Rev. 12/2014

STEPP MFG™

ASPHALT MAINTENANCE EQUIPMENT

SBF BOTTOM FIRED KETTLES

OPERATIONS/MAINTENANCE/PARTS MANUAL

LP or Diesel Burner Systems

12325 River Road North Branch MN 55056 ~ Phone: 651-674-4491 ~ Fax: 651-674-4221
www.steppmfg.com

Warranty

Stepp Manufacturing Company Inc. hereby warrants to the original purchaser that products manufactured by Stepp Mfg. will be free from defects in material and workmanship for a period of one (1) year from the date of purchase.

Stepp Mfg., at its discretion, will provide for the repair or replacement of any part found upon examination by Stepp Mfg. to be defective, except as noted below. Such repair or replacement will be free of charge to the original purchaser for a period of one (1) year from the date of purchase, except as noted below.

No warranty is extended to cover:

•Product pump wear or damage caused by foreign objects.
•Routine maintenance, cleaning, and adjustments.
•Parts/components that have been altered, misused, or improperly adjusted or maintained.
•Transportation to and from the place of warranty repair.
•Removal of material from equipment.

The following items are covered solely by their manufactures warranty:

•Engines
•Hydraulic components
•Burners
•Pumps
•Tires
•Other component parts

The following items are covered by a pro-rata warranty:

•Hoses that carry heated materials.
•Heating elements for hoses and wands.

Disclaimer of further warranty:

Stepp Mfg. makes no warranty, expressed or implied, other than this warranty. The implied warranties of merchantability and fitness for particular purpose are hereby disclaimed. Repair or replacement of products or parts proving to be defective in material or workmanship shall be the exclusive remedy for breach of this warranty.
Stepp Mfg shall not be liable for incidental or consequential damages including but not limited to: damages for inconvenience, rental or purchase of replacement equipment, for loss of profits, loss of material, or other loss resulting from breach of this warranty.
Stepp Mfg reserves the right to incorporate any changes in design into its products without obligation to make such changes on products previously manufactured.
Please see Warranty section for more details.

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INTRODUCTION

SBF Bottom Fired Kettle

Thank you for selecting *Stepp* highway maintenance equipment. We are confident you will be satisfied with the *Stepp SBF Bottom Fired Kettle*. *Stepp Manufacturing* is backed by over 70 years of experience in the design and manufacture of highway maintenance equipment. This experience along with our innovative design and unique features make the *Stepp SBF* the fastest and most efficient *Bottom Fired Kettle* available. Continued research and development, along with input from you, the user, help make this possible.

To assure safe operation of this equipment, the operator must read and understand all operating procedures and safety notices contained in this manual. In addition, the operator must receive instruction from their supervisor, or the manufacturer, on how to safely operate the *Stepp SBF*. Contact the manufacturer if any questions arise, or if you desire training for additional staff members.

Operating instructions, adjustments, and periodic maintenance procedures are given so you, the operator, can keep your unit working like new and expect many years of dependable service from it. Remember, any machine, regardless of design or type, will perform only in relation to the way it is operated and the maintenance it receives.

Read this manual carefully and observe all Warnings and Cautions. If you have any recommendations or comments regarding this manual, please send them attention to: Engineering Dept., Stepp Manufacturing Co. Inc., 12325 River Road, North Branch MN. 55056-6225 or call 651-674-4491. All comments we receive are reviewed and may be incorporated into future manuals.

When ordering parts or making any inquiry about the *Stepp SBF,* be sure to include the model number and serial number found on the data plate attached to the frame.

TABLE OF CONTENTS

IMPORTANT NOTICE!
This manual contains cautions and warnings that alert you to potential safety issues.

WARNING is used to inform you of conditions or operations that could cause serious injury or death.

CAUTION is used to inform you of conditions or operations that could cause damage to the equipment

NOTE is used to provide you with additional information that may be helpful or useful for a particular situation.

This manual explains the basic operations, maintenance, and use of the Stepp SBF Bottom Fired Kettle. The main objective of this equipment is to heat various bitumens and emulsions for crack filling and seal coating.

Before Starting or Operating this Machine

Understand and observe all the following Warnings, Cautions, and Notes.

WARNINGS

- This equipment contains mechanical and heating components that may cause serious injury or death if not handled or maintained properly. All personnel must be properly trained in the operation and maintenance of this equipment.
- Before refueling, shut off the burners and allow all flames in the burner and pilot light to extinguish. Shut off the engine.
- Check fuel lines, fuel line connections, and all other components for leaks. If any leaks are found, they must be repaired before using the unit.
- Know the temperature required for the material being used, and do not exceed this temperature. Avoid over heating, as this may cause equipment damage, personal injury, and/or death.
- Never load a tank with heated oil when moisture is present in the tank. Depending on the temperature of the hot oil, the moisture may instantly boil causing hot oil to foam up and out of the tank causing severe burns.
- Do not operate the tack tank burner when the amount of material in the tank is less than 4" above the flues. Allow 10 minutes cool-down time after the burner has been shut off before exposing the flues. Exposed flues will over-heat and cause an explosion and/or fire.
- The tack tank cover must be unlatched when operating the tack tank burner. This is to provide for emergency venting, in the event of a flash, to prevent the tank from exploding.

CAUTIONS

- Know the materials being used and know the proper handling, heating, application, clean-up, and storage procedures. Not all materials are compatible with each other. Many materials have a very limited shelf life. Most materials require special handling procedures to prevent personal injury and/or equipment damage. Contact your material supplier and/or manufacturer for proper handling instructions. Equipment malfunction or damage due to improper handling or use of the materials is not covered by warranty.
- Do not exceed the maximum heating temperature or storage time as recommended by the material manufacturer. This may cause emulsion type materials to separate and become difficult or impossible to remove from the machine. Consult with the material manufacturer for recommendations.
- Over-agitation or circulation may cause emulsion type materials to separate and become difficult or impossible to remove from the machine. Consult with the material manufacturer for recommendations.
- Do not mix *Anionic* and *Cationic* materials together, as the materials attach to each other and will become difficult or impossible to remove from the machine. If you are not sure consult your material supplier.

NOTES

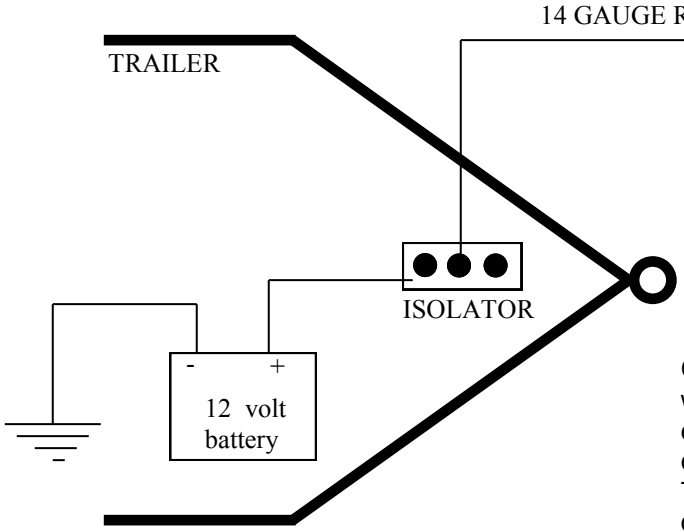
- Become familiar with the Material Safety Data Sheet (MSDS) for the material being used in the machine and take appropriate safety precautions. Wear the proper clothing and protective gear as recommended by the MSDS and your safety director.
- Do not use the equipment unless it is in good condition.
- In case of skin contact with hot materials, dip into **cool**, **clean water immediately**. Do not wipe the product, as this will spread the burn.
- Consult the MSDS and contact your safety director for proper extinguishing of petroleum based fires.
- Carry a fire extinguisher(s) as recommended by your safety director.
- Notify your supervisor or the manufacturer if any questions arise concerning the operation of this equipment.

OPERATIONS

WARNING: *Prior to transporting, the driver of the tow vehicle must assure the safety of the operation. The driver must also know, and assure, the product temperature is within limits.*

Trailer Hook-up

1. Connect trailer to towing vehicle.
   a. Check that hitch is engaged properly.
   b. Attach safety chains to towing vehicle.
   c. Connect battery charging circuit to tow vehicle if required.
   d. Connect electrical plug to towing vehicle.
   e. Connect breakaway cable to towing vehicle.
   f. Check operation of lights and brakes.
2. Secure trailer for transport.
   a. Shut OFF the engine and burners.
   b. Shut OFF all fuel valves.
   c. Be sure the product temperature is not above the recommended operating temperature.
   d. Securely latch the tank cover.



Connection to the tow vehicles battery is required when the Stepp SBF is equipped with spark ignition or electronic thermostats and does not have its own charging system. (i.e.: onboard engine or generator) The isolator will protect the battery on the trailer from discharging through the tow vehicles electrical system.

Loading

WARNING: *Be sure operators have been properly instructed in starting and operating equipment.*

1. Check that the proper material is being used.
2. The tank must be thoroughly cleaned if the material being loaded is not compatible with that already in the tank. Check with your material supplier for compatibility.
3. Load tank through top manhole cover.

This system uses electrical sparks to ignite the pilot lights that, in turn, ignite the burners. If the pilot light goes out, the system will attempt a re-ignition. If the re-ignition is not successful, the gas supply will automatically be shut off and the system must be vented before resetting the system. The system is reset by switching the 12 volt power supply OFF then ON again. By use of a thermostat, the system automatically controls the burners to maintain the desired product temperature.

WARNING: *BEFORE IGINITING BURNER: Know the materials being used. DO NOT exceed flash point or operating range temperatures.*

Igniting Burner

1. Turn OFF burner and pilot valves.
2. Attach liquid LP bottle to system and set regulator between 10 and 20 PSI, depending on intensity of flame desired.
3. Open pilot light valve.
4. Turn on main power switch and a clicking sound can be heard as the ignition system starts to work.
5. When the pilot light ignites, proceed to next step. If ignition has failed, reset power switch. **NOTE:** *The ignition system is designed to sense flame at the pilot light to act as flameout protection. If flame is not present within approximately six seconds, the ignition igniter will drop out and require resetting with the power switch.*

WARNING: *The burner chamber will require venting to eliminate the possibility of gas build up after each ignition reset.*

6. Open burner valve then set thermostat to the desired temperature and the burner will ignite.
7. Operate engine or other charging circuit as necessary to provide power to the thermostat and spark ignition system.

To Shut Off Burners

1. Turn off power switch on the control box.

CAUTION: *When storing the equipment, turn off fuel supply tank valve and allow the fuel system to burn off. This will prevent temperature changes from building excess pressure in the system and possibly damaging components. Then turn OFF the power switch.*

When equipped with a Baso Safety Valve, this system will shut off the gas supply to the burners if the flame should go out for any reason. This system is not equipped with automatic temperature controls. It is the operators responsibility to shut off the burners when the product reaches the recommended temperature. Allow for temperature "creep" when the burners are shut off.

Igniting Burner

1. Verify that the main burner valve and lighting wand valve are OFF.
2. Attach Liquid LP bottle to system and set regulator between 10 to 20 PSI, depending on intensity of flame desired.
3. Open pilot light control valve between four to six turns.
4. Open lighting wand valve ¼ to ½ turn and light immediately to prevent gas build-up and fire hazard.
5. Insert lighting wand near outlet of pilot light.
6. Push the button on the safety control valve (baso valve).
7. Once the pilot light has ignited, hold the button down 30-45 seconds, or until it stays energized by itself.
8. Once the pilot light is lit and the Baso Valve is staying in the operating position, close valve on lighting wand and store.
9. Open the main burner valve slowly until you acquire the desired flame.

To Shut Off Burners

1. Turn off the burner control valve and allow the burner to self-extinguish.
2. Close pilot light valve.

CAUTION: *When storing the equipment, turn off fuel supply tank valve and allow the fuel system to burn off through the lighting wand. This will prevent temperature changes from building up excess pressure in the system and possibly causing damage to the equipment, or personell injury and/or death.*

This system incorporates a 12 volt burner and blower assembly and burns #2 diesel fuel. A 12 volt battery and charging circuit supplies power to the burner, blower motor, and thermostat. The charging circuit may consist of an engine driven alternator mounted on the unit, or a hook-up to the tow vehicle's charging system. The thermostat will automatically control the burners to maintain the desired temperature. The temperature of the material is shown on LCD digital displays.

Igniting Burner

1. Check fuel tank for proper fuel type and quantity.
2. Set thermostat to the product manufacturers recommended level.
3. Turn ON burner power switch and the burner will ignite.
4. Operate battery charging device.

To Shut Off Burner

1. Set thermostat to the lowest setting.
2. Turn OFF burner power switch.

CAUTION: *The burner requires a minimum of 12 volts for proper operation. Poor combustion with excessive smoke and lack of heat or burner malfunction will result with lower voltage. Assure the battery is fully charged and the charging circuit is operating properly for maximum performance.*

Pumping System w/ Spray Wand

An optional pump may be installed to pump material through a spray wand. The pump may be driven by a gas or diesel engine or by an electrical or hydraulic system. The plumbing must be purged of material when finished to prevent plumbing freeze-up. This is done by reversing the pump to suck the material out of the wand. An optional flush tank may also be installed to further flush the system of any remaining material. **NOTE:** *All valves should be OFF unless directed to be open.*

1. Circulate. In this operation, the contents of the tank are pumped through the recirculation system and directed back to the tank to aid heating and mixing.

a. Set Recirculate/Spray valve (2) to "Recirculate" position.

b. Open tank valve (1).

c. Engage pump in “Forward” direction.

2. Spray. In this operation, the contents of the tank are pumped to the wand for application to the road surface.

a. Set Recirculate/Spray valve (2) to "Spray" position.

b. Open tank valve (1).

b. Engage pump in “Forward” direction.

c. Open valve on spray wand.

3. System Purge. (suck back) In this operation, the pump is “Reversed” to purge the product from the system.

a. Disengage pump.

b. Set Recirculate/Spray valve (2) to "Spray" position.

c. Open tank valve (1).

d. Open valve on wand, then engage pump in “Reverse” for two minutes.

e. Close tank valve (1) and disengage pump.

4. **System Flush. (optional)** Flushing solvent is pumped through the pump and wand to clean material from the system.

WARNING: *The burners must be extinguished prior to performing flushing operations. DO NOT allow flushing solvent to contaminate the contents of the main tank.*

a. Disengage pump.

b. Set Recirculate/Spray valve (2) to "Spray" position.

c. Open flush valve (3).

d. Place end of wand into suitable container. **NOTE:** *DO NOT allow flushing solvent to splash out of container or enter product tank.*

e. Engage pump in “Forward” position, then open the wand valve to flush.

f. When complete, disengage pump.

g. Close flush valve (3) and open air valve (4)

h. Engage pump in “Forward” position to vacate as much solvent as possible.

i. Disengage pump and close air valve (4).

j. Place suitable container under tank valve drain and open valve (5) to allow all tank valve contents to drain.

k. Dispose of flushing solvent in accordance with local, state, and federal laws.

Pumping System w/ Wand & Spray Bar

An optional pump may be installed to pump material through a wand and spray bar. The pump may be driven by a gas or diesel engine, or by an electrical or hydraulic system. The plumbing must be purged of material when finished to prevent plumbing freeze-up. This is done by reversing the pump to suck the material out of the system. An optional flush tank may also be installed to further flush the system of any remaining material.

1. **Circulate.** In this operation, the contents of the tank are pumped through the Recirculate/ Spray valve and directed back to the tank to aid heating and mixing.
   a. Set the Recirculate/Spray valve to "Recirculate" position.
   b. Set the Product/Flush valve to "Product" position.
   c. Engage pump in “Forward” direction.
2. **Wand.** In this operation, the contents of the tank are pumped to the wand for application to the road surface.
   a. Set the Recirculate/Spray valve to "Spray" position.
   b. Set the Product/Flush valve to "Product" position.
   c. Set the Wand/Spray Bar valve to "Wand" position.
   d. Engage pump in “Forward” direction.
   e. Open valve on spray wand handle.
3. **Spray Bar.** In this operation, the contents of the tank are pumped to the spray bar for application to the road surface.
   a. Set the Recirculate/Spray valve to "Spray" position.
   b. Set the Product/Flush valve to "Product" position.
   c. Set the Wand/Spray Bar valve to "Spray Bar" position.
   d. Engage pump in “Forward” direction.
4. **System Purge.** (suck back) In this operation, the pump is “Reversed” to purge the product from the system.
   a. Set the Recirculate/Spray valve to "Spray" position.
   b. Set the Product/Flush valve to "Product" position.
   c. Set the Wand/Spray Bar valve as needed to suck back the system as desired. (open valve on wand handle if sucking back the wand)
   d. Engage pump in “Reverse” for two minutes.
   e. Close valve on wand handle and disengage pump.

Pumping System w/ Wand & Spray Bar CONT.

5. **System Flush. (optional)** Flushing solvent is pumped through the pump, spray bar, and wand to clean material from the system.

WARNING: *The burners must be extinguished prior to performing flushing operations. DO NOT allow flushing solvent to contaminate the contents of the main tank.*

a. Disengage pump.

b. Set the Recirculate/Spray valve to "Spray" position.

c. Set the Product/Flush valve to "Flush" position.

d. Set the Wand/Spray Bar valve as needed to flush the system as desired.

e. Place a suitable container under spray bar.

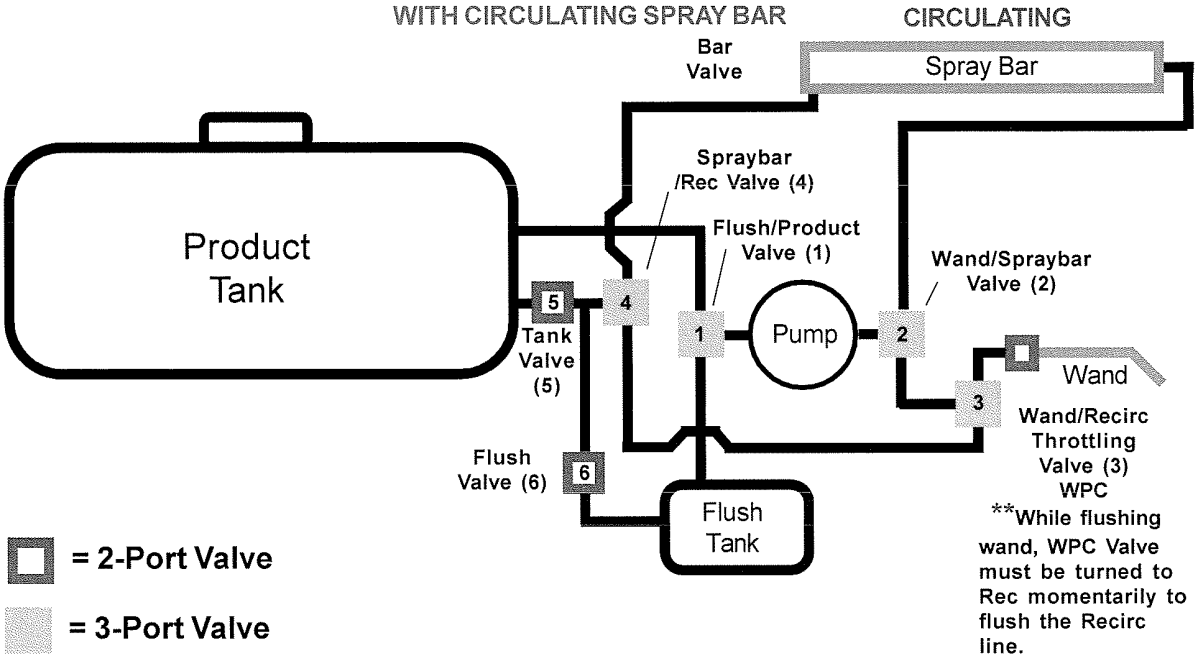
f. Engage pump in “Forward” position to flush system.

g. Open valve on wand handle to flush wand.

h. When complete, disengage pump.

i. Dispose of flushing solvent in accordance with local, state, and federal laws.

PUMPING OPERATIONS



OPERATION	V-1	V-2	V-3 WPC	V-4	V-5	V-6	Pump					
Circulate	Prod	Wand	Rec	Rec	Open	Close	For					
Wand	Prod	Wand	Wand wpc	Rec	Open	Close	For					
Spraybar	Prod	Spray	Rec	Spray	Open	Close	For					
Suckback Wand	Prod	Wand	Wand	Rec	Open	Close	Rev					
Suckback Bar	Prod	Spray	Rec	Spray	Open	Close	Rev					
Flush Wand ⚠	Flush	Wand	** Wand	Rec	Close	Open	For					
Flush Bar ⚠	Flush	Spray	Rec	Spray	Close	Open	For					

⚠**CAUTION:**Do not allow flushing solvent to enter product tank. Do not operate heaters unless heating elements are completely covered with a minimum of 4 inches of product.

Note: WPC (Wand Pressure Control) Position the WPC Valve handle between Wand & Recirc to control wand pressure.

--- Valve orientation does not affect this operation.

Heated Hose & Wand (optional)

CAUTION: *DO NOT turn on the wand heat unless the hose is filled with material. Damage to equipment may result.*

The application wand and hose may be equipped with an optional electrical heating element. This heating element prevents the product from freezing in the hose and wand. The electric wand thermostat should be set to the desired temperature 30-40 minutes before trying to pump product through the hose and wand. This will allow time for the product to re-liquefy in the hose.

NOTE: *No flushing or clean-up is required with this system. Just shut the machine off as the product in the hose can be remelted by activating the wand heat.*

Engine Operations (optional)

1. Engine Starting
    a. Check all fluid levels.
    b. Check reduction drive oil level.
    c. Open fuel valve at fuel tank.
    d. Start engine. (see manual insert)
    e. Set the engine speed to the desired level.
2. Turning OFF Engine
    a. To stop engine, move throttle to the idle position.
    b. Allow a two minute cool down period at idle.
    c. Shut OFF engine.
    d. Refer to the engine manufacturers operators manual for additional information.

Murphy Shut Down Switch (optional)

If the engine is equipped with a Murphy switch it must be held in while starting the engine. Once the engine is started the release the switch. If the oil pressure or engine temperature limits are exceeded, the Murphy switch will shut down the engine, protecting it from damage.

MAINTENANCE

SBF MAINTENANCE SCHEDULE

ITEM	OPERATION TO PERFORM	DAILY	EVERY WEEK	EVERY MONTH	EVERY 3MO	EVERY 6MO	EVERY YEAR
Product Pump	Adjust end clearances and packing as needed.						
Burner Orifice	Clean and blow out with compressed air.					X	
Heating Flues	Clean and inspect for leaks.						X
Door Hinges and Slides	Lubricate with high temperature grease. Inspect for worn or damaged components.				X		
Hose Assembly on Spray Wand	Inspect for cracks, fraying, or deterioration. Replace if needed with original equipment hose.		X				
Hose Assembly on Spray Wand	Replace with original equipment hose.						X
Main Tank	Clean out and inspect for cracks or other damage. Weld or repair as needed						X
Fuel Filter for Burner	Install new filter for diesel burner. Install new strainer for LP burner.					X	
Fuel Lines	Check for security, damage, and leaks. Replace with OEM type hose as needed	X					
Fuel Tanks	Check for damage and leaks.	X					
Brakes	Test for proper operation.	X					
Brake Adjustment/Inspection	Adjust brake shoes to proper clearance. Check brake shoes for excessive wear.				X		
Wheel Bearings	Inspect for corrosion and wear. Clean and repack, install with new seals.						X
Suspension Part	Inspect for bending, loose fasteners, and wear. Repair as needed.				X		
Axle Hangers	Inspect weld for security.					X	
Wheel Nuts	Re-torque to proper specs.				X		
Tires	Check pressure. Inspect for wear, cuts, or other damage.		X				
Hitch	Check for damage and loose fasteners.	X					
Lights	Check for proper operation.	X					

SBF MAINTENANCE RECORD

DATE	MAINTENANCE PERFORMED	HOUR METER	SERVICED BY

All maintenance items must be performed according to the maintenance schedules and documented for warranty coverage to be effective.

Oil & Filter Change

1. Run engine until operating temperature is reached, then shut OFF engine.
2. Place drain pan under oil drain hose.
3. Open oil drain valve and drain oil from the engine.
4. Close the oil drain valve.
5. Place drain pan under engine oil filter and remove filter.
6. Coat gasket of new oil filter with engine oil and install, hand tighten only.
7. Add 5 quarts SAE 10W40 oil.
8. Run engine and check for leaks.
9. Return used oil to a recycling center.

Air Cleaner Service

1. Remove wing nut in center of air cleaner.
2. Remove filter.
3. Clean element following instructions on air cleaner housing. Element may be cleaned up to six times before replacement.
4. Reinstall element in housing and tighten wing nut.

Fuel Filter Change

1. Position drain pan under fuel filter.
2. Remove fuel filter.
3. Fill new filter with clean diesel fuel.
4. Lubricate gasket with fuel and install filter, hand tighten only.
5. Loosen the air vent plug on the injection pump where the fuel line is attached.
6. Pump the lever on the fuel pump until no air bubbles are present, tighten air vent plug.

Cooling System Service

1. Allow engine to cool to ambient temperature.
2. Open radiator petcock and drain coolant into a suitable container.
3. Open petcock on left side of engine block and drain into a suitable container.
4. Open radiator cap and remove lower radiator hose.
5. Flush clean water through radiator until the water comes out clear.
6. Remove the thermostat then flush clean water through the engine block until the water comes out clear.
7. Install new thermostat and gasket.
8. Install radiator hose and close all petcocks.
9. Refill system with fresh anti-freeze in a 50/50 mix.
10. Run engine and check for leaks, then re-check coolant level after engine has cooled.

Filter Change

1. Position drain pan under filter.
2. Remove oil filter.
3. Lubricate gasket of new filter with hydraulic oil.
4. Install new filter, hand tighten only.
5. Start unit and check for leaks.
6. Shut down unit, then check hydraulic oil level.

Hydraulic Oil Change

1. Position drain pan under the hydraulic reservoir. (Reservoir capacity exceeds 15 gallons, be sure drain pans have adequate capacity)
2. Remove drain plug from bottom of reservoir and drain oil.
3. Return used oil to a recycling center.
4. Replace drain plug using pipe sealer on threads.
5. Fill reservoir with hydraulic oil to about 3 to 4 inches from the top of the tank. (approx. 15 gal.)

Strainer Screen Service

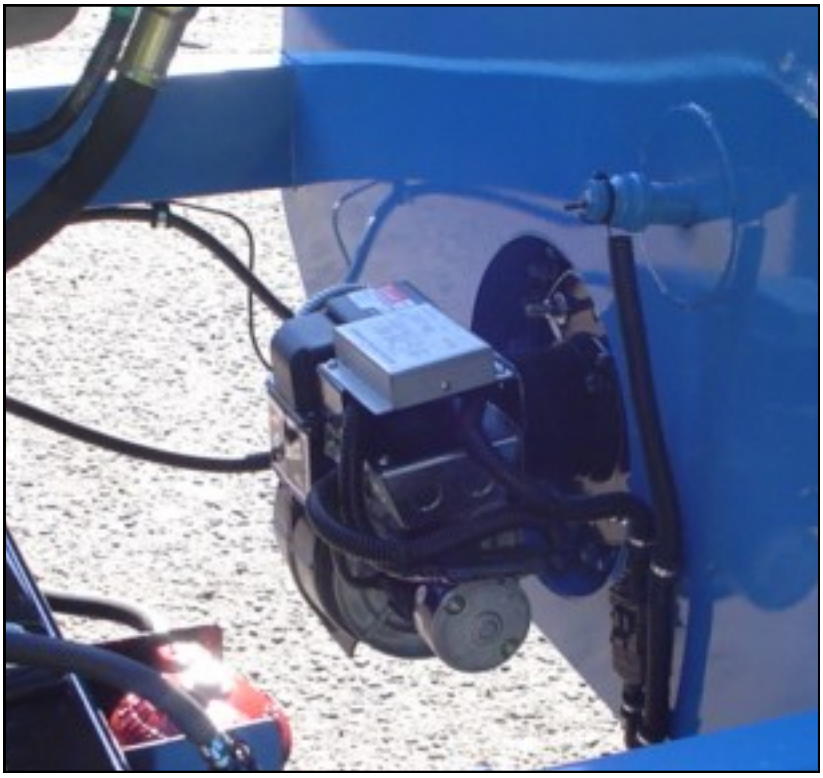
1. Position drain pan under the hydraulic reservoir. (Reservoir capacity exceeds 15 gallons, be sure drain pans have adequate capacity.)
2. Remove drain plug from bottom of reservoir to drain oil.
3. Replace drain plug using pipe sealer on threads.
4. Remove hose clamps and 1¼" suction hose from nipple on hydraulic reservoir tank.
5. Unscrew king nipple from street-el.
6. Unscrew strainer from tank and clean in solvent.
7. Apply pipe sealer to threads and reinstall strainer and king nipple.
8. Attach 1¼" suction hose to king nipple and tighten clamps.
9. Refill hydraulic reservoir with hydraulic oil.
10. Check for leaks.

Fuel Filter Replacement (burner)

1. Close fuel shutoff valve located at the fuel tank.
2. Remove the nut securing the canister to the fuel filter body.
3. Remove the canister and the filter element.
4. Replace the element with a new one.
5. Reinstall the canister and turn on the fuel valve.
6. Attach a clear hose to the fuel pump bleeder screw on the burner and direct the hose into a suitable container.
7. Start engine, set thermostats, then turn on the burner power switch. This will allow the fuel pump in the burner to run so the fuel system can be bled of air.
8. Loosen the bleeder screw and observe the flow of fuel through the clear hose, when all air is purged from the system close the bleeder screw.
9. Check entire fuel system for leaks.
10. Set the thermostats to the desired level and the burner will ignite.

Brush Inspection (Every 300 hours)

1. Using a screwdriver, remove 2 brush holders located on the exterior of the motor housing and remove the brushes.
2. Replace brushes if less than 1/4 inch in length.

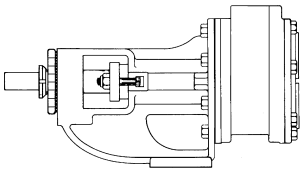


TROUBLE SHOOTING

	POSSIBLE CAUSE	*Items to Check /Service*
LACK OF PERFORMANCE	Plugged Strainer Screen	Service strainer screen
	Hydraulic Filter Plugged	Replace hydraulic oil filter
	Collapsed Suction Hose	Replace suction hose and service strainer screen
	Air Leak in Suction Hose	Replace hose.
	Low Fluid Level	Fill Reservoir to proper level.
	Over Heated Hydraulic Fluid	Clean oil cooler fins with pressurized water.
	Worn Pump or Hydraulic Motor	Adjust, rebuild, or replace as necessary.
	Crushed Hydraulic Lines	Replace line.
	“Brand” valve relief out of adjustment	Adjust relief on “Brand” valves to 1000 lbs.
HYDRAULIC MOTORS DO NOT TURN OR TURN SLOWLY	Product in Tank not Melted	Allow for more time for product to melt
	Foreign Material Jamming Agitator	Remove foreign material from agitator.
	Foreign Material Jamming Product Pump	Remove foreign material from product pump.
	Also see “Lack of Performance”	
UNUSUAL NOISES	Low Hydraulic Fluid	Fill reservoir to proper level.
	Air Leak in Suction Hose	Replace Hose
	Damaged Pump or Hydraulic Motors	Repair or replace as necessary
EXCESSIVE OIL LEAKS FROM PUMP OR HYDRAULIC MOTOR SHAFT	Bad Shaft or Shaft Seal	Replace as necessary.

	POSSIBLE CAUSE	*Items to Check /Service*
PRODUCT PUMP DOES NOT TURN	Product in Tank not Melted	Allow more time for product to melt.
	Foreign Material Jamming Product Pump	Remove foreign material from product pump
	Pump Motor not Functioning	Refer to "Hydraulic System" Trouble Shooting
LACK OF FLOW FROM WAND	Product Temperature too Cold.	Heat product to manufacturers recommended temperature.
	Product "Froze" in Wand & Hose	Allow additional time for heating element to melt product in hose.
	Non-functioning Heat Element in Hose	Refer to "Electric Wand & Hose" Trouble Shooting
	WPC Valve not Positioned Correctly	Refer to operating instructions for WPC Valve position.
	WPC Valve and External Plumbing "Froze"	Heat to remelt product
	Worn Product Pump	Adjust or repair product pump as necessary.

Product Pump



Lack of flow from wand.

Check for rotation of product pump.

No Rotation

Engage pump control and observe engine RPM.

Little or no change in RPM

Refer to hydraulic system trouble shooting.

Rotation

Check that the pump control is in the "Pump" position and not "Reverse".

Definite RPM drop

Check that the product is at working temperature.

CAUTION: *Product repeatedly heated beyond manufacturer's recommended heating cycles will harden and be difficult or impossible to remove from machine.*

Electric wand & hose heat on. Allow 30 to 40 minutes to heat.

Little or no heat in wand or hose

Refer to electric wand & hose trouble shooting.

Wand & hose hot

Position WPC valve toward "Wand" position and observe engine RPM's.

Definite RPM drop

Indicates a plugged/ frozen wand or hose; allow additional time for heating elements to work. Also check for a plugged valve or nozzle at the end of the wand, or frozen plumbing next to WPC valve. Heat if necessary.

Little or no change in RPM

Check for loose pump pick-up tube and that tube is in product.

Check pump packing for excessive leakage.

Excessive Leakage

Adjust packing per Mfg. instructions.

No Excessive Leakage

Adjust pump end clearance per Mfg. instructions.

Lack of flow from wand

Rebuild or replace as necessary.

Normal flow from wand

Normal flow from wand

System functioning properly; return unit to service.

No heat, or low heat in wand or hose.

With engine OFF, Check for loose pulleys and loose or missing belts on 24 volt alternator.

Start engine, with wand switch OFF check voltage at battery terminal of 24 volt alternator.

9 volts or less → Check for a dead battery, then check for an open resister or open wires from battery to alternator, or a shorted wire between the alternator and control panel switch and alternator and battery.

24 to 28 volts

12 to 14 volts → Repair or replace alternator.

With engine running, turn wand switch ON, check voltage at battery terminal of 24 volt alternator.

9 volts or less → Check for "short" between switch and heating elements. Alternately disconnect the wires to the hose and wand heating elements, when the voltage goes to 24 - 28 volts you have located the "shorted" circuit.

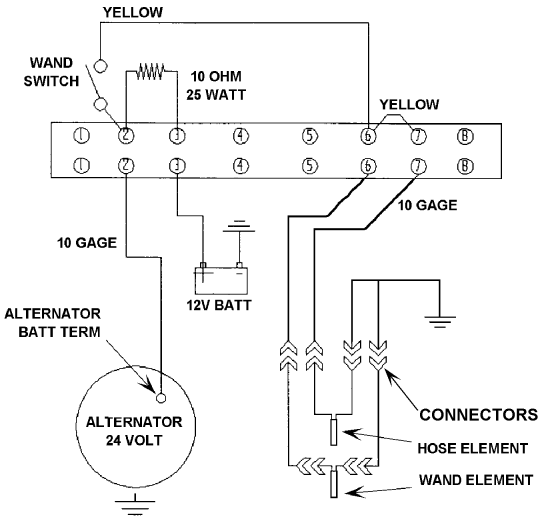
Check element resistance as follows:

15' hose element: .4 to 1.0 W.
20' hose element: .5 to 1.2 W.
Wand element: .9 to 1.6 W.

Repair or replace as necessary.

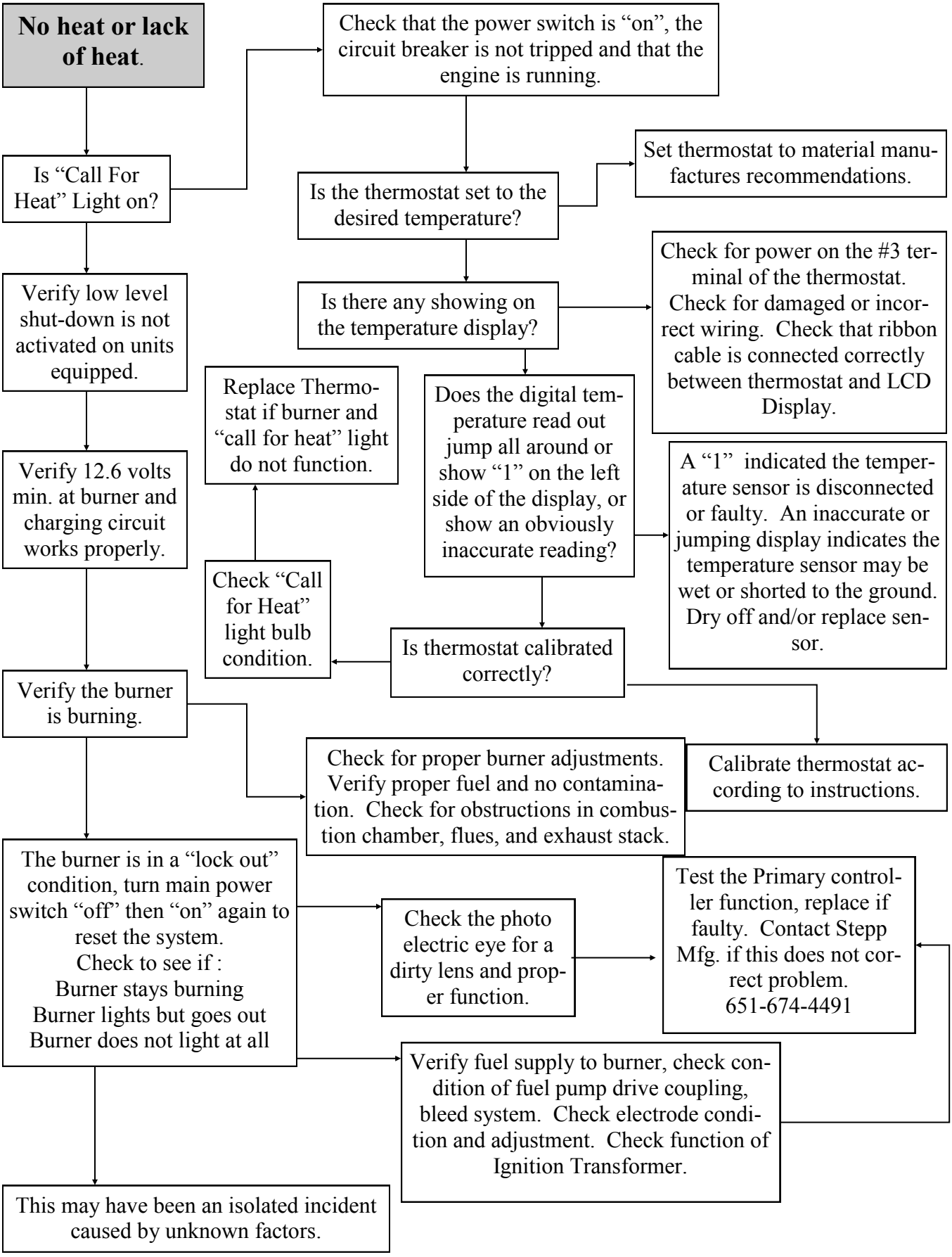
24 to 28 volts

Check heating elements for an "open" condition. Check for faulty switch. Check for broken wires or loose connections from alternator to switch, and switch to heating elements.

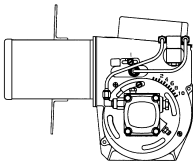


TROUBLE SHOOTING

Diesel Burner



Primary Controller Burner MTD/Hard Wired



NOTE: *The primary controller can be bench tested for proper operation using an automotive type, 12 volt battery as a power source. Refer to the wiring schematics for wire identification.*

1. Remove controller from burner. Mark all wires for proper reassembly.
2. Using two test lights, or volt meters, connect one to the blue wire, and one to the white/orange wire of the controller. Connect the black leads of your test instruments to the negative (-) terminal of the battery.
3. Connect the black wire from the controller to the negative (-) terminal of the battery.
4. Connect the red, white/red, and the white wires together, then connect these three wires to battery (+) terminal. Both test instruments should show voltage for approximately 15 seconds. After 15 seconds, the controller should "lock out" and no voltage will be present.
5. Repeat step #4, only this time connect the two yellow wires from the controller together three seconds after applying power to the three wires of the controller. (This simulates the controller receiving a "flame" signal from the photo electric eye). The white/orange wire should show voltage as long as the controller is hooked to the battery. The blue wire should only show voltage for about 15 seconds. Replace the controller if it fails any of these tests.

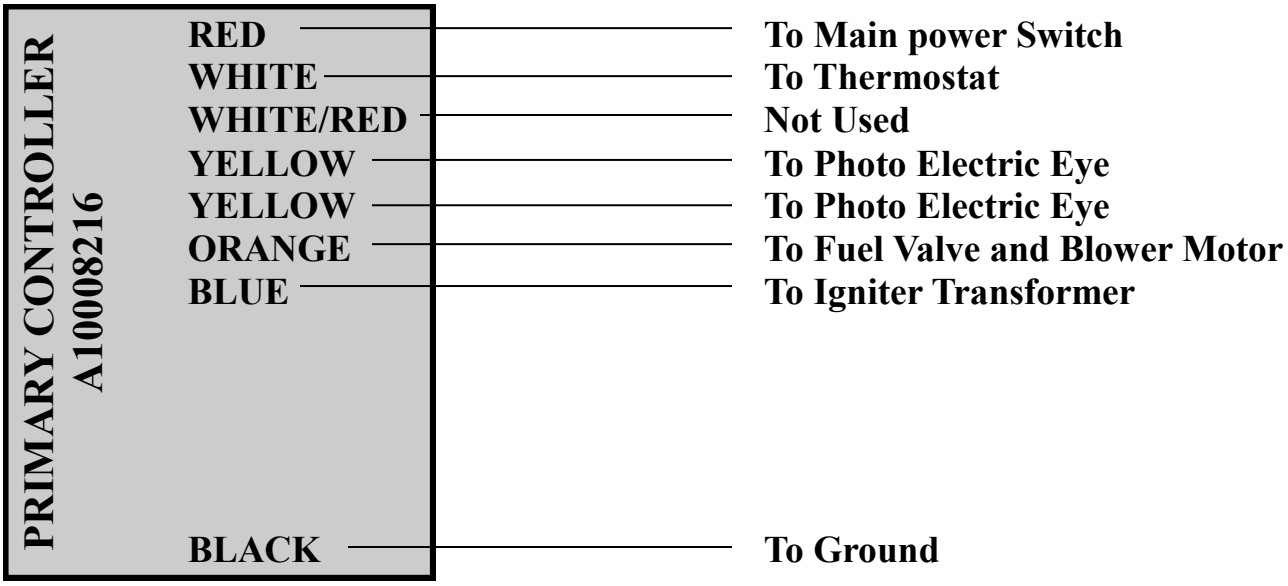
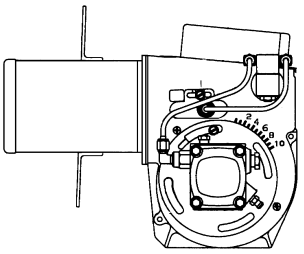


Photo Electric Eye



NOTE: *The Photo Electric Eye can be bench tested for proper operation using an ohm meter. Assure the lens of the Photo Electric Eye is clean prior to testing.*

1. Block off all light to the Photo Electric Eye. Test across the leads with your ohm meter; you should get an infinite resistance reading (a lot of resistance).
2. Point the Photo Electric Eye at a light source, the brighter the light, the less resistance your ohm meter will show.

CAUTION: *Replace the Photo Electric Eye if it does not respond in this way.*

Fuel Valve

NOTE: *The Fuel Valve can be bench tested for proper operation using an automotive type 12 volt battery as a power source.*

1. Disconnect the two leads and remove the fuel lines from the fuel valve.
2. The valve should be closed when no power is available.
3. Apply 12 volts to the two leads and the valve should open.

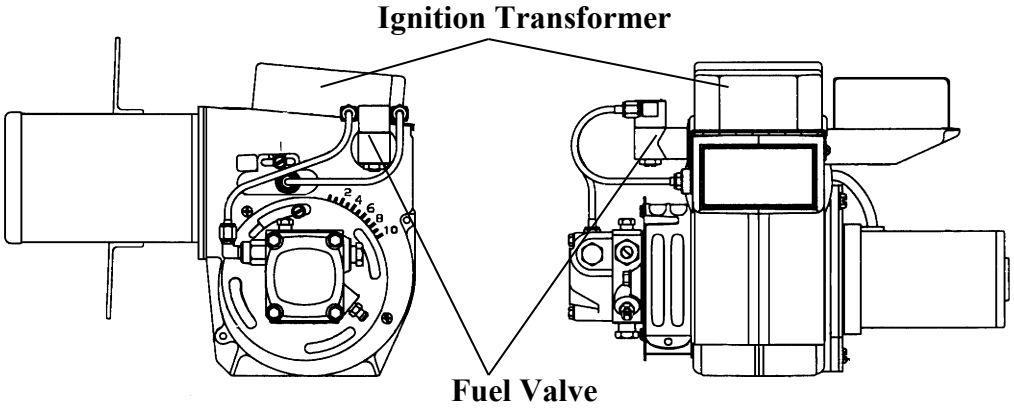
CAUTION: *Replace the fuel valve if it does not respond in this way.*

Ignition Transformer

WARNING: *Shock hazard, high voltage up to 20,000 volts.*

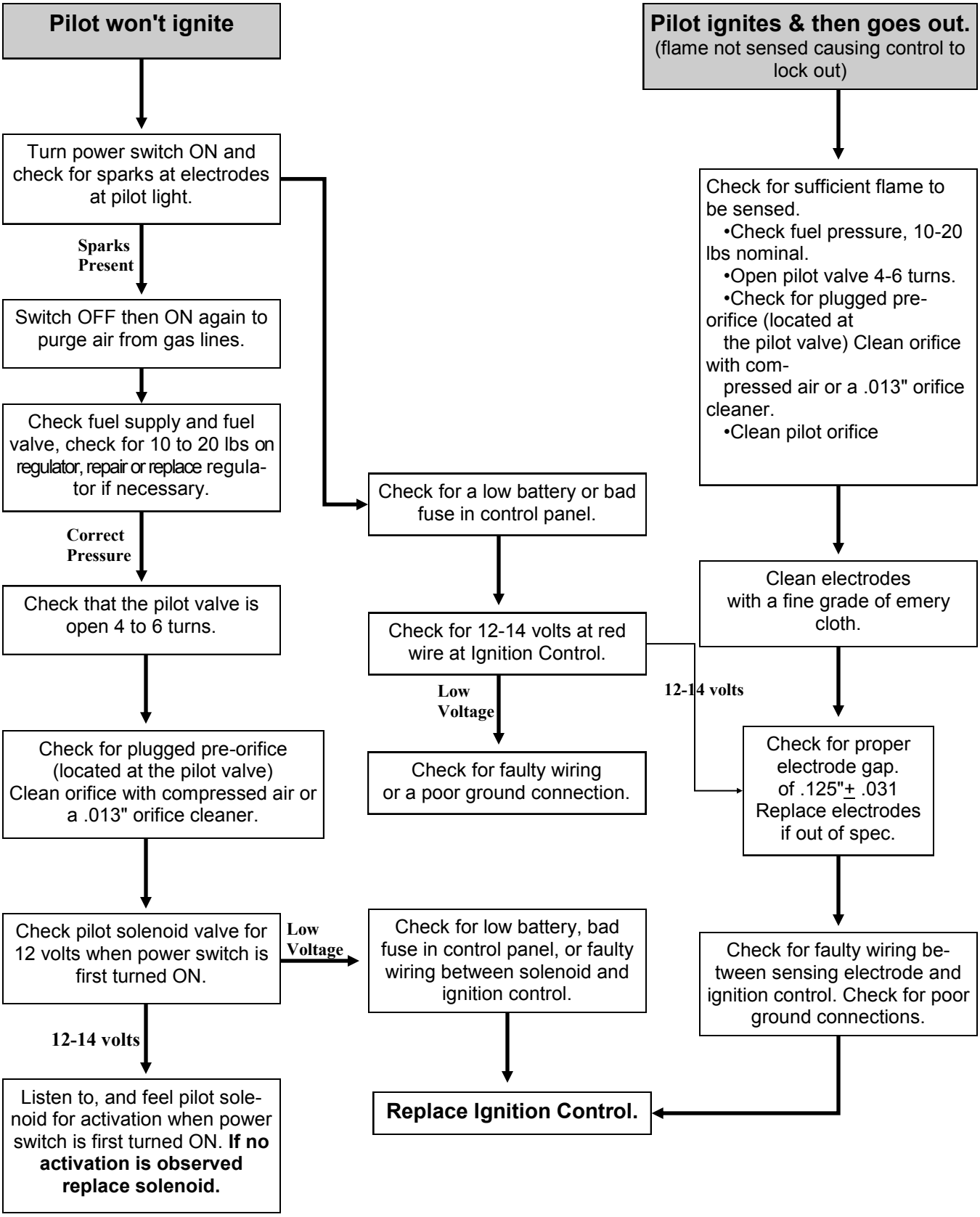
1. Assure that 12 volts is being supplied to the transformer during the ignition cycle. (Refer to the Primary Controller tests.)
2. Check electrode condition and adjustment. Replace or adjust as necessary.

CAUTION: *Replace ignition transformer if unit won't produce sparks.*



TROUBLE SHOOTING

LP Burner Spark Ignition



Fuel Valve Solenoid

The fuel solenoid valve needs to be removed to perform this test. 12 volts applied to the fuel solenoid valve activates an electromagnet that pulls the valve open. With no power applied, a spring pushes the valve closed. Blow through the valve to verify proper operation. Replace valve if not functioning properly.

Fenwal Ignition Control

The Fenwal Ignition Control creates sparks at the electrodes for igniting the pilot light, and supplies power to the fuel valve at the appropriate times. The controller receives voltage from either the thermostat or main power switch (depending on the system) to begin operation. A flame sensing circuit is incorporated for control of the fuel valve if the flame goes out.

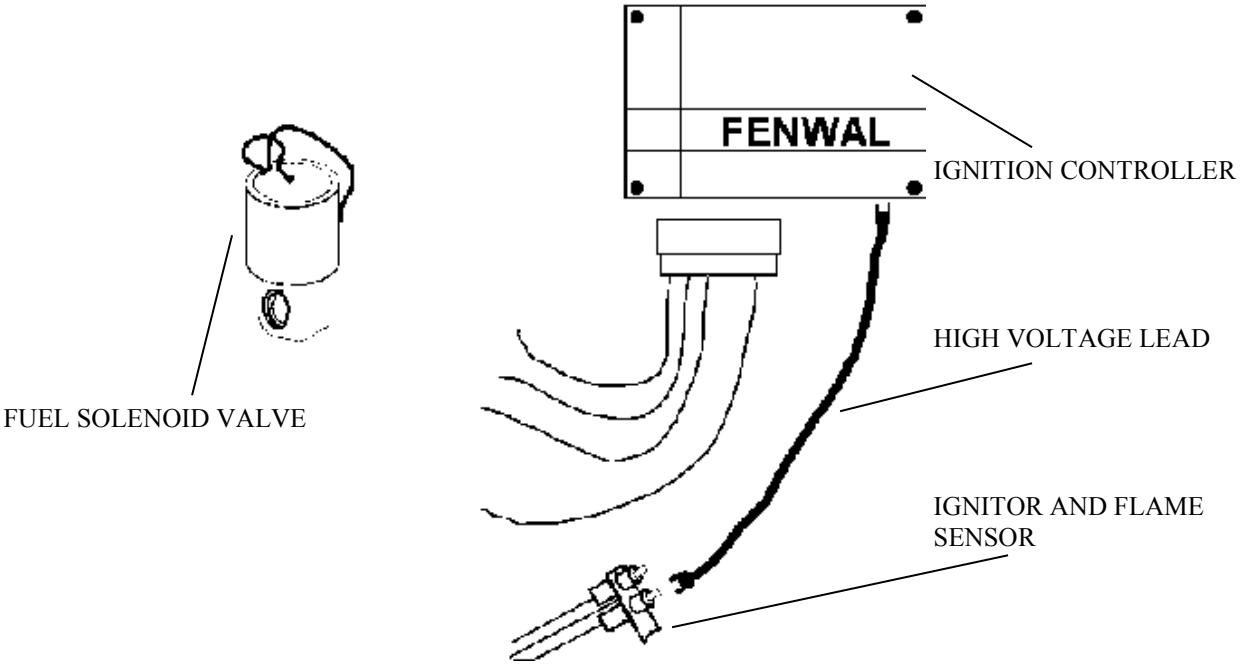
When the power switch is turned on, or when the thermostat calls for heat, a 12 volt signal is sent to the controller. The controller will then create sparks at the electrodes. At the same time, the controller also sends a 12 volt signal to the fuel valve causing it to open. This allows fuel into the pilot light and it is ignited by the sparks at the electrodes.

The flame sensing circuit will signal the controller that ignition was successful. The controller will then shut off the sparks. The fuel valve will remain open to keep the flame burning.

If the controller does not sense a flame within approximately six to seven seconds, it will shut off the fuel supply and the sparks. The controller will then "lock out".

If the flame should go out for any reason, the controller will try for re-ignition, if re-ignition is not successful in six to seven seconds, the controller will "lock out".

If a lock out situation occurs, the main power switch must be shut off, then on again to reset the system. (continued on next page)

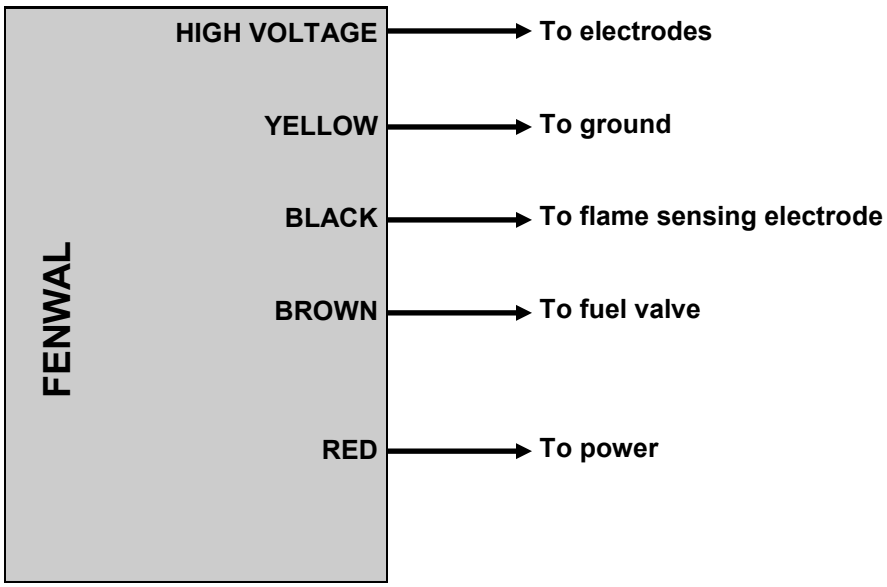


Fenwal Ignition Tests

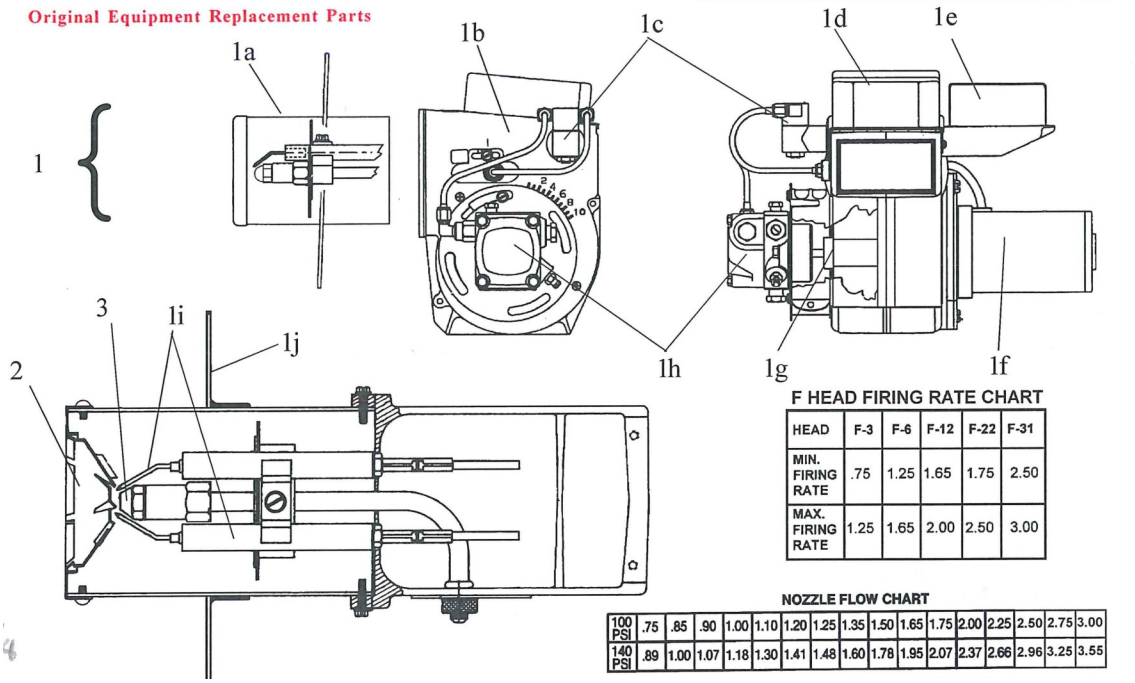
Fenwal Ignition Control

The Ignition Controller can be tested for proper operation using an automotive type 12 volt battery as a power source. A propane torch, and a 12 volt test light will also be needed. Do not use a digital volt/ohm meter, as it may give false readings for these tests.

1. Disconnect wires as necessary to perform these tests. Mark all wires for proper reassembly.
2. Connect one lead of your test light to the brown wire from the fuel valve. Connect the other lead to neg. (-) terminal of battery.
3. Be sure the yellow wire from the controller is connected to ground. (neg. terminal of battery).
4. While observing your test light, apply power to the red wire on the controller by turning on the main power switch and thermostat (if equipped). The test light should light up and sparks will be present at the electrodes for approximately six seconds, then the controller should "lock out." The sparks will stop and the test light will go out.
5. Repeat step #4, only this time direct flame from a propane torch across the sensing and ground electrodes two seconds after applying power to the controller.
6. The sparks should stop and the brown wire (fuel valve) should show voltage as long as the flame is directed across the electrodes.
7. Remove the flame and the sparks should reappear for six seconds; this is the trial for re-ignition. If the flame is not re-established, the system "locks out".
8. Be certain all wiring is correct and undamaged, then replace the controller if it fails any of these tests.

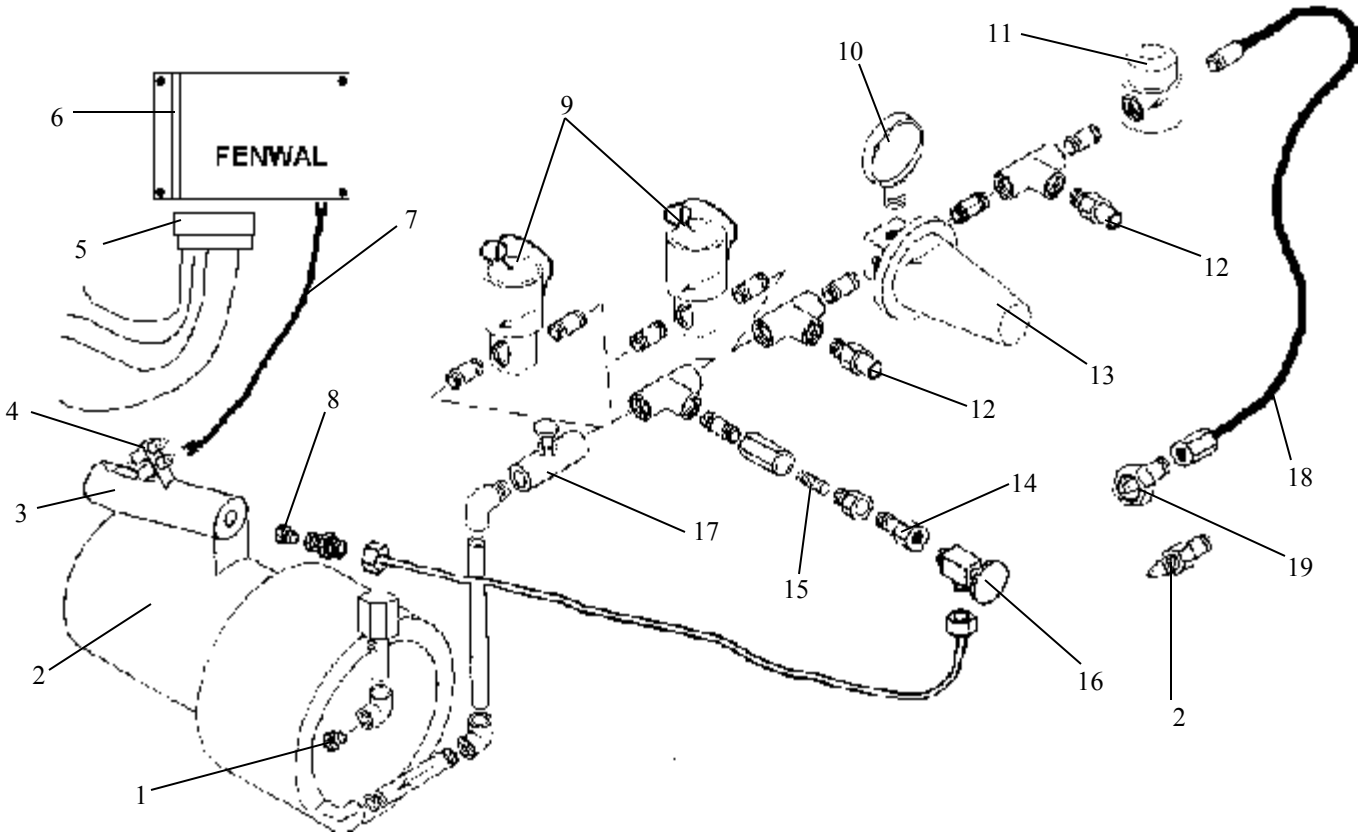


REPLACEMENT PARTS



ITEM	QTY	DESCRIPTION	PART#
1	1	Burner assembly w/ Primary Control (less fuel retention head and nozzle)	A10008215
1	1	Burner assembly, complete w/ fuel retention head and nozzle	A10008105
1a	1	Air Tube	509070
1b	1	Photo electric eye (under ignition transformer)	
		-With Connectors	A10007678
		-Without Connectors	P10007720
1c	1	Valve, fuel control	509091
1d	1	Ignition Transformer	509087
1e	1	Primary Controller	P10001034
		-Weather Pack/Weather Pack	A10007216
		-Weather Pack/CPC New Style	A10008216
1f	1	Motor, blower	509092
1g	1	Coupling, pump to motor	509086
1h	1	Pump, burner fuel	509094
**	1	Pump, burner fuel– Internal Fuel Shut-off Valve	509109
1i	1	Electrode, igniter set	509089
1j	1	Mounting Flange	509071
**	1	Blower Fan Wheel	509069
2	1	Fuel retention head, F3 (for .75 to 1.25 gph)	P10005134
3	1	Nozzle, .75 gph. 80°	P10005136
**	1	Fuel Filter Element	509078

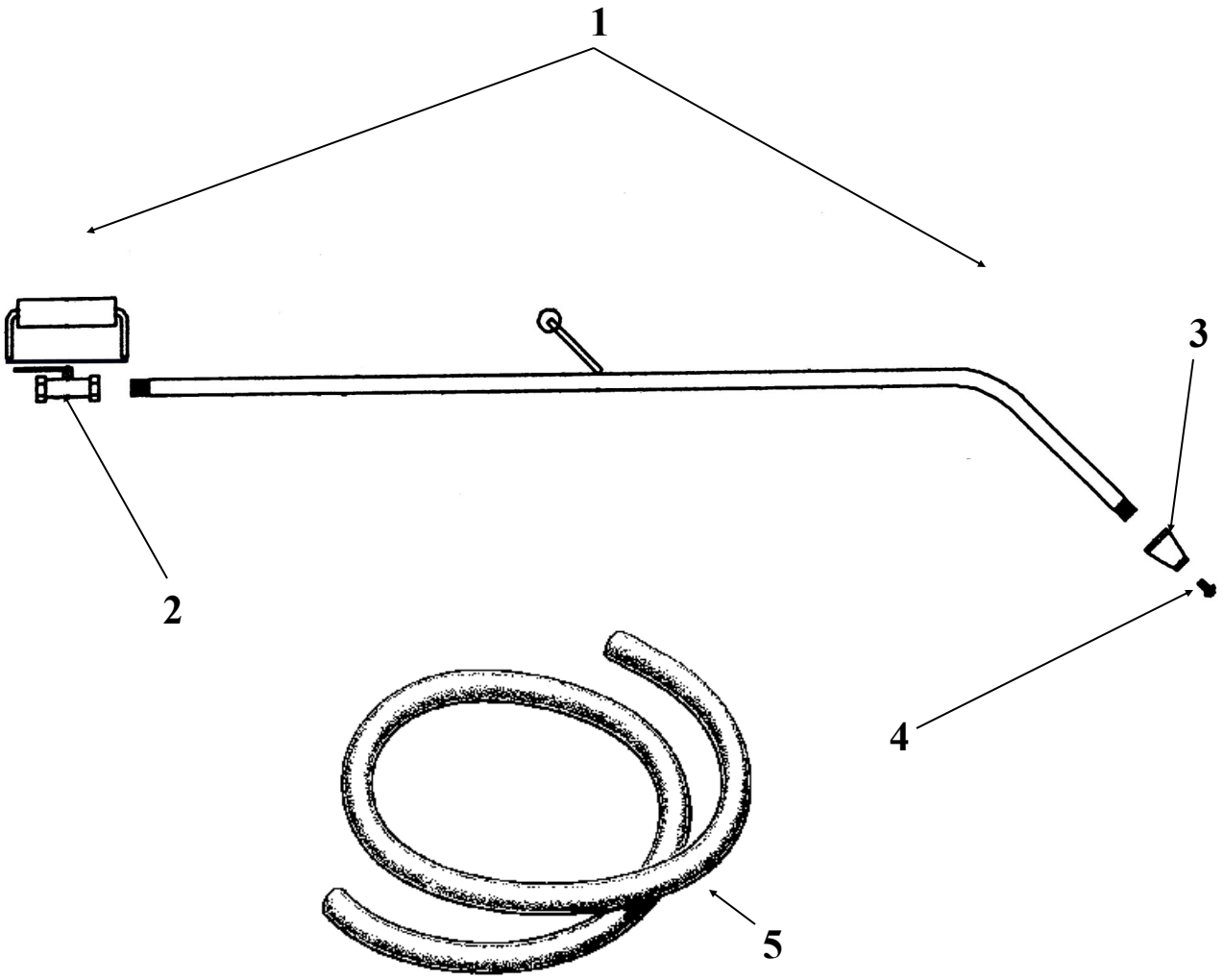
** Not Shown
Note: Indented item numbers with letter suffix are included with preceding item number.
Nozzle GPH rated at 100 psi. Match nozzle and fuel retention head with that installed.



ITEM	QTY	DESCRIPTION	PART#
1	1	Orifice, main burner	call
2	1	Burner assembly	call
3	1	Pilot light, spark ignition	901101
4	1	Ignition electrode & flame sensor assy.	P10005738
5	1	Low voltage cable assembly	P10005737
6	1	Ignition control box	P10005719
7	1	High voltage cable assembly	P10005736
8	1	Orifice, pilot light, .035	P10005718
9	2	LP Solenoid valve assembly, 12V	P10005720
**	2	Solenoid winding only, for LP Solenoid valve	509051
10	1	Pressure gauge	P10005630
11	1	LP filter (element only)	509028
12	2	LP relief valve (location may vary)	P10005656
13	1	LP regulator	P10002936
14	1	Pre-orifice, pilot light, .013	509005
15	1	Strainer, pilot light	P10005653
16	1	Valve, pilot light	P10005652
17	1	Valve, burner - V104	P10005655
18	1	.25 x 5' LP hose	P10005685
	1	.25 x 10' LP hose (optional)	523004
19	1	Pol fitting, liquid LP - female (recommended)	P10005657
20	1	Pol fitting, vapor LP - male	509021

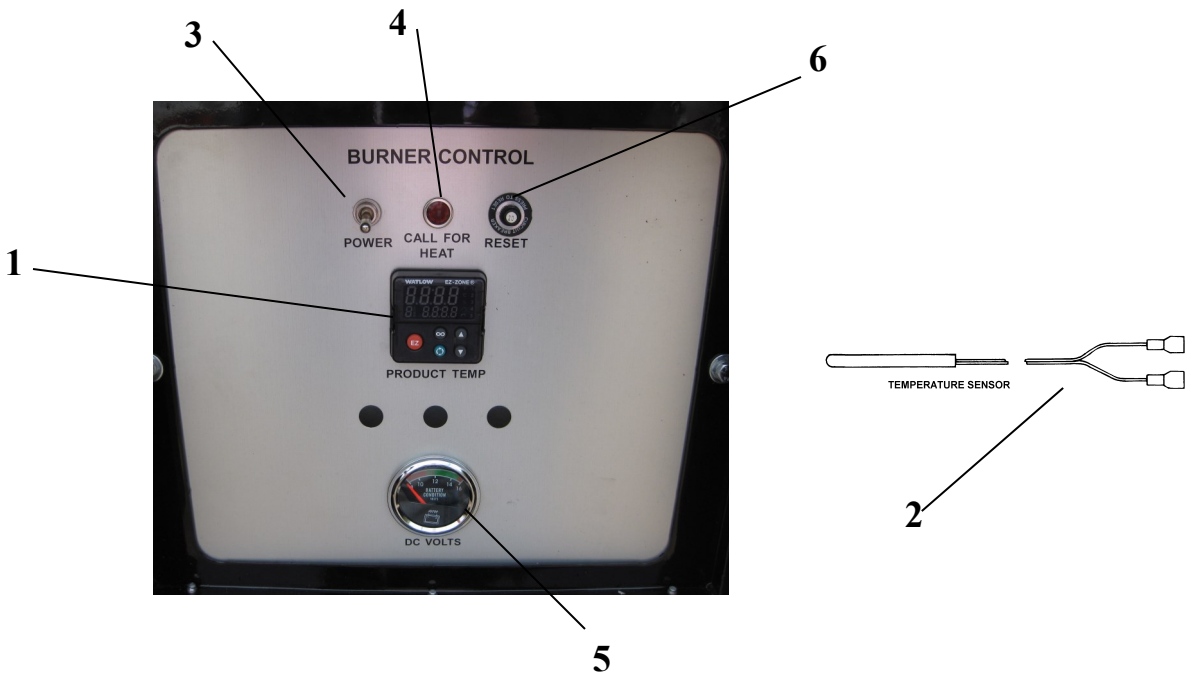
(** Not Shown)

Spray Wand



ITEM	QTY	DESCRIPTION	PART #
1	1	Wand Assembly Complete, Steel (Includes Item 1-4)	A10008187
2	1	2 Port Valve, Brass, 3/4”	517012
3	1	Coupling 3/4 to 1/4	513809
4	1	Veejet Nozzle, H1/4W-9508	520060
5	1	Hose 1/2 x25’ Yellow Ortec	523006

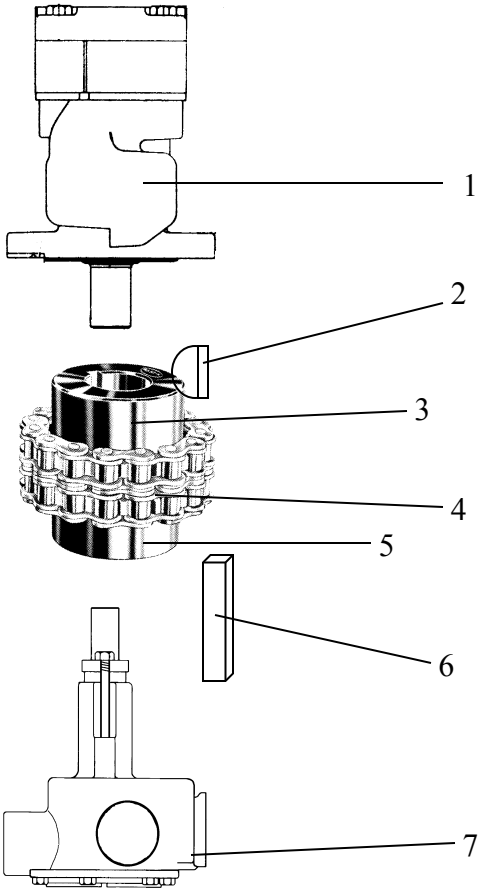
Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.



ITEM	QTY	DESCRIPTION	PART#
1	-	Thermostat, Watlow 0-550°, (12volt)	P10003540
2	-	Sensor, RTD Watlow 0-550°, (12volt)	A10001017
3	-	Switch– SPST Toggle ON/OFF	P10000180
4	-	Light– Call For Heat 12V	P10000181
5	-	Volt Meter	P10000184
6	-	20 Amp Breaker	P10000179

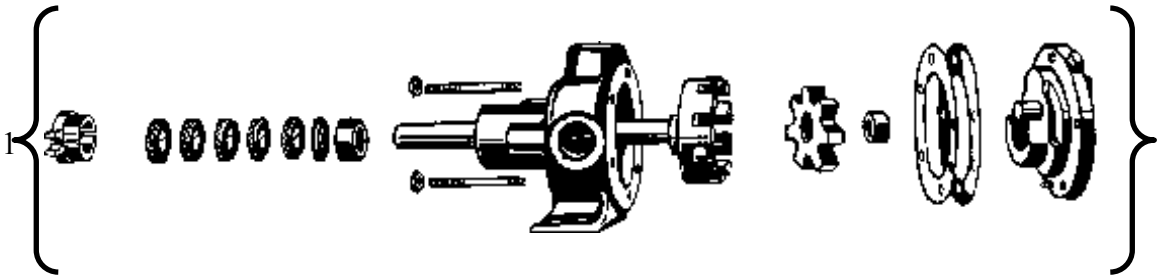
** Not Shown

Product Pump Drive Line



ITEM	QTY	DESCRIPTION	PART #
1	1	Motor, Hydraulic	Call
2	1	Woodruff Key, ¼" × 1"R	Call
3	1	Chain Hub, 4016 x5/8 Bore	P10004555-001
4	1	Coupling Chain, 4016	P10004556
5	1	Chain Hub, 4016 x 3/4 Bore	P10004555-002
6	1	Drive Key, 3/16" x 1 1/2"L	Call
7	1	Product Pump (refer to parts break-down page)	P10004373

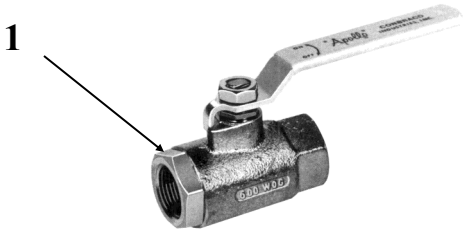
Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.
Part description and unit serial number are required to place orders for parts without numbers.

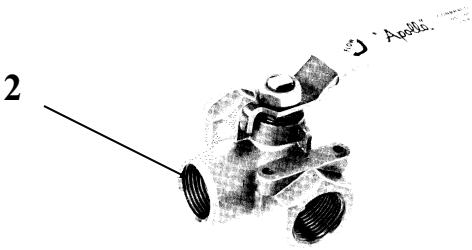


ITEM	QTY	DESCRIPTION	PART#
1	1	HL32 Pump L/RV	P10004373

Note: Illustrations are for parts identification only. Illustrations may not represent actual parts. Items without part numbers are available by giving the part description and the serial number of the equipment.

Valves





ITEM	QTY	DESCRIPTION	PART #
1	-	2 Port Valve, 1/2"	517005
	-	2 Port Valve, 1"	517018
	-	2 Port Valve, 1 1/2"	P10008125
	-	2 Port Valve, 2"	517014
2	-	3 Port Valve, 1/4”	517023
	-	3 Port Valve, 1"	P10004391
	-	3 Port Valve, 1 1/2"	P10004387

Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.

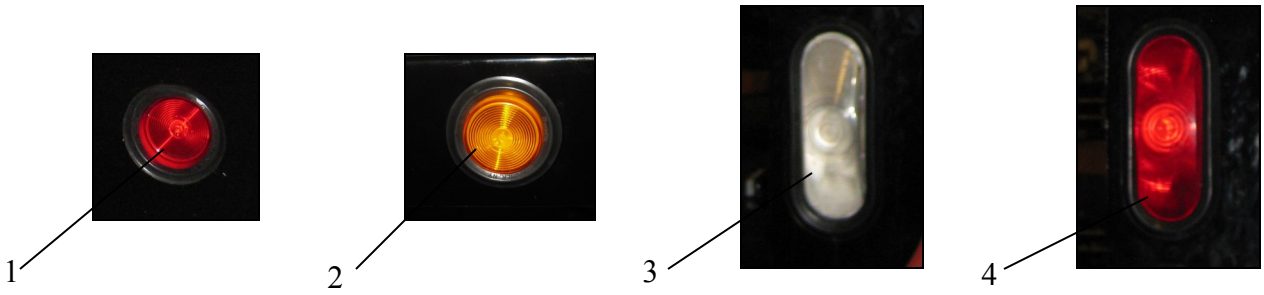
Spray Bar

ITEM	QTY	DESCRIPTION	PART #
**	2	Gasket– Spray Bar Flange 4x5	520086
**	16	Gasket– Spray Valve	520100
**	1	Tether– 25’ Tack Bar Control	526520
**	16	Veejet Nozzle– H1/4U6515	P10002944
**	1	Linear Actuator– 6” 12v 22a	P10009283

Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.

REPLACEMENT PARTS

Lights



ITEM		QTY	DESCRIPTION	PART #
1		7	Clearance LED– Red	P10002891
2		2	Clearance LED– Amber	P10007246
3		2	Light Back Up– Oval LED	P10005551
4		4	Lights– Tail 6” Oval LED Red	P10007080
5	**	1	Lights– License plate	P10006767

Misc.

ITEM	QTY	DESCRIPTION	PART#
**	-	Valve-SDCF 18 Gal @1500	510075
**	-	Filter– Single Hyd w/Adapt	A10002644
**	-	Strainer– Hyd 2”x 1 1/4” NPT	P10001124
**	7.5 Gal	Oil– Hydraulic #32	P10001292
**	-	Hyd Pump– 1.2 ci 5/8 Key	P10009279
**	-	Drain cock– 2 1/2”	107006
**	75 sq ft	Insulation– 1x6lb Ceramic	P10000635
**	-	Gasket-20” Manhole	P10006929
**	-	Heater– 1.5 KW 60-250 6wt sq in	526082

NHTSA Reporting Safety Defects

If you believe that your vehicle has a defect in which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying STEPP MANUFACTURING CO., INC..

If NHTSA receives similar complaints, it may open an investigation and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or STEPP MANUFACTURING CO., INC..

To Contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to http://www.safecar.gov; or Write to: NHTSA, US Department of Transportation, 1200 New Jersey Ave., S.E., Washington DC 20590. You can also obtain information about your motor vehicle safety from http://www.safecar.gov.

STEPP MFG™

ASPHALT MAINTENANCE EQUIPMENT

Consumer Warranty Guide

12325 River Road, North Branch, MN 55056~ Phone: 651-674-4491~ Fax: 651-674-4221 www.steppmfg.com

Introduction

Congratulations on your purchase of equipment built by Stepp Manufacturing for your asphalt maintenance needs. Your equipment has been designed and constructed to give you the most in performance, ease of use, and reliability. It is our desire that you will find operating the equipment both productive and profitable.

Warranty Procedures Through A Dealer

If your equipment requires repair, or needs parts for repair, please contact your area dealer. For repairs, the unit must be brought to the dealer for warranty. The dealer will require purchase date information, where the machine was purchased, and the Vehicle Identification Number (VIN) of the equipment. This information is needed so the dealer can submit a warranty claim. The dealer will repair your equipment, once warranty is approved, at no charge to you under the provisions of the warranty policy.

Warranty Procedures Direct Through The Factory *(when no servicing dealer is available in your area)*

Contact Stepp Manufacturing's Customer Service Department at (651) 674-4491.

In this situation, it may be advantageous for you to repair the machine and be reimbursed direct from the factory for warranty repairs. If you do not have the facilities, or the technicians, to perform the repair, the unit can be brought to a local repair facility. In either case, Stepp Manufacturing ***MUST*** be contacted and authorize the warranty repair ***PRIOR*** to any work being performed. If work is done prior to authorization, the warranty will not be honored.

If parts are required for the warranty repair, contact Customer Service at Stepp Manufacturing for replacements. When warranty replacement parts are shipped to you, a Warranty Authorization Number will be issued. If asked to return the defective parts, "tag" the defective parts with the Warranty Authorization Number, then package them in the same box the new parts were shipped in. Ten (10) business days will be allowed for return of the defective parts. If the defective part is not received back at the factory within this allotted time, the warranty will not be honored.

You will be billed for all parts shipped that require returning of defective parts. However, when the defective parts are returned and evaluated, you will receive credit for the cost of the part only. Thus, it is important that all defective parts are turned to Stepp Manufacturing in the allotted ten (10) day period.

Engine Warranty Claims

When a warranty issue develops with the engine, bring the unit to the engine manufacturer nearest authorized service center for repair. Be prepared to supply them with proof of purchase information with purchase dates.

Stepp Manufacturing cannot process engine warranty claims. However, we will be happy to offer assistance in locating the nearest service center.

Equipment Owner Responsibilities

As the equipment owner, you are responsible for:

- Using the equipment in accordance with the correct operating procedures as shown in the operators manual.
- Assuring all maintenance items are completed in accordance with the operators/maintenance manuals.
- Transporting the equipment to the place where warranty repairs can be completed.
- Supplying purchase date and VIN information to establish warranty coverage.

General Warranty Statement
Stepp Manufacturing's One (1) Year Limited Warranty

Stepp Manufacturing Co., Inc. hereby warrants, to the original purchaser of new equipment, that products manufactured by Stepp Manufacturing will be free from defects in material and workmanship for a period of one (1) year from the date of purchase from Stepp Manufacturing.

Stepp Manufacturing, at is discretion, will provide for the repair or replacement of any part found, upon examination by Stepp Manufacturing, to be defective, except as noted below. Such repair or replacement shall be free of charge to the original purchaser of new equipment for a period of one (1) year from the date of purchase, except as noted below.

No warranty is extended to cover:

- Product pump wear or damage caused by foreign objects.
- Routine maintenance, cleaning, and adjustments.
- Parts or components that have been altered, misused, improperly adjusted, or improperly maintained.
- Transportation to and from the place of warranty repair.
- Removal of materials from equipment.

The following items are covered solely by their manufacturer's warranty:

- Engines
- Hydraulic components
- Burners
- Pumps
- Axles
- Tires
- Other component parts not solely manufactured by Stepp Manufacturing

The following items are covered by a pro-rata warranty:

- Hoses that carry heated materials
- Heating elements for material hoses and wands

Disclaimer of further warranty:

Stepp Manufacturing makes no warranty, expressed or implied, other than this warranty. The implied warranties of merchantability and fitness for a particular purpose are hereby disclaimed. Repair or replacement of products or parts proving to be defective in material or workmanship shall be the exclusive remedy for breach of this warranty.

Stepp Manufacturing shall not be liable for incidental or consequential damages. Including, but not limited to, damages for inconvenience, rental or purchase of replacement equipment, loss of profits, or other loss resulting from breach of this warranty.

Stepp Manufacturing reserves the right to incorporate any changes in design into its products without obligation to make such changes on products previously manufactured.

Twelve (12) Month Pro-Rata Limited Warranty
Heated Asphalt Hose and Heating Elements

Effective for Equipment Delivered After 5/1/2012

Stepp Manufacturing Co., Inc. hereby warrants to the original purchaser, on a pro-rated basis, that the heated asphalt hose and heating elements installed on NEW Stepp Manufacturing's equipment shall be free from defects in material and workmanship for period of twelve (12) months for the heated asphalt hose and six (6) months for the heating element.

In the event that a heated asphalt material hose or a heating element fails under normal use during the warranty period, Stepp Manufacturing will supply a replacement heated asphalt hose or heating element, along with one-half (0.5) hour for installation labor on a pro-rated adjustment basis.

- If the failure occurs under normal use within the first three (3) months from date of purchase, Stepp Manufacturing will supply a replacement, and provide for one-half (0.5) hour installation labor at no charge to the customer.
- If the failure occurs under normal use within the fourth (4th) through twelfth (12th) months, Stepp Manufacturing will supply a replacement, and provide for one-half (0.5) hour installation labor on a pro-rata basis.

The pro-rated adjustment is based on the total number of months elapsed since the purchase date of the new equipment from Stepp Manufacturing. This rate is then applied to the one-half (0.5) hour labor rate and the current suggested retail price of the proper replacement heated asphalt hose or heating element supplied by Stepp Manufacturing. This is the amount the customer will have to pay. Freight will not be included in the reimbursement. If a new heated asphalt hose or heating element is needed prior to warranty inspection, you will be billed for all parts shipped that require returning of defective parts. However, when the defective parts are returned and evaluated, you will receive credit for the cost of the part only. **Thus, it is important that all defective parts are turned in to Stepp Manufacturing in the allotted ten (10) day period, or warranty will be denied.**

In no case will the warranty coverage extend beyond the six (6) month period for the heating element or the twelve (12) month period for the heated asphalt hose, from the original purchase date of the new equipment from Stepp Manufacturing. *Physical damage is not covered by this warranty*. Physical damage may include, but is not limited to:

- Broken heating element (typically caused by repeated bending to less than a one (1) foot radius).
- Heated asphalt hoses burnt from the inside (typically caused by operating the heating element in an empty hose).
- External cuts or abrasions on the heated asphalt hose (typically caused by dragging on the ground).

The chart below shows the pro-rated amount, by percentage, that will be allowed by warranty, pending examination of the heated asphalt hose or heating element.

Heated Asphalt Hose		
Failure Date	**Warranty's Responsibility**	**Customer's Responsibility**
0-3 Months *0-90 Days*	100%	0%
3-6 Months *91-180 Days*	70%	30%
6-7 Months *181-211 Days*	60%	40%
7-8 Months *212-242 Days*	50%	50%
8-9 Months *243-273 Days*	40%	60%
9-10 Months *274-304 Days*	30%	70%
10-11 Months *305-335 Days*	20%	80%
11-12 Months *336-365 Days*	10%	90%
After 12 Months	0%	100%

Heating Element		
Failure Date	**Warranty's Responsibility**	**Customer's Responsibility**
0-3 Months *0-90 Days*	100%	0%
3-4 Months *91-121 Days*	60%	40%
4-5 Months *122-152 Days*	40%	60%
5-6 Months *153-180 Days*	20%	80%
After 6 Months	0%	100%

STEPP MFG™
ASPHALT MAINTENANCE EQUIPMENT

Warranty Claim Authorization Number: _____
Call Customer Service at 651-674-4491 to obtain prior approval or warranty will be denied.
Date of Authorization Request _____

Equipment Owner		Warranty to be Performed by	
Customer Name		Company Name	
Street Address		Address	
City/State/Zip		City/State/Zip	
Equipment Model #		Contact Name	
Equipment VIN		Contact Phone #	
Hour Meter Read			
Purchase Date		Date of Malfunction	
Dealer Purchased Form		Date of Repair	

Warranty Authorization		Signature for Authorization
Date of Malfunction		X
Date of Repair		

Symptoms / Diagnostics / Action

Symptoms	Diagnostics	Action
Describe the symptoms in detail, be as specific as possible. Ex: Burner ignites and runs for 35 seconds, then goes out.	*Describe issues found, be as specific as possible. Ex: Part failed due to loose connection, resulting in misalignment and premature wear.*	*Describe action taken, be as specific as possible. Ex: Removed damaged section of wire harness, soldered new leads in place, and insulated splices w/ heat shrink tubing.*

Parts and Labor

Labor Time to Correct Problem (reimbursed at $55/hour)		Parts Used to Correct Problem		
Labor Time (in hours)	Repair Made	Part Number	Description	Qty

Parts Return

All parts returned must be tagged with the warranty authorization number and a copy of this claim. Retain all parts until credit is received from the factory. When requested, return the parts, along with this claim, to:

Stepp Manufacturing Co., Inc.
Attn: Warranty Department
12325 River Road
North Branch MN 55056

*__Note__: If defective parts are not returned within 10 days, or this warranty claim does not accompany the returned parts, the claim will be denied.

Office Use Only

Date Claim/Parts Received?		Is this a warrantable claim?	Yes	No
Claim Reviewed By:		Original Invoice # for Parts		
Date of Review:				

Warranty Totals

WATLOW PROGRAMMING

Watlow 12v Series PM Temperature Controller

Operators Programming Sequence for 12 volt devices.

PN EZ-ZONE– P1003540

This programming sequence is taken from the manufacturers programming manual for this controller and reduced to eliminate the non-essential entries. Please follow the entries carefully and if any questions arise because of misunderstanding the instructions, see your supervisor or call the factory for clarification. **To view the entire EZ-Zone PM Controller Users Manual, go to www.watlow.com, search on *EZONE PM Users Manual*.**

If at any time during the entries you feel that you have entered an incorrect entry and want to restart the procedure from the beginning, simply press the Infinity key to return to Home Page from any page or parameter. After 60 seconds with no key presses, the controller reverts to the Home Page.

The EZ-Zone PM Controller has four menus that are used to determine the configuration and operation of the controller. They are the Home Page, Setup Page, Operations Parameters Page, and the Factory Page. If you are installing the EZ-Zone PM Controller, you will need to determine the proper settings for all pages. The controller is preset at the factory prior to delivery of the equipment and is ready for operations. Always confirm that the controller is programmed correctly and operating correctly under normal operating conditions.

Caution: Pay particular attention to the h.SP (High Temperature Set point) setting for max. product application temperature that is entered on the Setup Page at step 7-8.

Do not set the High Temperature Set Point any higher than the product manufacturer maximum application temperature recommendations. Do not hesitate to ask your supervisor or call the factory for the correct setting if any questions or concerns arise.

Watlow Series PM-12 volt controller
Sample Display Illustrations

- This display shows a typical temperature selection by the operator.
- Upper display shows actual product temperature in red color.
- Lower display shows operator desired maximum temp setting in green color.
- Set the desired maximum temp with the up and down keys.

Operator will not be able to exceed the maximum temperature set point as shown in the programming procedure in the following pages.
Do not hesitate to ask your supervisor for the correct setting if any questions or concerns arise.

Watlow Series PM-12volt Temperature Controller

Operators Programming Sequence for 12 volt devices

This programming sequence is taken from the manufacturers programming manual for this controller and condensed to eliminate the non-essential entries for ease of setup. Please follow the entries carefully and if any questions arise because of misunderstanding the instructions, please call the manufacturer for clarification.

If at any time during the entries you feel that you have entered an incorrect entry and want to restart the procedure from the beginning, simply press the up arrow and the down arrow at the same time to erase all entries and begin the procedure from the beginning.

Menu Structure and Programming

The Series PM Controller has four menus that are used to determine the configuration and operation of the controller. They are the Home Menu, Setup Menu, Operations Menu and the Factory Menu. If you are installing the Series PM Controller, you will need to determine the proper settings for all menus. If the controller is already installed in the equipment that you have purchased, you may only need to set a few of the parameters to adjust the controller to your specific usage of the equipment. The Setup Menu displays the parameters that configure the Series PM Controller to fit your application. When installed on new equipment, the controller is preset at the factory prior to delivery of the equipment and is ready for operations. Always confirm that the controller is programmed correctly and operating correctly under normal operating conditions.

Caution: Pay particular attention to the h.SP setting for max. product temperature. Do not set any higher than the product manufacturer maximum application temperature. Do not hesitate to ask your supervisor for the correct setting if any questions or concerns arise.

Watlow Series PM-12volt Temperature Controller

Operators Programming Sequence for 12 volt devices

Home Menu:

Procedure for programming the Series PM-12 volt Watlow Control.

Step 1: Connect all wires to Watlow control including RTD (temp sensor).

Step 2: Connect power to Watlow controller.

Step 3: Enter the Setup menu. (press both the **up and down** arrow keys for 6 seconds).
A1 will appear in the upper display and **SEt** will appear in the lower display.

Note:
You will have to pass through the Operations menu to get to the Setup menu.
Hold the up and down arrow keys simultaneously for 6 seconds to step through the menus.

Step 4: Once **A1** is in the upper display, and **SEt** is in the lower display, you are in the Setup menu. If not, press the **infinity key** to return to the Home page and redo step 3.

Step 5: Press the **Advance key**. Use the **up or down** keys to change values.

	Parameter	Value	Description	Caution
5-1	**SEn**	**ro.1H**	**sensor type**	**Do not enter { rl.OH }**
	Advance key			
5-2	**rt.L**	**2**	**RTD leads**	
	Advance key			
5-3	**FiL**	**0.5**	**Filler type**	
	Advance key			
5-4	**i.Er**	**off**	**error latching**	
	Advance key			
5-5	**dEC**	**0**	**decimal**	
	Advance key			

Step 6: After pressing the **Advance key,** after parameter **dEC,** you will return to the parameter .**SEn.** Press the **infinity** key to return to the Setup menu. Display will show **{ Ai Set }.**

Step 7: Press either the **up or down** key to select the Loop submenu**. LOOP** will be in the upper display and **SEt** will be in the lower display. If this is shown, press the **advance key** to enter the Loop submenu. (once in the submenu, use the **up or down** key to change the parameter values).

	Parameter	Value	Description
7-1	**h.Ag**	**on.of**	**heat algorithm**
	Advance key		
7-2	**C.Ag**	**off**	**cool algorithm**
	Advance key		
7-3	**UfA**	**off**	**user fail action**
	Advance key		
7-4	**fAiL**	**off**	**input error failure**
	Advance key		
7-5	**LodE**	**no**	**open loop detect enable**
	Advance key		
7-6	**rP**	**off**	**ramp action**
	Advance key		
7-7	**L.SP**	**0 degrees**	**low temperature set point(degrees)**
	Advance key		
7-8	**h.SP**	**250 or 550**	**high temperature set point(degrees)**
	Advance key		
7-9	**SP.Lo**	**-100.0**	**set point, low limit open loop**
	Advance key		
7-10	**SP.Hi**	**100.0**	**set point, high limit open loop**
	Advance key		

Step 8: Pressing the **advance key** after parameter **SP.hi** will return you to the parameter **h.Ag.** Press the **infinity key** once to return to the setup menu.

Step 9: Use the **up or down** keys to select the output submenu**. otPt** will be in the upper display, and **SEt** will be in lower display. Press the **Advance key** to enter the submenu.

	Parameter	Value	Description
	(use the **up or down** key to change parameter values)		
9-1	**Fn**	**heat**	**Function**
	Advance key		
9-2	**o.tb**	**20.0**	**time base**
	Advance key		
9-3	**O.LO**	**0%**	**low power scale**
	Advance key		
9-4	**o.h1**	**100%**	**high power scale**
	Advance key		

Step 10: Pressing the **advance key** after parameter o.h1 will return you to parameter Fn. Press the **infinity key** to return to the output submenu.

Step 11: Use the **up or down** keys to select the global submenu **gLbL** will be in the upper dis play and **SEt** will be in the lower display. Press the **advance key** to enter the global menu.

	Parameter	Value	Description
11-1	**C_F**	**F**	**display units**
	Advance key		
11-2	**AC.LF**	**60**	**AC line frequency**
	Advance key		

Step 12: After pressing the **advance key** at parameter **AC.LF** will advance you back to parameter **C_F.** Press the **infinity key** once to return to the global submenu.

Step 13: Use the **up or down** keys to select the communication submenu. **Cor7** will be in the upper display and **SEt** will be in the lower display. Press the **advance key** to enter the communications submenu.

	Parameter	Value	Description
13-1	**Ad.5**	**1**	**Address Standard Bus**
	Advance key		

Step 14: Pressing the **advance key** on parameter **Ad.5** will advance you back to the same parameter, **Ie**. you will still see parameter **Ad.5** displayed. Press the **infinity key** once to return to the communications sub menu.

Step 15. Press the **infinity key** to return to the Home page.

Step 16. From the Home page, press both the **up and down** keys for (3) seconds, **Ai** will appear in the upper display and **oPEr** will appear in the lower display.

Operations Page

Step 17: Once **F1i** is in the upper display and **oPEr** is in the lower display, you are at the Operations menu. If not, press the **infinity key** to return to the Home menu and redo step 16.

Step 18: Press the **up and down** keys until **LooP** is in the upper display and **oPEr** is in the lower display. Press the **advance key** to enter the **LooP** sub menu.

	Parameter	Value	Description
	(use the up or down keys to change values)		
18-1	**C.r7**	**auto**	**control mode**
	Advance key		
18-2	**C.SP**	**75**	**closed loop setpoint**
	Advance key		

	Parameter	Value	Description
18-3	**id.5**	**75 degree F.**	**Idle set point**
	Advance key		
18-4	**h.hy**	**3.0 degree F.**	**Heat hysteresis**
	Advance key	**reads 3 on display**	
18-5	**o.SP**	**0.0%**	**Open loop set point**
	Advance key		

Step 19: Pressing the **advance key** at parameter **o.SP** will advance you back to parameter **C.r7** Press the **infinity key** once to return you to operations Loop menu. Press the **infinity key** again to return you to the Home Page.

Step 20: Enter the Factory Page by pressing the **advance key** and **infinity keys** together and holding them for six (6) seconds. **CUSt** will be in the upper display and **FCty** will be in the lower display.

Factory Page

Step 21: Once **CUSt** is in the upper display and **FCty** is in the lower display, you are in the Factory menu. If not, press the **infinity key** to return to the Home Page and redo step 20.

Step 22: Press the advance key if **CUSt** is in the upper display and **FCty** is in the lower display. The upper display will now read **1** and the lower display will read **CUSt** . Press the **advance key** again.

Step 23: The upper display will read **AC.Pu** and the lower display will read **PAr** . If the upper display does not read this way, use the **up and down** keys to change the value. Once the value has been changed, press the **infinity key** once.

Step 24: The upper display will read **1** and the lower display will read **CUSt** . Use the **up or down** keys to change the upper display to read **2** , press the **advance key.**

Step 25: The upper display will read **AC.SP** and the lower display will read **PAr** . If the upper display reads differently, use the **up or down** keys to change it to **AC.SP** Once complete, press the **infinity key** once.

Step 26: The upper display will read **2** and the lower display will read **CUSt** . Use the **up or down** keys to change the upper display to read **3** . Press the **advance key** once.

Step 27: The upper display will read some parameter or other, and the lower display will read **PAr** , Use the **up or down** keys to change the upper display to read **none.**

Once complete, press the infinity key.

Step 28: Repeat steps 26 and 27 for display values of **4** through **2**, changing each parameter to **nonE.**

Note: ***The upper display will show the previous value you changed. You must increment this value from 4 through 20!***

Step 29: When all 20 parameters are set, press the **infinity key** once to return you to the main Factory Page, **CUSt** will be in the upper display and **FCty** will be in the lower display.

Step 30: Use the **up or down** keys to move to the Lockout submenu. **LoC** will be in the upper display and **FCty** will be in the lower display. Press the **advance key** to enter the Lock out submenu.

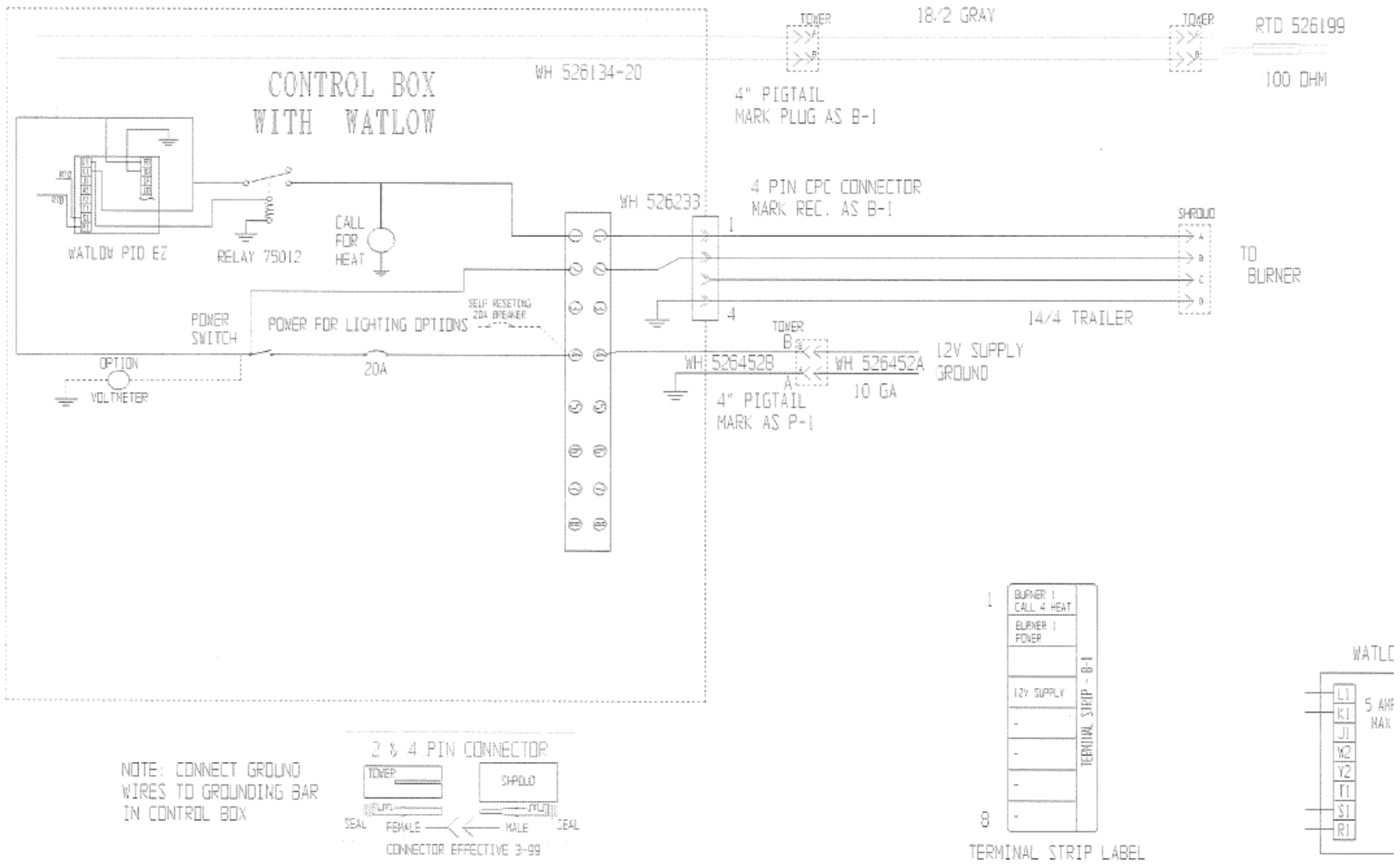
	Parameter	**Value**	**Description**
	(use the up or down keys to change parameter values)		
30-1	**LoC.o**	**2**	**Lock Operations Page**
	Advance key		
30-2	**rLoC**	**1**	**Read Lockout Security**
	Advance key		
30-3	**SLoC**	**1**	**Set Lockout Security**
	Advance key		

Step 31: Pressing the **advance key** at parameter **SLoC** will advance you to back to parameter **LoC.o**. Press the **infinity key** to return you to the Lockout submenu.

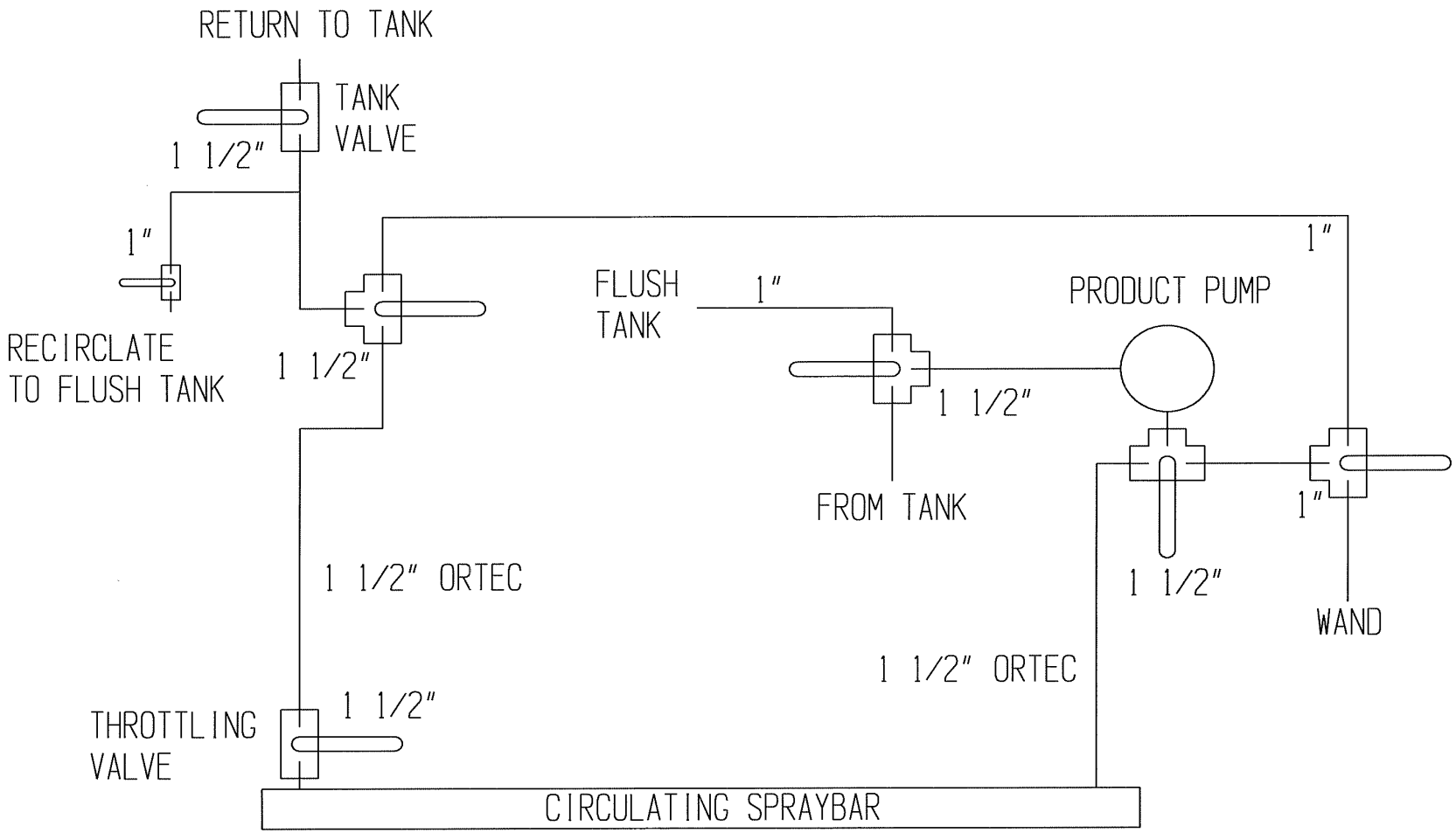
Step 32: Press the **infinity key** again to return you to the Home page.

Congratulations! Programming is Complete.

SCHEMATICS



SHOP NOTES	MACHINE CODE			
STANDARD SHOP TOLERANCE UNLESS OTHERWISE NOTED: ±1/16" & ±1°	LOCK FORMER: -	STEPP MFG CO INC. NORTH BRANCH, MN. 55056	ROUTING: -	PROJECT:
	WIEDEMANN: -		CAGE CODE: 06447	ASS'Y: ONE BURNER CONTROL
	LARGE BRAKE: -		DWN: 4-08 DWN BY: JD	PART NAME: WIRING DIAGRAM
		NOT TO BE REPRODUCED IN ANY FORM WITHOUT THE EXPRESSED WRITTEN PERMISSION OF STEPP MFG CO INC.	REV: -	FILE NAME: 12V1B-WAT-EZ
			INV NO: -	INV AMT EA: - QTY:
			MAT'L: AS NOTED	JOB NO: JOB



Rev: 1-11 added 1 1/2" valve

SHOP NOTES	MACHINE CODE
STANDARD SHOP TOLERANCE UNLESS OTHERWISE NOTED: ±1/16" & ±1°	LOCK FORMER:
	WIEDEMANN:
	LARGE BRAKE:

SMCI
STEPP MFG CO INC
NORTH BRANCH, MN. 55056

ROUTING: -		PROJECT:	SBF-PLUMBING
CAGE CODE: 06447		ASS'Y:	PUMPING SYSTEM
DWN: 12-10	DWN BY: -	PART NAME:	PUMP SYS CIRC BAR SBF
REV: 1-11		FILE NAME:	PL-HL32-CIR-SB-SBF
INV NO: -		INV AMT EA: -	QTY: 1
MAT'L: SEE B.O.M.		JOB NO:	JOB QTY:

HYDRAULIC OIL MSDS

MATERIAL SAFETY DATA SHEET

SECTION 1	PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **UNIVIS N 32**
Product Description: Base Oil and Additives
Product Code: 8259
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION

Supplier: **Canada Imperial Oil Limited, An Affliate of Exxon Mobil Corporation**
P.O. Box 4029, Station A
Calgary, ALBERTA. T2P 3M9 Canada

24 Hour Health Emergency	519-339-2145
Transportation Emergency Phone	519-339-2145
Supplier General Contact	1-800-567-3776

SECTION 2	COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	20 - 30%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3	HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4	FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5	FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Smoke, Fume, Sulfur oxides, Aldehydes, Oxides of carbon, Incomplete combustion products

FLAMMABILITY PROPERTIES

Flash Point [Method]: 165C (329F) [ASTM D-93]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6	ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. U.S. regulations require reporting releases of this material to the environment which exceed the reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7	HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8	EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL, 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Work conditions can greatly effect glove durability; inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid
Color: Yellow
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.87
Flash Point [Method]: 165C (329F) [ASTM D-93]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: 229C (444F) - 512C (954F)
Vapor Density (Air = 1): N/D
Vapor Pressure: [N/D at 40 °C] | < 1 kPa (7.5 mm Hg) at 38C
Evaporation Rate (n-butyl acetate = 1): < 0.1
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 32 cSt (32 mm2/sec) at 40 C
Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -48°C (-54°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10	STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11	TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/ m3	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC
2 = NTP SUS
3 = IARC 1
4 = IARC 2A
5 = IARC 2B
6 = OSHA CARC

SECTION 12	ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13	DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning PRECAUTIONARY LABEL TEXT: Empty containers may retain residue and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

SECTION 14	TRANSPORT INFORMATION

LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15	REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: DSL, TSCA

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Delayed Health.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The Following Ingredients are Cited on the Lists Below:*

Chemical Name	CAS Number	List Citations
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	13, 17, 18
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive
* EPA recently added new chemical substances to its TSCA Section 4 test rules. Please contact the supplier to confirm whether the ingredients in this product currently appear on a TSCA 4 or TSCA 12b list.

SECTION 16	OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
No revision information is available.

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DGN: 5007202 (1012936)
