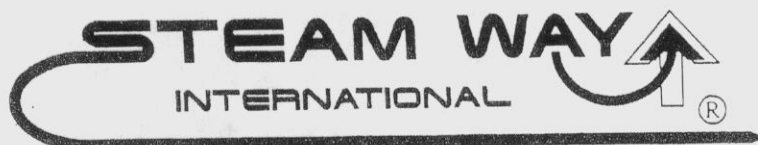


MASTERMATIC OMEGA 4200 MANUAL



1625 KDC Lane - P.O. Box 514 - Jackson WY 83001
(800) 447-8326 www.steamway.com



INCORPORATED

4550 Jackson Street Denver, CO 80216
1-800-447-8326 (303) 355-3516 FAX (303) 355-3516

Dear Valued Customer,

Thank you for your purchase of one of Steam Way International's highest performance truck mounted carpet cleaning units, the **MASTERMATIC® OMEGA 4200**.

We insist on complete training as documentation for all equipment we sell. The attached Technical Manual is for the OMEGA 4200. It includes all the information you need to be fully knowledgeable of your new machine:

- Warranty & Policies
- Interim Operation Detail
- Parts Manual
 - Wands and hand tools
 - Kohler engine
 - Cat pump
 - Sutorbilt blower
- High pressure washing

If you have any questions, don't hesitate to call your local distributor or call us here in Denver at 1-800-447-8326. Thank you again for the opportunity to deserve your business.

Steam Way International, Inc.
Sales Division and Manufacturing Team

MASTERMATIC®
OMEGA 4200

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***Before operating your MasterMatic® Omega 4200,
THOROUGHLY READ and STUDY this manual.***

SECTION 1

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SECTION 2

INTRODUCTION

The Steam Way MASTERMATIC® OMEGA 4200 Truck Mounted Carpet and Upholstery Cleaning Unit by Steam Way International, Inc., is built for simplicity and ease of operation, plus low maintenance. Even though simple to operate and easy to maintain, it delivers a superb job on carpet and upholstery cleaning along with the ability to perform as a high pressure steam cleaner.

This unit comes with the newest innovations of Kohler Engine technology. The power plant is a 18 horsepower Command V twin cylinder engine with hydraulic operated over head valves. Overhead valves yield a higher compression ratio which will cause more complete fuel combustion, even burning for greater fuel efficiency and almost no carbon buildup. The interval between oil and oil filter changes are 100 and 200 hours respectively, which makes routine maintenance a breeze! The engine is equipped with an oil Sentry® switch to stop the engine in the event of low oil pressure.

The new OMEGA 4200 unit comes equipped with a 42 amp automotive alternator and clutch operated pump, that can be turned off when water pressure is not required.

The model OMEGA 4200 uses a fuel oil burner that heats the water. The recommended fuel is kerosene with a consumption of approximately one-half gallon per hour. The temperature is thermostatically controlled and has a safety device, the water flow switch, which allows the heater to fire only when water is moving.

The standard waste recovery tank holds 70 gallons of water, with an optional 100 gallon waste tank available. It is made of aluminum and has baffles for reinforcement and reduced splashing. A screen mounted inside the tank insures that no debris can ever enter the vacuum blower. A cutoff switch is installed near the top of the tank to stop the engine when the tank is full to prevent a blowover. A 2 inch dump valve allows rapid dumping of waste water from the tank.

Remember that water does freeze at 32° F; so whether or not the unit is in use, in transit, or parked, it MUST be protected from freezing.

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 onlookers. 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 battery 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, 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 uses a 12V DC power for the engine that has high voltage spark plug leads, like that of an automobile. Use the same electrical safety precautions observed on an automobile. A high voltage ignitor is used to produce an arc to ignite the fuel in the burner. Much care should be used to prevent electrical shock.

SECTION 3

INSTALLATION OF UNIT

The unit can be either side-mounted or rear-mounted. In either location, it is imperative that the exhaust scoop outlet be located visibly outside the van's interior. There are two very important reasons for this, first to protect occupants that might be in the van's interior, and secondly to keep the hot exhaust air from entering the engine's intake. Also, make sure that when the exhaust scoop is pushed in so that the van doors will close.

Closely inspect that all is clear beneath the vehicle before drilling holes to bolt the unit to the vehicle. Look for such things as gasoline tanks, brake and gas lines, and cross members; and be certain that no damage will result when drilling holes at that spot.

Install your unit in a safe manner, securing the unit so that in the event of an accident, the machine will not advance into the driver or passenger seat. A minimum of three 3/8" bolts should be used with large washers used beneath the floor of the vehicle, so that the bolts will not be pulled through the floor in the event of an accident.

Since the waste tank is not attached to the basic unit, its location can be where desired or applicable. It must be secured as described in the previous paragraph for the machine, using the four bolts to secure the tank. Other equipment in the vehicle should be secure while the vehicle is in motion.

To maintain cooler operating temperatures in the van, a roof vent may be installed. Roof vents are available through your Steam Way distributor or Steam Way International.

SECTION 4

PREOPERATIONAL INSTRUCTIONS

Before starting the OMEGA 4200, several operations must be complied with:

- 4-1 Fill the gasoline tank (red) with regular unleaded fuel, 87 octane or higher (Kohler's recommendation). The connection hose has a female connector that connects to Point H-1 (Figure 4-2) on the left side of the machine. Fill the kerosene tank (green) with recommended kerosene or #1 diesel fuel. With its connecting hose which goes to Point H-2 (Figure 4-2), bleed it by pushing the male connector against something solid; and by pumping the squeeze ball. All air can be dispensed before making connection to female connector H-2 (Figure 4-2).

CAUTION:

For safety, always leave the supply hoses on 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) on the side of the machine. In this way, no incorrect connection 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 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 antifreeze may be used at a ratio of 2 to 4 ounces per 6 gallons of fuel. The additive is available under many brand names, one of which is Heet®. Another very effective method of removing water from the tank is by dumping the fuel occasionally, especially when the tank is very low on fuel; and by rinsing with a pint of clean fuel, this will remove water and debris from the tank.

Throughout this manual you will find reference numbers on figures, diagrams and drawings. These reference numbers are listed in: Tables 14-1 Controls; 14-2 Gauges; 14-3 Hook-ups, drains and hoses; 14-4 Major components.

4-2 FLUSH'NG PROCEDURE (Before first start-up)

Before filling the water holding tank (P-5, Figure 4-2), disconnect the Q.D. (H-11, Figure 4-2), then connect the water hose assembly that was supplied with the starter package to the female Q.D. of H-11. Remove the male pressure out QD (H-4, Figure 6-1) from the machine. Now, turn the water on with the input valve assembly that is plugged into H-11, and the water will flush out antifreeze or stale water that was in the machine during shipping. Within a few seconds, clean fresh water will be observed at the point that H-4 was removed. When the male QD (H-4) has been reconnected to the original position, the flushing procedure is complete. Reconnect H-11 to the water holding tank (P-5) and insert the water input valve assembly to H-3 to fill the water holding tank.

If the optional warm-up valve (Part #17-9015 which is highly recommended) is installed, it can be opened fully to warm-up position instead of removing the pressure output QD (H-4).

- 4-3 With the input valve assembly and garden hose attached to the water faucet, you now must fill the water holding tank (P-5) by inserting it into H-3 (Figure 4-3). When the tank is filled to a predetermined level, the float control valve (C-13) will shut the water off.
- 4-4 Fill the chemical container (P-19) with the desired cleaning agent premixed as instructed by the chemical manual supplied with your standard basic starter kit. Connect the chemical line from the chemical container (P-19) to connector (H-6, Figure 4-2).
- 4-5 Pull the exhaust scoop to the OUT position. NEVER OPERATE IT IN THE IN POSITION! (H-3 Figures 4-4)

FIGURE 4-1
Unit Right Side View

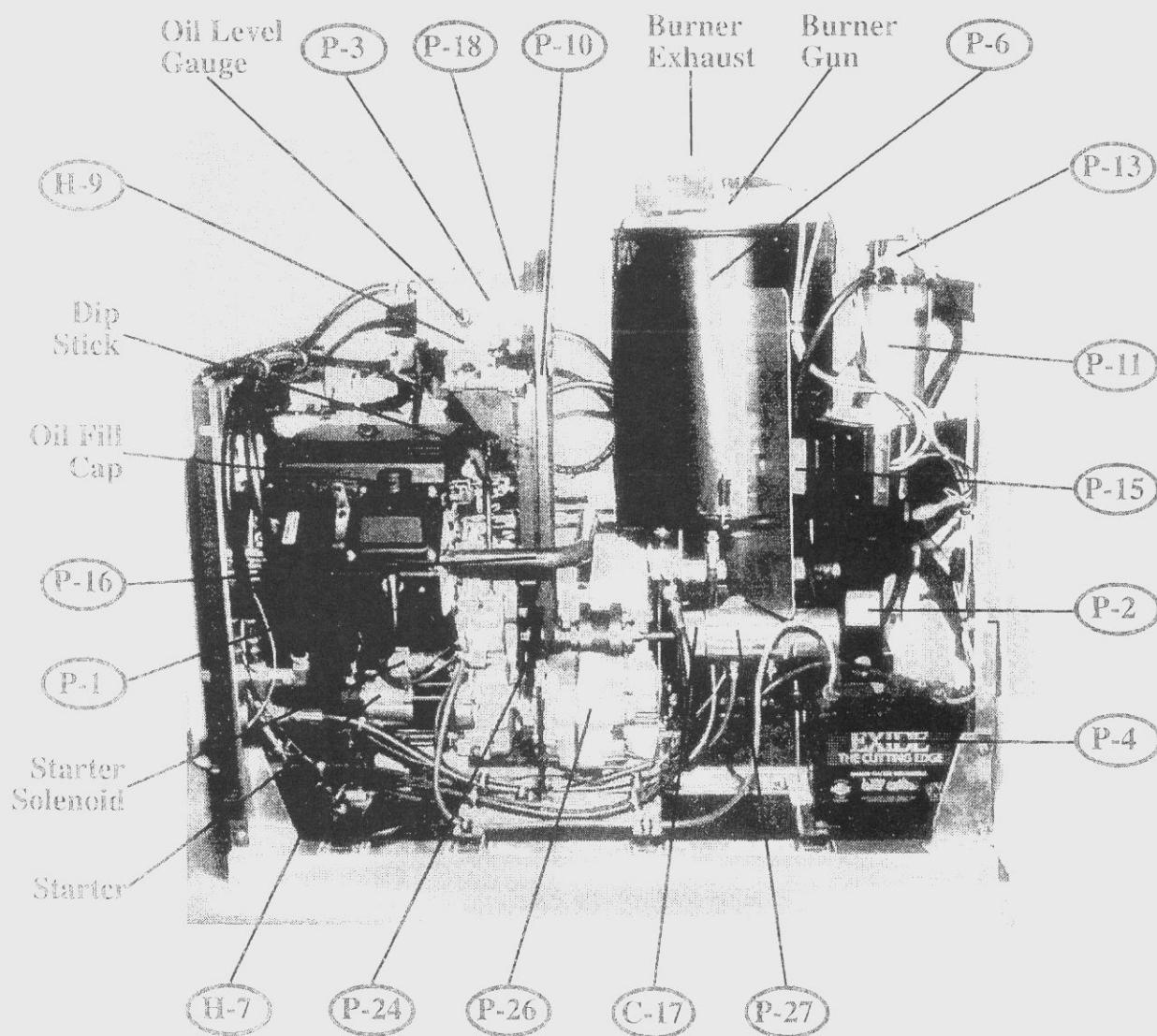


FIGURE 4-2
Unit Left Side View

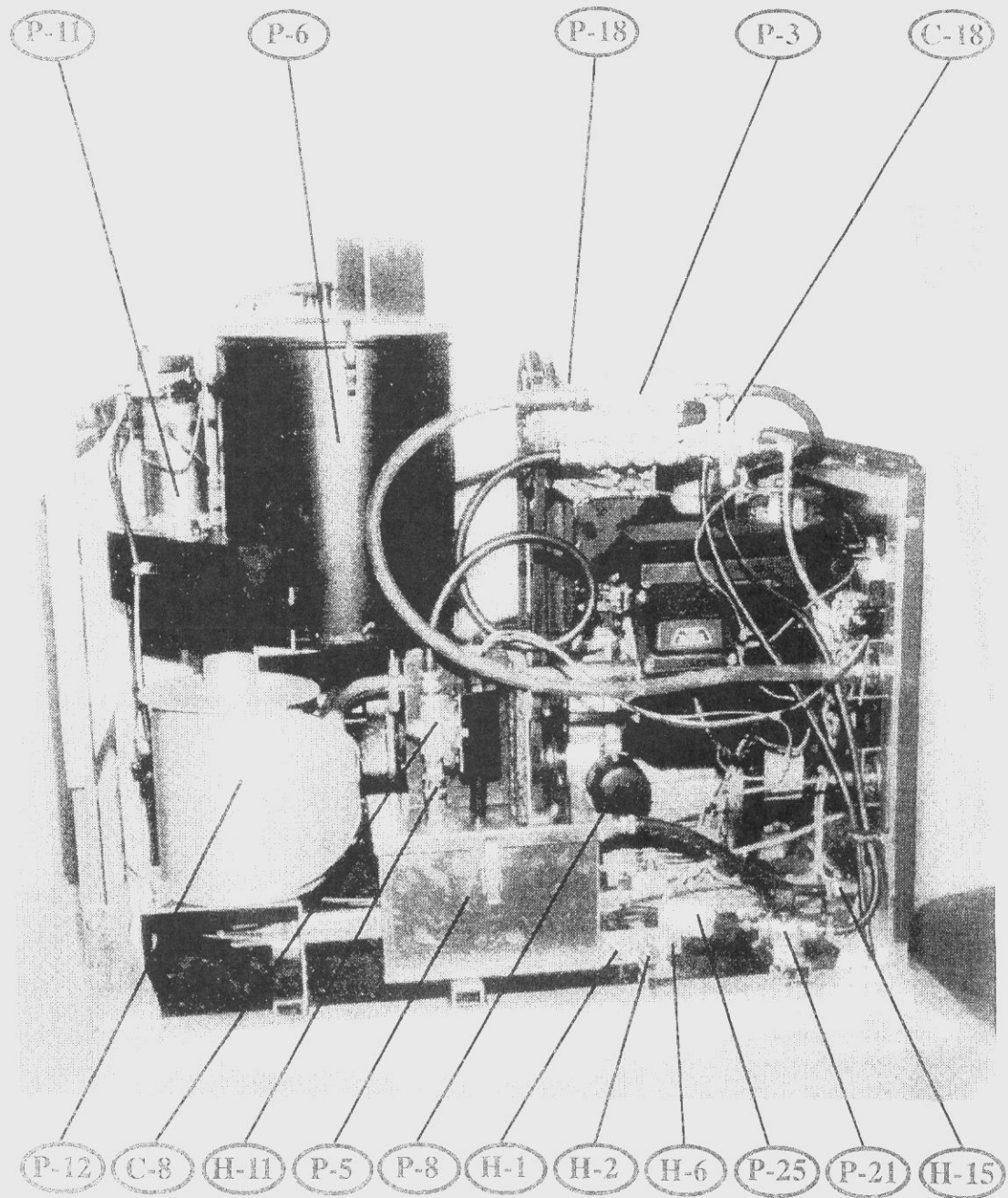
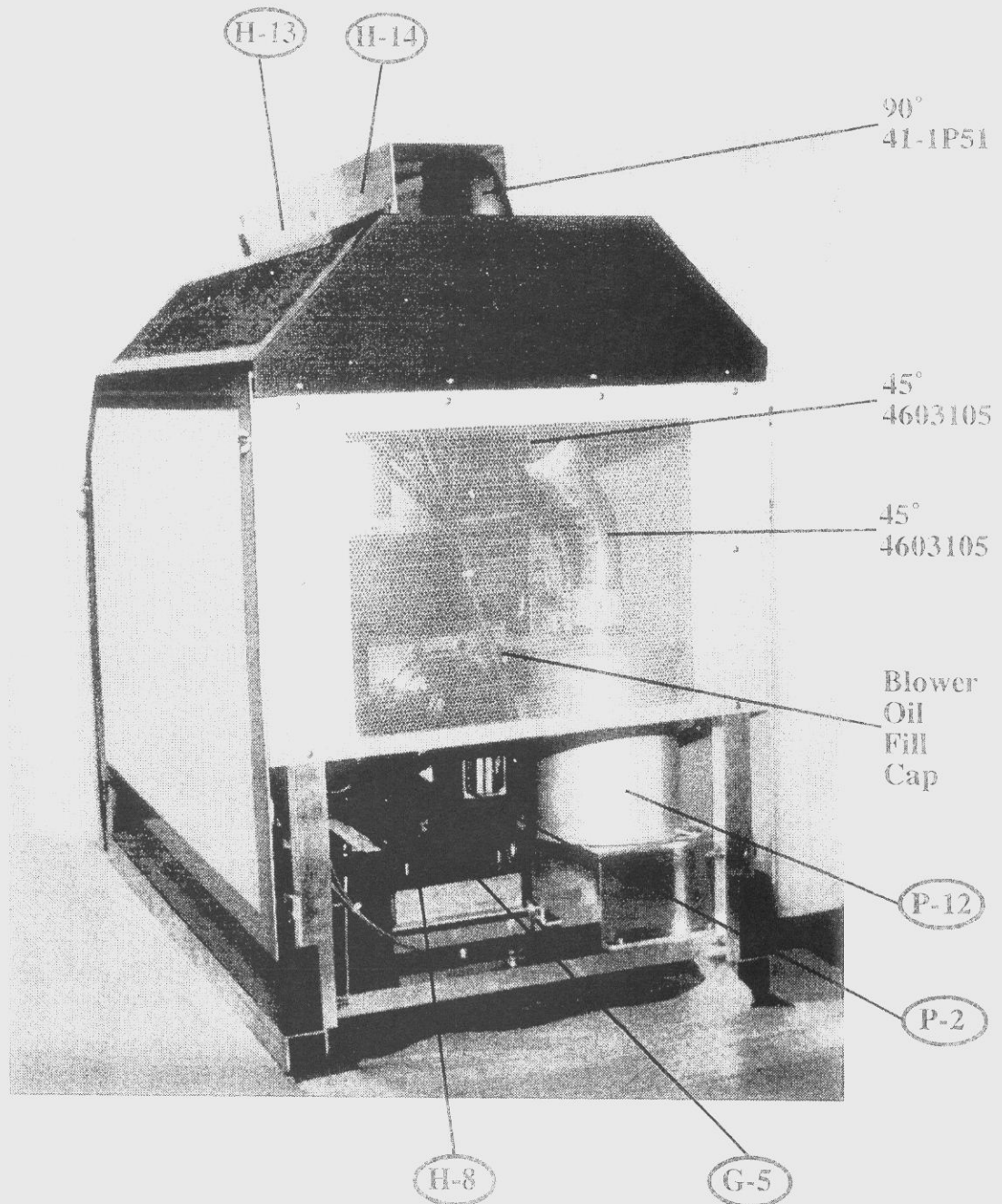




FIGURE 4-4
Unit Rear View



SECTION 5

OPERATING PROCEDURES

5-1 PREOPERATIONAL CONTROL SETTINGS

<u>Control</u>	<u>Number</u>	<u>Figure</u>	<u>Set To</u>
Engine Ignition Switch	C-1	4-3	Off
Engine Throttle	C-2	4-3	Closed
Engine Choke	C-3	4-3	In
Heater Switch	C-4	4-3	Off
Temperature Control	C-5	4-3	Desired Temp
Dump Valve	H-10	8-1	Closed
Soap Flow Meter	C-7	4-3	As Desired
Pressure Regulator	C-6	4-3	As Desired
Exhaust Scoop	H-13	4-4	Out
Pump Switch	C-21	4-3	Off

5-1.1 Check engine oil, blower oil and Cat pump oil levels

5-2 STARTING

5-2.1 Connect input water to H-3 (Figure 4-3) and turn on.

5-2.2 Attach vacuum hose from H-5 (Figure 8-1) to cleaning tool.

5-2.3 Connect the high pressure hose, that delivers solution to the cleaning tool, to H-4. If it is the first job of the day, turn the warm-up valve (optional item) to warm-up (open) for 2 or 3 minutes to discharge possible rusty water from the heater coils. The flushing procedure in paragraph 4-2 will accomplish the same. The warm-up valve when on will allow the heater to operate. The part number for the optional warm-up valve is 17-9015.

5-2.4 The engine is now ready to start. Open the throttle slightly. Pull the choke closed (if engine is cold). Turn the ignition switch to the start position. When the engine starts, push the choke back in.

5-2.5 Bring the engine up to operating speed (2900 RPM) as displayed on the tach hour meter (G-2).

- 5-2.5A Turn the pump switch on. Observe whether the green light (G-7) is lit.
- 5-2.6 If using a special fabricated warm-up valve kit connected to H-4 (Figure 4-3) the movement of water can be observed, and the pump can flush the heater coils. This would constitute water flow, and the heater operation could be tested at the same time. The warm-up kit is highly recommended.
- 5-2.7 Turn the heater switch (C-4) on and select the desired safe cleaning temperature (C-5). The burner should NOT come on until water is made to flow and the red light is on (G-6).
- 5-2.8 The soap solution control (C-7) may have to be reset after the cleaning begins to get to the desired results.

5-3 RUNNING

<u>Control</u>	<u>Number</u>	<u>Figure</u>	<u>Position</u>
Engine Ignition Switch	C-1	4-3	ON
Engine Throttle	C-2	4-3	OPEN to mechanical stop (2900 RPM)
Engine Choke	C-3	4-3	IN
Pump Switch	C-21	4-3	ON - Green light
Heater Switch	C-4	4-3	ON for heat
Temperature Control	C-5	4-3	As desired
Pressure Regulator	C-6	4-3	Set desired pressure while the cleaning tool is activated
DC Volt meter	G-4	4-3	IN - Green

PRESSURE EXAMPLES

- A. Pressure Washing 1000 p.s.i. (1250 MAX)
- B. Carpet Cleaning 425 p.s.i.
- C. Upholstery Cleaning 175 p.s.i.

<u>Control</u>	<u>Number</u>	<u>Figure</u>	<u>Position</u>
Soap Flow Meter	C-7	4-3	As needed
Dump Valve	H-10	8-1	CLOSED
Vacuum Relief Breaker	C-17	8-1	Factory Adjusted to 13 Hg

- 5-3.1 During the cleaning operation or water recovery operation, if the engine stops suddenly, it is likely that the waste recovery tank has filled, and the float switch (C-16) has stopped the engine.
- 5-3.2 Observe closely the fuel quantities during operation, especially during big jobs.
- 5-3.3 Pay close attention to the amount of soap solution in the solution container (P-19). Running out of solution will result in a loss of pressure and could do serious damage to the water pressure pump (P-3)
- 5-3.4 When this unit is used for water extraction ONLY, the pump switch (C-21) MUST be turned off and the heater switch (C-4) must be off.

5-4 SHUT DOWN

- 5-4A Turn pump switch off (C-21).
- 5-4.1 Turn heater switch (C-4) off.
- 5-4.2 Last job of the day or after a blowover, allow about 1 or 2 pints of water to be drawn into the blower oiler (H-12 Figure 4-3) slowly. Allow the blower to air dry for approximately 3 minutes. Then apply a small amount of light weight oil or spray WD-40 for into the oiler for 5 - 8 seconds.
- 5-4.3 Move engine throttle control (C-2) to idle.
- 5-4.4 Turn ignition switch (C-1) to off.
- 5-4.5
 - A. Retrieve tools from job site and store.
 - B. Disconnect vacuum hose and place in vehicle.
 - C. Disconnect pressure hose and roll it up or store it.
- 5-4.6 In cold weather, use the most expedient method to get hoses and tools into the vehicle to keep from freezing.

5-4.7 Inspect the waste recovery tank.

- A. Drain when and where appropriate. NOTE: Dumping waste water in the street is prohibited by law in some areas. Check with local authorities.
- B. THOROUGHLY CLEAN THE LINT SCREEN. This system must be free of lint to perform optimum cleaning and drying.
- C. Rinse out the waste tank FREQUENTLY while the dump valve is open. Disconnect the water input valve assembly from H-3 to rinse the waste recovery tank while the water input hose is still connected to the water faucet.
- D. Turn water faucet off, relieve the pressure in the hose roll up and place in vehicle.

5-4.8 Push the hood scoop in so the door will close.

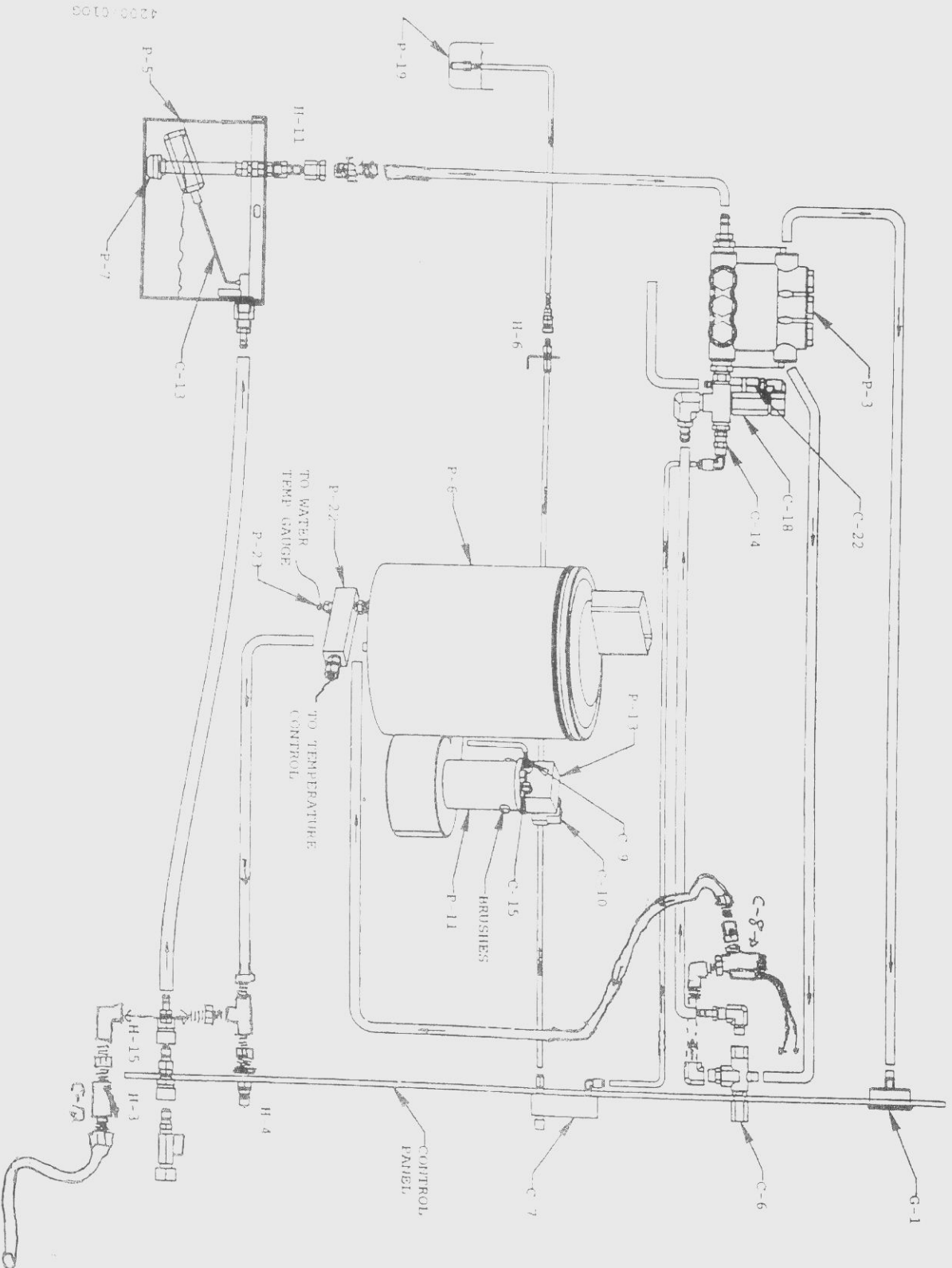
SECTION 6

WATER FLOW SYSTEM

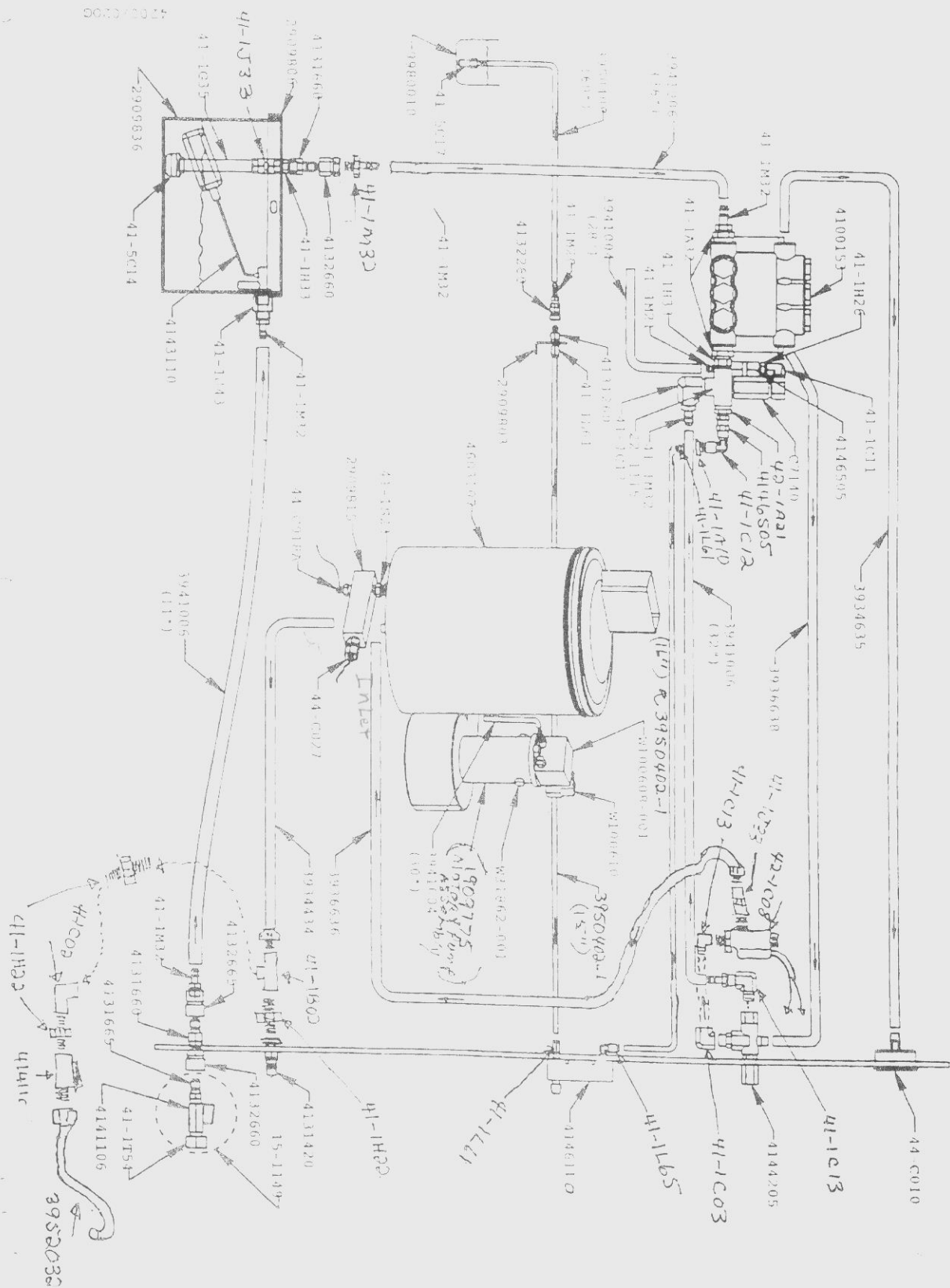
- 6-1 The water pump (P-3) has two reservoirs of liquids to draw from.
- A. The water holding tank (P-5), which is continuously refilled by the water input hose assembly. The hose assembly is attached to H-3, a female Q.D. in front of the machine.
 - B. The cleaning solution container (P-19), which contains the premixed solution required must be attached to the machine at (H-6 Figure 6-1) the solution connection. Failure to connect this hose to the chemical container will allow air to be drawn into the system, which will cause a loss of water pressure and could cause damage to the pump.
 - C. When the pump switch (C-21) is turned on, the clutch is engaged and starts the action of the pump.
- 6-2 When a demand for water by the pump (P-3) is made (cleaning tool turned on), water and solution will be drawn from the two tanks mentioned above. The amount of detergent solution is controlled by the visi-float control (C-7).
- 6-3 Chemicals are drawn into the 4 way cross connector just prior to entering the water pump (P-3). Note that a one way check valve (C-14) is installed in the chemical line just before the mixing tee. This will prevent water from backing into the solution container when water is forced into the mixing tee. Water is drawn into the water pump from the water holding tank (P-5). As the water is being pulled into the water pump, the flow switch (C-8) detects waterflow for the heater circuits (discussed later).
- 6-4 As the Cat pump (P-3) is being driven by the engine, three plungers are drawing water and solution on the back stroke and is pushing or pressurizing water on the forward stroke. This causes a movement of approximately 3.5 gallons of water per minute. The water goes from the output of the pump, located on the discharge manifold, and flows to the pressure regulator (unloader C-6).
- 6-5 It is very important to note that the oil level sight gauge which has a red dot in the center is for checking the oil when the unit is NOT in operation. The oil level should be adjacent to the red dot. The Cat Pump (P-3) uses a special Cat Pump Oil (Part #4810106).

- 6-6 As the water reaches the pressure regulator (C-6), back pressure is produced, causing the excess water to bypass back to the pump; however, the pressurized usable water is directed into the heater coils and out through the heater output block (P-22) where temperature sensing is done and then to the pressure out connector (H-4). Note that a gauge line is connected to the water pump so that the water pressure can be monitored on the water pressure gauge (G-1). NOTE: Water pressure can only be read on the gauge when the cleaning tool is turned on.
- 6-7 With the adjustment lug on the regulator (C-6), you may adjust the pressure to any desired pressure, within the limits of the pump and regulator (1200 PSI maximum).
- 6-8 As the water leaves the heater coils (P-6), it passes temperature sensors for the temperature gauge (G-3) and temperature control (C-5). The water exits the machine at the male connector (H-4), and is sent to the cleaning tool via braided high pressure hoses.
- 6-9 CAUTION: When the cleaning tool is not in use (i.e., drying, moving furniture), the pressure regulator is bypassing all of the water causing a rapid increase in water temperature in the pump, which will cause damage to the pump. The Cat Pump manufacturer suggests that a limit of SIX MINUTES is maximum for this situation.
- 6-10 A Thermal Protection Valve (C-18) will protect the system for situations where the operator may not observe the six minute limit mentioned above. When the recirculated water reaches a temperature of 145°F (still safe for the pump) the thermal valve will open, dispensing the hot water into the waste tank (P-9). The pump will draw cold water from the water holding tank (P-5) to cool itself to a safe temperature.

FIGURE 6-1
Water Flow Diagram



42200/0108



SECTION 7

HEATER SYSTEM



- 7-1 When the Kohler engine is running at operating speed, the alternator produces 12 Volt DC from the 42 AMP charging system (automotive alternator). This supplies power for recharging the battery and providing power to run the components of the burner system.
- 7-2 The components of the burner system that require 12 Volt DC are: the fuel solenoid (C-10), the igniter module (P-15); and the DC motor (P-11). They are also protected by a circuit breaker (C-19, Figure 7-2) with a reset button.
- 7-3 When the heater switch (C-4) is turned on, this supplies power to the DC motor (P-11) that runs the fan and kerosene fuel pump. This power is also applied to the temperature control (C-5). If there is a demand for heat the voltage will be applied to the ignitor (P-15) and to the water flow switch (C-8). When there is a flow of water as a result of turning on the cleaning tool or warm-up valve on (optional item), the water flow switch closes, sending power to the fuel solenoid (C-10). When lit, the red light (G-6) indicates that power is applied to the solenoid.
- 7-4 The fuel solenoid (C-10) is the component that allows the fuel to enter the burner gun, to cause the heater to fire. Figure 7-2 shows that two controlling devices are responsible to furnish power to the solenoid (C-10). They are the temperature control (C-5) and water flow switch (C-8). A diode is used in this circuit as a spark suppressor to enhance the life of the contacts in the water flow switch and temperature control, and bulb of (G-6).
- 7-5 The ignitor (P-15) will produce a very high voltage to cause an arc of electricity across the electrodes in the burner, when the heater switch (C-4) is on and there is a demand for temperature.
- 7-6 The burner will turn off automatically when:
- A. Water ceases to flow (C-8) when the tool is off.
 - B. Temperature demand has been met (C-5).
 - C. Heater switch is turned off (C-4).

To gain access to the high voltage ignitor item 10 of Figure 7-1, remove the four (4) screws that secure the ignitor to the fan housing. Caution: High voltage is being produced when the heater switch is on and the thermostat is asking for heat. The high voltage is sent to the burner gun electrodes, item 20 of Figure 7-1, by the two red high voltage leads.

7-7 Fuel pressure can be changed by turning the adjusting screw C-15 of Figure 7-4. Each 1/4 turn will increase or decrease fuel pressure by approximately 3 to 4 PSI (clockwise increases counter clockwise decreases).

7-8 The air (oxygen) being drawn into the burner assembly can be adjusted by two methods. At the bottom of the fan housing is an adjustable lever, item 39 of Figure 7-1, which will increase or decrease the opening for air to be drawn into the burner by the blower fan, item 35 of Figure 7-1. A locking screw is used to secure the adjustment lever. (C-11, Figure 7-1).

Another lever located on the top of the fan housing assembly, item 28 of Figure 7-1, is a damper in the air channel. It is factory set for approximately 50% open. The lever is parallel with the damper in the air channel.

If it is set cross wise, i.e.,  minimum air is allowed to flow. If the lever is set in line, i.e., with the air channel  maximum air is allowed to flow. NOTE: Small adjustments make large temperature changes. The initial setting for this adjustment is approximately 50% open/closed. A white line has been drawn to show the approximate 50% open/close position.

7-9 A bleed valve (C-9 Figure 7-4) is located on the fuel pump (P-13). When the need to bleed air from the pump is necessary, follow the instructions below:

- Turn the heater switch (C-4) on.
- Use a 3/8" wrench to turn the bleed valve (C-9) counter-clockwise slightly, and this will discharge the air and fuel out through the rubber tube to the bottom of the machine where a cup or container can catch the discharged fuel.
- Turn the bleed valve fully clockwise after a few seconds.
- Turn heater switch off.
- Test run unit to see if bleeding the pump corrected the situation.

7-10 Electrode spacing is shown on Figure 7-3.

- 7-11 The fuel pump (P-13 Figure 7-4) contains a very fine mesh fuel strainer to ensure that no debris can enter the pump. To gain access to the strainer, remove the four (4) screws that hold the cover for the filter, located on the top of the pump. After inspection or cleaning, retighten the screws securely. A new gasket may be required, part # W53779801.
- 7-12 The brushes on the DC motor (Figure 7-4) must be checked every 200 hours for wear. Failing to change the brushes when worn may cause serious damage to the motor. The part # for new brushes is W31862-001.

A hand-drawn schematic diagram of a mechanical assembly, likely a pump or engine component. The diagram includes the following labeled parts and features:

- Top Section:** A horizontal assembly with a central component labeled **30** (part number **100608-001**). To its right is a component labeled **27** (part number **W100610**). Below these are components labeled **13**, **14**, and **16**, with part numbers **5078677**, **5078678**, and **5078679** respectively.
- Central Section:** A vertical assembly featuring a large central component labeled **19** (part number **5078651**). To its left is a component labeled **20** (part number **5078715**). Below these are components labeled **21**, **22**, and **23**, with part numbers **5078660**, **5078715**, and **5078660** respectively.
- Bottom Section:** A large cylindrical component labeled **4** (part number **5078729**). To its right is a component labeled **5** (part number **5078731**). Below these are components labeled **6**, **7**, and **8**, with part numbers **185078658**, **5078640**, and **507871** respectively.
- Other Labels:** The diagram includes various other labels such as **31** (part number **4209669**), **32** (part number **5078629**), **33** (part number **5078629**), **34** (part number **5078629**), **35** (part number **5078734**), **36** (part number **5078629**), **37** (part number **5078629**), **38** (part number **5078629**), **39** (part number **5078629**), **40** (part number **5078629**), **41** (part number **5078629**), **42** (part number **5078629**), **43** (part number **5078629**), **44** (part number **5078629**), **45** (part number **5078629**), **46** (part number **5078629**), **47** (part number **5078629**), **48** (part number **5078629**), **49** (part number **5078629**), **50** (part number **5078629**), **51** (part number **5078629**), **52** (part number **5078629**), **53** (part number **5078629**), **54** (part number **5078629**), **55** (part number **5078629**), **56** (part number **5078629**), **57** (part number **5078629**), **58** (part number **5078629**), **59** (part number **5078629**), **60** (part number **5078629**), **61** (part number **5078629**), **62** (part number **5078629**), **63** (part number **5078629**), **64** (part number **5078629**), **65** (part number **5078629**), **66** (part number **5078629**), **67** (part number **5078629**), **68** (part number **5078629**), **69** (part number **5078629**), **70** (part number **5078629**), **71** (part number **5078629**), **72** (part number **5078629**), **73** (part number **5078629**), **74** (part number **5078629**), **75** (part number **5078629**), **76** (part number **5078629**), **77** (part number **5078629**), **78** (part number **5078629**), **79** (part number **5078629**), **80** (part number **5078629**), **81** (part number **5078629**), **82** (part number **5078629**), **83** (part number **5078629**), **84** (part number **5078629**), **85** (part number **5078629**), **86** (part number **5078629**), **87** (part number **5078629**), **88** (part number **5078629**), **89** (part number **5078629**), **90** (part number **5078629**), **91** (part number **5078629**), **92** (part number **5078629**), **93** (part number **5078629**), **94** (part number **5078629**), **95** (part number **5078629**), **96** (part number **5078629**), **97** (part number **5078629**), **98** (part number **5078629**), **99** (part number **5078629**), **100** (part number **5078629**).

Parts Breakdown

FIGURE 7-1A

Ref #	Description	Part #
1 A	Heater Housing	
2	Insulation Disc (Soft)	S078725
3	Insulation Disc (Rigid)	S078726
4	Coil, Heat Exchange	S078729
5	Coil Head w/ Flute	S078731
6	Fuel Line High Pressure 911-918 NS	S078684
7	Top Cover	S078640
8	Ignition Cable	S078720
Not Shown	Igniter Plate	Part of Junction Box
10	High Voltage Igniter Module (P-15)	4809671
Not Shown	Junction Box, Igniter Mount	3952016
12	Connector, Igniter Cable	S078723
13	Fuel Line Connector Bolt (Hollow)	S078677
14	Seal Washer Copper	S078578
15	Fuel Line Coupling	S078674
16	Disc Burner Head	S078738
17	Nut 4MM (Electrode)	S078657
18	Washer 4X9 MM	S078658
19	Fuel Nozzle Coupler	S078652
20	Electrode, Ignition	S078715
21	Screw (Electrode Mount)	S078660
22	Nozzle, Burner	3952021
23	Diffuser Head	S078662
24	Screws, Diffuser Mounting	S078661
27	Fuel solenoid (C-10)	W100610
28	Air Adjust Lever (Top)	
30	Kerosene Fuel Pump (P-13)	W100608-001
31	DC Motor	4209669
33	Set Screw, Blower Wheel	S078629
34	Flange, Motor Mount	3951983
35	Blower Wheel (Fan)	S078734
36	Washer 18 - 24 MM	S078663
37	Lock Nut	S078718
38	Burner Head (Complete)	S78665
39	Air Adjust Lever Bottom	3952082
40	Air Adjust Locking Screw (C-11)	Metric
No Ref #	Burner Mounting Plate (Bottom)	1909751
No Ref #	Burner Mounting "J" Bolt	4009354
	Motor and Pump Assembly	1909775
	Key	3952025

S078720
S078720

FIGURE 7-2
Simplified Burner Circuit

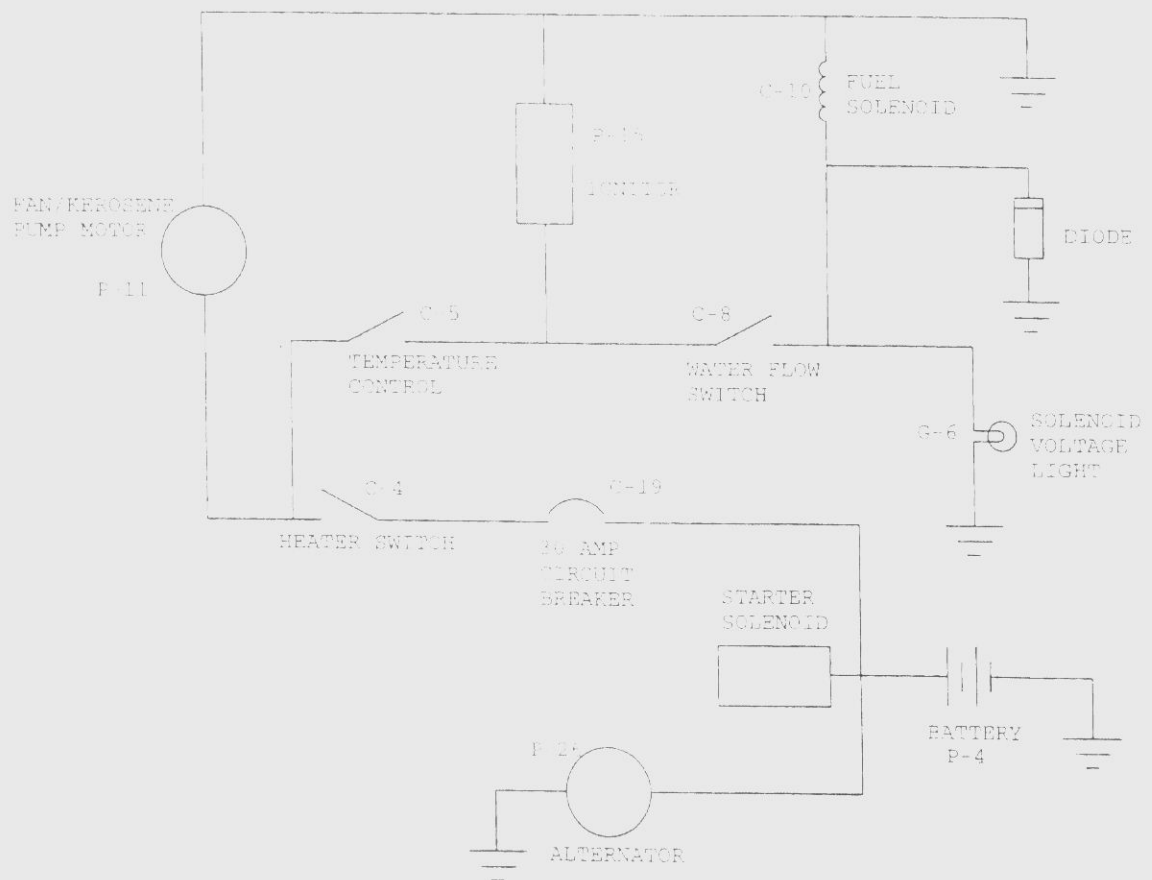
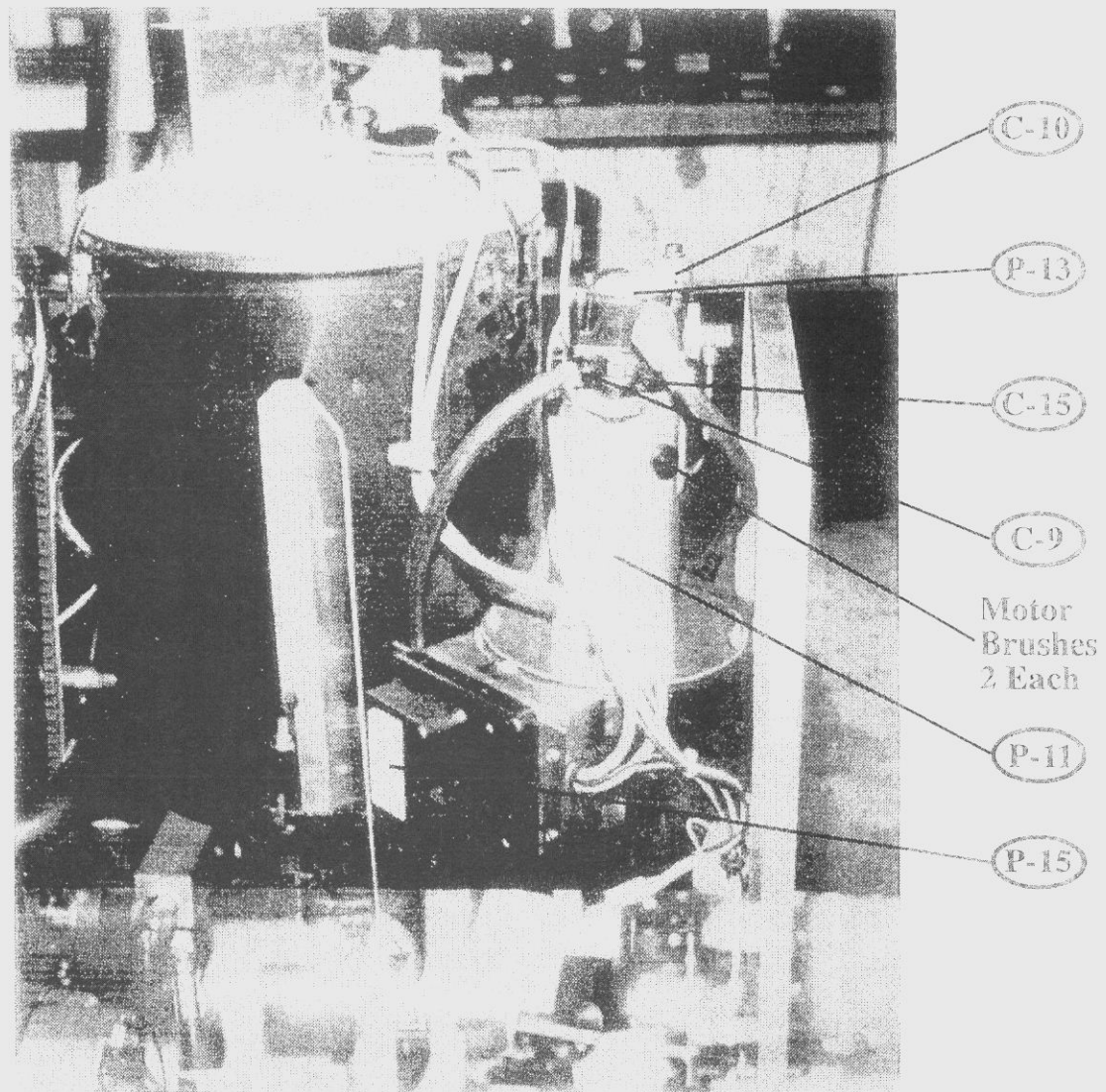


FIGURE 7-4
Burner Assembly (Enlarged View)



SECTION 8

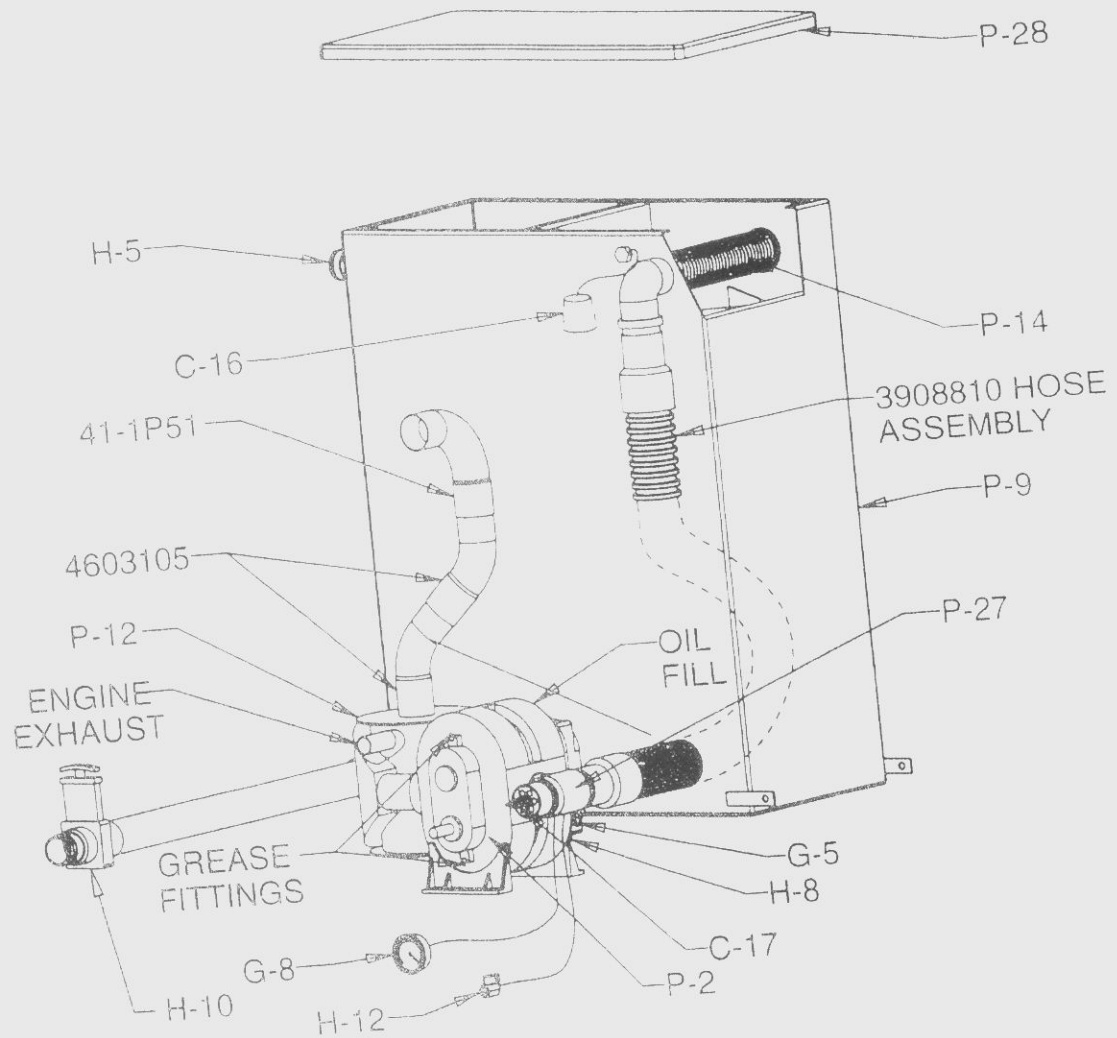
RECOVERY SYSTEM

- 8-1 If it could be determined which specific part of the cleaning process (pressure, heat, or vacuum) is the most important one, probably the recovery (vacuum) would head the list. Even with the superb water pressure, cleaning agents and heat, if you can't recover soil that has been dislodged, the cleaning process has NOT been accomplished. A thorough knowledge of the recovery system is very important to keep this system at its peak performance.
- 8-2 The vacuum blower (P-2, Figure 8-1) is the heart of the recovery system. While the engine operates at 2900 RPM, it turns the blower shaft at a 1:1 ratio or operating speed. This causes the Sutorbilt No. 3 Legend positive displacement blower to pull a large volume of air.
- 8-2.1 To sustain long life for the vacuum blower, it must be serviced properly. The gears must be lubricated with gear oil (Lubriplate #4) and bearings must be greased (630 AA Lubriplate). The maintenance check list (Figure 11-1) suggests the frequency for services.
- 8-2.2 The level for the oil in the gear case can be checked by observing the oil level gauge (C-5) of Figure 8-1. If the window is black the oil level is sufficiently high enough. The two grease fittings for the bearings are located on the opposite side of the blower near the drive shaft. NOTE: Paragraph 8-2.1 above.
- 8-3 In referring to Figure 8-1, it shows that air enters the waste recovery tank at H-5 by attaching vacuum hoses, and is emptied into the waste recovery tank (P-9). At this point, water, soil, and debris are dropped to the bottom of the tank, but the air continues on into the vacuum blower (P-2). With the positive displacement action of the blower, the air is pushed into the silencer (P-12). The silencer not only receives the air from the blower, but also receives the exhaust from the Kohler engine. All of the air and exhaust are expelled into the exhaust scoop on top of the machine along with output of the heater burner assembly (P-6). All of the gases are exhausted away from the machine and vehicle.

- 8-4 A vacuum relief breaker (C-17) is installed on vacuum "T" (P-27 Figure 8-1). The vacuum breaker is normally set to approximately 13 hg. To readjust the break point the spring on the breaker can be made tighter or looser as desired. As adjustments are made, monitor the vacuum gauge (C-3) for the desired inches of mercury Hg to be set in. NOTE: Adjust with full vacuum load (vacuum input covered (H-5)).
- 8-5 To check the recovery (vacuum) system to ensure peak performance, inspect the following:
- A. Clean lint screen (P-14).
 - B. Dump valve closed (H-10).
 - C. Seal around the lid of waste tank (P-9).
 - D. Condition of vacuum hoses and cuffs.
 - E. Inspect the cleaning tool for clogged air passage.
- 8-6 After a known blow-over (dirty water being pulled into and through the blower), the impellers should be cleaned and oiled. Open the blower oiler valve (H-12) and allow water from the water input hose to be drawn into the blower at a slow rate. After approximately one or two pints of water has been inserted into the vacuum blower, allow the blower to air dry for about three minutes. After the blower has dried, insert a small amount of oil or spray WD-4 into the blower to lubricate the impellers. Oiling the blower after the last job of the day is highly recommended to preserve the life of the blower and to prevent lock-up due to rust.

CAUTION: DO NOT LET THE BLOWER PULL ANYTHING INTO THE TUBE, (i.e., LOOSE OBJECTS, ETC.) SERIOUS DAMAGE WILL RESULT.

FIGURE 8-1
Recovery System



4200/06OG

SECTION 9

BELT AND DRIVE SYSTEM

The belt and drive system consists of an engine to blower coupling device, two "V" belts, and double "V" pulleys.

9-1 The main drive system from the Kohler engine shaft to the vacuum blower shaft is coupled with a flange and tapered bushing (internally locked) on the engine shaft. The blower shaft uses a flange and tapered bushing (externally locked.). The coupling between the two flanges is made with a rubber sleeve. It is imperative that when the engine or blower is installed or repositioned, a perfect alignment between the two components be made.

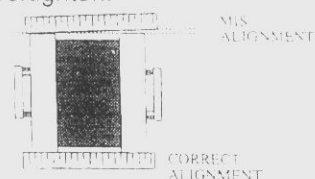
The use of a straight edge at the 3:00 or 9:00 o'clock positions of the flange will show either correct or incorrect alignment.

9-2 A "V" pulley is installed on the engine shaft that drives the belts. One belt operates the Cat pump (water pressure). Another belt drives the automotive type alternator that supplies DC power to run the burner, and power that keeps the battery recharged to run the engine and an electrical components.

9-3 When new belts must be installed:

- A. Remove the three (3) bolts on the bushing of the blower shaft and insert them into the other three (3) holes of the bushing. As they are tightened this will separate the bushing from the flange. Note drawing in paragraph 9-1 above.
- B. Slide the flange and bushing toward the blower so that the drive coupler will open up, allowing room for the new belt to be inserted over the drive shaft. The belt now can be matched up with the appropriate set of V pulleys and tightened.
- C. Push the flange and bushing back from against the drive coupler and insert the three (3) bolts back into their original holes. Do not overtighten.
- D. Realign engine to blower as per diagram below.

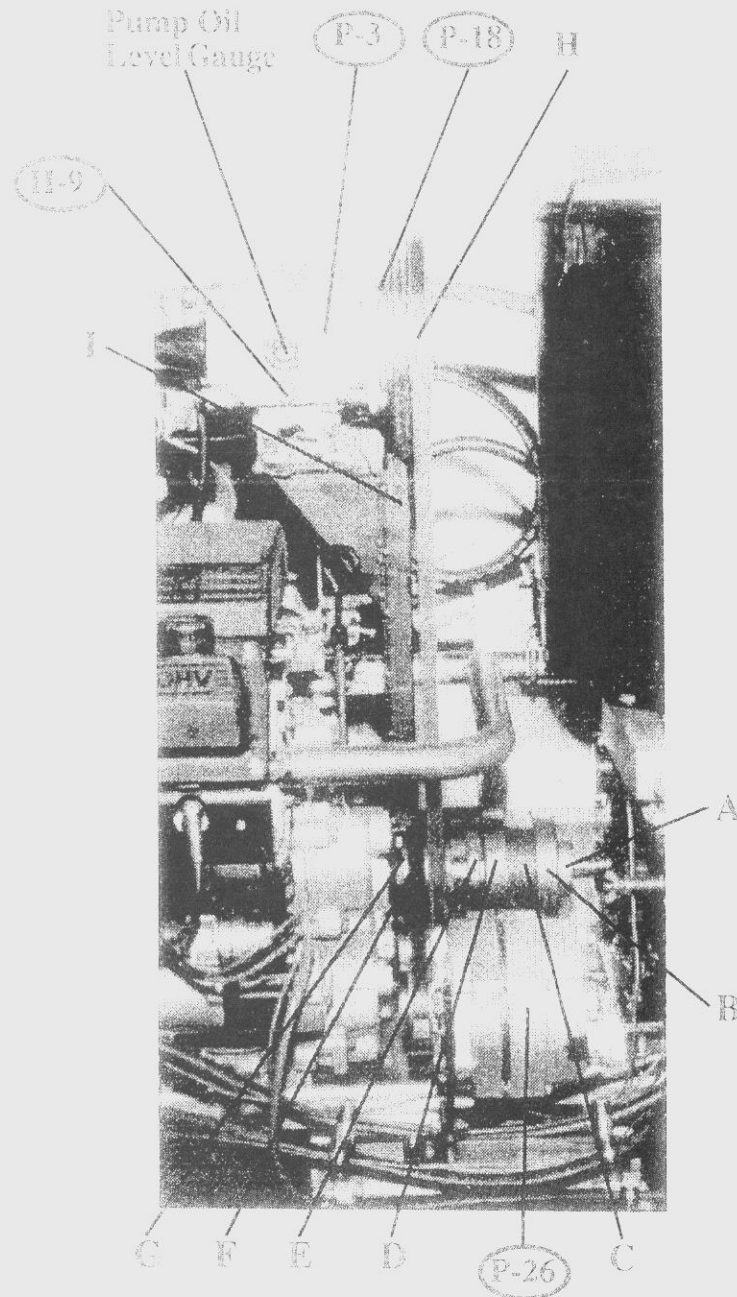
OVERHEAD VIEW OF COUPLER LOOKING FROM DIRECTLY ABOVE ADDITIONALLY CHECK AT THE 12 O'CLOCK POSITION FOR VERTICAL ALIGNMENT



- E. Test run the engine for a few minutes to check for vibration and belt tension. After two or three jobs, recheck belt tension again.

FIGURE 9-1

Belt and Drive System



- A. Bushing For Blower Flange 44-E651
- B. Modified Flange Blower Shaft 44-E304
- C. Drive Sleeve 44-E303
- D. Modified Flange Engine Shaft 44-E304
- E. Bushing For Engine Flange 44-E655

- F. Alternator Drive Belt 44-E514
- G. Drive Pulley Engine Shaft 4603106
- H. Pump Belt 4603104
- I. Pump Stand 3951985

SECTION 10

WIRING SYSTEM

- 10-1 To become familiar with the wiring of this machine, refer to Figure 10-1 as you study the entire system.
- 10-2 The main source of power is the 12 volt battery and is continuously being recharged by the automotive alternator (P-26). The recharging potential and battery voltage can be monitored by the DC volt meter (G-4).
- 10-3 The battery connection at the starter solenoid is a convenient point to disperse DC power to the two circuit breakers on the control panel (C-19 and C-20).
- 10-4 The 30 amp circuit breaker (C-19) protects the components of the burner system, they being the DC motor (P-11), ignitor (P-15) and the fuel solenoid (C-10) covered in Section Seven of this manual.
- 10-5 The 20 amp circuit breaker (C-20) protects the components necessary to run the engine, i.e., fuel pump, carburetor solenoid. The 20 amp circuit breaker also protects the water pump clutch circuit and the water temperature gauge circuit.
- 10-6 The tach/hour meter will display the RPM of the engine when the engine is running, and will display the hours operated when the key is off. The electrical hook up is illustrated in the drawing below.

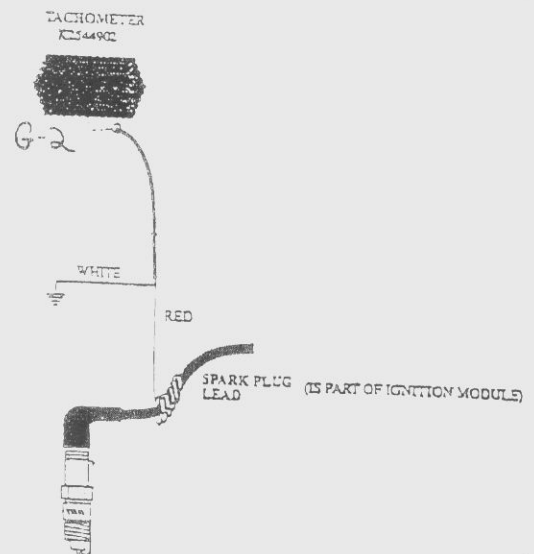
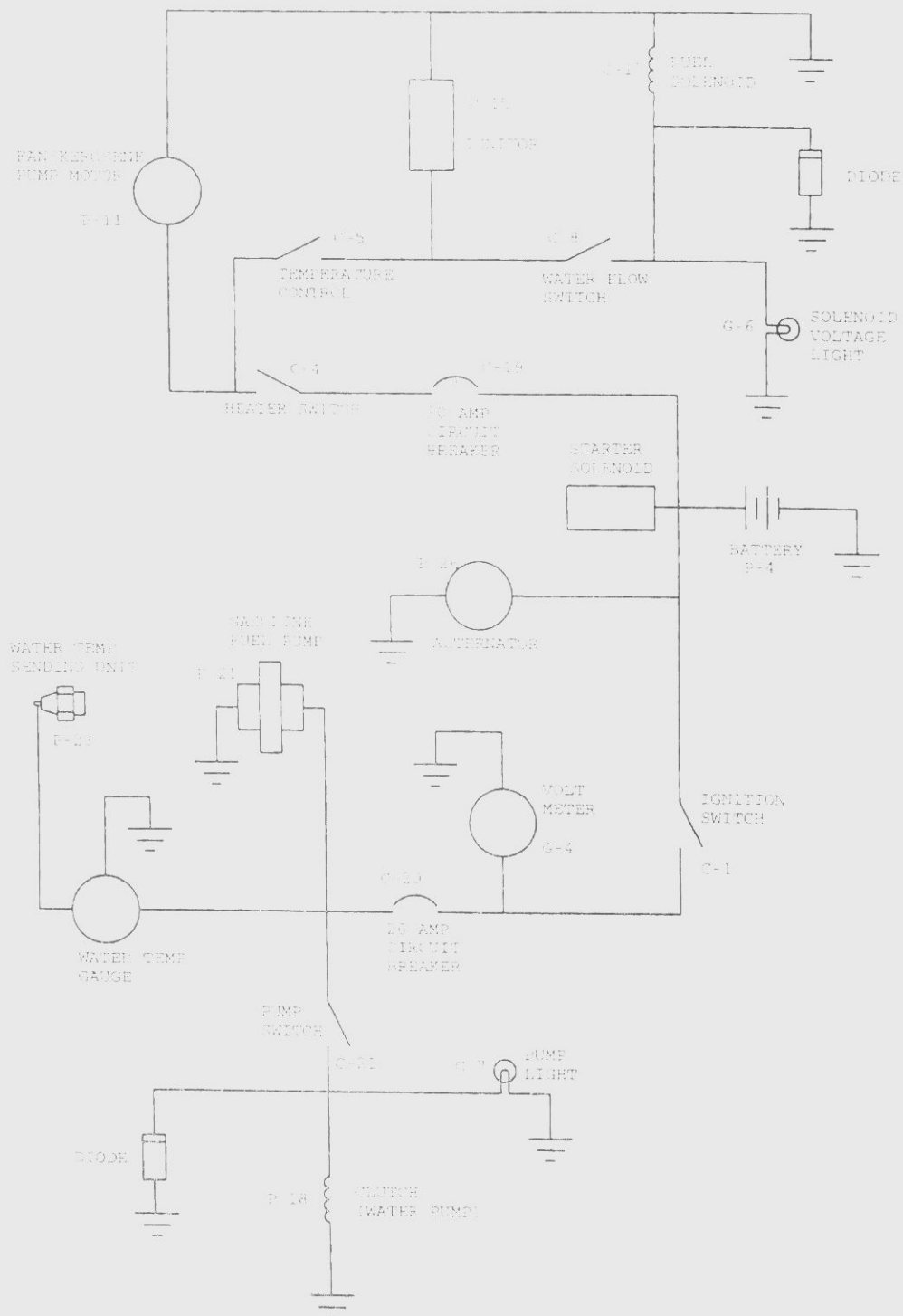


FIGURE 10-1
Wiring Diagram



SECTION 11

SCHEDULED MAINTENANCE

11-1 Your MasterMatic unit is a machine that has many moving parts; but with proper maintenance they are designed for long life and relatively trouble-free service. The key to this unit, as with any other piece of equipment, depends upon the type of service that it receives.

When you purchase an automobile, tractor or any other piece of highly technical equipment, you also receive a maintenance schedule; and all interested new owners are eager to perform these procedures to insure good operation and long life for their new investment. It is imperative that you follow the maintenance schedule shown on Figure 11-1 and become thoroughly familiar with the individual owner manuals of the specific components of this unit, located in the appendix of this manual. A maintenance log should be started at the very beginning, so that accurate records of service are readily available (See **Figure 11-1 on page 37**).

FIGURE 11-1

MAINTENANCE CHECK

IST (MasterMatic Omega 4200)

Item	Every Job	Every Day	Every Week	6 Months	50 Hours	100 Hours	200 Hours	500 Hours	Product (Available At Steam Way Int'l.)
Lint Screen Waste Tank	Clean								16-1101
Kohler Engine Oil		Check	1st Change 5 hours			Change			SAE 10W40 (API SF or SG)
Oil Filter			1st Change 5 hours			Change			Kohler P/N K12 050 01
Carb Foam Pre-cleaner		(Service Each 25 Hours)	(In some instances this filter may not be used.)				Kohler P/N K0438809		
Air Cleaner Element					Check				K470e362
Spark Plugs					Check				RG 12 YC (Champion) #K12 13002
Gasoline Filter				Check					P/N 41 5042
Cat Pump Oil		Check (red dot)			First Change			Change	Special Cat Oil SW P/N 4510102
Vac Blower Oil		Check (inspection window G-5) Figure 8-1						Change	#4 Lubriplate SW P/N 4810102
Bearing Grease								Lube	High Temperature Grease - SW P/N 4810102
Lube Impellers		Lube	(Refer to paragraph 8-6)						
Burner Fuel Strainer				Check					W 3715732 / Gasket W3779801
D.C. Motor Brushes			(See Figure 7-4)				Check		Brush Kit SW P/N W31862 001
Electrode Spacing				Check		(See Fig. 7-3)			

SECTION 12

DESCALING PROCEDURE

- 12-1 The MASTERMATIC, like any other unit, has the inherent ability to collect calcium and other mineral deposits within the hoses and coils which will restrict the water flow within the machine. When this condition is noted or suspected, a very simple and inexpensive method of descaling has been established.
- 12-2 Items needed:
1. A five gallon plastic bucket (45# Formula A container).
 2. At least 1/2 gallon of Descaler Chemical Part Number 9950100 (Quarts).
 3. A Descaler hose, Part Number 15-8002.
 4. A high pressure hose or hoses, with the male connector removed from the end of the last hose.
- 12-3 Procedure: (See Precautions Before Using)
1. Mix 1/2 gallon of Descaler solution with five gallons of water in the plastic bucket.
 2. Connect the high pressure hose or hoses to pressure out connection H-4 on the machine. (You may desire to descale all hoses during the procedure.)
 3. Connect the descaler hose (15-8002) to the female connector H-11 on left side of the machine with the other end in the bucket of descaling solution. Turn the chemical control meter (C-7) off (fully clockwise).
 4. Start the engine turn the pump switch (C-21) on and note that the solution is being drawn from the bucket. When approximately 1/2 of the solution has been drawn into the machine, put the high pressure hose into the bucket so that the bucket will not become empty.
 5. After approximately 25 minutes, you should observe that the return flow rate back into the bucket has increased. This indicates that the procedure has been effective and the descaling procedure is almost complete. Stop the engine.

6. Now the descaling solution MUST be removed from the system. To accomplish this:
- Remove the descaler hose.
 - Reconnect H-11 to original configuration.
 - Reinsert the input water supply hose to H-3 "water in".
 - Start the engine and monitor the discharge coming out of the open high pressure hose (male end removed). When clean water is being discharged through the hose, the descaling procedure is complete.

PRECAUTIONS WHEN USING DESCALER:

CAUTION: 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 13

TROUBLE SHOOTING

- 13-1 Kohler engine problems - See the Kohler Engine Manual, located in the appendix of this technical manual. A list of Kohler Engine Sales and Service Centers is listed in the back of the Kohler Manual.
- 13-2 Water pump problems - See the Cat Pump Manual (Green Insert), last paragraph, for diagnosis and maintenance for the Cat Pump. The manual is located in the Appendix of this technical manual.
- 13-3 For the information concerning troubleshooting the Sutorbilt blower, refer to the Blower Manual, page 9, located in the Appendix Section of this manual.
- 13-4 When trouble shooting the water pressure system of the MASTERMATIC unit, refer to Figure 6-1 of this manual.
- 13-5 Remember that the system cannot draw water if an air leak exists in the suction side of the pump. To check for air leaks, insert tap water into the female QD of H-11, Figure 6-1, while looking for leaks.
- 13-6 Restriction in the system will result in low or no water pressure.
- 13-7 To trouble shoot the heater system, refer to Section 7 of this manual. Insure that adequate fuel is available, the Ignitor Module is developing a spark, and that 12 volt DC is applied to the fuel solenoid.
- 13-8 Recovery system problems are covered in Section 8 of this manual.

*New
Copies
Originals*

SECTION 14

IT NUMBER REFERENCE LISTS

TABLE 14-1

Controls

CONTROL#	PART NO.	NAME	FIGURE
C-1	K2509904	IGNITION SWITCH	4-3
C-2	K2475548	THROTTLE	4-3
C-3	KOHLER PART	ENGINE CHOKE	4-3
C-4	42-2A11	HEATER SWITCH	4-3, 7-2, 10-1
C-5	44-C027	TEMPERATURE CONTROL	4-3, 7-2, 10-1
C-6	4144205	PRESSURE REGULATOR	4-3, 6-1
C-7	4146110	CHEMICAL CONTROL	4-3, 6-1
C-8	4209672	WATER FLOW SWITCH	4-2, 6-1, 7-2, 10-1
C-9	PUMP PART	KERO BLEED VALVE	6-1, 7-4
C-10	W100610	FUEL SOLENOID	6-1, 7-1, 7-2, 7-4, 10-1
C-11	(METRIC)	LOCK SCREW, AIR CONTROL	7-1
C-12	4146506	CHECK VALVE, WATER IN	6-1
C-13	4143110	FLOAT CONTROL, WATER HOLDING TANK	6-1
C-14	4146504	CHECK VALVE, SOAP FLOW	6-1
C-15	KERO PUMP PART	KERO FUEL PRESS ADJ.	6-1, 7-4
C-16	42-1C11	FLOAT SWITCH, WASTE TANK	8-1
C-17	16-2400	VACUUM BREAKER	4-1, 8-1
C-18	C7140	THERMO VALVE	4-2, 6-1
C-19	42-2C11	30 AMP CIRCUIT BREAKER	4-3, 7-2, 10-1
C-20	42-2C10	20 AMP CIRCUIT BREAKER	4-3, 7-2, 10-1
C-21	42-2A12	PUMP SWITCH	4-3, 7-2, 10-1
C-22	4146505	CHECK VALVE	6-1

TABLE 14-2

Gauges

GAUGE	PART NO.	NAME	FIGURE NO.
G-1	44-C010	PRESSURE GAUGE	4-3, 6-1
G-2	K2544902	TACH/HOUR METER	4-3, PARA 10-6
G-3	44-C018	WATER TEMP GAUGE	4-3, 10-1
G-4	44-C035	DC VOLT METER	H-3, 10-1
G-5	PART VAC BLOWER	OIL LEVEL SIGHT GAUGE	8-1
G-6	4209667	SOLENOID VOLT LIGHT (RED)	4-3, 7-2, 10-1
G-7	4209666	WTR PUMP ON LIGHT (GREEN)	4-3, 10-1
G-8	44-C011	VACUUM GAUGE	4-3, 8-1

TABLE 14-3
Hookups, Drains, And Hoses

HOOKUP POINT	PART NUMBER		NAME	FIGURE NO.
	(Male)	(Female)		
H-1	4131210	4132210	GASOLINE CONNECTION	4-2
H-2	4131210	4132210	KEROSENE CONNECTION	4-2
H-3	4131660	4132665	WATER IN CONNECTION	4-3, 6-1
H-4	4131420		PRESSURE OUT CONNECTION	4-3, 6-1
H-5	PART WASTE TANK		VACUUM HOSE CONNECTION	8-1
H-6	4131260	4132260	SOLUTION CONNECTION	4-2, 6-1
H-7	41-1N33	CAP 3/8	ENGINE OIL DRAIN	4-1
H-8	PART BLOWER		BLOWER OIL DRAIN	8-1
H-9	C25625		CAT PUMP OIL DRAIN	4-1
H-10	4142021		WASTE TANK DUMP VALVE	8-1
H-11	4131660	4132660	QD. WATER HOLDING TANK	4-2, 6-1
H-12	2909835		BLOWER OILER	4-3, 8-1
H-13	3952000		VENT EXTENSION	4-4
H-14	3952003		VENT COLLECTOR	4-4
H-15	4131660	4132660	WATER INPUT (PANEL TO TANK)	4-2, 6-1
H-16	41-1S23		HEATER OUTPUT SWITCH	6-1A

NOTE: FOR ALL HOSE PART NUMBERS REFER TO FIGURE 6-1A
(LOW PRESSURE HOSES ARE SOLD BY THE FOOT.
THE LENGTH OF THE LOW PRESSURE HOSE IS NOTED ON THE DIAGRAM.)

TABLE 14-4

Major Components

MAJOR	PART NO.	NAME	FIGURE NO.
P-1	43-0A05	KOHLER ENGINE	4-1, 9-1
P-2	41-0B12	VACUUM BLOWER	4-1, 8-1
P-3	4100153	WATER PUMP	4-1, 4-2, 6-1, 9-1
P-4	42-9M22	12 VOLT BATTERY	4-1, 7-2, 10-1
P-5	2909836	WATER HOLDING TANK	4-2, 6-1, 6-1A
P-6	46C3107	HEAT EXCHANGER	4-1, 6-1, 6-1A
P-7	41-5C14	WATER FILTER	6-1, 6-1A
P-8	K1205001	ENGINE OIL FILTER	4-2
P-9	17-3001	WASTE TANK (70 GALLON)	8-1
P-10	4301002	PUMP DRIVE BELT	4-1, 9-1
P-11	4209669	DC MOTOR	4-1, 6-1A, 7-1, 7-4
P-12	2909810	SILENCER	4-2, 8-11
P-13	W100608-001	BURNER FUEL PUMP	4-1, 6-1, 7-1, 7-4
P-14	16-1101	LINT FILTER, WASTE TANK	8-1
P-15	4209671	HIGH VOLTAGE IGNITOR MODULE	4-1, 7-1, 7-2, 7-4, 10-1
P-16	2909812	ENGINE EXHAUST MANIFOLD	4-1, 9-1
P-17	W3715732	KEROSENE STRAINER	PART OF P-13
P-18	4300114	CLUTCH, WATER PUMP	4-1, 9-1, 10-1
P-19	9980010	SOLUTION CONTAINER	6-1, 6-1A
P-20	45C3108	BURNER FAN	7-1
P-21	41-0A84	GASOLINE FUEL PUMP	4-2
P-22	2909815	HEATER OUTPUT CLUSTER	6-1, 6-1A
P-23	44-C018A	WATER TEMP SENDER	6-1, 6-1A, 10-1
P-24	44-E514	ALTERNATOR BELT	4-1, 9-1
P-25	41-5C42	GASOLINE FILTER	4-2
P-26	42-0B08	AUTOMOTIVE ALTERNATOR	4-1, 7-2, 9-1, 10-1
P-27	16-2422	VACUUM INPUT T	4-1, 8-1
P-28	17-3100	LID 70 GAL WASTE TANK	8-1

FIGURE 7-3 BURNER GUN

ELECTRODES - DIFFUSER PLATE - FUEL NOZZLE - HEATER

I. Electrode Adjustment Parameters:

3/16" gap between electrode points.

3/16" offset from center hole of nozzle.

1/8" min. - 3/16" max. height above fuel nozzle.

II. Diffuser Plate:

The diffuser plate air slots must be kept clear (open).

The diffuser plate parameter - 3/8" above fuel nozzle.

The diffuser plate must be kept mounted and secure.

If not secure - non-firing of fuel or excessive smoke will occur.

III. Fuel Nozzle:

	Jet Size	Fuel Type	Fuel Press.
General purpose fuel nozzle size	1.25 70°W	Kerosene Fuel	115 psi - 125 psi
Kerosene fuel nozzle size	1.50 70°W	Kerosene Fuel	95 psi - 105 psi
Diesel fuel nozzle size	1.25 70°W (correct)	Diesel	125 psi - 140 psi
Diesel fuel nozzle size	1.00 60°A (optional)		130 psi - 145 psi

