valve, Check - Last Step Chemical Injection	2
9	000-143-152	Screw, 5/16"-24UNF x 1.50" Lg. Socket Head	6
10	000-097-054	O-Ring, Chem. Pump Valve Viton-Parker 2-114	2

Figure 7-14 CDS 4.6/4.8 DuraFlow APO Pump Assembly

D-5984 Rev B

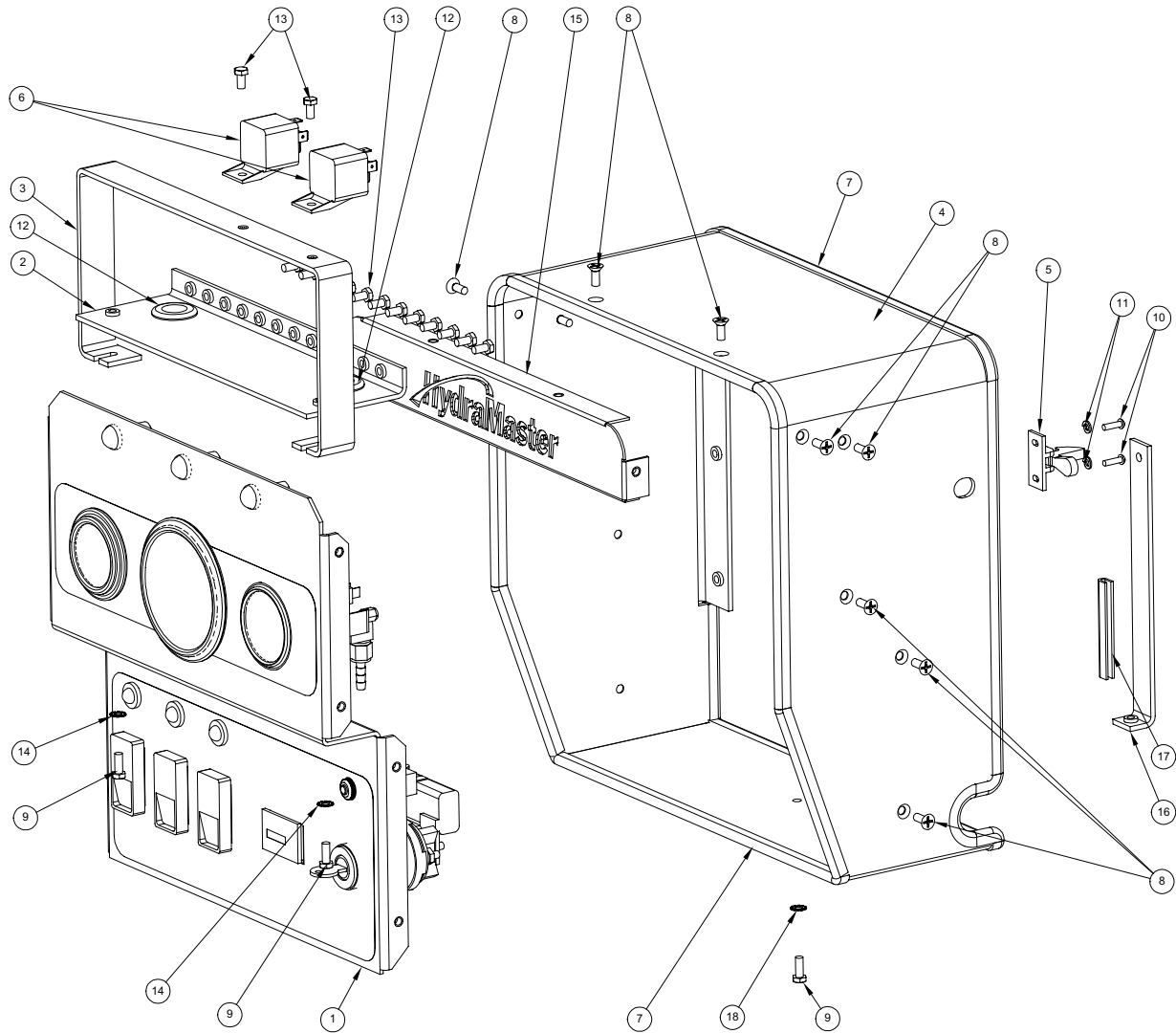


CDS 4.6/4.8 DuraFlow APO Pump Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-169	Assembly, APO Pump - Jabsco	1
2	000-091-042	Motor, Bison 438 Series	1
3	000-015-908	Bracket, CDS Duraflow Power Pack	1
4	000-143-074	Screw, 1/4-20 x 1/2" Self Tapping	4
5	000-174-002	Washer, 1/4" Flat	6
6	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	2
7	000-033-020	Clamp, Size #16 Hose	2
8	000-068-528	Hose, 1" I.D. Reinforced	1
9	000-052-757	Insert, 1" NPT x 3/4" Elbow	1
10	000-052-758	Insert, 1" NPT x 1" Barb	1

Figure 7-15 CDS 4.8 Dash Assembly

D-3932 Rev E



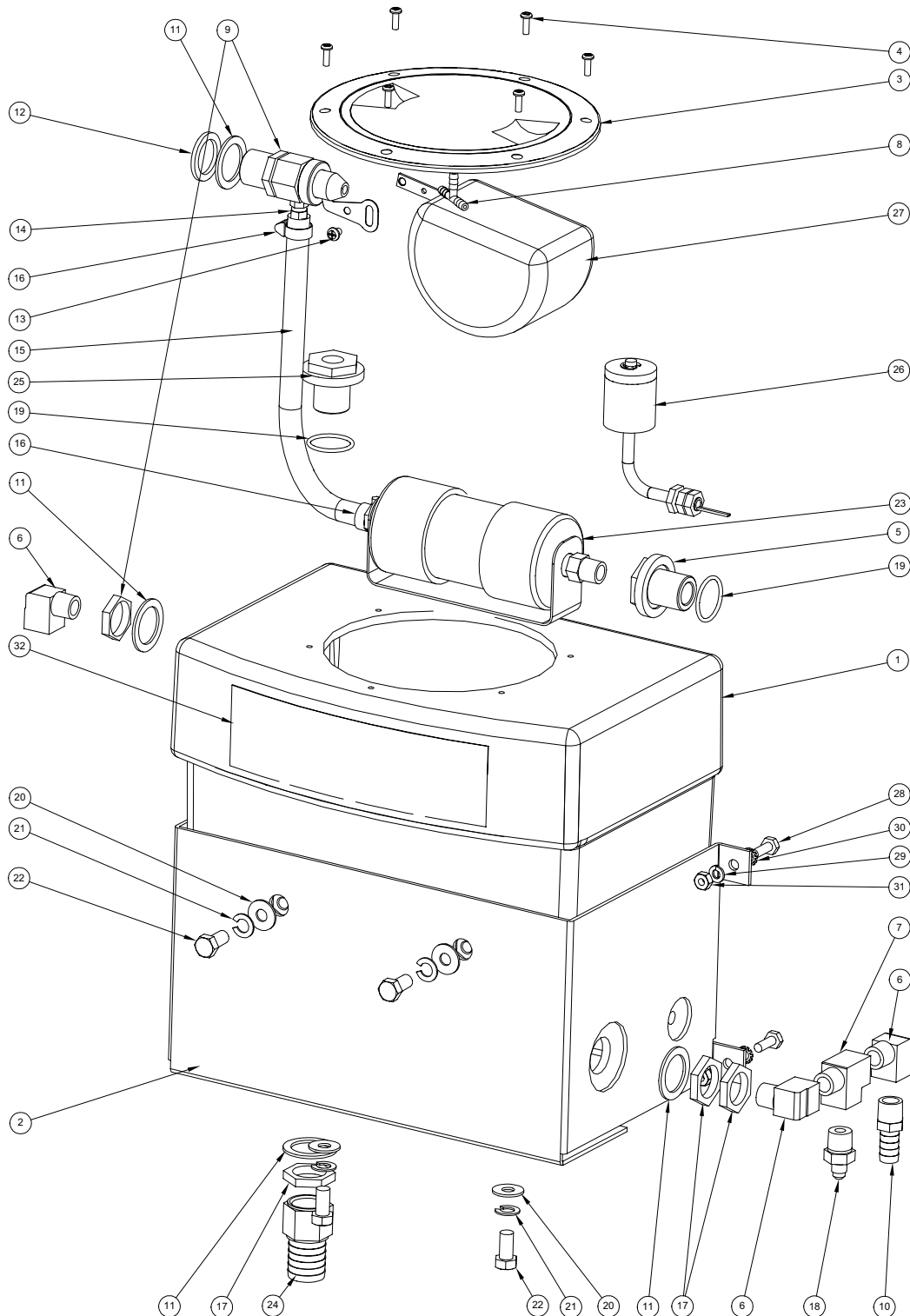
CDS 4.8 Dash Assembly Parts List

Item	Part Number	Description	Qty
1	Fig. 7-16	Dash Panel Assembly - CDS 4.8	1
2	000-015-183	Bracket, Grounding Bus	1
3	000-015-184	Bracket, Relay Mounting	1
4	000-013-025	Dash Box, Painted	1
5	000-086-104	Latch, Dash Securing	1
6	000-157-022	Switch, Relay	2
7	000-131-027	Trimlock, 1/8" Id x 3/8"	1
8	000-143-114	Screw, #10-24UNC x 0.50" Lg. Flat Head	12
9	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	3
10	000-143-046	Screw, #6-32UNC x 0.50" Lg. Pan Head	2
11	000-174-043	Washer, #6 Lock	2
12	000-060-002	Grommet, Large Wiring	2
13	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	14
14	000-175-015	Washer, #10 Outside Star	2
15	000-105-053	Plate, Dash Name - HM	1
16	000-015-175	Bracket, Dash Box Support	1
17	000-131-027	Trimlock, 1/8" I.D. x 3/8"	1
18	000-174-015	Washer, #10 Outside Star	1

CDS 4.8 Dash Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-018-004	Breaker, 25 AMP Circuit	1
2	000-100-070	Panel, Dash - CDS 4.8	1
3	000-074-034	Gauge, Tach. Mag Pick Up 3-3/8" Dial Chev 03+	1
4	000-074-018	Meter, Rectangular w/o Bezel	1
5	000-074-016	Gauge, Temperature	1
6	000-074-006	Gauge, Vacuum	1
7	000-084-015	Lamp, 12V 2W Round Red Indicator	3
8	000-084-004	Lamp, Replacement Guage	3
9	000-084-009	Lamp, Socket - Dashboard	3
10	000-157-040	Switch, 20 AMP Rocker	3
11	000-157-008	Switch, Ignition	1
12	000-033-049	Clamp, Indicator Lamp	3
13	000-052-084	Elbow, 1/8" NPT Street	1
14	000-052-096	Insert, #F23 (1/8" FPT x 3/16" Barb)	1
15	000-174-052	Washer, 3/8" Flat	1
16	000-056-006	Fuse Holder, Inline Weather Proof	1
17	000-056-003	Fuse, 15 AMP Plug In	1
18	000-074-019	Guage, Tach. 99+ Ford & 97-02 Chev	1
19	000-081-099	Label, Lower Dash - CDS 4.8	1
20	000-081-099	Label, Upper Dash - CDS 4.8	1

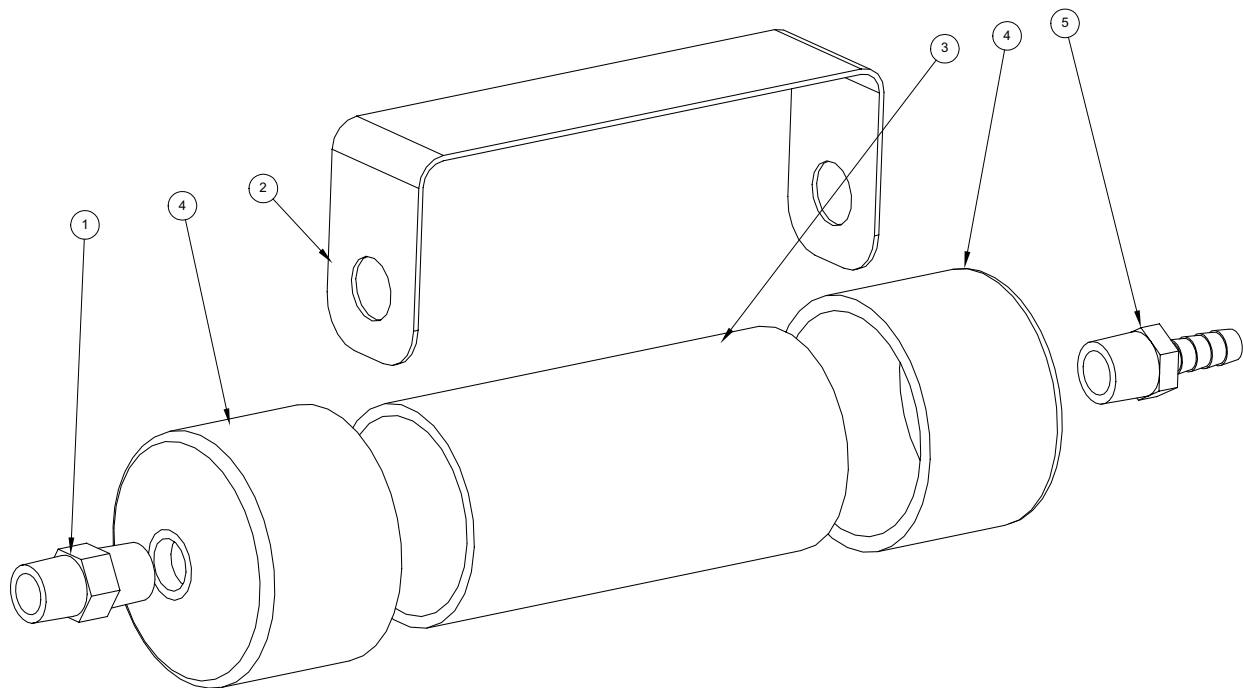
Figure 7-17 CDS 4.6/4.8 Water Box Assembly
D-6990 Rev A



CDS 4.6/4.8 Water Box Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-107	Tank, Poly Water Box - Modified	1
2	000-015-938	Bracket, Water Box Mounting (4 Gallon)	1
3	000-041-005	Cover, 6"	1
4	000-143-314	Screw, #8 x 1/2" Lg. Pan Head	6
5	000-052-660	Bulkhead, 3/8" FPT x 3/8" FPT	1
6	000-052-086	Elbow, 3/8" NPT Street	3
7	000-052-023	Tee, 3/8" NPT Male Street	1
8	000-052-155	Tee, 3/16" Plastic Vacuum Insert	1
9	000-169-167	Valve, Mechanical Incoming Water - Water Box	1
10	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
11	000-174-063	Washer, 1.5" O.D. x 1.073" I.D. x 0.075" Thk.	4
12	000-057-052	Gasket, 1" Garden Hose	1
13	000-143-336	Screw, #10-32UNF x 0.25" Lg. Pan Head Phillips	1
14	000-052-099	Insert, #26 (1/8" NPT x 3/8" Barb)	1
15	000-068-326	Hose, 3/8" I.D. Clear w/ Braid Solution	1
16	000-033-005	Clamp, Size #5 Hose	2
17	000-094-097	Nut, 1-14" Brass Water Box	3
18	000-052-662	Nipple, 3/8" NPT x 1/4" M SAE	1
19	000-097-041	O-Ring, 1/2" Bulkhead	2
20	000-174-032	Washer, 3/8" Flat	4
21	000-174-057	Washer, 3/8" Lock	4
22	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
23	000-049-151	Assembly, Diffuser Filter (Fig. 7-18)	1
24	000-052-754	Insert, #F816 (1/2" FPT x 1" Barb)	1
25	000-052-728	Bulkhead, 1/2" FPT x 3/8" FPT	1
26	000-157-0801	Assembly, Float Switch w/ Polypropylene Barrel	1
27	000-005-007	Float, Water Box	1
28	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	4
29	000-174-017	Washer, 1/4" Lock	4
30	000-174-039	Washer, 1/4" Outside Star	4
31	000-094-010	Nut, 1/4"-20UNC Hex	4
32	000-081-252	Label, Water Box	1

Figure 7-18 **CDS 4.6/4.8 Diffuser Filter Assembly**
C-6554 Rev -

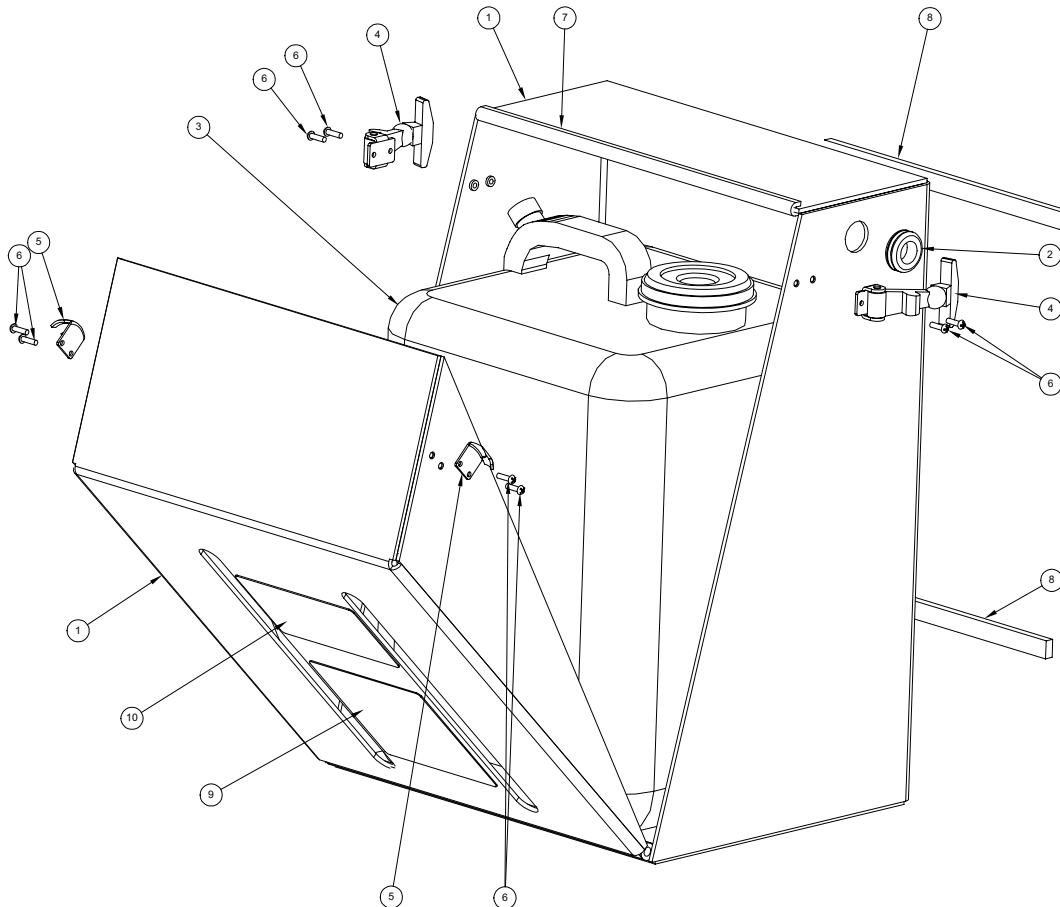


Diffuser Filter Assembly Parts List

Item	Part Number	Description	Qty
1	000-052-074	Nipple, 3/8" NPT Hex	1
2	000-033-131	Clamp, Diffuser - Boxxer 427	1
3	000-125-222	Tube, Diffuser - Boxxer 427	1
4	000-027-115	Cap, 2" PVC Modified For Diffuser - Boxxer 427	2
5	000-052-104	Insert, #66 (3/8" NPT x 3/8" Barb)	1

Figure 7-19 CDS 4.8 Soap Jug Tray Assembly

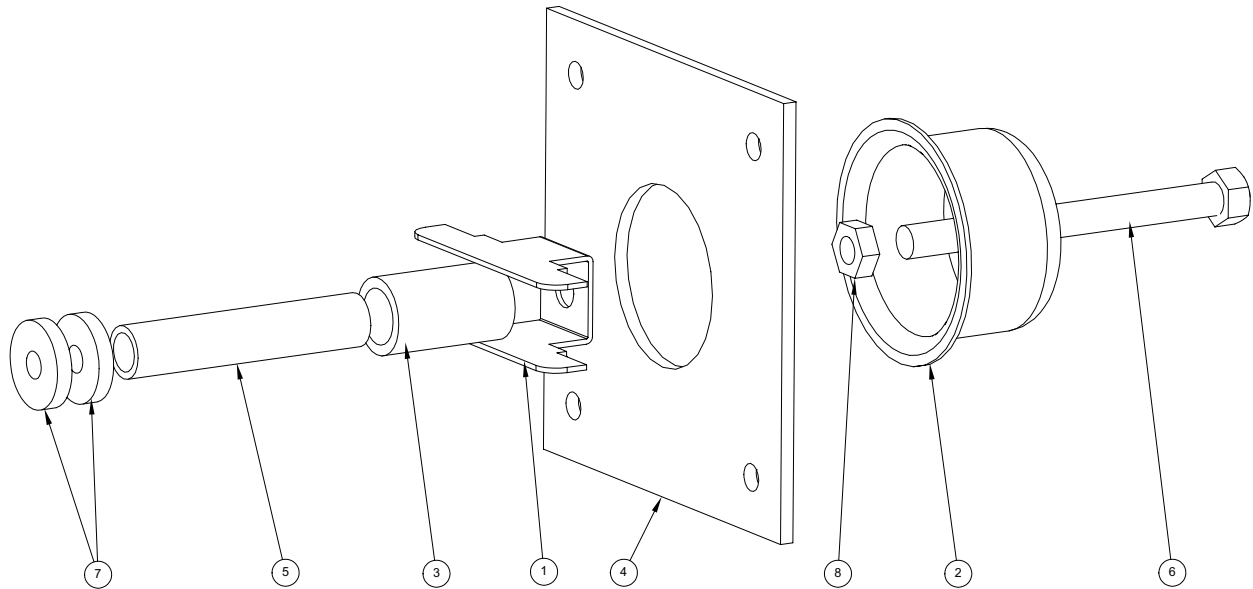
D-4178 Rev C

**CDS 4.8 Soap Jug Tray Assembly Parts List**

Item	Part Number	Description	Qty
1	000-166-029	Soap Jug Tray - Weldment - CDS 4.8	1
2	000-060-002	Grommet, Large Wiring	1
3	000-159-016	Jug, 5 Gallon Plastic Chemical - Standard	1
4	000-086-008	Latch, Bungie	2
5	000-086-008	Latch, Bungie - Strike	2
6	000-143-046	Screw, #6-32UNC x 0.50" Lg. Pan Head	8
7	000-131-027	Trimlock, Crossfire Brow - 3/8"	1
8	000-057-026	Gasket, 1/2" x 18-1/8" Lg. x 1/4" (Cut In Half)	2
9	000-081-252	Label, ANSI Warning - Large	1
10	000-081-252	Label, ANSI Warning - Park Position - Machine	1

Figure 7-20 CDS 4.6/4.8 Vacuum Relief Valve Assembly

C-6894 Rev-

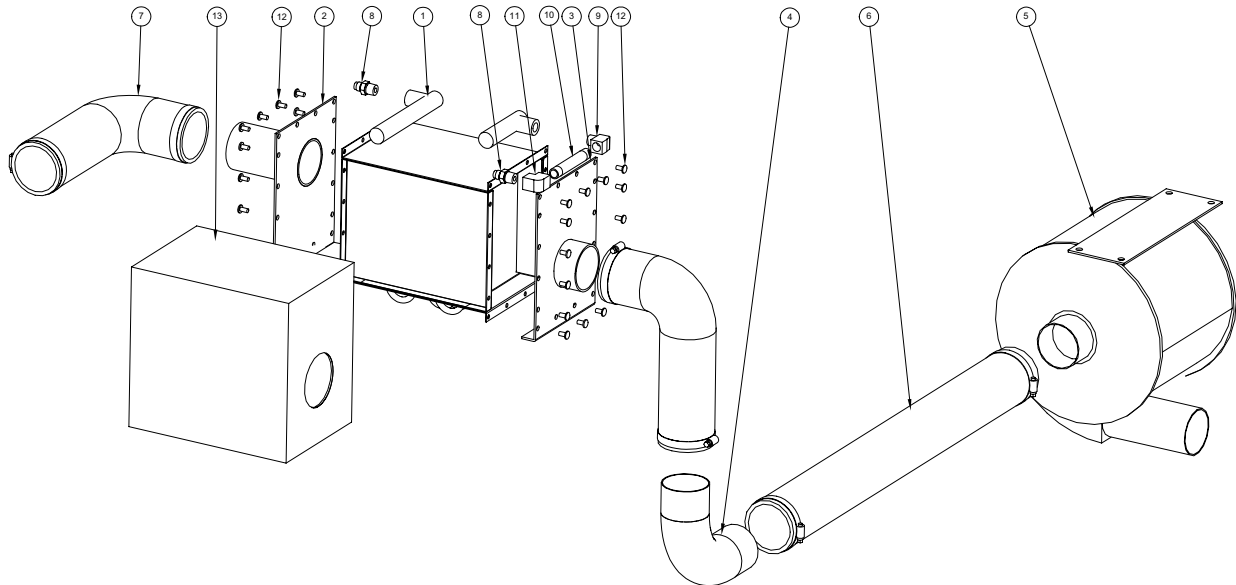


CDS 4.6/4.8 Vacuum Relief Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-182	Bracket, Vacuum Relief Valve	1
2	000-027-032	Cap, Vacuum Relief Valve	1
3	000-125-111	Pipe, Vacuum Relief Spring Guide	1
4	000-105-332	Plate, Vacuum Relief Valve Mounting - Universal Recov	1
5	000-155-026	Spring, Vacuum Relief	1
6	000-143-198	Screw, 3/8"-16UNC x 4" Lg. Hex Head Full Thread	1
7	000-094-077	Nut, 3/8"-16UNC x 1.00" O.D. Knurled	2
8	000-094-101	Nut, 3/8"-16UNC Hex Jam	1

Figure 7-21 CDS 4.6/4.8 Salsa & Silencer 2005+Assembly

D-5954 Rev -



CDS 4.6/4.8 Salsa & Silencer 2005+ Assembly Parts List

Item	Part Number	Description	Qty
1	000-038-053	Core, Blower Heat Exchanger - Boxxer 421	1
2	000-100-154	Panel, Salsa Inlet - Weldment - CDS 4.8	1
3	000-100-155	Panel, Salsa Outlet - Weldment - CDS 4.8	1
4	000-052-649	Tube, 3" OD x 0.065 Wall 4.5" R w/ 2" Tangents	1
5	000-093-030	Silencer, 3" Inlet And Outlet	1
6	000-068-187	Hose, 3" x 30" Lg. Nitrile	1
7	000-052-674	Elbow, 3" Rubber w/ Clamps	2
8	000-052-528	Nipple, 3/8" M JIC x 3/8" NPT	2
9	000-052-086	Elbow, 3/8" NPT Street	1
10	000-052-408	Nipple, 3/8" NPT x 4" Lg.	1
11	000-052-142	Elbow, 3/8" FPT x FPT	1
12	000-140-021	Rivet, 1/4" Blind x 0.50" Lg.	32
13	000-108-140	Protector, Salsa Insulation - CDS 4.8	1

CDS 4.6 Machine Assemblies & Parts

Figure 7-22 CDS 4.6 Machine Assembly - Front View
D-7144 Rev -

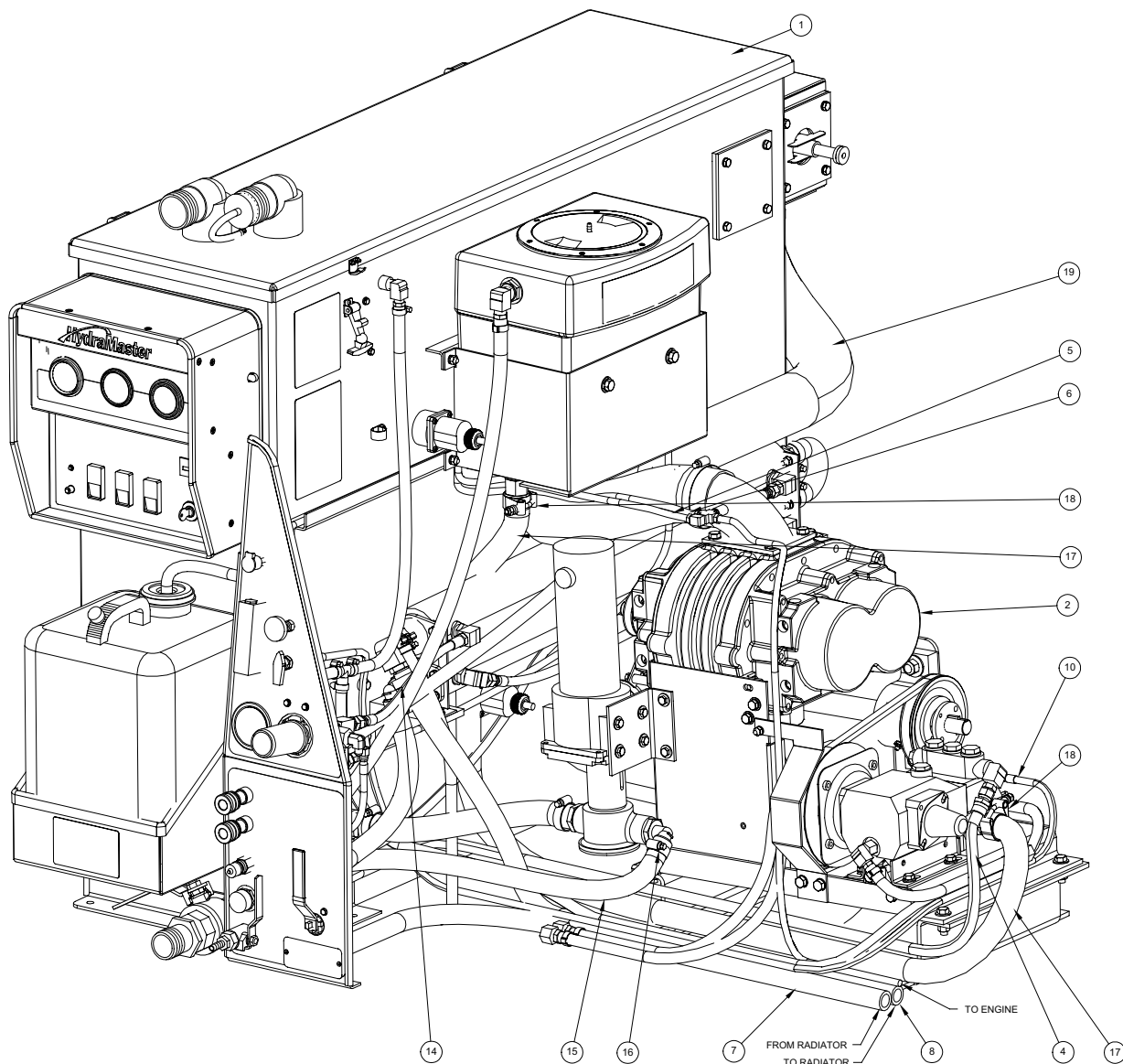
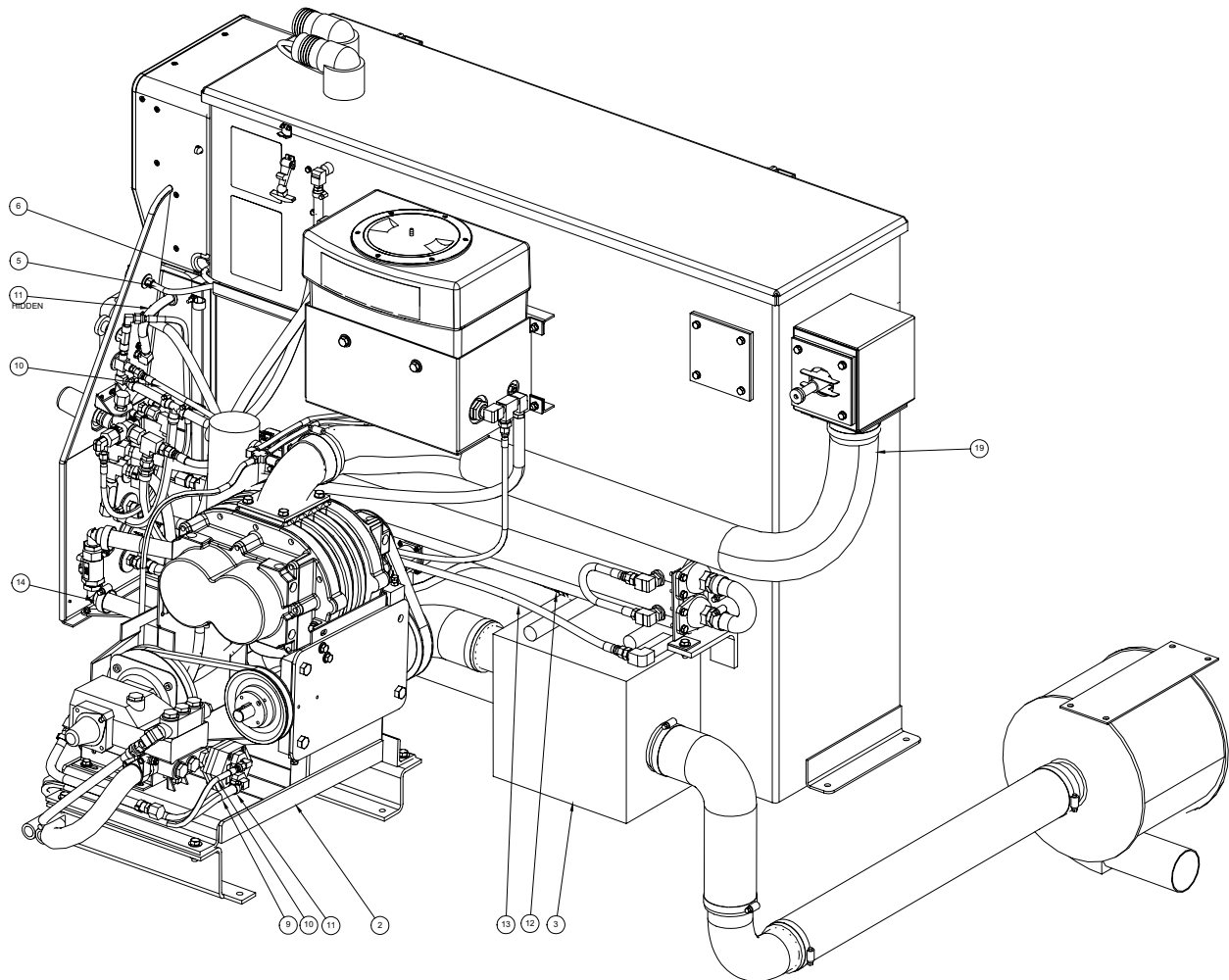


Figure 7-23 CDS 4.6 Machine Assembly - Rear View
D-7144 Rev -



CDS 4.6 Machine Assembly Parts List

Item	Part Number	Description	Qty
1	Fig. 7-24 & 7-25	Assembly, Recovery Tank - CDS 4.6	1
2	Fig. 7-26	Assembly, Pump & Blower - CDS 4.6	1
3	000-079-077	Assembly, Salsa 2005+ CDS (Fig. 7-21)	1
4	000-052-756	Hose, 3/8" x 36" Lg. Throb - CDS	1
5	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
6	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
7	000-068-459	Hose, 3/4" I.D. Green Stripe - Bulk	1
8	000-068-459	Hose, 3/4" I.D. Green Stripe - Bulk	1
9	000-068-085	Hose, 3/8" Hi Temp Black - Bulk	1
10	000-068-706	Hose, 3/16" x 70" Lg. Teflon w/ F JIC Ends	1
11	000-033-005	Clamp, Size #5 Hose	2
12	000-068-755	Hose, 3/8" x 31" Lg. Teflon w/ 3/8" JIC Ends	1
13	000-068-755	Hose, 3/8" x 31" Lg. Teflon w/ 3/8" JIC Ends	1
14	000-033-020	Clamp, Size #16 Hose	2
15	000-068-069	Hose, 3/4" I.D. Parker GST II - Bulk	1
16	000-033-026	Clamp, Size #10 Hose	2
17	000-068-777	Hose, 1" x 45" Lg. Suction	1
18	000-033-132	Clamp, 1-1/2" T-Bolt	2
19	000-068-772	Hose, Ø2.5" x 51" Lg. Flexible Wire Reinforced	1

Figure 7-24 CDS 4.6 Recovery Tank Assembly - Front View
D-6978 Rev -

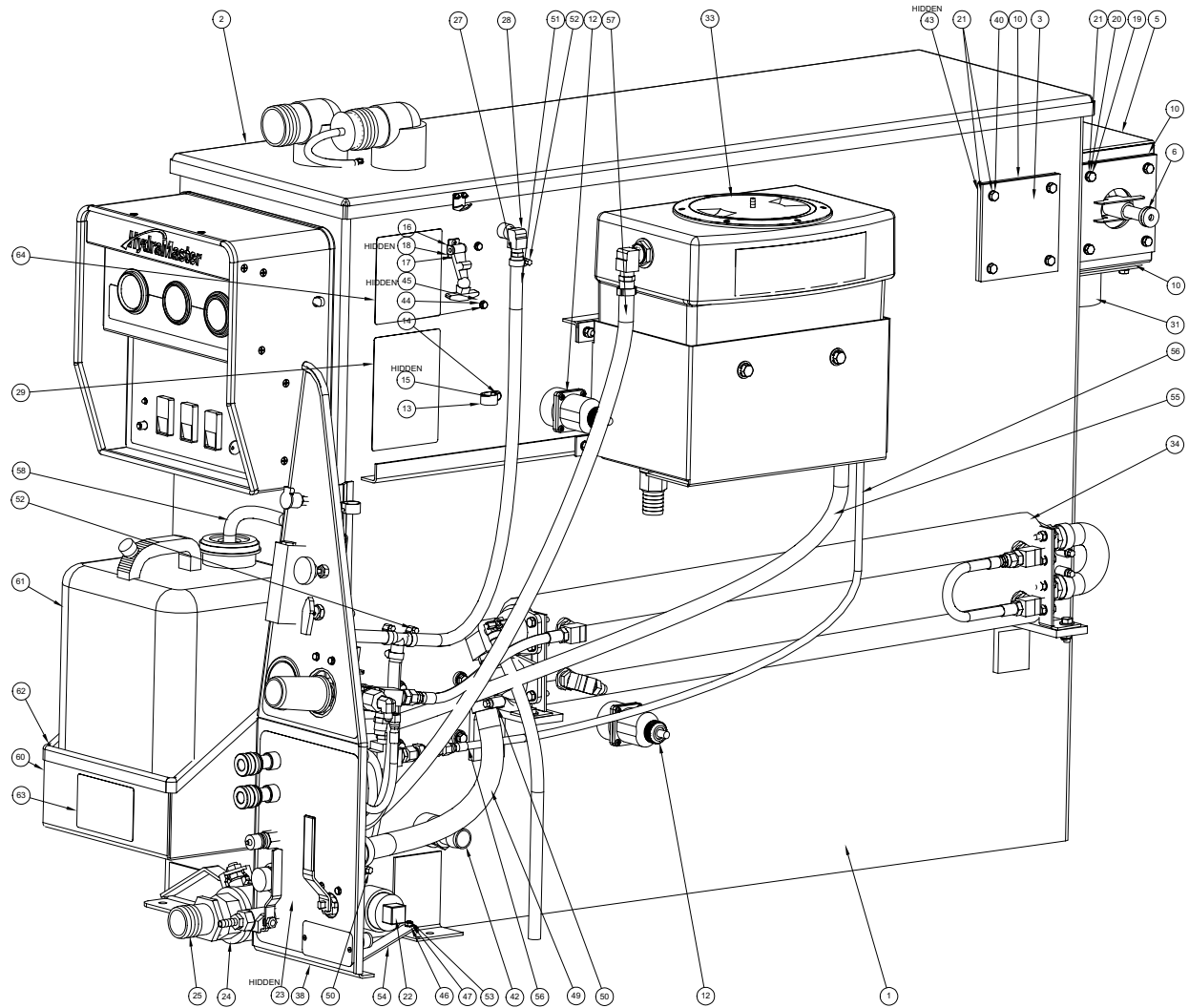
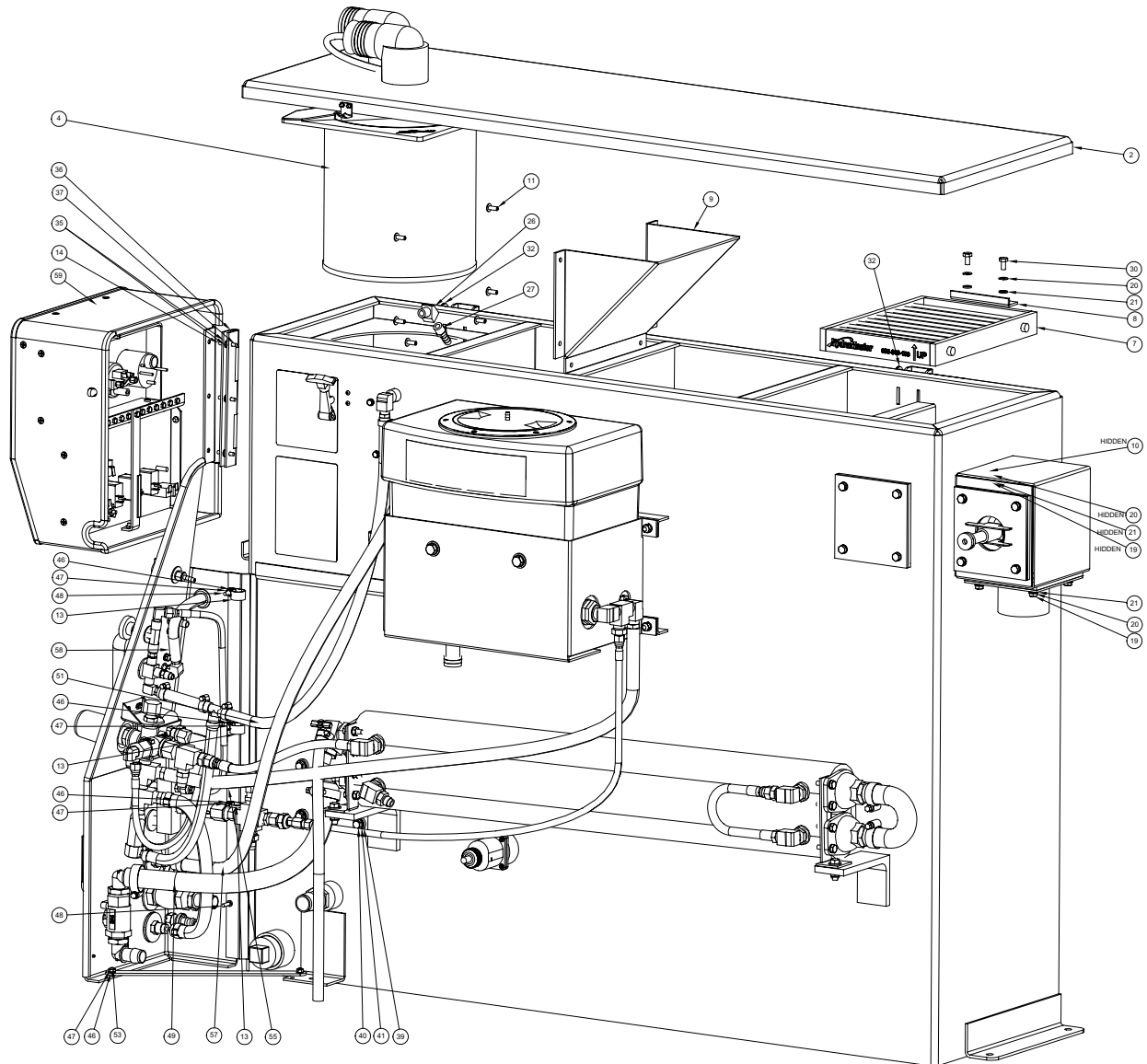


Figure 7-25 CDS 4.6 Recovery Tank Assembly - Rear View

D-6978 Rev -



CDS 4.6 Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-130	Tank, 100 Gallon CDS Universal Recovery - Weldment	1
2	Fig. 7-5	Assembly, Recovery Tank Cover - 100 Gallon CDS	1
3	000-105-336	Plate, Vacuum Port Cover - 100 Gallon Universal Recovery T	1
4	000-049-152	Filter, Recovery Tank Basket	1

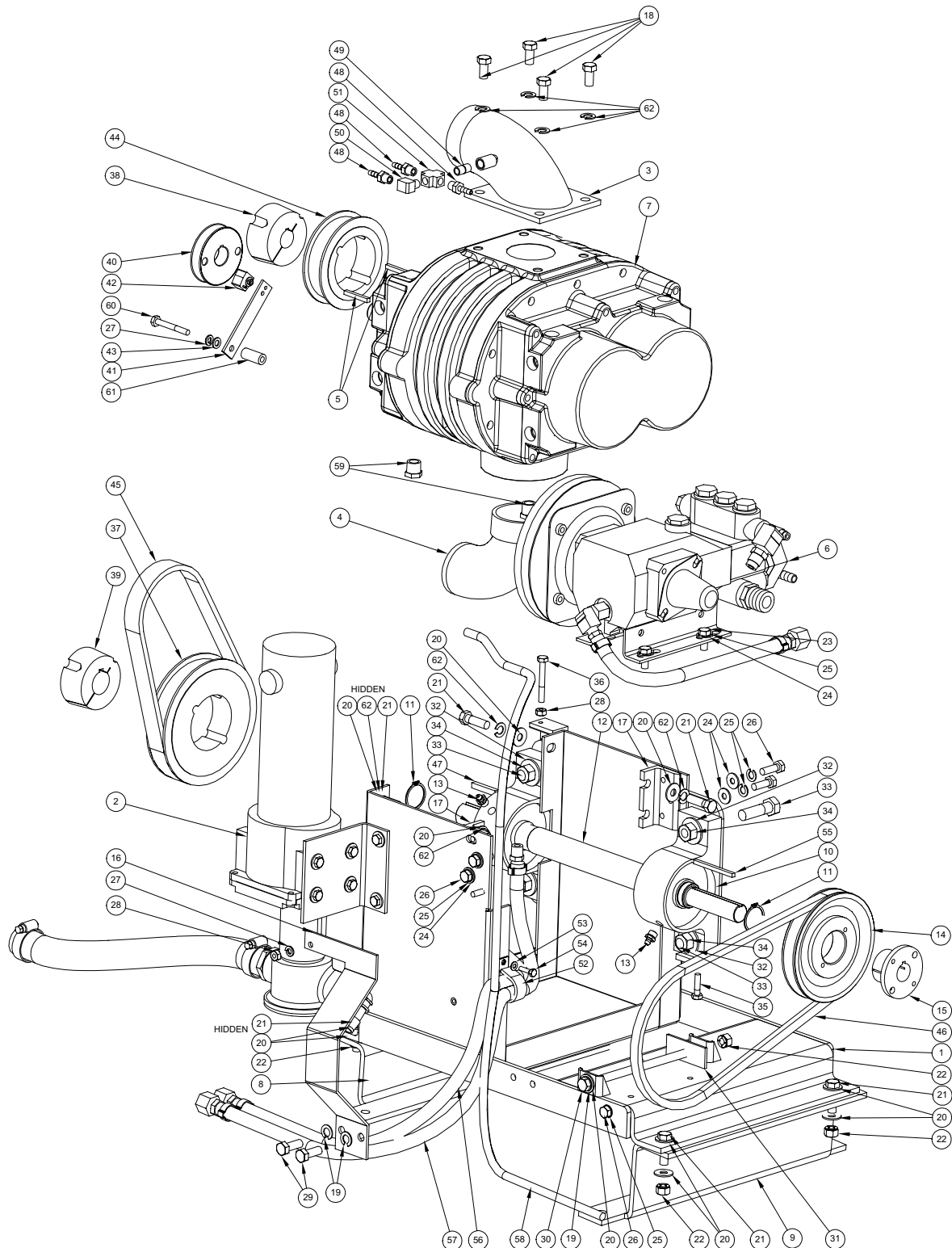
CDS 4.6 Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
5	000-013-070	Box, Vacuum Relief Valve - Universal Recovery Tank	1
6	Fig. 7-20	Assembly, Vacuum Relief Valve	1
7	000-049-153	Filter, Flat - Recovery Tank	1
8	000-015-932	Bracket, Flat Filter Securing - Universal Recovery Tank	1
9	000-049-154	Deflector, Air - Universal Recovery Tank	1
10	000-057-206	Gasket, Adapter - Universal Recovery Tank	4
11	000-140-023	Rivet, AB8-6A Aluminum Pop	6
12	000-157-090	Float, Lever Switch	2
13	000-033-023	Clamp, 3/4" Nylon Hose	4
14	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	6
15	000-094-059	Nut, #8-32UNF Nylock	1
16	000-086-008	Latch, Bungie	1
17	000-143-539	Screw, #6-32UNC x 0.50" Lg. Button Head Allen	2
18	000-094-063	Nut, #6-32UNC Nylock	2
19	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	12
20	000-174-019	Washer, 1/4" Lock	14
21	000-174-003	Washer, 1/4" Flat	22
22	000-106-019	Plug, 1-1/2" NPT	1
23	000-052-763	Nipple, 1-1/2" IPS Close s/s	1
24	000-169-022	Valve, 1-1/2" Full Port Ball	1
25	000-052-226	Insert, 1-1/2" NPT x 1-1/2" Barb (Grey)	1
26	000-052-082	Elbow, 1/4" NPT Street x 45°	1
27	000-052-102	Insert, #46 (1/4" NPT x 3/8" Barb)	2
28	000-052-085	Elbow, 1/4" NPT Street	1
29	000-081-252	Label, Maintenance & Lubrication Schedule	1
30	000-143-333	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head	2
31	000-001-132	Adapter, Tank To Ø3.0" Blower Hose - Universal Recovery T	1
32	000-174-029	Washer, 3/8" Rubber Back	2
33	Fig. 7-17	Assembly, Water Box	1
34	Fig. 7-10	Assembly, Dual Heat Exchanger	1

CDS 4.6 Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
35	000-174-001	Washer, #10 Flat	6
36	000-067-031	Hinge, Dash Box	1
37	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	3
38	Fig. 7-6 & 7-7	Assembly, Instrument Panel	1
39	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
40	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	8
41	000-174-060	Washer, 1/4" Flat Rubber Backed	4
42	000-052-758	Insert, 1" NPT x 1" Barb	1
43	000-094-009	Nut, 1/4"-20UNC Hex Nylock	4
44	000-174-036	Washer, #10 Flat Rubber Backed	2
45	000-094-034	Nut, #10-24UNC Nylock	2
46	000-174-015	Washer, #10 Outside Star	5
47	000-094-004	Nut, #10-24UNC Hex	5
48	000-143-064	Screw, #10-24UNC x 1.00" Lg. Flat Head Phillips	4
49	000-068-459	Hose, 3/4" I.D. Green Stripe	1
50	000-033-020	Clamp, Size #16 Hose	2
51	000-068-017	Hose, 3/8" Bulk	1
52	000-033-005	Clamp, Size #5 Hose	2
53	000-143-114	Screw, #10-24UNC x 0.50" Lg. Flat Head	2
54	601-013-001	Stabilizer, Instrument Panel To Recovery Tank	1
55	000-068-018	Hose, 1/2" I.D. Rubber - Bulk	1
56	000-068-203	Hose, 3/16" x 34" Lg. 1/4" FJIC x 1/4" FJIC	1
57	000-068-734	Hose, 1/2" x 42.5" Lg. w/ 3/8" NPT & 3/8" SAE F Ends	1
58	000-068-326	Hose, 3/8" I.D. Clear w/ Braid	1
59	Fig. 7-27	Assembly, Dash Box - N/S	1
60	000-166-002	Tray, Soap Jug - Weldment	1
61	000-159-016	Jug, 5 Gallon Plastic Chemical - Standard	1
62	000-131-003	Trimlok,	1
63	000-081-252	Label, Ansi Warning - Park Position - Machine	1
64	000-081-252	Label, Ansi Warning - Large	1

Figure 7-26 CDS 4.6 Pump & Blower Assembly
D-4431 Rev M



CDS 4.6 Pump & Blower Assembly Parts List

Item	Part Number	Description	Qty
1	000-055-028	Frame, Pump & Blower	1
2	000-079-097	Assembly, Duraflow APO Pump - CDS (Fig. 7-14)	1
3	000-001-041	Adapter, Blower Inlet	1
4	000-001-043	Adapter, Blower Outlet	1
5	000-077-001	Key, #3 & #4 Vacuum Pump Drive	2
6	Fig. 7-12	Assembly, Pump - CDS 4.8	1
7	000-111-145	Blower, 4005 Dominator	1
8	000-154-147	Spacer, Power Pack - Rear - CDS 4.8 Ford 2005+	1
9	000-154-146	Spacer, Power Pack - Front - CDS 4.8 Ford 2005+	1
10	000-008-020	Bearing, Pillow Block - 1-3/16" Bore	2
11	000-139-021	Snap Ring, 1-3/16" Shaft	2
12	000-150-040	Shaft, Drive Sprocket - CDS 4.8	1
13	000-052-505	Zerk Fitting, 1/8" MNPT Grease Fitting-Straight	2
14	000-109-022	Pulley, AK54 H Pump	1
15	000-020-019	Bushing, #H x 7/8" Bore	1
16	000-108-065	Protector, CAT Pump Belt Shield	1
17	000-015-722	Bracket, Angle Tab - CDS 4.6	2
18	000-143-017	Screw, 3/8"-16UNC x 0.75" Lg. Hex Head Grd. 8	4
19	000-174-057	Washer, 3/8" Lock	3
20	000-174-004	Washer, 5/16" Flat	13
21	000-143-025	Screw, 3/8"-16UNC x 1.25" Lg. Hex Head Grd 8	8
22	000-094-100	Nut, 3/8"-16UNC Hex Nylock	5
23	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	4
24	000-174-002	Washer, 1/4" Flat	8
25	000-174-018	Washer, 5/16" Lock	9
26	000-143-013	Screw, 5/16"-18UNC x 1.00" Lg. Grade 8	5
27	000-174-017	Washer, 1/4" Lock	2
28	000-094-010	Nut, 1/4"-20UNC Hex	2
29	000-143-096	Screw, 3/8"-16UNC x 1.00" Lg. Hex Head	2
30	000-143-260	Screw, 3/8"-16UNC x 8.00" Lg. Hex Head w/ 6" Threads	1

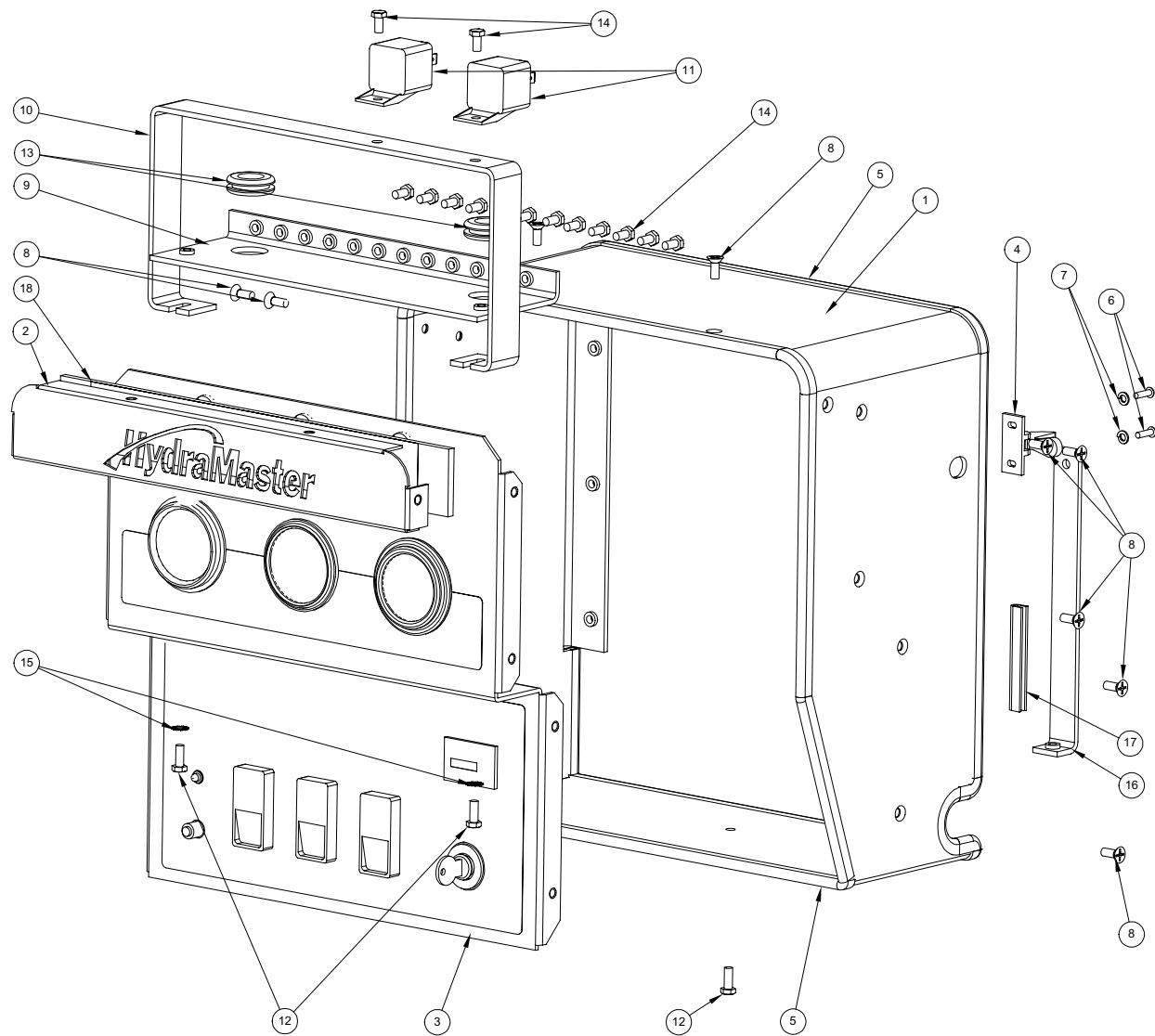
CDS 4.6 Pump & Blower Assembly Parts List

Item	Part Number	Description	Qty
31	000-015-173	Bracket, CAT Pump Tensioner Plate - CDS 4.8	1
32	000-174-012	Washer, 1/2" SAE H/D Flat	4
33	000-143-240	Screw, 1/2"-13UNC x 1.75" Lg. Hex Head - Grade 5	4
34	000-094-037	Nut, 1/2"-13UNC Hex 2-Way Locking - Z/P	4
35	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	1
36	000-143-548	Screw, 1/4"-20UNC x 2.00" Lg. Hex Head	1
37	000-109-058	Pulley, 56 Tooth GT2 8MX-56S-21 Engine & Blower	1
38	000-020-020	Bushing, 7/8" Taper-Lock	1
39	000-020-026	Bushing, 1-1/8" Taper-Lock	1
40	000-109-009	Pulley, 2.75" x 0.88" Pump Drive	1
41	000-015-930	Bracket, Tach. Magnetic Extension N/S - CDS 4.6	1
42	000-149-010	Sensor, CDS Magnetic Tach.	1
43	000-174-003	Washer, 1/4" Flat	1
44	000-109-057	Pulley, 40 Tooth GT2 8MX-40S-21 Engine & Blower	1
45	000-010-052	Belt, Polychain GT	1
46	000-010-051	Belt, #9380 CAT Pump Drive	1
47	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
48	000-052-293	Insert, #23 (1/8" NPT x 3/16" Barb)	3
49	000-052-057	Nipple, 1/8" NPT Close	1
50	000-052-084	Elbow, 1/8" NPT Street	1
51	000-052-079	Cross, 1/8" FPT	1
52	000-033-057	Clamp, 1" Cushion Loop	1
53	000-174-001	Washer, #10 Flat	1
54	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	1
55	000-077-012	Key, 3/16" x 2.5" Lg. Class 2 Fit	1
56	000-068-149	Hose, CDS Blower Oil Drain	1
57	000-068-149	Hose, CDS Blower Oil Drain	1
58	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
59	000-052-061	Bushing, 3/8" NPT x 1/4" FPT	2
60	000-143-373	Screw, 1/4"-20UNC x 2" Lg. Hex Head Grd 5	1

CDS 4.6 Pump & Blower Assembly Parts List

Item	Part Number	Description	Qty
61	000-154-153	Spacer, Tach. Sensor - CDS 4.8	1
62	000-174-021	Washer, 3/8" Lock	8

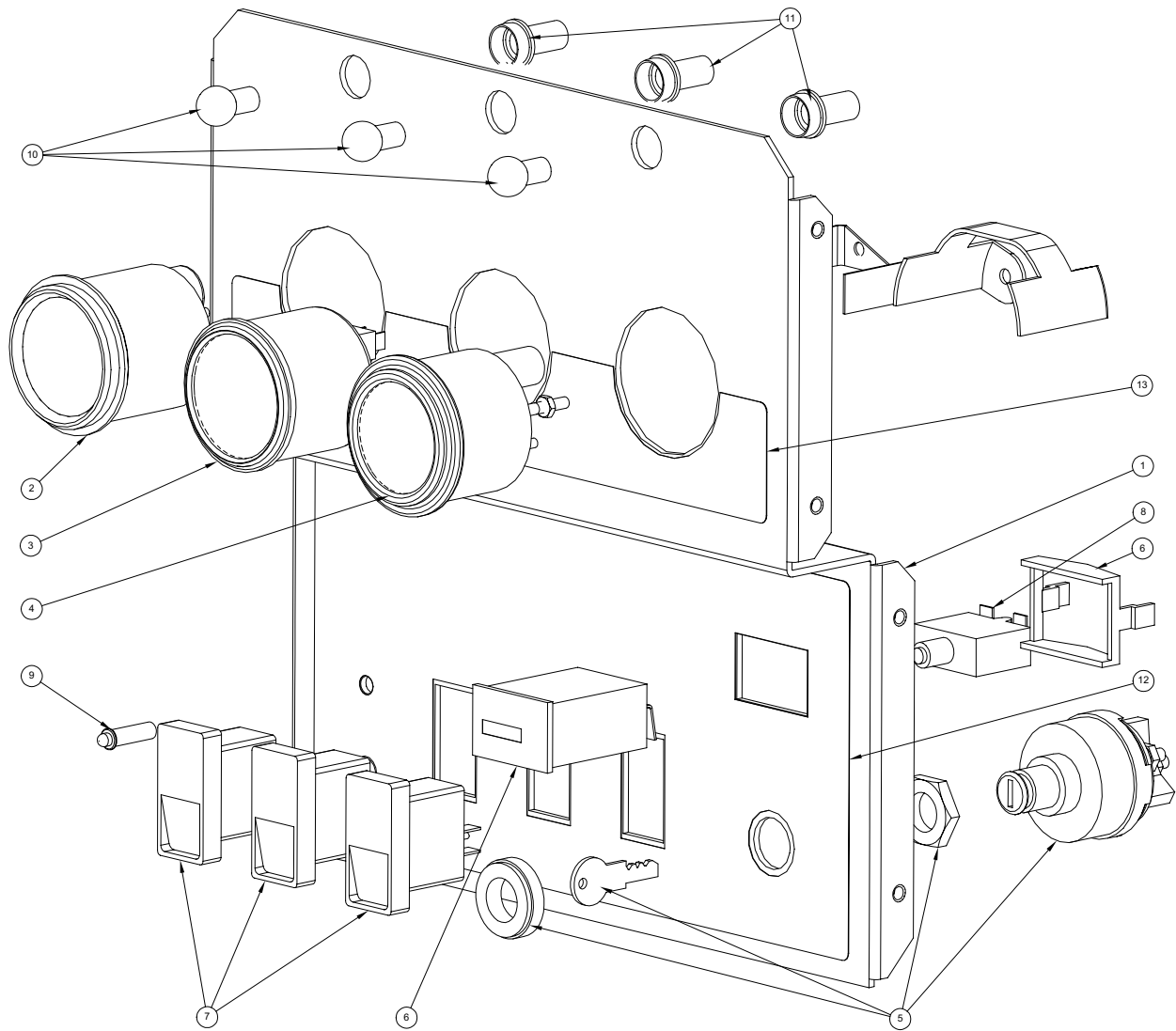
Figure 7-27 CDS 4.6 Dash Box Assembly
D-6986 Rev -



CDS 4.6 Dash Box Assembly Parts List

Item	Part Number	Description	Qty
1	000-013-025	Dash Box, Painted	1
2	000-105-053	Plate, Dash Name - Hm - CDS 4.8	1
3	Fig. 7-28	Assembly, Dash Panel - N/S	1
4	000-086-104	Latch, Dash Securing	1
5	000-131-027	Trimlock, 1/8" ID x 3/8"	1
6	000-143-046	Screw, #6-32UNC x 0.50" Lg. Pan Head	2
7	000-174-043	Washer, #6 Lock	2
8	000-143-114	Screw, #10-24UNC x 0.50" Lg. Flat Head	12
9	000-015-183	Bracket, Grounding Bus	1
10	000-015-184	Bracket, Relay Mounting	1
11	000-157-022	Switch, Relay	2
12	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	3
13	000-060-002	Grommet, Large Wiring	2
14	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	14
15	000-175-015	Washer, #10 Outside Star	2
16	000-015-175	Bracket, Dash Box Support - CDS 4.8	1
17	000-131-027	Trimlock, 1/8" I.D. x 3/8"	1
18	000-084-016	Reflector, 1.625" x 11.88" New HM Logo	1

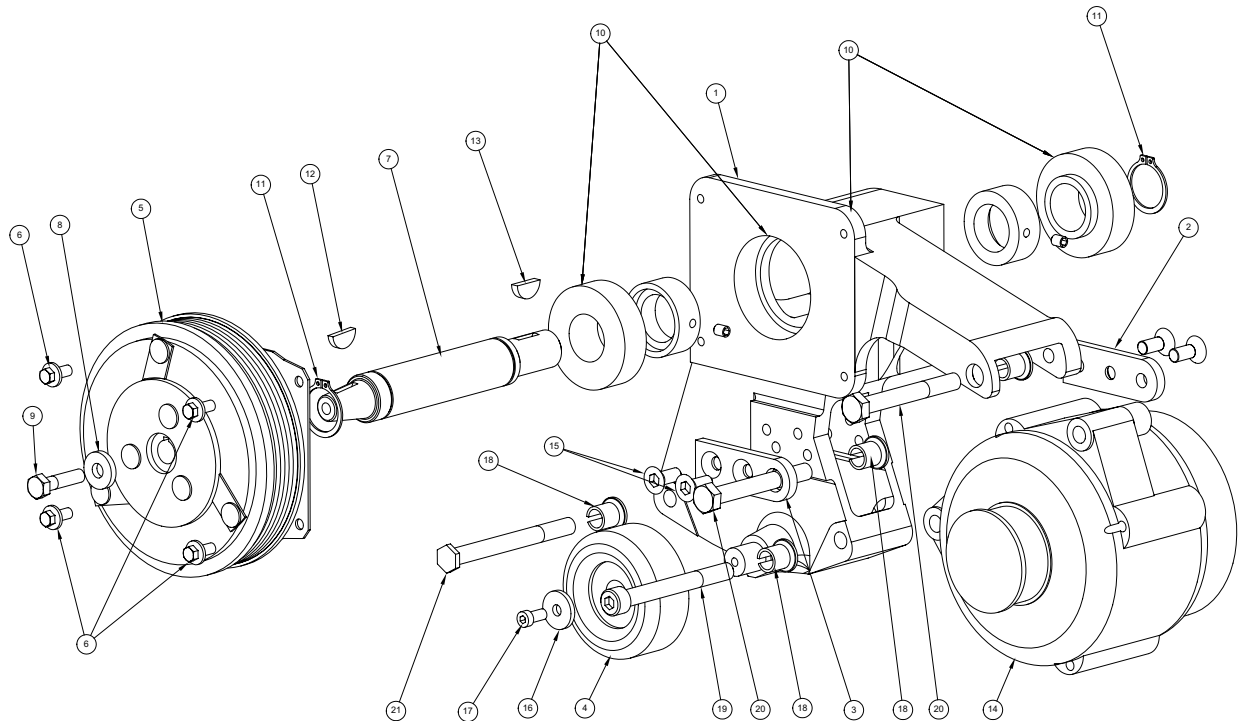
Figure 7-28 CDS 4.6 Dash Panel Assembly
D-6982 Rev -



CDS 4.6 Dash Panel Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-167	Panel, Dash - CDS 4.6	1
2	000-074-004	Gauge, Tachometer	1
3	000-074-006	Gauge, Vacuum	1
4	000-074-016	Gauge, Temperature	1
5	000-157-008	Switch, Ignition	1
6	000-074-018	Meter, Rectangular w/o Bezel	1
7	000-157-040	Switch, 20 AMP Rocker	3
8	000-018-003	Breaker, 15 AMP Circuit	1
9	000-084-011	Light, Red LED Indicator Mini	1
10	000-084-004	Lamp, Replacement Guage	3
11	000-084-009	Lamp, Socket - Dashboard	3
12	000-081-099	Label, Dash - Lower	1
13	000-081-099	Label, Dash - Upper	1

Figure 7-29 CDS 4.6/4.8 Front End 2003+ GMC Assembly
D-5481 Rev A



CDS 4.6/4.8 Front End 2003+ GMC Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-002	Casting, Front End 4.8 Chevy CDS	1
2	000-015-880	Bracket, Idler Casting - Rear - 2003 CDS	1
3	000-015-879	Bracket, Idler Casting - Front - 2003 CDS	1
4	000-109-095	Pulley, 76mm CDS Idler - Gates w/ Double Row Bearing	1
5	000-036-003	Clutch Assembly, 6" Poly Groove	1
6	000-143-141	Screw, 1/4"-20UNC x 1/2" Lg. Whiz Lock	4
7	000-150-009	Shaft, Electric Clutch - CDS	1
8	000-036-003	Washer, Clutch Assembly, 6" Poly Groove	1
9	000-143-151	Screw, 5/16"-24UNF x 1.25" Lg. Hex Head	1
10	000-008-011	Bearing, CDS Clutch	2
11	000-139-005	Ring, Snap - CDS Clutch Shaft	2
12	000-077-008	Key, 5/32" x 3/4" Woodruff	1
13	000-077-009	Key, 3/16" x 3/4" Woodruff	1
14	---	Alternator, 2003 GMC (Part Of Van)	1
15	000-143-562	Screw, 5/16"18UNC x 0.75" Lg. Flat Head Allen	4
16	000-174-104	Washer, Idler Casting - 2003+ GMC	1
17	000-143-079	Soc. Hd. Mach. Scr., 1/4"-20UNC x 0.50" Lg.	1
18	000-154-141	Bushing, CDS Idler Casting - Alternator Mounting	4
19	000-143-563	Screw, M-10 x 1.5 x 90mm Lg. Socket Head	1
20	000-143-564	Screw, M10 x 1.5 x 80mm Lg. Hex Head	2
21	000-143-558	Screw, M10X1.5 x 90mm Lg. Mod. Thinner Head	1

Figure 7-30 Horizontal Pump In Tank Assembly - Front
D-3700 Rev C

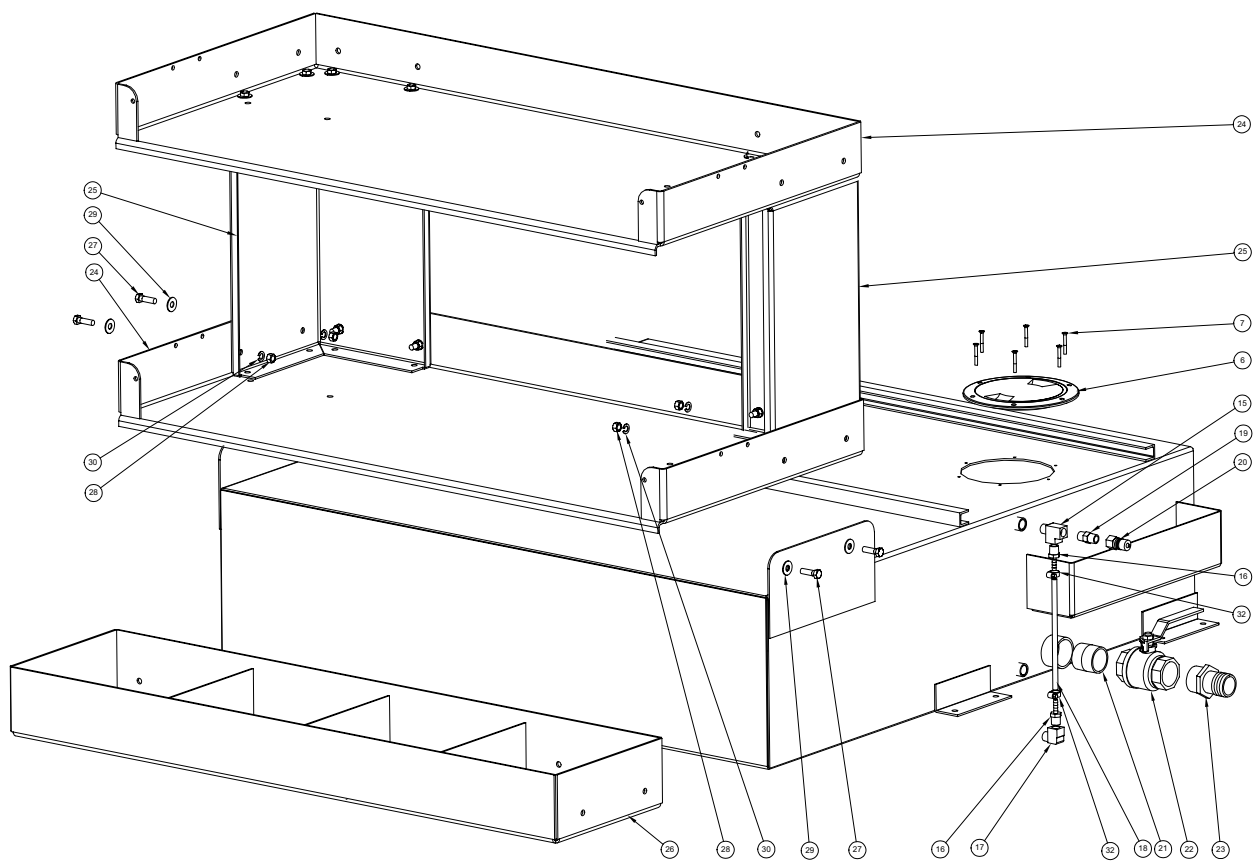
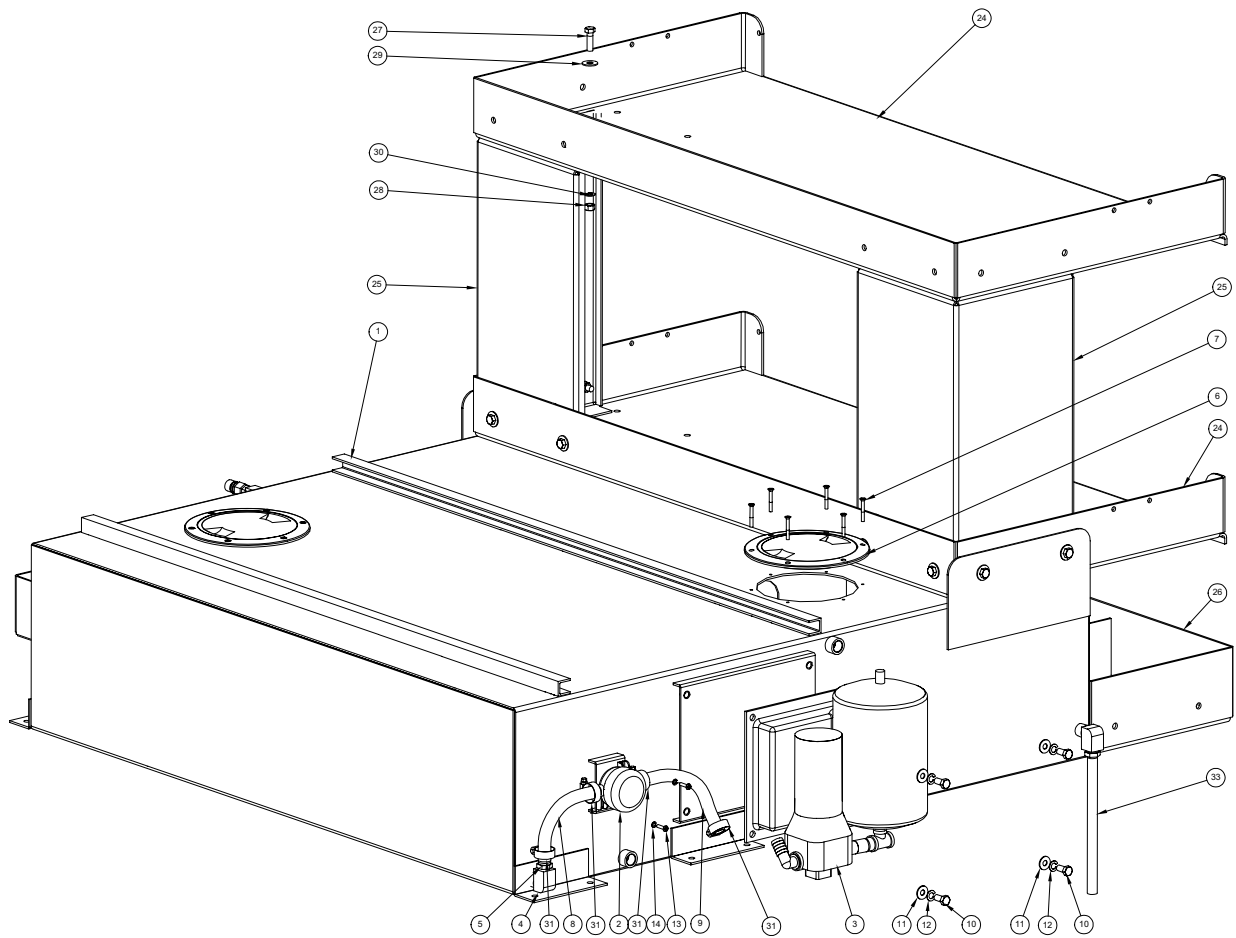


Figure 7-31 Horizontal Pump In Tank Assembly - Rear

D-3700 Rev C



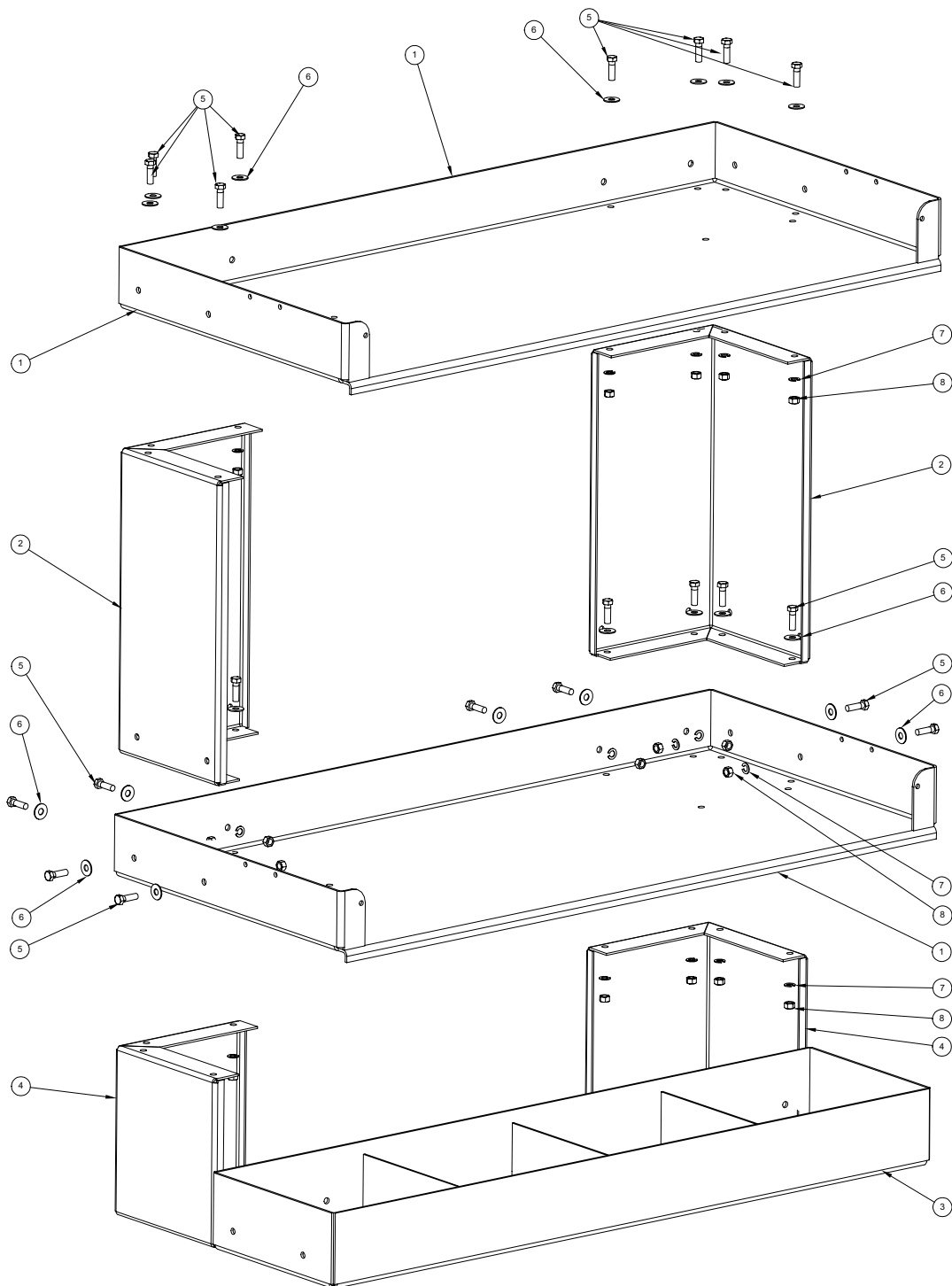
Horizontal Pump In Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-005	Tank, 120 Gallon Horizontal Pump-In - Weldment	1
2	000-111-170	Filter, (Supplied With Pump)	1
3	000-111-170	Pump, Flojet Fresh Water	1

Horizontal Pump In Tank Assembly Parts List

Item	Part Number	Description	Qty
4	000-052-087	Elbow, 1/2" NPT Street	1
5	000-052-129	Insert, #812 (1/2" NPT x 3/4" Barb)	1
6	000-041-005	Cover, 6"	2
7	000-143-113	Screw, #10-24UNC x 1 1/2" Lg. Flat HD Philipps	12
8	000-068-069	Hose, 3/4" Weatherhead	1
9	000-068-069	Hose, 3/4" Weather Head	1
10	000-143-017-1	Screw, 3/8"-16UNC x 3/4" Lg. Hex Head	4
11	000-174-032	Washer, 3/8" Flat	4
12	000-174-057	Washer, 3/8" Lock	4
13	000-143-062	Screw, #10-24UNC x 0.75" Lg. Pan Head Phillips	2
14	000-174-014	Washer, #10 Lock	2
15	000-052-023	Tee, 3/8" NPT Male Street	1
16	000-052-103	Insert, #64 (3/8" NPT x 1/4" Barb)	2
17	000-052-086	Elbow, 3/8" NPT Street	1
18	000-068-025	Hose, 1/4" Clear Bulk	1
19	000-052-074	Nipple, 3/8" NPT Hex	1
20	000-052-052	Quick Connect, 660 Male w/ Viton Standard	1
21	000-052-182	Nipple, 1-1/2" NPT Close Galvanized	1
22	000-169-022	Valve, 1-1/2" Full Port Ball	1
23	000-052-226	Insert, 1-1/2" NPT x 1-1/2" Barb (Grey)	1
24	000-166-011	Tray, Air Mover - Removable - Weldment	2
25	000-083-001	Leg, Tray Support - Weldment	2
26	000-166-013	Bin, 4 Compartment Removable - Weldment	1
27	000-143-019	Screw, 3/8"-16UNC x 1.25" Lg. Hex Head Grd 5 Zinc	16
28	000-094-014	Nut, 3/8"-16UNC Hex Zink Plated	16
29	000-174-005	Washer, 3/8" Flat	16
30	000-174-021	Washer, 3/8" Lock	16
31	000-033-029	Clamp, Size 12 Hose	4
32	000-033-003	Clamp, Size #4 Mini	2
33	000-068-165	Hose Assembly, Pump In Overflow	1

Figure 7-32 Free Standing Tray Assembly
D-3772 Rev -



Free Standing Tray Assembly Parts List

Item	Part Number	Description	Qty
1	000-166-011	Tray, Air Mover - Removable - Weldment	2
2	000-083-001	Leg, Tray Support - Weldment	2
3	000-166-013	Bin, 4 Compartment Removable - Weldment	1
4	000-083-006	Leg, Free Standing Tray Support - Weldment	2
5	000-143-019	Screw, 3/8"-16UNC x 1.25" Lg. Hex Head Grd 5 Zinc	24
6	000-174-005	Washer, 3/8" Flat	24
7	000-174-021	Washer, 3/8" Lock	24
8	000-094-014	Nut, 3/8"-16UNC Hex Zink Plated	24

Figure 7-33 **85 Gallon Rotomoded Fresh Water Tank Assembly - Front**
D-5566 Rev B

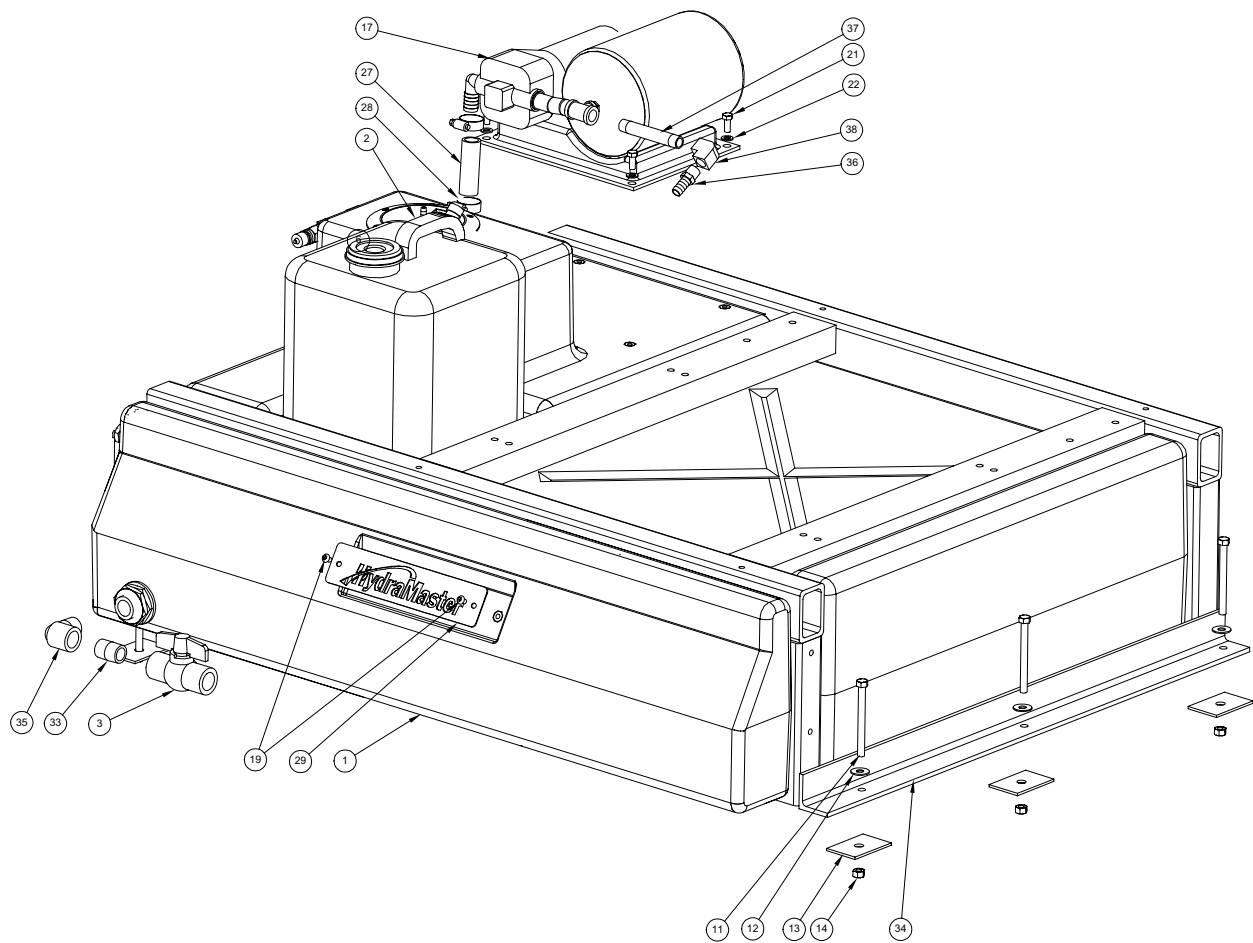
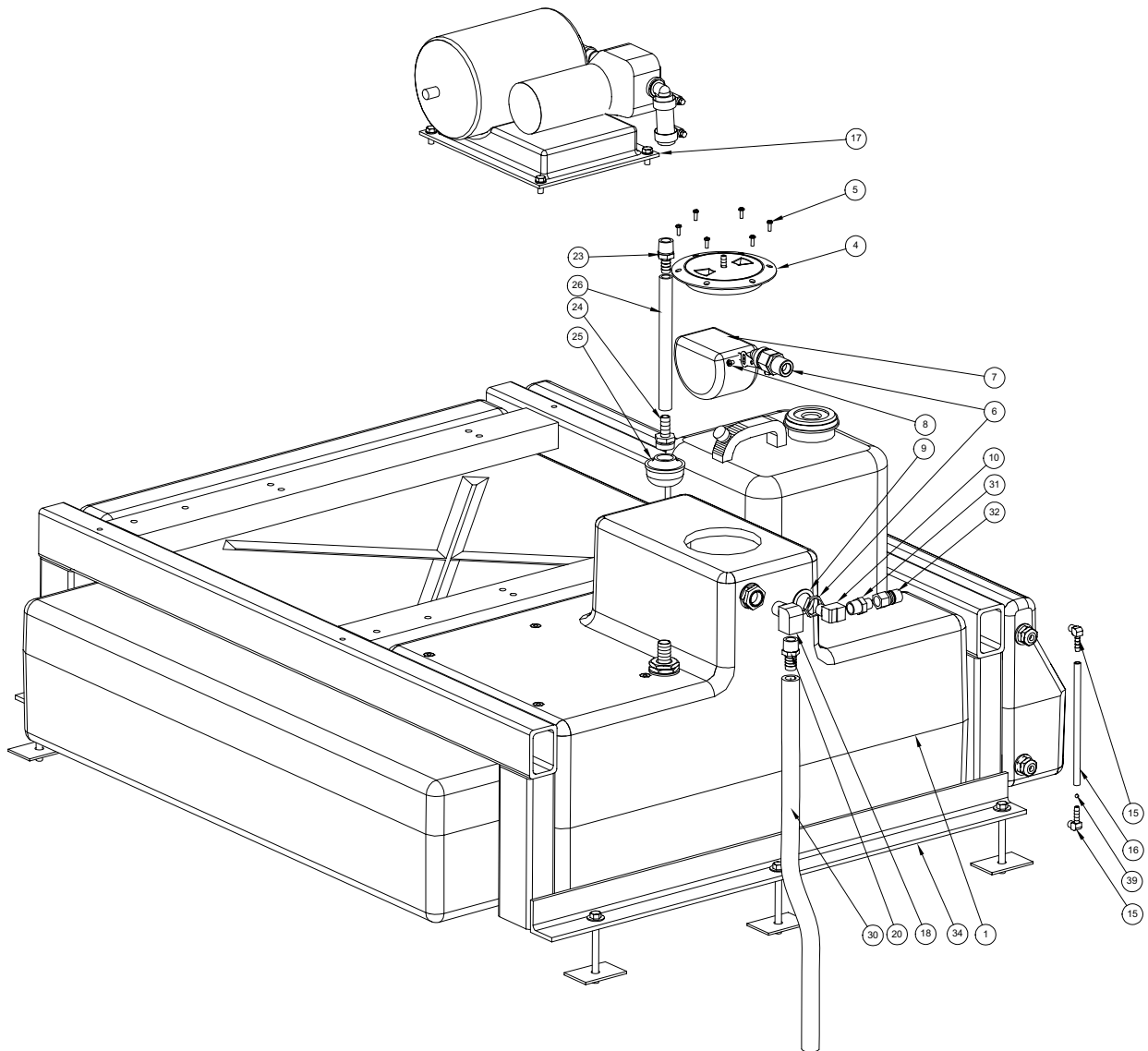


Figure 7-34 **85 Gallon Rotomolded Fresh Water Tank Assembly - Rear**
D-5566 Rev B



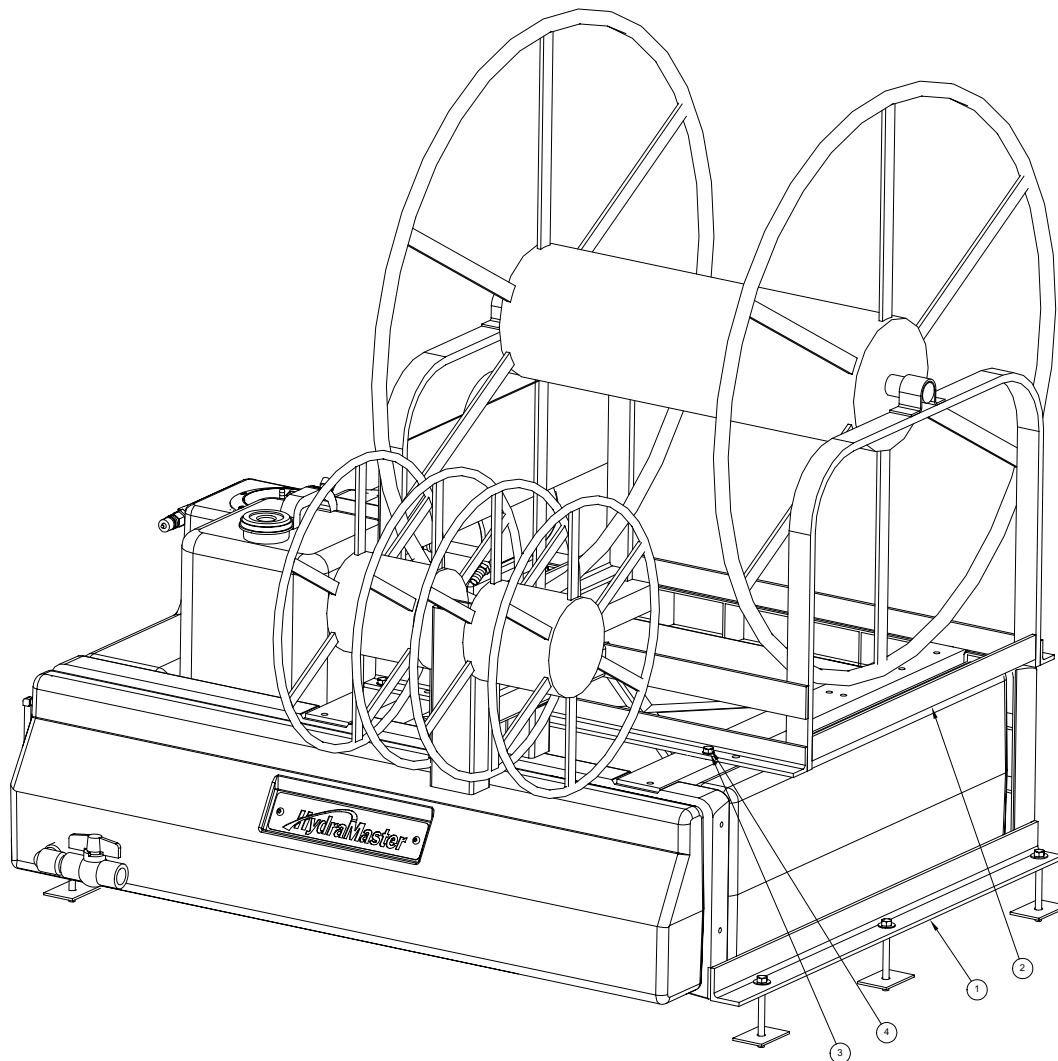
85 Gallon Rotomolded Fresh Water Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-116	Tank, Boxxer Fresh Water - Rotomolded	1
2	000-159-016	Jug, 5 Gallon Plastic Chemical - Standard	1
3	000-169-202	Valve, 3/4" FPT Ball Valve	1
4	000-041-004	Cover, Poly Water Box Mod. w/ Vent	1
5	000-143-314	Screw, #8 x 1/2" Lg. Pan Head	6
6	000-169-167	Valve, Mechanical Incoming Water - Water Box	1
7	000-005-007	Float, Water Box	1
8	000-143-336	Screw, #10-32UNF x 0.25" Lg. Pan Head Phillips	1
9	000-174-063	Washer, 1.5" O.D. x 1.073" I.D. x 0.075" Thk.	1
10	000-052-086	Elbow, 3/8" NPT Street	1
11	000-143-198	Screw, 3/8"-16UNC x 4" Lg. Hex Head Full Thread	6
12	000-174-005	Washer, 3/8" Flat	6
13	600-011-003	Tie Down Cleat Washer	6
14	000-094-015	Nut, 3/8"-16UNC Hex 2-Way Locking	6
15	000-052-253	Elbow, 1/8" NPT x 1/4" Barb	2
16	000-068-025	Hose, 1/4" I.D. Clear	1
17	000-111-170	Pump, Flojet Fresh Water	1
18	000-052-087	Elbow, 1/2" NPT Street	1
19	000-143-565	Screw, 1/4-20 UNC x 0.375" Lg. Button Head	2
20	000-052-130	Insert, #810 Brass	1
21	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	4
22	000-174-049	Washer, 5/16" Flat	4
23	000-052-107	Insert, #88 (1/2" NPT x 1/2" Barb)	1
24	000-052-160	Insert, 3/4" M Garden x 1/2" Barb	1
25	000-049-020	Filter, Screen - Medium	1
26	000-068-018	Hose, 1/2" I.D Bulk	1
27	000-068-069	Hose, 3/4" I.D. Weatherhead Blue - Bulk	1
28	000-033-029	Clamp, Size 12 Hose	2
29	000-105-313	Plate, Hydramaster Name- Roto Tank	1
30	000-068-020	Hose, .625" I.D. - Green Stripe	1

85 Gallon Rotomolded Fresh Water Tank Assembly Parts List

Item	Part Number	Description	Qty
31	000-052-075	Nipple, 3/8" NPT x 1/2" NPT	1
32	000-052-052	Quick Connect, 660 Male w/ Viton Standard	1
33	000-052-326	Nipple, 3/4" NPT Close	1
34	000-055-169	Frame, Rotomolded Fresh Water Tank - Boxxer	1
35	000-052-726	Elbow, 3/4" Street (Grey)	1
36	000-052-105	Insert, #68 (3/8" NPT x 1/2" Barb)	1
37	000-052-408	Nipple, 3/8" NPT x 4" Lg.	1
38	000-052-142	Elbow, 3/8" FPT x FPT	1
39	000-005-008	Sight Float Bead, 5mm Red Wally Whale	1

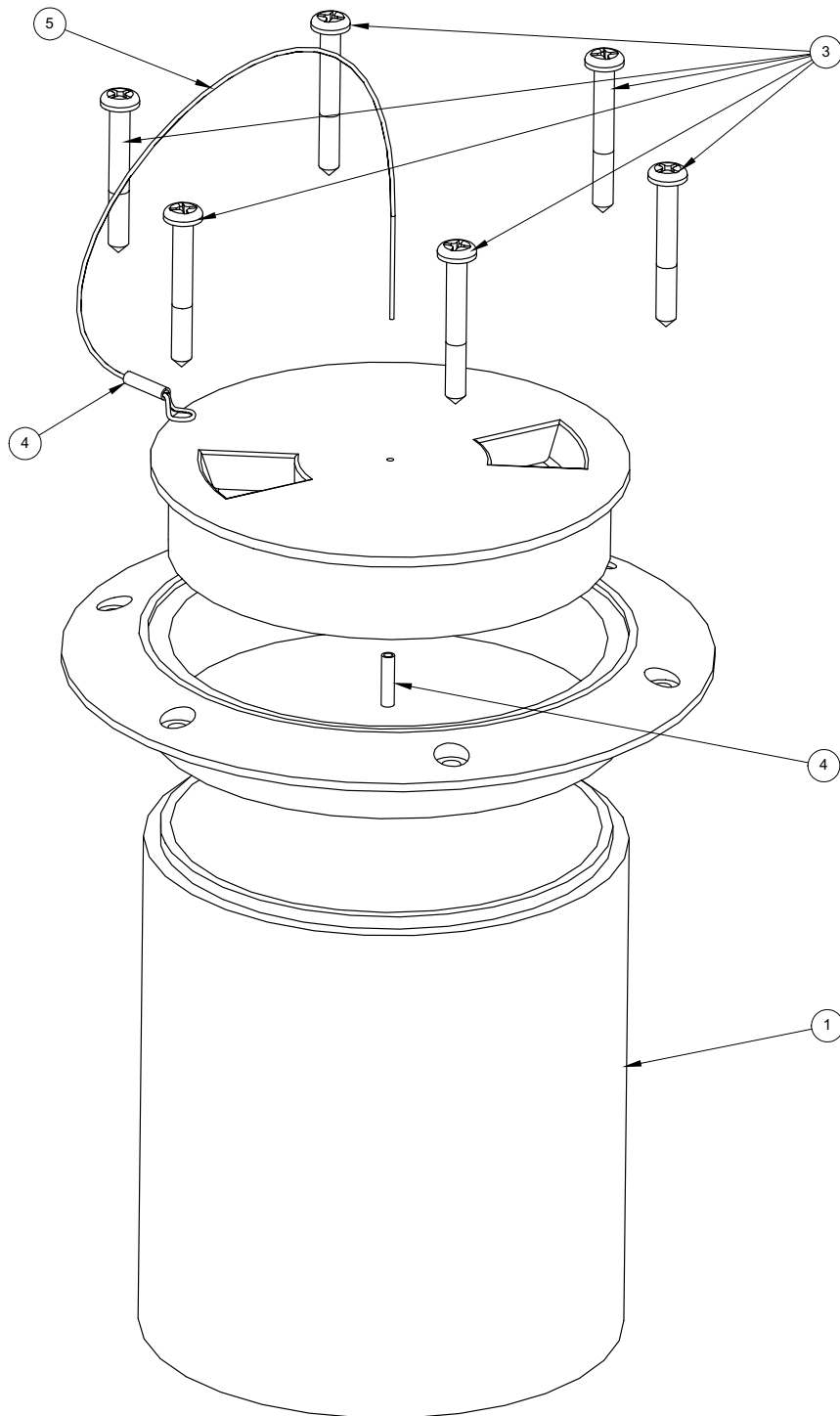
Figure 7-35 **85 Gallon Rotomolded Fresh Water Tank w/ Reel Assembly**
D-5817 Rev -



85 Gallon Rotomolded Fresh Water Tank w/ Reel Assy Parts List

Item	Part Number	Description	Qty
1	000-159-118	Assembly, Rotomolded Tank - Boxer (Fig. 7-33 & 7-34)	1
2	000-163-543	Reel, Tripple Electric 300' (E2336-518S)	1
3	000-174-057	Washer, 3/8" Lock	4
4	000-143-017-1	Screw, 3/8"-16UNC x 3/4" Lg. Hex Head	4

Figure 7-36 **CDS Pass Through Assembly**
C-5623 Rev B



CDS Pass Through Assembly Parts List

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

CDS 4.6/4.8 Belts

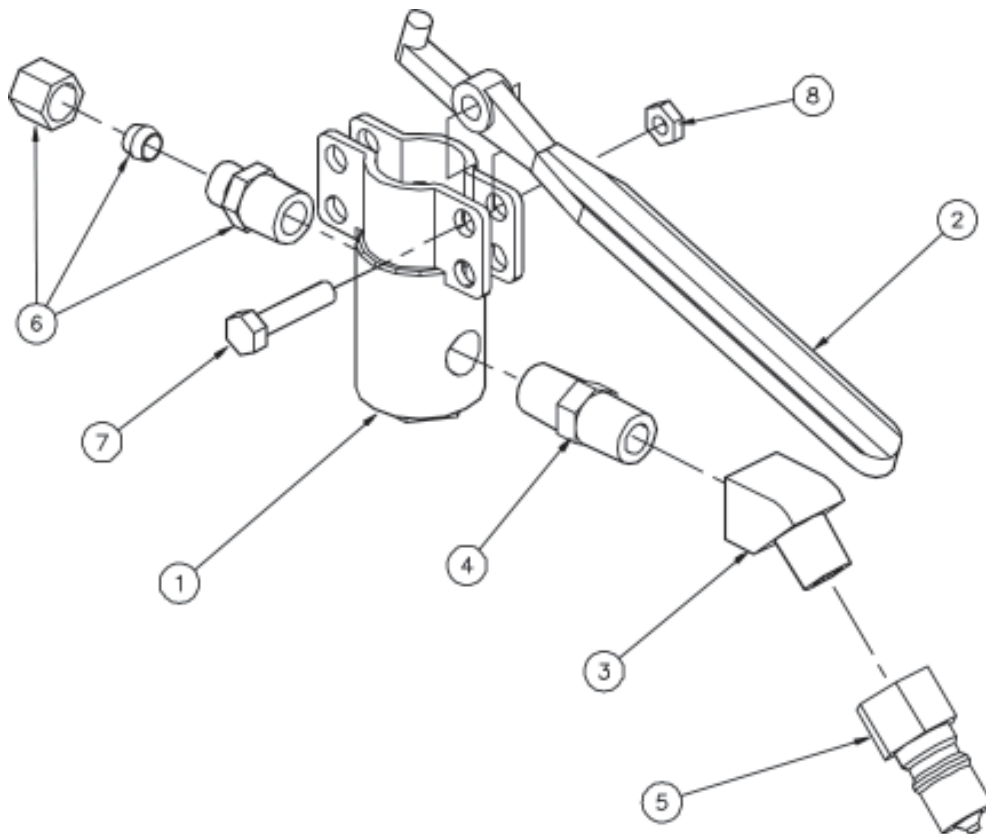
PART NO.	DESCRIPTION
All Vans	
010-051	Belt, Cat Pump Drive
010-015	Belt, CDS 4.8 APO Drive
010-052	Belt, Polychain GT Blower Drive
Chevrolets	
010-001	Belt, '85 Chev 8 Drive
010-002	Belt, '85-86 Chev 8 Water Pump
010-032	Belt, '86 Chev 8 Drive
010-034	Belt, '87-91 Chev 8 Drive
010-010	Belt, '92+ Chev 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 4.6/4.8 Belts (cont.)

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

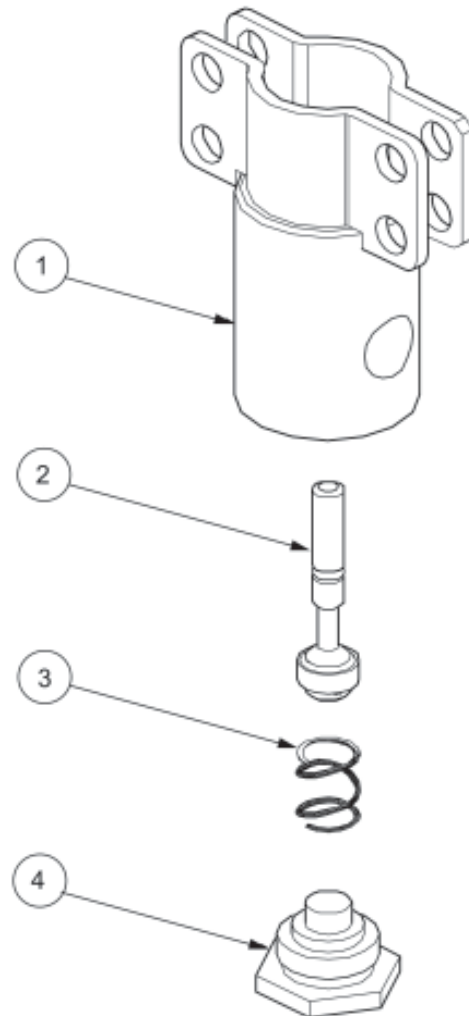
Cleaning Wand Assembly and Parts Lists

Figure 7-37 **Valve Assembly**
C-3652 Rev -



ITEM	PART NO.	DESCRIPTION	QTY
1	169-058	Valve, s/s HM Solution (Fig. 7-38)	1
2	167-013	Trigger, Hydra Hoe Valve - Brass	1
3	052-082	Elbow, 1/4" Brass 45 Street	1
4	052-095	Nipple, 1/4" s/s Hex	1
5	052-050	Quick Connect, 440 M with Viton	1
6	052-152	Compression, 1/4" Male Hydra Hoe Fitting	1
7	143-002	Screw, 1/4 - 20 x 1" HHC s/s	1
8	094-009	Nut, 1/4 - 20 s/s Nylock	1

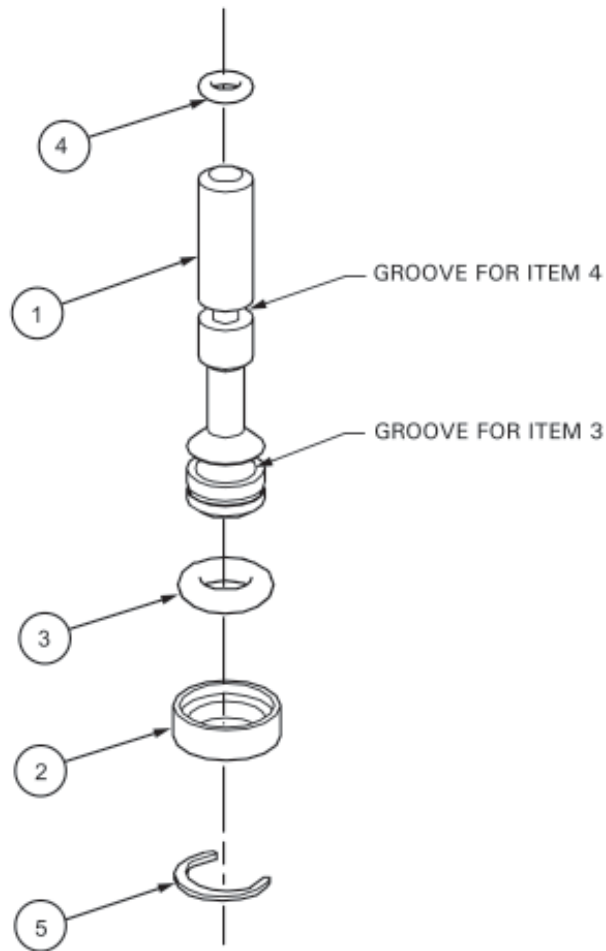
Figure 7-38 **Solution Valve Assembly**
B-1234 Rev A



ITEM	PART NO.	DESCRIPTION	QTY
1	600-012-001	Valve Body Sub Assembly (Fig. 7-39)	1
2	600-012-002	Valve Stem Sub Assembly	1
3	155-003	Spring, HM Solution Valve	1
4	027-001	Cap, Brass	1

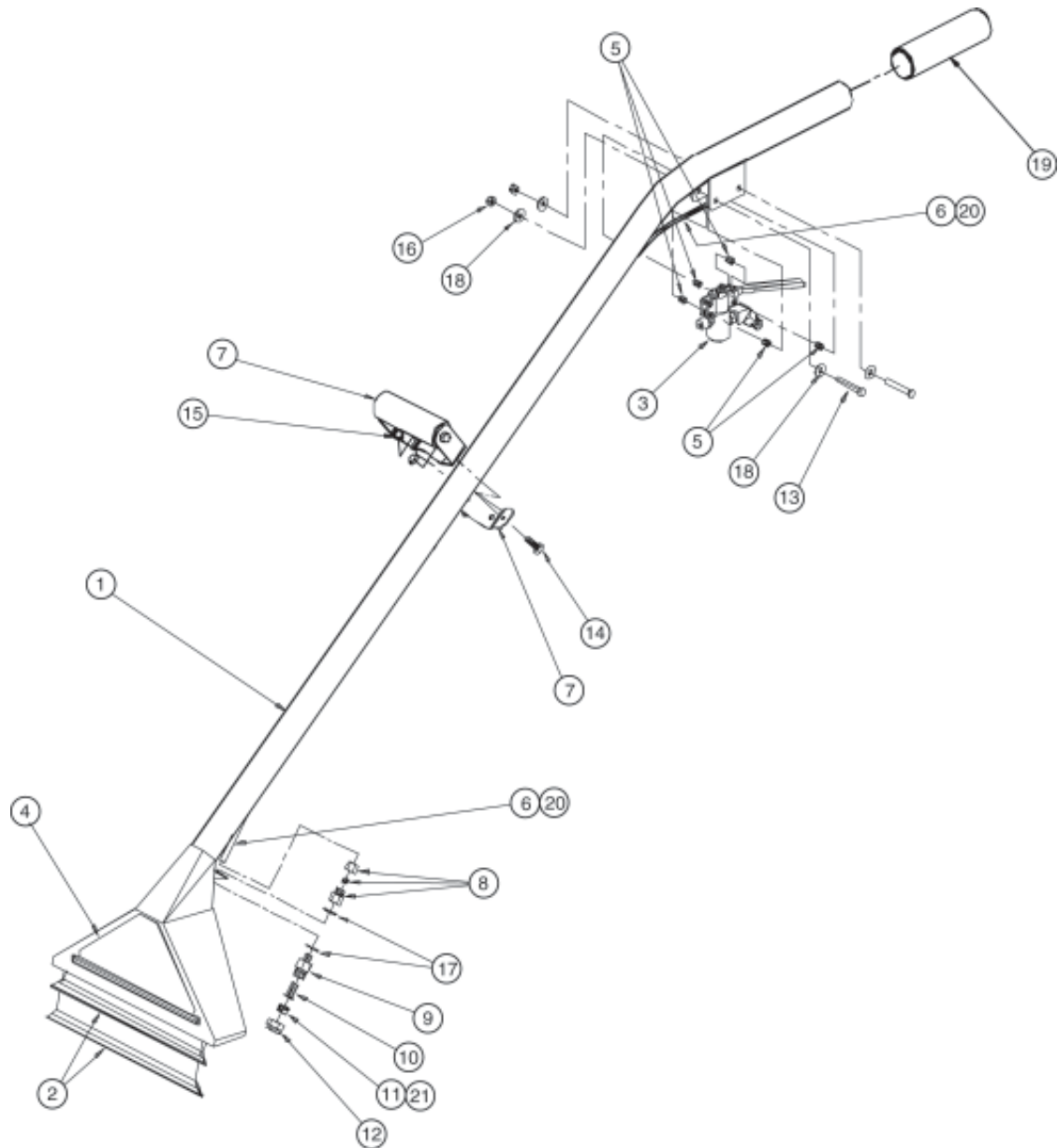
Figure 7-39 Valve Stem Assembly

B-3743 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 7-40 **Hydra Hoe Wand Assembly**
C-2660 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 Assy, s/s Hydra Hoe with Trigger (Fig. 7-37)	1
4	081-015	Label, 'HydraMaster' Wand	1
5	154-001	Spacer, $\frac{1}{4} \times \frac{5}{16}$ s/s Solution Valve	5
6	168-001	Tube, Hydra Hoe Solution - $\frac{1}{4}$ " OD s/s	1
7	061-006	Handle, Pressure Guide	1
8	052-151	Compression, $\frac{1}{8}$ " 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, $\frac{1}{4}$ - 20 x $1\frac{3}{4}$ " HHC	2
14	143-012	Screw, $\frac{5}{16}$ - 18 x $\frac{3}{4}$ " HHC s/s	2
15	094-035	Nut, $\frac{5}{16}$ - 18 s/s Nylock Half	2
16	094-009	Nut, 3 - 20 s/s Nylock	2
17	174-032	Washer, $\frac{3}{8}$ s/s Flat	2
18	174-003	Washer, $\frac{1}{4}$ " s/s Flat	4
19	061-007	Handle Grip Hydra Hoe	1
20	063-003	Harness Wrap, High Temp. $\frac{1}{4}$ " - Gray	4
21	076-045	Jet, 8004E s/s T	1

Vacuum System

CDS 4.6/4.8

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 filter system 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 14" 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. 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 cleaned 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. At the drive end the bearings are lubricated by being partially submerged in oil. There are oil slingers attached on the shafts.

FILLING PROCEDURE

Remove vented oil fill plug on front or rear oil case. Fill with specified oil until it registers to the top of the sight glass.
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 hose is connected under the head plate, at the end of the oil drain hose is a cap.

INSTRUCTIONS FOR OIL LUBRICATED GEARS AND BEARINGS

<i>Ambient Temperature*</i>	<i>Oil Grade USA</i>	<i>Oil Viscosity, Centistokes at 40E</i>
below 32E F (below 0E C)	SAE 20 Non-Detergent	100
32E to 100E F (0E to 38E C)	SAE 40 Non-Detergent	200
over 100E F (38E C)	SAE 50 Non-Detergent	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 (If Equipped)

<i>Blower Discharge Temperature</i>	<i>Grease Type</i>
-40E to 275E F (-40E to 120E C)	No. 2 Bearing Grease

Blower Troubleshooting

1.0. Weak vacuum at wand. Gauge reads normal (10hg to 14hg)

1.1. Clogged hoses or wand tube. Disconnect hoses and carefully check for an obstruction.

1.2. Excessive length of hoses connected to machine. Make sure machine is rated for the conditions under which it is being operated.

2.0. Vacuum gauge will not come up to 14" hg. 4.6/4.8 CDS

2.1. There is an air leak somewhere in the vacuum system. Check vacuum relief valve for proper adjustment. Check all hoses for cuts and breaks. Check recovery tank lid gasket. Make sure the recovery tank drain valve is fully closed.

2.2. The vacuum gauge is defective. Test and replace as necessary.

2.3. Vacuum blower is turning too slowly. (4.8 only) Check engine RPM at tachometer on dash of machine. Adjust vacuum pods necessary.

2.4. Vacuum blower is turning too slowly. (4.6 only) Check blower RPM at tachometer on dash of machine. Adjust vacuum pods necessary.

3.0. Vacuum gauge reads high with no hoses attached

3.1. Filter in recovery tank is clogged. Remove and clean or replace as necessary.

3.2. Hose from recovery tank to blower is collapsed internally. Inspect and replace as necessary.

4.0. Noisy Vacuum Blower

4.1. Vacuum blower is low on oil. Inspect oil level and replenish as necessary

NOTE: Running blower low on oil will cause severe internal damage to the blower. If this situation occurs, it should be inspected by a qualified service technician.

4.2. There is internal damage to blower. Refer to qualified service technician.

5.0. Vacuum Blower is locked and will not turn

5.1. The machine has been unused for a period of time and the blower was not properly lubricated when it was shut down, causing rust to build up on internal surfaces. Spray penetrating oil into blower and let sit for at least one hour. Then very carefully use pipe wrench on outer diameter of pulley on blower shaft and attempt to free up blower. Do not use wrench directly on blower shaft. If unable to free up blower in this manner refer to a qualified service technician.

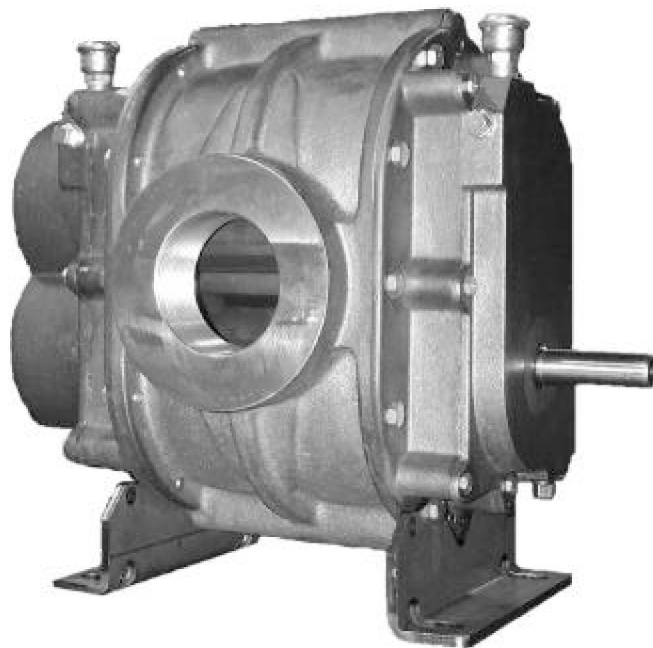
5.2. There is internal damage to blower. Refer to qualified service technician.

Tuthill Vacuum & Blower Systems

Rotary Positive Displacement Air Blower

Models 3003 4005 4007

INSTALLATION OPERATION MAINTENANCE REPAIR MANUAL



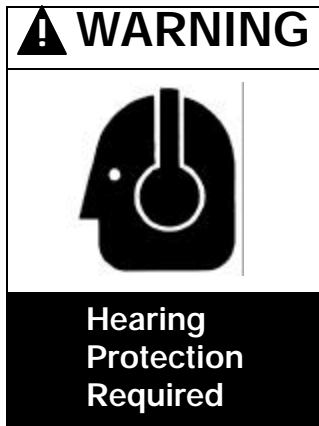
WARNING
DO NOT OPERATE
WITHOUT READING MANUAL



HydraMaster

SAFETY INSTRUCTIONS

1. Do not operate before reading the enclosed instruction manual.
2. Use adequate protection, warning and safety equipment necessary to protect against hazards involved in installation and



SAFETY WARNING

- Keep hands and clothing away from rotating machinery, inlet and discharge openings.
- Blower and drive mounting bolts must be secured.
- Drive belts and coupling guards must be in place.
- Noise level may require ear protection.
- Blower heat can cause burns if touched.

TUTHILL VACUUM & BLOWER SYSTEMS

Springfield, MO USA

NOTICE

The above safety instruction tags were attached to your unit prior to shipment. Do not remove, paint over or obscure in any manner.

Failure to heed these warnings could result in serious bodily injury to the personnel operating and maintaining this equipment.

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IMPORTANT

In order to assure you of the full benefits of our product warranty, please complete, tear out and return the warranty registration card located on the back cover of this manual, or you can register your product online at http://pneumatics.tuthill.com/product_registration

SAFETY PRECAUTIONS

For equipment covered specifically or indirectly in this instruction book, it is important that all personnel observe safety precautions to minimize the chances of injury. Among many considerations, the following should particularly be noted:

- Blower casing and associated piping or accessories may become hot enough to cause major skin burns on contact.
- Internal and external rotating parts of the blower and driving equipment can produce serious physical injuries. Do not reach into any opening in the blower while it is operating, or while subject to accidental starting. Cover external moving parts with adequate guards.
- Disconnect power before doing any work, and avoid bypassing or rendering inoperative any safety or protective devices.
- If blower is operated with piping disconnected, place a strong, coarse screen over the inlet and avoid standing in discharge air stream.
- Avoid extended exposure in close proximity to machinery with high intensity noise levels.
- Use proper care and good procedures in handling, lifting, installing, operating, and maintaining the equipment.
- Other potential hazards to safety may also be associated with operation of this equipment. All personnel working in or passing through the area should be warned by signs and trained to exercise adequate general safety precautions.
- Hearing protection may be required depending on silencing capabilities.

INTRODUCTION

CONGRATULATIONS on your purchase of a new HydraMaster™ Rotary Positive Displacement Blower from Tuthill Vacuum & Blower Systems. Please examine the blower for shipping damage, and if any damage is found, report it immediately to the carrier. If the blower is to be installed at a later date make sure it is stored in a clean, dry location and rotated regularly. Make sure covers are kept on all openings. If blower is stored outdoors be sure to protect it from weather and corrosion.

HydraMaster blowers are built to exacting standards and if properly installed and maintained will provide many years of reliable service. We urge you to take time to read and follow every step of these instructions when installing and maintaining your blower. We have tried to make these instructions as straightforward as possible. We realize getting any new piece of equipment up and running in as little time as possible is imperative to production.

WARNING: Serious injury can result from operating or repairing this machine without first reading the service manual and taking adequate safety precautions.

IMPORTANT: Record the blower model and serial number in the OPERATING DATA form below. You will save time and expense by including this reference identification on any replacement part orders, or if you require service or

OPERATING DATA

It will be to the user's advantage to have the requested data filled in and available in the event a problem should develop in the booster or the system. This information is also helpful when ordering spare parts.

Model No. _____

Serial No. _____
(Recorded from nameplate on unit)

NOTES: _____

INSTALLATION

WARNING: Customers are cautioned to provide adequate protection, warning and safety equipment necessary to protect personnel against hazards involved in the installation and operation of this equipment in the system or facility.

Do not use air blowers on explosive or hazardous gases. Casing pressure must not exceed 25 PSIG (1.72 bar g). Each size blower has limits on pressure differential, running speed, and discharge temperature, which **must not** be exceeded. These limits are shown on the Specification Sheet "Maximum Operating Limits" on page 10.

WARNING: Keep hands, feet, foreign objects and loose clothes from inlet and outlet openings to avoid injury or damage if lobes are to be rotated at this point.

LUBRICATION

Do not start up the blower until you are positive that it has been properly and fully lubricated. (See Lubrication Section on page 6.)

WARNING: Do not operate equipment without adequate silencing devices since high noise level may cause hearing damage. (Reference OSHA Standards.)

LUBRICATION

Shaft bearings at the gear end of the blower are splash lubricated by one or both gears dipping into an oil reservoir formed in the gear end plate and cover. Shaft bearings at the drive end of the blower are lubricated by a slinger assembly dipping into an oil reservoir. Before starting the blower, fill oil sumps as shown below under "Filling Procedure." Tuthill approved mineral-based and synthetic lubricants are listed on page 11.

FILLING PROCEDURE

1. Remove fill plugs or breathers from both gear end and drive end plates.
2. SLOWLY pour oil through fill until oil appears in the oil sight glass. Bring oil level to center of sight glass. Except for the Competitor (3003), which requires grease in the drive end (see page 11 for Tuthill recommended grease).
3. Verify oil level is at proper level in BOTH gear end and drive end sight glasses.
4. Replace fill plugs or breathers that were removed in step 1.

CAUTION: Do not start the blower until you are sure oil has been put in the gear housing. Operation of the blower without proper lubrication will cause the blower to fail and void its warranty.

WARNING: NEVER ATTEMPT TO CHANGE OIL WHILE THE BLOWER IS IN OPERATION. Failure to heed this warning could result in damage to the equipment and/or serious personal injury. **Oil level must be checked while the blower is not running.**

APPROXIMATE OIL CAPACITIES

MODEL	Horizontal Air Flow		Vertical Air Flow	
	GEAR END	DRIVE END	GEAR END	DRIVE END
3003	3.4 ounces (100 mL)	Requires grease	6.0 ounces (180 mL)	Requires grease
4005, 4007	5.8 ounces (170 mL)	4.7 ounces (140 mL)	8.5 ounces (250 mL)	6.4 ounces (190 mL)

PneuLube™ synthetic oil is the best lubricant for your blower. Contact your local Tuthill Vacuum & Blower Systems Sales Professional for availability of this superior lubricant.

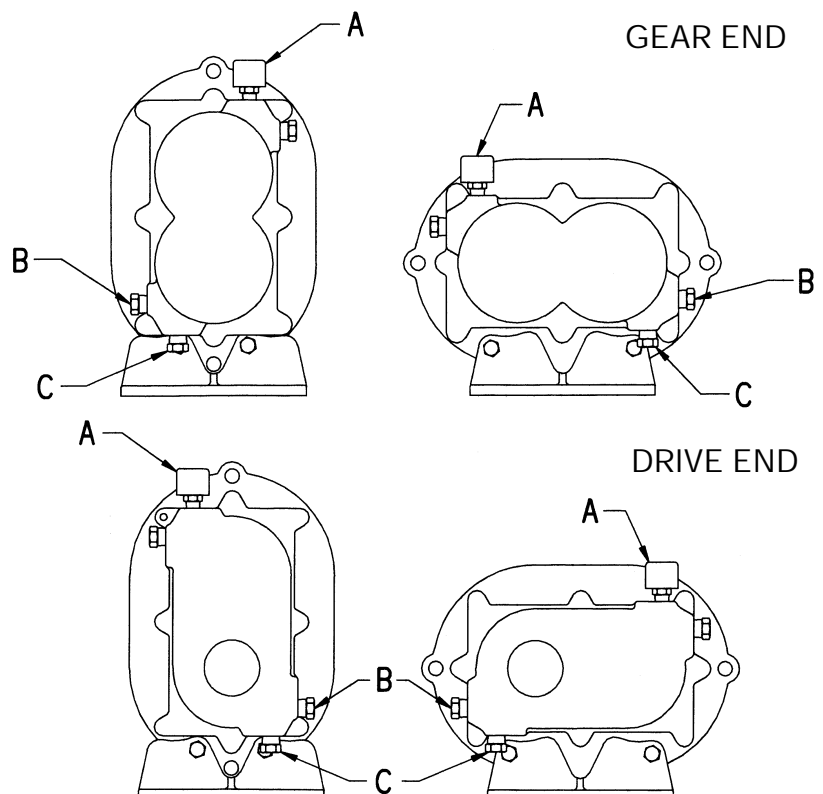
CAUTION!

Most Hydra Master blowers are shipped from the factory in a left hand drive, vertical flow configuration.

If drive shaft location is changed, the oil level plugs, sight glasses and breathers must be relocated to proper positions, as shown to the right.

Failure to change plug location will result in blower failure and void the product warranty.

A = Breather
B = Oil Level Sight Glass
C = Magnetic Oil Drain Plug



PREVENTATIVE MAINTENANCE

A good maintenance program will add years of service to your blower.

A newly installed blower should be checked frequently during the first month of operation, especially lubrication. Check oil level in both the drive end and gear end of the blower and add oil as needed. See HydraMaster owners manual for recommended oil change intervals.

The following is recommended as a minimum maintenance program.

DAILY MAINTENANCE	WEEKLY MAINTENANCE	MONTHLY MAINTENANCE
1. Check and maintain oil level, and add oil as necessary.	1. Clean all air filters. A clogged air filter can seriously affect the efficiency of the blower and cause overheating and oil usage.	1. Inspect the entire system for leaks.
2. Check for unusual noise or vibration (See Troubleshooting on page 8)	2. Check relief valve to assure it is op-	2. Inspect condition of oil and change if necessary (see page 6)
		3 Check drive belt tension and tighten if necessary.

START-UP CHECKLIST

We recommend that these startup procedures be followed in sequence and checked (v) off in the boxes provided in any of the following cases:

- After maintenance work has been performed
- After blower has been removed and replaced

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Date Checked

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1. Check the unit for proper lubrication. Proper oil level cannot be over-emphasized. Refer to Lubrication Section.

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2. Check Alignment.
For Direct Drive: Check coupling and shaft alignment.
For Belt Drive: Check for proper belt alignment and tension.

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3. Turn the rotors by hand to be certain they do not bind.
4. "Bump" the unit with the motor a few times to check rotation and to be certain it turns freely and smoothly.

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5. Start the unit and operate it for 30 minutes at no load. During this time, feel the cylinder for hot spots. If minor hot spots occur, refer to the Troubleshooting Section (page 8).

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6. Apply the load and observe the operation of the unit for one hour. Check the unit frequently during the first day of operation.

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7. If minor malfunctions occur, discontinue operation and refer to the Troubleshooting Section (page 8).

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TROUBLESHOOTING

Although HydraMaster blowers are well designed and manufactured, problems may occur due to normal wear and the need for readjustment. The chart below lists symptoms that may occur along with probable causes and remedies.

SYMPTOM	PROBABLE CAUSE	REMEDIES
Loss of oil.	Gear housing not tightened properly. Lip seal failure. Insufficient sealant.	Tighten gear housing bolts. Disassemble and replace lip seal. Remove gear housing and replace sealant.
Excessive bearing or gear wear.	Improper lubrication. Excessive belt tension.	Correct oil level. Replace dirty oil. (See Lubrication section on page 6) Check belt manufacturer's specifications for tension and adjust accordingly.
Lack of volume.	Slipping belts. Worn lobe clearances. Speed too low.	Check belt manufacturer's specifications for tension and adjust accordingly. Check for proper clearances (See Assembly Clearances on page 10) Increase blower speed within limits.
Knocking.	Unit out of time. Distortion due to improper mounting or pipe strains. Excessive pressure differential.	Re-time. Check mounting alignment and relieve pipe strains. Reduce to manufacturer's recommended pressure.
Excessive blower temperature.	Too much or too little oil in gear reservoir. Too low operating speed. Clogged filter or silencer. Excessive pressure differential. Elevated inlet temperature. Worn lobe clearances.	Check oil level. (See Lubrication section on page 6) Increase blower speed within limits. Remove cause of obstruction. Reduce pressure differential across the blower. Reduce inlet temperature. Check for proper clearances (See Assembly Clearances on page 10)
Rotor end or tip drag.	Insufficient assembled clearances. Case or frame distortion. Excessive operating pressure.	Correct clearances. Check mounting and pipe strain. Reduce pressure differential. Reduce pressure differential or reduce inlet temperature.
Vibration.	Belt or coupling misalignment. Lobes rubbing. Worn bearings or gears. Unbalanced or rubbing lobes. Driver or blower loose. Piping resonance.	Check carefully, realign if necessary. Check cylinder for hot spots, then check for lobe contact at these points. Correct clearances (See Assembly Clearances on page 10) Check condition of gears and bearings; replace if necessary. Possible buildup on casing or lobes, or inside lobes. Remove buildup and restore clearances. Check mounting and tighten if necessary. Check pipe supports, check resonance of nearby equipment, check foundation

RECOMMENDED SHUTDOWN PROCEDURE TO MINIMIZE RISK OF FREEZING OR CORROSION

When high humidity or moisture is present in an air piping system, condensation of water can occur after the blower is shut down and the blower begins to cool. This creates an environment favorable to corrosion of the iron internal surfaces, or in cold weather, the formation of ice. Either of these conditions can close the operating clearances, causing the blower to fail upon future start-up.

The following shutdown procedure outlined below minimizes the risk of moisture condensation, corrosion and freezing. **Care must be taken so as not to overload or overheat the blower during this procedure.**

1. Isolate the blower from the moist system piping, allowing the blower to intake atmospheric air. Operate the blower under a slight load allowing the blower to heat within safe limits. The heat generated by the blower will quickly evaporate residual moisture.
2. For carpet cleaning applications, after the work is completed, simply allow the blower to run a few (3-5) minutes with the suction hose and wand attached. The suction hose and wand will provide enough load to the blower to evaporate the moisture quickly.
3. For extended shutdown, inject a small amount of a light lubricating oil such as 3-in-One® or a spray lubricant such as WD-40® into the inlet of the blower just prior to shutdown. The lubricant will provide an excellent protective coating on the internal surfaces. If using a spray lubricant, exercise care to prevent the applicator tube from getting sucked into the blower. The applicator tube will damage the blower, most likely to the point that repair would be required.

January, 2001

3-in-One and WD-40 are registered trademarks of WD-40 Company.

HydraMaster

Maintenance and Service Specifications Sheet

Assembly Clearances

Metric values (mm) are shown in parentheses ()

All other values are in inches

MODEL	LOBES TO END PLATES			INTERLOBE	LOBE TO CASING	
	DRIVE END	GEAR END	TOTAL		TIP-DOWEL	TIP-PORT
3003	.005" - .008" (.13 - .20)	.003" - .005" (.08 - .13)	.009" - .012" (.23 - .30)	.006" - .012" (.15 - .30)	.002" - .005" (.05 - .13)	.004" - .007" (.10 - .18)
4005-22L3-5837 4005-22L3-7964 4007-22R3-7963 4007-22R3-5874	Min. Drive Cl. .012" (.30) .012" (.30) .010" (.25) .010" (.25)	Min. Driven Cl .015" (.38) .015" (.38) .017" (.43) .017" (.43)				

Maximum Operating Limits			
MODEL	RPM	VACUUM in. Hg (mbar)	TEMPERATURE RISE F° (C°)
3003	3600	12 (510)	180 (82)
4005	3600	14 (540)	210 (117)
4007	3600	14 (510)	170 (94)

HydraMaster

MAINTENANCE AND SERVICE SPECIFICATIONS SHEET RECOMMENDED LUBRICANTS AND CAPACITIES

RECOMMENDED MINERAL BASED LUBRICANTS

AMBIENT	SHELL	CITGO	CHEVRON TEXACO	EXXONMOBIL
0° F (-18° C) to	TELLUS® PLUS 68	A/W 68	RANDO HD 68	DTE HEAVY MEDIUM
32° F (0° C) to	TELLUS® PLUS 100	A/W 100	RANDO HD 100	DTE HEAVY
90° F (32° C) to	TELLUS® PLUS 150	A/W 150	RANDO HD 150	DTE EXTRA HEAVY

RECOMMENDED SYNTHETIC BASED LUBRICANTS FOR M- D PNEUMATICS™ ROTARY BLOWERS

AMBIENT TEMPERATURE	TUTHILL	EXXONMOBIL	SHELL
0° F (-18° C) to 32° F (0° C)	PneuLube™ (ISO 100)	SHC 626 (ISO 68)	MADRELA® AS 68 (ISO 68)
32° F (0° C) to 90° F (32° C)		SHC 627 (ISO 100)	MADRELA® P 100 (ISO 100)
90° F (32° C) to 120° F (50° C)		SHC 629 (ISO 150)	MADRELA® P 150 (ISO 150)

NOTE: Tuthill Vacuum & Blower Systems cannot accept responsibility for damage to seals, O-rings and gaskets caused by use of synthetic lubricants not recommended by Tuthill Vacuum and Blower Systems.

Due to its superior viscosity index, Tuthill PneuLube™ provides the greatest ambient temperature flexibility. Contact your local Tuthill Vacuum & Blower Systems Sales Professional for availability of this superior lubricant.

* Oil capacities are based on filling from dry condition. Less oil may be needed depending on emptiness of oil reservoir (gear housing) after draining.

Always fill the gear housing until oil drips out of the oil level hole. Replace plugs in their respective holes. Following this procedure will insure proper oil level.

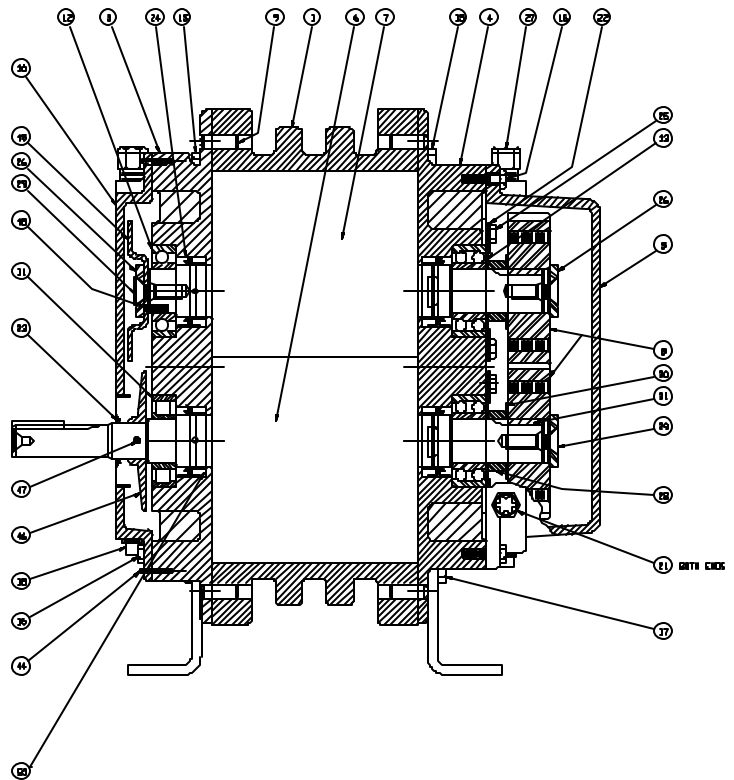
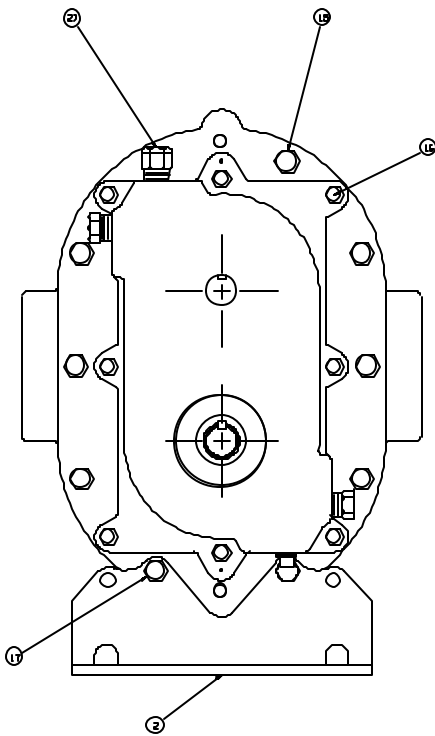
RECOMMENDED GREASE FOR DRIVE END:

For the Competitor (3003) only

Use NLGI #2 premium grade, petroleum base grease with high temperature resistance and good mechanical stability, such as PneuLube grease available from your Tuthill Pneumatics Sales Professional. Using a pressure gun, force new grease into each bearing until traces of clean grease come out of the relief fitting

HydraMaster

CUTAWAY VIEW AND PARTS LIST



ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Housing	1	21	Sight Gauge	2
2	Mounting foot	2	22	Bearing Retainer	2
3	Drive End Plate	1	23	Lip Seal	1
4	Gear End Plate	1	24	Lip Seal	4
5	Gear Cover	1	25	Screw, Hex Head	4
6	Drive Rotor	1	26	Washer	2
7	Driven Rotor	1	27	Breather	2
8	Timing Gear	2	28	Spacer	2
9	Dowel Pin	4	29	Screw, Socket Head	3
10	Drive Cover	1	30	Timing Shims	1
11	Roller Bearing	1	31	Timing Gear Key	2
12	Bearing	1	44	Dowel Pin	1
13	Bearing	2	45	Slinger	1
15	Screw, Hex Head	16	46	Slinger	1
16	Screw, Hex Head	16	47	Set Screw	2
17	Screw, Hex Head	4	48	Roll Pin	2
18	Drain Plug	2	50	Lab Seal	4
19	Pipe Plug	2			

When ordering parts, use the item number shown, plus your model and serial number.

HydraMaster Blower Warranty Definition

The warranty will be uncontested for a period up to two (2) years from the initial date of service on the original equipment. “Uncontested” means the blower will be warranted for all causes of failure on the first blower failure. An advanced replacement will be provided. After the first failure the Tuthill standard warranty will apply. The distributor is to document when the unit goes into service.

Tuthill Warranty

Subject to the terms and conditions hereinafter set forth and set forth in General Terms of Sale, Tuthill Vacuum & Blower Systems (the seller) warrants products and parts of its manufacture, when shipped, and its work (including installation and start-up) when performed, will be of good quality and will be free from defects in material and workmanship. This warranty applies only to Seller's equipment, under use and service in accordance with seller's written instructions, recommendations and ratings for installation, operating, maintenance and service of products, for a period as stated in the table below. Because of varying conditions of installation and operation, all guarantees of performance are subject to plus or minus 5% variation. (Non-standard materials are subject to a plus or minus 10% variation)

Product Type	Type of Application	
	Atmospheric Air or Process Air	Process Gases Other Than Air,
New	24 months from date of shipment, or 18 months after initial startup date, whichever occurs first	18 months from date of shipment, or 12 months after initial startup date, whichever occurs first
Repair	12 months from date of shipment, or remaining warranty period, whichever is greater	12 months from date of shipment, or remaining warranty period, whichever is greater

THIS WARRANTY EXTENDS ONLY TO BUYER AND/OR ORIGINAL END USER, AND IN NO EVENT SHALL THE SELLER BE LIABLE FOR PROPERTY DAMAGE SUSTAINED BY A PERSON DESIGNATED BY THE LAW OF ANY JURISDICTION AS A THIRD PARTY BENEFICIARY OF THIS WARRANTY OR ANY OTHER WARRANTY HELD TO SURVIVE SELLER'S DISCLAIMER.

All accessories furnished by Seller but manufactured by others bear only that manufacturer's standard warranty.

All claims for defective products, parts, or work under this warranty must be made in writing immediately upon discovery and, in any event within one (1) year from date of shipment of the applicable item and all claims for defective work must be made in writing immediately upon discovery and in any event within one (1) year from date of completion thereof by Seller. Unless done with prior written consent of Seller, any repairs, alterations or disassembly of Seller's equipment shall void warranty. Installation and transportation costs are not included and defective items must be held for Seller's inspection and returned to Seller's Ex-works point upon request.

THERE ARE NO WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE.

After Buyer's submission of a claim as provided above and its approval, Seller shall at its option either repair or replace its product, part, or work at the original Ex-works point of shipment, or refund an equitable portion of the purchase price.

The products and parts sold hereunder are not warranted for operation with erosive or corrosive material or those which may lead to build up of material within the product supplied, nor those which are incompatible with the materials of construction. The Buyer shall have no claim whatsoever and no product or part shall be deemed to be defective by reason of failure to resist erosive or corrosive action nor for problems resulting from build-up of material within the unit nor for problems due to incompatibility with the materials of construction.

Any improper use, operation beyond capacity, substitution of parts not approved by Seller, or any alteration or repair by others in such manner as in Seller's judgment affects the product materially and adversely shall void this warranty.

No employee or representative of Seller other than an Officer of the Company is authorized to change this warranty in any way or grant any other warranty. Any such change by an Officer of the Company must be in writing.

The foregoing is Seller's only obligation and Buyer's only remedy for breach of warranty, and except for gross negligence, willful misconduct and remedies permitted under the General Terms of Sale in the sections on **CONTRACT PERFORMANCE, INSPECTION AND ACCEPTANCE** and the **PATENTS** Clause hereof, the foregoing is **BUYER'S ONLY REMEDY HEREUNDER BY WAY OF BREACH OF CONTRACT, TORT OR OTHERWISE, WITHOUT REGARD TO WHETHER ANY DEFECT WAS DISCOVERED OR LATENT AT THE TIME OF DELIVERY OF THE PRODUCT OR WORK.** In no event shall Buyer be entitled to incidental or consequential damages. Any action for breach of this agreement must commence within one (1) year after the cause of action has occurred.

NOTES

Electrical System

CDS 4.6/4.8

Section 9-1

The CDS' 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.

♦ 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.

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 4.8 Wiring Schematic
D-4000 Rev J

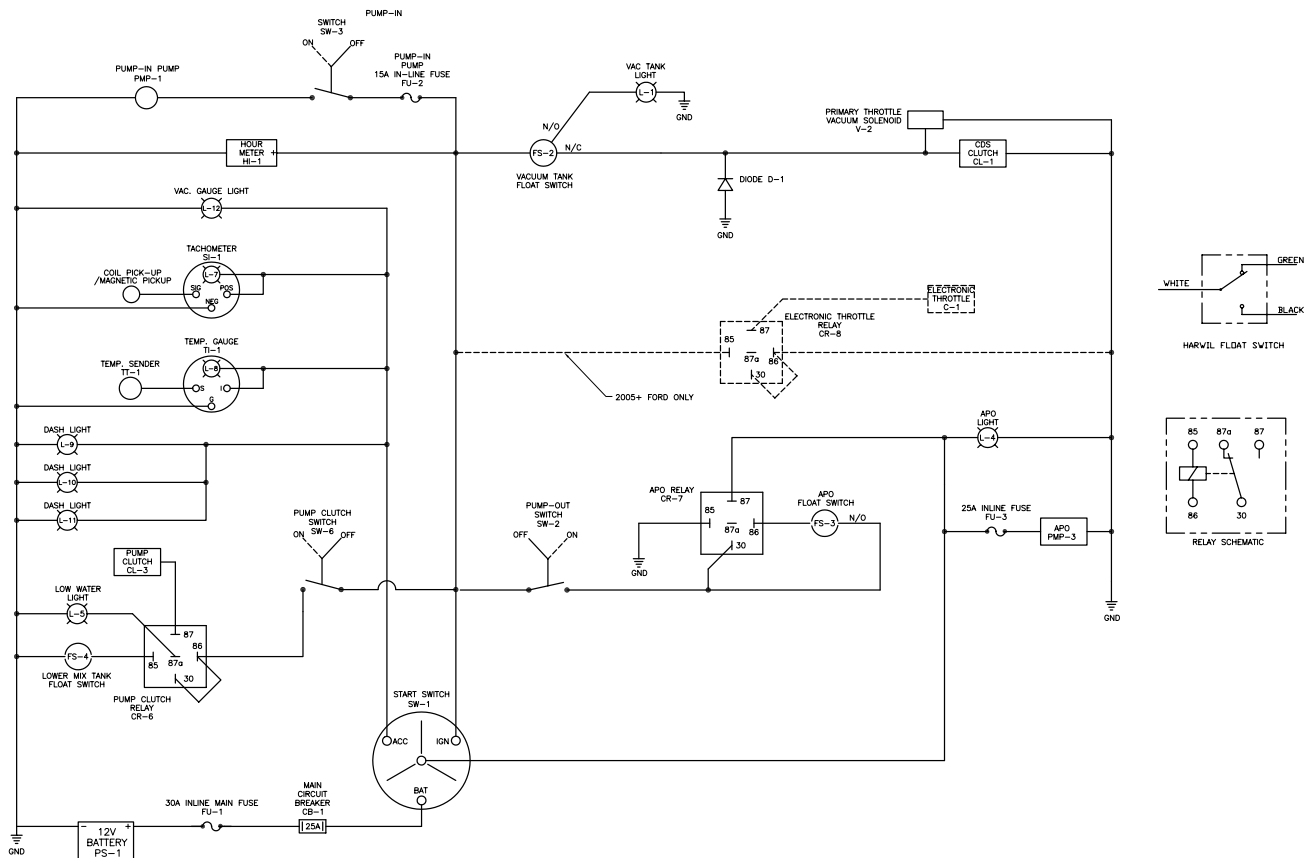


Figure 9-2 4.6 Wiring Schematic

D-5110 Rev E

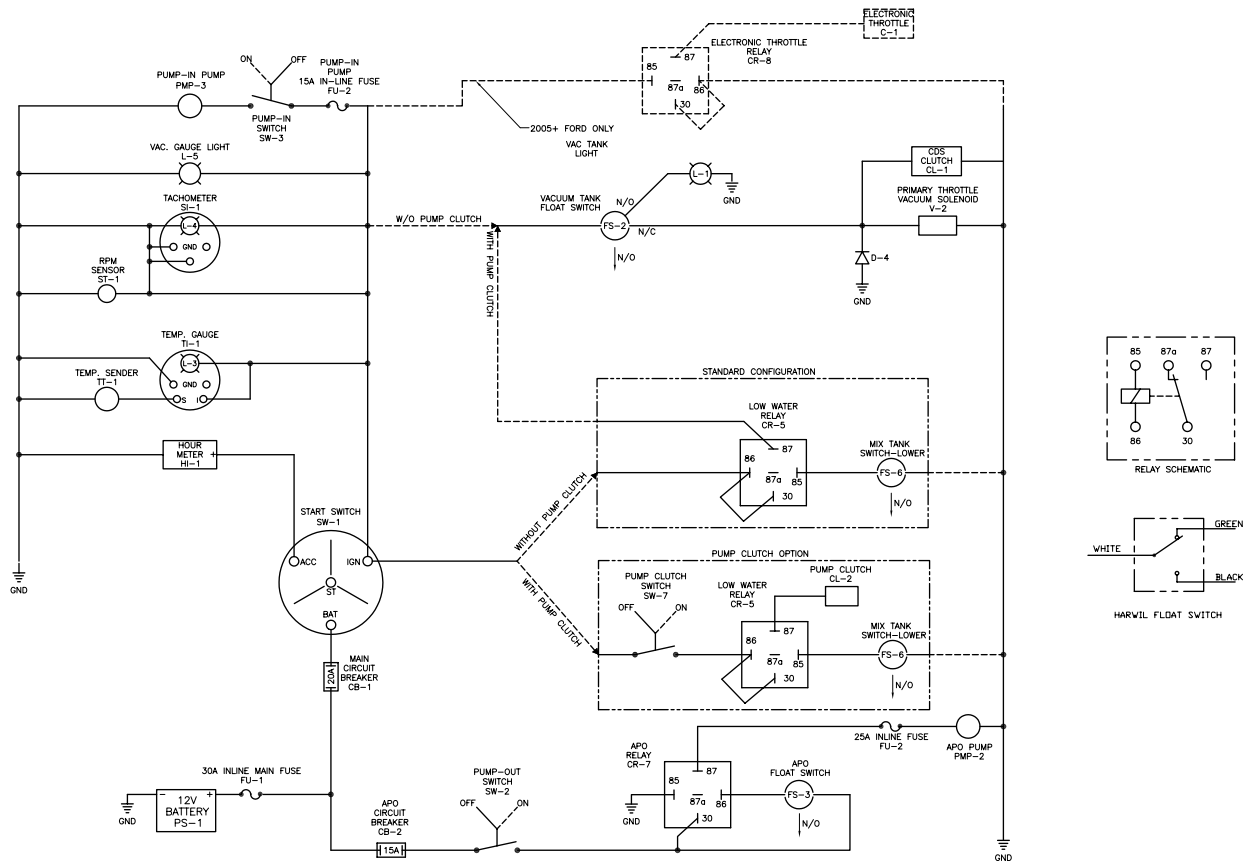


Figure 9-3 4.8 Wiring Diagram

D-4001 Sht 2, Rev K

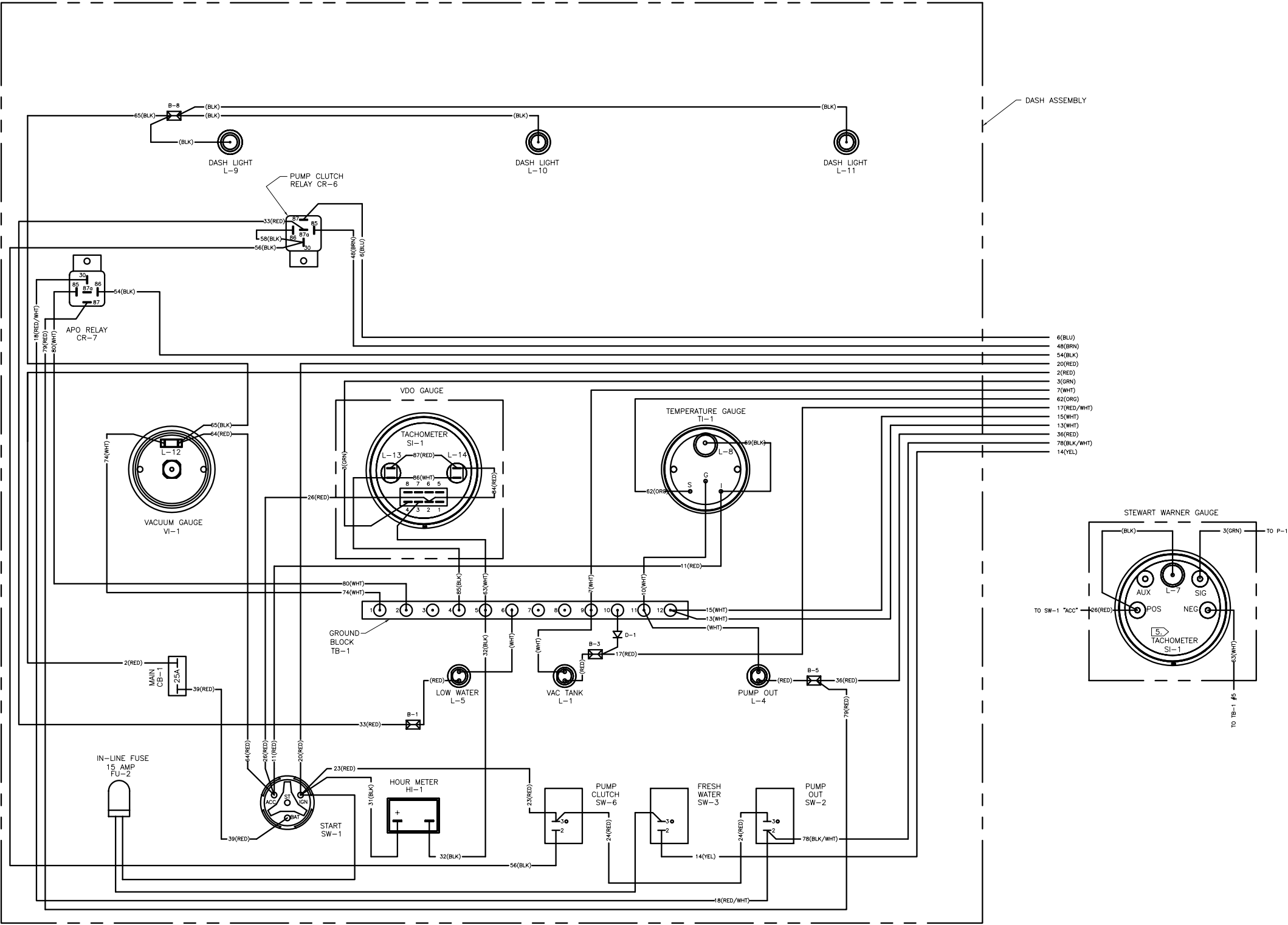


Figure 9-3 4.8 Wiring Diagram

D-4001 Sht 2, Rev L

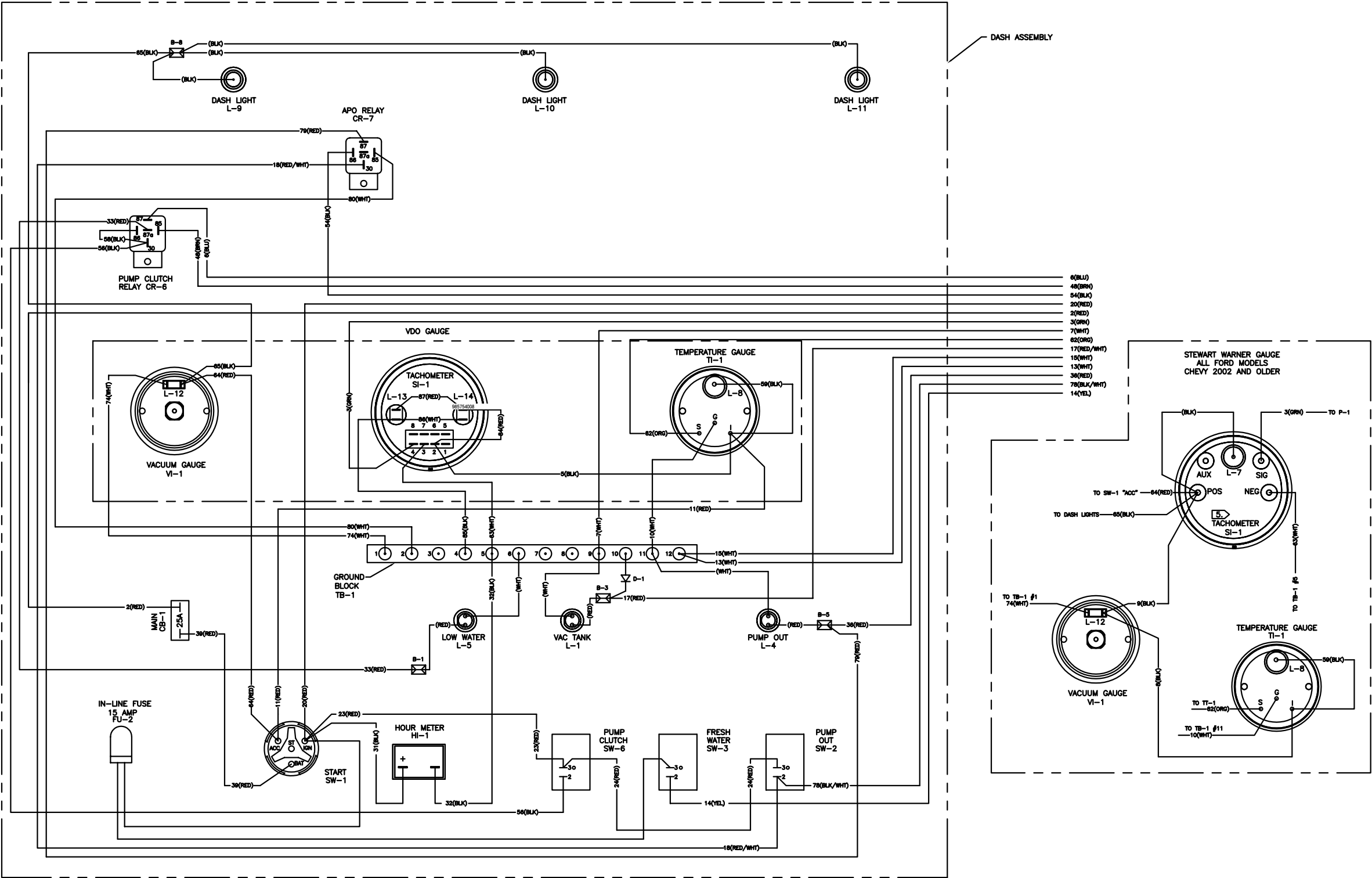


Figure 9-4 4.8 Wiring Diagram
D-4001 Sht 3, Rev L

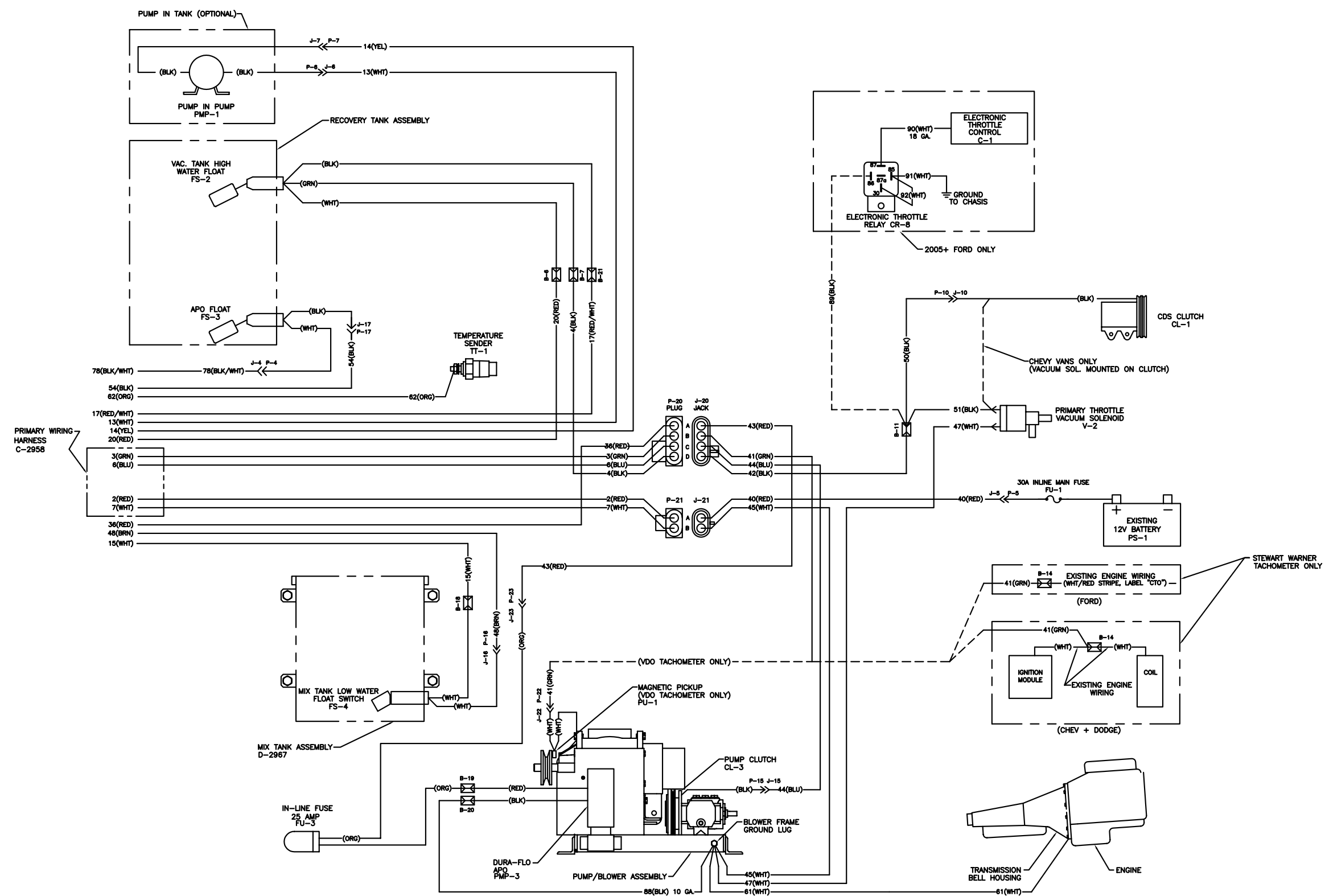
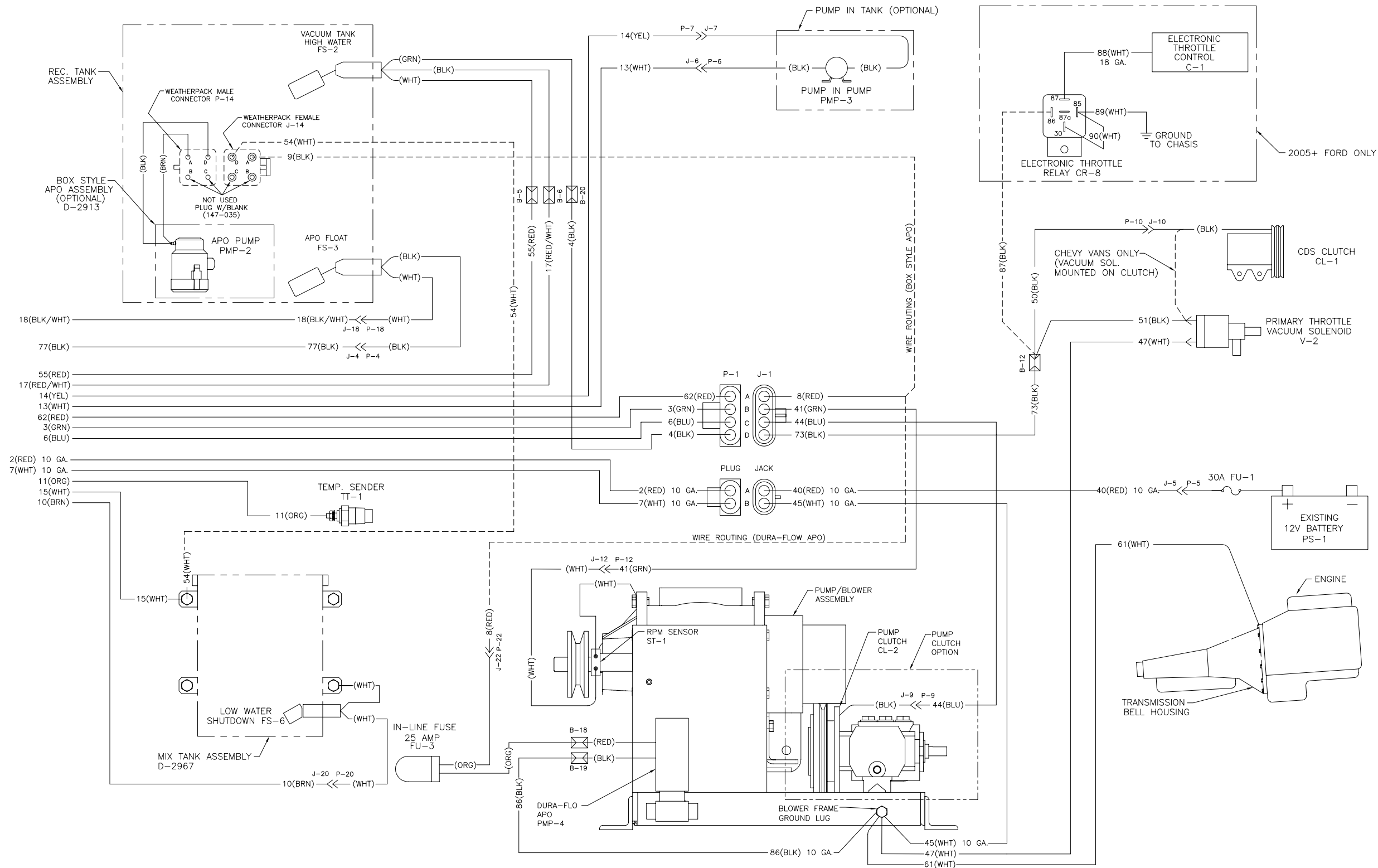


Figure 9-6 4.6 Wiring Diagram
D-5109 Sht 3, Rev G



Electrical Troubleshooting

1.0. CDS will not turn on

1.1. The main fuse under the hood has blown. Remove CDS cowling and engine cover and check all wiring from the power source back to the CDS console for damage. Replace fuse only after locating the problem that caused the fuse to blow. If unable to locate problem, refer to qualified service technician.

1.2. The plug-in connection at the base of the recovery tank is corroded. Clean up and seal connection to protect it from moisture.

1.3. The main circuit breaker has blown on the dash of the machine. Reset breaker and look for loose connections or damaged wires. Check all wires from the control panel forward to the front of the vehicle. If no problem is found but the breaker still trips refer to qualified service technician.

1.4. The park position switch on the side of the transmission is out of adjustment or faulty. This switch interrupts power to the CDS drive clutch and the speed control vacuum solenoid when the transmission gear selector is not in park. Inspect switch for proper adjustment and for continuity. Adjust or replace as necessary.

2.0. CDS turns on but will not come up to speed

2.1. Throttle cables are broken or out of adjustment. Inspect throttle cables for proper adjustment. Adjust or replace as necessary.

2.2. Throttle pod is defective. Inspect throttle pods to ensure they will hold vacuum when compressed. Replace as necessary.

2.3. There is no vacuum at throttle pods. Inspect all vacuum lines to the pods and to the vacuum solenoid. Replace or repair as necessary.

2.4. There is no power to the vacuum solenoid. Check for 12 volts and a ground at the vacuum solenoid with the machine key on and the vehicle off. If there is 12 volts and a ground at the solenoid but it does not activate, replace the solenoid.

2.4.1. If there is not 12 volts and a ground at the solenoid, check the wiring back to the CDS console. Repair as necessary. Note: The ground wires at the connection point on the blower frame can look and feel tight but still be corroded. It is a good idea to periodically remove, clean and re-tighten these wires.

3.0. CDS will not maintain proper RPM

3.1. The secondary throttle cable is out of adjustment or broken. Readjust or replace as necessary.

3.2. The secondary vacuum pod is defective. Test pod to see if it holds vacuum. Replace as necessary.

3.3. The vacuum source to the secondary pod is not sufficient. Check hose from blower inlet to secondary pod and repair or replace as necessary.

3.4. Vacuum is set too high. Cap off both vacuum inlets on the recovery tank. If vacuum gauge reads over 14", re-adjust the vacuum relief valve.

4.0. Horn activates when machine is turned on

4.1. Emergency brake lever is not depressed when machine is turned on. Depress brake and restart machine.

4.1.1. If the horn still sounds when the emergency brake is depressed, check wire connections at horn and emergency brake switch. If connections appear to be good, refer to qualified service technician.

5.0. CDS shuts off while in use

5.1. Recovery tank is full. Empty tank and restart machine.

5.2. Recovery tank float switch is dirty or defective. Inspect float to see if the triangle mark on the float is facing up. If it is, and the float slides freely on the post, replace the float assembly.

5.3. The 219 degree thermal sensor has activated. Refer to section III, 1.0.

5.4. The vehicle gear selector has moved. Inspect the gear selector to be sure it is in the proper position. If selector has moved, refer to qualified service technician. Note: This is a dangerous condition and needs to be repaired immediately.

5.5. Park position switch has come out of adjustment or is faulty. Adjust or replace as necessary.

Machine Maintenance

CDS 4.6/4.8

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.

♦ CAUTION ♦

HydraMaster recommends that you follow the vehicle maintenance schedule as stated by the manufacturer. All Hydramaster references to vehicle maintenance serve as general reminders on when your vehicle should be serviced. If there are any questions regarding the servicing of your van please contact your local vehicle dealership.

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 equipped.
- 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.

Note: If you are using T.M. DeScaler through the flow meter, make sure to run clean water through the flow meter after this procedure

OVERALL MACHINE 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.

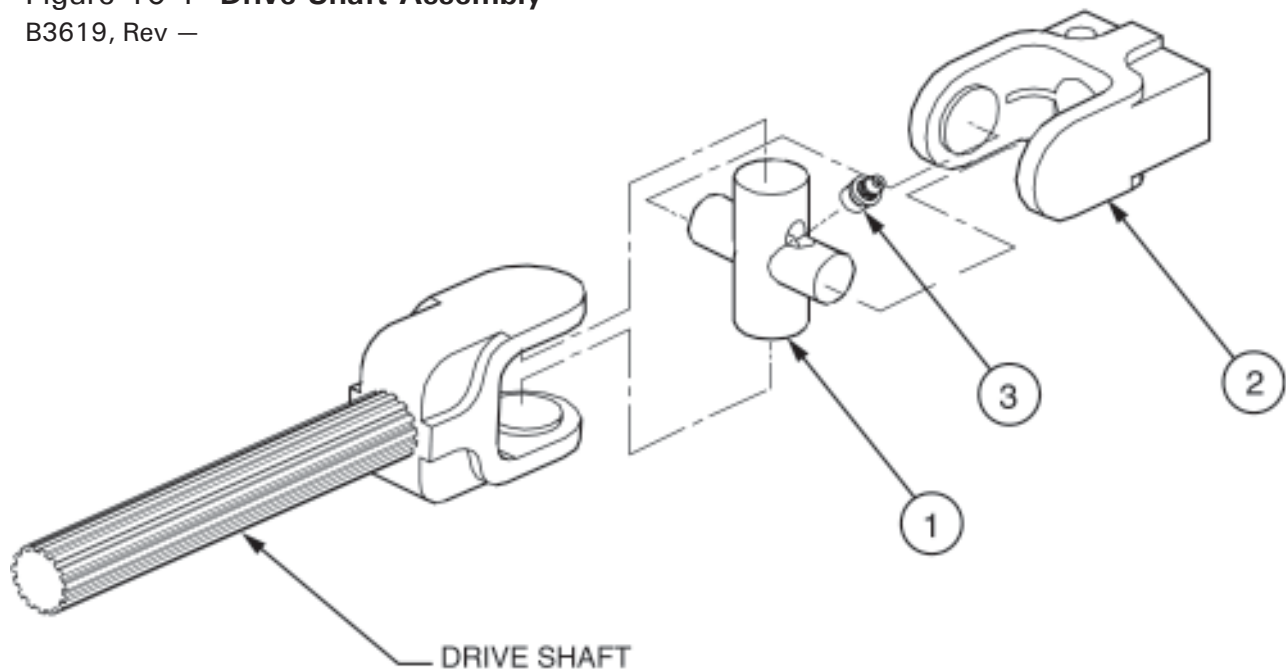
Long Term Maintenance Schedule

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

<u>Component</u>	<u>Interval</u> (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	039-015	Replacement U-Joint for CDS Drive Shaft	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.

Troubleshooting

SECTION I. HEATING SYSTEM

1.0. Vehicle overheats and shuts off CDS

1.1. The high-temperature shutdown switch has activated or is faulty. Unplug the 219 degree hi-temperature shutdown sensor from the top coolant heat exchanger see if the machine starts. If it does start, inspect the vehicle cooling system for the following:

1.1.1. Low coolant level in the vehicle. Check coolant level of the truck to make sure it is full, including the overflow bottle. If coolant level is low, check hoses, fittings, water pump and radiator cap for leaks. Repair or replace as necessary. **Note:** When adding coolant to the system, do not mix green antifreeze with the DEXCOOL (pink) antifreeze. Severe damage to the cooling system will result.

1.1.2. The vehicle engine fan clutch is faulty. Refer to vehicle dealer for repair.

1.1.3. The thermostat in the vehicle engine is faulty. Refer to vehicle dealer for repair.

1.1.4. The vehicle radiator is plugged. Refer to vehicle dealer for repair.

1.1.5. The vehicle water pump is faulty. Refer to vehicle dealer for repair.

2.0. Unable to achieve normal cleaning temperature

2.1. There is hard water or chemical build-up in the heat exchangers. This will not allow the heat to transfer properly. Descale and flush as necessary.

2.2. Cleaning solution flow is too great. Measure flow at tool.

2.2.1. The jet in the cleaning tool is too large or worn out. Test the tool for water flow and replace or repair jet as necessary.

2.2.2. Cleaning solution pressure is too high. Adjust pressure to normal. Inspect pressure gauge for accurate reading.

2.3. The SALSA X2 system thermal valve is stuck open. Remove recovery tank lid and check for premature flow from thermal valve hose at tank. The machine must be at or below normal operating temperature for this test. Replace or repair as necessary.

2.4. The CDS is being operated at too low RPM or too low vacuum setting. The SALSA X2 system must be at full operating RPM and full vacuum load to achieve full operating temperature. These values must be set per manufacture's specifications. Adjust vacuum or RPM as necessary.

3.0. System attains normal heat but drops off sharply

3.1. Solution flow at cleaning tool is too high. Orifice in tool is too large or worn out. Test flow of tool. Repair or replace as necessary.

3.2. RPM of machine is set too low. Adjust as necessary.

3.3. Recirculation orifice from hi-pressure outlet manifold plugged, giving incorrect reading at gauge. Clean filter screen and inspect orifice. Clean or replace as necessary.

3.4. Cleaning solution pressure is too high. Adjust pressure to normal. Inspect pressure gauge for accurate reading.

SECTION II. MISCELLANEOUS

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

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

2.0. Vehicle overheats

2.1. Faulty thermostat in van. Refer to dealer

2.2. Faulty water pump on van. Refer to dealer

2.3. Faulty radiator (plugged) limited water flow. Refer to dealer

2.4. Faulty fan clutch, limited air-flow. Refer to dealer

CDS 4.6/4.8 MAINTENANCE LOG

MAX HRS	DAILY SERVICE	OIL RECOMMENDATIONS							
8	ENGINE OIL - check	BLOWER	40 weight non-detergent						
8	GARDEN HOSE SCREEN -inspect, clean	PUMP	5 - 30 weight synthetic motor oil						
8	MACHINE - general inspection	ENGINE	See vehicle owners manual for recomendations.						
8	VACUUM TANK INLET FILTER - clean								
8	BLOWER INLET - spray with lubricant								
	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								
25	FLOAT SWITCHES - check for debris								
	MONTHLY SERVICE								
100	ENGINE OIL - change								
100	ENGINE AIR CLEANER - inspect								
100	BATTERY TERMINALS -clean as needed								
	QUARTERLY SERVICE (3 MONTHS)								
400	BLOWER OIL - change								
400	PUMP OIL - change								
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								
400	CHEMICAL PUMP - inspect								
400	CHEMICAL PUMP DIAPHRAGM - check for wear								
400	CHEMICAL PUMP VALVES - check for wear								
400	WATER BOX FLOAT VALVE - remove stem and lubricate								
	YEARLY								
	VEHICLE - complete service								
	COOLING SYSTEM - flush								
	TRANSMISSION FLUID - change								
1,000	DRIVE SHAFT - grease U-Joints and Splines								

How to Order Parts

CDS 4.6/4.8

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 Customer Service Department at (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 4.6/4.8

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 safety release in tank.
- Use of improper chemicals.

CHEMICAL SYSTEM:

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

CONTROL PANEL:

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

VACUUM AND SOLUTION HOSES:

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

CLEANING WAND:

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

WATER HEATING SYSTEM:

- Over-pressurization of the system (recommended maximum working pressure-1,000 PSI).
- Failure to protect against freezing.

HARD WATER DEPOSITS:

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

WARRANTY PROCEDURE

Warranty coverage is available to you through *your local Distributor*.

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

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

IMPORTANT: HydraMaster's warranty policy provides replacement parts without charge for thirty (30) days to distributors maintaining current account status. An invoice will be sent to the distributor for the amount of the parts sent. The customer's faulty parts **must be** returned for evaluation prior to the expiration of the thirty (30) day period. Upon warranty approval, a credit will be issued the distributor for the replacement parts invoice. **Warranty disapproval or failure to return the faulty parts within the thirty (30) day period allowed will result in the customer being charged for the replacement parts sent.**

FOR YOUR REFERENCE:

Model No. _____

Serial No. _____

Date of Purchase: _____

Purchased From (Distributor): _____

GOLDEN GUARANTEE® LIMITED WARRANTY

HydraMaster warrants truckmount machines of its manufacture to be free from defects in material and workmanship if properly installed, maintained, and operated under normal conditions with competent supervision. No person, agent, representative or dealer is authorized to give any warranties on behalf of HydraMaster nor to assume for HydraMaster any other liability in connection with any HydraMaster products. This warranty shall extend to the original purchaser of said equipment for the periods listed below from date of installation. To ensure the functionality and safety of this equipment, if repairs, replacements or modifications are made by the Purchaser without HydraMaster's consent, HydraMaster's warranty shall cease to be in effect.

Machinery, equipment and accessories furnished by HydraMaster, but manufactured by others, are warranted only to the extent of the original manufacturer's warranty to HydraMaster unless otherwise specified in the listing below.

HydraMaster agrees, at its option, to repair at the point of shipment, or to replace without charge any parts or parts of products of HydraMaster's manufacture, which within the specified warranty period shall be proved to HydraMaster's satisfaction to have been defective when shipped, provided the purchaser promptly notifies HydraMaster, in writing, of such alleged defect. HydraMaster will pay all freight and transportation charges within the United States, via normal ground shipping means, for replacement of parts covered under this warranty.

This warranty covers parts, as specified, and does not cover labor which may be necessary in completing repairs. HydraMaster's liability to Purchaser, whether in contract or in tort arising out of warranties, representation, instructions, or defects from any cause shall be limited to repairing or

the defective part or parts using new or remanufactured parts. To qualify for warranty coverage, defective parts must be returned to HydraMaster within 30 days. No liability whatsoever shall attach to HydraMaster until said products have been paid for.

Except as stated in this section and in the proceeding section and except as to title, there are no guarantees or warranties of merchantability, fitness, performance or otherwise, express, implied or statutory, and HydraMaster shall have no liability for consequential, incidental, or other damages, howsoever caused, including but not limited to lost business, downtime, lodging. Parts supplied under this warranty will themselves be warranted only for the remaining time left in the original warranty period.

All components not specifically referenced in the schedule below are covered under this warranty for a period of one (1) year, excepting those parts which are considered, by HydraMaster, to be expendable in normal use, including but not limited to paint, labels and other cosmetic parts or features.

Freezing of any water or chemical related component will VOID all warranties on water or chemical related components, internal or external, of this equipment.

Deposits and/or build-up in the water, chemical, recovery or heating systems due to hardness in the water used or chemicals which results in deposits, will VOID all warranties on affected components.

The use or application of any chemical, including but not limited to acids or solvents, which results in damage to metal, rubber, plastic, or painted parts will VOID all warranties on those parts.

FRAME, COVER ASSEMBLIES:	3 years
VACUUM RECOVERY TANK:	3 years
ENGINE:	As provided by original Manufacturer's Warranty
VACUUM BLOWER: (Uncontested Through Tuthill)	2 years
CHEMICAL SYSTEMS:	1 year
CLEANING WAND:	1 year
INTERNAL MACHINE HOSES:	1 year
HIGH PRESSURE BY-PASS VALVE:	1 year
EXTERNAL MACHINE HOSES:	1 year
BELTS, FITTINGS, FILTER SCREENS, GAUGES:	1 year
WATER HEATING SYSTEM:	1 year
WATER PRESSURE PUMP: (Through original Manufacturer.)	1 year
ELECTRICAL COMPONENTS:	1 year

Sales:
1-800-426-1301



Accessories

CDS 4.8

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.***



Retail pricing included for:

- Truckmount machines
- Accessories
- Hose reels
- Chemicals

Please contact your local distributor for more product and pricing information.

For a distributor near you, please visit www.hydramaster.com or call 1.800.426.1301.

February 15, 2007

Truckmount Retail Price List

Effective March 1, 2007

Standard Truckmount Package Pricing*

Retail Price

SpitFire™ Heat-Exchanger Systems

SpitFire™ 3.2 - #700-070-002.....	\$9,495.00
With 85 gal. Poly Fresh Water Tank (#159-118 & #079-093).....	12,079.95

Boxxer™ Heat-Exchanger Systems

Boxxer™ 421 - #700-070-011.....	\$14,595.00
With 100 gal. Recovery Tank Upgrade (#610-003-057).....	15,070.00
With 85 gal. Poly Fresh Water Tank (#159-118 & #079-092).....	17,179.95
Boxxer™ 427 - #700-070-033.....	\$17,995.00
With 100 gal. Recovery Tank Upgrade (#610-003-056).....	18,470.00

Boxxer™ Water Recovery System

Boxxer™ H ₂ O - #700-070-036.....	\$11,595.00
With APO (#000-079-091).....	12,990.00

Maxx™ Premium Heat-Exchanger Systems

Maxx™ 450 - #700-070-045.....	\$20,595.00
Maxx™ 450 Diesel - #700-070-044.....	21,695.00
Maxx™ 470 - #700-070-047.....	21,695.00

CDS™ Overdrive Van-Powered Systems

(Standard colors are HydraMaster Blue and Antique Vein.)

CDS™ 4.6 Chevy.....	\$16,495.00
CDS™ 4.6 Chevy with Salsa Heat Booster (#079-077).....	17,790.00
CDS™ 4.6 Ford.....	17,495.00
CDS™ 4.6 Ford with Salsa Heat Booster (#079-077).....	18,790.00
• For Electric Clutch Option (#000-079-076) add:.....	459.95
CDS™ 4.8 Chevy.....	\$17,995.00
CDS™ 4.8 Chevy with Salsa Heat Booster (#079-077).....	19,290.00
CDS™ 4.8 Ford.....	18,995.00
CDS™ 4.8 Ford with Salsa Heat Booster (#079-077).....	20,290.00

Rotary Extraction™ Systems

RX-20™ (RX-20 HE) High-Efficiency Model - #700-041-006.....	\$3,295.00
RX-20™ (RX-20 HE) with Extended 'Tallman' Handle - #700-041-106.....	3,395.00
Rotary DriMaster™ (RDM) Power Tool - #700-041-016.....	2,995.00

*Standard Package price does not include freight, installation, battery or dealer preparation.

Prices subject to change without notice. All prices quoted FOB Factory, Mukilteo, Washington.



Accessories

Retail Price List

Effective March 1, 2007

Part Number

Retail Price

RX-20 Rotary Extractor and Attachments

700-041-006	RX-20HE High Efficiency Model	\$3,295.00
700-041-106	RX-20HE With Extended "TallMan" Handle	3,395.00
000-163-018	RX-20 Mounting Bracket	79.95
190-041-020	RX-20 Pad and Bonnet Driver	149.00
190-041-024	RX-20 Hard Floor Attachment (LD)	549.00
190-041-026	RX-20 Hard Floor Attachment (MD)	549.00
190-041-025	RX-20 Hard Floor Attachment (HD)	549.00

Rotary DriMaster

700-041-016	RDM Rotary DriMaster Power Tool	\$2,995.00
000-163-057	RDM Mounting Bracket	79.95

Carpet and Upholstery Cleaning Tools

000-163-020	HydraHoe Carpet Cleaning Wand	\$495.00
000-163-104	2" S-Bend 2 Jet Wand	525.00
100-011-106	1½" S-Bend 2 Jet Wand	299.00
000-163-008	Utility Cleaning Tool (UT-40)	379.95
000-163-010	DriMaster Upholstery Tool (HydraMaster)	439.95
000-163-009	Truckmount Stair Tool (UT-14)	289.95
000-163-053	Pressure Washing Tool	99.95
000-163-007	Hand Spray Tool (#6 Jet)	74.95

Automatic Pump Out Systems

000-079-025	Drop-In APO (SpitFire 3.2)	\$795.00
000-079-097	Dura-Flow™ APO (CDS)	1,395.00
000-079-091	Dura-Flow™ APO (New Boxxers & Maxx)	1,395.00
000-079-094	Dura-Flow™ APO (Retrofit Boxxer & Maxx)	1,595.00

"Salsa" Heat Booster

000-079-077	"Salsa" Heat Booster for CDS	\$1,295.00
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PRI-990510 Doc Control 6/7/2007

HydraMaster Corporation
11015 47th Avenue West Mukilteo, WA 98275
Phone: (800) 426-1301 Fax: (425) 771-7156
www.hydramaster.com

Part Number**Retail Price****Fresh Water Supply Tanks**

000-159-118	85 gal. Roto-Molded Tank	\$2,295.00
000-079-093	SpitFire 3.2 Kit - 85 gal. Roto-Molded Tank	289.95
000-079-092	Boxxer 421 Kit - 85 gal. Roto-Molded Tank	289.95
000-079-012	120 gal. Horizontal Tank	2,295.00
000-159-115	110 gal. Poly Tank (over wheel-well)	1,295.00
000-079-081	Pump-in Kit for Poly Tank	249.00

Custom Interior Packages . . . “Get Organized!”**Package 1**

000-079-020-2 Custom Interior Package with 85 gallon freshwater tank: \$2,895.00

(Shelves cannot be mounted on tank - only hose reels)

Package 2

000-079-022-2 Custom Interior Package with 120 gallon freshwater tank: \$2,895.00

(Shelves & Reels can be mounted on tank)

Custom Interior Package Includes:

✓ Fresh Water Tank, ✓ Two-Bin Back Door Shelf Assembly, ✓ Custom Three-Tier Shelf, ✓ Wand Storage Rack, ✓ Stair Tool Holder, ✓ Furniture Tab / Snap Block Holder, and ✓ Rake Storage Clips.

HOSE REELS ARE ORDERED SEPARATELY (See hose reel price sheet)

Note: Mix-n-Match shelving may be added to your 120 gallon tank (not to the 85 gallon tank) for an additional charge. See below.

**Mix-N-Match Shelf System -
Add to Your 120 Gallon Fresh Water Tank**

All shelf configurations can be built out of the following 4 components:

000-166-014	Four-Compartment Bin	\$199.95
000-166-012	Air Mover Tray	239.95
000-083-002	Tall Side Support (sold as each)	82.95
	Tall Side Support (sold as set or 2)	165.90
000-900-900	Hardware Kit	16.95

EXAMPLE: A Mix-n-Match shelf with two airmover trays would be:

000-166-012	2 ea. Airmover Trays	\$479.90
000-083-002	2 ea. Supports	165.90
000-900-900	1 ea. Hardware Kit	16.95
	Total	\$662.75

Part Number**Retail Price****Interior Van Accessories**

000-163-015	Furniture Pad/Snap Block Holder	\$99.95
000-163-038	Custom Three-Tier Shelf.....	299.95
000-163-050	Two-Bin Back Door Shelf Assembly.....	179.95
000-163-078	Over-Wheelwell Shelf System No. 1 (2 Airmover trays).....	839.95
000-163-079	Over-Wheelwell Shelf System No. 2 (1 Airmover tray, 1 4-bin).....	829.95
000-163-017	Wand Storage Rack, Clip & Rail.....	22.95
000-079-048	Chemical Jug Assembly (complete with hose).....	289.95
000-079-049	APO kit for Chem Jug Assembly (complete with hose).....	48.95

Fuel Line Kits

000-078-074	1987-1996 Chev / 1987-1991 Dodge / 1987-2002 Astro (w/2" neck)	\$34.95
000-078-081	1987-1991 Ford / 1992-1997 Dodge / 1997-2002 Chev.....	69.95
000-078-082	1992-1997 Ford / 1999-2003 Ford (Diesel needs 2).....	99.95
000-078-183	1998 Ford (Diesel needs 2).....	56.95
000-078-110	1999-2003 Ford (Diesel needs 2).....	369.95
000-078-425	2004-2007 Ford	299.95
000-078-042	2004 Sprinter Diesel / 2004-2006 Dodge	222.95
000-078-407	2003-2007 Chev / 2003-2007 Astro (w/1" neck).....	299.95
000-078-181	1998-2003 Dodge	69.95
000-078-034	1997-2003 Chev Diesel (frame tank only)	79.95

Miscellaneous Accessories

000-159-016	5 gal. Chemical Jug.....	\$12.95
000-163-031	Professional Trigger Sprayer (6 pack)	52.95
000-163-056	MagnaClean Water Conditioner	399.95
70 to 100 UPG	100 gal. Recovery Tank Upgrade (for Boxxers)	478.00
000-079-076	CDS 4.6 Electric Clutch Option	459.95
000-078-381	CDS Security Hose Pass-Thru	39.95
000-078-382	CDS Security Hose Kit	195.95
000-078-414	Exhaust Thru-Floor Kit	184.95

Hydra-Wear

000-002-007	HydraMaster Monogrammed Jacket	\$64.95
000-002-019	HydraMaster Polo Shirt	41.95

Rotary DriMaster Marketing Literature

000-002-027	Post Card, RDM (200 pack)	\$25.97
000-002-028	Door Hanger, RDM (200 pack)	46.95
000-002-029	Self Mailer, RDM (200 pack)	36.95

Postcards

000-002-005	Reminder Post Cards (100 pack)	13.95
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Part Number**Retail Price****Decals**

000-081-057	"HydraMaster Equipped" 3-Color, 3" x 20" Decal	\$9.95
000-081-058	"SafeClean" Green on White Decal	8.95

Vacuum Tank Filter Bags

000-049-028	Long and Narrow, 7" x 34"	\$7.95
000-049-030	Short and Narrow, 7" x 20"	7.95
000-049-029	Short and Wide, 14" x 18"	7.95

Vacuum Hose Connectors

000-052-166	2" Diameter to 1½" Diameter	\$5.79
000-052-168	2" Diameter	4.79
000-052-162	1½" Diameter to 1½" Diameter	2.89

Vacuum Hose with Cuffs

000-068-136	Orange, 1½" Diameter, 10 foot whip	\$23.95
000-068-194	Gray, 1½" Diameter, 15 Feet	38.95
000-068-331	Gray, 1½" Diameter, 25 Feet	53.95
000-068-036	Gray, 1½" Diameter, 50 Feet	89.95
000-068-047	Orange, 1½" Diameter, 50 Feet	89.95
000-068-316	Blue, 1½" Diameter, 50 Feet	89.95
000-068-048	Orange, 2" Diameter, 50 Feet	109.95
000-068-065	Blue, 2" Diameter, 50 Feet	109.95

SuperFlex HP Solution Line

000-068-311	Orange, 25 Feet, M-F	\$86.95
000-068-315	Orange, 25 Feet, F-F	99.95
000-068-054	Orange, 50 Feet, M-F	139.95
000-068-199	Blue, 50 Feet, M-F	139.95
000-068-055	Orange, 50 Feet, F-F	159.95
000-068-198	Blue, 50 Feet, F-F	159.95
000-068-567	Blue, 50 Feet (without QC)	109.95
000-068-208	Blue, 100 Feet, F-F	229.95
000-068-053	Orange, 150 Feet, F-F	310.95
000-068-206	Blue, 150 Feet, F-F	310.95

All prices quoted F.O.B. Factory, Mukilteo, Washington. Prices subject to change without notice.

Hose Reels

Retail Price List

Effective July 1, 2007

Type of Rewind	_____	R 12 36-150S	_____	Storage or Live
	Drum Length		Capacity	
		Rim Diameter		

Storage Hose Reels



Part No.	Model No.	Capacity	Width	Height	Depth	Retail Price
000-163-501	R1836-200S	200'	25"	38"	36"	\$398.94
000-163-502	R2336-300S	300'	30"	38"	36"	416.67
*000-163-503	R1244-200S	200'	19"	46"	44"	405.59
*000-163-504	R1544-250S	250'	22"	46"	44"	416.66
*000-163-505	R1844-300S	300'	25"	46"	44"	436.62

Storage Hose Reels - Electric Rewind



Part No.	Model No.	Capacity	Width	Height	Depth	Retail Price
000-163-510	E1236-200S	150'	23"	38"	36"	\$1,292.11
000-163-511	E1836-200S	200'	29"	38"	36"	1,303.19
000-163-512	E2336-300S	300'	34"	38"	36"	1,316.49
*000-163-513	E1244-200S	200'	23"	46"	44"	1,316.49
*000-163-514	E1544-250S	250'	26"	46"	44"	1,327.57
*000-163-515	E1844-300S	300'	29"	46"	44"	1,343.09

Live Hub Reels



Part No.	Model No.	Capacity	Width	Height	Depth	Retail Price
*000-163-522	R1244-200L	200'	19"	46"	44"	\$589.54

Live Hub Reels - Electric Rewind



Part No.	Model No.	Capacity	Width	Height	Depth	Retail Price
*000-163-532	E1244-200L	200'	23"	46"	44"	\$1,469.41

* These reels will not fit on a fresh water tank.



PRI-012003 Doc Control 06/07/2007 Hose Reel Retail Pricing.PMD

HydraMaster Corporation
 11015 47th Avenue West Mukilteo, WA 98275
 Phone: (800) 426-1301 Fax: (425) 771-7156
www.hydramaster.com

Triple Storage Reels for Vacuum, Solution and Garden Hoses - Electric or Manual



<i>Part No.</i>	<i>Model No.</i>	<i>Capacity</i>	<i>Width</i>	<i>Height</i>	<i>Depth</i>	<i>Retail Price</i>
000-163-540	R1836-518S	200'	25"	38"	52"	\$1,041.67
000-163-541	E1836-518S	200'	29"	38"	52"	1,930.50
000-163-542	R2336-518S	300'	30"	38"	52"	1,052.75
000-163-543	E2336-518S	300'	30"	38"	52"	1,968.09
000-163-544	E3036-518S	350'	32"	38"	52"	2,010.05

Triple Live Reels for Vacuum, Solution and Garden Hoses - Electric or Manual



<i>Part No.</i>	<i>Model No.</i>	<i>Capacity</i>	<i>Width</i>	<i>Height</i>	<i>Depth</i>	<i>Retail Price</i>
000-163-550	R1836-518L	200'	25"	38"	52"	\$1,258.86
000-163-551	E1836-518L	200'	29"	38"	52"	2,132.10
000-163-552	R2336-518L	300'	30"	38"	52"	1,278.81
000-163-553	E2336-518L	300'	30"	38"	52"	2,143.17

Storage Reels for Solution or Garden Hoses



<i>Part No.</i>	<i>Model No.</i>		<i>Capacity</i>	<i>Diameter</i>	<i>Width</i>	<i>Retail Price</i>
000-163-560	605-18S	Storage	300' x 1/4"	18"	5"	\$118.42
000-163-561	605-18L-02	Live - 1/4"	300' x 1/4"	18"	5"	188.38
000-163-562	605-18L-05	Live - 1/2"	200' x 1/2"	18"	5"	210.55
000-163-565	605-22S	Storage	450' x 1/4"	22"	5"	129.16
000-163-566	605-22L-02	Live - 1/4"	450' x 1/4"	22"	5"	192.98
000-163-567	605-22L-05	Live - 1/2"	350' x 1/2"	22"	5"	217.20

Hose Reel Accessories



<i>Part No.</i>	<i>Model No.</i>	<i>Description</i>	<i>Retail Price</i>
000-163-581	82-28	Stacking Bracket for 2 Reels	\$56.00
000-163-582	82-29	Front Stand for 2 Solution Reels	160.08
000-163-583	172A	2" Vacuum Swivel Joint	153.51
000-163-584		12 Volt Electric Motor Rewind Kit	791.22
000-163-585	23-12S	12 Volt Motor	469.86
000-163-586	28-1	Switch	32.27
000-163-587	28-2	Solenoid	58.51
000-163-588	23-11-40	Circuit Breaker	26.27
000-163-589		To Make Portable	234.09
000-163-590		Wall Mount Bracket	37.64

FOB: Daton, NV

Carpet and Fabric Care Products

Retail Price List

Effective January 15, 2007

Detergents, Rinse Agents, Bonnet Cleaners, and Presprays

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
Hydra-Dri	950-100-A	12 x 1.5 lb	\$6.97
<i>Powdered Truckmount</i>	950-100-B	4 x 6.5 lb	26.20
<i>Carpet Cleaning Detergent</i>	950-100-C	40 lb	128.80
	950-100-D	300 lb	825.00
Hydra-Clean	950-110-B	4 x 1 gal	\$18.85
<i>Ultra Concentrated</i>	950-110-C	5 gal	84.00
<i>Carpet Cleaning Detergent</i>	950-110-D	30 gal	511.00
	950-110-E	55 gal	783.15
RinseFree Powder	800-101-B	4 x 6.5 lb	\$28.50
<i>Carpet Cleaning Detergent</i>	800-101-C	40 lb	152.00
RinseFree Liquid	800-200-A	12 x 32 oz	\$11.33
<i>Carpet Cleaning Detergent</i>	800-200-B	4 x 1 gal	33.00
Rinse Out	950-140-B	4 x 1 gal	\$17.25
<i>Neutralizing Fiber Rinse</i>	950-140-E	55 gal	590.91
ClearWater Rinse	800-250-A	12 x 32 oz	\$8.83
<i>Low Residue Fiber Rinse</i>	800-250-B	4 x 1 gal	25.90
	800-250-O	55 gal	1,051.56
Zip-Dri	950-150-B	4 x 1 gal	\$25.85
<i>Low Residual Bonnet Cleaner</i>	950-150-E	55 gal	1,130.00
Fast Break	950-130-B	4 x 1 gal	\$28.40
<i>Ultra Concentrated</i>	950-130-C	5 gal	128.00
<i>Carpet Pre-Spray</i>			
Quake	950-125-B	4 x 1 gal	\$14.85
<i>Heavy Duty Pre-Spray</i>	950-125-C	5 gal	64.00
<i>& Traffic Lane Cleaner</i>	950-125-D	30 gal	395.000
	950-125-E	55 gal	684.75
Soil Break	950-120-A	12 x 1.5 lb	\$7.90
<i>Enzyme Carpet Pre-Spray</i>	950-120-B	4 x 6.5 lb	27.60
	950-120-C	40 lb	151.00
	950-120-D	300 lb	1,055.00



Detergents, Rinse Agents, Bonnet Cleaners, and Presprays (cont.)

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
Blitz	950-145-A	12 x 1.5 lb	\$7.75
<i>Heavy Duty Powdered Pre-Spray</i>	950-145-B	4 x 6.5 lb	27.40
	950-145-C	30 lb	111.00
	950-145-D	300 lb	940.00
Poly Break	950-135-B	4 x 1 gal	\$17.70
<i>Olefin Pre-Conditioner</i>	950-135-C	5 gal	75.92
Release	800-400-B	4 x 1 gal	\$19.40
<i>Liquid Traffic Lane</i>	800-400-C	5 gal	86.00
<i>Cleaner & Pre-Spray</i>	800-400-E	55 gal	694.28

Hard Floor Chemicals

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
Q.C.T.	950-155-B	4 x 1 gal	\$18.75
<i>Quarry and Ceramic Tile Cleaner</i>			
Hydra-Solv	950-165-B	4 x 1 gal	\$16.40
<i>Hard Surface Degreaser</i>			

Specialty Products

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
Grease Breaker	950-160-A	12 x 32 oz	\$12.00
<i>High Powered Cleaning Booster</i>	950-160-B	4 x 1 gal	34.00
	950-160-E	55 gal	1,670.00
Enzyme 5	950-170-A	12 x 32 oz	\$9.17
<i>5 Strain Enzyme Additive</i>	950-170-B	4 x 1 gal	24.25
	950-170-E	55 gal	800.00
Repel & Protect	950-185-B	4 x 1 gal	\$53.45
<i>Fluorochemical Protector/Dye Blocker for Carpet and Upholstery</i>			
Hydra Boost	950-175-A	12 x 2 lbs	\$14.67
<i>pH Stable Detergent Booster</i>			
De-Foam	950-177	4 x 8 lbs	\$19.50
<i>Powdered Defoaming Additive</i>			
TM DeScaler	800-800-B	4 x 1 gal	\$21.00
<i>Non-Acid Scale Remover</i>			

Deodorizers

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
MultiPhase	800-500-A	12 x 32 oz	\$7.67
<i>Triple Action</i>	800-500-B	4 x 1 gal	22.25
<i>Odor Neutralizer</i>	800-500-C	5 gal	100.00
	800-500-D	30 gal.	538.00
	800-500-E	55 gal	765.00
U-P-S	800-475-A	12 x 32 oz	\$7.75
<i>Urine Pre-Spray</i>	800-475-B	4 x 1 gal	22.25
	800-475-D	55 gal	745.00
OdorMate BASE	950-210-B	4 x 1 gal	\$15.75
<i>Odor Control System</i>			
OdorMate SCENT	950-200-B	4 x 1 gal	\$31.00
<i>"Tropical Breeze"</i>			

Upholstery Products

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
FabricMaster HEAVY DUTY	950-230-B	4 x 1 gal	\$17.80
<i>Upholstery Pre-Spray</i>			
FabricMaster FINE FABRIC	950-220-B	4 x 1 gal	\$18.00
<i>Upholstery Pre-Spray</i>			
Natural Orange	800-450-B	4 x 1 gal	\$28.50
<i>Carpet and Upholstery Pre-Spray</i>			

Spotting Agents

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
OJ Orange Jel	800-600-A	12 x 1 qt	\$22.00
<i>Clear Gel Solvent Spotter</i>			
Knock Out	950-260-A	6 x 1 qt A& B	\$19.47
Coffee, Wine & Dye		(Part A & Part B are sold as a set)	
<i>Stain Spotter</i>			
Knock Out Mixing Bottle	950-265-A	12 x 1 qt	\$2.40
(12 per case)			
Knock Out Dual Trigger Sprayer	950-266K	Each	\$11.95
(Min order is 50 – price is each)			

Spotting Agents (cont.)

<i>Product</i>	<i>Part Number</i>	<i>Package</i>	<i>Retail Unit Price</i>
Master Spotting Kit	950-290	each	\$197.00
Master Spotting Kit Replacement Items:			
Hydra Freeze	950-300	12 x 5 oz can	\$9.42
Wet Solvent	950-301	12 x 1 pt	7.90
Non-Volatile Dry Solvent	950-302	12 x 1 pt	8.37
Volatile Dry Solvent	950-303	12 x 14 oz can	11.53
Rust Out	950-304	12 x 1 pt	5.79
Ammonia	950-305	12 x 1 pt	6.26
Acetic Acid	950-306	12 x 1 pt	5.21
Enzyme	950-307	12 x 1 pt	6.26
Reducer	950-308	12 x 1 lb	8.37
Neutral Spotter	950-309	12 x 1 pt	6.26
SpotMaster GEL	950-250-A	12 x 1 qt	\$11.00
<i>Paint, Oil, Ink & Grease Spotter</i>			
SpotMaster CSR	950-255-A	12 x 2 lbs	\$16.92
<i>Coffee & Stain Remover</i>			
SpotMaster PRO	950-240-A	12 x 1 qt	\$7.50
<i>Professional Grade Spotter</i>			
SpotMaster Retail Spotter	950-270	12 x 22 oz	\$7.90
<i>All-Purpose Textile Spotter with Trigger Bottles</i>			
SpotMaster Retail Spotter	950-280	24 x 8 oz	\$4.16
<i>All-Purpose Textile Spotter with Fliptop Cap</i>			



Terms of the HydraMaster Money-Back Guarantee: Return the unused portion of the HydraMaster cleaning product within 30 days for a full refund of the purchase price. The distributor will submit a copy of the sales receipt to HydraMaster for product replacement.

Product Support Bulletins

CDS 4.6/4.8

Section 14-1