

SECTION ONE

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SECTION TWO

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SECTION THREE

INTRODUCTION

The PowerMatic® Legacy 2100 truck mounted unit by Steam Way International, Inc. is a superb piece of equipment, built for high capacity professional carpet and upholstery cleaning, and pressure washing. At first glance it appears to be a complex machine, but with some study will prove to be relatively simple in operation and maintenance.

To understand this equipment more thoroughly, study of the basic systems of the PowerMatic® Legacy 2100 is suggested. The machine consists of four major systems.

1. Water pressure
2. Water heating
3. Extraction (vacuum)
4. Power (engine and electrical)

A water reservoir provides a continuous water supply. The pump draws from this supply, injects the cleaning agent, and pressurizes the solution to the desired PSI. The solution is heated to the desired operating temperature and is then transmitted to the cleaning tool. Extraction is accomplished by a powerful positive displacement vacuum blower. The PowerMatic® Legacy 2100 has a large waste recovery tank adequate for hours of operation and many hundreds of square feet of cleaning.

The machine is equipped with a powerful air cooled gasoline engine which also has an innovated oil cooling system. The engine provides the power to drive the vacuum blower, the water pump and the 120 V AC, 60 Hertz alternator. All monitoring gauges are systematically clustered on the control panel for easy viewing.

Each system contains unique features that make the PowerMatic® Legacy 2100 a desirable unit. After the input water hose is connected, and the engine started with the use of the warm-up valve. The heater can be operated to pre-heat the water and keep the unit warm while the remaining hoses and tool are being attached. The temperature control can be set to the desired safe temperature needed for the job. Three pre-set pressures are available (high, medium and low) by turning the selector knob to the desired pressure. Each of the pre-sets may be readjusted to those values the operator feels best for his/her particular needs.

The waste recovery tank is easily drained with the use of large dump valve. Particular attention should be made that it be dumped where environmentally safe. The use of pump out systems such as the Pollution Solution System can be used to keep the waste recovery tank emptied during the cleaning process.

The four systems on your PowerMatic® Legacy 2100 are carefully engineered and matched to compliment each other. Before attempting to operate the PowerMatic® Legacy 2100, study this manual familiarizing yourself with the controls, connections and functions of the machine.

SAFETY

1. This portion may be the most important in your manual. It is our desire at Steam Way International that you have many years of satisfactory use, with no injuries to the operator, maintenance personnel, customers or on-lookers. If the operator uses good safety practices, the likelihood of injuries will be minimal.
2. Carbon Monoxide is emitted by the gasoline engine and could become lethal if the unit is operated in a confined area. Carbon Monoxide is odorless, colorless and can cause death if inhaled. Never run the engine in a closed garage or similar area. Look for and consider the following:
 - A. Location of the vehicle
 - B. Wind direction
 - C. Dizziness
 - D. Unexplained headaches
 - E. Symptoms of others who are exposed to this situation
3. Hot exhaust tubes will cause burns to the hands and arms if touched while they are hot. These are all confined to the machine interior, but when performing service or maintenance, use much caution.
4. Moving parts can cause injuries if safety precautions are ignored. Always keep loose clothing away from pulleys, belts and shafts when maintenance procedures must be performed with the engine operating. Loose clothing can become tangled and caught in the machine's moving parts and can pull the hand or arm into pulleys or belts, causing personal injury.
5. The battery contains sulfuric acid. To prevent acid burns, avoid contact with skin, eyes and clothing. Batteries produce an explosive hydrogen gas while being charged. To prevent a fire or explosion, charge batteries only in a well ventilated area. Keep sparks, open flames and other sources of ignition away from the battery at all times.
6. Gasoline is an explosive fuel. Gasoline is extremely flammable and its vapors can explode if ignited. Do not fill the fuel tank while the engine is running, since spilled fuel could ignite if it comes in contact with sparks. When removing the fuel cap to fill the tank or venting the tank as per Paragraph 5.1. Use extreme caution to assure that no cigarette smokers and other live flames or sparks are near. If gasoline comes in contact with the skin, wash it off immediately.
7. Kerosene is also a fuel that should be treated with respect, but is not nearly so volatile as gasoline. Use the same precaution with kerosene as discussed in the paragraph above. The kerosene tank should be vented during operation.
8. This unit has electrical power consisting of 120V AC, 60 cycle power, the same as is found in all homes and 12V DC power for the engine that has high voltage park plug leads, like that of an automobile. Use the same electrical safety precautions observed in the home or an automobile.

SECTION FOUR INSTALLATION OF UNIT

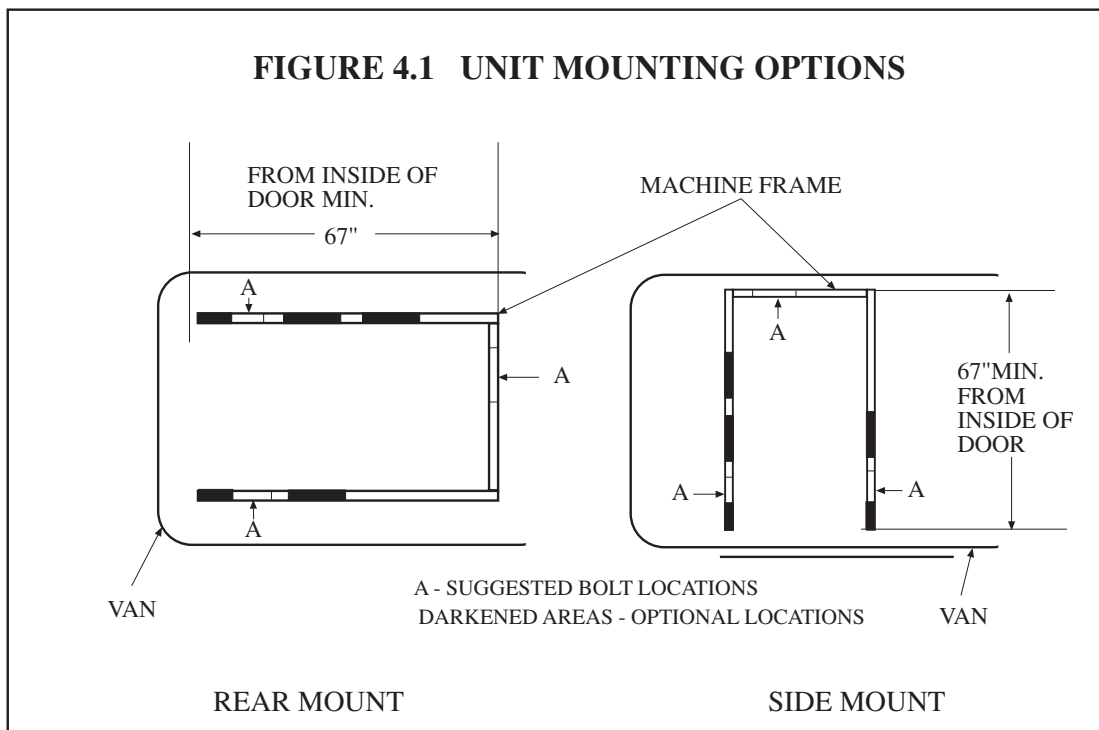
We recommend that the PowerMatic® Legacy 2100 be installed in 3/4 or 1 ton vehicles. However, many 1/2 ton vans are in use and with the incorporation of heavy duty shocks or springs, will make the lighter vehicles capable of the task. The door opening must be 39 inches wide and 46 inches high, with an overall length of 67 inches. The PowerMatic® Legacy 2100 can be installed in either the rear or side door, but experience has proven that the side installation gives better weight distribution about the van.

When installing this unit into a 1992 or later model Ford van, you must remove the battery box mount attachment, if side mounting is desired. The removal of this corner of the unit was especially designed for this purpose because of the location of the gasoline tank filler neck on the van. A specially designed drip pan with the left corner notched is also designed for this configuration.

While the PowerMatic® Legacy 2100 is being loaded into the van, much caution should be used to see that no protruding components are damaged as the machine enters the doorway.

After the machine is in place, it is essential for safe transport of the unit and safety for the driver/operator, that the machine be securely attached through the floor of the vehicle. We recommend that no less than three (3) 3/8" bolts be used to secure the power Matic to the vehicle.

Large washers (approximately 3" diameter) should be used beneath the floor of the van. Refer to Figure 4.1 for options for unit and bolt locations. Before any holes are drilled, make a thorough inspection to insure that no fuel lines, brake lines or cross members of the frame, or other vital parts will not be destroyed or damaged.



During the operation of the PowerMatic® Legacy 2100, it is important that the van's doors adjacent to the machine, be left open for proper ventilation and a means for the exhaust gases to escape from the vehicle. Appropriate measures must be made to insure the doors are stabilized so they will not be closed by the wind or struck by passing traffic or pedestrians. The use of bungee cords or other devices may be used.

The use of a metal roof vent is strongly suggested in hot climates. The use of plastic devices have been known to melt when installed too near the engine's exhaust system.

Water will freeze at 32°F. Therefore, a method of keeping the machine from freezing is imperative. During operation of the machine, using good cold weather techniques and operating procedures, the machine can be operated with weather temperatures well below the freezing point. When the PowerMatic® Legacy 2100 is not in service, it must be kept from freezing (above 32°F) at all times. Several methods can be used.

1. Vehicle's heater (transporting between jobs)
2. Electric heaters (adequate size)
3. Butane and propane heaters
4. Kerosene heaters
5. Heated garage

NOTE: Use a thermometer to assure that the heating device above is doing its job.

SECTION FIVE

PREOPERATIONAL INSTRUCTIONS

Before starting the PowerMatic® Legacy 2100, several operations must be complied with.

- 5.1 Fill the gasoline tank (red) with regular unleaded fuel (Kohler's recommendation). The connecting hose has a female connector that connects to point (Figure 5.3, H-1) on the fuel bracket which is on the left side of the machine. Prior to engine start-up, vent the tank by loosening the fill cap 1/4 turn.

Fill the kerosene tank (green) with kerosene or #1 diesel fuel. With its connecting hose which normally goes to (H-2, Figure 5.1), bleed the line by pushing the male connector against something solid, while pumping the squeeze ball. This will cause the air to be dispensed before making the connection at (H-2, Figure 5.1). Kerosene is a better heating fuel than diesel. The kerosene tank should be vented during operation the same as the gasoline tank.

It is a safer practice to leave the fuel supply hoses connected to the fuel tanks. When it is necessary to remove a tank for filling, remove the hose at the quick disconnect (H-1 or H-2) at the machine. In this way, no incorrect reconnection can be made. Gasoline must never be applied to the heater, nor kerosene to the Kohler engine.

Condensation of water in the burner fuel tank causes a rapid deterioration of the burner fuel pump. As condensation of water in the fuel tank cannot be prevented, the addition of a fuel additive is suggested. A standard gas-line anti-freeze may be used at a ration of 2 to 4 ounces per 6 gallons of kerosene. The additive is available under many brand names, one of which is Heet®. Another very effective method of removing water from the kerosene tank is by dumping the fuel occasionally, especially when the tank is very low on fuel. By rinsing the tank with a pint of clean fuel, will remove water and debris from the tank.

- 5.2 Before the first start-up, flush the anti-freeze from the machine that was used to make the machine safe for shipping. Connect the water input hose assembly to quick disconnect #7 on the cluster block (Figure 7.3). Turn to warm-up and when the water is turned on (Lever on the water input hose assembly), water will be forced through the entire system, purging the lines of anti-freeze, air and dirty water. When the water that is being discharged through the vacuum input connection is clear, the procedure is complete. Reconnect hoses to original configuration (Figure 7.3).

Fill the water holding tank (P-7, Figure 5.1) with water by connecting the male connector of the water input hose assembly to the female connector (H-3, Figure 5.2), located on the lower front panel of the machine. It is always a good practice to inspect the input water supply to insure that adequate water is available from the customers water faucet to the PowerMatic® Legacy 2100. This should be done prior to hooking up to the machine. When the tank is full, the float control will turn the water off until more water is needed.

- 5.3 Fill the solution tank (P-6, Figure 5.2) with the desired cleaning solution (see your chemical manual for selection). Pre-mix as directed by your chemical manual supplied with your Basic Starter Kit. The solution fill mode is discussed Paragraph 6.2-4 in the next section of this technical manual.

FIGURE 5.1
LEFT SIDE VIEW

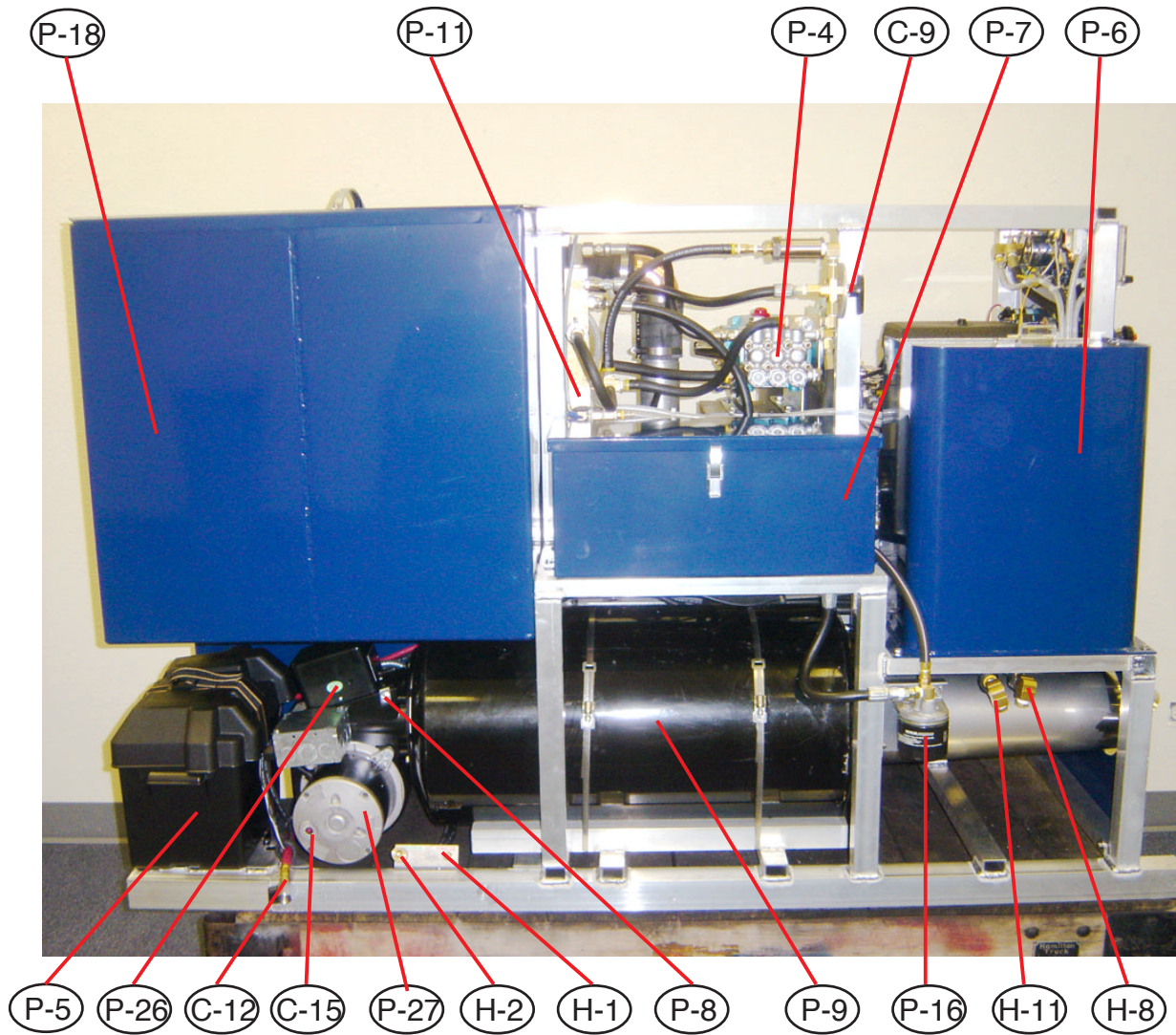


FIGURE 5.2
FRONT VIEW

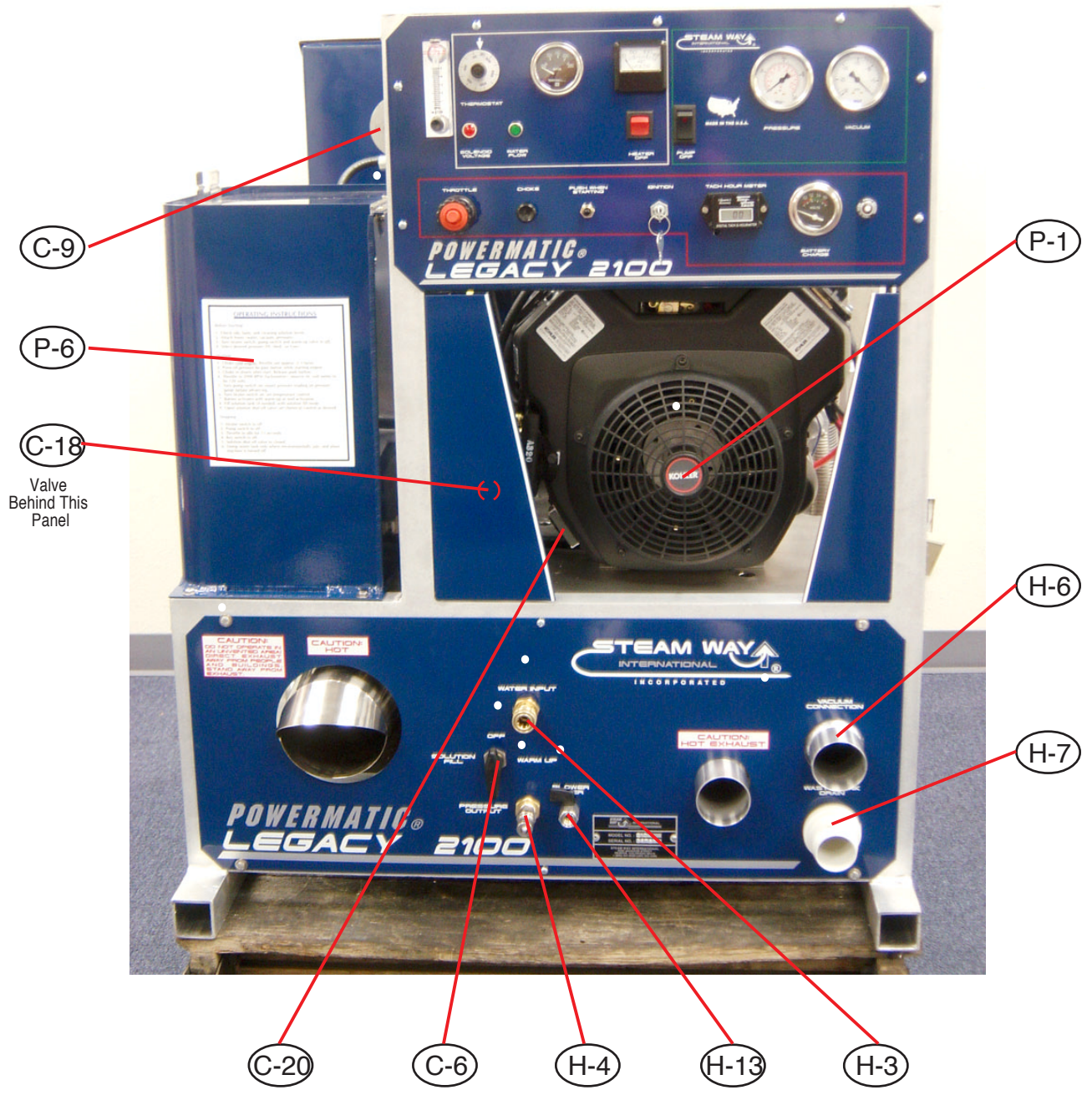
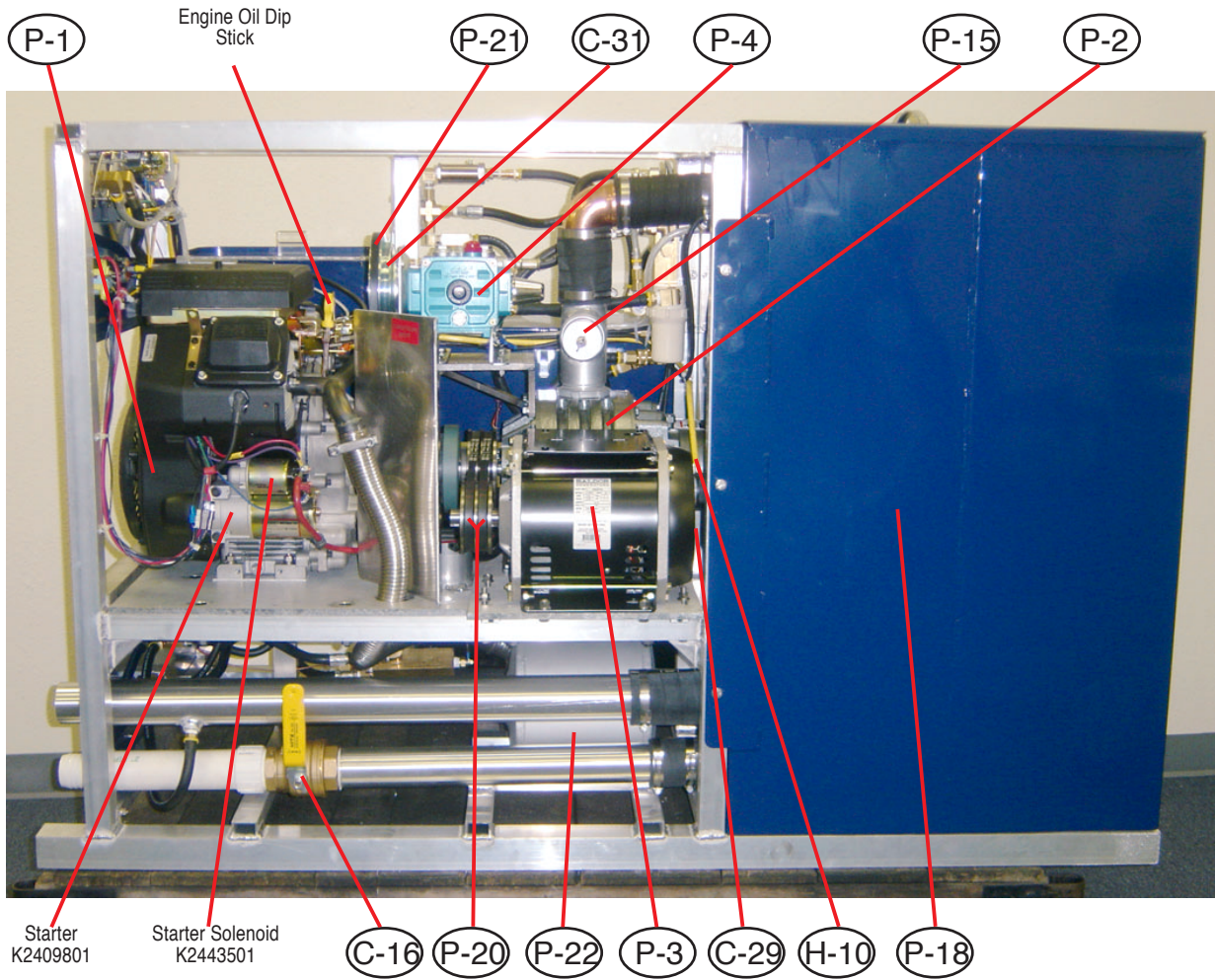


FIGURE 5.3
RIGHT SIDE VIEW



It is important to note that this solution tank should never be allowed to run dry during operation. Should this happen, air will be drawn into the water pump and a loss of pressure would be experienced immediately. Serious damage may result if the pump loses its prime.

5.4 Inspect the waste recovery tank (P-18, Figure 5.1) before each job. Remove the lid and check the following items.

1. Cleanliness and condition of line screen (note below)
2. Condition of lid seal gasket
3. Security of float switch tether
4. Dump valve closed (C-16, Figure 5.3)
5. Lid securely in place on waste tank

Any one of the items above may cause a complete loss in vacuum or a substantial reduction.

Before starting the engine, study Section 6 (Operating Procedures) immediately following. As you study Section 6, use the condensed version "Operating Procedures" attached to the solution tank (P-6, Figure 5.2) to become familiar with the operation of the PowerMatic® Legacy 2100. Develop good operating techniques early and they will be with you as long as you operate the equipment.

A. Dirty Screen Will:

- a. Decrease cleaning ability
- b. Increase drying time
- c. Increase gasoline consumption
- d. Increase on location time
- e. decrease customer satisfaction of your service

SECTION SIX

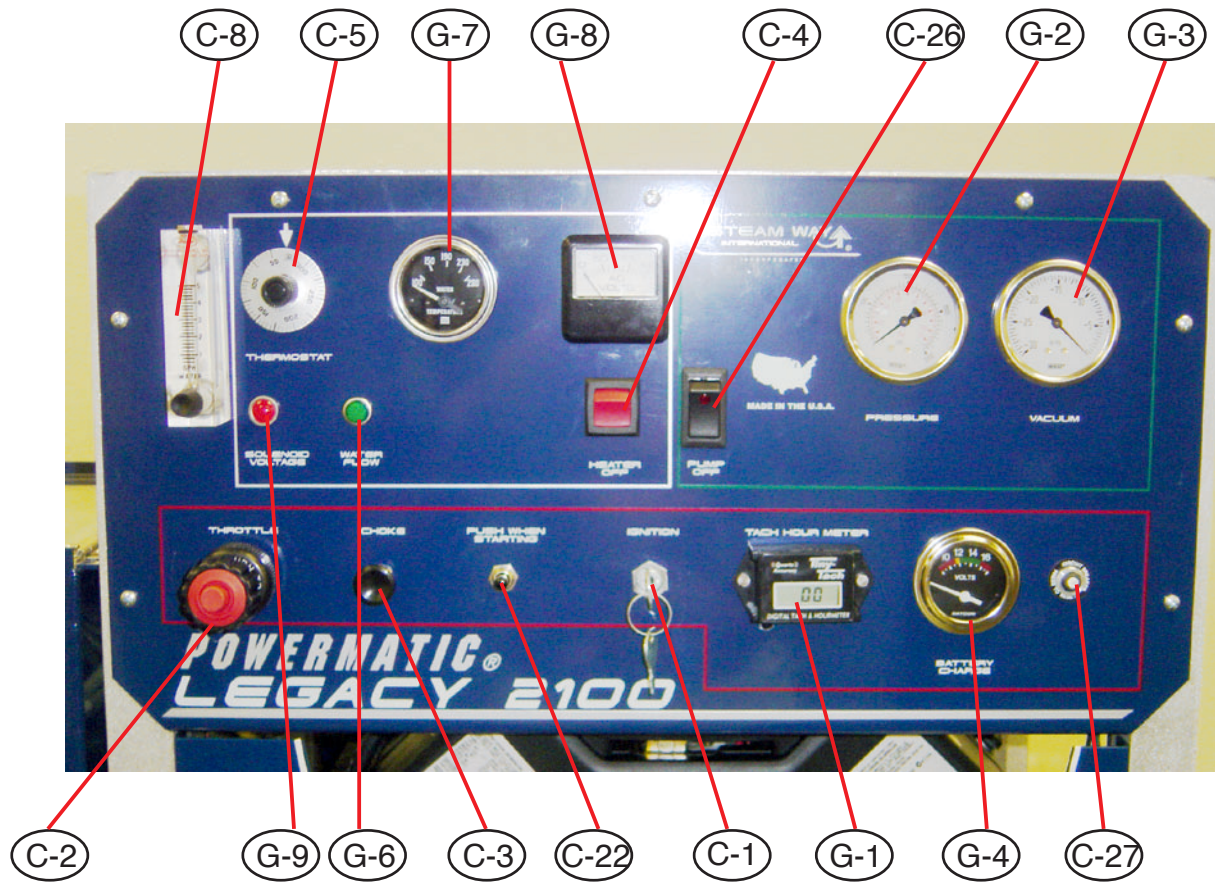
OPERATING PROCEDURES

6.1 **Pre-operational Control Settings** (Before starting)

The following controls and switches should be in the position indicated below before start-up (also see condensed "operating instructions" on solution tank) (P-6, Figure 5.1).

<u>Control</u>	<u>Number</u>	<u>Figure</u>	<u>Position</u>
Engine Ignition Switch	C-1	6.1	Off
Engine Throttle	C-2	6.1	In
Engine Choke	C-3	6.1	In
Heater Switch	C-4	6.1	Off
Temperature Control	C-5	6.1	As Desired
Warm-up/Solution Fill	C-6	5.2	Off
Pressure Selection	C-9	7.1	As Desired
Dump Valve	C-16	5.3	Closed (up)
Chemical Control Meter	C-8	6.1	As Desired
Chemical Control Valve	C-18	7.3	Closed

FIGURE 6.1
Control Panel



6.1-1 Pre-operational Checks and Hook-Ups

- A. Check engine blower and pump oil levels
- B. Open and stabilize side and rear doors, open roof vent if applicable. (hot weather)
- C. Connect water input hose assembly to customers water faucet and check to assure water is available. (turn full on)
- D. Connect male quick connect of water input hose assembly to water in (H-3, Figure 5.2) then turn water inlet valve on.

OPTION: 1. In cold weather, start the engine now and proceed with instructions.
2. In warm weather, complete hook-up of vacuum hoses, pressure hoses and tool may be completed at this time.

6.2 Starting Engine [See operating instructions on solution tank (P-6, Figure. 5.1)]

- 6.2-1
 - A. Choke cold engine. Throttle out approximately midway between fast and slow.
 - B. Depress oil pressure by-pass button (C-22, Figure 6.1) while turning the ignition switch (C-1, Figure 6.1) to the start position for engine start.
 - C. Choke in slowly, release oil pressure by-pass button.
 - D. Pull throttle (C-2, Figure 6.1) (Coarse Adjustment) or rotate knob counter clockwise (fine adjustment) until tachometer (G-1, Figure 6.1) reads 2900 RPM. Observe the AC Voltmeter reads approximately 125 volts (G-8, Figure 6.1). This is the operating speed for the machine. Throttle lock down is advised. Turn the black ring clockwise.
- 6.2-2
 - A. Turn the water pump on (engage clutch) and observe the pressure gauge. If the pressure gauge (G-2, Figure 6.1) gives a reading, this assures that the water pump is primed and safe to run.
 - B. If no water pressure is observed on the gauge within 30 seconds, turn the pump switch off. Refer to Trouble Shooting Chart figure 13.3.
- 6.2-3
 - A. Turn the heater switch on (C-4, Figure 6.1) ONLY after water pressure is observed.
 - B. Turn temperature control (C-5, Figure 6.1) to desired temperature.
 - C. Switch the warm-up valve (C-6, Figure 5.2) to the warm-up position. At this time the heater should come on.
 - D. Allow the machine to run in this configuration for 2 to 3 minutes to discharge any rust or contaminated water from the unit, to insure heater operation, to preheat the water and to check for back pressure (scaling). Extended periods of time in the warm-up mode will fill the waste recovery tank prematurely. **NOTE:** wide open in warm-up, the temperature will not reach the temperature selected.
- 6.2-4 Solution Fill Mode
 - A. Turn the temperature control to a lower temperature, approximately 125°F for a good safe mixing temperature.
 - B. Turn the solution shut-off valve (C-18, Figure 7.3) to the "off" position.
 - C. Turn the warm-up solution fill valve (C-6, Figure 5.2) to the solution fill position. **NOTE:** Before the first job of the day or after long non-operating periods always accomplish step "6.2-3 A through D" first.
 - D. If a liquid cleaning agent (concentrate) is being used, adequate mixing will occur as the solution tank is filling. If a powder cleaning agent is being used, thorough mixing by stirring is mandatory as the tank is filling.
 - E. When filled to the desired level, turn the solution fill valve back to the "off" position. Turn the solution "shut-off" valve back to the "open" position, and select the temperature desired for the job.

6.3 Check Out During Operation

Only a minimum amount of attention will have to be devoted to check out during operation, but listed below are some items to consider.

- A. An adequate level of solution in the solution tank (P-6) should be maintained. Running out of solution will cause a loss of pressure and could damage the pump.
- B. Insure an ample level of gasoline in the tank (or the van's gasoline tank) to finish the job.
- C. Check the level of kerosene in the tank. (Running out of kerosene sometimes makes it hard to re-prime the system.)
- D. Check the level of water in the waste tank (P-18). If the tank is near full, dump it to save a trip back to the machine in the immediate future. Always physically check the lint screen for cleanliness when checking the waste tank. The engine will have to be stopped for step D (see "stopping" instruction).

6.4 Normal Gauge Reading and Control Settings During Operation

<u>ITEM</u>	<u>FIGURE</u>	<u>NUMBER</u>	<u>READING/POSITION</u>
Ignition	6.1	C-1	On
Throttle	6.1	C-2	2900 RMP (tachometer) G-1
AC Voltmeter	6.1	G-8	115-120 volts
Choke	6.1	C-3	In
Pump Switch (Clutch)	6.1	C-26	On
Heater Switch	6.1	C-4	On
Solution Shut-off Valve	7.3	C-18	Open for chemicals
Chemical Control Meter	6.1	C-8	As desired
Temperature Control	6.1	C-5	As desired
Warm-up Valve	5.2	C-6	Off
Dump Valve	5.3	C-16	Closed (up)
Heater Motor Reset Button	8.3	C-15	Not Popped (on the burner)
Pressure Select Valve	7.1	C-9	Select hi, med or low
High Pressure Regulator	7.3	C-32	As desired, max 1500 PSI
Medium Pressure Regulator	7.3	C-7	As desired, max 1000 PSI
Low Pressure Regulator	7.3	C-10	As desired, max 200 PSI
Green Light	6.1	G-6	Lights when water flows
Red Light	6.1	G-9	Lights when solenoid receives voltage
Vacuum Relief Breaker	9.1	P-15	Do no exceed 16Hg (max)
DC Volt Meter	6.1	G-4	Approximately 14V
Water Temperature Gauge	6.1	G-7	Determined by temp control
Vacuum Gauge	6.1	G-3	Variable depending on current situation

6.5 Shutdown

Refer to the operating instructions on Solution Tank (P-6, Figure 5.2) stopping. **NOTE:** If the alternator is being used to run auxiliary equipment, turn equipment off or unplug from alternator before engine slow down.

- 6.5-1
 - A. Heater switch off (C-4)
 - B. Pump switch off (C-26)
 - C. Solution shut-off valve closed (C-18)
 - D. Flush chemicals from system at end of day, see Paragraph 6.5-5.
- 6.5-2
 - A. Throttle to idle for 15 seconds (C-2) at 1500 - 2000 RPM.
 - B. Ignition switch off (C-1)

- 6.5-3
 - A. Retrieve cleaning tools from job site and store securely
 - B. Disconnect vacuum hoses and place in vehicle (hose reel role-up)
 - C. Disconnect pressure hoses and place in vehicle (hose reel role-up)

- 6.5-4 In cold weather, use the most expedient method to keep hoses and tools from freezing.

- 6.5-5 LAST JOB OF THE DAY - Flushing procedure (two methods available)
 - A. Method Number One: (engine running)
 - 1. Start engine and throttle to fast idle
 - 2. Turn pump switch on (C-26) and observe PSI
 - 3. Insure solution shut-off valve is in the closed position (C-18)
 - 4. Turn warm-up valve to warm-up position (C-6)
 - 5. Let unit run for approximately three minutes to flush soap from machine
 - B. Method Number Two: (engine not running)
 - 1. Direct water from garden hose to #7 of cluster block (Figure 7.3)
 - 2. Open warm-up valve to warm-up position
 - 3. Turn the water lever on the input valve assembly to the "on" position, and observe water coming from vacuum hose connection (Figure 5.2, H-6). When water comes out clear, soap has been flushed from the machine.

- 6.5-6
 - A. Dump the waste tank only where environmentally safe.
 - B. Rinse out the waste tank using the input water hose and valve assembly.
 - C. Remove the lint screen filter (Figure 9.1, P-19) and clean thoroughly, using wire brush.
 - D. Inspect the seal around the lid of the waste tank. (A bad seal will lower vacuum and cleaning ability.)
 - E. If a lint sock (optional) is used on the vacuum input PVC elbow, inside the waste tank, empty it and be sure that it is clean. The blower impellers should be oiled by spraying WD-40 or cable fluid into the blower for 5 to 10 seconds while the engine is still running. This will help preserve the life of the blower and keep it from lock-up during inactivity due to rust. The blower oiler (Figure 5.2, H-13) is provided for this procedure.

- 6.5-7 Disconnect and stow water supply hose.

SECTION SEVEN

WATER SYSTEM

7.1 Water Holding Tank

The water holding tank (P-7, Figure 5.1) is a reservoir for the water pump to draw from. Water is supplied to this tank by the input water hose and valve assembly, routed directly from (H-3, Figure 5.2) to the float valve in the tank. When the float reaches the desired level, the valve will cause the water to be shut off. When a need for more water is required, the float will drop and the tank will be refilled once again to the desired level. The float arm and ball are adjustable and at some time may require a slight adjustment.

The water holding tank is also used as a oil cooler. Oil from the Kohler engine enters the cooling coils in the tank. The cold water lowers the oil temperature, then the oil is sent to the oil filter. The oil returns back to the engine via the return hose.

The water pump draws water from the lower bulkhead fitting of the tank. The water travels up to #7 of the Cluster Block (P-11, Figure 7.3) and on through the lower cavity to #8. From #8 the water is delivered to the pump through the in-line filter to assure that no foreign objects enter the pump.

7.2 Solution (Soap) Tank

The solution tank (P-6, Figure 5.2) is another reservoir which holds approximately eight gallons of liquid concentrate for the pump to draw from. The concentrate being drawn from this tank can be metered out from 0 - 5 gallons per hour by the chemical control (C-8, Figure 6.1) the concentrate is mixed with water that was discussed in the preceding paragraph (7.1). It is very important that this tank not be allowed to run dry (become empty) during operation, which would cause the pump to lose its prime and could do serious damage to the water pump.

The solution fill mode of operation is accomplished by turning the three way valve (C-6, Figure 5.2) to the SOLUTION FILL position. During this mode, it is suggested that the temperature control be set to no higher than 125°F and the ball valve, chemical shut off (C-18, Figure 7.3) be turned to the closed position. The operator must monitor the solution level of the tank and turn the three way valve back to the “off” position when the tank has reached the desired level. Thorough mixing of chemicals is mandatory.

7.3 Cluster Block (P-11, Figure 7.3)

The cluster block is the heart of the water pressure system. It consists of two separate cavities, created by drilling the block from the top, almost halfway down and from the bottom almost half way up. Note that the two cavities are separated by a solid mass (P-11, Figure 7.3). The lower cavity is the low pressure side which provides the pump a route to draw water and solution from. The upper cavity is the high pressure cavity which provides routing for returned water from the regulators and a discharge route for pressurized water to be delivered to the heater coil.

NOTICE that the cluster block (P-11, Figure 7.3) has number 1-9 stamped by each port or entry point on the block. This provides easy identification of hoses and component for study and trouble shooting purposes.

FIGURE 7.1
CLUSTER DETAIL

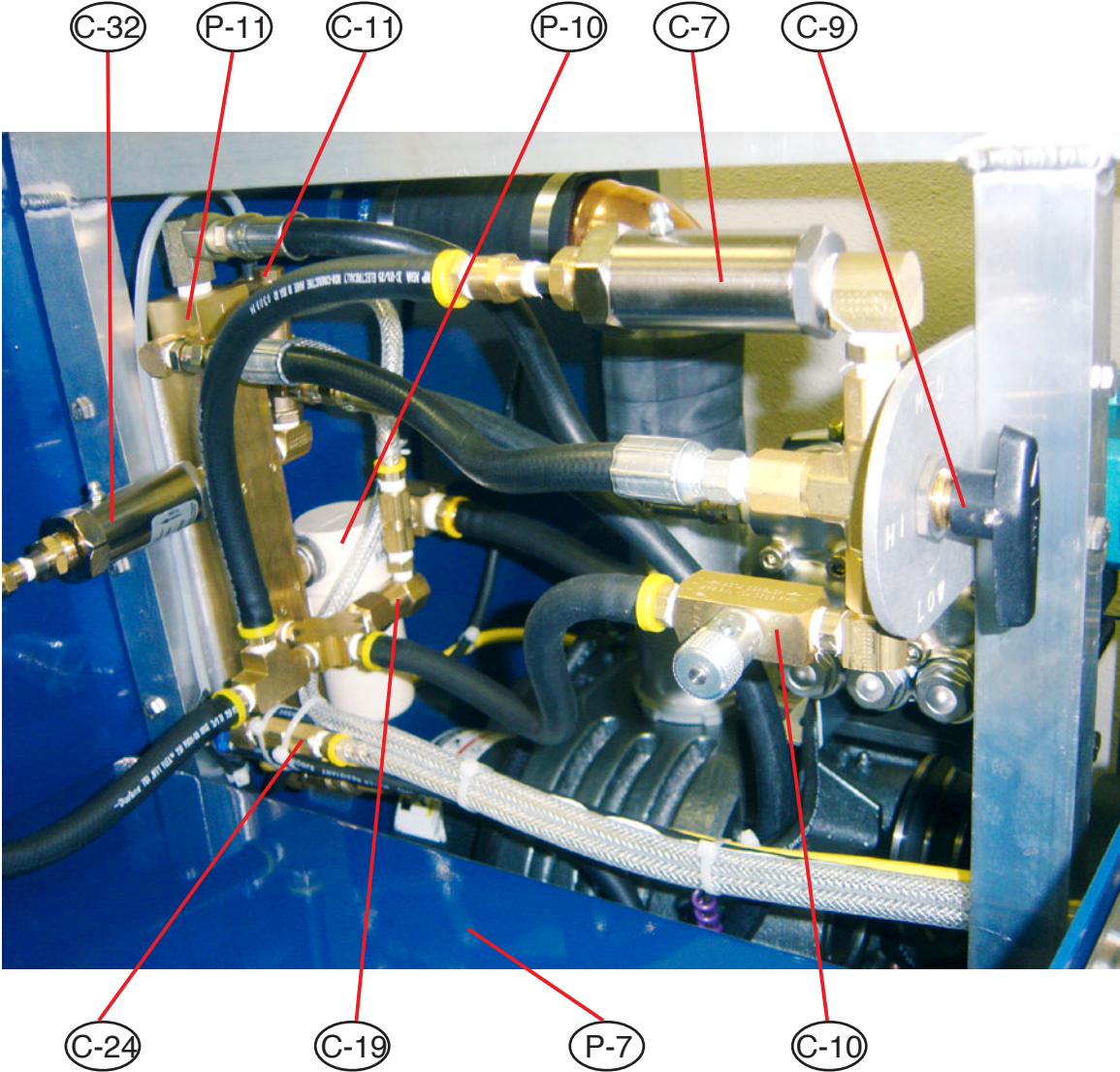


FIGURE 7.2
PUMP & DRIVE DETAIL

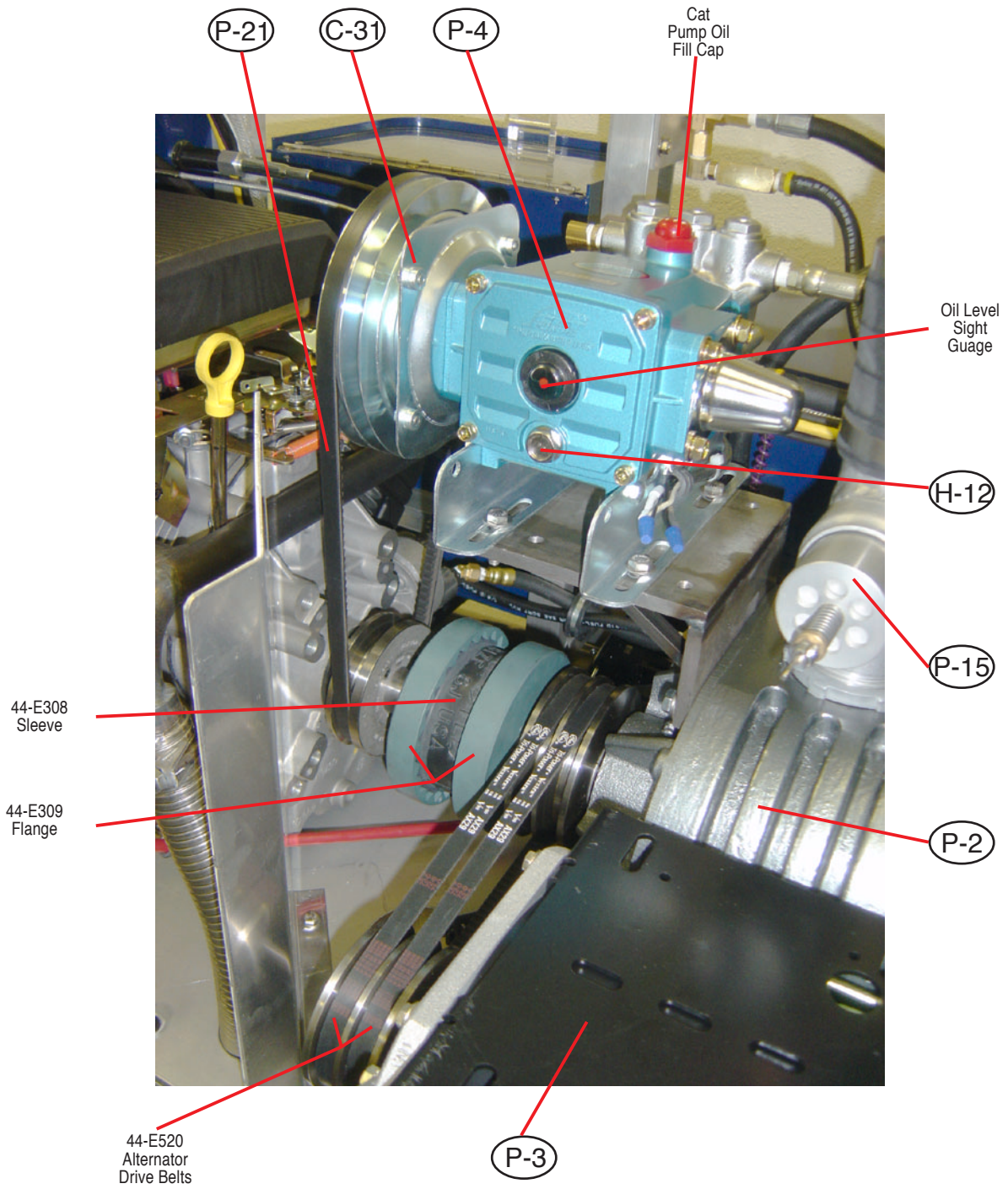
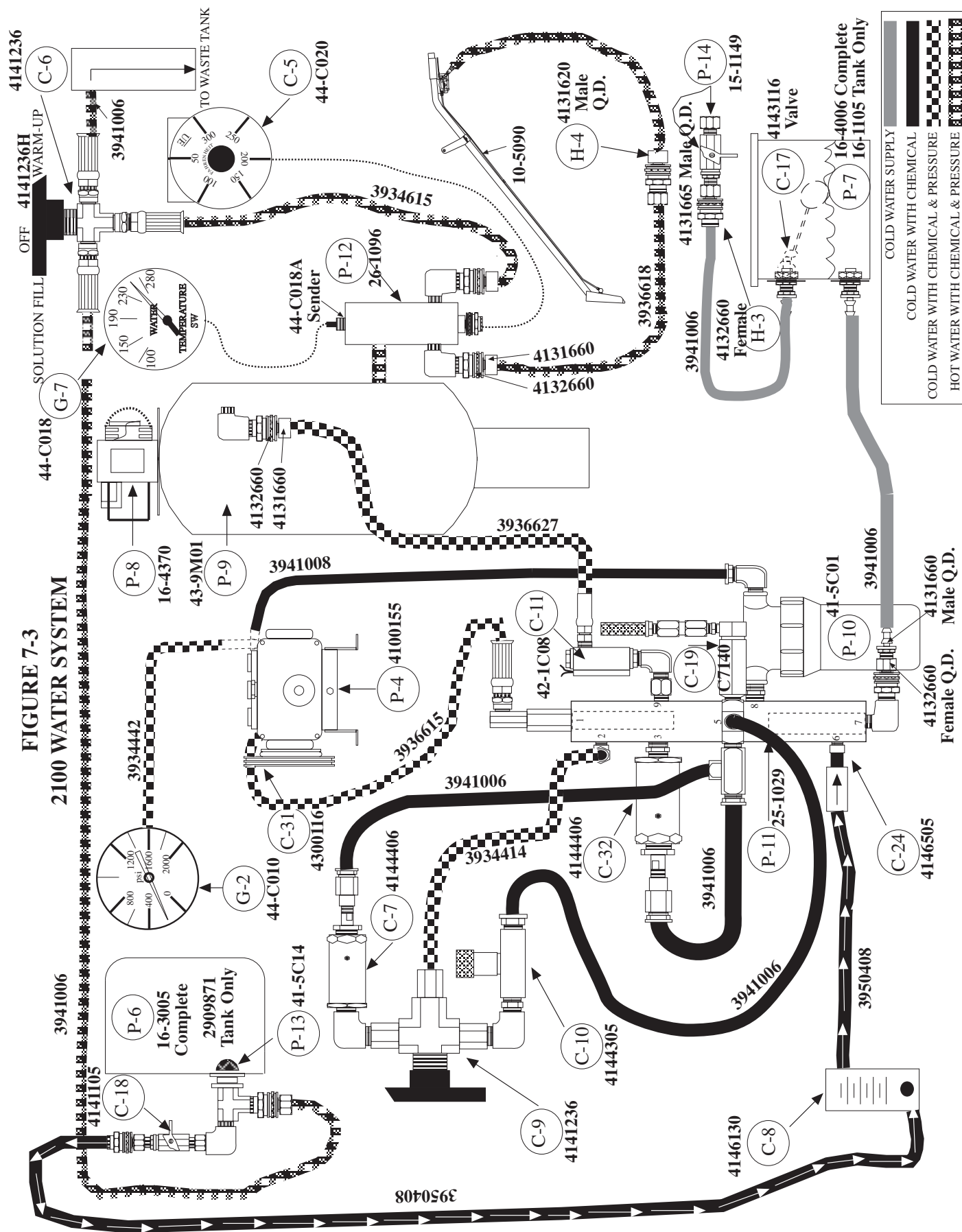


FIGURE 7-3
2100 WATER SYSTEM



7.4 **Water Pump And Pressure System**

When the clutch is engaged (turned on) and the pump is operating (P-4, Figure 7.2) the pump will draw water from #8 of the cluster block. The water is filtered by the in-line filter (P-10, Figure 7.2) before entering the pump. The lower cavity is connected to the water holding tank via Port #7 and the solution tank at #6. These tanks are reservoirs of liquids for the pump to draw from.

When the water and soap have been drawn into the pump, the plunger action of the pump will cause the fluids to be pressurized and delivered to the manifold head on the pump. From this point, the solution is sent to #1 of the cluster block and to the pressure gauge (G-2, Figure 6.1). Water entering the upper cavity would build immediately to an infinite pressure without a pressure regulator to bypass unwanted pressure or water.

A unique feature of the PowerMatic is to be able to select one of three pressure regulators, high, medium, or low for the preset pressure desired. Each of the three regulators may be set for individual pressure requirements. When the selector valve (C-9, Figure 7.1) has been turned to the high position, the medium PSI regulator C-7 and the low PSI regulator C-10 have been eliminated from the pressure determining process and only C-32, the high pressure regulator, will develop pressure for use at this time. Water is returned to the lower cavity via the common junction where the thermal protection valve is located. (C-19, Figure 7.3).

When the selector valve is turned to the medium position, another route to bypass water from the upper cavity is available through the medium PSI regulator C-7 which develops the pressure. With C-32 set to a higher pressure than C-7, water will take the path of least resistance through (C-7) and return to the lower cavity via the common junction where the thermal protection valve is located.

When the selector valve is turned to the low position C-7 is dialed out of the system and water pressure is developed by C-10 (low pressure regulator). Water is returned to the lower cavity via the common junction where the thermal protection valve is located. Note that in any of the cases, whether selecting high, medium, or low, the thermal protection valve is monitoring the temperature of the returned water. When the water temperature reaches 145°F (still safe for the pump). The valve will open dispensing the hot water into the waste tank, thus drawing cold water into the pump to cool it to a safe operating status.

7.5 Low pressure problems are considered in Section 13, troubleshooting section of this technical manual but a more detailed explanation of pressure problem follows:

7.5-1 Insufficient water supply from the water input hose will cause a loss of pressure when the pump has not been supplied with adequate water to meet the demands, check the following:

- A. low city water pressure
- B. faucet not fully turned on
- C. kinked input water hose
- D. screen in input water valve assembly clogged
- E. float control in water holding tank defective or improperly set

- 7.5-2 A pressure drop will occur when the water pump cannot draw a sufficient amount of water from the water holding tank (P-7, Figure 7.3). Check the following:
- A. air leak on the suction side of pump (force water into #7 of cluster and look for leaks)
 - B. clogged in-line filter (P-10, Figure 7.3)
 - C. defective pump (worn seals)
 - D. solution tank empty
 - E. air leak in the solution line tank to cluster #6
 - F. see 7.5-1
 - G. defective O-Rings in #7 female quick disconnect
- 7.5-3 If low pressure persists after steps 7.5-1 and 7.5-2 have been complied with, check the following:
- A. pressure selection valve set for low pressure
 - B. pressure regulator defective or maladjusted
 - C. pressure gauge giving false reading
 - D. large leak on pressure side of pump i.e. Broken heater coil, blown high pressure hose, open line
 - E. warm-up, solution fill valve turned to other than "off" position
 - F. defective warm-up, solution fill valve
 - G. defective water pump
 - H. clutch not engaged or slipping
- 7.5-4 Water pressure gauge shows desired pressure but very little water movement at cleaning tool (jet). Check the following:
- A. partially clogged jet
 - B. defective high pressure hose (restricting flow)
 - C. quick disconnect defective
 - D. scale build up in heater coils and hoses
- 7.6 **Heater**
- The heater system is covered in complete detail in Section 8 of this technical manual. Since the heating coils are a part of the water flow system, some preliminary information will be given at this time. The water or cleaning solution leaves the cluster block (P-11, Figure 7.3) at Port (#9) passing through the water flow switch (C-11) on it's way to the heat exchanger (P-9) (heater coils). As the water travels through the heater coils, it is heated to the desired temperature. The water will exit the heater coils via (P-12) (heater output cluster) which has four functions:
- A. the temperature sensor for temperature control (C-5)
 - B. the temperature sensor for temperature gauge (G-7)
 - C. the warm-up, solution fill connection to (C-6, Figure 7.3) three-way valve
 - D. the connection to pressure out (H-4), high pressure connection to cleaning tools

SECTION EIGHT

SOLUTION HEATING SYSTEM

8.1 Operating Conditions

The solution heating diagram is on Figure 8.1. The diagram graphically describes the burner system. The requirements for the burner system to fire are listed below:

- A. proper A.C. power is supplied (by the alternator or auxiliary power cord)
- B. pump switch is on (clutch is engaged, pump is turning)
- C. heater switch is on (supplies power to the Wayne Burner motor, transformer, and fuel solenoid)
- D. water is flowing, (tool is on, warm-up mode, or solution fill mode).
- E. burner fuel supply adequate, connected and air bled from pump and lines
- F. solution (water) temperature is lower than the set temperature on the temperature control
- G. If any of these conditions are not met, the burner will not fire.

8.2 Temperature Control (C-5, Figure 6.1)

The temperature control will sense temperature variations by the liquid filled bulb that hydraulically transmits through the capillary tube, causing the micro switch in the temperature control, to be turned on or off as required for heat. The liquid filled bulb is inserted into the heater out-put cluster (P-12, Figure 8.1) that is attached directly to the out-put tube of the heat exchanger (heater coil) for a prompt and accurate control for the burner.

Slight fluctuations above and below the set temperature is a normal function of this system. A professional carpet cleaner will know and select the proper temperature so that no damage to the carpet will occur.

A temperature sender is inserted into the heater out-put cluster (P-12, Figure 8.2) to monitor the water temperature as it comes from the heater coils. The temperature sender sends a signal to the water temperature gauge (G-7, Figure 6.1) where it can be read by the operator. NOTE: this circuit has no control on the burner's operation, but does give the operator needed information.

8.3 Heat Exchanger (Heater Coil) P-9, Figure 7.1

The heat exchanger is manufactured especially for Steam Way for use on the Power Matic machine. It consists of many feet of steel tube coiled in single layer until near the exit end of the exchanger, where it is coiled to three layers deep for maximum heating efficiency. When heat is demanded, the Wayne Burner develops a large flame that is blown into the coils of the exchanger to heat the water as it passes through on it's way to the cleaning tool.

Water enters the exchanger from port #9 of the cluster block. The water is heated as it passes through the heater coil, but the temperature is not monitored until it reaches the heater out-put cluster (P-12, Figure 8.2).

FIGURE 8.1
BURNER MOTOR AND HIGH VOLTAGE TRANSFORMER CIRCUIT

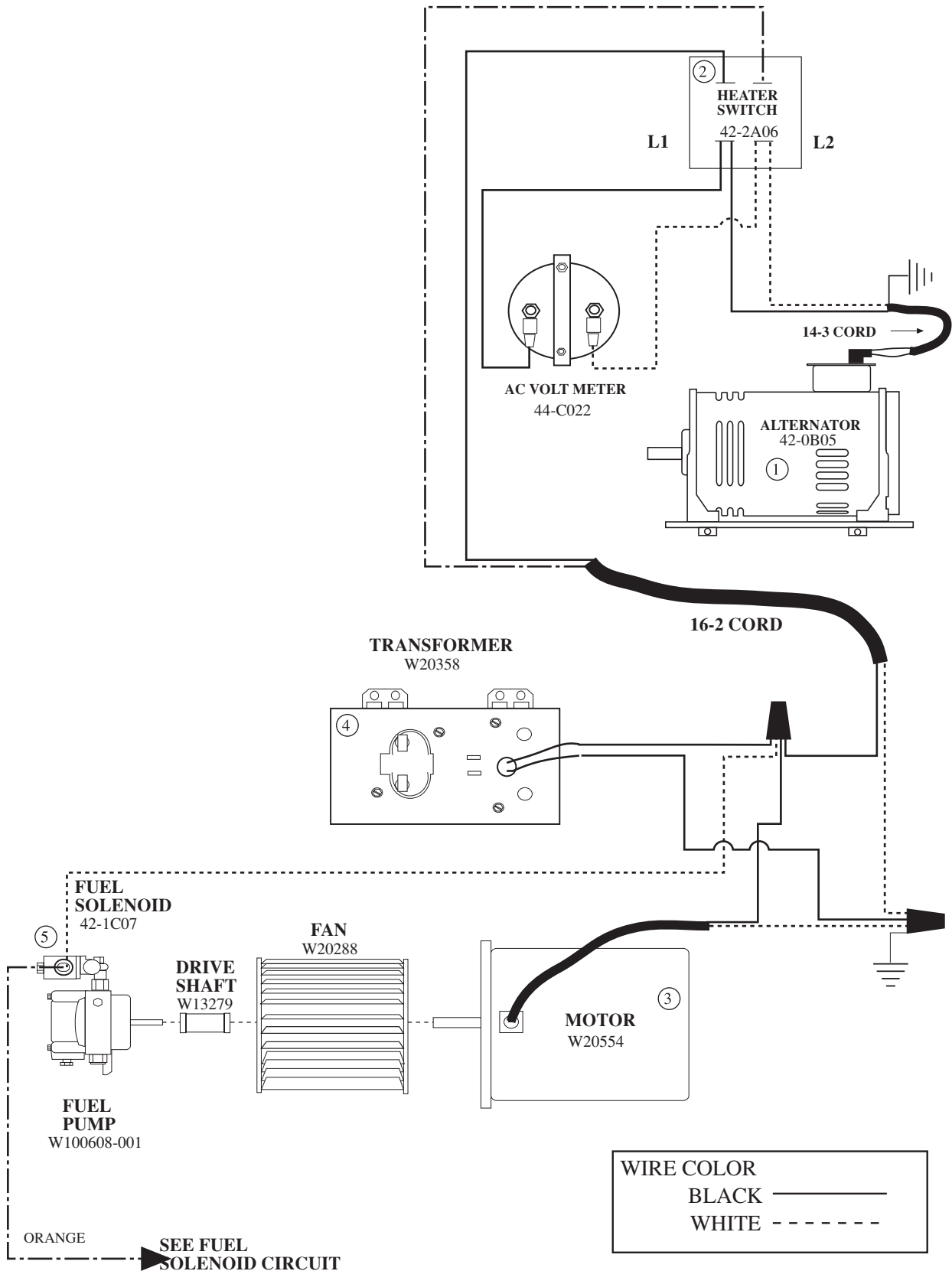
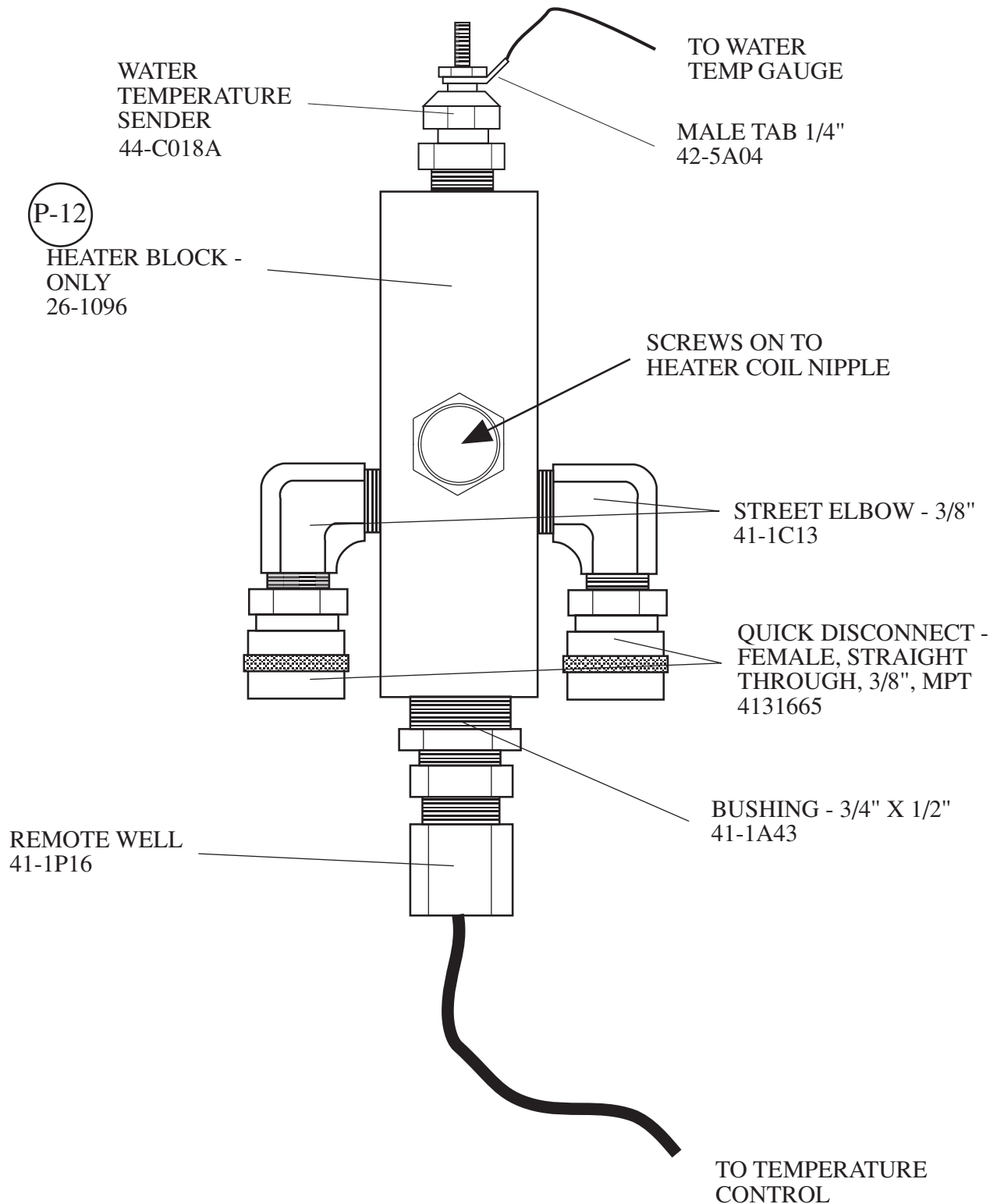


FIGURE 8.2
16-3105 HEATER OUTPUT CLUSTER



**FIGURE 8.2-1
SIMPLIFIED ELECTRICAL SCHEMATIC
FOR BURNER SYSTEM**

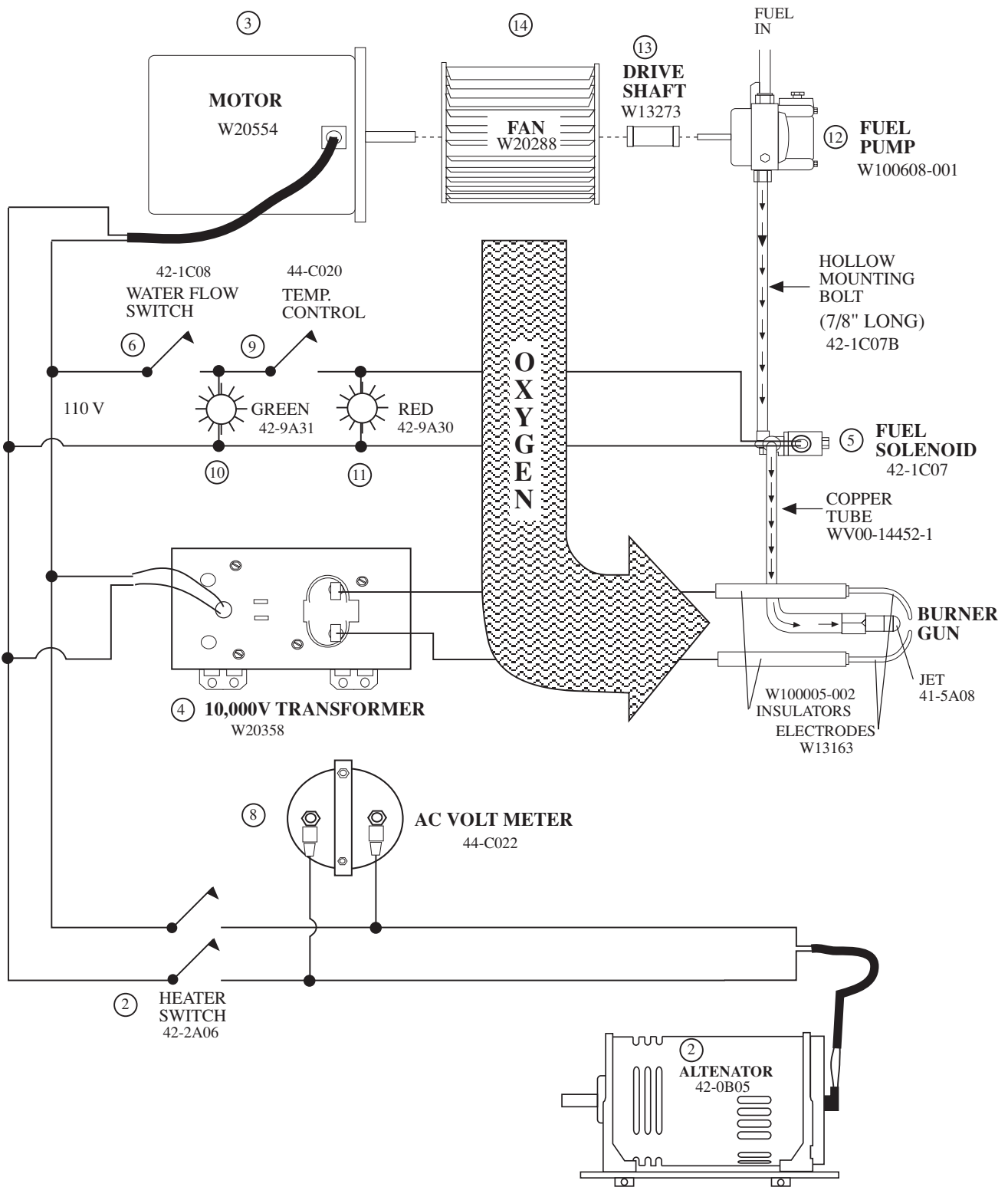
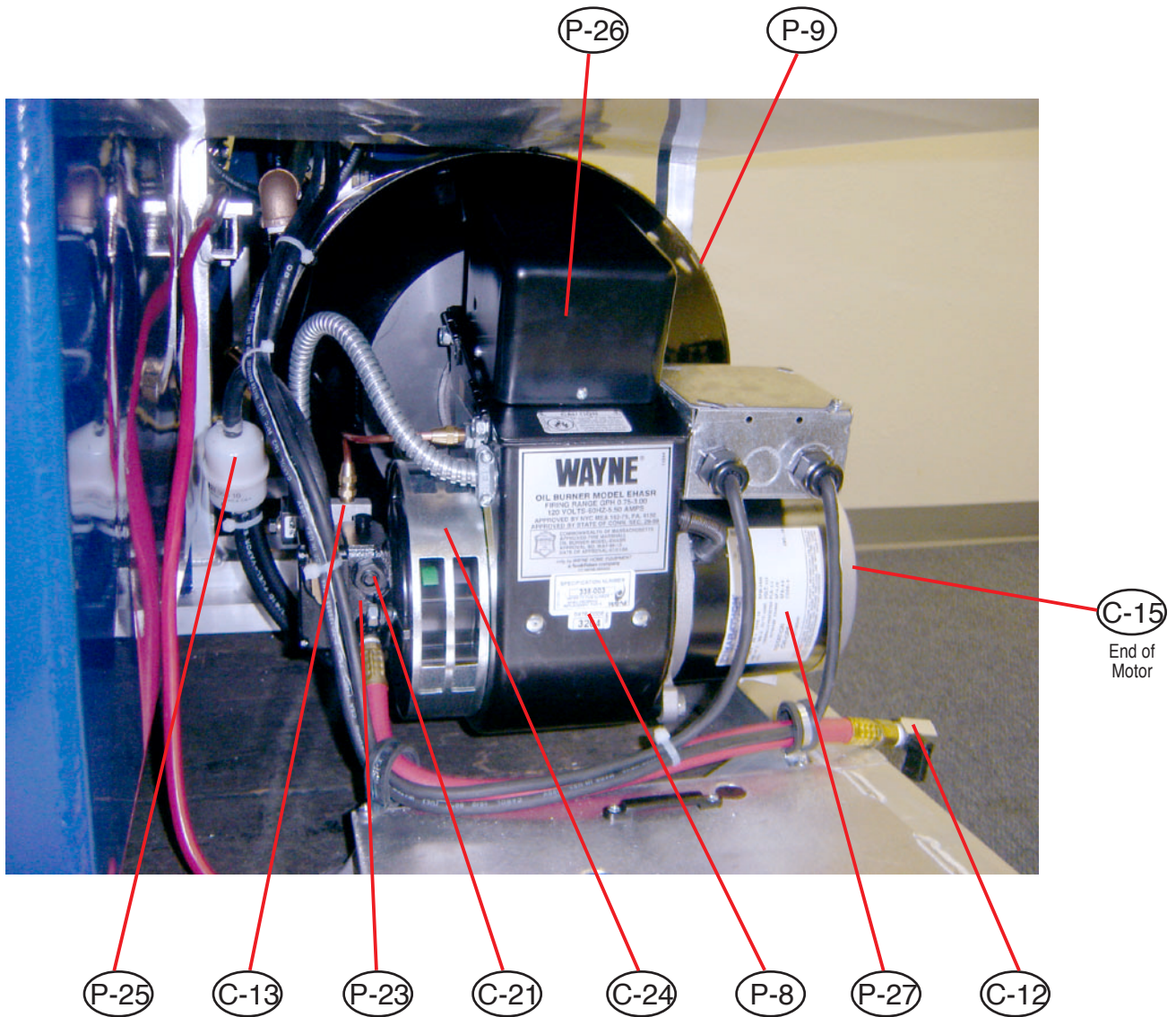
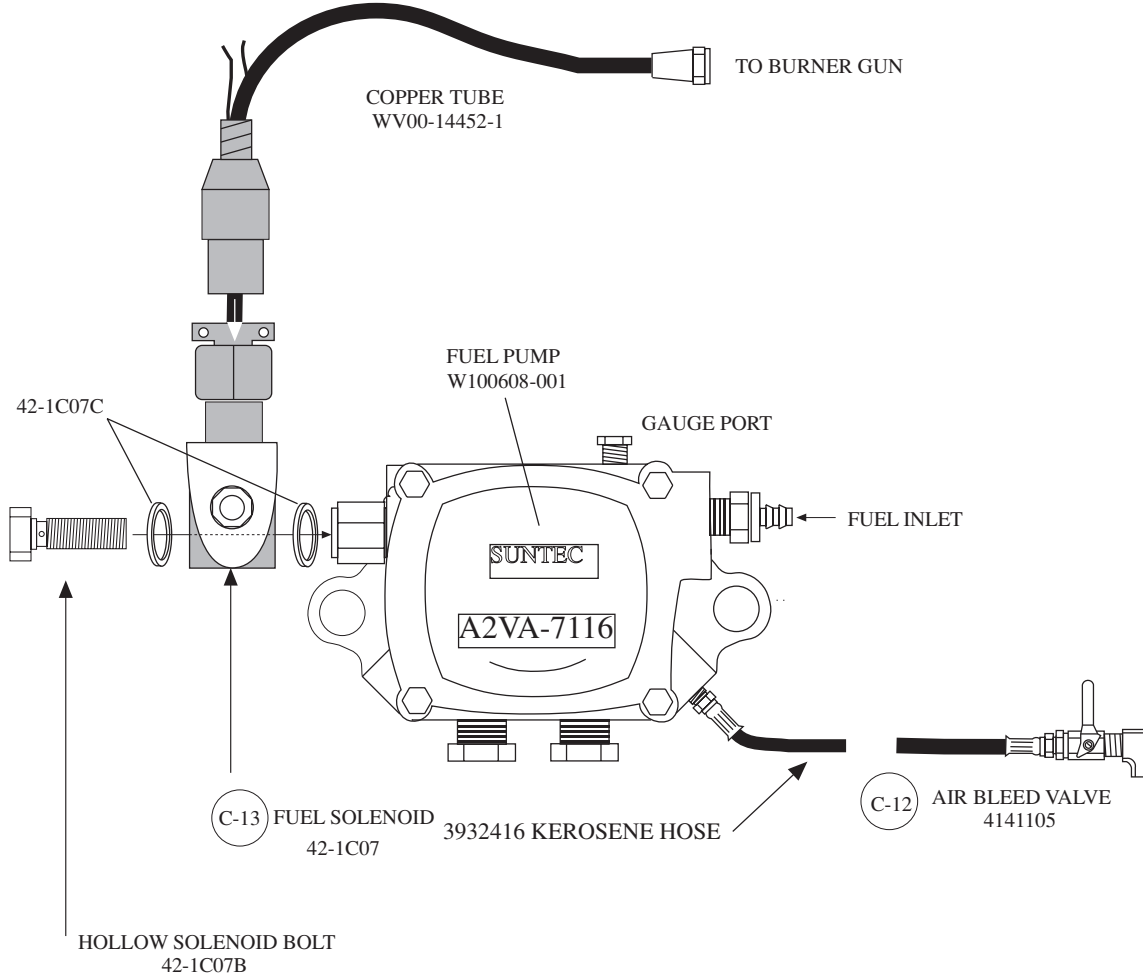


FIGURE 8.3
Wayne Burner Exploded View



**FIGURE 8.4
BURNER FUEL PUMP**



SIDE VIEW

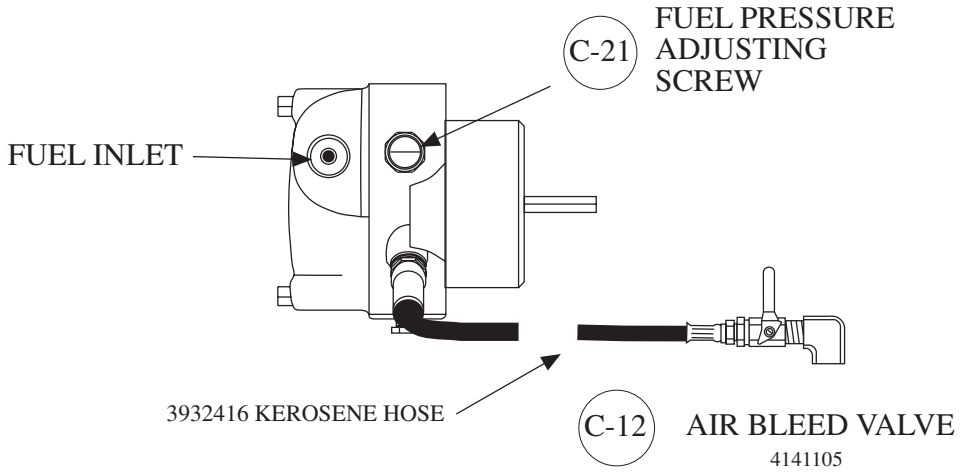


FIGURE 8-5

BURNER ADJUSTMENTS

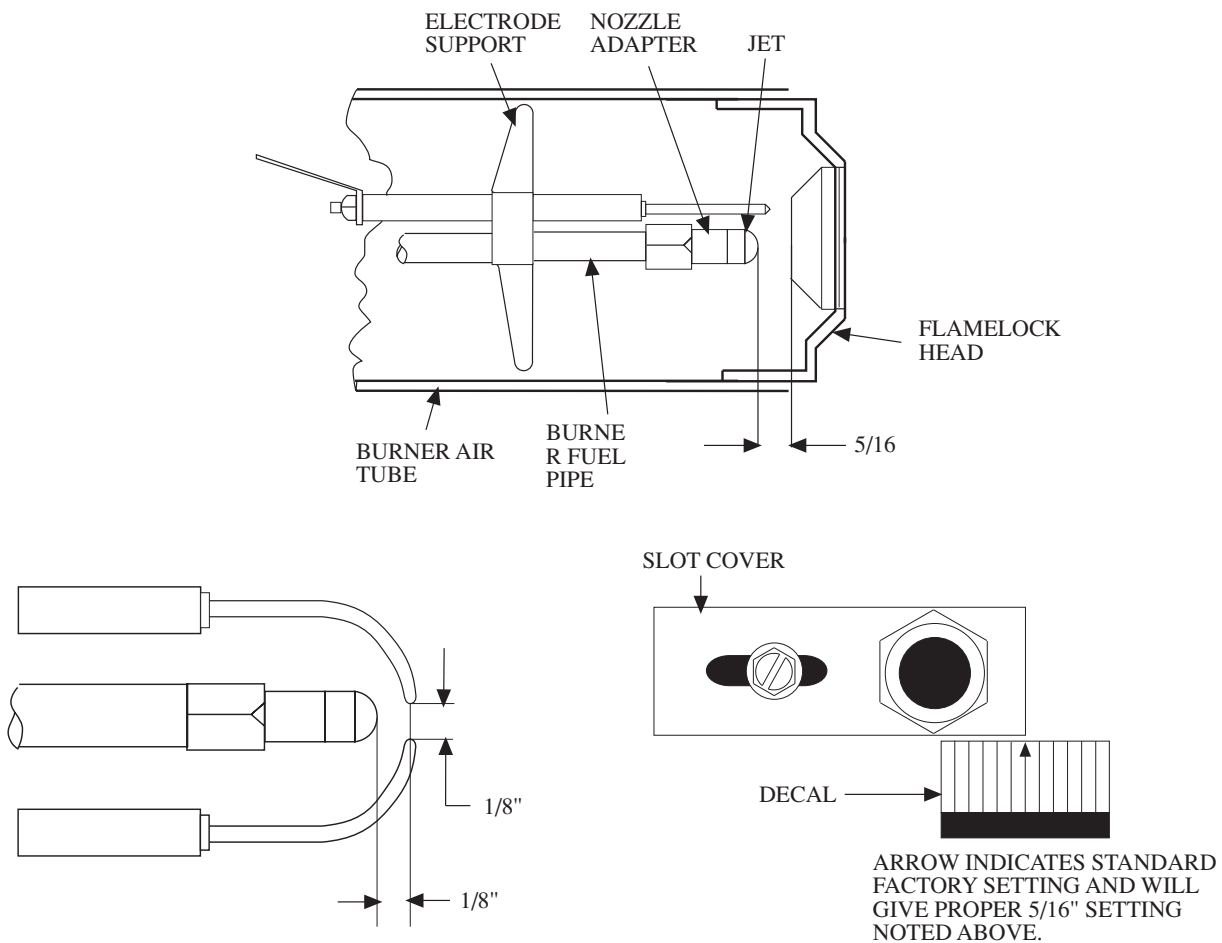
Removing Gun Assembly: Disconnect the oil line at the fan housing and remove lock nut on copper tube fitting. Remove transformer hold-down screws and swing transformer on hinge. Gun Assembly can now be removed through this opening.

BURNER NOZZLE

Check nozzle size as to conformance to installation requirements. Install nozzle by screwing into hexagon adapter.

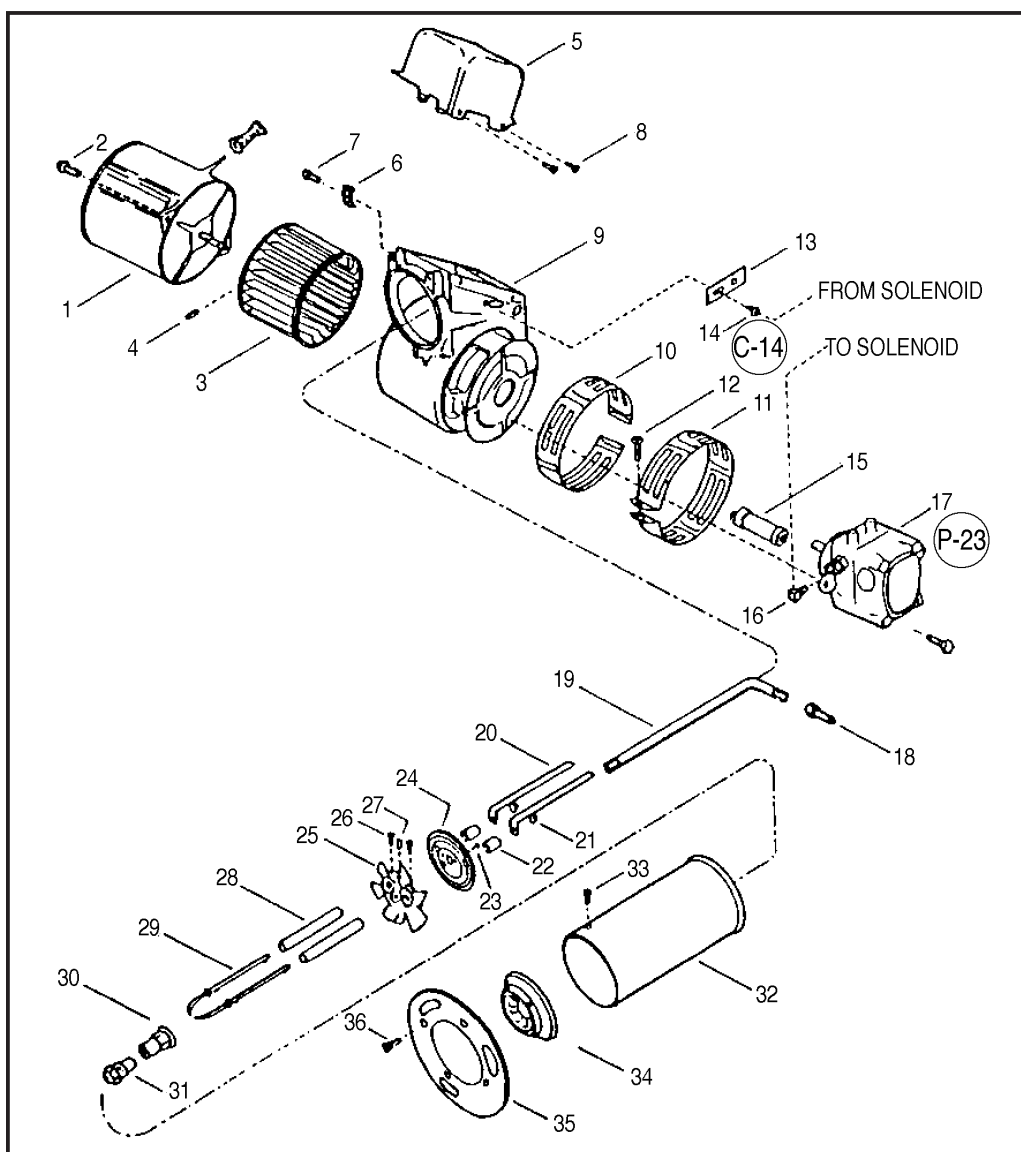
Nozzle Adapter: This burner is equipped with a dribble-proof nozzle adapter which will accomplish intended results only when installed with the stamped word "TOP" in the correct position.

Spacing of Electrodes: The electrodes should be spaced 1/8 inch apart. They should extend 1/8 inch beyond the end and 1/2 inch above the center of the nozzle tip as shown in drawing below.



Air Adjustment: The air intake is located on the left side of the blower housing and consists of two interlocking bands. To adjust, loosen screw in outer band and position band by rotating to the desired opening. Retighten screw after adjustment to assure permanent adjustment.

**FIGURE 8.6
OIL BURNER**



ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
1.	Motor 1/8 HP - 3450 rpm	19.	Oil Pipe
2.	Motor Mounting Screw	20.	Buss Bar
3.	Fan	21.	Palnut
4.	Fan Set Screw (Included w/ fan)	22.	Insulator Bushing
5.	Transformer	23.	Baffle Plate Screw
6.	Transformer Hold Down Clip	24.	Baffle Plate
7.	Transformer Hold Down Clip Screw	25.	Stabilizer - Reversed
8.	Transformer Hinge Screw	26.	Rd. Head Machine Screw - Electrode
9.	Fan Housing Assembly	27.	Set Screw
10.	Air Adj. Band - Inner	28.	Insulator
11.	Air Adj. Band - Outer	29.	Electrode Stem & Washer
12.	Air Band Screw	30.	Nozzle Adapter
13.	Oil Line Adj. Slot Cover	31.	Nozzle
14.	Oil Line Slot Cover Screw	32.	Air Tube
15.	Pump Coupling	33.	Air Cone Mounting Screw
16.	Oil Line Elbow	34.	Air Cone
17.	Fuel Unit	35.	Flange
18.	Oil Line Fitting	36.	Flange Mounting Screw

8.4 **Heater** (Wayne Burner) P-8, Figure 8.3

The Wayne Burner is a gun type fuel oil system runs on recommended kerosene or #1 diesel. The electrical components of the heater system are a motor, a transformer, and a fuel solenoid requiring 120V, AC 60 cycle power for their operation. When the heater switch (C-4, Figure 6.1) is turned on, two things occur immediately:

1. The ignitor transformer produces an ark (spark) for the ignitor tips.
2. The motor runs, causing the squirrel cage fan and the fuel pump to turn (P-23, Figure 8.3) at 3450 RPM.

The fuel pump draws fuel from the tank, pressurizing it and delivers it to the fuel solenoid. The fuel solenoid is attached directly to the fuel pump by a hollow bolt which doubles as an attachment device and a fuel delivery tube. Fuel cannot go beyond this point until certain conditions are fulfilled. The next paragraph (8.5 Fuel Solenoid) explains its function.

8.5 **Fuel Solenoid** (C-13, Figure 8.3) *Refer to figure 8.2-1 (which is a simplified diagram) as you study this paragraph.*

As stated in the preceding paragraph, the fuel solenoid is attached to the fuel pump. The fuel is being delivered to the fuel solenoid when the heater switch is on but cannot proceed beyond this point. The opening and closing of the fuel solenoid is controlled by the fuel solenoid circuit (Figure 8.2-1) which consists of the heater switch, the water flow switch, temperature control, the fuel solenoid. These switches must be closed (turned on) to cause the solenoid to be energized.

1. Heater switch (on)
2. Water flow switch (on) when cleaning tool is turned on or warm-up is on or solution fill is on. Observe the green light (G-6, Figure 6.1).
3. Temperature control (on) when selecting a higher temperature than is presently indicated.

When these conditions have been met, voltage will be applied to the fuel solenoid allowing it to open so that fuel can flow to the burner gun nozzle. Note that the fuel solenoid light (G-9, Figure 6.1) on the instrument panel will be on to indicate all conditions have been met and the heater is on.

Since this is a series circuit, any one of the three switches will turn the heater off:

1. Heater switch (off)
2. Water flow switch (no water flowing through the machine)
3. Temperature control (temperature demand has been met)

8.5-1 If the heater does not come on, several possible causes are listed below:

1. Circuit breaker on motor popped (C-15, Figure 5.1)
2. Air in system, bleed with (C-12, Figure 8.3)
3. Ignitor transformer not producing spark
4. Water flow switch not closing (observe green light)
5. Fuel pump not delivering fuel to solenoid (loosen hollow solenoid mounting bolt, observe fuel flow)
6. Defective fuel solenoid - red light on but no fuel from solenoid (loosen copper tube)
7. Defective drive shaft - [(Item 15, Figure 8.6) (Motor and fan turning, fuel pump not turning)].
8. Plugged jet (nozzle) on gun

For more troubleshooting details, see Paragraph 13.8 of Troubleshooting Chart, Section 13 of this manual.

- 8.5-2 The heater operation may be checked without running the engine. Comply with the following:
1. Insert the water input hose assembly into #7 (bottom) of the cluster block.
 2. Unplug the power cord from the alternator (P-3, Figure 5.3) and connect it to a conventional 3 lead, heavy duty power cord. Connect the power cord to a regular 120V, AC 60 cycle receptacle to furnish power to the machine.
 3. Turn the warm-up valve (C-6, Figure 5.2) to the warm-up position.
 4. With the input water valve assembly, turn the water on. (Observe that water is running from the vacuum input tube.)
 5. Turn the heater switch (C-4, Figure 6.1) to "on" position.
 6. Turn the temperature control (C-5, Figure 6.1) to a higher temperature.
 7. Heater should be "on". Troubleshoot according to Paragraph 8.5-1 and Paragraph 13.8 of Troubleshooting Chart, Section 13 of this manual.

8.6 **Heater Adjustments**

- 8.6-1 Several adjustments can be made that will affect the efficiency of the oil burner system that is covered in this section of the technical manual. The quality of the fuel is a very important factor in the heating capability of the heating system. Kerosene or #1 diesel fuel has been proven to be the best. The following paragraphs describe the burner adjustments.
- 8.6-2 If it becomes necessary to bleed the air from the burner system, refer to (C-12, Figure 8.3) with the heater switch on, as described in Paragraph 6.2-3 or as in paragraph 8.5-2 above. Turn the bleed valve to the open position and allow the air to be dispensed from the system. When a steady flow of fuel is observed, close valve. The pump is primed and the burner should fire. Appropriate measures should be made to catch the fuel from the bleed valve, to keep it off the floor or pan. NOTE: just because the pump bleeds good, is no assurance that the pump is delivering fuel from its output to the fuel solenoid.
- 8.6-3 Fuel pressure can be adjusted by the fuel pressure adjustment (C-21, Figure 8.3) located on the fuel pump (P-23, Figure 8.1). The fuel pressure is factory set to approximately 105 PSI operating pressure. Each 1/4 turn of the adjustment screw will change the pressure 3 to 4 PSI. Clockwise (CW) rotation will increase the PSI and counter clockwise (CCW) will decrease the fuel pressure. Always be aware of how much and which way the adjustment was made so that the original setting can be re-accomplished if desired.
- 8.6-4 The air bands (C-14, Figure 8.3) can be adjusted to achieve maximum efficiency of the burner system. Too little air will cause the burner to burn rich, smoking and poor heating will results. If the bands are adjusted for too much air, the burner will produce poor heating qualities. After final setting of the air bands, retighten the locking screw so that the adjustment will stay set.
- 8.6-5 The burner gun can be removed for replacement of parts, i.e., electrodes, insulators, nozzle and other parts. Refer to Figure 8.5 for precise spacing of electrodes and burner gun replacement.

SECTION NINE

EXTRACTION SYSTEM

A vital part of the cleaning process is the ability to recover soil that has been suspended from the carpet or upholstery fibers. Removing the soil, dirty water and debris is the purpose of the extraction system.

The extraction (vacuum) system consists of the following components:

1. Vacuum blower (P-2, Figure 9.1)
2. Waste recovery tank (P-18, Figure 9.1)
3. Vacuum relief breaker (P-15, Figure 9.1)
4. Silencer (muffler) (P-22, Figure 9.1)
5. Connecting hoses (vacuum hoses) (Section 14)
6. Cleaning tool (Section 14)
7. Vac input tee (H-14, Figure 9.1)

9.1 **Vacuum Blower** (P-2)

9.1-1 The vacuum blower is the heart of the extraction system. As the engine runs, it turns the blower at one-to-one ratio. The normal operating speed is 2900 RPM. The blower has two impellers rotating at the operating speed, pulling air from the top of the blower and pushes it out the bottom. A very large volume of air is being moved by the positive displacement blower. Refer to Figure 9.1 as you study the Extraction System.

Under normal operating conditions, the blower receives all of its air from the slot in the cleaning tool. If we follow the route of the air along with the dirt, debris and water from the cleaning tool (see Figure 9.1), we will find that it travels through the vacuum hoses to the vacuum input connector (H-6, Figure 9.1), making its way into the waste recovery tank, where the water, dirt and debris are dumped to the bottom of the waste tank. The air continues through the lint screen (P-19), through the blower (P-2) and into the silencer (P-22). The silencer reduces the sound of the vacuum blower. The air is exhausted into the atmosphere through the silencer output tube.

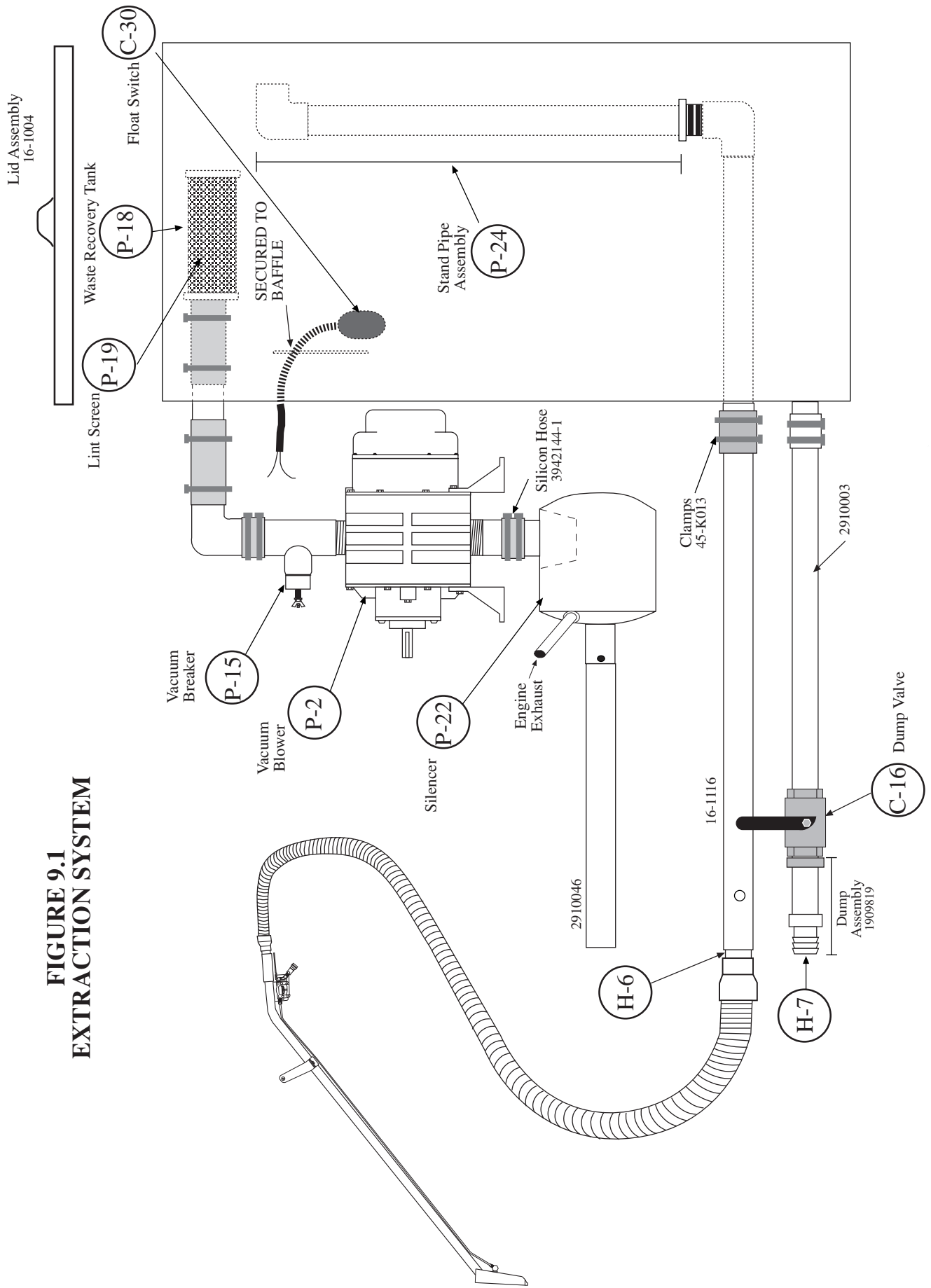
9.1-2 Good maintenance procedures for the vacuum blower will add life and efficiency to insure longer trouble-free operating hours for the blower. Listed below are three suggested maintenance procedures:

1. Make sure that the gear case is maintained with the proper level of gear oil. The blower holds 10 ounces of (PneuLube) gear oil. See the maintenance check list (Figure 12.1) for frequency of service needed.
2. Recommended grease for drive end: Use NLGI #2 premium grade, petroleum base grease with high temperature resistance and good mechanical stability, such as PneuLube grease available from your local 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.

CAUTION: To avoid blowing out the drive shaft seal, do not grease too rapidly.

3. The impellers must be serviced to enhance the longevity of the blower. This procedure is done after a known blow-over and at the end of the day. Do this procedure while the engine is running. A small amount of water is inserted into the blower oiler (H-13, Figure 5.2) with the valve open. After approximately one or two pints of water have slowly entered, let the blower air dry for two to three minutes. The last but very important part of the procedure, is to insert a small amount of oil WD-40, or chain lube through the blower oiler for five to ten seconds. This will lubricate the impellers and inner chamber of the blower. When the machine is going to be out of service for a period of time (vacations, etc.),

**FIGURE 9.1
EXTRACTION SYSTEM**



it is imperative this procedure be complied with. Close the valve after the oil has been inserted.

9.2-2 The waste recovery tank requires three points of daily maintenance to insure good air flow that makes superior drying and cleaning characteristics possible:

1. The lint screen (P-19, Figure 9.1) should be cleaned thoroughly. It is suggested that this be done at the end of each job. The filter must be removed frequently so that it can be cleaned with a wire brush and to insure maximum air flow through it.
2. Daily rinsing of the waste tank will prevent a build-up of mud and debris in the bottom of the tank. A large build-up in the tank may make it impossible to dump, requiring complete removal of the tank from the machine to be cleaned out.
3. The condition of the seal around the tank where the lid seals should be daily observance. When placing the lid back on the tank, pay particular attention that it is properly and securely set so that no vacuum leak will occur upon start-up.

9.3 **Vacuum Relief Breaker** (P-15)

9.3-1 The vacuum relief breaker is a spring loaded device that under a pre-determined vacuum load will open, giving the engine relief so that unnecessary loading will not occur. The vacuum breaker will also give relief to the operator so that the tool does not adhere to the surface material, making the tool more manageable. The vacuum relief breaker can be set for the desired break point needed for the operation at hand. Factory setting from Steam Way International is 12 to 13 Hg (inches of mercury) as the vacuum approaches 13 inches of mercury, a noticeable load will be felt by the engine and a RPM decrease will be seen on the tachometer. Tightening the spring with the wing nut will increase Hg and loosening the spring will decrease the inches of mercury (Hg).

9.4 **Silencer (Muffler)** (P-22)

9.4-1 The Silencer (P-22, Figure 9-1) is used for the Kohler engine's exhaust as well as for the vacuum blowers exhaust. The blower output enters the silencer directly beneath the blower via a 2.75 inch rubber tube and the engines exhaust enters the Silencer by the flexible exhaust tube. It is very important that the lint screen (P-19, Figure 9.1) be in place and in good condition at all times to keep lint from entering the silencer.

9.5 **Connecting Hoses** (Vacuum)

9.5-1 The vacuum hose is connected to the machines vacuum hose connection (H-6, Figure 5-2). A machine reducer is used to make it possible to connect a two inch diameter vacuum hose to a 2.5 inch connection. Two and a half (2.5) inch vacuum hoses are available when needed for extended distances to insure adequate air flow.

9.5-2 The cleaning tool has a 1.5 inch vacuum connection. To get from the cleaning tool to the machine reducer on the machine, two different diameter hoses are normally used. The use of a 1.5 inch by a 2 inch vacuum hose coupler is required. All necessary hose couplers and reducers are in your starter package of equipment.

9.6 **Cleaning Tool**

9.6-1 An assortment of cleaning tools may be used with the PowerMatic (see Section 14). During the use of any of the tools, a frequent inspection of the vacuum chamber should be made to insure that no restriction of lint or debris exists.

9.7 **Float Switch (C-30)**

9.7-1 A float switch (C-30, fig 9.1) is incorporated into the system to turn the water pump off when the tank is almost full of water to prevent a blow over. This is the operators signal that the tank should be dumped.

SECTION TEN

POWER SYSTEM

The PowerMatic® Legacy 2100 machine requires both mechanical and electrical power to drive the various components of the unit. The two major components that provide the power are:

1. The Kohler engine for mechanical power
2. The alternator for 120V AC electrical power

10.1 **Kohler Engine** (P-1, Figure 5.2)

10.1-1 The 25 HP Kohler engine is used to drive the vacuum blower, water pump and the alternator.

10.1-2 The recommended fuel for the engine is unleaded gasoline. Refer to the Kohler engine manual following this technical manual. The Kohler engine Owners Manual recommends that a high quality detergent oil with a service class "SF" or "SG" be used. Since the operating temperature (inside the vehicle) is always above 32°F, 10W-30 weight oil is preferred. Refer to the maintenance check list for all services required on Figure 12.1 of this manual.

10.1-3 The engine cooling is accomplished by two methods. Normal air cooling is accomplished by cool air being drawn into the engine by the fan on the flywheel and directed into the various cooling fins of the engine. The second method of cooling is done by diverting the oil through the cooling coils located in the water holding tank (P-7, Figure 5.1). After the oil travels through the coil which is covered with cool water, the oil goes to the oil filter and returns to the engine by the return hose. (Caution: Do not reverse the hoses.)

10.1-4 The other scheduled maintenance that is required for the engine is found on the maintenance check list (Figure 12.1). Strict adherence to this schedule has proven to provide added life and trouble free service for the engine.

10.1-5 The 12V battery is continuously being recharged by the engine's flywheel alternator. As the engine runs at its normal operating speed, the flywheel alternator produces 28 to 30 volts AC (see Figure 11.3). This AC voltage is sent to the voltage regulator rectifier where it is converted to 12V DC. The DC voltage leaves the regulator-rectifier and is sent to the starter solenoid where the positive battery cable is connected. This will provide battery charging voltage as well as power to the ignition switch via the red wire that is protected by a circuit breaker. When the ignition switch is turned on the charging voltage can be monitored on the DC volt meter (G-4 Figure 6-1).

10.2 **Alternator 120V AC** (P-3, Figure 5.3)

10.2-1 The alternator produces 120V AC, 60 cycle power at normal operating speed to operate the three components of the Wayne Burner:

1. Electric motor
2. Ignitor transformer
3. Fuel solenoid

10.2-2 The alternator has the capability of producing 2250 watts of power. The PowerMatic® Legacy 2100 unit requires only approximately 700 watts of power to operate the heater unit. Other electrical components that require 120V AC power may be operated from the AC receptacle on the alternator. However, the combined sum cannot exceed 2250 watts of power. If the power requirements exceed 2250 watts, serious damage will result and the alternator will have to be repaired or replaced.

10.2-3 The heater switch must not be turned on nor additional electrical components be plugged in until the machine has been brought up to the operating speed. The heater switch must be turned off and the additional electrical components unplugged before the engine speed is retarded.

10.2-4 Some periodic maintenance procedures for the alternator are required.

1. Inspect the circuit breaker on the rear cover of the alternator to ensure that it has not popped out.
2. The alternator contains two sets of brushes (4 brushes) that needs to be checked and or replaced periodically. The alternator will have to be removed from the machine for this procedure. See the alternator manual located in the parts section of this manual, for specific instructions,

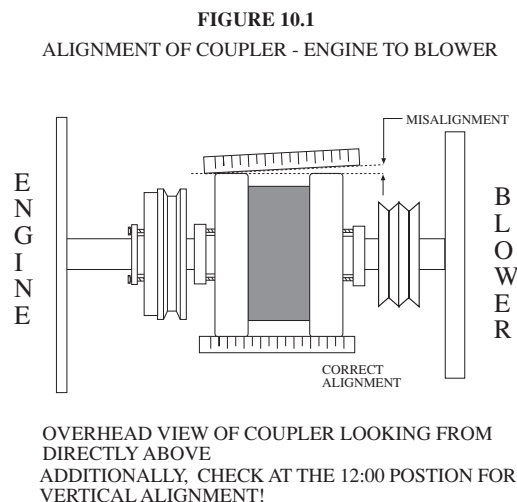
10.3 **Belt and Drive Maintenance**

The coupling device between the engine and the vacuum blower is made with the use of two flanges, two tapered bushings and a rubber sleeve. The water pump is driven by the V-pulley on the engine shaft, and the alternator is driven by the Double-V pulley on the blower shaft. All components on the engine and blower shaft are stabilized with tapered bushings.

10.3-1 The flanges for the blower and engine uses taper lock bushings to secure them onto the shaft. The heads of the bolts for the bushings are located inside the rubber sleeve. To gain access to the bolts for the bushings, the engine must be pulled forward approximately one inch to allow the rubber sleeve to be removed. To remove the flange from the shaft, take the three bolts from their existing locations and insert them into the other three holes. As they are tightened, the bolts will push the flange away from the bushing. Reinstallation of the flange and bushing is done by inserting the three bolts back into the original holes. As they are tightened, the device will be pulled together and a secure connection will be made. **CAUTION:** Only nine foot pounds of torque is required. (Do not over tighten.)

10.3-2 When the bushings, flanges or pulleys are removed from the shaft, it is important to make note of the exact location of that device on the shaft. The "V" pulleys and the Double V-pulleys use the same general type of mechanism for their removal or installation with only slight differences, i.e., the number of bolts and type of screw heads.

10.3-3 To tighten the "V" belt for the water pump, the four bolts on the pump bracket must be loosened slightly. The mounting bracket is slotted, which will allow the pump to be moved in the direction of the water holding tank. While holding torque on the pump, the four bolts must be retightened.

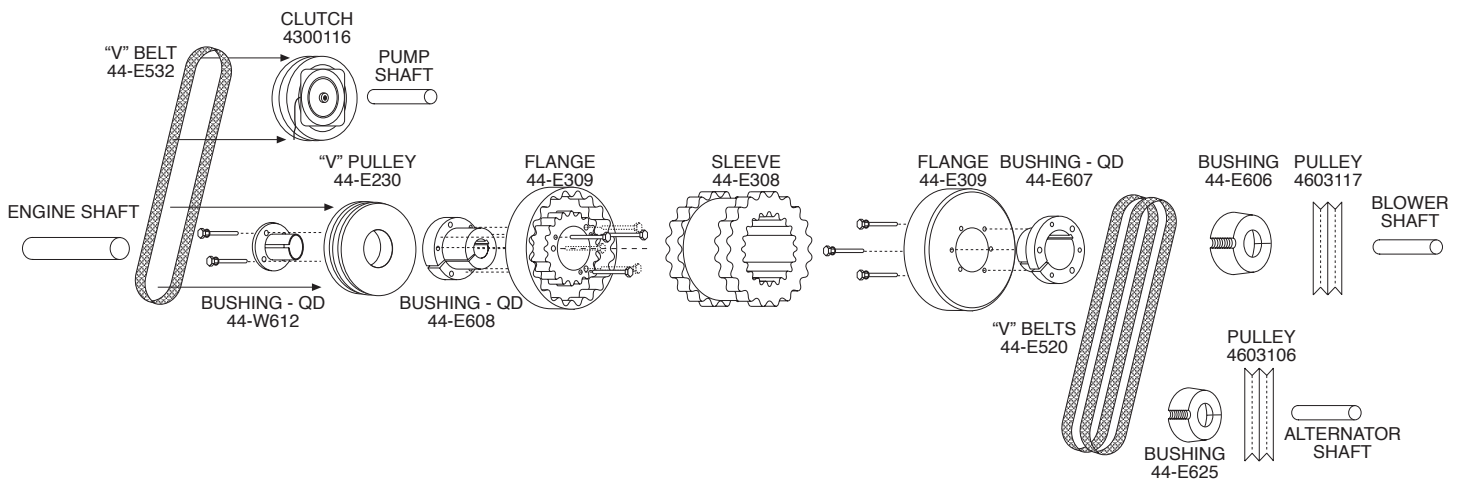


10.3-4 The alternator belt is tightened after loosening the four bolts on the alternator mounting plate. Just under the outer edge of the alternator mounting plate are two Allen screws that when tightened will pull the mounting plate away from the blower, which will make the belt tighter. Alignment of the belt must be considered during this procedure. Equal tightening of each of the Allen screws will assure proper alignment. **CAUTION: DO NOT OVER TIGHTEN.** Retighten the four bolts on the alternator mounting plate.

10.3-5 When the installation of a new belt is required, the engine must be decoupled as per Paragraph 10.3-1, so that new belts can be installed over the main shaft. It is very important to realign the engine to blower before the mounting bolts are tightened. Use Figure 10.1 as a reference to assure proper alignment. A straight edge is used at the 9:00 o'clock or 3:00 o'clock positions on the flanges to confirm proper alignment. The engine's mounting bolts are retightened after the alignment mentioned above is assured.

10.3-6 The complete drive system is shown on Figure 10.2 with the part number for each item.

**FIGURE 10.2
POWERMATIC LEGACY DRIVE COMPONENTS**



SECTION 11

ELECTRICAL SYSTEMS

11.1 The electrical systems are shown on the following pages, which consist of two diagrams, Figure 11.1 and 11.2, which describe how the 120V AC power is used. Figures 11.3 through 11.7 show the 12V DC circuits. A list of the circuits is shown below.

1. Burner motor and high voltage transformer circuit
2. Burner fuel solenoid circuit
3. Battery charging, 15 Amp wiring diagram
4. Ignition modules grounding circuit
5. 12V water temperature gauge and DC volt meter circuit
6. Water pump clutch circuit
7. Tachometer/hour meter circuit
8. Engine fuel pump and gauge light circuit

11.2 **Electrical Circuits**

A brief explanation of each diagram is found in this section. Read the explanation while following the appropriate diagram.

11.2-1 Burner Motor and High Voltage Transformer Circuit (see Figure 11.1)

The source of the AC voltage is from the alternator (1), which generates 120V AC at the operating speed. This is monitored on the AC volt meter (8). The heater switch (2) allows the power to be distributed to the 16-2 power cord that delivers power to run the fan and fuel pump motor (3), the high voltage transformer (4) and one lead of power for the fuel solenoid (5). The motor (3) and transformer (4) are completed circuits but the fuel solenoid's (5) circuit is not completed until other conditions are met, which will be outlined in the next paragraph and figure of this section.

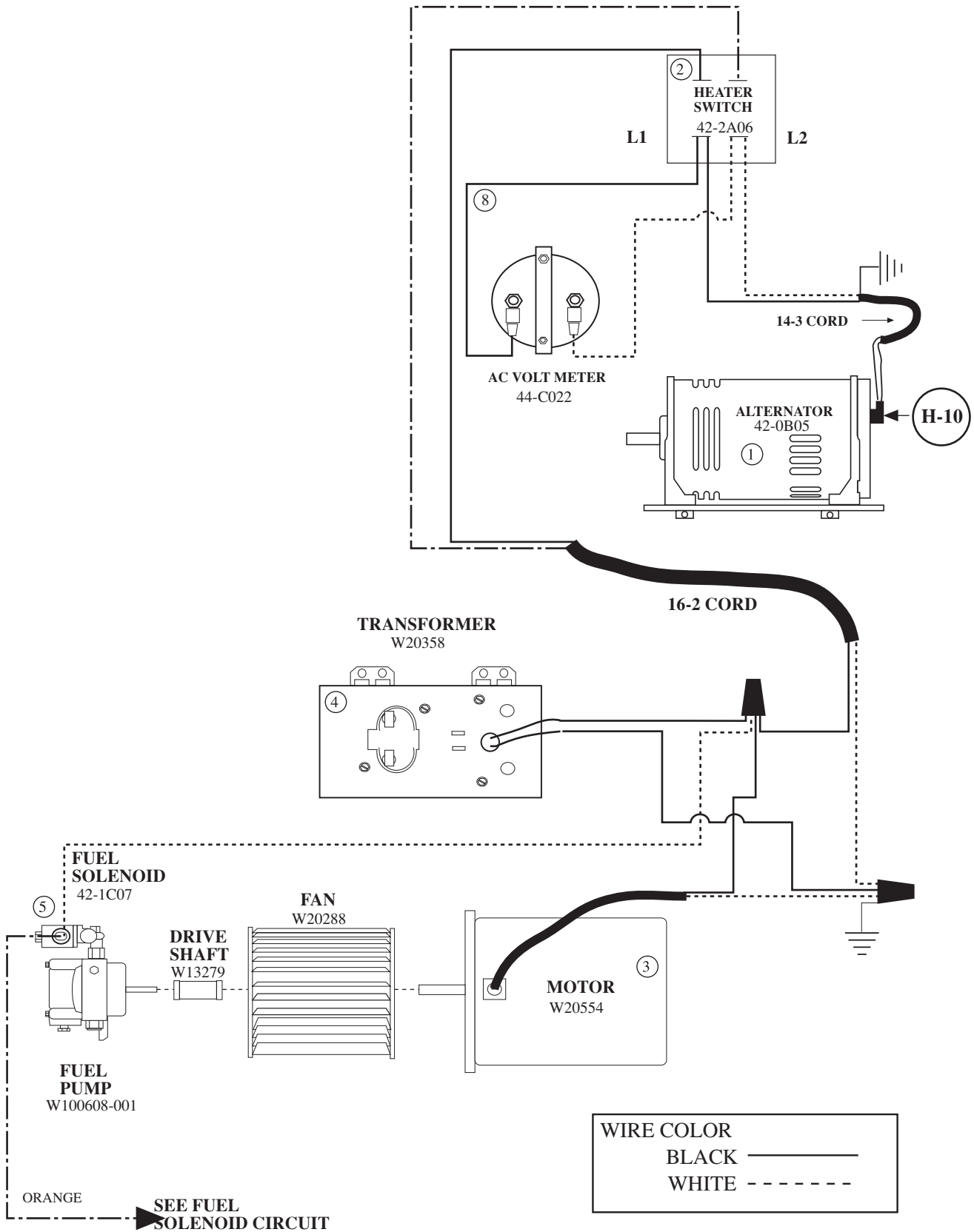
11.2-2 Burner Fuel Solenoid Circuit (see Figure 11.2)

As mentioned in 11.2-1 above the black lead is all ready attached to the fuel solenoid (5) but the white lead will be the controlling factor to get power to the solenoid (5). Following the white lead from the 16-2 cord we see that four connections are made at the middle wire nut on figure 11.2 transformer, motor, and both white leads of the two 16-2 cords. The white lead passes through the water flow switch (6) when water flows and goes to the top of the temperature control (9). If temperature is demanded the contacts will be closed and power will exit the black lead at the bottom and will be attached to the orange solenoid lead after going through the 16-2 cord. Note at the temperature control (9) two lights are attached, one to show that water is flowing (10) the green light and the other is the solenoid light (11) red that assures that the fuel solenoid (5) is receiving voltage. Note that Figure 8.2-1 is a simplified diagram to aid you in the understanding of this circuit.

11.2-3 Battery Charging 25 Amp Wiring Diagram (see Figure 11.3)

When the engine is running at the appropriate speed, AC power will be picked up from the flywheel stator (bottom right corner of Figure 11.3) and sent to the rectifier regulator. This power will be approximately 28 to 30 AC, but must be rectified because AC power cannot recharge a battery. The B+ lead comes out of the rectifier regulator and is sent to the starter solenoid via the violet wire, where it is connected to the battery cable for a charging opath to the battery. The B+ provides no less than 13.7 volts DC to recharge the battery. The source of power for the ignition switch and related circuits, is brought to the ignition switch (contact B) from the starter solenoid via a red wire. A circuit breaker is in this lead to protect the system from electrical over-loads.

FIGURE 11.1
BURNER MOTOR AND HIGH VOLTAGE TRANSFORMER CIRCUIT



**FIGURE 11.2
FUEL SOLENOID CONTROL CIRCUIT**

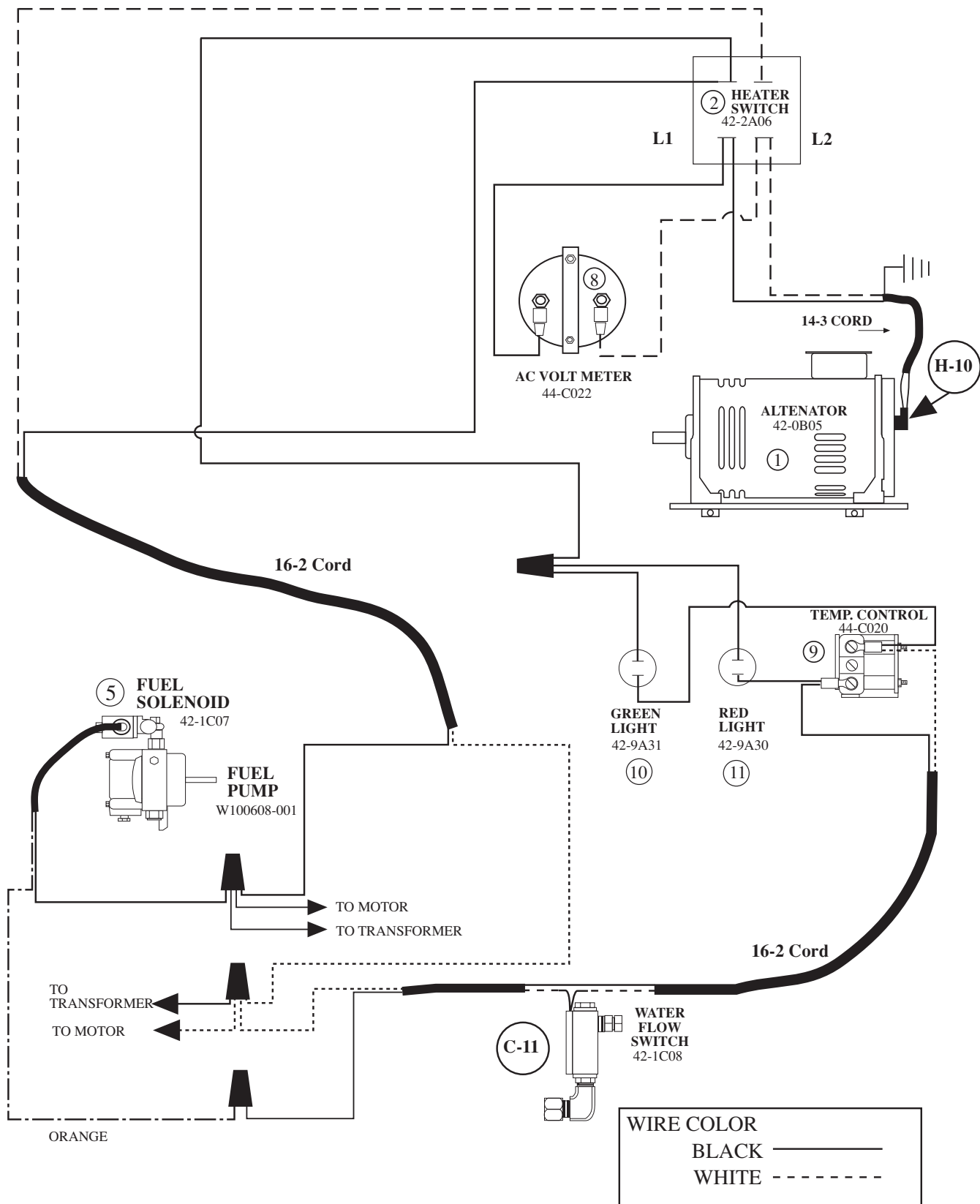


FIGURE 11.3

**WIRING DIAGRAM - REGULATED
25 AMP BATTERY CHARGING SYSTEM**

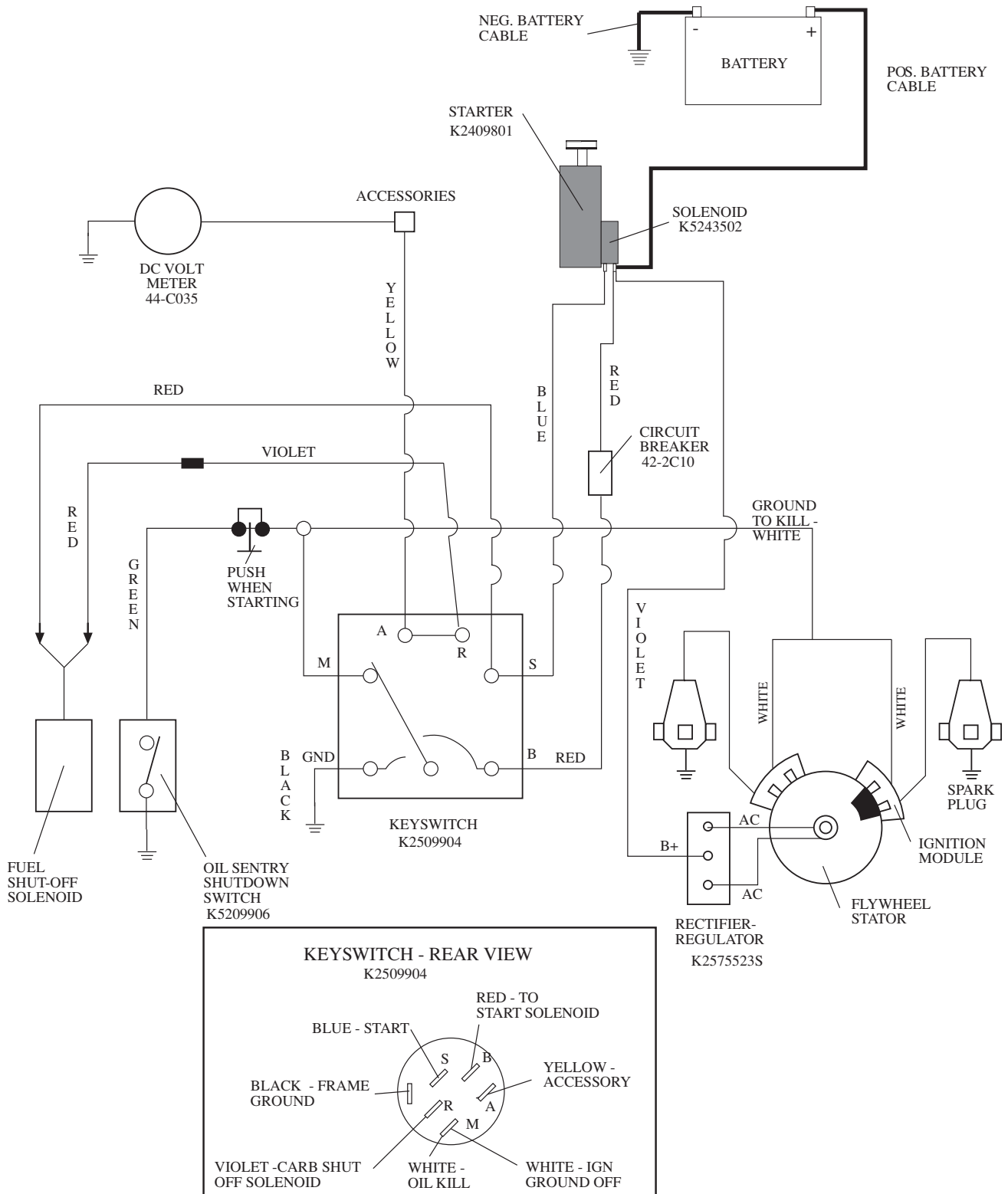


FIGURE 11.4

**DC VOLT METER AND WATER TEMPERATURE
DC GAUGE CIRCUIT**

CONTROL PANEL (REAR VIEW)

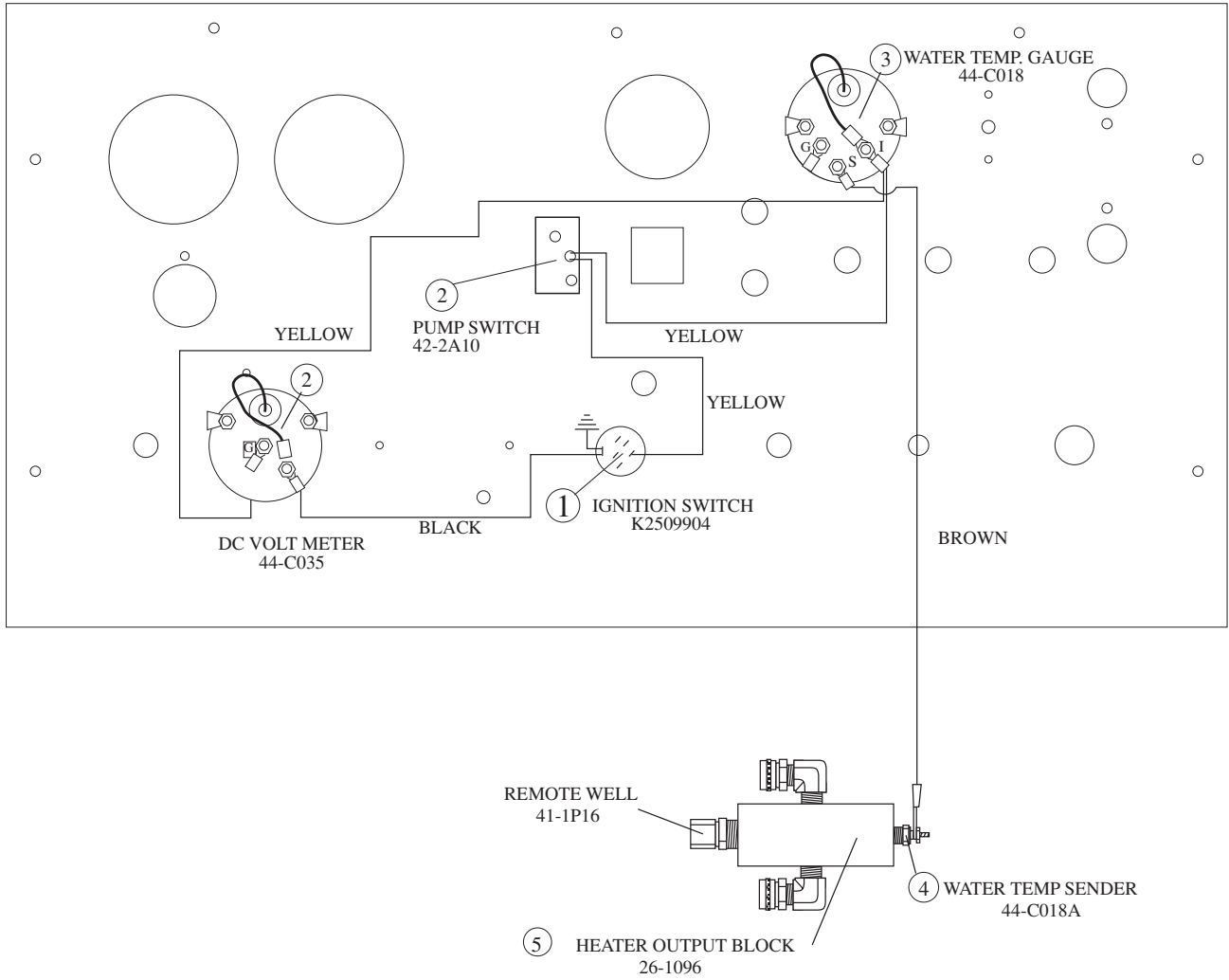


FIGURE 11.5
WATER PUMP CLUTCH CIRCUIT

CONTROL PANEL (REAR VIEW)

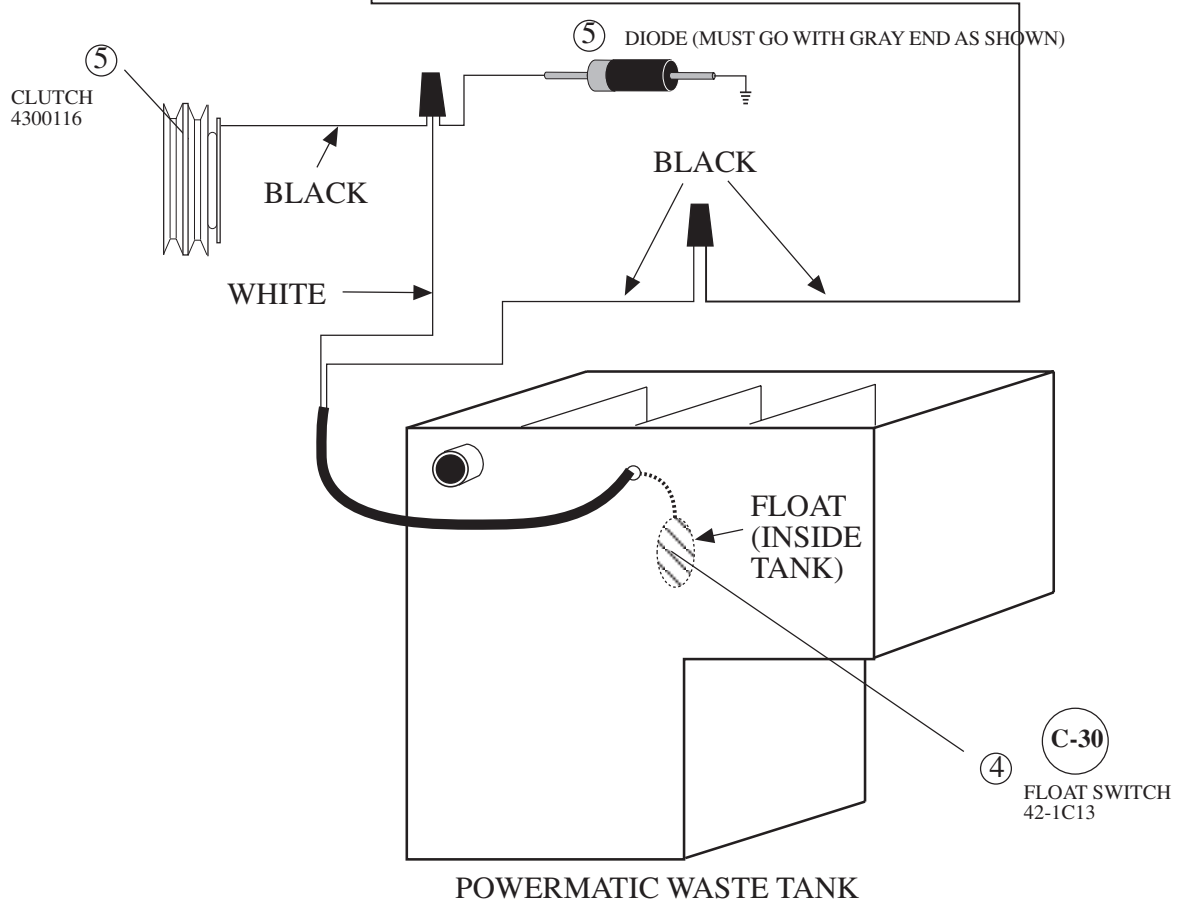
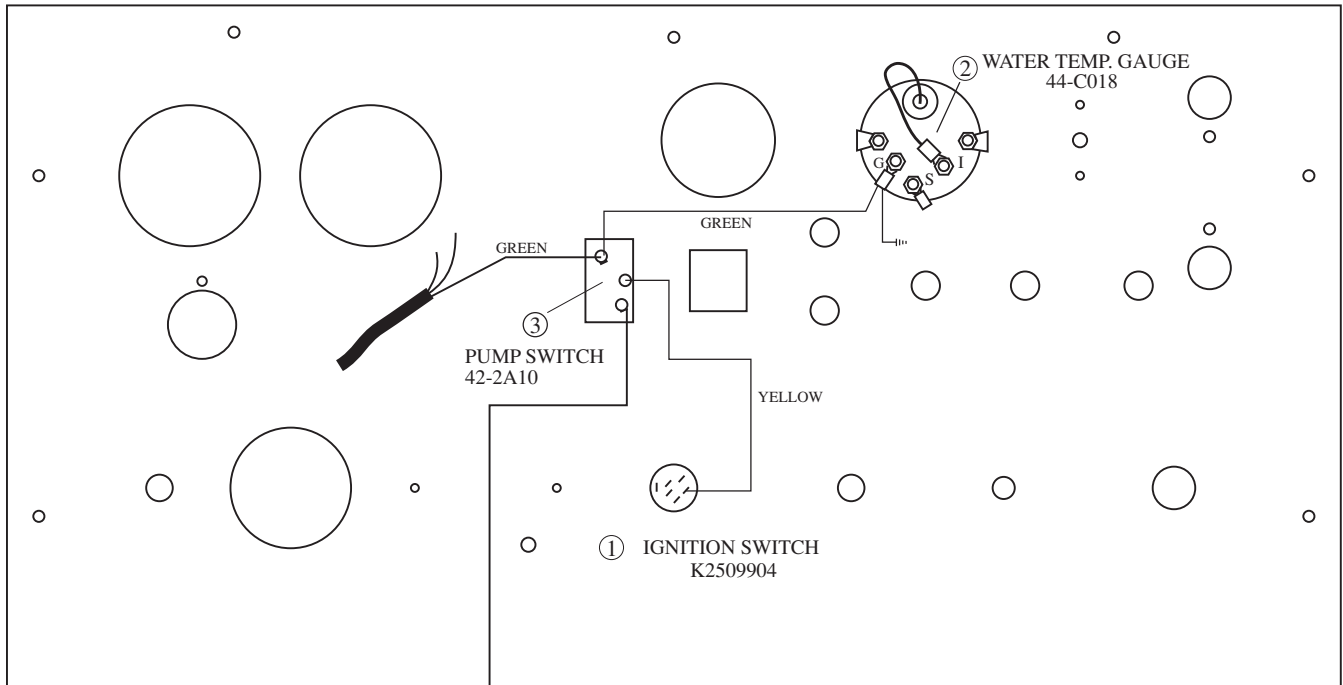


FIGURE 11.6
TACHOMETER HOUR METER CIRCUIT

CONTROL PANEL (REAR VIEW)

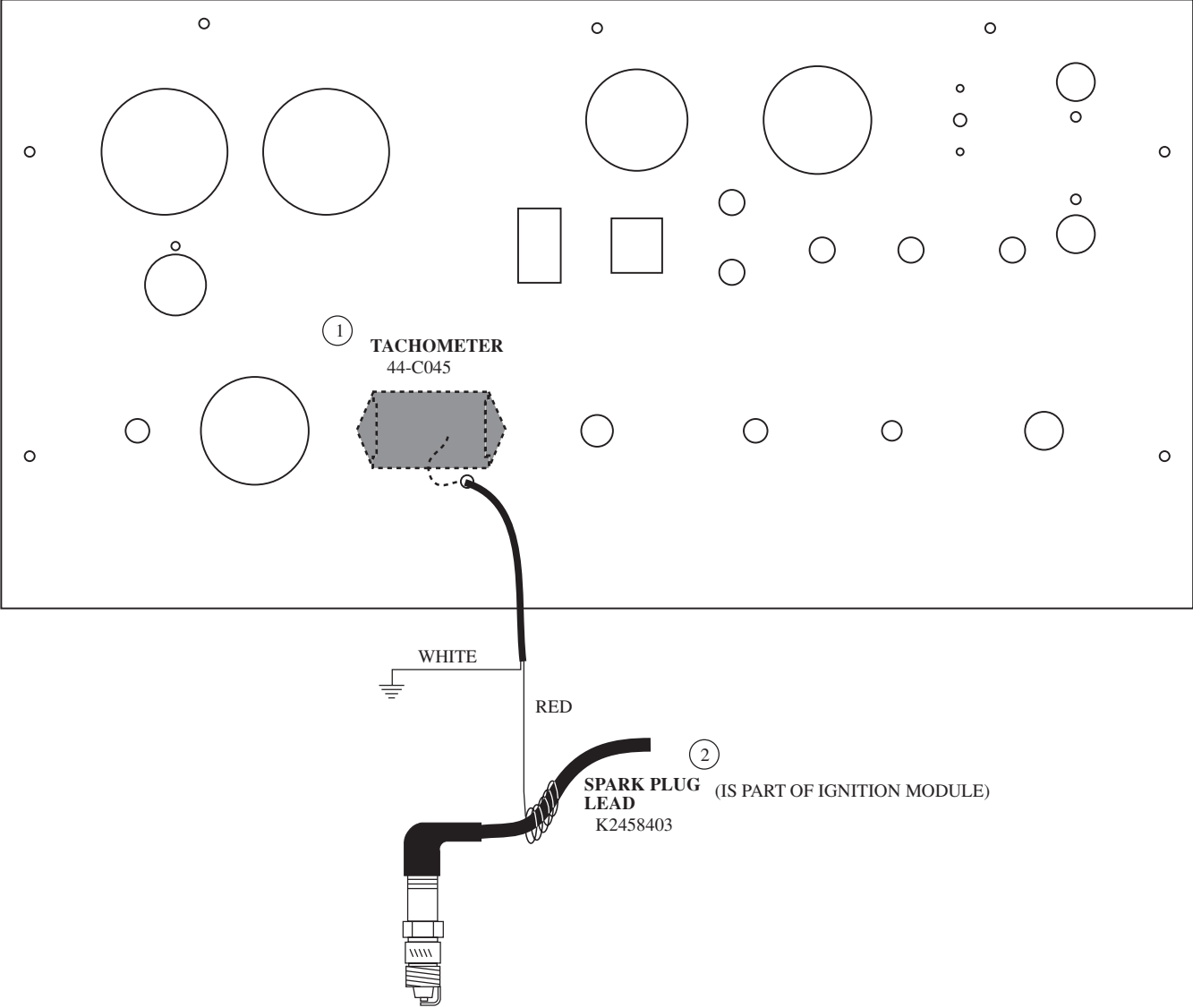
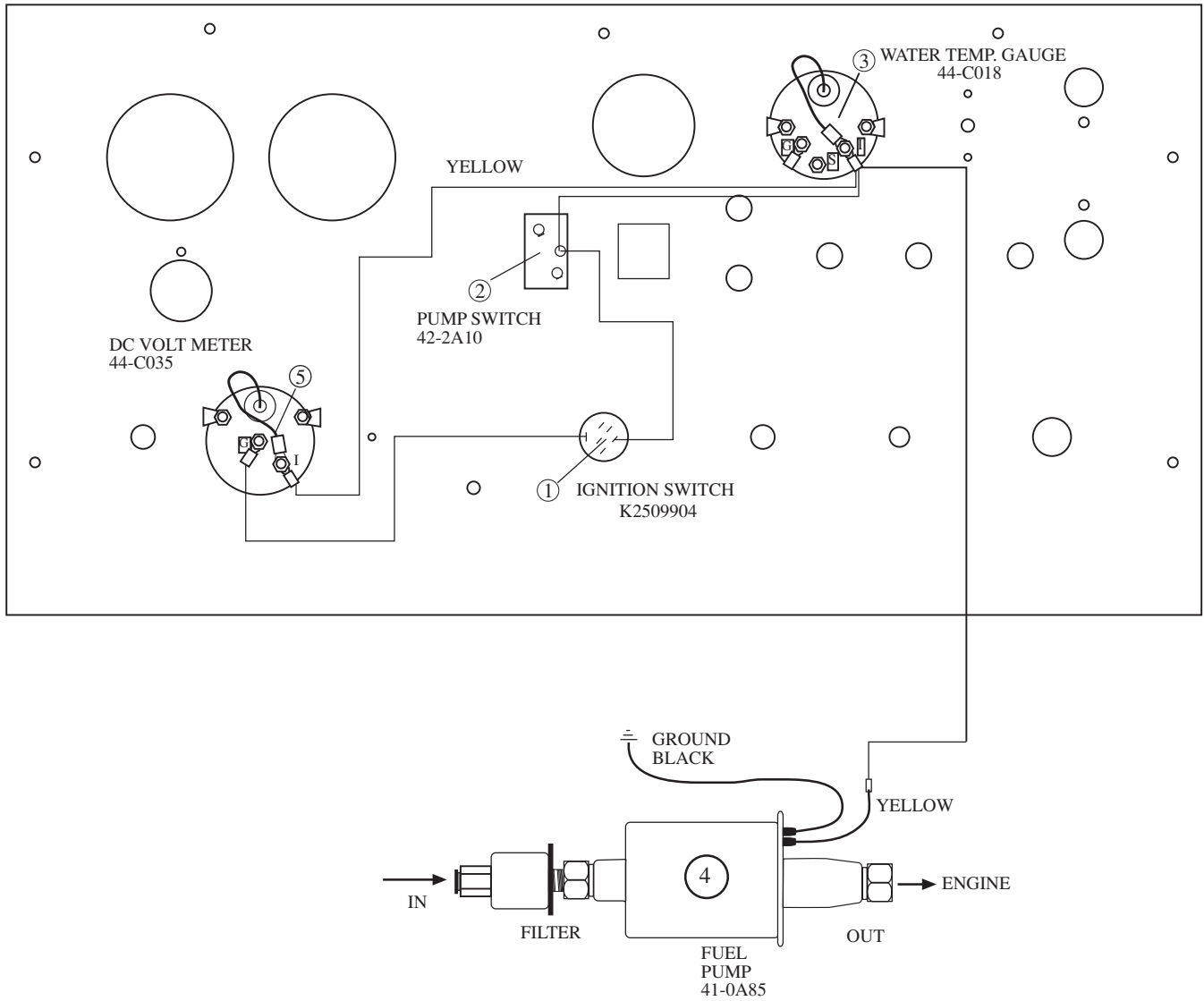


FIGURE 11.7
ENGINE FUEL PUMP AND GAUGE LIGHT CIRCUIT

CONTROL PANEL (REAR VIEW)



When the key switch is turned to the "on" position, battery power goes from contact B of the key switch to contacts A and R, to provide power for accessories and power to open the fuel shut-off solenoid on the carburetors. Power is also applied to the DC volt meter, which will show approximately 14 volts, to assure that the battery is being recharged.

11.2-4 Ignition Module Grounding Circuit (see Figure 11.3)

When the ignition switch is in the "off" position, the ignition modules are grounded and they cannot produce a spark for the spark plugs. When the ignition switch is turned "on" or the "start" position, this ground is removed but another ground will keep the engine from running, unless sufficient oil pressure is monitored by the oil sentry switch. During the starting process, the starter motor will cause the oil pressure to build-up to a safe level, ungrounding the ignition modules. However, a push button (Figure 6.1, C-22) when pressed will eliminate the ground at the sentry switch and cause a much quicker start for the engine. **CAUTION:** If pressing the button (Figure 6.1, C-22) is the only way to keep the engine running, this probably indicates a serious oil pressure problem and the engine should be shut down immediately.

11.2-5 Water Temperature Gauge Circuit (see Figure 11.4)

When the ignition switch (1) is turned on, voltage is applied to the pump switch (2) and sent on to the I terminal of the water temperature gauge (3). The water temperature sender (4) responds to the actual water temperature present at this point and controls the electrical current that will flow in this circuit, causing the water temperature gauge to respond accordingly. The reading on the gauge is a calibrated reading and will show accurate temperature. No other wire other than the brown wire from the sender (4) should ever be attached to the S terminal of the water temperature gauge (3).

11.2-6 Water Pump Clutch Circuit (see Figure 11.5)

The power that engages the clutch comes from the ignition switch (1). When the key is in the "on" position, power is supplied to the pump switch (3). When the pump switch (3) is turned on, power will be sent to the float switch (4) inside the waste tank. If the waste tank is not full, the power will through the float switch, which is connected directly to the black wire of the clutch coil (5) engaging the clutch. A diode is connected between the clutch wire and ground, that will protect the contacts of the switch and the light bulb in the pump switch (3). The bulb in the pump switch (3) is grounded to the ground terminal of the water temperature gauge (2).

11.2-7 Tachometer/Hour Meter Circuit (see Figure 11.6)

When the engine is running, a red pick-up wire that is wrapped around the spark plug lead, which excite the tachometer/hour meter (1) and it will show the speed of the engine (RPM). When the engine is not running, the tachometer/hour meter (1) will show the total hours of operation to let you know when maintenance is due. See your Kohler engine manual and refer to the maintenance check list on Figure 12.1 in this manual. The white lead is attached to the ground.

11.2-8 Engine Fuel Pump and Gauge Light Circuit (see Figure 11.7)

When the ignition switch (1) is turned on, 12 volts DC is sent to the I terminal of the water Temperature gauge (3) via the pump clutch switch (2). Terminal I of the water temperature gauge is the hook-up point for the fuel pump (4) and the light bulbs in the temperature gauge (3) and the power to the DC volt meter (5).

SECTION 12

MAINTENANCE

- 12.1 Good maintenance procedures are the key to longer life and less down time of your equipment. Most new operators of this equipment fail to realize just how much use they subject the machine to. Listed below is a comparison chart to compare PowerMatic® Legacy 2100 hours operated to automobile miles driven:

<u>Hours</u>	<u>Miles</u>	
1	70	Job
5	350	Day
25	1750	Week
108	7575	Month
1296	91,000	Year

With these numbers in mind, we at Steam Way International request that you comply with the maintenance check list on Figure 12.1, which is the next page in this Technical manual. Failure to comply may void the warranty. The items, frequencies and products to use are suggested on the Maintenance Check List. Those are the intervals suggested by the manufacturer of that component.

It is very important that you start a maintenance log to go along with the maintenance check list. A maintenance log, properly maintained, will let you know when maintenance is due.

- 12.2 Please refer to the maintenance check list (Figure 12.1). The left hand column lists the components that require scheduled maintenance. The center portion of the chart indicates the frequency of maintenance. The right hand column lists the type of lubricant, product or special service needed, and Steam Way®'s part number for that product.

FIGURE 12.1 MAINTENANCE CHECK LIST (PowerMatic® Legacy 2100)

Item	Every Job	Every Day	Every Week	1 Month	50 Hours	100 Hours	200 Hours	500 Hours	Product (Available At Steam Way® Int'l)
Lint Screen Waste Tank	Clean	(Note: monitor the filter conditions gauge, G-5, fig. 6-1)							
KOHLER ENGINE									
Oil	Check	5hrs. 1st	Change						10W30 (API SF OR SG)
Oil Filter		5 hrs. 1st	Change						K1205001
Air Filter			Change						K2508303
Pre-cleaner	Wash and re-oil each 25 hours								K24080305
Spark Plugs						Check	Change		K1213202 RC12YC Champion
CAT PUMP									
⚙️ Crank Case Oil	Check				1st Change			Change	Special Oil (CAT Pump Oil) #4810106
VAC BLOWER									
Crank Case Oil						First Change		Change	Pneulube Gear Oil #4100158-1
Bearing Grease						Lube			See pg 33 Paragraph 9.1-2 #2 Use a high speed temp lube
Impellers	Lube								See pg 33 Paragraph 9.1-2 #3
PRESSURE REGULATOR									
				Lube					Same as blower bearing grease above
GASOLINE FILTER									
	If it becomes necessary to change - Remove existing filter and replace with a standard in line filter that can be purchased locally.								
KEROSENE FILTER									
								Change	K2405002

SECTION 13

Troubleshooting

This section is not intended to cover every possible malfunction that could happen, but it does cover a wide variety of possible problems that might occur during the life of the PowerMatic. The key to skillful troubleshooting is knowledge, the better you understand the operation of your unit, the easier it will be to identify and repair the problem.

The troubleshooting chart which follows is organized in three columns:

Left - Problem

Center - Probable Cause

Right - Corrective Action

In using the troubleshooting chart, you will most likely discover the probable cause and make the corrective action to get back into service immediately. Even if a determination cannot be made at this point, the information gained during troubleshooting will aid your distributor or Steam Way International in helping you to solve the problem.

Problem	Probable Cause	Corrective Action
<p>13.1 Low Pressure at water supply</p>	<p>1) Inadequate supply</p> <p>2) Partially frozen supply hose Partially frozen faucet</p>	<p>1) Locate a better source or use auxiliary water holding tank (optional equipment) 100 gal. on board supply.</p> <p>Let water run to thaw hose or pipes</p> <p>Use auxiliary water holding tank for conditions above (optional equipment)</p>
<p>13.2 Low pressure at water connection (P-14) to machine</p>	<p>1) Water faucet not fully open</p> <p>2) Low pressure at source</p> <p>3) Hose screen clogged (P-14)</p> <p>4) Water supply hose kinked</p> <p>5) Partially frozen hose or supply</p>	<p>1) Open faucet</p> <p>2) Same as 13.1 above</p> <p>3) Remove, clean, or replace</p> <p>4) Straighten hose</p> <p>5) Same as 13.1 above</p>
<p>13.3 Low operating pressure or no pressure at all</p>	<p>1) Inadequate water supply</p> <p>2) Solution (soap) tank dry</p> <p>3) Pump clutch switch off</p> <p>4) Faulty clutch</p> <p>5) Defective float switch</p> <p>6) In-line filter restricting water flow (P-10)</p> <p>7) Waste tank full</p> <p>8) A Air lock in inlet side of pump engaged. Hold hand on vac input connector for 10 seconds, warm-up to off check for pressure on gauge.</p> <p>9) Defective warm-up valve</p> <p>10) Defective pressure regulator</p> <p>11) Worn seals in Cat Pump or defective pump</p> <p>12) Belt slipping or broken on Cat Pump</p> <p>13) Severe air lock in suction side of pump</p>	<p>1) Same as 13.1 and 13.2 above</p> <p>2) Fill tank or close solution shut off valve (C-18, Fig. 7-4)</p> <p>3) Turn switch on</p> <p>4) Replace</p> <p>5) By-pass momentarily then re place in waste tank</p> <p>6) Clean filter</p> <p>7) Drain tank completely (switch stays off until almost empty)</p> <p>8) Turn on warm-up, with clutch</p> <p>9) Replace three way warm-up valve releasing pressure to waste tank</p> <p>10) Re-adjust pressure regulator to minimum value, then adjust for desired value. Repeat operation two or three times. <u>Note:</u> Hold stem while adjusting regulator to prevent stem from turning.</p> <p>11) Replace seals or defective component. See Cat Pump Manual for repairs.</p> <p>12) Tighten or replace</p> <p>13) Force feed pump with water inlet of pump hose to #7 of cluster. Look for leaks. Repair if observed then test run while force feeding the pump.</p>

Problem	Probable Cause	Corrective Action
13.4 Low operating pressure at tool but good pressure on gauge	1) Jet in cleaning tool partially clogged 2) Scaling in pressure hoses 3) Scaling in heater coils and hoses of machine (Full open in warm-up PSI gauge should read near zero).	1) Remove clog or replace jet 2) Descale or replace hoses 3) If substantial pressure is observed (100 PSI or more). Descale machine. See descaling Procedures in this manual (Fig.15.2)
13.5 Pressure higher than pre-set	1) Pressure regulator defective valve 2) Heater runaway (excessive steam pressure)	1) a. Reset regulator to desired pressure b. Disassemble regulator, clean, lubricate, reassemble, and adjust to desired PSI NOTE: Do not let stem turn when adjusting pressure. 2) Turn heater off immediately
13.6 Reduced cleaning action	1) Low pressure 2) Solution strength too weak 3) Water temperature too low 4) Clogged jet 5) Severe scale build-up in hoses and heater coil	1) Refer to 13.3 and 13.4 2) Increase Visi-Float adjustment 3) Increase temperature with control 4) Repair or replace 5) Descale machine - see descaling procedure
13.7 Water holding tank over fills	1) Improper adjustment of float ball in holding tank 2) Bent float rod 3) Float valve stuck or worn valve seat 4) Reposition vehicle	1) Readjust for lower level 2) Bend rod for desired shut off 3) Disassemble, clean, inspect, or replace 4) Angle of vehicle (parked unlevel)
13.8 Burner will not fire	1) No 120V AC Power (Check AC volt meter) 2) Heater switch off 3) Thermal reset button on burner blower motor tripped 4) Temp Control set too low 5) No water flow (no green light) 6) No fuel (kerosene) 7) Defective fuel solenoid (both green and red light lit, but burner does not fire) 8) Defective ignitor transformer	1) Re-establish 120VAC (See 13.11) (alternator) - (Power Cord) 2) Turn-on 3) Push in to reset (C-15, Fig. 8-1) If it trips again, check the kerosene fuel pump for seizure. 4) Set for desired temperature 5) Turn pump clutch on when pressure is seen, turn on cleaning tool, or turn to warm up or turn to solution fill (to get green light). 6) Fill tank then bleed air as per section 5 paragraph 5.1 7) Assuming that fuel is present to solenoid but no output. REPLACE SOLENOID. 8) If weak spark or no spark, replace ignitor transformer.

Problem	Probable Cause	Corrective Action
13.8 continued	9) Kerosene fuel pump defective 10) Defective drive shaft (shaft will not turn pump) 11) Defective water flow switch (water flows but no green light) 12) Defective temperature control	9) a. pump bleeds but will not deliver fuel to fuel solenoid - replace pump b. Pump locked (siezed) cannot unlock - replace pump 10) Replace drive shaft 11) Replace flow switch 12) Short the two wires on back of temperature control together - if heater comes on, replace micro switch or temperature control
13.9 Heater comes on but water does not get hot.	1) Baffle plate in heater coil missing or out of place 2) Air bands improperly set 3) Low fuel pressure 4) Partially clogged burner nozzle 5) Severe scaling in heater coils 6) Inferior grade burner fuel	1) Reattach to coil 2) Readjust (Fig. 8.3, C-14) 3) Readjust as per Paragraph 8.6-3 and Fig. 8.3, C-21 4) Replace jet 5) Descale unit as per descaling procedure in this manual (15.2) 6) Replace fuel with proper fuel (good grade, good quality)
13.10 Heater does not go off when red (fuel solenoid) light goes off or water flow light (green) is on when no water is flowing or heater runs after set temperature has been met but goes on and off with the water flow.	1) Fuel solenoid is stuck in open 2) Defective water flow switch 3) Defective temperature control (no gas in capillary)	1) Change fuel solenoid immediately or serious damage will result 2) Replace water flow switch 3) Replace temperature control (use thermal compound)
13.11 No 120V AC voltage	1) Belt broken 2) Plug not inserted into AC receptacle securely 3) Pulley slipping on shaft 4) Brushes worn too short (in alternator) 5) Take up rings (commutators) corroded, dirty or oily 6) Defective electrical cord (alternator to heater switch) 7) Defective alternator	1) Replace 2) Reconnect 3) Check key and retighten 4) 1/2 inch or shorter- replace 5) Clean with 200 grit sandpaper (do not use emery cloth) 6) Repair or replace 7) Repair or replace alternator
13.12 Low vacuum	1) Waste tank lid not properly sealed 2) Dump valve open 3) Lint screen in waste tank clogged 4) Vacuum relief breaker improperly set or faulty 5) Defective vacuum hoses or connectors 6) Drive coupler engine to blower shaft slipping	1) Reposition lid - replace seal 2) Close dump valve 3) Remove and clean thoroughly (use wire brush) 4) Reset, repair or replace 5) Repair or replace 6) Replace

Problem	Probable Cause	Corrective Action
13.12 continued	7) Lid on view master not properly sealed (when used) optional 8) Crack in waste tank 9) Clog in vacuum line or tubes in waste tank 10) Clogged vacuum chamber of cleaning tool 11) Silencer clogged with lint 12) Normal vacuum but gauge reads low 13) Blower worn out	7) Reset lid or replace gasket 8) Repair (weld) 9) Remove debris use garden hose 10) Remove debris 11) Replace silencer 12) Vent gauge or replace 13) Replace - usually not worth rebuilding
13.13 No gasoline to engine	1) Out of gasoline 2) Defective fuel pump (pump does not click) (pump chatters excessively) 3) Fuel line not firmly connected 4) Dirty fuel filter 5) Defective fuel line-tank to fuel pump (air leak) or (restricted)	1) Fill tank 2) Replace pump 3) Check connections, reattach if loose 4) Located on gasoline fuel, pump 5) Repair or replace
13.14 Low or no oil pressure (confirm by having to hold the "Push When Starting" button to keep the engine running). NOTE: Immediate and severe damage will occur. Do not run engine.	1) Inadequate oil level in engine 2) Oil pressure centry switch 4) Defective oil pump (Kohler engine)	1) Fill to proper level 2) Have service center check for oil pressure 4) See Kohler engine service center
13.15 Engine drive coupling failure	1) Worn or broken drive sleeve 2) Engine to blower shaft misalignment 3) Taperlock bushing or flange loose	1) Replace drive sleeve 2) Realign as per Figure 10.1 3) Separate engine from blower reassemble or replace (Caution: Only 9 foot lbs. of torque required).
13.16 Excessive machine vibration	1) Loose or defective belts, alternator drive 2) Misalignment between engine and blower 3) Rough running engine 4) Pump-Belt defective 5) Loose alternator	1) Tighten or replace 2) Realign as per Figure 10.1 3) Usually indicates engine tune-up needed 4) Replace belt 5) Realign and tighten bolts

SECTION 14

Cleaning Tools, Hoses, And Accessories

14.1 Section 14 gives a brief description of the various cleaning tools, hoses, and accessories available for use with the truck mounted units. Steam Way International publishes a catalog "Cleaning Tech-Catalog" that gives a complete listing of all equipment and products available. A copy of the catalog is presented with the purchase of each machine sold and a copy should be in this notebook binder.

14.2 Listed below is an assortment of cleaning tools for each major category:

14.2-1 Carpet Cleaning Tools	Part #'s
1. 12" stainless steel scrub wand (standard)	10-5090
14.2-2 Upholstery Cleaning Tools	
1. Standard upholstery tool	10-2001
2. Hydro-Kinetic upholstery tool	10-2050
3. Deluxe upholstery tool	10-2200
14.2-3 Stair Cleaning Tool	
1. Short handle stair tool	10-3101
Note: The items in paragraph 14.2-2 and 14.2-3 above require the use of a <u>mini-head adapter</u> part # 10-9001.	
14.2-4 Hard Surface Cleaning Tool	
1. E.P.C. 380 hard surface wand	10-5500
14.2-5 High Pressure Washing Tools	
1. High pressure wash gun w/30" barrel	10-6094
2. High pressure wash gun w/48" barrel	10-6095
3. High pressure dirt blaster	48-K095

14.3 Pressure hoses are available in 25' and 50' lengths. The PowerMatic® Legacy 2100 uses 3/8 inch quick disconnects and can be ordered with or without QD's. The hose carries a P.S.I. and temperature rating well above any projected operating ranges for which the equipment was designed to be used.

14.4 Vacuum hoses are available in diameters of 2-1/2", 2", and 1-1/2". The standard vacuum hose used is a durable and manageable G-Vac hose that comes in 25 foot and 50 foot lengths. Heavy duty high vac hoses are also available but are restricted to 25 foot lengths. Vacuum hose cuffs and couplers are available for all types and diameter hoses mentioned above.

14.5 Many accessories are available that will enhance the operation of the PowerMatic® Legacy 2100 cleaning plant. A list of all accessories available is in the "Cleaning Tech Catalog".

SECTION 15

General Data

This section contains information about chemical usage and guides the operator to information about the types of chemicals available and how to mix and use them. Also, in this section, the descaling procedure is covered step by step.

15.1 Chemical Usage

An array of chemicals are available for a wide variety of cleaning operations, fabrics and conditions to be used with the PowerMatic® Legacy 2100. A list of these is found in the "Cleaning Tech Catalog" Chemicals section, where much information can be gained by studying this important data. The "Cleaning And Restoration Procedures Manual" which includes a chemical manual is also supplied with the purchase of your PowerMatic cleaning machine. A thorough understanding of the information in these manuals will help you to become the professional cleaner that you want to be.

15.2 Descaling

15.2-1 Scale buildup inside the coils and hoses is a natural phenomenon for water heating systems. The rate of build-up depends on several factors such as the minerals in the water, the type of chemicals used, and the operating procedures being used. All three of the above mentioned factors can be controlled to some extent. Water softeners and magnetic devices can take away or reduce the minerals that cause scaling problems. The quality and quantity of the rinsing agents will effect the scaling rate. Flushing chemicals from the unit when not in use will also decrease the scaling rate.

15.2-2 Scale buildup can be verified by the procedures below:

1. Turn warm-up valve fully open in the warm up mode, the water pressure gauge should read near zero P.S.I. High P.S.I. reading in warm-up indicates much scale build-up.
2. Visually inspect hoses and connections for thick build-up inside these components verifies scaling.
3. When desired P.S.I. reading on the pressure gauge is observed but little water is being dispensed through the cleaning tool. Indicates a blockage in the system. NOTE: This could indicate a plugged jet in the tool.
4. Remove the pressure out male QD (H-4) when the pump is turned on, water should be discharged freely through this opening with little or no pressure reading on the water pressure gauge. High readings indicate scale build-up.

15.2-3 Required equipment for descaling:

- | | |
|--|-------------------------|
| 1. Descaling solution | Part #
9950100 quart |
| 2. Descaling hose | 15-8002 |
| 3. Five gallon plastic bucket | |
| 4. Discharge hose (high pressure hose with the male end removed) | |

15.2-4 Descaling procedure:

1. If the heater coils are hot, cool to normal input water temperature and stop unit.
2. Disconnect the existing QD from #7 cluster block, disconnect the QD from the water holding tank (3 inches left of #7) insert it into #7.
3. Attach the descaling (15-8002) to the water-in connection (H-3). The open end will go to the descaling bucket.

4. Connect a pressure hose to pressure out connector (H-4) and attach those pressure hoses that may need descaling to it. Remove the male QD from the end of the last hose. Eventually this open hose will be returned to the bucket but not immediately.
5. Turn the soap solution control valve (C-18) to off and remove the lid from the waste recovery tank.
6. Put five gallons of water into the plastic bucket. Mix 1/2 (one half) gallon of descaler solution into the water. For severe scaling, use only 3 to 4 gallons of water with 1/2 gallon of descaler.
NOTE: This solution contains Hydrochloric Acid, avoid contact with skin, eyes and mist. READ MATERIAL SAFETY DATA SHEET BEFORE USE.
7. Before starting engine, insure that the descaler hose (15-8002) is inserted into the solution in the bucket.
8. Start the engine, run at fast idle or approximately 1/2 normal run speed. Turn the pump switch on and observe the end of the open pressure hose to insure that water is flowing from that opening. If no water flows after 30 seconds under this condition, stop the pump and prime the system.
9. When water is flowing from open pressure hose for a few seconds, you will observe that the descaling solution in the bucket is getting lower and lower. When the level is approximately six inches deep, put the pressure hose into the bucket so that the pump will not run dry.
10. Continue this procedure for approximately 20 - 30 minutes observing the pressure on the water pressure gauge is decreasing and that the water flow back into the bucket is increasing in flow. This is an indication that the procedure is producing desired results.
11. During the last five minutes of the descaling procedure, move the descaling bucket so that it will catch any discharge from the vacuum input connection (H-6). Turn the warm-up valve (C-6) fully open to warm-up position. This will descale the warm-up valve and two more hoses within the machine.
12. Turn the pump switch off (C-26) then stop the engine. Hook all hoses back to the normal configuration except the end of the pressure hose will still be open.
13. Insert the water input hose to water in (H-3). Start the engine and run at fast idle. When the pump switch (C-26) is turned on, the machine will pump clean water through the entire system to purge the descaler from the machine. Just before the unit is stopped, turn to warm-up to clear the descaler from the warm-up valve and the two hoses. After approximately five minutes of flushing, the water should be clear and completely safe for normal operation.
14. **PRECAUTIONS WHEN USING DESCALER: CORROSIVE. USE THE FOLLOWING PRECAUTIONS WHEN USING DESCALER.** Harmful or fatal if swallowed. Contains Hydrochloric Acid. Do not mix with other chemicals. Do not use on aluminum parts. Use only with adequate ventilation. Wear respirator, goggles and gloves when applying. Dispose of wastes properly. Apply only in well ventilated areas. Avoid breathing spray mist or vapors. Avoid contact with skin. Keep out of the reach of children at all times. Avoid eye contact. As with all chemicals, use only with adequate ventilation. Professional chemicals should always be under the complete control of the technician at all times.

PLEASE READ MATERIAL SAFETY DATA SHEET BEFORE USING THIS PRODUCT.

SECTION 16

Component Part Number And Reference List

This sections contains a list of tables that gives the name of components, Steam Way part numbers and a figure reference numbers. Note below is the list of table in this section:

16-1 Table of Controls

Control #	Part No.	Name	Figure
C-1	K2509904	Ignition Switch	6.1
C-2	43-9A11	Throttle	6.1
C-3	43-9A03	Choke	6.1
C-4	42-2A06	Heater Switch (rocker)	6.1, 8.1
C-5	44-C020	Temperature Control	6.1, 7.3, 8.2-1
C-6	4141236	Warm-Up Solution Fill	5.2, 7.3
C-7	4144406	Pressure Regulator (med.)	7.1, 7.3
C-8	4146110	Solution Control Meter	6.1, 7.3
C-9	4141236	Pressure Selection Valve	5.1, 5.2, 7.1, 7.3
C-10	4144305	Pressure Regulator (Lo)	7.1, 7.3
C-11	42-1C08	Water Flow Switch	7.1, 7.3, 11.2
C-12	4141105	Bleed valve, kerosene pump	5.1, 8.3, 8.4
C-13	42-1C07	Fuel Solenoid	8.1, 8.3, 8.4
C-14	Part of burner	Lock Bolt, air adjust control	8.3, 8.6
C-15	Part of motor	Reset button - heater motor	5.1, 8.3
C-16	4141132	Dump valve	5.3, 9.1
C-17	4143116	Float valve, water holding tank	7.1, 7.3
C-18	4141105	Ball valve, soap flow	5.2, 7.3
C-19	C7140	Thermal protection valve	7.3
C-20	K2575523S	Voltage regulator, rectifier (25A)	5.2, 11.3
C-21	part of pump	Heater fuel pressure adjuster	8.3, 8.4
C-22	42-2A04	Oil pressure kill bypass button	6.1, 11.3
C-24	4146505	Check valve, soap flow	7.1, 7.3
C-26	42-2A10	Pump clutch switch (rocker)	6.1, 11.5
C-27	42-2C10	Circuit breaker	6.1, 11.3
C-29	42-2C10	AC circuit breaker	5.3, 7.2
C-30	42-1C13	Float switch, waste tank	9.1, 11.5
C-31	4300116	Pump clutch	5.3, 7.2, 11.5
C-32	4144406	Pressure regulator (high)	7.1, 7.3

16-2 Table of Gauges

Gauge	Part Number	Name	Figure
G-1	44-C045	Tachometer/hour meter	6.1, 11.6
G-2	44-C010	Water pressure gauge	6.1, 7.3
G-3	44-C011	Vacuum gauge	6.1
G-4	44-C035	DC volt meter	6.1, 11.3
G-6	42-9A31	Water flow indicator light	8.2-1, 6.1, 11.2
G-7	44-C018	Water temperature gauge	7.3, 6.1, 11.4
G-8	44-C022	AC Voltmeter	6.1, 8.2-1, 11.1, 11.2
G-9	42-9A30	Fuel solenoid indicator light	6.1, 8.2-1, 11.2

16-3 Table of Hookups, Drains, and Hoses

Hookup Point	Part Number		Name	Figure No.
	Male	Female		
H-1	4131210	4132210	Gasoline connection	5.1
H-2	4131210	4132210	Burner fuel connection	5.1
H-3	4131665	4132660	Water input connection	5.2, 7.3
H-4	4131620		Pressure hose output connection	5.2, 7.3
H-5			<i>For future use</i>	
*H-6	16-1161		Vacuum hose connection	5.2, 9.1
H-7	5723006		Waste tank dump connection	5.2, 9.1
H-8	41-1N03	plug	Engine oil drain	5.1
H-10	42-3C05	42-9M26	outlet AC, alternator	5.3, 11.1, 11.2
H-11	41-1N03	Plug	Oil drain, vacuum blower	5.1
H-12	C25625		Oil drain, Cat pump	5.2, 7.2
H-13	4141105		Blower oiler connection	

* Machine Reducer 2-1/2" x 2" part # 3900350

16-4 Table of Major Components

Component	Part Number	Name	Figure No.
P-1	43-0A10	Engine	5.2, 5.3
P-2	4100158	Blower	5.3, 9.1, 7.2
P-3	42-0B05	AC Alternator	5.3, 7.2, 11.1
P-4	4100155	Cat 5CP2150W	5.1, 5.3, 7.2
P-5	42-9M25	Battery	5.1, 11.3
P-6	2909871	Solution tank (tank only)	5.1, 5.2, 7.3
P-7	16-1105	Water holding tank (tank only)	5.1, 5.2, 7.1, 7.3
P-8	16-4370	Oil burner assembly	5.1, 7.3, 8.3
P-9	43-9M01	Heater coil	5.1, 7.3, 8.3
P-10	41-5C01	Water filter, pump input	7.1, 7.3
P-11	25-1029	Cluster block, pump	5.1, 7.1, 7.3
P-12	26-1096	Heater coil output cluster	7.3, 8.2
P-13	41-5C14	Lint screen, solution tank	7.3
P-14	15-1149	Valve assembly, water input	7.3
P-15	16-2400	Vacuum relief breaker	5.3, 7.2, 9.1
P-16	K1205001	Engine oil filter	5.1
P-17	41-0A85	Fuel pump, gasoline	frame behind water holding tank
P-18	16-1003	Waste recovery tank	5.1, 5.3, 9.1
P-19	41-5C50	Lint screen, waste tank	9.1
P-20	44-E520	Alternator drive belts	5.3, 7.2
P-21	44-E532	Water pump drive belt	7.2, 5.3
P-22	2910044	Silencer, blower, engine	5.3, 9.1
P-23	W100608-001	Burner fuel pump (kerosene)	8.1, 8.3, 8.4, 8.6
P-24	16-1103	Stand pipe assembly, waste tank	9.1
P-25	41-5C42	Burner fuel filter	8.3
P-26	W20358	Ignitor, transformer	5.1, 8.3
P-27	W20554	Motor, Fan, Fuel Pump	5.1, 8.1, 8.3

16.1 Technical Bulletins And Updated Material

When technical information needs to be changed because of component changes due to manufacturing updates or engineering data the information will be forwarded to you in the form of a technical bulletin. Please make reference to the change on the appropriate figure or paragraph and file the change immediately after this page.