CTS 330 Hot Carbonating Truckmount System™

Manufactured Exclusively for ChemDry®
By

HydraMaster
CARPET CLEANING PRODUCTS

Mukilteo, Washington

Machine Serial Number _____

Table of Contents

List of Figures and Tables

Figures 2-1 through 2-3 are photos relating to machine specifications

Figures 3-1 through 3-3 are photos relating to operating instructions

Figures 4-1 through 4-14 are photos relating to machine maintenance

Reference Information

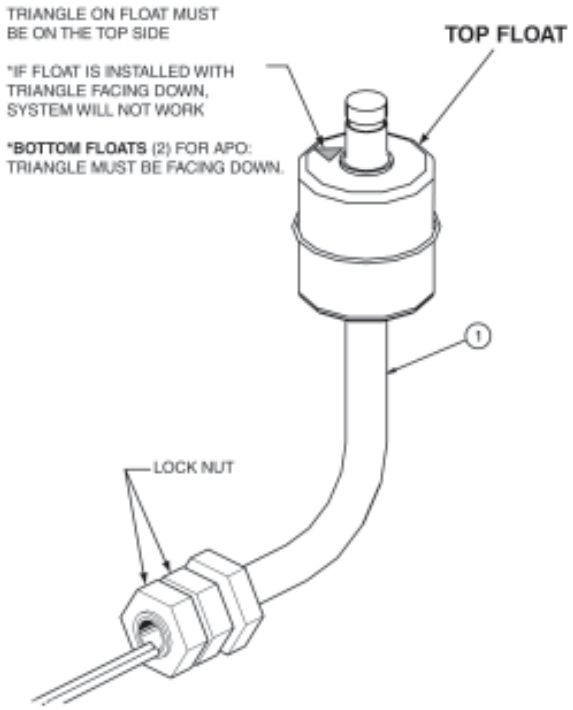
Include with this manual are the following:

- ☐ Blower Owner's Manual (Section 7)
- ☐ Engine Owner's Manual (Section 10)
- ☐ Compressor Owner's Manual (Section 6)
- ☐ Warranty Golden Guarantee Information (Section 11)

Quick Reference

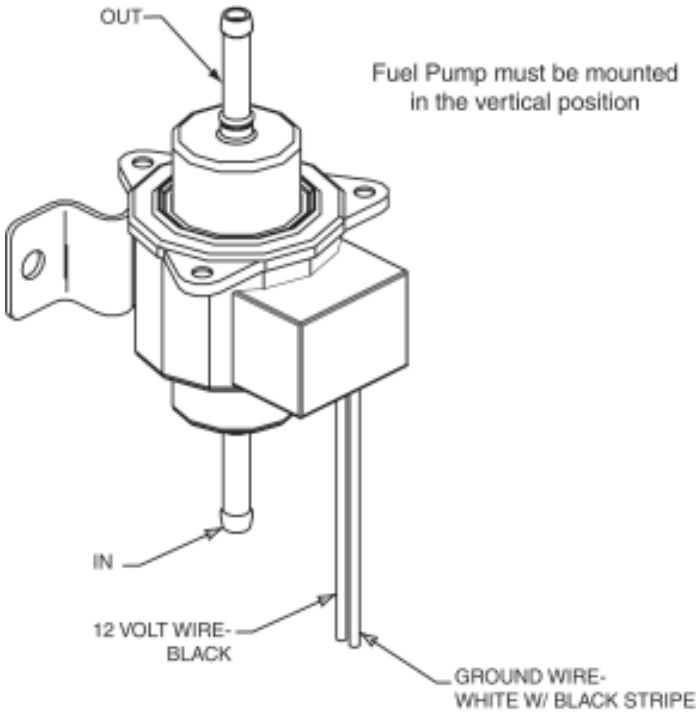
Recovery Tank Float Switch-Top Float Shown

B4624 Rev—



Fuel Pump Assembly

B4627 Rev—



General Information

This manual contains installation and operation 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 solution system provides stable pressure at proper water flow for cleaning.
- The heating system must maintain proper heat.
- The vacuum tank must store dirty water until drained.

As you can see, this machine is not just a simple turn-key operation where your only worry is "**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.

Telephone Numbers

CTS Installer: _____	_____
HydraMaster/ChemDry Tech Support	(877) 282-2319
HydraMaster Customer Service	(800) 426-1301
Harris Research, Inc. Tech Support	(435) 755-0255

Hours

HydraMaster	Monday-Friday 6:00 am to 5:00 pm Pacific Standard Time
Harris Research, Inc.	Monday-Friday 8:00 am to 5:00 pm Mountain Standard Time

Precautions

⚠ CAUTION

1. Engine Cooling

Units employing internal combustion engines must not be enclosed within a van with doors and windows closed. Excessive temperatures within the engine will result in premature engine failure and a compromise of applicable warranty.

⚠ CAUTION

2. Level Operation

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

⚠ WARNING

3. Moving Parts

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

⚠ CAUTION

4. Freeze Protection

There is often little warning before a cold spell. Failure to protect 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

5. Exhaust System

Do not allow flammable material (i.e. oil, fuel, plastic, or wood products) to come in contact with the exhaust system.

⚠ WARNING

6. Hot Surfaces

During the operation of this equipment, many surfaces on the machine will become very hot. When standing in the proximity of the van, care must be taken not to touch any hot surface such as the heater, engine, exhaust, and etc.

WARNING

7. 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 machine use.

WARNING

8. 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

9. Toxic Fumes

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

WARNING

10. Engine Exhaust

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

WARNING

11. Carburetor Drain

Under no circumstances should the drain in the carburetor bowl be used when the machine is hot.

WARNING

12. Portable Gas Tank

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

WARNING

13. Transportation of Fuel Containers

Transportation in a vehicle of any vented fuel container that presently has or has ever contained a flammable liquid is strictly forbidden by Harris Research Inc. and by federal and state regulations.

⚠ WARNING

14. Vacuum System
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 over loading and damaging itself, there is a vacuum relief system installed on the vacuum tank. When the vacuum tank inlet is completely sealed off, a maximum of 12 inches 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 this operation is not performed daily the vacuum blower will develop rust deposits from moisture and will decrease the life of the vacuum blower.

⚠ CAUTION

15. Vacuum Tank
Foam passing through the blower could lead to equipment malfunction. Therefore, it is important to keep the vacuum tank foam free.

⚠ WARNING

16. Vacuum Hose
Do not leave the vacuum hose unattended during operation. This could cause bodily injury.

Responsiblities

The **Purchaser's** responsibilities are:

Reading of Owner's Manual: It is the purchaser's responsibility to read the unit operation manual and to familiarize himself with the information contained therein. *Special attention should be paid to all* ***Cautions and Warnings.***

Prior to arrival of unit, install exterior plywood flooring in the vehicle and we suggest sealing with a sealer.

Purchase a heavy duty group 24 - 60 amp hour battery and have the battery 'slow' charge if new. If the battery is not fully charged, damage can occur to the engine charging regulator.

The **Equipment Installer** responsibilities are:

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 equipment installer is responsible for the correct installation of the unit in your vehicle and thoroughly training you in its operation, maintenance and precautions.

Correct Installation Includes:

- Installation of through-floor fittings for gasoline fuel lines.
- Placing the unit and recovery tank in your vehicle and securing them with bolts or tie down cleats.
- Install and connect the fuel pump.
- Connecting gasoline lines.
- Connecting the battery.
- Checking the vacuum blower and engine oil levels prior to starting the unit.
- Starting the unit to check engine and see that all systems function normally.
- Checking all hoses, wands, etc. for correct operation.

Note: Under certain circumstances, machines may require modification for optimal performance. Certain environmental conditions may require engine modification or control function calibration.

Training Shall Include:

- A thorough review of the operation manual with purchaser.
- A thorough review of the unit warranty and warranty procedures.
- Instruction and familiarization in:
    1. How to correctly start up and shut down the unit.
    2. How to correctly clean with the unit.
    3. Where and how often to check and change component oil levels.
    4. How the unit's systems work.
    5. How to troubleshoot the unit.
    6. How to do basic repairs.
    7. Safety precautions and their importance.
    8. Freezing damage and how to avoid it.
    9. Cleaning the orifices and how they function in the system.

Vehicle Preparation

The preferable vehicle for the CTS 330 Truckmount installation is either a cargo van or a minivan with a heavy-duty suspension package. The van should have a minimum 1/2 ton capacity.

Be cautious when drilling any 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.

TRUCK PREPARATION

The manufacturer recommends a spray-on bed liner or the installation of plywood flooring, in the vehicle prior to installation of machine.

This provides a metal-to-cushion mounting rather than metal-to-metal, insulation and makes an attractive van interior.

Materials Needed:

1. 2 sheets 4 x 8 x 5/8" exterior plywood
2. 1 Gallon Polyurethane Wood Sealer
3. 16 - 1½" sheet metal screws

(See **Figures 1-1 and 1-2** for correct placement of plywood flooring)

Roof Vents

Harris Research strongly recommends installing roof vents in vehicles operated in hot weather locations.

Figure 1-1 **Plywood Installation**

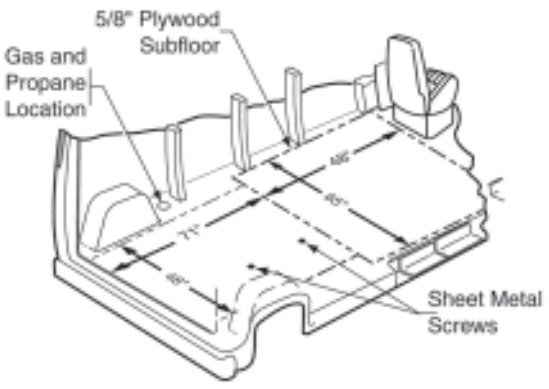
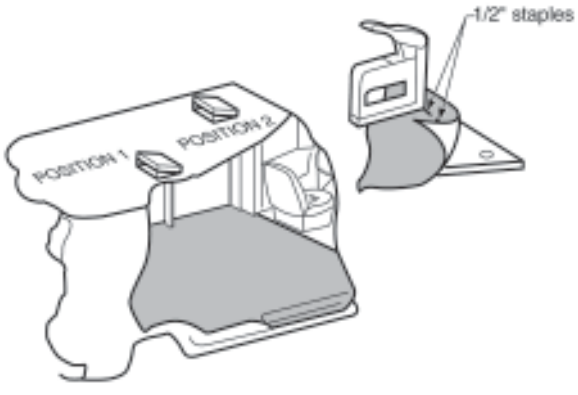


Figure 1-2 **Astroturf and Roof Vent**



PLACEMENT OF UNIT IN VEHICLE

There are two recommended unit placements, side door and rear door. These recommended placements are described below and illustrated in **Figure 1-3**.

SIDE DOOR:

Most installations are side door. This provides rear access for accessories and hoses as well as unobstructed access to the component/working side of the machine, thus making it a bit easier to perform maintenance and/or repair without removing the unit from the truck.

REAR DOOR:

Although this location partly limits working access, it does direct the noise away from the cleaning site. Some cleaners in the colder areas prefer this location because it puts the weight over the rear wheels for better traction in ice and snow. Rear mounting requires the unit to be slid to the right side as far as possible.

This not only provides adequate working space on the component side of the unit but also improves weight distribution inside the van (engine and component weight line up over drive shaft). Also, it is physically easier to load the unit into the rear door due to the height of the van bed.

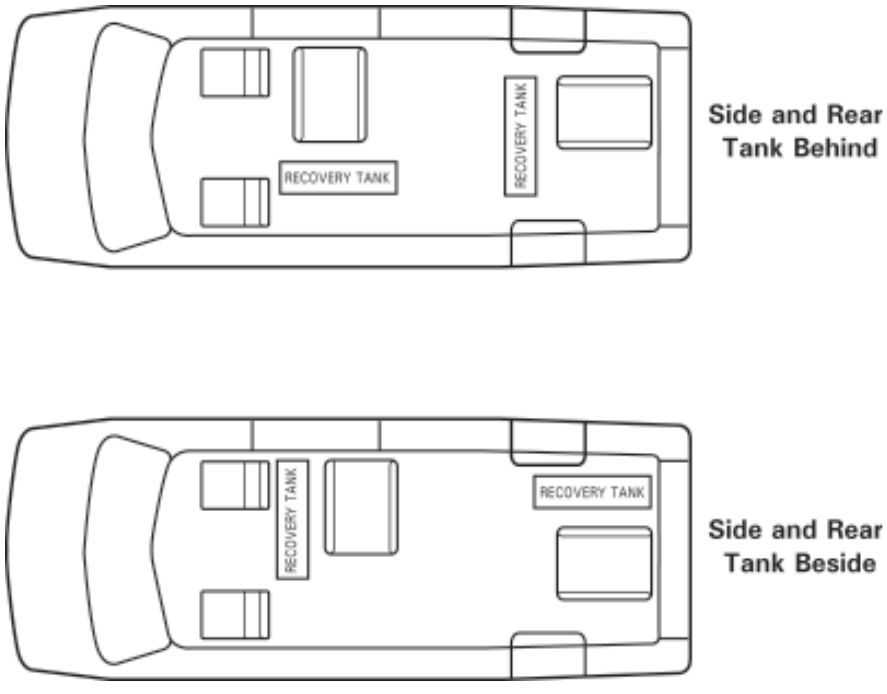


Figure 1-3 **Recommended Placement**

Machine Tie Down Cleats

Secure the machine to the floor of the van with the four tie down cleats provided (See **Figure 1-4**). This safety measure will ensure that the machine will not slide inside the van. See the following illustration for the correct installation.

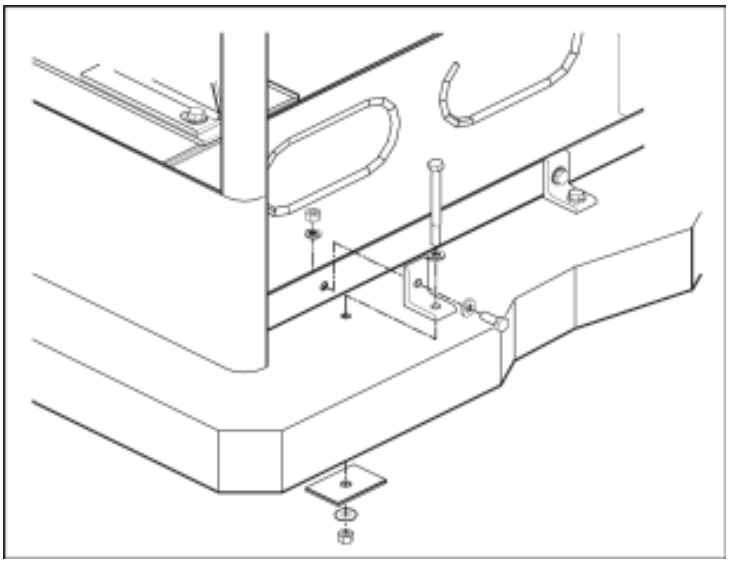


Figure 1-4 **Installation Using Tie-down Cleats**

⚠ WARNING

Ensure that the machine is well secured to the floor of the van with the hardware supplied. A sudden or crash stop will cause the machine to rocket forward. Protect yourself and the machine. **SECURE IT**!

⚠ WARNING

It is recommended by the manufacturer that the exhaust from the front of the machine be vented down under the truck to prevent carbon monoxide from entering the job site. **Always park the truck so the exhaust is blowing away from the job site**.

The manufacturer also recommends the installation of 12 volt powered vents in the truck roof to allow heat to escape.

⚠ WARNING

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

Mount a fire extinguisher just inside the rear or side door for emergencies.

⚠ WARNING

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

⚠ WARNING

Transportation in a vehicle of any vented fuel container that presently holds or has ever held a flammable liquid is strictly forbidden by HydraMaster Corporation and by federal and state regulation.

⚠ WARNING

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

⚠ WARNING

If the battery location is at your option, first make sure it is in an approved battery container and that it is covered and secured to the floor of the vehicle. Make sure the battery is isolated from hot machine components. This will cause the battery to last longer and also prevent the possibility of fire or explosion.

The quality of water varies greatly. Many areas have an excess of minerals in the water

High Altitude Operation Preparation

To have your machine run at it's peak performance; you may have to make adjustments depending on the elevation. Elevation plays a key role in how the machine will operate.

The factory setting of the machine is set for elevations from 0—3,000 feet. Any time the machine is operated above 3,000 feet there are two areas on the machine the *may* need adjustment.

The first area is the carburetor jet. The higher the elevation, the less air is provided to the fuel mixture. This will make the engine run 'rich', and, in turn will result in the loss of power, excessive heat in the exhaust, and carbon buildup in the exhaust and heat exchanger system. The jet sizes vary per engine and elevation. Consult HydraMaster to obtain proper jet size.

The second area that may need adjustment is the heat control system. The heat control system is also optimized to 0-3,000 feet. At higher altitudes the boiling point of water is lowered. In turn, this can cause the water box to boil and the high pressure pump to cavitate. The heat control system settings will have to be adjusted to compensate for the elevation. These settings will vary according to elevation. Contact HydraMaster to obtain the recommended settings.

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.

⚠ CAUTION

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

HARD WATER AREA MAP

The hard water map on page 1-15 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, and the appearance of cleaned carpets enhanced when water softeners are incorporated in hard water areas. The manufacturer strongly urges the use of a water softener units in areas exceeding 32 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.

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.

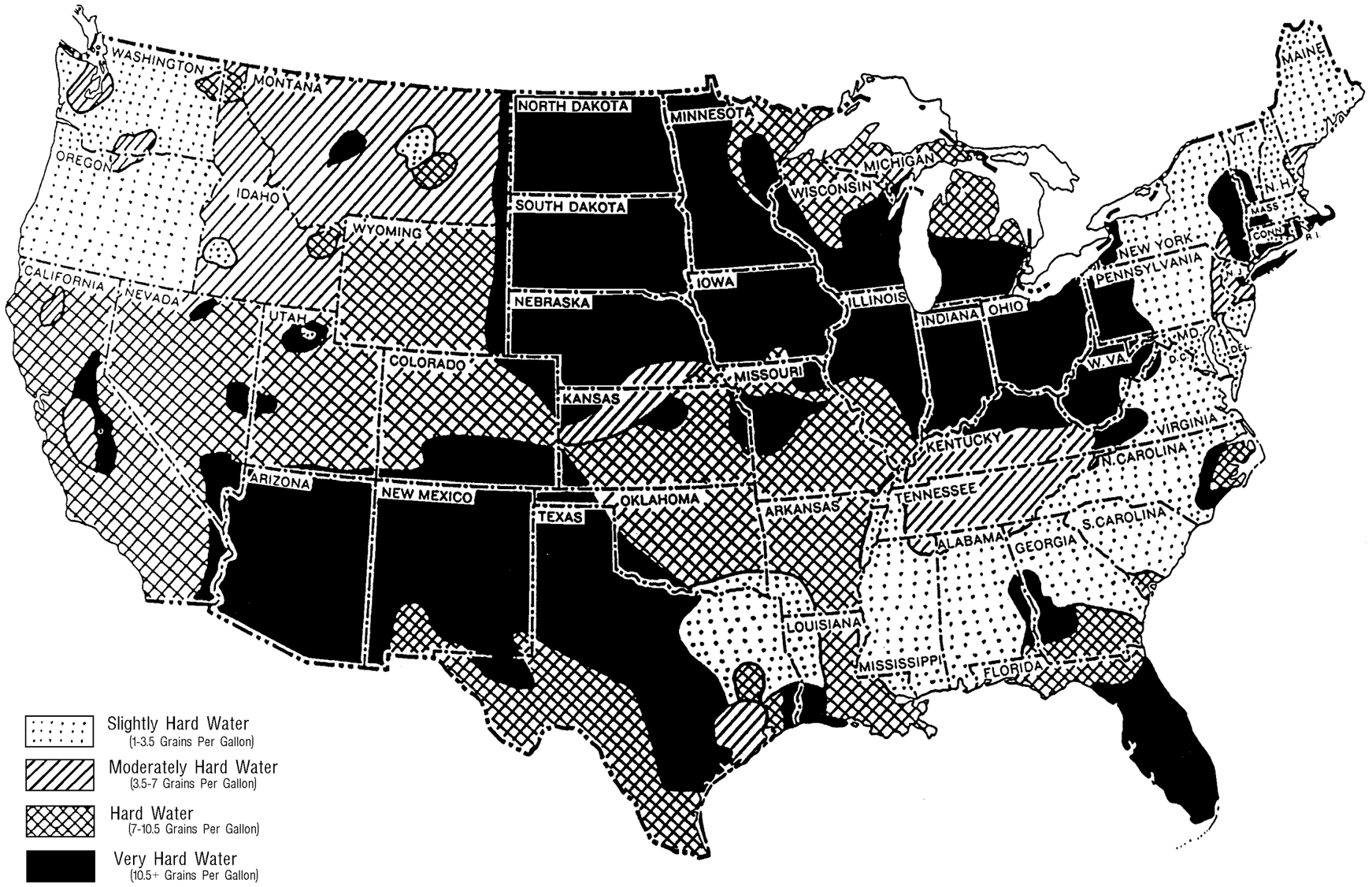
In most cases, an acceptable method of waste water disposal is to discharge into a municipal sewage treatment system after first filtering out solid material such as carpet fiber. Access to the sanitary system can be obtained through a toilet, laundry drain, RV dump, etc. Permission should first be obtained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

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

Figure 1-5 **Hard Water Map**



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

Machine Specifications

Frame: 23"W x 31"L x 22"H

Weight: 385 lbs.

Engine: Vanguard 16 HP Briggs & Stratton
Pressurized oil system
Spin-on oil filter
12 v electric starter motor
12 v, 16 amp alternator, regulated

Air Compressor: Thomas clutch driven

Vacuum Blower: Tuthill, 3003 Competitor Plus

Solution System: Dual high pressure tank compressed air fed

Heating System: Stainless steel cross flow exhaust heat exchanger

Drive System: Direct coupling rubber

Instruments and Controls: Vacuum level gauge, 0-30" Hg
Hour meter, machine run time
Keyed ignition
Mechanical throttle
Recovery tank drain valve
Manual engine choke
Blower lubrication port

Recovery Tank: 50 gallon aluminum, epoxy finish

High Pressure Hose: 3/16" high temperature, lined, vinyl covered
Hose rated to 2200 psi, 250° F.

Vacuum Hose: 2" reinforced

Standard Equipment: Machine power console
Full instrumentation
Thomas air compressor
Tuthill Competitor Plus™ Vacuum Blower
Stainless steel water heating package
Vacuum recovery tank
(1) fifteen gallon stainless steel solution tank with holder
100 ft, 2" vacuum hose
100 ft, 3/16" solution line
10 ft, 1½" recovery drain line
Battery box
Van installation kit

Machine Layout

Recovery Tank – Holding tank for solution recovered from the carpet

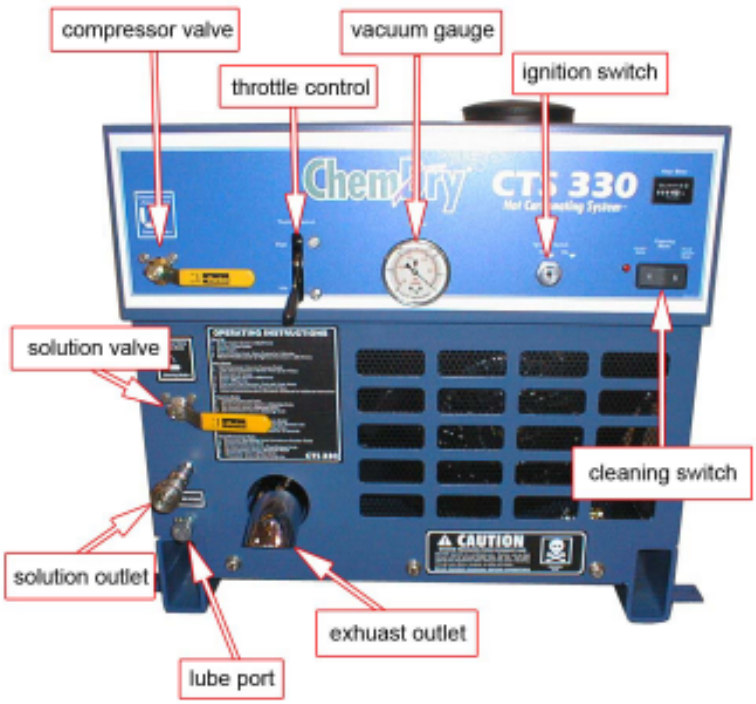
Throttle Control – Controls the speeds of the engine.

Cleaning Mode Switch – Selects between carpet and extraction modes.

Choke – Pull style cable for cold starts (located behind the dash).

Compressor Valve – Allow compressed air to be purged from the system.

Solution Valve – Allows priming of the high temperature solution to be purged from the system.



Solution Outlet – Hook up for the 3/16" solution hose.

Lube Port – Allows the blower to be lubricated.

Vac. Hose Hook Up – Hook up for the 2" vacuum hose.

Dump Valve – Allows the recovery tank to be dumped manually into a treated sanitary system (i.e. toilet).

Ignition Switch – Main power control to the machine.

Vacuum Gauge – Displays engine temp, solution temp (older versions), and vacuum.

Heat Mode Light – Shows if the diverter is in heat mode.

Exhaust Out – Engine and blower exhaust outlet.

Component Descriptions

The engine produces the power required to operate the vacuum pump and air compressor (**Figure 2-1**).

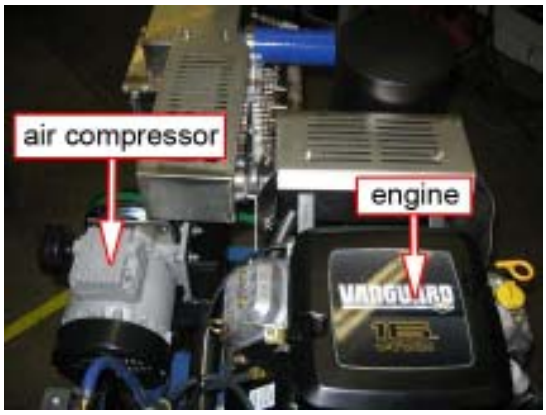


Figure 2-1

The vacuum pump is driven through the direct coupler by the engine (**Figure 2-2**).

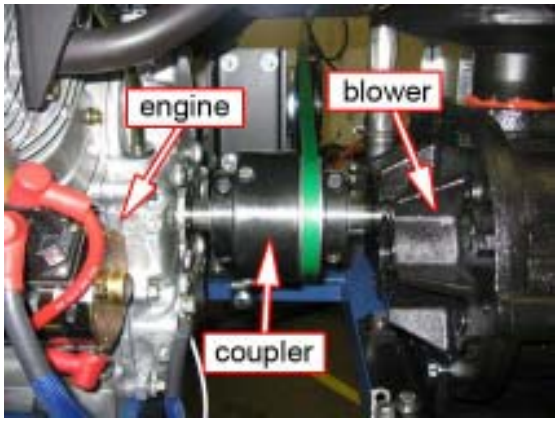


Figure 2-2

The air compressor is driven by a V-belt located between the blower and engine (**Figure 2-3**).

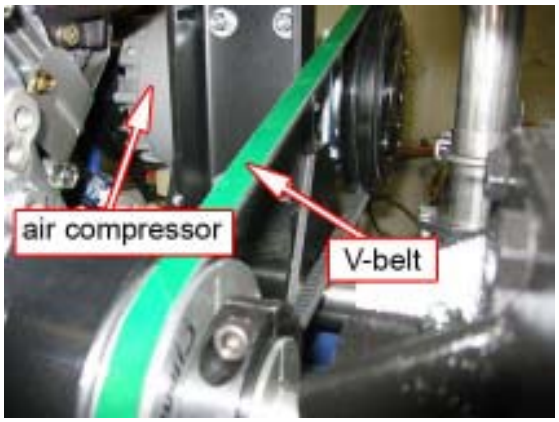


Figure 2-3

Operating Instructions

⚠ WARNING

Do not jump start machine! Damage may occur to Electrical System!

Start Up

1. Perform daily and periodic maintenance as specified in this Owner's Manual.
2. Pull out choke knob (located behind the dash).
3. Move throttle lever to IDLE position.
4. Start engine.
5. Push in Choke knob.
6. Allow engine to warm up in the idle position for 3-5 minutes.
7. Move throttle lever to HIGH position (**Figure 3-1**).

Note: *For optimal solution temperature, block off vacuum port for 5 minutes prior to cleaning.*

Figure 3-1

⚠ WARNING

The machine cannot be run in the IDLE position for cleaning upholstery, carpet or flood extraction. This will void the warranty.

Carpet or Upholstery Cleaning

1. Fill solution tank with solution.
2. Position the Compressor Valve to CLEANING MODE.
3. Position the Solution Valve to CLEANING MODE.
4. Change Cleaning Mode switch to CARPET MODE.
   This will engage the compressor clutch and put the temperature control on auto.
5. Connect the solution and vacuum hoses to the tool.
6. Commence cleaning.

Notes:

- ❑ The machine operates at a pressure of 100 - 120 psi.
- ❑ If the Solution Valve is left in the PRIME position, the solution will evacuate from the chemical tanks into the recovery tank.
- ❑ If the solution tanks run dry, air will fill the system. After the solution tanks have been filled, with solution, purging the air from the system may require several minutes. This can be expedited by turning the solution valve to prime for 15 seconds, then returning the valve to cleaning mode.

Flood Extraction

Figure 3-2

1. Position Solution Valve to PRIME mode (**Figure 3-2**).
2. Position Compressor Valve to PRESSURE RELIEF (**Figure 3-2**).
3. Set Cleaning Mode switch to EXTRACT ON mode.
4. Connect vacuum hoses and tool.
5. If equipped, switch Auto Pump Out to ON.
6. Disconnect out-going quick connects on chemical tanks.

Notes:

- ❑ The Compressor Valve **must be** positioned in the PRESSURE RELIEF during flood extraction. If the valve is left in the CLEANING MODE, this may cause damage to the air compressor and related components.
- ❑ The Solution Valve **must be** positioned in the PRIME mode during flood extraction. If the valve is left in the CLEANING MODE, the system may build up excessive pres sure, which could cause damage to the machine.

Solution Fill Procedure

Figure 3-3

1. Position Compressor Valve to PRESSURE RELIEF.
2. Remove the lids from the solution tanks.
3. Disconnect hoses if necessary (**Figure 3-3**).
4. Fill solution tank with solution.
5. Replace the lids on the chemical tanks.
6. Reconnect hoses if necessary.
7. Position the Compressor Valve to CLEANING MODE.

Notes:

- ❑ Solution tank recharge time will vary depending on the level of the solution.

Shut Down

1. Set Compressor Valve to PRESSURE RELIEF.
2. Lube vacuum blower at blower port. (End of Day)
3. If in use, switch OFF Auto Pump –Out.
4. Disconnect all hoses.
5. Move throttle lever to IDLE mode.
6. Switch OFF ignition.
7. Drain and Flush recovery tank with clean water.
8. Remove and clean filter bag. (End of Day)

Safety Shut Down

This machine is equipped with two safety shutdowns.
This will alert you by shutting down the machine.

The two machine shutdowns are:

1. **Machine Overheat**
   This will activate when then machine solution temperature reaches 300° F.
2. **Recovery Tank Full**
   This will activate once the recovery tank has reached its full capacity.

General Operating Information

1. In accordance with state and local EPA laws, do not dispose of wastewater into gutters, storm drains, streams, reservoirs, etc. Dispose wastewater into a treated sanitary system.

This page intentionally left blank

Machine Maintenance

Engine

- ❑ Quick Reference List.
- ❑ Check air filter.
- ❑ Drain oil.
- ❑ Change oil filter.
- ❑ Fill oil.
- ❑ Remove and replace spark plugs.
- ❑ Set spark plug gap.
- ❑ Change fuel filter
- ❑ Visually check compressor belt.
- ❑ Tighten belt.
- ❑ Loosen belt.
- ❑ Check exhaust system (donut gaskets).

Engine Air Filter

1. Unlock the two clamps and remove cover (**Figure 4-1**).
2. Remove air filter cartridge.
3. Carefully clean out cartridge and foam element.
4. Reinstall air filter cartridge.
5. Install cover and lock clamps.

Figure 4-1

Note: Do not use pressurized air or solvents to clean cartridge and foam ring.

Engine Oil and Filter Change

Tools:
- ❑ 11/16 inch wrench
- ❑ 5/8 inch wrench
- ❑ Oil filter wrench

1. Remove oil drain cap from drain hose located on the right side of the engine (**Figure 4-2**). Do not reinstall cap until you begin filling the engine with oil (refer to step 4)
2. Remove oil filter located on the left side of the engine (**Figure 4-3**).

Figure 4-2

Figure 4-3

3. Apply oil to the new oil filter gasket. Install oil filter (HRI part # 049-014).
4. Remove the oil fill cap located on top of the valve cover.
5. Begin filling engine with 30W. After the oil begins to flow out of the oil drain fitting, re-install the cap. This will allow air to evacuate from the system and give accurate oil level readings. Engine oil capacity is approximately 1.75 quarts with filter.

⚠ WARNING

Failure to do this step will result in an insufficient amount of oil in the engine!

6. Check oil dipstick for proper level.
7. Re-install the oil fill cap.

Spark Plug Replacement

The spark plugs are located on each side of the engine.

Tools:
- ❑ 5/8 inch spark plug socket
- ❑ 0.030" feeler gauge

1. Unplug the wires from the spark plugs (**Figure 4-4**).
2. Remove the spark plugs with a 5/8" Socket.
3. Install the new plugs with a gap of 0.030".
   Champion Part # RC12YC
   HRI Part # 000-106-016
4. Re-install the spark plug wires.

Figure 4-4

Fuel Filter

The fuel filter is located underneath the van. It is between the fuel filler neck and the fuel through floor assembly (**Figure 4-5**).

Tools:
- ❑ 12 mm wrench

1. Loosen the hose clamps on either side of the filter.
2. Pull the hoses off of the filter.
3. Install the new filter. The filter has an arrow on it. The arrow should point towards the hose to the machine. HRI Part # 049-049
4. Tighten the hose clamps.

Figure 4-5

Blower

Quick Reference List:
- ❑ Check blower level.
- ❑ Drain oil.
- ❑ Fill oil.
- ❑ Lube blower.

Blower Oil Change

The vacuum blower has grease ports in the front and **one sight glass** for checking the oil level (**Figure 4-6**). The sight glass is located in the rear of the blower and can be viewed by looking at the right side on the rear case of the blower. The oil level should be checked **daily** to ensure that it reaches over half the sight glass.

Figure 4-6

Tools:
- ❑ 11/16 wrench
- ☐ 5/8 wrench
- ❑ Grease gun

1. Remove the oil drain cap, which is located on the oil drain hose on the side of the machine. (**Figure 4-7**).
2. Remove oil fill cap.
3. Fill the blower with 40W non-detergent oil. After oil begins to flow out of the oil drain fitting, re-install the caps. This will allow air to evacuate from the system and give accurate oil level reading.

Failure to do this step will result in an insufficient amount of oil in the blower will lead to damage or failure!

4. Re-install the oil fill plug.
5. Attach grease gun to zerks and pump grease into the blower until grease flows out of the weep holes.

Figure 4-7

Recovery Tank

Quick Reference List

- ❑ Remove and Clean Filter Bag
- ❑ Remove and Clean S/S Filter
- ❑ Remove and Clean APO Filters
- ❑ Clean APO Pump
- ❑ Remove and Clean S/S Floats
- ❑ Clean Vac Relief Box

1. Remove the filter bag and clean (**Figure 4-8**). **Perform this operation after every cleaning job.**

Figure 4-8

2. Remove stainless steel filter (**Figure 4-9**).
3. Clean the stainless steel filter of debris **daily**. This filter is connected to the vacuum blower. Failure to clean the filter daily will result in a loss of vacuum. This loss of vacuum will cause the blower to over heat.

Figure 4-9

4. Remove the stainless steel floats and clean (**Figure 4-10**).

Figure 4-10

Recovery Tank (cont.)

5. Rinse out the recovery tank thoroughly. **Perform this operation daily.**
6. Clean vacuum relief box as necessary (**Figure 4-11**).
7. Replace all parts before starting up machine.

Figure 4-11

Solution System

Quick Reference List:

- ❑ Remove filters
- ❑ Clean filters
- ❑ Remove orifice
- ❑ Clean orifice
- ❑ Inspect manifold
- ❑ Rinse tanks

Orifice Quick Connect Assembly

The orifice assembly is located on the side of the solution tank bracket, in line with the outlet hose. The purpose of the orifice manifold is to control the amount of solution being used and to filter any debris from entering the system.

Tools:

- ❑ 3/32 Allen wrench

Figure 4-12

<u>Orifice and Filter Maintenance</u>

1. Position Compressor Valve to PRESSURE RELIEF.
2. Remove the filter by disconnecting the stainless steel quick connect (**Figure 4-12**).

⚠ WARNING

NEVER disconnect under pressure!

3. Clean the filters and orifices with fresh water or compressed air. **Perform this operation daily** (**Figure 4-13**)**.**
4. Re-install filters and orifices (**Figure 4-14**).

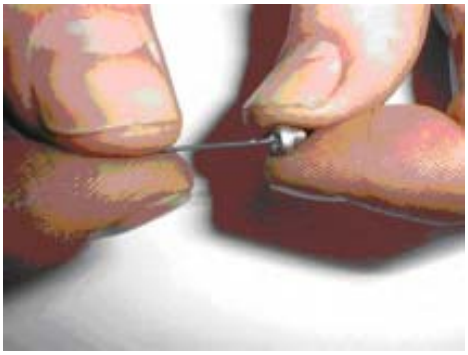


Figure 4-13

Figure 4-14

General Maintenance

1. Inspect hoses.
2. Inspect wire connections.
3. Check nuts, belts, and hose clamps.

Freeze Guard Information

Your machine should be protected from freezing for any temperature below 35° F.

⚠ WARNING

Water freezes at 32° F

Freeze Guard Procedure

1. Empty solution tank. Once they have been emptied reinstall the lid and all the hoses.
2. Turn the Solution Valve to the “Purge” position.
3. Turn the Air Valve to the “Cleaning Mode” position.
4. Run the machine for approximately 3 to 5 minutes.
5. Empty the recovery tank.

This page intentionally left blank.

CTS 330
GENERAL MAINTENANCE LOG

MAX HRS	DAILY SERVICE	OIL RECOMMENDATIONS	
8	ENGINE OIL check	BLOWER	40 weight non-detergent
8	MACHINE general inspection	PUMP	30 weight non-detergent
8	RECOVERY TANK FILTER BAG clean	ENGINE	30 weight motor oil
8	RECOVERY TANK STAINLESS STEEL FILTER Clean		
8	BLOWER INLET spray with lubricant		NOTE: Overhead valve engines can use multi-viscosity oil, but will experience increased oil consumption.
8	Empty Air Tank		
8	Clean ORIFICE FILTER		
8	ORIFICE inspect/clean		

	WEEKLY SERVICE	DATE & HOURS						
See Note	OIL change with filter		Note: Break-in period determined by manufacturer. Refer to engine manual.					
25	BLOWER check oil level							
25	DRIVE SYSTEM tighten screws							
25	COMPRESSOR BELTS & PULLEYS check for wear *HRI Part # 000-010-122* *Gates Belt # HD9465*							
25	HIGH PRESSURE LINES check for chafing							
25	NUTS & BOLTS check tightness							
25	VACUUM RELIEF VALVE inspect, clean, lube							
25	VACUUM TANK clean & flush							
25	WIRING check for chafing							
25	FLOAT SWITCHES check for debris							
	MONTHLY SERVICE							
100	ENGINE OIL change							
100	ENGINE AIR CLEANER clean *HRI Part # 000-049-012*							
100	BATTERY WATER LEVELS check (if applicable)							
200	OIL FILTER change							
200	COMPRESSOR BELT check tension							
	QUARTERLY SERVICE (3 MONTHS)							
300	FUEL LINES check for wear							
300	SPARK PLUGS clean and gap *HRI Part # 000-106-016* *Champion Part # RC12YC*							
300	SOLUTION TANKS clean & flush							
400	BLOWER OIL change							
	YEARLY SERVICE							
1200	TEMPERATURE CONTROL SENSOR clean							

CTS 330 Hot Carbonating Truckmount System™

Machine Assemblies and Parts Lists

Figure 5-1 **Machine Assembly - Front Right View**
D-6150 Rev -

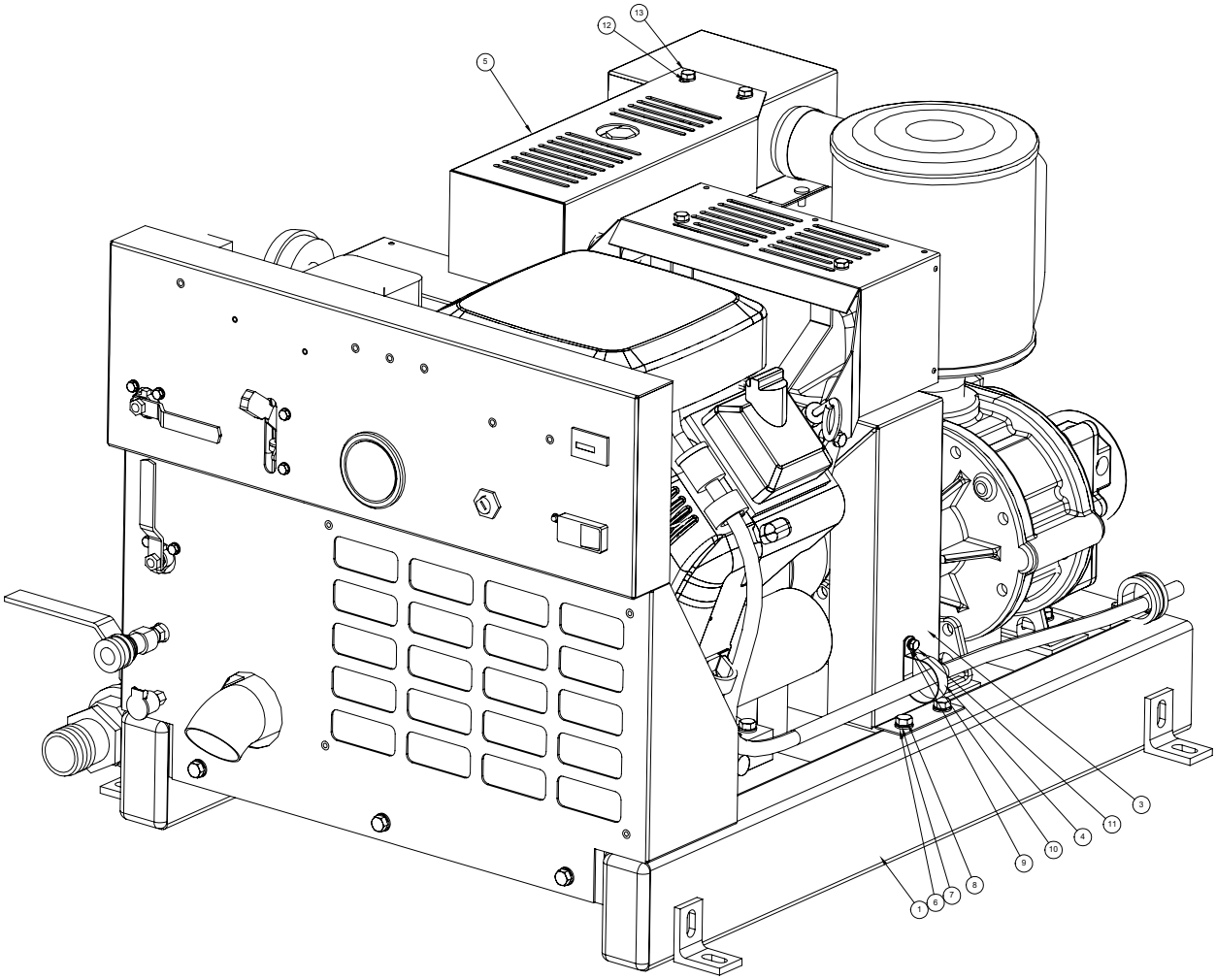


Figure 5-2 **Machine Assembly - Front Left View**
D-6150 Rev -

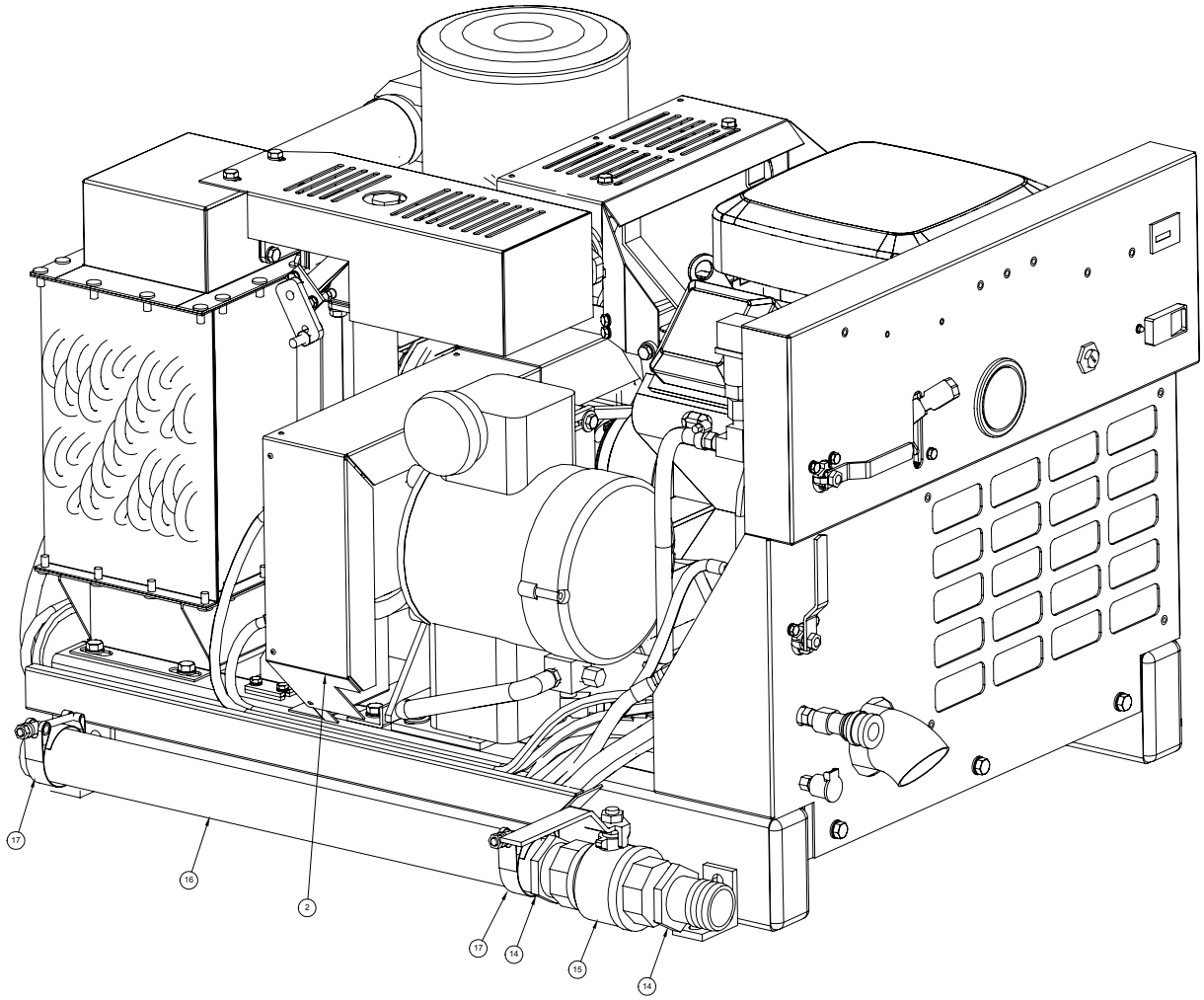
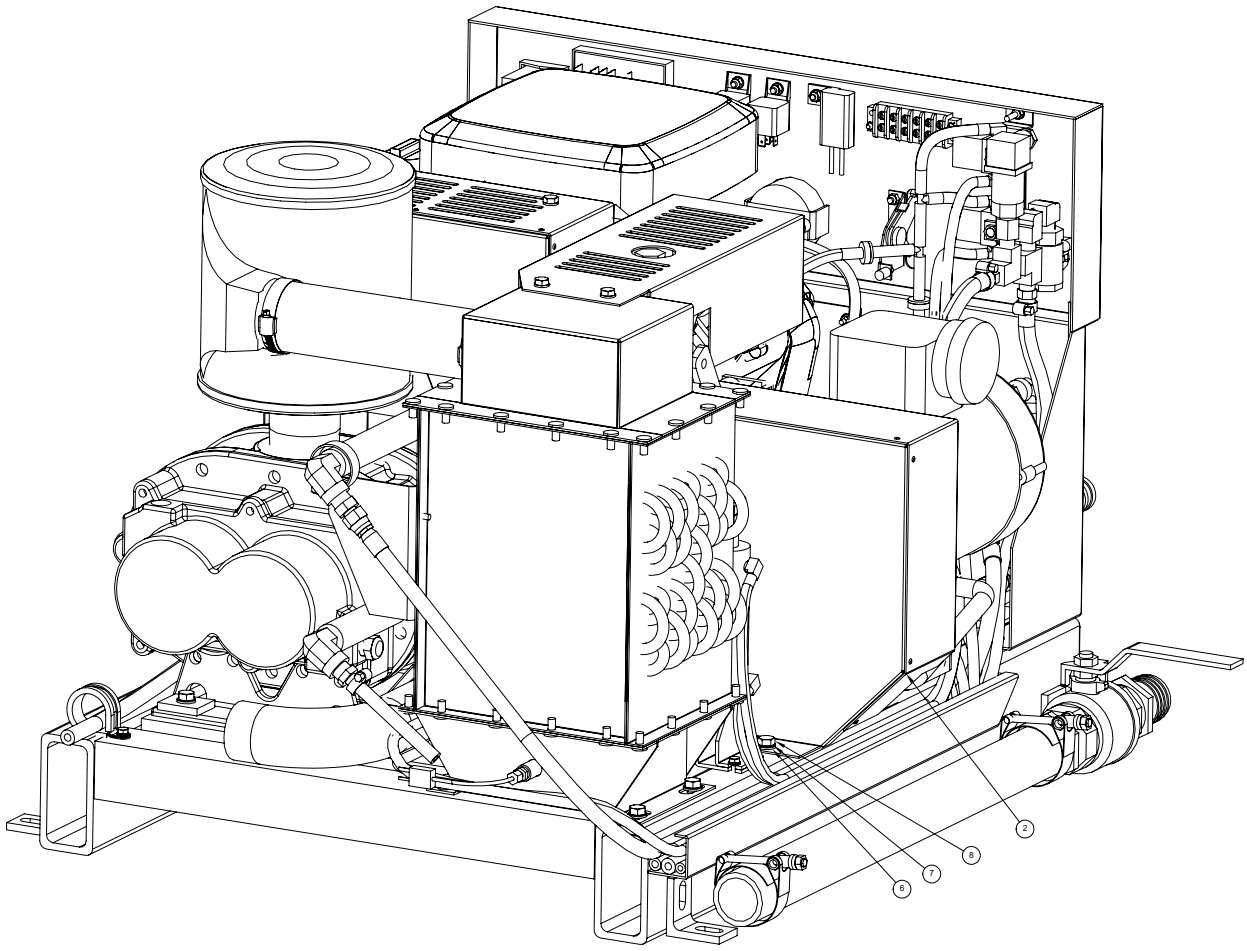


Figure 5-3 **Machine Assembly - Rear View**
D-6150 Rev -



Machine Assembly Parts List

Item	Part Number	Description	Qty
1	610-001-034	Assembly, Frame - CTS 330 **(Fig 2-4 thru 2-6)**	1
2	000-108-142	Protector, Belt Guard - Left Assembled - CTS 330	1
3	000-108-143	Protector, Belt Guard - Right - CTS 330	1
4	000-033-053	Clamp, 1-1/2" Cushion Loop	1
5	000-041-437	Cover, Exhaust - Weldment - CTS 330	1
6	000-174-049	Washer, 5/16" Flat	4
7	000-174-018	Washer, 5/16" Lock	4
8	000-143-011	Screw, 5/16"-18UNC x 1/2 Hex Head	4
9	000-174-001	Washer, #10 Flat	1
10	000-174-014	Washer, #10 Lock	1
11	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	1
12	000-174-003	Washer, 1/4" Flat	2
13	000-143-333	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head	2
14	000-052-226	Insert,1-1/2" NPT x 1-1/2" Barb (Grey)	2
15	000-169-022	Valve, 1-1/2" Full Port Ball	1
16	000-068-135	Hose, Ø1.50" I.D. Red Stripe Type 55 - Bulk	1
17	000-033-063	Clamp, 1-1/2" T-Bolt	2

Figure 5-4 **Frame Assembly - Front Left View**
D-6151 Rev -

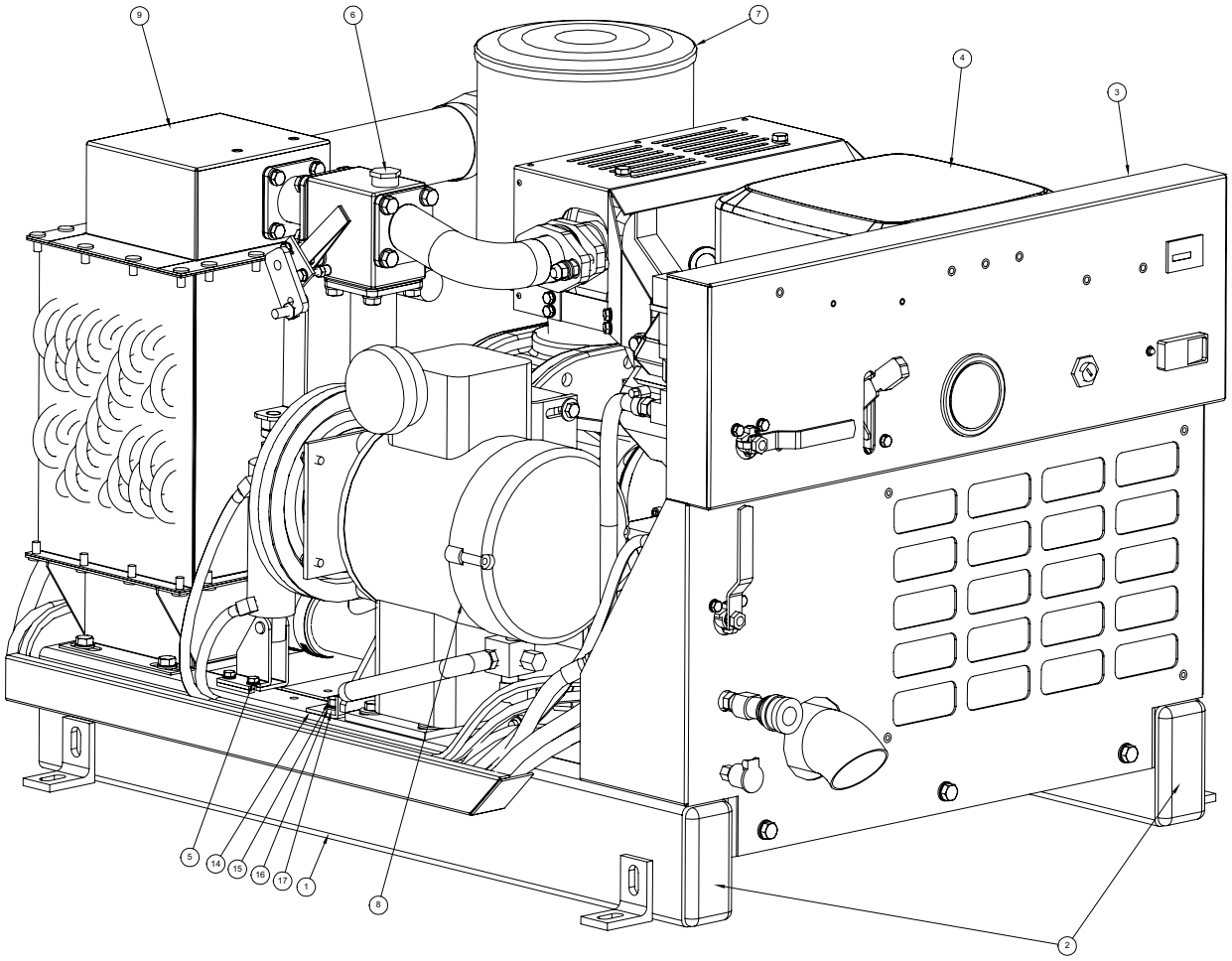


Figure 5-5 **Frame Assembly - Front Right View**
D-6151 Rev -

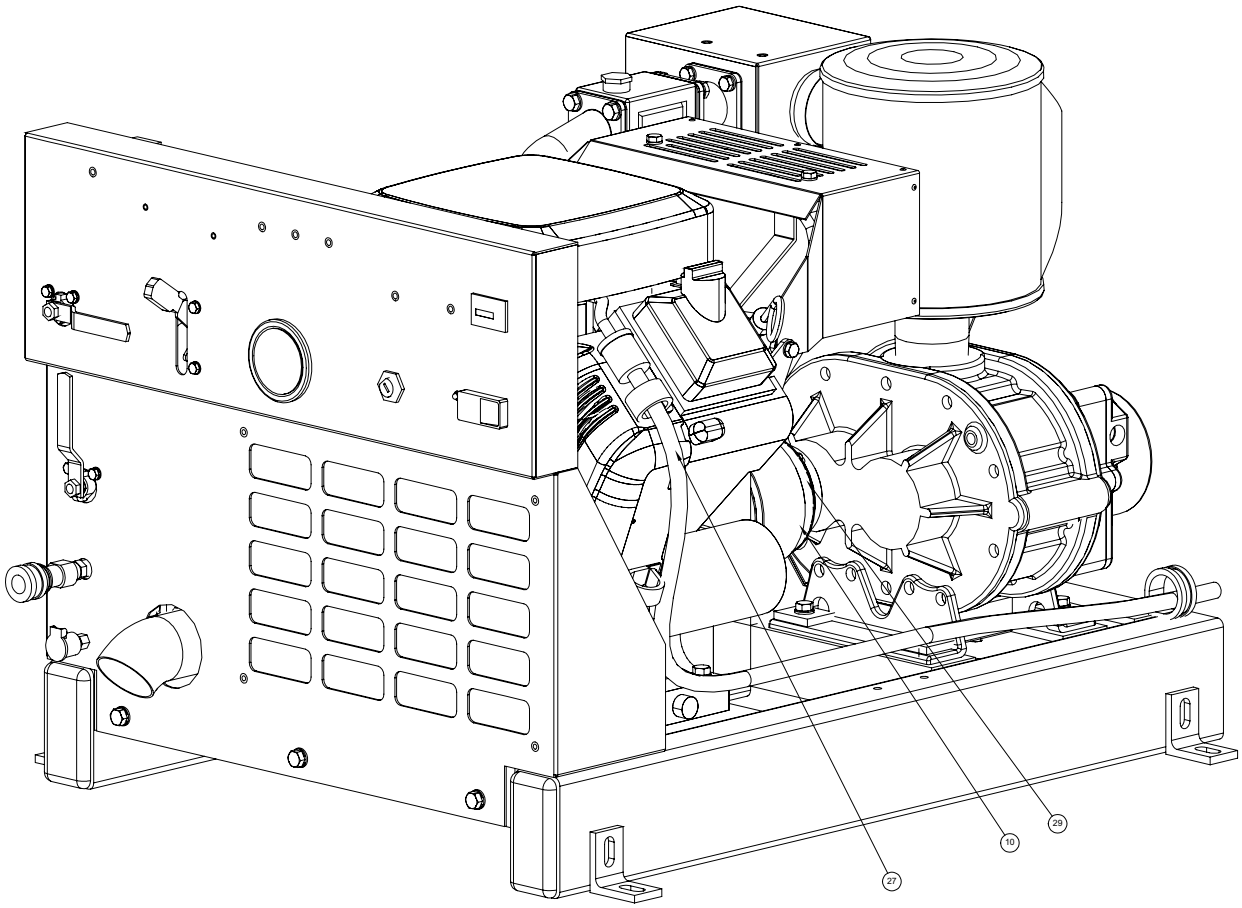
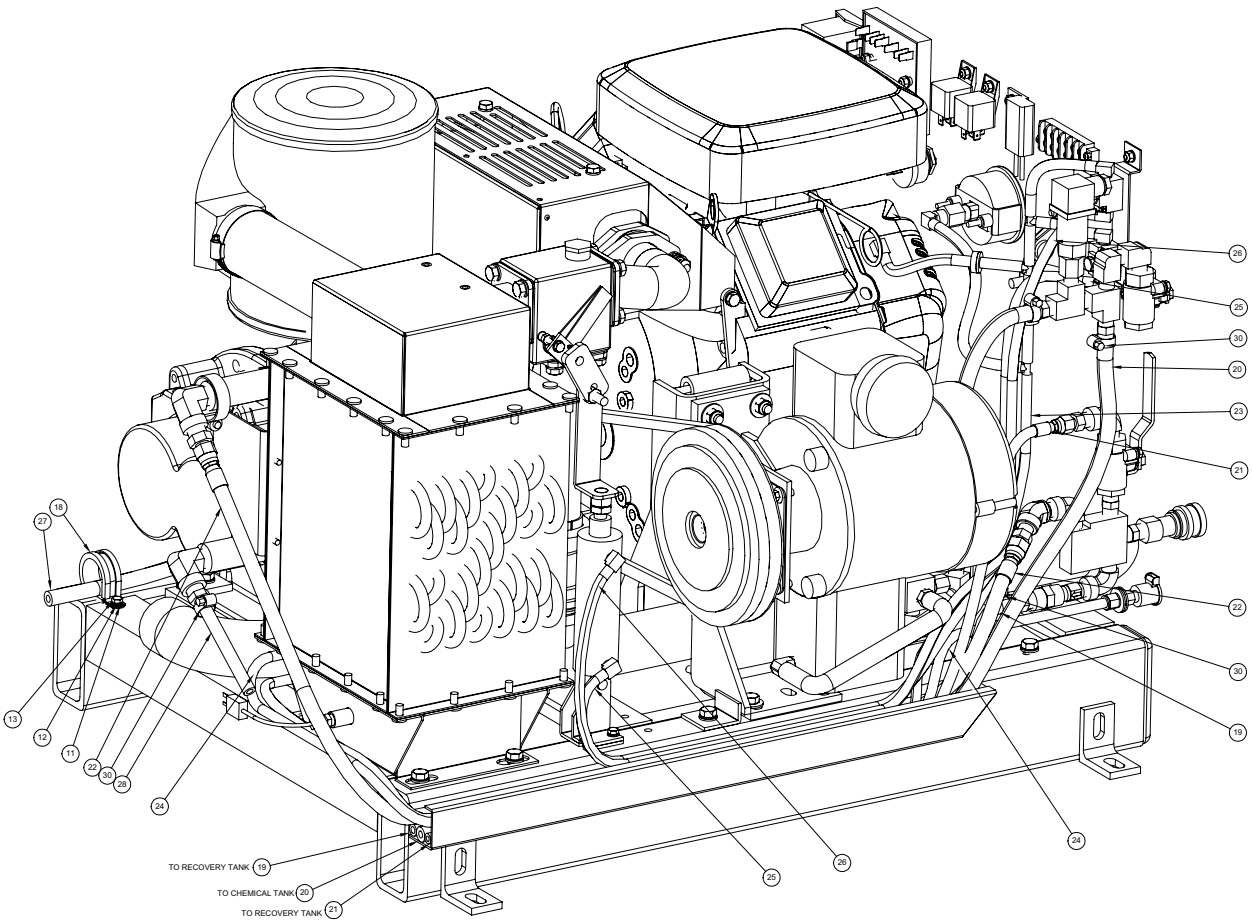


Figure 5-6 **Frame Assembly - Rear View**
D-6151 Rev -



Frame Assembly Parts List

Item	Part Number	Description	Qty
1	000-055-181	Frame, Welded - CTS 330	1
2	000-027-034	Cap, Frame End - Modified - Maxx/CTS 450	2
3	610-018-034	Assembly, Dash - CTS 330 **(Fig. 2-7 thru 2-8)**	1
4	610-003-034	Assembly, Engine 16 HP Vanguard **(Fig. 2-12 thru 2-13)**	1
5	610-003-034	Assembly, Diverter Valve Actuator **(Fig. 2-15)**	1
6	610-003-034	Assembly, Exhaust - CTS 330 **(Fig. 2-14)**	1
7	610-002-034	Assembly, Blower - CTS 330 **(Fig. 2-16)**	1
8	610-007-034	Assembly, Air Compressor - CTS 330 **(Fig. 2-17)**	1
9	610-005-034	Assembly, Blower Heat Exchanger - CTS 330 **(Fig. 2-18)**	1
10	000-039-054	Coupler, 40 Series	1
11	000-174-001	Washer, #10 Flat	1
12	000-174-014	Washer, #10 Lock	1
13	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	1
14	000-015-920	Bracket, Compressor Guide - CTS 330	1
15	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	1
16	000-174-018	Washer, 5/16" Lock	1
17	000-174-049	Washer, 5/16" Flat	1
18	000-033-052	Clamp, 1-1/4" Cushion Loop	1
19	000-068-015	Hose, 1/4" I.D. Rubber - Bulk	1
20	000-068-131	Hose, 1/4" I.D. Hi Temp - Bulk	1
21	000-068-723	Hose, 3/16" I.D. x 775" Lg. Teflong w/ JIC Ends	1
22	000-068-758	Hose, 3/8" I.D. x 50" Lg. Teflon	1
23	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
24	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
25	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
26	000-068-030	Hose, 5/32" I.D. Vacuum - Bulk	1
27	000-068-660	Hose, 1/4" Fuel - Trident - Bulk	1
28	000-068-015	Hose, 1/4" I.D. Rubber - Bulk	1
29	000-010-122	Belt, Compressor - CTS 330	1
30	000-033-003	Clamp, Size #4 Mini	3

Figure 5-7 **Dash Assembly - Front View**
D-6152 Rev -

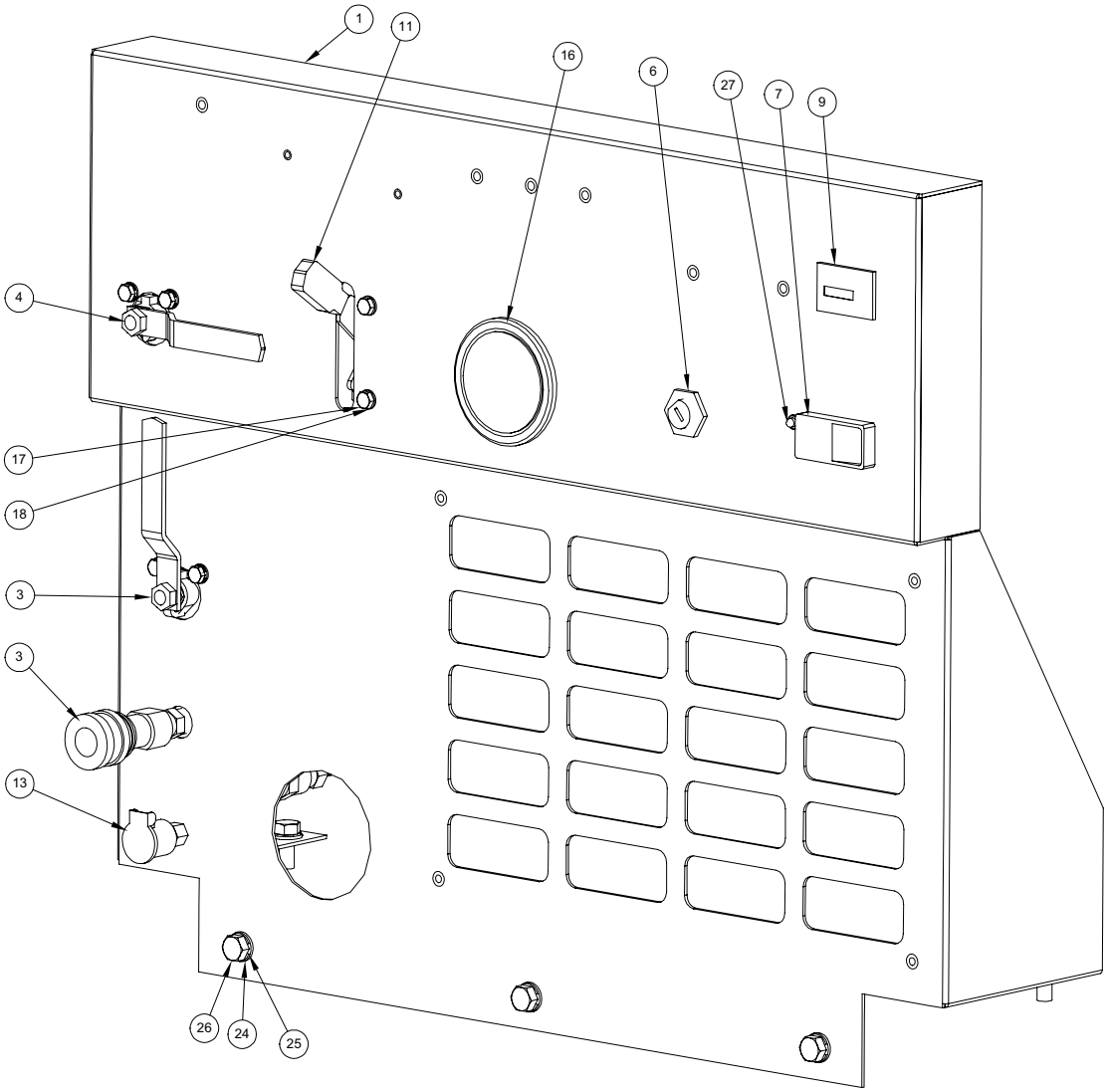
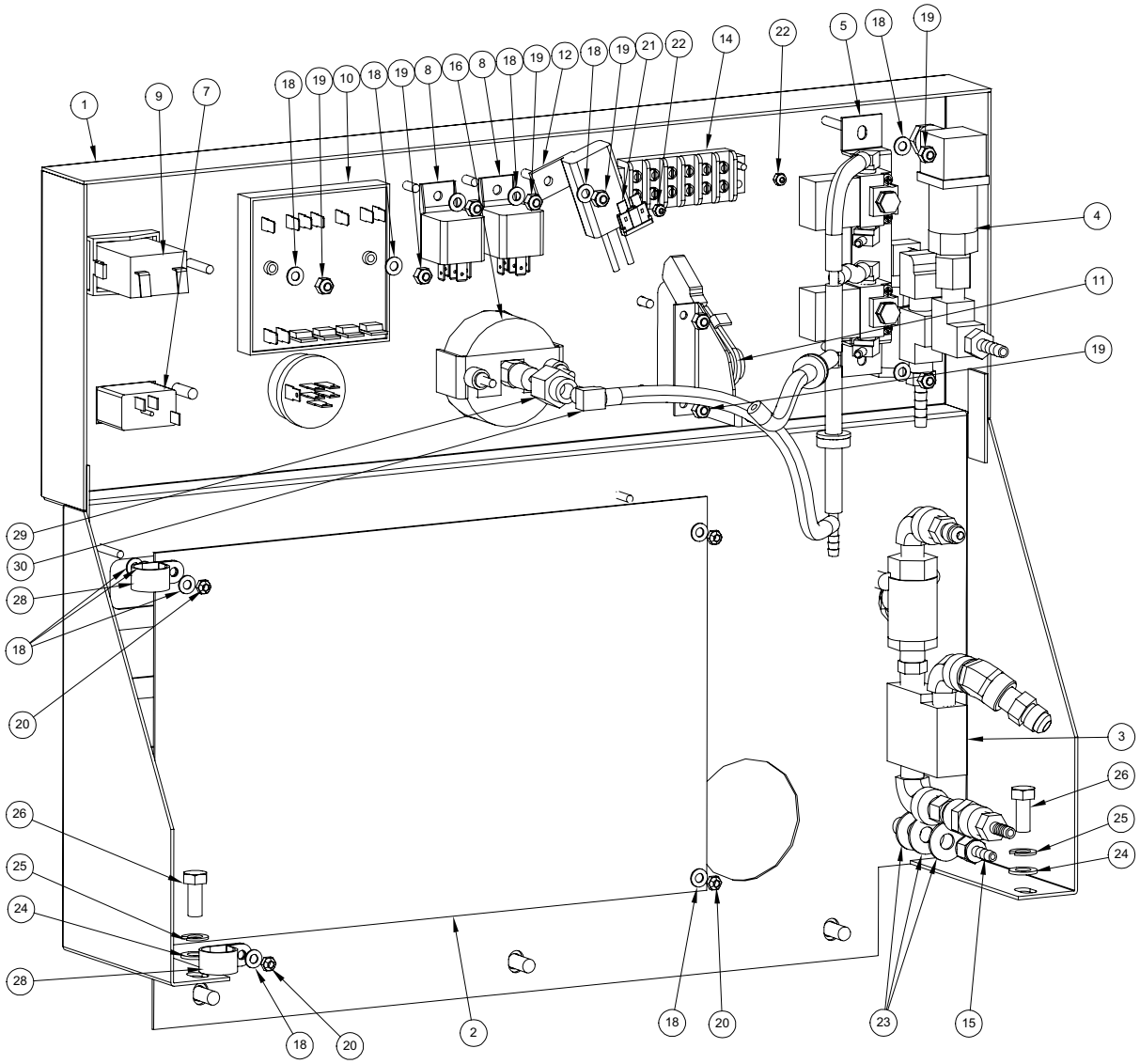


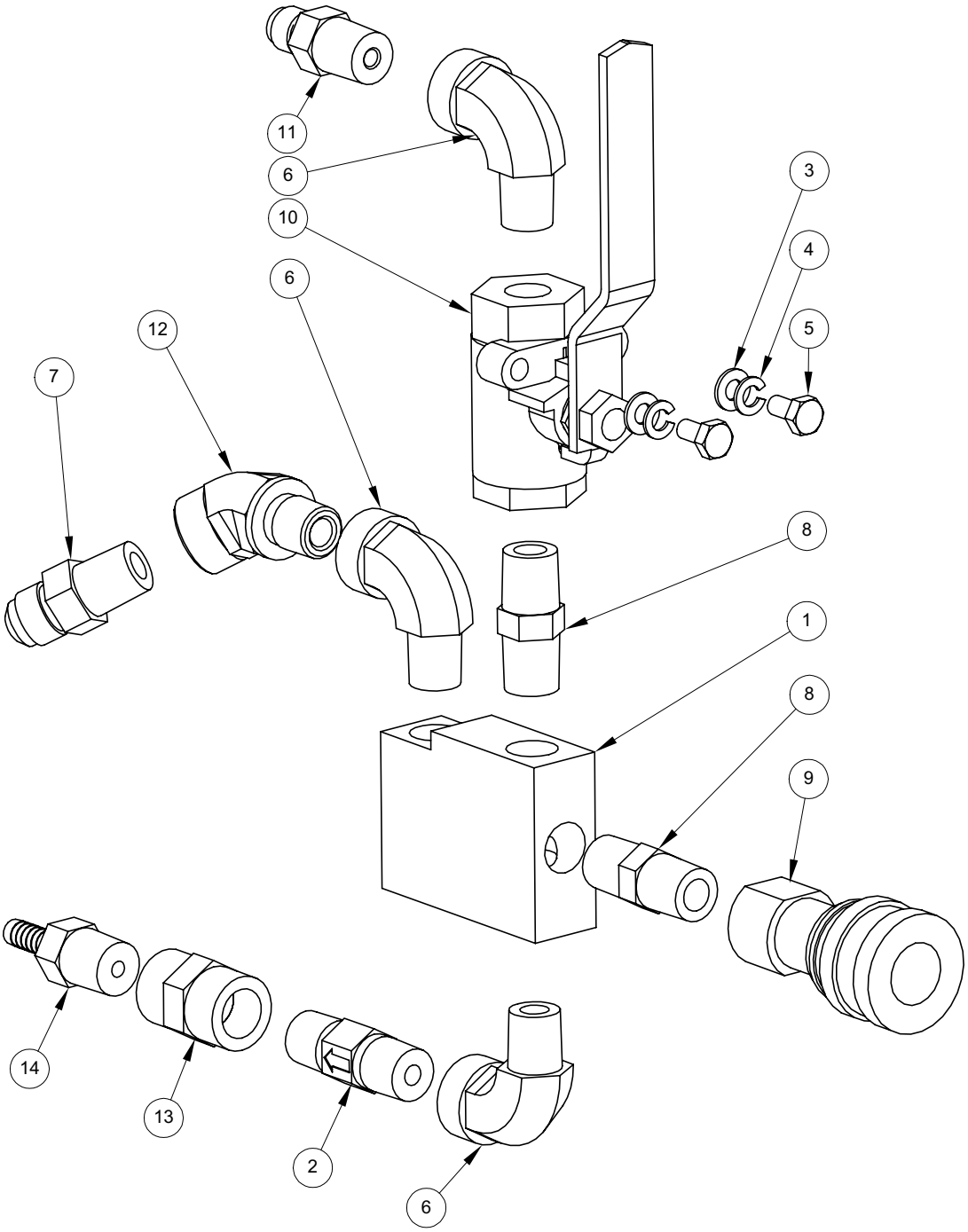
Figure 5-8 **Dash Assembly - Rear View**
D-6152 Rev -



Dash Assembly Parts List

Item	Part Number	Description	Qty
1	000-100-160	Panel, Dash w/ Gussets - CTS 330	1
2	000-100-161	Panel, Perforated Grill - CTS 330	1
3	610-018-034	Assembly, Hi-PSI Manifold - CTS 330 **(Fig. 2-9)**	1
4	610-018-034	Assembly, Purge Valve - CTS 330 **(Fig. 2-10)**	1
5	610-018-034	Assembly, Vacuum Solenoid Valves **(Fig. 2-11)**	1
6	000-157-017	Switch, Ignition B&S 14 HP	1
7	000-157-040	Switch, 20 AMP Rocker	1
8	000-157-022	Switch, Relay	2
9	000-074-018	Meter, Rectangular w/o Bezel	1
10	000-074-162	Controller, Exhaust Sensing 'K' Type Thermocouple	1
11	- - -	Throttle Box Modification - Spitfire 3.2	1
12	000-056-006	Fuse Holder, Inline Weather Proof	1
13	000-052-272	Cup, Gravity Feed Oil Blower Lubrication Port	1
14	000-012-002	Block, 6 Post Terminal	1
15	000-052-096	Insert, #F23 (1/8" FPT x 3/16" Barb)	1
16	000-074-025	Gauge, 0-30"Hg Vac. 2 1/2"	1
17	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	2
18	000-174-001	Washer, #10 Flat	21
19	000-094-034	Nut, #10-24UNC Nylock	9
20	000-094-059	Nut, #8-32UNF Nylock	4
21	000-056-011	Fuse, 30 AMP Plug In	1
22	000-094-063	Nut, #6-32UNC Nylock	2
23	000-174-032	Washer, 3/8" Flat	3
24	000-174-049	Washer, 5/16" Flat	5
25	000-174-018	Washer, 5/16" Lock	5
26	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	5
27	000-084-011	Light, Red LED Indicator Mini	1
28	000-033-023	Clamp, 3/4" Nylon Hose	2
29	000-052-066	Coupler, 1/4" FPT x 1/8" FPT	1
30	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	1

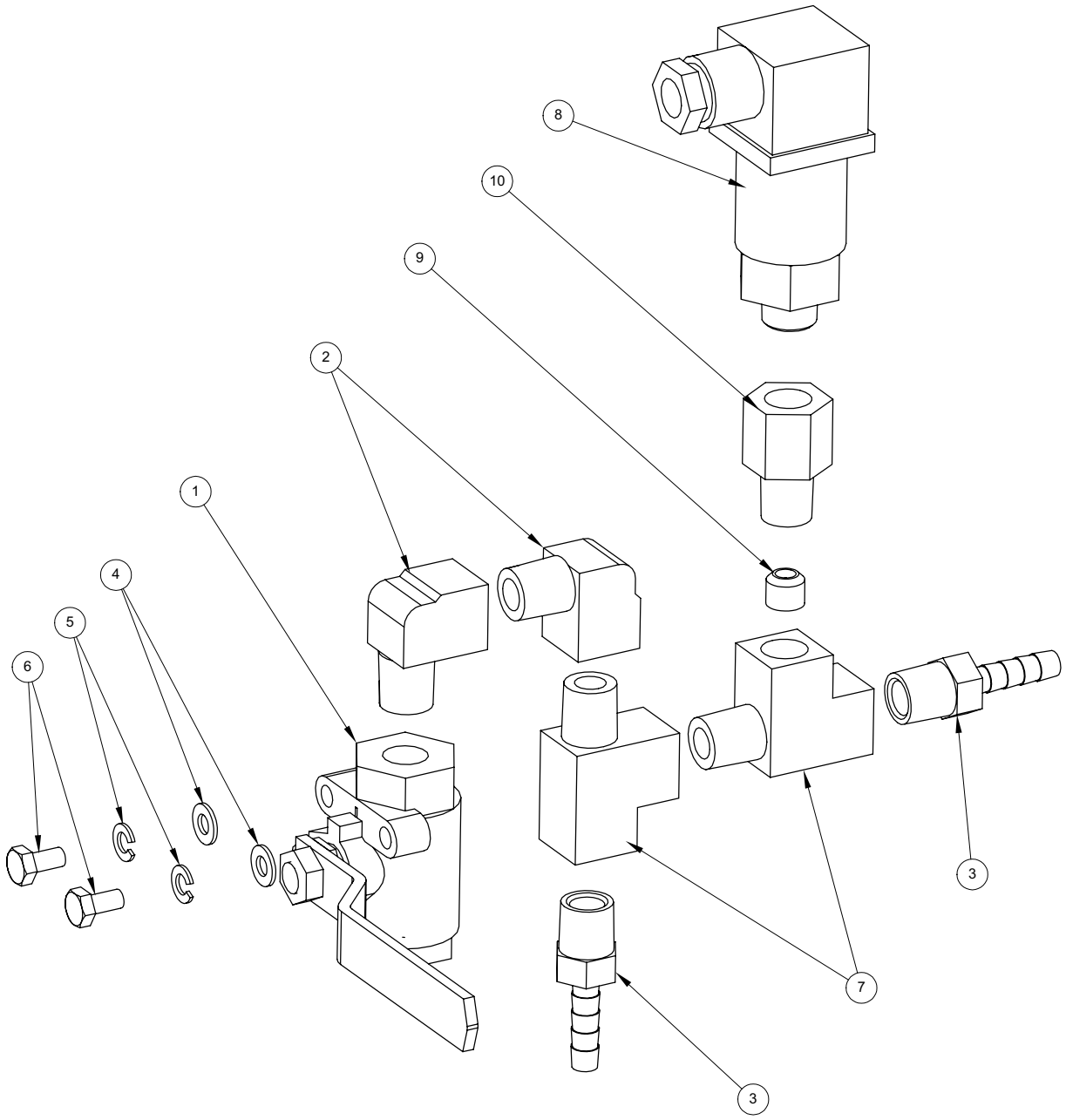
Figure 5-9 **HI-PSI Manifold Assembly**
C-6158 Rev -



HI-PSI Manifold Assembly Parts List

Item	Part Number	Description	Qty
1	000-090-018	Manifold, Hi PSI s/s	1
2	000-169-195	Valve, 200 PSI Pop Off	1
3	000-174-001	Washer, #10 Flat	2
4	000-174-014	Washer, #10 Lock	2
5	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	2
6	000-052-691	Elbow, 1/4" Street s/s	3
7	000-052-506	Nipple, 1/4" NPT x 9/16"-18UNF x 37° JIC	1
8	000-052-095	Nipple, 1/4" NPT Hex	2
9	000-052-690	Quick Connect, Female - CTS 450	1
10	000-169-095	Valve, 1/4" NPT Panel Mount - Full Port Ball	1
11	000-052-526	Nipple, 1/4" NPT x 1/4" JIC	1
12	000-052-745	Elbow, 1/4" NPT x 45° Street s/s	1
13	000-052-756	Coupler, 1/4" FPT Hex s/s	1
14	000-052-696	Insert, #44 (1/4" NPT x 1/4" Barb) s/s	1

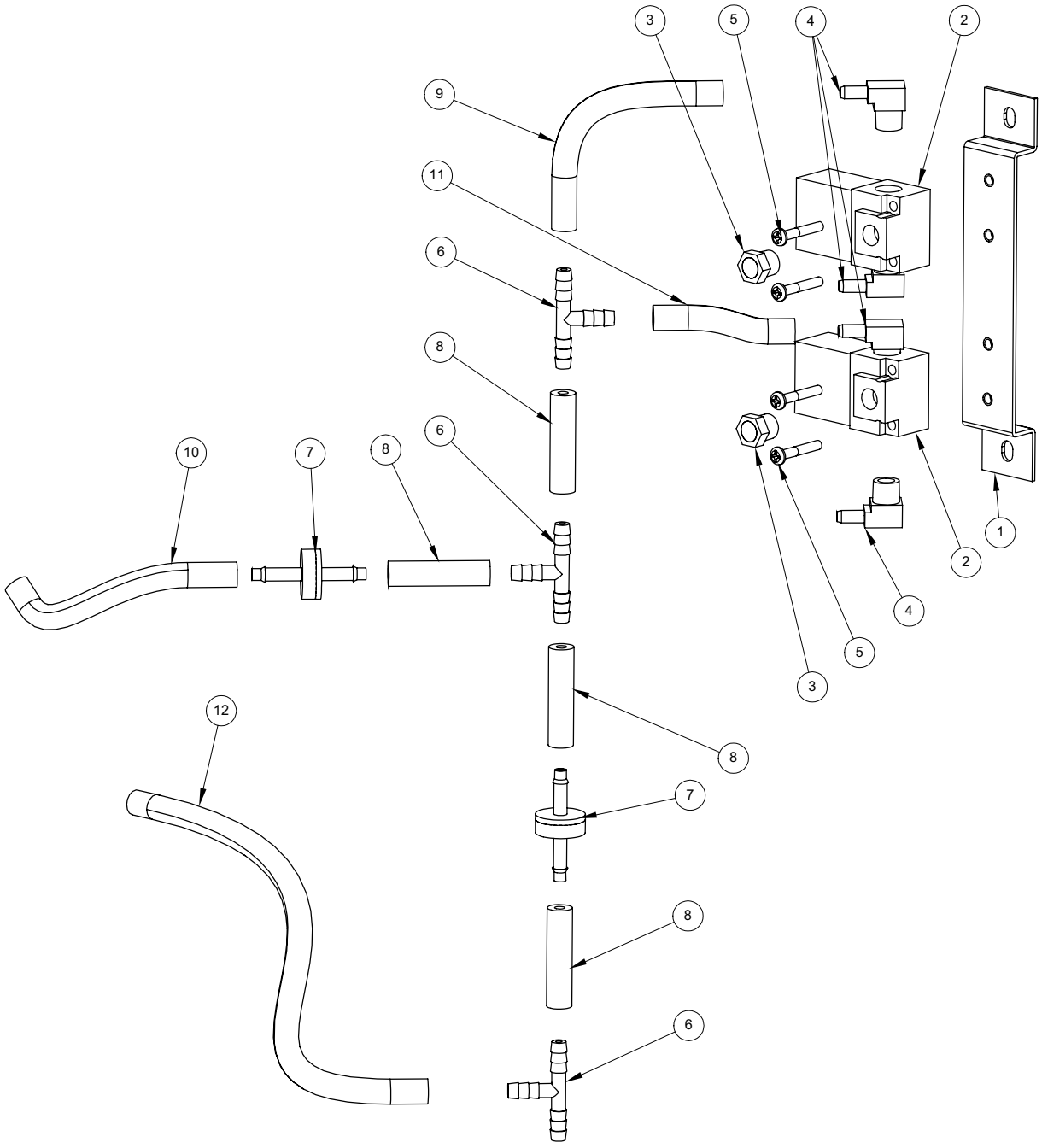
Figure 5-10 **Purge Valve Assembly**
C-6161 Rev -



Purge Valve Assembly Parts List

Item	Part Number	Description	Qty
1	000-169-090	Valve, 1/4" NPT Panel Mount - Full Port Ball	1
2	000-052-085	Elbow, 1/4" NPT Street	2
3	000-052-100	Insert, #44 (1/4" NPT x 1/4" Barb)	2
4	000-174-001	Washer, #10 Flat	2
5	000-174-014	Washer, #10 Lock	2
6	000-143-166	Screw, #10-24UNC x 0.38" Lg. Hex Head	2
7	000-052-090	Tee, 1/4" NPT Branch M-F-F	2
8	000-157-148	Switch, Pressure 125 PSI	1
9	000-180-004	Orifice, Set Screw 0.033"	1
10	000-052-423	Bushing, Modified Set Screw Orifice	1

Figure 5-11 **Vacuum Solenoid Valves Assembly**
C-6162 Rev -



Vacuum Solenoid Valves Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-924	Bracket, Vacuum Solenoid Valves Mounting - CTS 330	1
2	000-169-070	Valve, Primary Vac. Solenoid	2
3	000-106-014	Plug, Gearbox Vent	2
4	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	4
5	000-143-047	Screw, #6-32UNC x 7/8" Lg. Pan Head Phillips	4
6	000-052-155	Tee, 3/16" Plastic Vacuum Insert	3
7	000-169-156	Valve, Check - Diverter Control System	2
8	000-068-030	Hose, 5/32" I.D. Vacuum	4
9	000-068-030	Hose, 5/32" I.D. Vacuum	1
10	000-068-030	Hose, 5/32" I.D. Vacuum	1
11	000-068-030	Hose, 5/32" I.D. Vacuum	1
12	000-068-030	Hose, 5/32" I.D. Vacuum	1

Figure 5-12 **Engine Assembly - Left View**
D-6153 Rev -

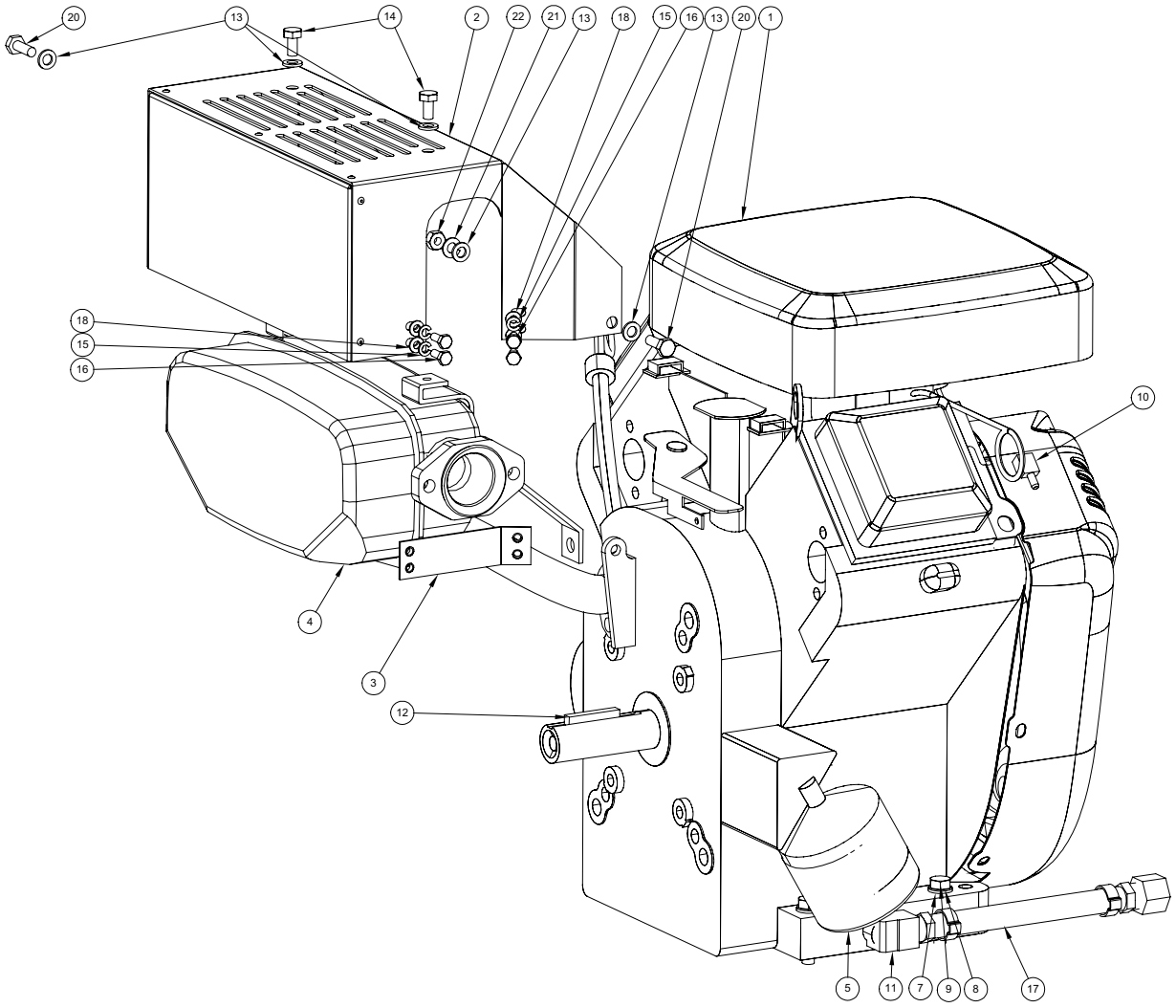
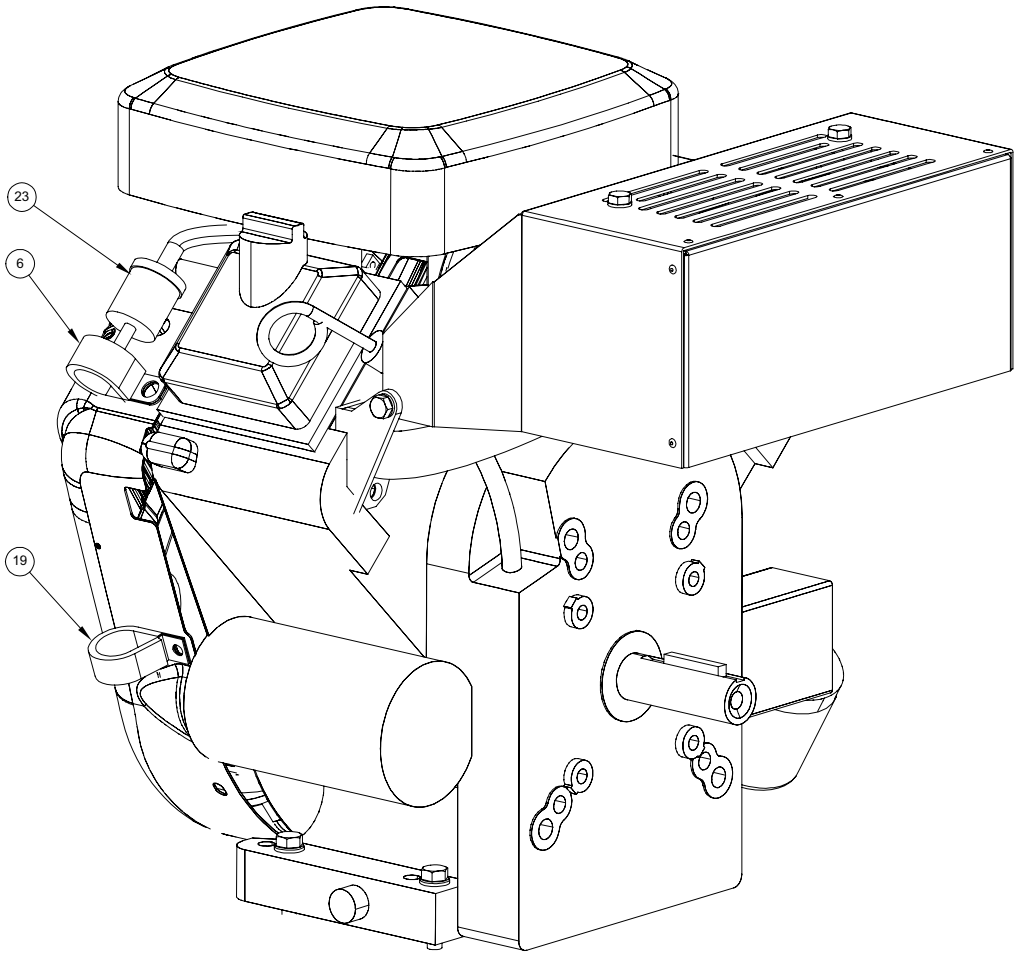


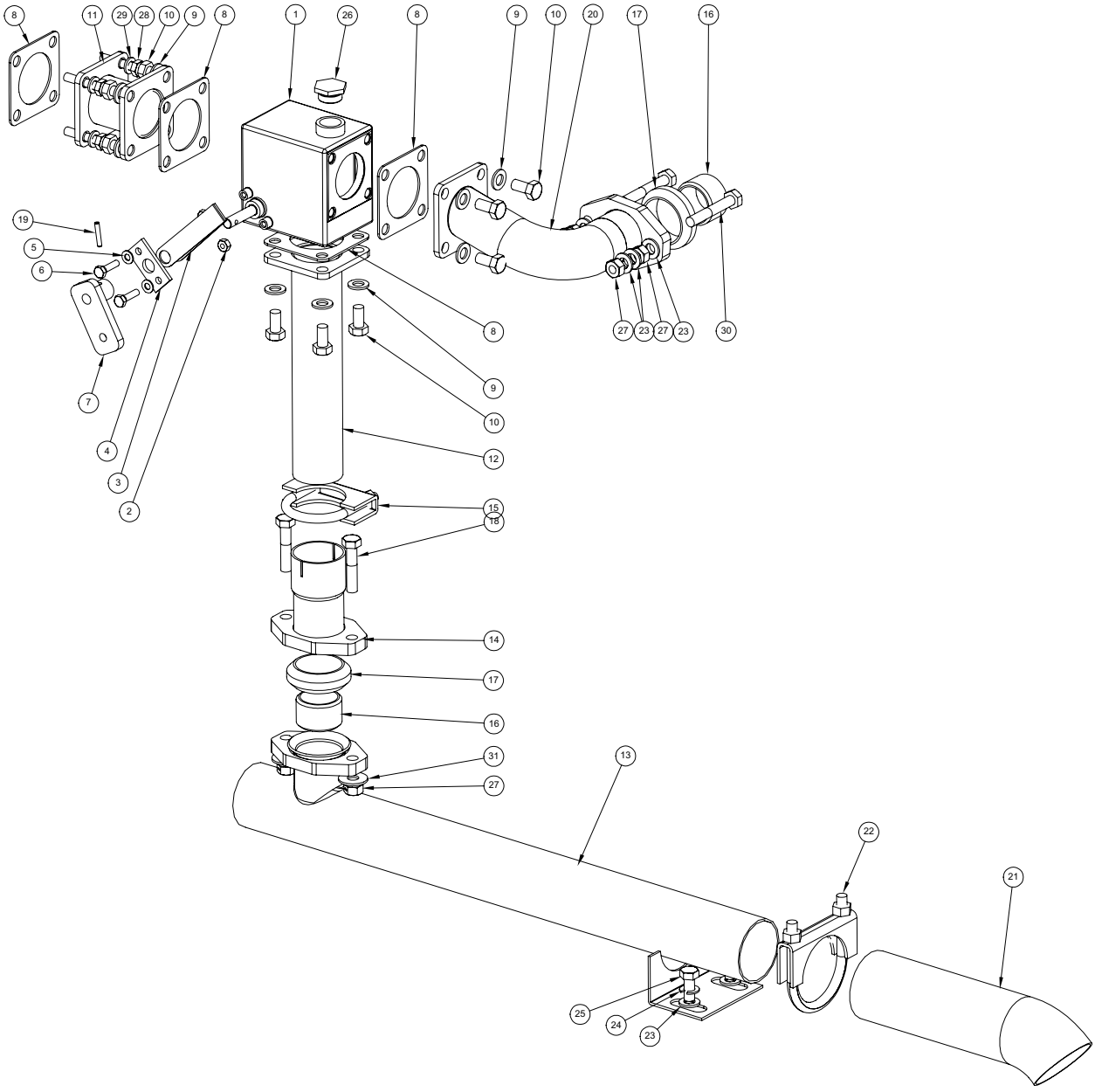
Figure 5-13 **Engine Assembly - Right View**
D-6153 Rev -



Engine Assembly Parts List

Item	Part Number	Description	Qty
1	000-047-008	Engine, B&S Vanguard 16 HP V-Twin	1
2	000-041-438	Cover, Muffler - Assemlby - CTS 330	1
3	000-015-921	Bracket, Muffler Cover Stiffener - CTS 360	1
4	000-093-099	Muffler, 16HP Vanguard - Modified - CTS 330	1
5	000-049-014	Filter, 16HP Oil - All B & S	1
6	000-033-117	Clamp, 1" Cushion Loop w/ 7/16" Mount Hole	1
7	000-174-049	Washer, 5/16" Flat	4
8	000-174-018	Washer, 5/16" Lock	4
9	000-143-015	Screw, 5/16"18UNC x 1.50" Lg. Hex Head	4
10	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	1
11	000-052-086	Elbow, 3/8" NPT Street	1
12	000-077-010	Key, 1/4" x 1-1/2" Lg. Class 2 Fit	1
13	000-174-003	Washer, 1/4" Flat	6
14	000-143-333	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head	2
15	000-174-014	Washer, #10 Lock	4
16	000-143-327	Screw, #10-32UNF x 0.50" Lg. Hex Head	4
17	000-068-219	Hose, Spitfire Pump Drain	1
18	000-174-001	Washer, #10 Flat	4
19	000-033-057	Clamp, 1" Cushion Loop	1
20	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	2
21	000-174-019	Washer, 1/4" Lock	2
22	000-094-010	Nut, 1/4"-20UNC Hex	2
23	- - -	Filter, B&S Fuel (Comes w/ Engine)	1

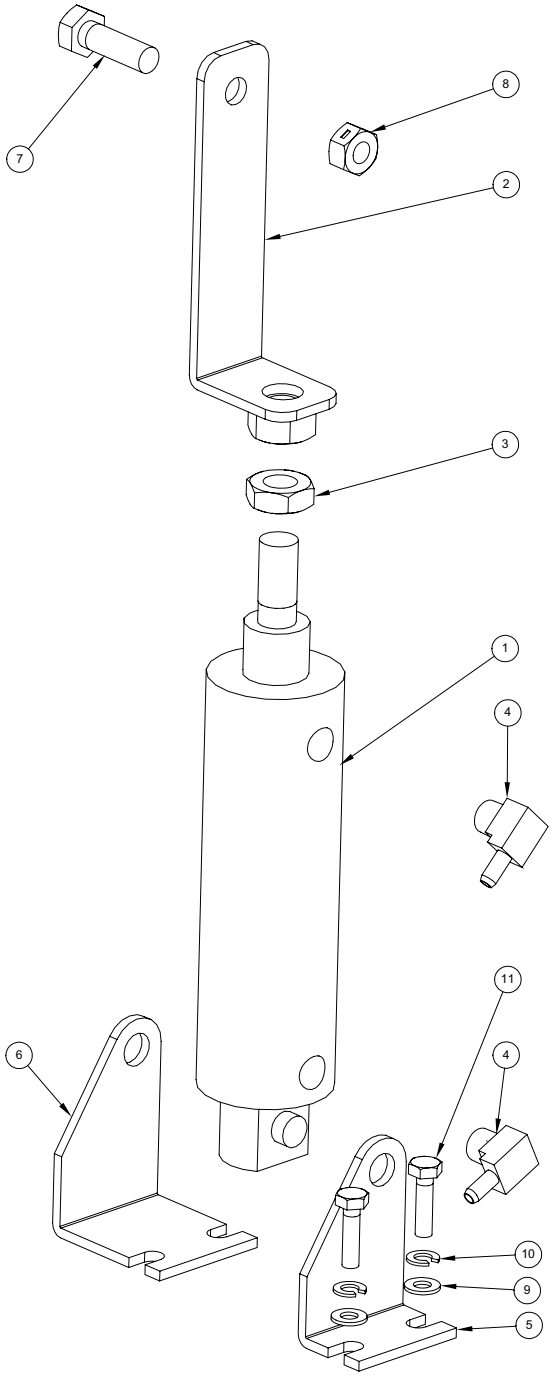
Figure 5-14 **Exhaust Assembly**
D-6155 Rev -



Exhaust Assembly Parts List

Item	Part Number	Description	Qty
1	000-169-045	Valve, Cast Exhaust Diverter	1
2	000-094-027	Nut, #10-24UNC Hex	2
3	000-155-030	Spring, Leaf	1
4	000-138-010	Retainer, Leaf Spring	1
5	000-174-001	Washer, #10 Flat	2
6	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	2
7	000-015-631	Bracket, Air Cylinder Actuation	1
8	000-057-146	Gasket, Four Hole Exhaust Diverter	4
9	000-174-069	Washer, 5/16" Inconel Belleville, Diverter Valve	12
10	000-143-338	Screw, 5/16"-18UNC x 0.63" Lg. Hex Head	12
11	000-125-209	Tube, Inlet To Heat Exchanger - CTS 330	1
12	000-125-210	Tube, Diverter Outlet - CTS 330	1
13	000-125-211	Tube, Heat Exchanger Outlet - Welded - CTS 360	1
14	000-001-116	Adapter, 1.50" F Slip To Flare - Boxxer 427	1
15	000-033-068	Clamp, 1-1/2" Muffler	1
16	000-125-128	Tube, 1-3/8" OD x 1/8" Wall x 7/8" Long	2
17	000-057-177	Gasket, Exhaust Donut 1.50"	2
18	000-143-501	Screw, 5/16"-18UNC x 1-1/2" Lg.	2
19	000-103-014	Pin, 1/8 x 3/4" Roll	1
20	000-125-208	Tube, Diverter Inlet - Welded - CTS 330	1
21	000-001-127	Adapter, Final Exhaust Turndown - CTS 330	1
22	000-033-024	Clamp, 2" Muffler	1
23	000-174-049	Washer, 5/16" Flat	8
24	000-174-018	Washer, 5/16" Lock	2
25	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	2
26	000-106-120	Plug, M18 x 1.5	1
27	000-094-081	Nut, 5/16"-18UNC Hex 2-Way Locking	6
28	000-143-003	Screw, 1/4"20UNC x 1.25" Lg. Hex Head	4
29	000-174-003	Washer, 1/4" Flat	4
30	000-143-316	Screw, 5/16"-18UNC x 2.00" Lg. Hex Head	2
31	000-174-004	Washer, 5/16" Flat	2

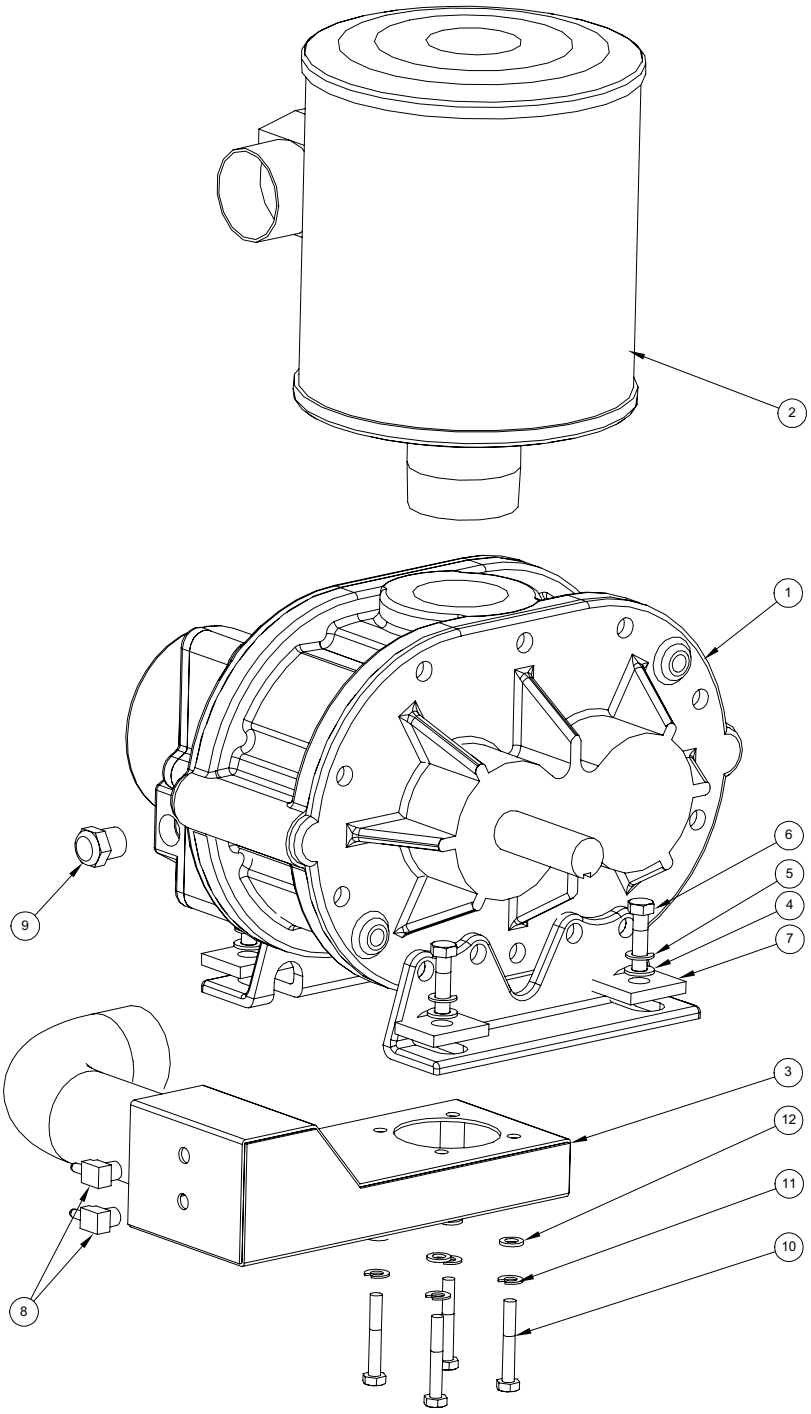
Figure 5-15 **Diverter Valve Actuator Assembly**
C-6154 Rev -



Diverter Valve Actuator Assembly Parts List

Item	Part Number	Description	Qty
1	000-169-169	Valve, Air Cylinder	1
2	000-015-922	Bracket, Air Cylinder Extension - CTS 330	1
3	000-094-092	Nut, 7/16"-20UNF Hex Jam	1
4	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	2
5	000-015-750	Bracket, Air Cylinder Mount - Inner	1
6	000-015-748	Bracket, Air Cylinder Mount - Outer	1
7	000-143-160	Screw, 5/16"-18UNC x 1.00" Lg. Hex Head Grd 8	1
8	000-094-081	Nut, 5/16"-18UNC Hex 2-Way Locking	1
9	000-174-001	Washer, #10 Flat	2
10	000-174-014	Washer, #10 Lock	2
11	000-143-132	Screw, #10-24UNC x 0.75" Lg. Hex Head	2

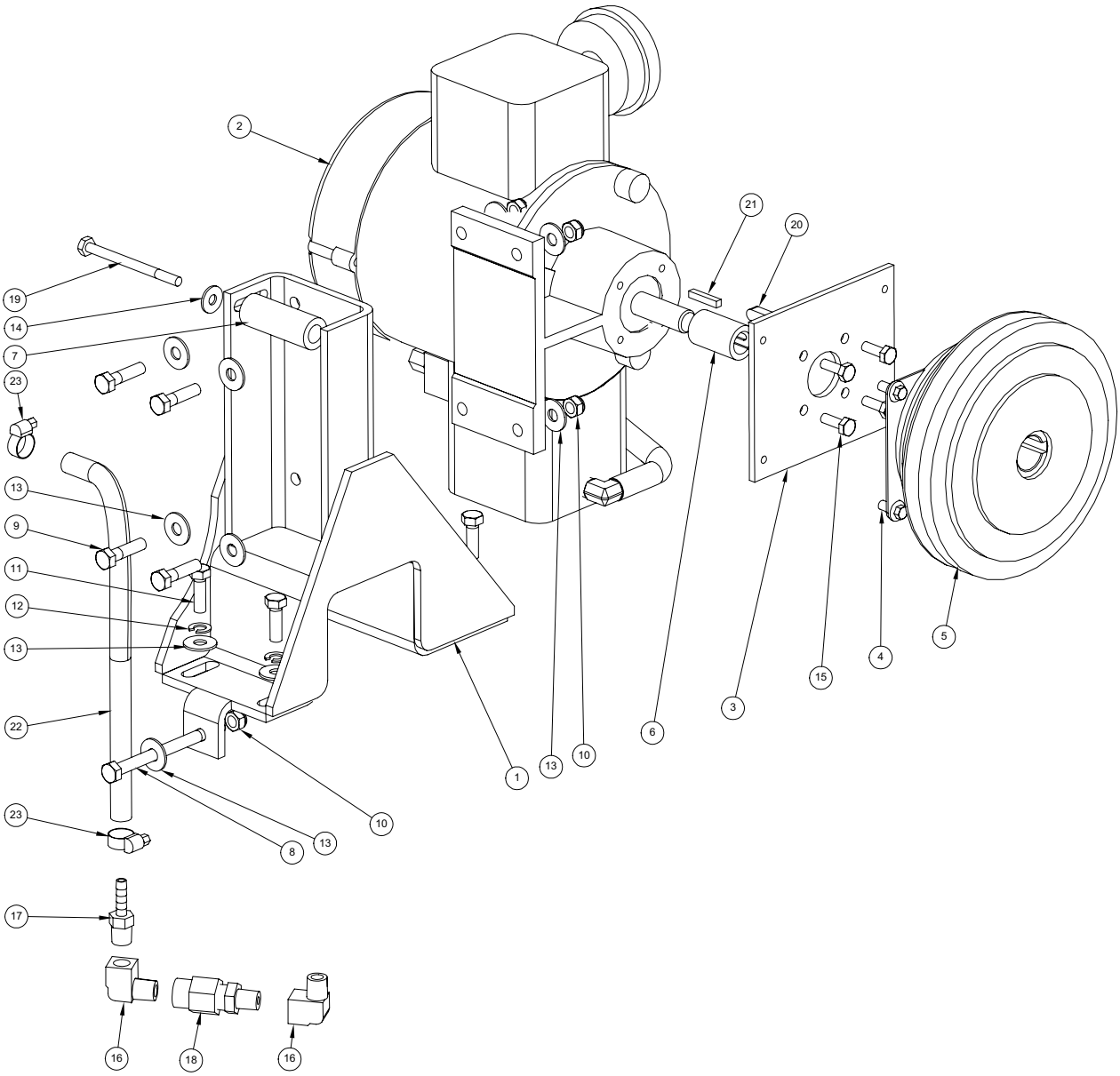
Figure 5-15 **Blower Assembly**
D-6156 Rev -



Blower Assembly Parts List

Item	Part Number	Description	Qty
1	000-111-133	Blower, 3003 Competitor Plus	1
2	000-093-101	Silencer, 2" Cowl - CTS 330	1
3	000-013-066	Box, Blower Outlet Collector - CTS 360	1
4	000-174-049	Washer, 5/16" Flat	4
5	000-174-018	Washer, 5/16" Lock	4
6	000-143-014	Screw, 5/16"-18UNC x 1.25" Lg. Hex Head	4
7	000-174-068	Washer, Blower Feet	4
8	000-052-106	Insert, 1/8" NPT x 5/32" Barb x 90°	2
9	000-027-112	Plug, Oil Sight Glass Tuthill Blower	1
10	000-143-005	Screw, 1/4"-20UNC x 1.75" Lg. Hex Head	4
11	000-174-019	Washer, 1/4" Lock	4
12	000-174-003	Washer, 1/4" Flat	4

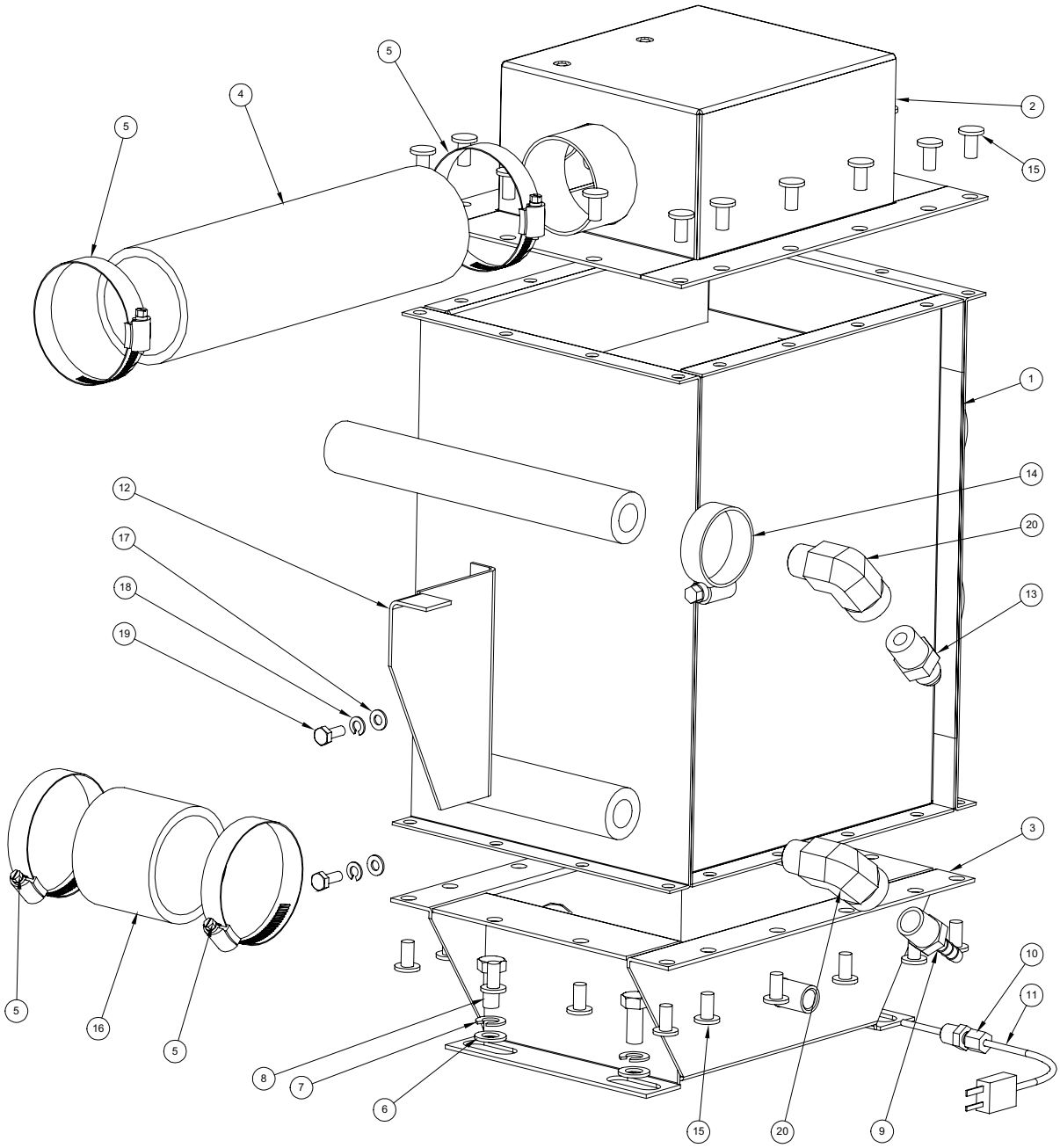
Figure 5-17 **Compressor Assembly**
D-6157 Rev -



Compressor Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-928	Bracket, Compressor Mounting - CTS 330	1
2	000-111-173	Compressor - Thomas	1
3	000-105-323	Plate, Clutch Mount - Compressor - CTS 330	1
4	000-143-141	Screw, 1/4"-20UNC x 1/2" Lg. Whiz Lock	4
5	000-036-008	Clutch, Electric Pump	1
6	000-154-150	Spacer, Air Compressor Clutch - CTS 330	1
7	000-154-149	Spacer, Belt Guard Stiffening - CTS 330	1
8	000-143-324	Screw, 5/16"-18UNC x 4" Lg. Hex Head Grd 5 Tap	1
9	000-143-014	Screw, 5/16"-18UNC x 1.25" Lg. Hex Head	4
10	000-094-038	Nut, 5/16"-18UNC Nylock	5
11	000-143-013	Screw, 5/16"-18UNC x 1.00" Lg. Grade 8	4
12	000-174-018	Washer, 5/16" Lock	4
13	000-174-004	Washer, 5/16" Flat	13
14	000-174-002	Washer, 1/4" Flat	1
15	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	4
16	000-052-085	Elbow, 1/4" NPT Street	2
17	000-052-100	Insert, #44 (1/4" NPT x 1/4" Barb)	1
18	- - -	Check Valve (Comes With Compressor)	1
19	000-143-372	Screw,1/4"20UNC x 3.25" Lg. Hex Head Grd 5	1
20	000-077-013	Key, Comet Clutch	1
21	- - -	Key, (Comes w/ Compressor)	1
22	000-068-131	Hose, 1/4" I.D. Hi Temp. - Bulk	1
23	000-033-003	Clamp, Size #4 Mini	2

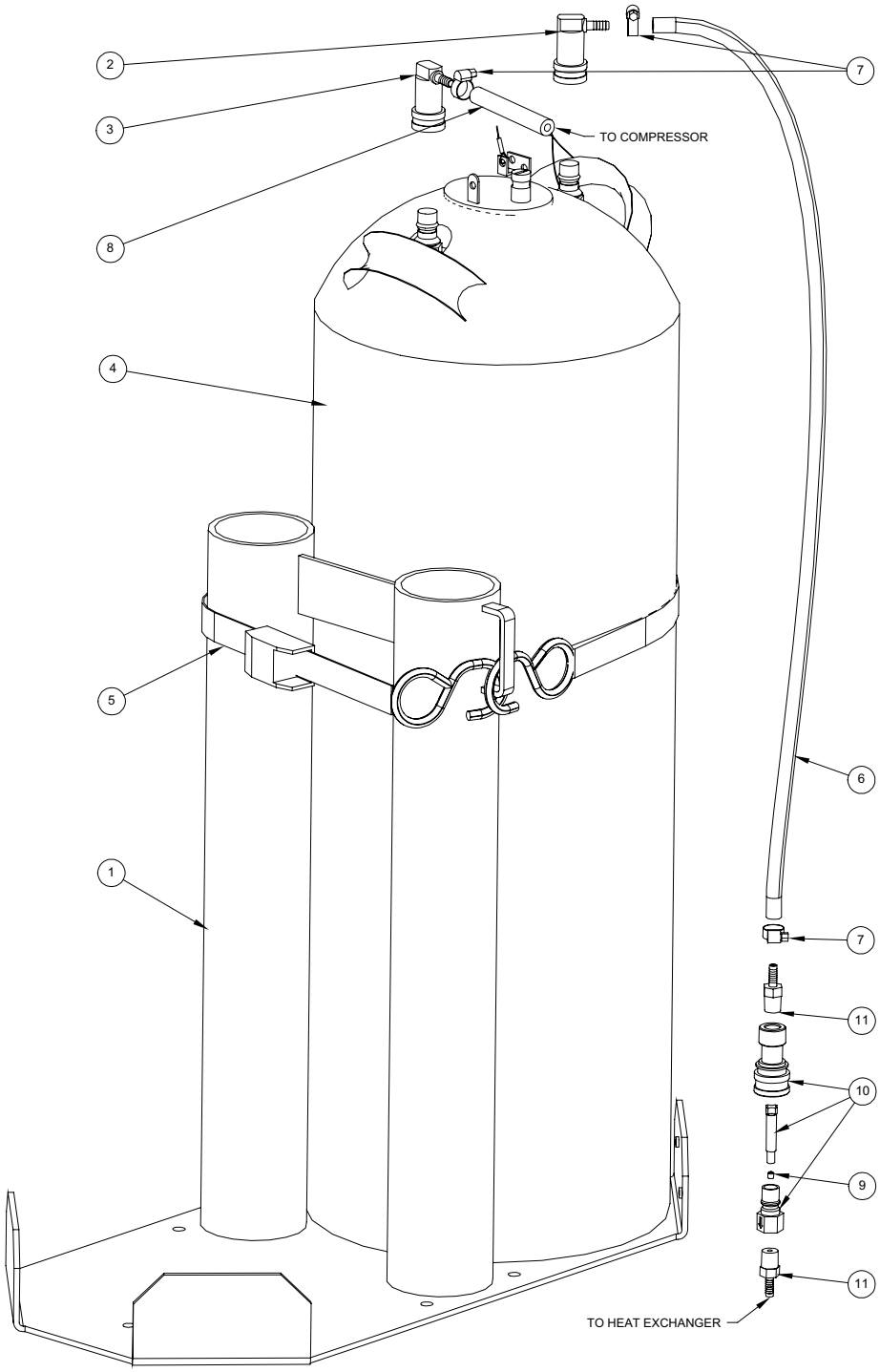
Figure 5-18 **Blower Heat Exchanger Assembly**
D-6159 Rev -



Blower Heat Exchanger Assembly Parts List

Item	Part Number	Description	Qty
1	000-038-071	Core, Blower Heat Exchanger s/s - CTS 330	1
2	000-013-064	Box, Inlet Plenum - Weldment - CTS 330	1
3	000-013-065	Box, Outlet Plenum - Weldment - CTS 360	1
4	000-068-728	Hose, 2" Silicone	1
5	000-033-010	Clamp, Size # 32 - Hose	4
6	000-174-049	Washer, 5/16" Flat	4
7	000-174-018	Washer, 5/16" Lock	4
8	000-143-012	Screw, 5/16"-18UNC x 0.75" Lg. Hex Head	4
9	000-052-749	Insert, #64 (3/8" NPT x 1/4" Barb)	1
10	000-052-744	Compression, 1/8" NPT x 1/8" Tube - Modified	1
11	000-149-054	Sensor, K Type Thermocouple 1/8" x 6" Lg.	1
12	000-015-923	Bracket, Blower Hx Manifold Support - CTS 330	1
13	000-052-507	Nipple, 3/8" NPT x 9/16"-18 37° JIC	1
14	000-033-020	Clamp, Size #16 Hose	1
15	000-140-021	Rivet, 1/4" Blind x 0.50" Lg.	32
16	000-068-728	Hose, 2" Silicone	1
17	000-174-001	Washer, #10 Flat	2
18	000-174-014	Washer, #10 Lock	2
19	000-143-126	Screw, #10-24UNC x 0.50" Lg. Hex Head	2
20	000-052-747	Elbow, 3/8" NPT Street	2

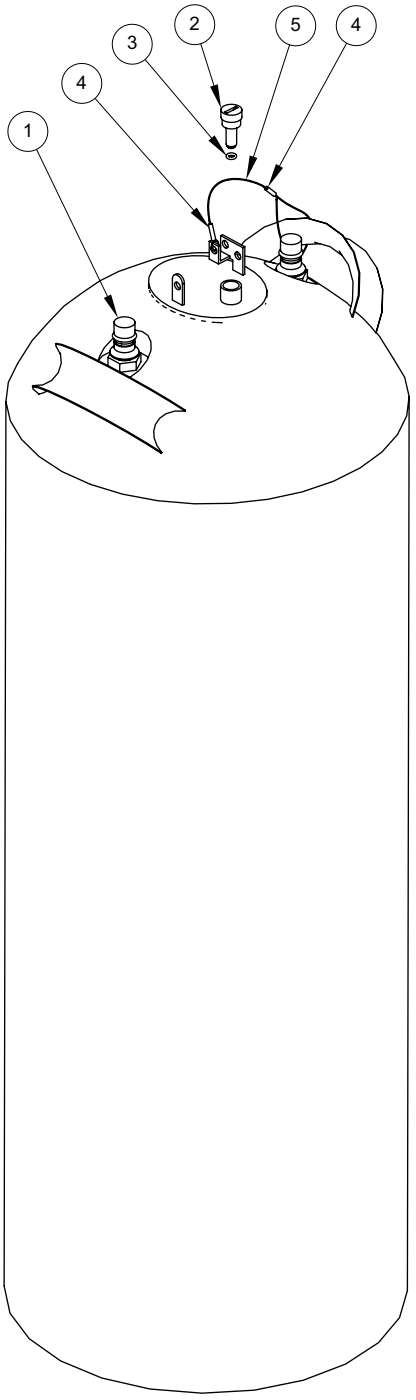
Figure 5-19 **15 Gallon Chemical Jug Assembly**
D-6163 Rev -



15 Gallon Chemical Jug Assembly Parts List

Item	Part Number	Description	Qty
1	000-015-869	Bracket, 15 Gallon Tank	1
2	000-052-697	Socket, In s/s 90º Barb	1
3	000-052-698	Socket, Out s/s 90º Barb	1
4	000-159-127	Tank, 15 Gallon Chemical - CTS 450 **(Fig 2-20)**	1
5	000-108-141	Tie Down Strap	1
6	000-068-015	Hose, 1/4" I.D. - Bulk	1
7	000-033-003	Clamp, Size #4 Mini	3
8	000-068-130	Hose, Ø1/4" Silcone	1
9	000-180-021	Orifice, Set Screw #10-32UNF x Ø0.052"	1
10	000-049-137	Filter, In-Line - Quick Connect	1
11	000-052-696	Insert, #44 (1/4" NPT x 1/4" Barb) s/s	2

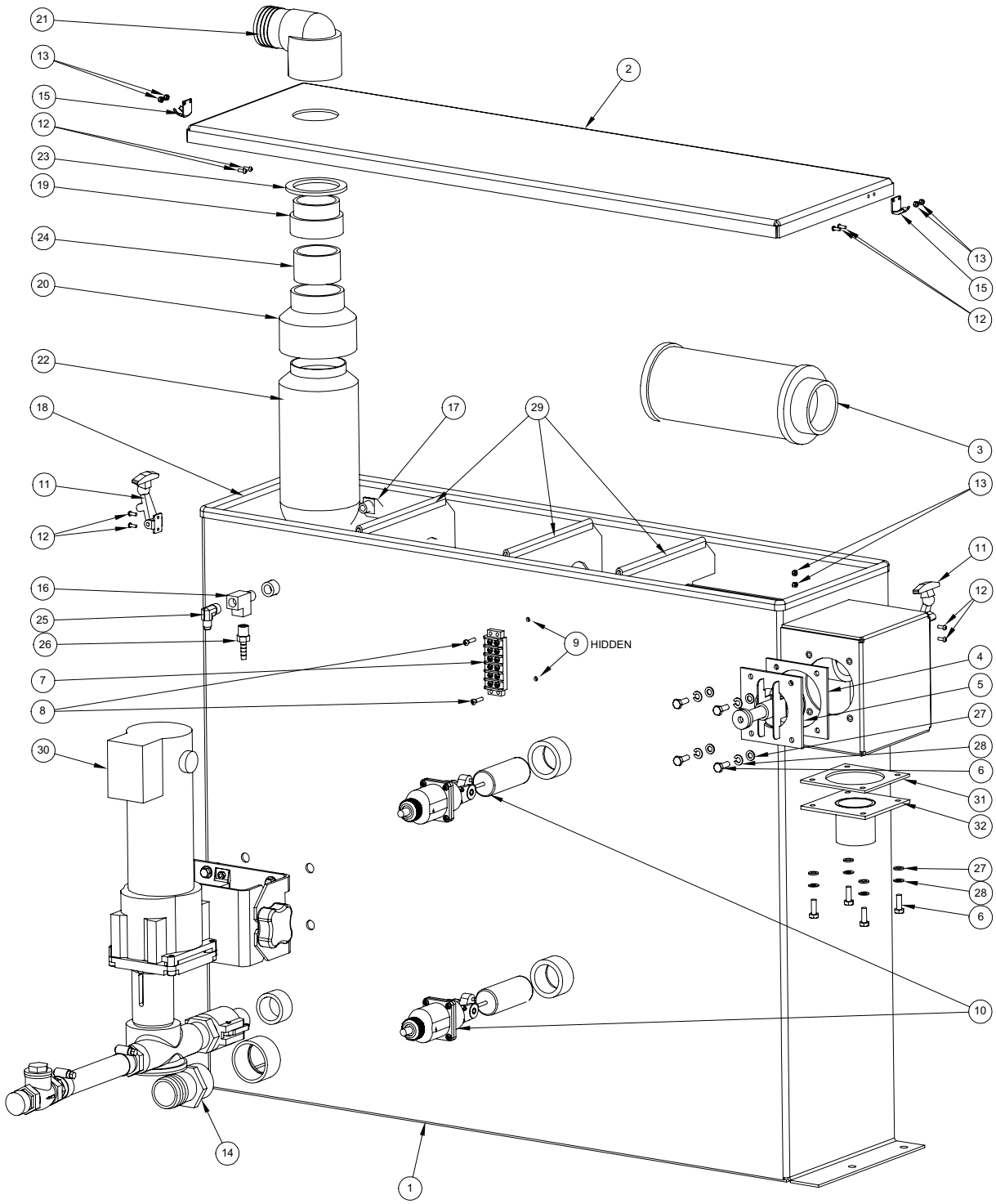
Figure 5-20 **15 Gallon Chemical Tank Assembly**
C-6109 Rev -



15 Gallon Chemical Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-126	Tank, 15 Gallon Chemical - CTS 450	1
2	000-106-055	Plug, 1/4 Ss Chemical Container - CTS 450	1
3	000-097-006	O-Ring, #8 Buna - New Rx Skid	1
4	000-033-032	Clamp, CDS Throttle Cable	2
5	000-025-008	Cable, 150 Lb Test	1

Figure 5-21 **Recovery Tank Assembly**
D-5530 Rev A



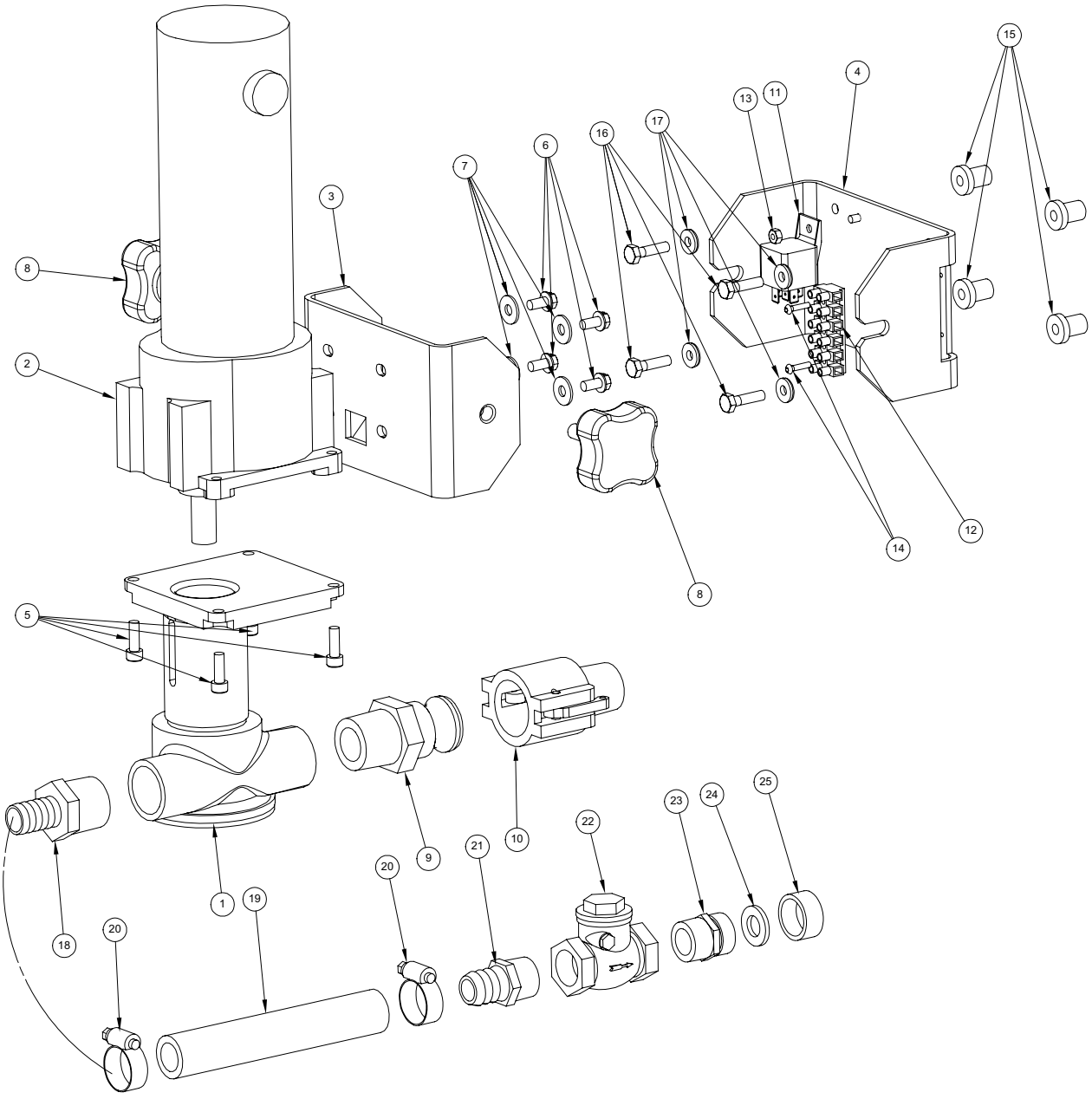
Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
1	000-159-112	Tank, Recovery - Weldment - CTS 330	1
2	000-041-409	Cover, Recovery Tank - Weldment - CTS 330	1
3	000-049-008	Filter, 2-1/2" Recovery Tank - CDS 4.6/Boxxer 421	1
4	000-057-178	Gasket, Vacuum Relief Plate	1
5	**Fig. 2-23**	Assembly, Vacuum Relief Valve	1
6	000-143-001	Screw, 1/4"-20UNC x 0.75" Lg. Hex Head	8
7	000-012-002	Block, 6 Post Terminal	1
8	000-143-051	Screw, #8-32UNC x 0.75" Lg. Binder Head Phillips	2
9	000-094-059	Nut, #8-32UNF Nylock	2
10	000-157-090	Float, Harwil	2
11	000-086-008	Latch, Bungie	2
12	000-143-165	Screw, #6-32UNC x 3/8" Lg. Pan Head	8
13	000-094-063	Nut, #6-32UNC Nylock	8
14	000-052-226	Insert,1-1/2" NPT x 1-1/2" Barb (Grey)	1
15	000-086-008	Latch, Bungie - Strike	2
16	000-052-090	Tee, 1/4" NPT Branch M-F-F	1
17	000-052-082	Elbow, 1/4" NPT Street x 45°	1
18	000-131-021	Trimlok, 5/8" x 1/8"	1
19	000-052-219	Adapter, 2" NPT x 2" F Slip	1
20	000-052-404	Adapter, 3" F Slip x 2" F Slip	1
21	000-052-222	Elbow, 2" Barb x 2" FPT	1
22	000-049-030	Filter Bag, 92+Truck Mount	1
23	000-057-015	Gasket, 1-1/2" Bulkhead Fitting	1
24	000-125-052	Tube, 2" Pvc x 1.50" Lg. Filter Bag Adapter Sleeve	1
25	000-052-532	Elbow, 1/4" SAE x 1/4" JIC x 90°	1
26	000-052-100	Insert, #44 (1/4" NPT x 1/4" Barb)	1
27	000-174-003	Washer, 1/4" Flat	8
28	000-174-019	Washer, 1/4" Lock	8
29	000-131-021	Trimlok, 5/8" x 1/8"	3
30	000-079-091	Kit, Dura-Flow APO - Production **(Fig. 2-22)**	1

Recovery Tank Assembly Parts List

Item	Part Number	Description	Qty
31	000-057-193	Gasket, Recovery Tank Outlet - Boxxer 427	1
32	000-001-129	Adapter, Recovery Tank Outlet - CTS 330	1

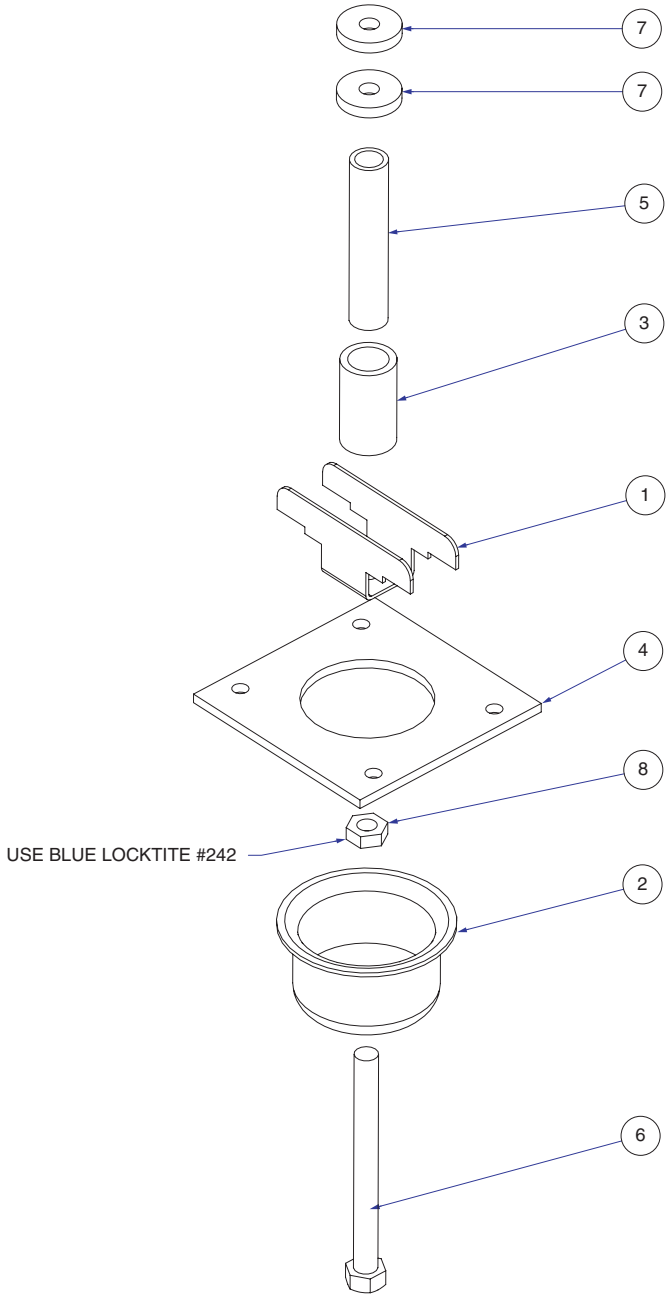
Figure 5-22 **Dura-Flow APO Assembly**
D-5654 Rev B



Dura-Flow APO 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	000-015-891	Bracket, APO Clamp	1
4	000-015-890	Bracket, Tank Mounted APO Support	1
5	000-143-566	Screw, 1/4-28UNF x 0.75" Lg. Socket Head	4
6	000-143-074	Screw, 1/4"-20UNC x 0.50" Lg. Hex Head Self-Tapping	4
7	000-174-002	Washer, 1/4" Flat	4
8	000-061-131	Knob, Handle - RDM	2
9	000-052-723	Fitting, 1" NPT Cam Lock - Banjo 100F	1
10	000-052-724	Fitting, 1" NPT Cam Lock - Banjo 100B	1
11	000-157-022	Switch, Relay	1
12	000-012-011	Block, 6 Post	1
13	000-094-027	Nut, #10-24UNC Hex	1
14	000-143-532	Screw,#6-32UNC x 5/8" Lg. Socket Head	2
15	000-094-113	Nut, 1/4"-20UNC Neoprene Wellnut	4
16	000-143-002	Screw, 1/4"-20UNC x 1.00" Lg. Hex Head	4
17	000-174-060	Washer, 1/4" Flat Rubber Backed	4
18	000-052-654	Insert, #1612 (1" NPT x 3/4" Barb)	1
19	000-068-069	Hose, 3/4" I.D. Weatherhead - Blue - Bulk.	1
20	000-033-026	Clamp, Size #10 Hose	2
21	000-052-338	Insert, #1212 (3/4" NPT x 3/4" Barb)	1
22	000-169-009	Valve, 3/4" FPT Swing Check	1
23	000-052-281	Nipple, 3/4" NPT x 3/4" Male Garden Hose	1
24	000-057-055	Gasket, Garden Hose	1
25	000-027-014	Cap, Garden Hose	1

Figure 5-23 **Vacuum Relief Valve Assembly**
C-4237 Rev B



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 Releif Valve	1
3	000-125-111	Pipe, Vacuum Relief Spring Guide	1
4	000-105-067	Plate, Vacuum Relief Valve Mounting	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

CTS 330 Hose Assemblies

CTS Hose Assemblies

This page intentionally left blank.

Compressor System

The compressor pump in this machine is also referred to as an oil-less reciprocating piston pump. The performance and life of this unit is greatly dependent on the care and proper maintenance it receives.

The compressor is belt and clutch driven. The clutch is controlled by the pressure switch located on the front panel. The compressor operates as follows:

- With the cleaning mode switch in “Cleaning Mode” and the pressure in the solution tank is below the set point, the pressure switch will activate the clutch. This allows the compressor to turn and pressurize the system.
- With the cleaning mode switch in “Cleaning Mode” and the pressure in the solution tank is above the set point, the pressure switch will deactivate the clutch. This will turn off the compressor.
- With the cleaning mode switch in “Extraction Mode” the clutch will turn off regardless of the pressure in the solution tank.

⚠ CAUTION

The compressor should be well ventilated. Objects place or installed adjacent to the pump will significantly reduce the life of the pump

Filtration: Periodically check the inlet air filter. To clean filter, disassemble filter housing and use compressed air to blow dirt particles from the filter element. Replace filter when element can no longer be cleaned with this method

⚠ CAUTION

Do not operate without an inlet air filter. Excessive dirt, foreign particles, moisture, or liquids entering the pump can contribute to poor performance and/or premature failure. Dirty filters reduce pump performance by restricting air flow.

Lubrication: The CTS 330 compressor is a dry, oil-less compressor. The product uses sealed grease packed bearings and does not require additional lubrication

⚠ CAUTION

DO NOT LUBRICATE. Adding grease products to this unit will reduce performance and can potentially damage the product.

This page intentionally left blank.

Vacuum System

The vacuum pump in this machine is commonly referred to as a 'positive displacement lobe' type blower. 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 inlet inside the vacuum recovery tank. This stainless steel screen is 'finger' tight and **should be removed for cleaning weekly.**

⚠ CAUTION

Caution should be used when machine is being run for test purposes and the vacuum inlet on top of the machine is open.

To protect the vacuum blower from overloading and damaging itself, there is a vacuum relief system installed on the vacuum tank. When the vacuum tank inlet is completely sealed off, a maximum of 12 HG will be attained.

At the end of each day, an oil based lubricant should be sprayed into the blower lubrication port before shutting down the machine. Lubricate the vacuum blower *daily* to prevent rust deposits and moisture that will decrease the life of the vacuum blower.

⚠ CAUTION

Foam passing through the blower could lead to serious problems.
It is important to keep the vacuum tank foam free.

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

⚠ CAUTION

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

VACUUM TANK FILTER BAGS

HydraMaster filter bags are designed to trap lint, sand and dirt that would normally collect at the bottom of your vacuum tank. The use of these bags, if emptied at the end of each job, will eliminate the build-up of much of the debris in the tank. The drawstring top of these bags is designed to be slipped around the incoming dirty water inlet in the vacuum tank.

Vacuum System Troubleshooting

1.0. Weak vacuum at wand. Gauge reads normal (10" to 12" with hoses & wand attached)

1.1. **Clogged hoses or wand tube**. Disconnect hoses and check carefully 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 12" hg

2.1. **There is an air leak somewhere in the vacuum system**. Check vacuum relief valve for proper adjustment. Carefully check all vacuum hoses for a cut or break. Check recovery tank lid gasket. Make sure recovery tank drain valve is fully closed.

2.2. **Vacuum blower is turning too slowly**. Check engine RPM. Adjust as necessary to 3000RPM.

2.3. **The vacuum gauge is defective**. Test gauge and replace as necessary.

3.0. Vacuum gauge reads too high with no hoses attached

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

3.2. **Hose from vacuum blower to recovery tank 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 vacuum blower low on oil can cause severe mechanical damage. If this situation occurs, it should be inspected by a qualified service technician.

4.2. **Vacuum blower has internal damage**. 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 on 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 inlet 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 qualified service technician.*

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

Miscellaneous Troubleshooting

1.0. Water from exhaust

1.1. **The recovery tank has been filled with foam or overfilled with water**. Remove recovery tank lid and inspect. If full, drain tank then inspect high-level shutoff switch for proper operation. Clean or replace switch as necessary.

1.1.1. If foam is observed in recovery tank, use defoamer on carpet being cleaned.

1.2. ***Condensation.*** *This will be more pronounced in cool weather and humid climates. Observe how long this condition persists after starting machine. If it is only until the machine* warms up, it is normal.

1.3**.** **A heat exchanger is leaking**. Change the diverter mode switch back and forth between divert and heat exchange mode. Observe which condition causes water to be expelled from exhaust.

1.3.1. If water is expelled while switch is in heat exchange mode, the engine exhaust after burner heat exchanger is leaking internally. Remove and test. Replace as necessary.

1.3.2. If water is expelled while switch is in divert mode, the blower exhaust heat exchanger is leaking. Remove and test. Replace as necessary.

Electrical System

The CTS 330 electrical system, in keeping with the entire machine concept, has been kept to a minimum so as to keep any necessary troubleshooting as easy as possible.

The entire electrical system operates on 12 volts DC which is provided by a battery. Battery levels are sustained by a 16 amp alternator inside the engine.

⚠ CAUTION

When a new battery is installed, check that it is properly charged before installation or damage to the charging system may occur.

The orange wire going from the engine starter solenoid to terminal #5 on the ignition switch is a fusible link and provides protection to the electrical system in case of failure.

Ignition Switch:

Table 8-1

Terminal No.	Wire Color	Function
1	Orange	To Solenoid (Battery Post)
2	White	To Main Fuse
3	Black	Engine Kill Lug
4	Yellow	To Solenoid (Start Position)
5	Brown	To Regulator Ground
6	Red	To Regulator / Rectifier

Table 8-2

Switch Position	Continuity
1. Off	1 + 3 + 6
2. Run	2 + 5 + 6
3. Start	2 + 4 + 5

This page intentionally left blank.

Figure 8-1 Wiring Diagram

D-6166 Sht 2, Rev -

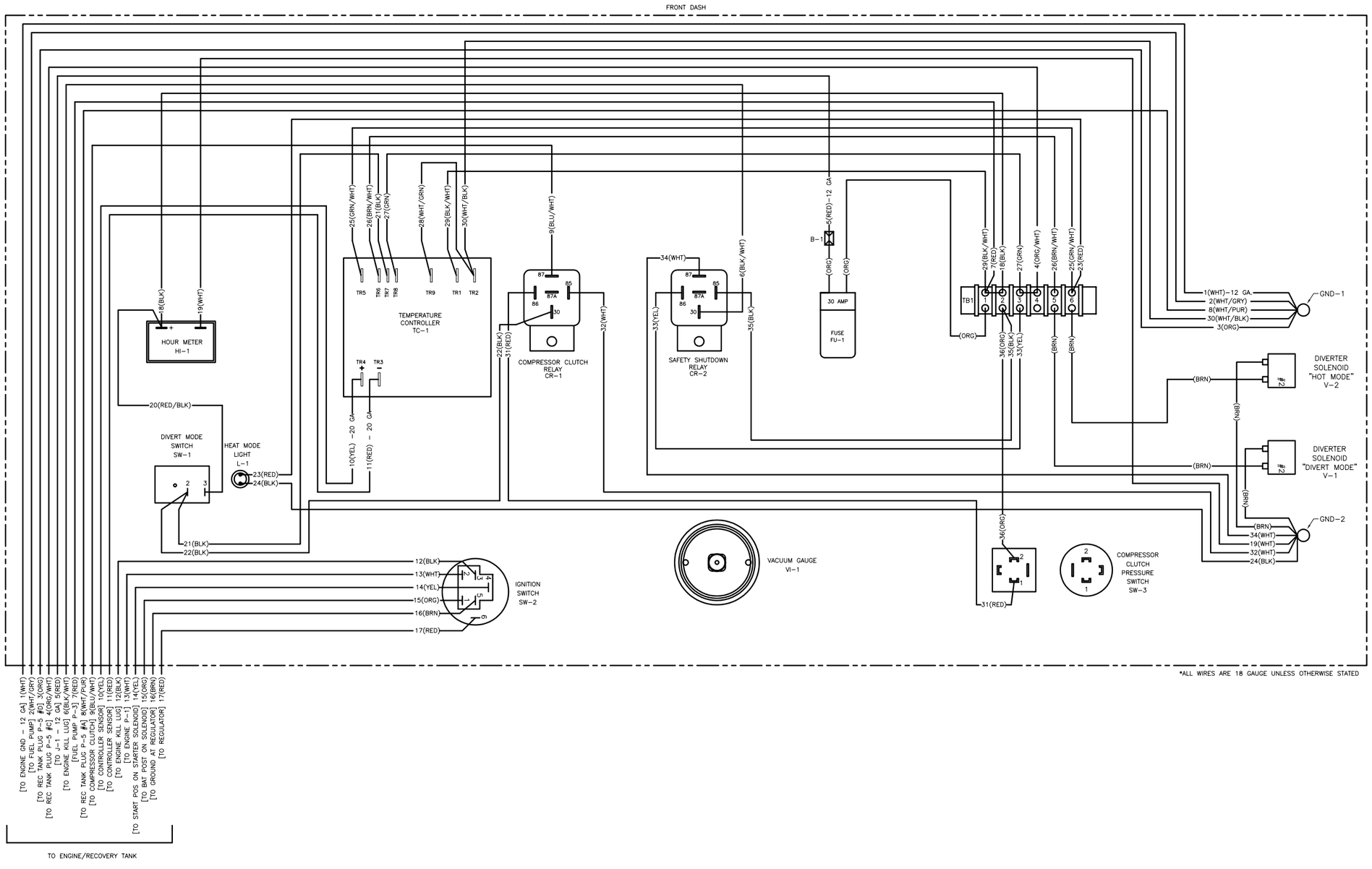


Figure 8-2 Wiring Diagram

D-6166 Sht 3, Rev -

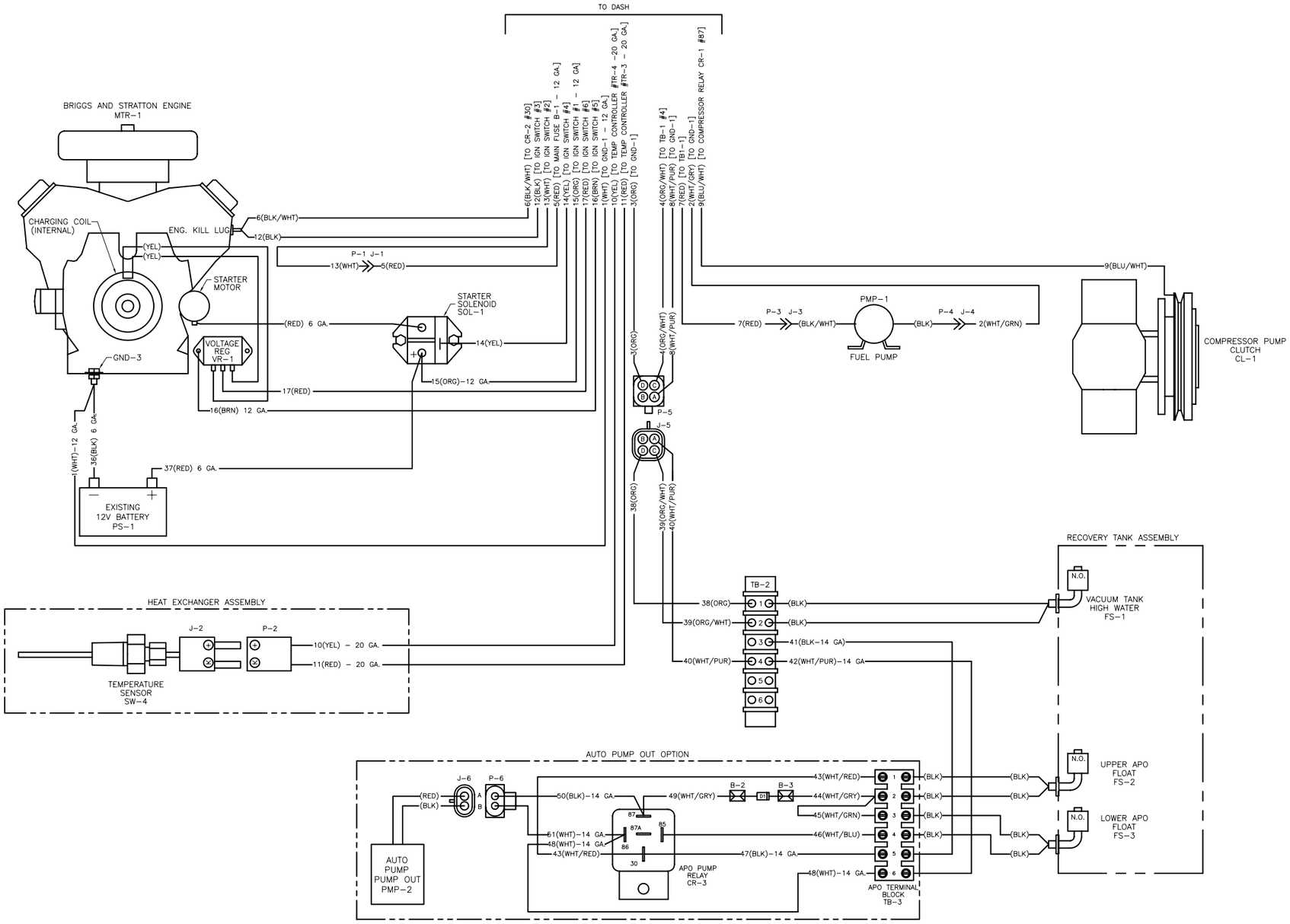
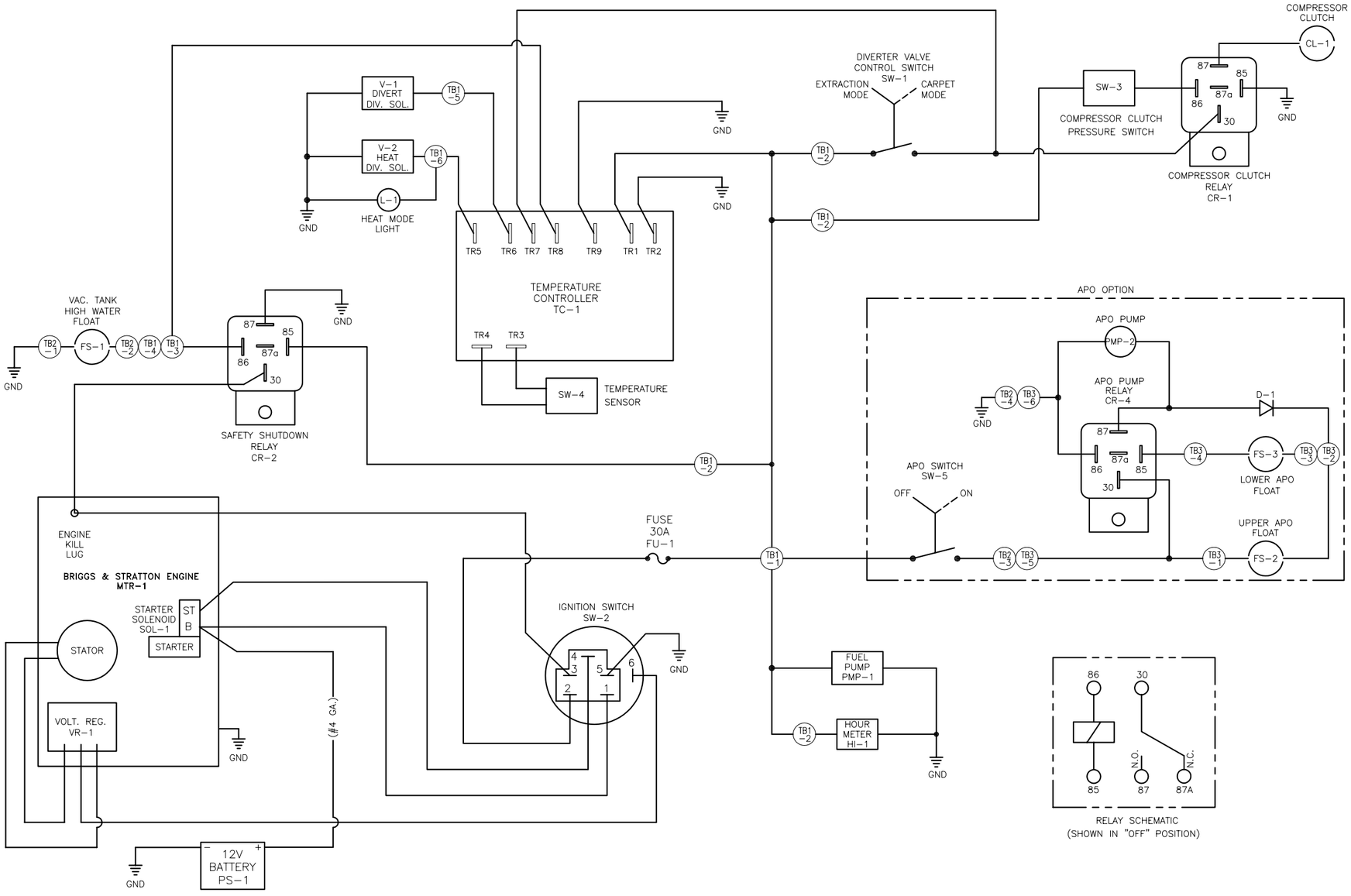


Figure 8-3 Wiring Schematic

D-6167 Rev -



Water and Chemical System

Chemical Flow Operation

The engine, vacuum pump, air compressor, drive system, and heat exchanger are the primary components of the cleaning system. The objective of this system is to move cleaning solution from the solution tank to the surface in need of cleaning, and eventually back to the recovery tank. The first part of this process is to move the cleaning solution out of the solution tanks. This is accomplished by pressurizing the solution tanks with the air compressor. The compressed air pushes the solution out of the tanks and through hoses to the orifice.

The orifice regulates the flow of the cleaning solution. The solution then flows through the heat exchange system into the outlet manifold. The outlet manifold contains a solution valve, pop off valve, and solution outlet. If the wand trigger is in use and the solution is at the desired temperature, the chemical solution will flow through the solution outlet. The solution valve and the pop off valve send the solution to the recovery tank.

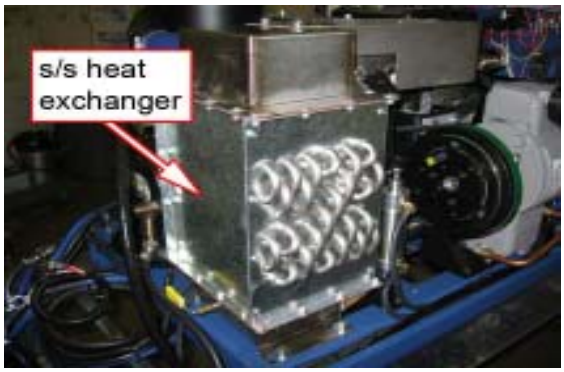


Figure 9-1

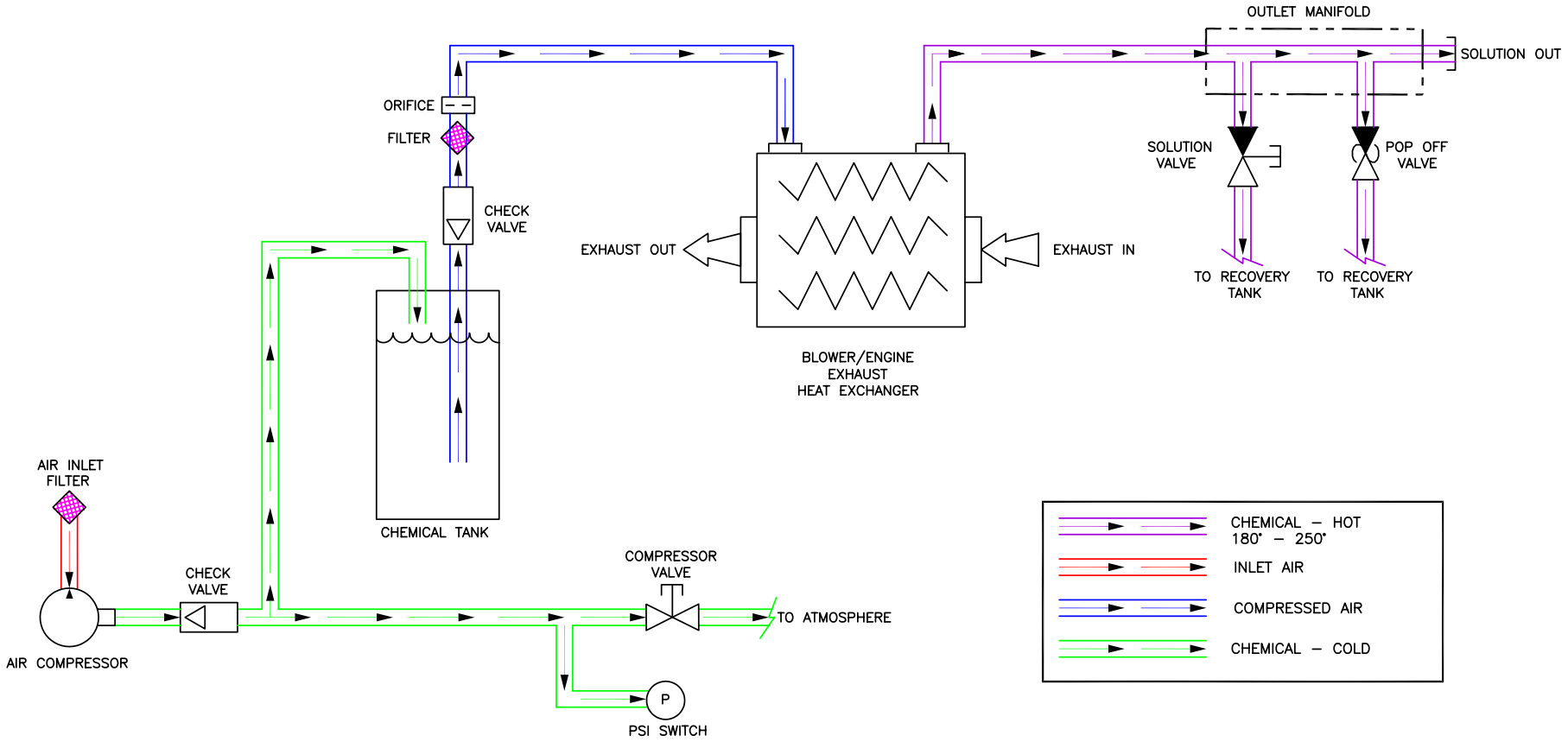
The heat exchange system (**Figure 5**) elevates the cleaning solution to the desired temperature. This system is comprised of two main components: The components are the engine/blower exhaust heat exchanger and the diverter valve system. The engine/blower exhaust heat exchanger is a cross-flow heat exchanger; solution flows through the stainless steel tubes which flows the mixed exhaust along the outside.

The heating process begins when the mixed exhaust flows through the heat exchanger. The cleaning solution is heated by the mixed exhaust as it flows through the coils of the heat exchanger. Once the cleaning solution has passed through the heat exchanger the flow is directed to the outlet manifold then to the cleaning tool.

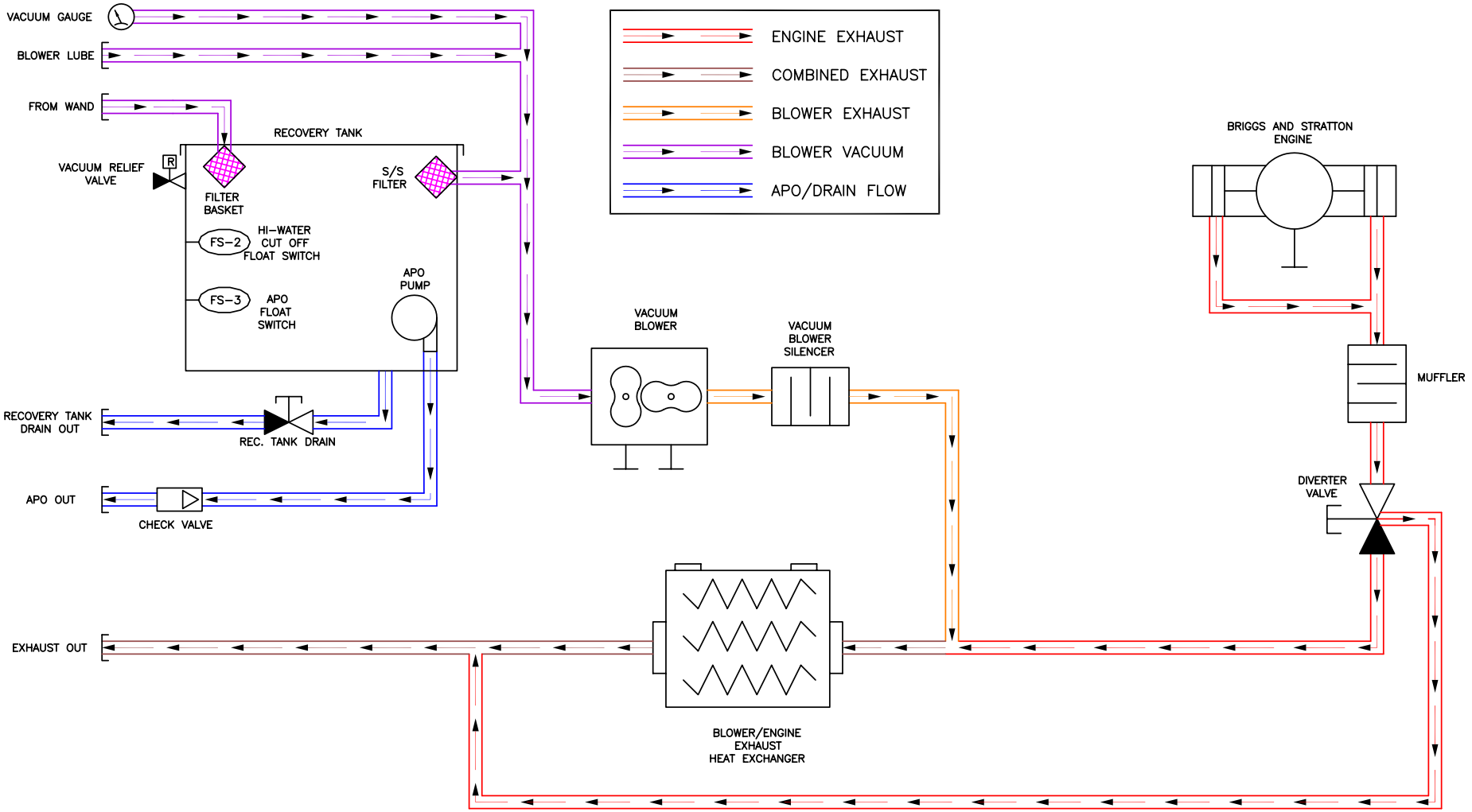
The **compressor valve**'s purpose is to manually relieve the system of compressed air. This is done in situations such as removing the lids on the solution tanks.

The **solution valve**'s purpose is to relieve the system of excessive pressure on the solution side. This is done in situations such as "Flood Damage Mode" or in a case of the machine running for an extended period of time with no solution hoses hooked up. The pressure build up in the heat exchangers and hoses can be too high for the solution hose to be hooked up. By turning this valve to prime, it will relieve the pressure and allow the solution hose to be connected. The valve can also be used for priming the solution.

Figure 9-2 **Solution Flow Diagram**
D-6168 Rev -



This page intentionally left blank.


VACUUM GAUGE
BLOWER LUBE
FROM WAND
RECOVERY TANK
VACUUM RELIEF VALVE
R
FILTER BASKET
S/S FILTER
FS–2
HI–WATER CUT OFF FLOAT SWITCH
FS–3
APO FLOAT SWITCH
APO PUMP
RECOVERY TANK DRAIN OUT
REC. TANK DRAIN
APO OUT
CHECK VALVE
VACUUM BLOWER
VACUUM BLOWER SILENCER
ENGINE EXHAUST
COMBINED EXHAUST
BLOWER EXHAUST
BLOWER VACUUM
APO/DRAIN FLOW
BRIGGS AND STRATTON ENGINE
MUFFLER
DIVERTER VALVE
EXHAUST OUT
BLOWER/ENGINE EXHAUST HEAT EXCHANGER

This page intentionally left blank.

Engine Troubleshooting

1.0. Will not turn over

1.1. **There is a loose or corroded battery terminal**. Clean and tighten the battery terminal connections.

1.2. **The battery is dead**. Recharge or replace the battery. Test the charging system. Repair if necessary.

⚠ WARNING

Do not attempt to jump-start this machine from a running vehicle. The amperage output from an automobile will damage the charging system of the truckmount.

1.3. **The 30 amp main power fuse in the electrical panel has blown**. Inspect the wiring thoroughly to locate shorted or damaged wires.

1.4. **The vacuum blower has seized**. Attempt to turn the engine by hand. If it will not turn, refer to Vacuum Troubleshooting in Section 6-3.

1.5. **The ignition switch is defective**. Test to see if there is 12 volts to the switch. If there is, but there is not 12 volts going from the switch, replace the switch.

1.6. **There is a problem with the starter solenoid**. If there is 12 volts at the battery connection and at the key switch connection with the key in the start position but there is not 12 volts on the starter connection of the solenoid, replace the solenoid.

1.7. **The starter motor is defective**. Check to see if the engine can be turned over by hand. If it can and if there is 12 volts from the starter solenoid to the starter, replace the starter.

1.8. **There is a mechanical problem with the engine**. If the engine can be turned over by hand and the vacuum blower is not locked, refer the engine to a qualified service technician to determine the cause of the problem.

2.0. Turns over but will not start. There *is no* spark

Note: To check for spark, use the following procedure. Remove a spark plug from the engine. Attach the lead wire back onto the plug. Ground the threaded part of the spark plug to an unpainted engine surface. While holding the plug and wire assembly by the insulated wire, crank the engine over by turning the ignition switch to the "start" position. You should observe a blue spark between the two electrodes of the spark plug.

2.1. **Recovery tank is full.** Empty the tank.

2.2. **Recovery tank float is defective**. Disconnect float. If engine starts, replace the float.

2.3. Note: It is important to use only Briggs oil filters. Even though an after-market filter may fit, the internal by-pass system may not be compatible with the Briggs engine resulting in low oil pressure.

2.4. **The high temperature switch has shut the engine down**. Observe the temperature gauge. If it is above the normal operating range, allow the machine to cool down. If it will still not start, disconnect the high temp switch. If the machine then starts, replace the switch.

2.4.1. If the machine starts after it has cooled down, refer to the Heating System section, 1.0.

2.5. **The spark plugs are faulty**. Remove and inspect. Replace as necessary.

2.6. **The engine ignition system is malfunctioning**. Refer to a qualified engine service technician for inspection.

3.0. Turns over but will not start. There *is* spark.

3.1**.** **Fuel is not reaching the carburetor inlet**. Check the fuel pump. If the pump is working, inspect the fuel lines between the fuel source and the carburetor. Repair or replace any faulty parts as necessary.

3.1.1. If the pump *is not* working, check for 12 volts and a ground at the pump.

3.1.2. If 12 volts *is not* present at the pump, check the wiring to the pump, including the fuse. Repair or replace as necessary. Note: If the fuse has blown, carefully inspect the wiring for a shorted or damaged wire. Repair immediately.

3.1.3. If 12 volts *is* present at the pump and the ground is good, replace the pump.

3.2**.** **The engine is flooded**. Wait for a few minutes and attempt to start with the choke open.
Note: *If the engine has been flooded, it may be necessary to remove and clean the spark plugs.*

3.3. **The spark plugs are dirty or worn**. Inspect and replace as necessary.

3.4. **There is a mechanical problem with the engine**. Have engine inspected by a qualified engine service technician.

4.0. Will not come up to normal operating rpm

4.1. **Throttle linkage is out of adjustment**. Inspect for broken or loose linkage. Repair or replace as necessary and adjust to proper rpm. Note: It is important to use an accurate tachometer to adjust engine speed to 3400 rpm (no load) while it is under a vacuum load of between 10"hg and 12"hg. Too high or too low will cause severe damage to machine components.

4.2. **There is excessive load on the engine due to the blower-to-recovery tank hose becoming delaminated.** Remove and inspect the inside of the hose. Replace as necessary.

4.3. **There is excessive back-pressure on the engine or blower exhaust.** Check for clogged blower heat exchanger.

5.0. Runs rough at medium or high speed

5.1. **One or both spark plugs are defective.** Remove and inspect spark plugs. Replace as necessary.

5.2. **A spark plug wire is loose at the spark plug or has been damaged**. Inspect wire. Replace wire and coil as necessary.

5.3. **Low compression on one or both cylinders**. Check compression. If low, check valve adjustment. If incorrect, adjust to proper specs. This operation should be performed by a qualified service technician.

5.3.1. If adjustment is okay, there is a possibility of burned valves, burned head gasket or worn cylinders. Refer to qualified engine service technician.

5.4. **Poor spark on one or both cylinders**. Refer to qualified engine service technician.

5.5. **Inadequate fuel supply to the carburetor**. Test the fuel volume at the carburetor by removing the fuel line from the carburetor inlet and placing the line in a metal container with a minimum of 16 oz capacity. Turn on the ignition switch to operate the fuel pump. The fuel flow volume should be 12 oz / minute. Check for clogged filter or obstructed fuel line. Also check to make sure the fuel pump is mounted vertically and is close to the fuel source. Repair as necessary.

6.0. Runs rich (Black smoke).

6.1. **Dirty air filter**. Inspect and replace as necessary.

6.2. **Choke is partially closed.** Inspect and adjust or repair as necessary.

6.3. **Excessive fuel to carburetor**. Insure that fuel pump is proper PSI rating. A fuel pump with a psi rating in excess of that of the pump supplied with the machine could overpower the inlet valve in the carburetor, causing excessive fuel to be supplied to the carburetor.

7.0. Engine overheats

7.1. **Poor ventilation in vehicle**. All cargo area doors must be open for proper ventilation. Roof vents are strongly recommended for machines that are operated in hot climates. Any item that might restrict air flow to the machine such as other equipment or a solid divider should be moved or modified to permit proper air flow.

7.2. **Low engine oil level**. Check oil level and replenish as necessary.

7.3. **Engine rpm too high**. Check RPM with an accurate tachometer. Adjust as necessary to 3400 rpm (no load).

7.4. **Restricted engine or blower exhaust**. Disassemble exhaust components to locate restriction. Repair as necessary.

Warranty Information

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

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

Solution System:
- Use of improper chemical
- Operating machine without proper solution filter screen.
- Failure to protect against freezing.

Vacuum and Solution Hose:
- 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.

Water Heating System:
- Failure to protect against freezing.

Limited Warranty Plan

HydraMaster warrants all 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. If repairs or replacements are made by the Purchaser without HydraMaster written consent, HydraMaster 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. Warranties on equipment purchased or used outside of the United States may not carry the same warranty, as per the policy of the individual component manufacturers.

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 replacing the defective part or parts. To qualify for warranty coverage, defective parts must be returned to HydraMaster within 30 days. No warranty liability whatsoever shall attach to HydraMaster unless and until HydraMaster has received payment in full for the warranted machine or part.

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.

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.