

Rev. 8/2017



STPH

STEPP PATCH TRUCKS



OPERATIONS/MAINTENANCE/PARTS MANUAL

Diesel Burner Systems



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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

STPH Pre-Mix Heater

Thank you for selecting *Stepp* highway maintenance equipment. We are confident you will be satisfied with the *Stepp STPH Pre-Mix Heater*. *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 STPH* the fastest and most efficient Pre-Mix Heater 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 STPH*. 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.


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


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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 STPH Pre-Mix Heater. The main objective of this equipment is to maintain heat in patching material in order to repair paved surfaces.

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

OPERATIONS

Hook Configuration (Optional)

1. Extend hook to receiver. Hook and insure that the hook is engaged and latched.



2. Lift unit until front legs are off the ground. Slide front legs up and pin in the "up" position.



3. Pull unit onto truck with the hook system.



4. Stop when unit is 3' to 4' from front of unit. Connect electrical connections, air connection at rear or front of unit. Pull hopper onto unit completely.



5. Make final hydraulic, electrical, and air connections and your unit is now fully operational.

OPERATIONS

Loading

WARNING: Hydraulic equipment can crush any object with tremendous force causing injury or death. Keep yourself and all other persons clear when opening and closing doors.

Hydraulic operated doors

1. Shut OFF the heating system.
2. Check area for door clearance.
3. Use the switch on the control panel to open and close doors.
4. Check that no foreign material has entered the equipment.
5. Check that the proper material is being used.
6. Fill the hopper box with the desired amount of material.
7. Close doors.



Loading Tack Tank

WARNING: DO NOT overheat bituminous or emulsion materials, strictly observe the recommendations of the material manufacturer for melting and pouring temperatures. Never load a tank with heated material when moisture is present in the tank. Thoroughly clean tank and pumping equipment when changing materials that are not compatible.

1. Burners must be OFF when loading tack tank
2. Verify that the proper material is being loaded. Fill the tack tank with the desired amount of material that will be consumed during the scheduled work period. Certain materials must be used within approximately 24 hours to prevent separation, mainly emulsions. Emulsions, if used, will separate if left in the tank over night and cause plugged lines.
3. Fill the tack tank with the desired amount of material that will be consumed during the scheduled work period.
4. When transporting the unit, shut off the burner.



OPERATIONS

Unloading

Material Unloading

1. A two speed auger dispenses the asphalt mix onto a shovel platform or directly onto the road surface. Two switches control the function and speed of the system.
2. The auger "Out/In" switch is used to start, stop, or reverse the auger movement.
3. The "Heating Oil Circulate/Auger High Speed" switch will increase the auger speed when placed in the "Auger High Speed" position.
4. In this position, hydraulic flow is diverted from the circulation pump to the auger to increase the material discharge rate. In normal operation the switch must be in the "Heating Oil Circulate" position or heating performance, particularly in the tack tank, will be reduced.



OPERATIONS

Diesel Burner

Heating System Operation

This system incorporates a 12 volt burner assembly and burns #1 or #2 diesel fuel. The thermostat will automatically control the burner to maintain the desired temperature. The temperature of the material and the heat transfer oil is shown on LCD digital displays.

1. To Ignite Burner

- a. Check fuel tank for proper fuel type & quantity.
- b. Start engine and engage hydraulic system.
- c. Set “*Heating Oil Circulate*” switch to “*Heating Oil Circulate*” position.
- d. Set “*Washdown Selector*” switch to “*Heating System*”.
- e. Set the “*Asphalt Mix Temperature*” thermostat to recommended temperature provided by the material manufacturer.
- f. If equipped with an optional tack tank, set temperature to the product manufacturers recommended level.
- g. Set “*Transfer Oil Temperature*” 25° to 50° F above the highest product temperature used. The “*Transfer Oil Temperature*” must not exceed 475° F
- h. Turn ON heating control “*Power Switch*” and the burner will ignite.

2. To Shut Off Burner

- a. Set thermostats to the lowest setting.
- b. Allow two minutes cool down period.
- c. Turn OFF burner power switch.



80 gal. Tack Tank Pumping System (optional)

The tack tank pumping system allows four (4) pumping functions.

Re-circulate - Circulates the tack material back to tank to aid heating and keep the material mixed.

Pump - Material from the tack tank is pumped through the spray wand for application to the road surface.

Suck Back - The pump is reversed to suck the material out of the hose and pump to prevent freeze-up. This step must be completed before the *Flush* function is performed.

Flush - A flush solution is pumped through the pump, hose, valves, and wand to clear the system of tack material. This step must be preceded by the *Suck Back* function.

WARNING *Do not allow flush solutions to enter tack tank. Never place valve to Re-circulate during Flush operations.*

120 gal. Tack Tank Pumping System (optional)

The tack tank pumping system allows four (4) pumping functions.

Re-circulate - Circulates the tack material back to tank to aid heating and keep the material mixed.

Pump - Material from the tack tank is pumped through the spray wand for application to the road surface.

Suck Back - The pump is reversed to suck the material out of the hose and pump to prevent freeze-up. This step must be completed before the *Flush* function is performed.

Flush - A flush solution is pumped through the pump, hose, valves, and wand to clear the system of tack material. This step must be preceded by the *Suck Back* function.

WARNING *Do not allow flush solutions to enter tack tank. Never place valve to Re-circulate during Flush operations.*

WARNING

Before operating the Tack Tank

*Know the materials being used. **DO NOT** exceed flash point or operating range temperatures. **DO NOT** operate tack tank unless the heating coils in the tank are immersed in product. **DO NOT** allow flush solutions to enter tack tank.*

Failure to observe these warnings may cause damage to the equipment, personnel injury, or death.

Tack Tank

A Tack Tank is available to pre-heat the tack oil used when making road repairs. The Tack Tank is heated by heat transfer oil circulated through heating coils in the lower portion of the tank. A thermostatically controlled diverter valve regulates the flow of the heat transfer oil from the main oil jacket to the coils in the tack tank to maintain the desired temperatures.

A reversible pump may be installed on the tack tank to pump the tack material through dispensing equipment such as a hose and wand. The pump is driven by the hydraulic system. The material in the plumbing must be purged (sucked back) 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.

Overnight Heaters (optional)

The overnight heaters are designed to pre-heat, or maintain the temperature of the heat transfer oil up to the capacity of the heating elements. This will decrease the amount of time necessary to bring the materials up to the recommended application temperatures.

The burner is automatically disconnected from the system and the electric heating elements are activated when the power cord is plugged in. The thermostats are set by the operator to prevent overheating.

1. To Activate Overnight Heaters

- a. Plug electrical cord into an outlet with a minimum 40 amp capacity and 240 volts.
- b. Set thermostats to recommended temperature provided by the material manufacturer, then turn on the heating control power switch. System operation is now automatic.
- c. Verify that the 12 volt charger is set to 12 volt normal. This maintains the tow vehicles battery when using the overnight heat.

CAUTION: *Do not exceed the material manufacturers recommended heating cycles or heating times (pot life).*

Washdown Pump (optional)

The wash down pump is used to spray solutions on the shovel platform and your tools for clean-up, and to reduce sticking of the asphalt material.

To reduce the risk of fire, the burner is automatically disconnected from the system when the washdown selector switch is activated. However, the operator should verify that the burner is actually off for increased safety, in case of a malfunction in the system.

WARNING: *Washdown solutions may be extremely flammable, use caution and avoid spraying solution near any hot components, sparks, or flame. DO NOT smoke while operating the Washdown pump.*

1. To Activate Washdown Pump

- a. Place Washdown selector switch in the "Washdown Pump" position.
- b. Verify burner has extinguished.
- c. Spray solution as needed. Avoid heated components, sparks, or flame.

MAINTENANCE

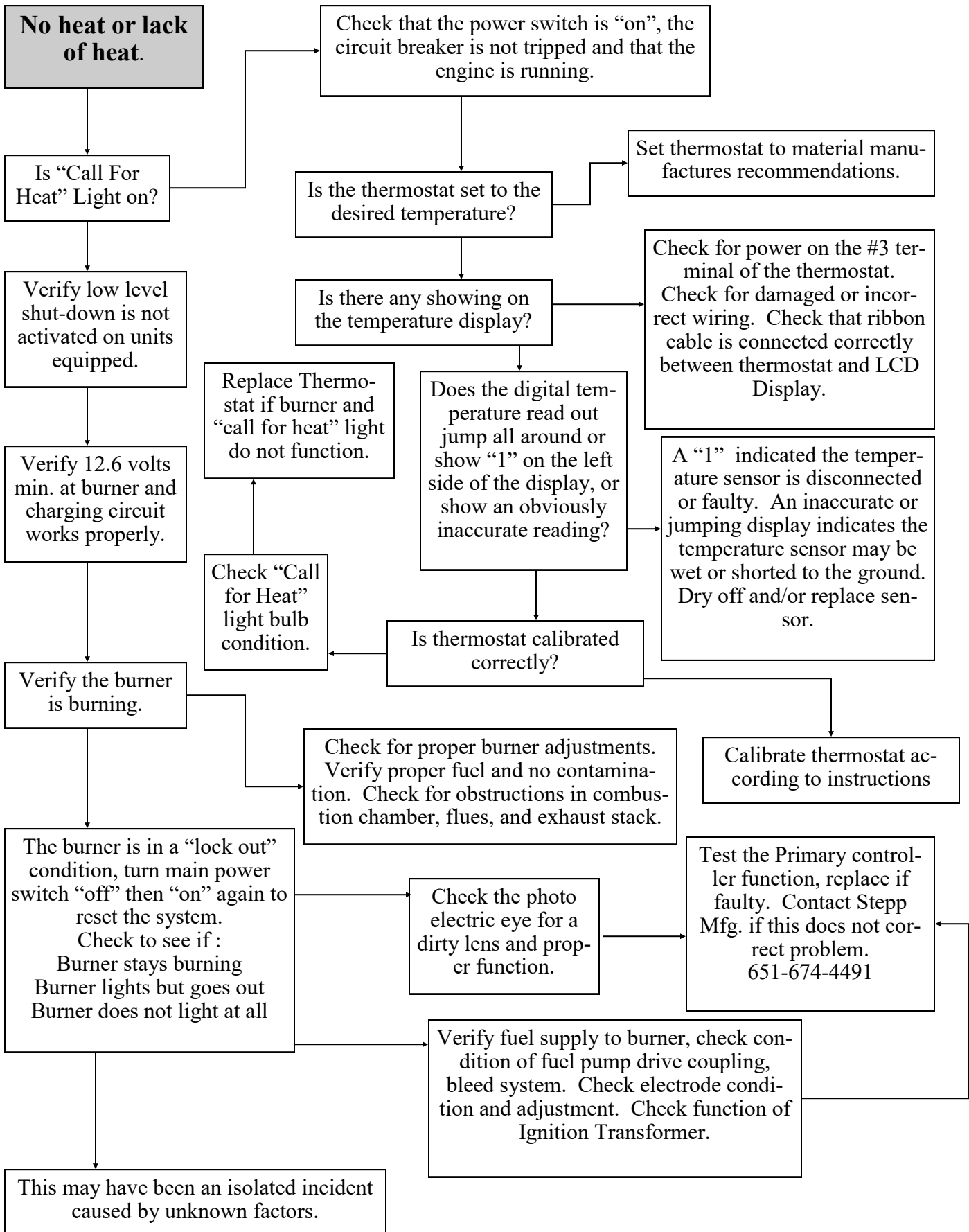
PRE-MIX HEATER MAINTENANCE SCHEDULE

ITEM	OPERATION TO PERFORM	DAILY	EVERY WEEK	EVERY MONTH	EVERY 3MO	EVERY 6MO	EVERY YEAR
Burner Diffuser	Inspect burner diffuser for damage and deterioration.				X		
Burner Diffuser	Replace burner diffuser. Refer to parts list for p/n						X
Pilot Light Pre-orifice	Clean with .013" orifice cleaner then blow out with compressed air. (LP Burners with spark ignition only)			X			
Door Hinges And Slides	Lubricate with high temperature grease. Inspect for worn or damages 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 Hopper	Clean out and inspect for cracks or other damage. Weld or repair as needed						X
Tack Tank	Cleanout and inspect for leaks, cracks or other damage.						X
Fuel Filter for Burner	Install new filter for diesel burner. Install new strainer for LP burner.					X	
Thermostats	Check for proper calibration, adjust as needed.	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 operations	X					

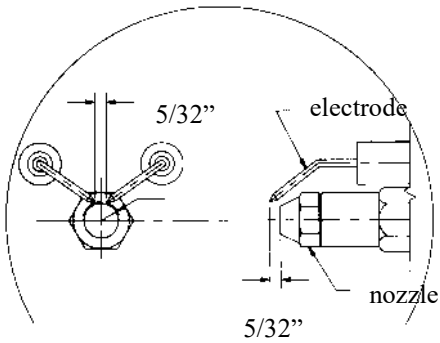
TROUBLE SHOOTING

TROUBLE SHOOTING

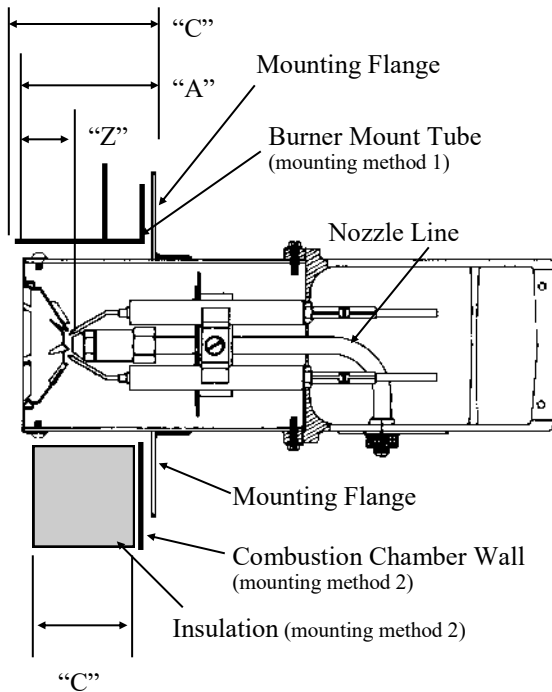
Diesel Burner



Diesel Burner Adjustments



Electrode Adjustment - Fig.1



Dimensional Adjustments - Fig. 2

NOZZLE FLOW CHART

100 PSI	.75	.85	.90	1.00	1.10	1.20	1.25	1.35	1.50	1.65	1.75	2.00	2.25	2.50	2.75	3.00
140 PSI	.89	1.00	1.07	1.18	1.30	1.41	1.48	1.60	1.78	1.95	2.07	2.37	2.66	2.96	3.25	3.55

Fig. 3

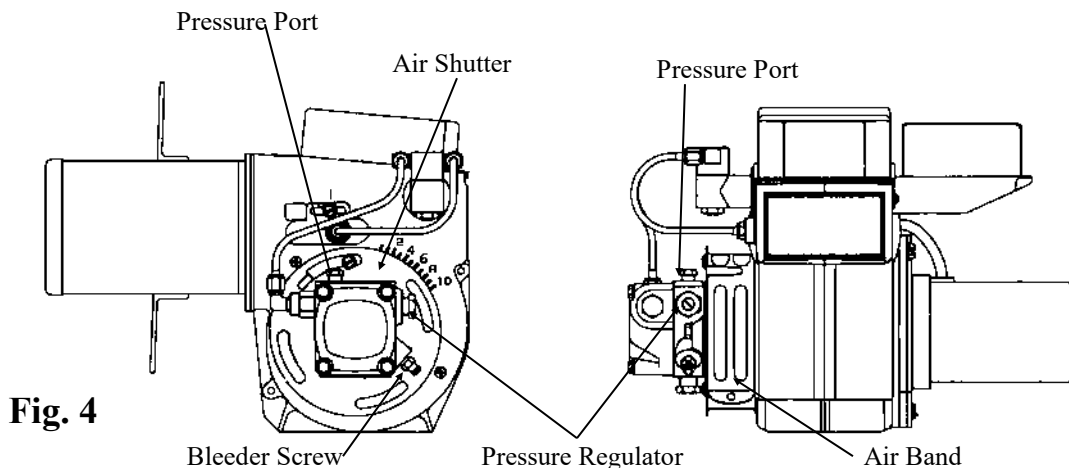
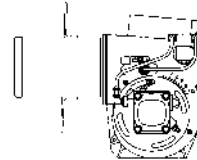


Fig. 4

1. Bleed all air from fuel system through bleeder screw. See Fig. 4 (burner motor must be running).
2. Check and adjust igniter electrodes as shown in Fig. 1.
3. Verify dimensional adjustments. The "Z" in dimension is set to 1 1/8" by repositioning the nozzle line. The "A" dimension is set 1/4" less than the "C" dimension by repositioning the mounting flange. Refer to the mounting methods shown in Fig. 2.
4. Check and adjust fuel pressure to 140 psi. 100 psi minimum may be used to compensate for high altitude operations (refer to Fig. 3).
5. Set initial adjustment of air band and air shutter to number six. Ignite the burner and adjust the air supply until there is a slight amount of smoke. See Fig. 4.
6. Allow temperature to rise to at least 150° F. then readjust air supply until there is just a trace of smoke.
7. Using combustion analyzer, measure the CO₂ or O₂ levels. Then increase the air supply to *reduce* the CO₂ by 1%, or *increase* the O₂ by 1%. If an analyzer is not available, increase the air supply until the smoke just disappears.
8. Tighten all screws after final adjustments are made.

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.

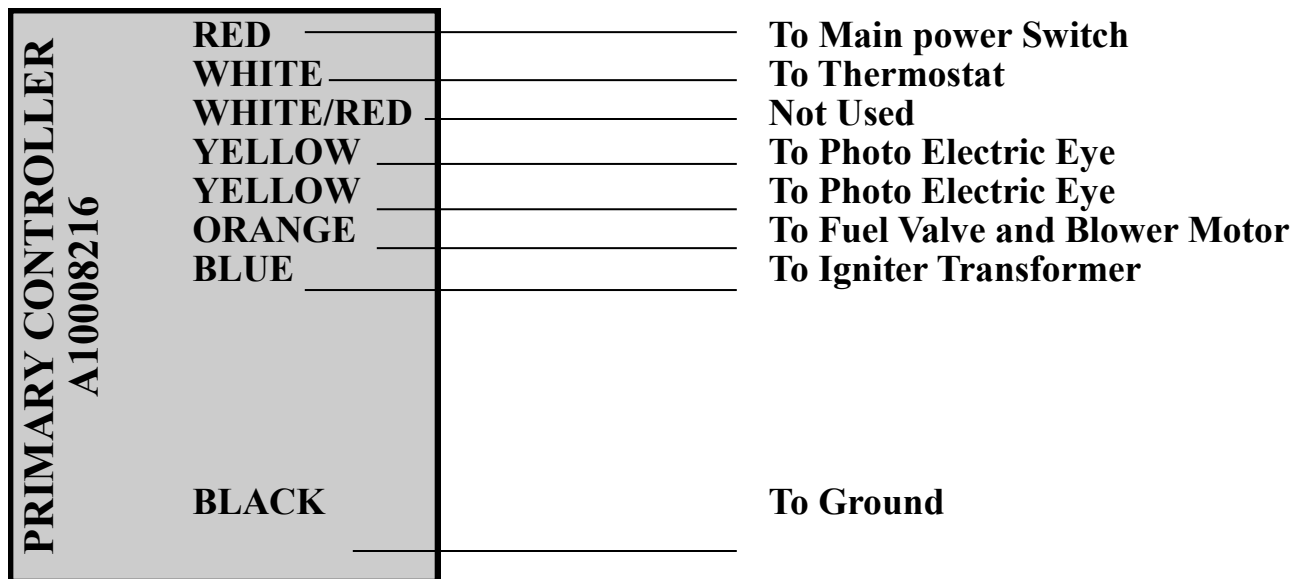
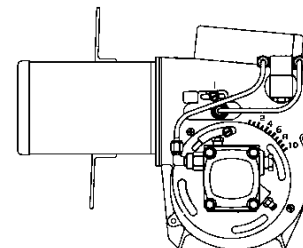


Photo Electric Eye

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

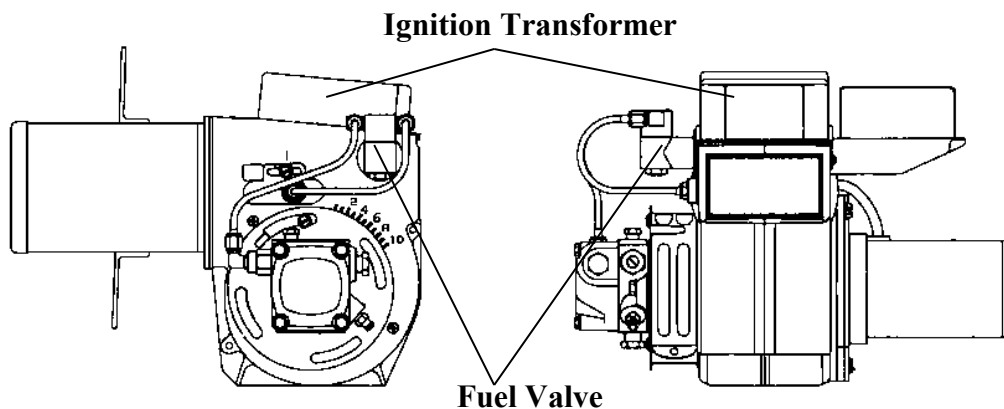
NOTE: The Fuel Valve can be bench tested for proper operation using an automotive type 12 volt battery as a power source.

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.

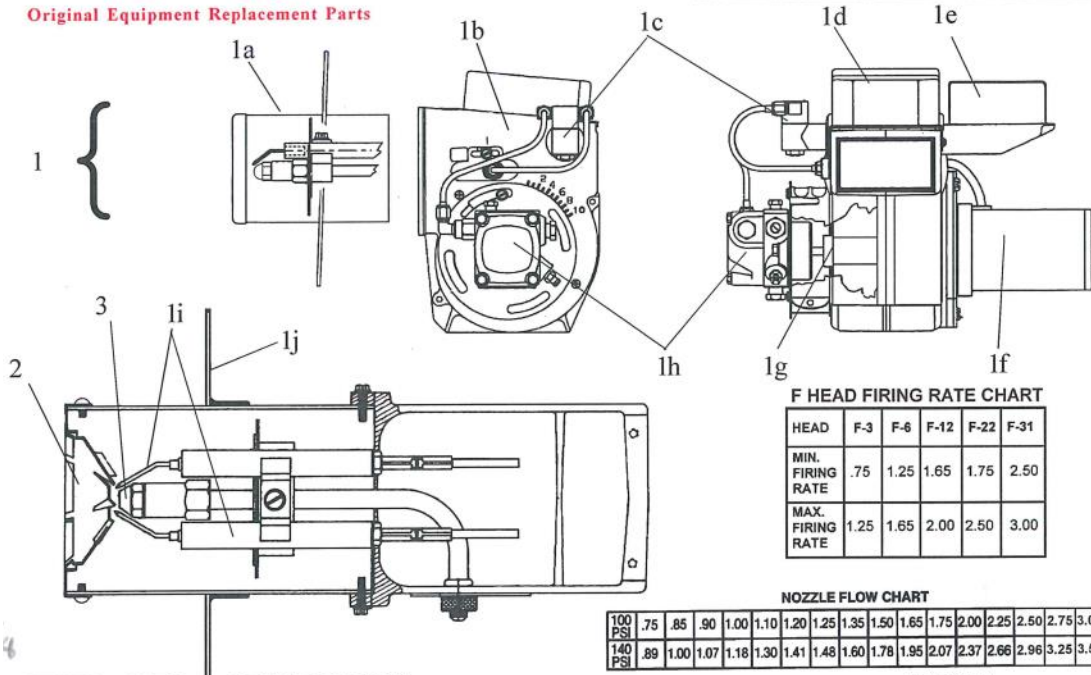


REPLACEMENT PARTS

REPLACEMENT PARTS

Diesel Burner

Original Equipment Replacement Parts



F HEAD FIRING RATE CHART

HEAD	F-3	F-6	F-12	F-22	F-31
MIN. FIRING RATE	.75	1.25	1.65	1.75	2.50
MAX. FIRING RATE	1.25	1.65	2.00	2.50	3.00

NOZZLE FLOW CHART

PSI	.75	.85	.90	1.00	1.10	1.20	1.25	1.35	1.50	1.65	1.75	2.00	2.25	2.50	2.75	3.00
100	.75	.85	.90	1.00	1.10	1.20	1.25	1.35	1.50	1.65	1.75	2.00	2.25	2.50	2.75	3.00
140	.89	1.00	1.07	1.18	1.30	1.41	1.48	1.60	1.78	1.95	2.07	2.37	2.66	2.96	3.25	3.55

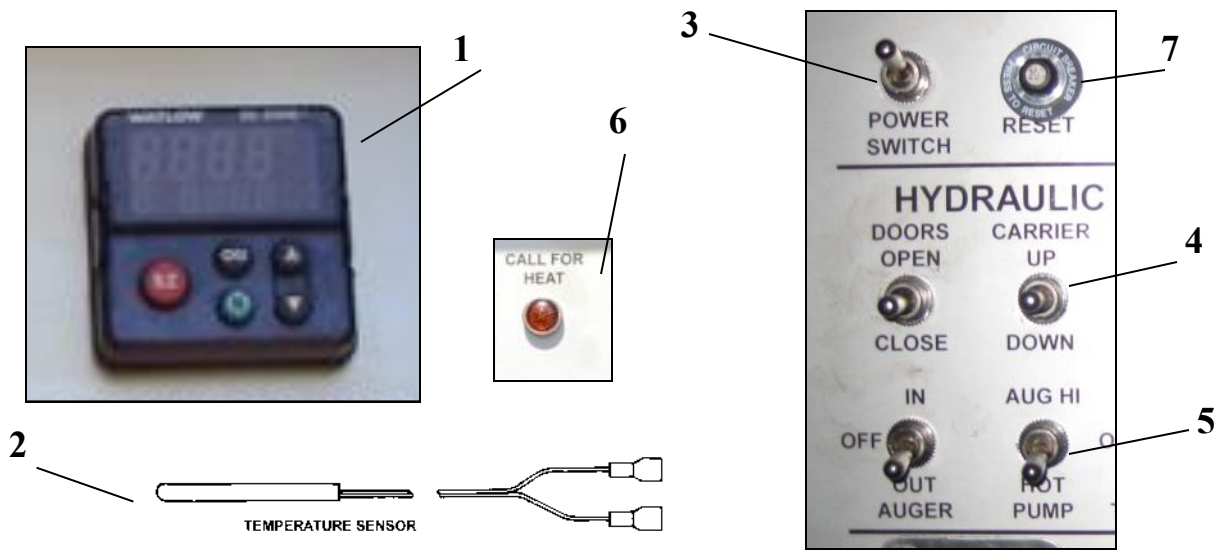
ITEM	QTY	DESCRIPTION	PART#
1	1	Burner assembly w/ Primary Control (less fuel retention head and nozzle) ...	A10008215
1	1	Burner assembly, complete w/ fuel retention head and nozzle	A10008105-003
1a	1	Air Tube.....	509070
1b	1	Photo electric eye (under ignition transformer)	
		-With Connectors.....	A10007678
		-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, F12 (for 1.65 to 2.0 gph) (Std Replacement-vert ojk)	P10005132
3	1	Nozzle, 1.5 gph. 80° (Std Replacement-vert ojk)	P10005125
**	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.

REPLACEMENT PARTS

Controls

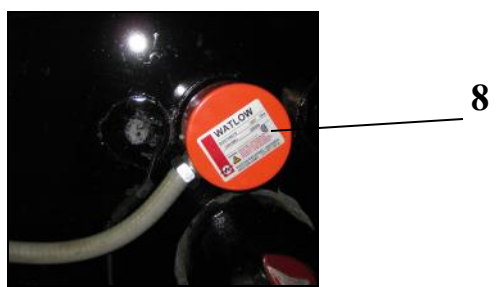


ITEM	QTY	DESCRIPTION	PART#
1	-	Thermostat, Watlow 0-550°, EZ 12V	P10003540
2	-	Sensor, RTD Watlow 0-550°	A10001017
3	-	Switch– SPDT Toggle ON/OFF	P10002869
4	-	Switch– DPDT Toggle ON/ON	P10002875
5	-	Switch– SPDT Toggle ON/OFF/ON	P10002877
6	-	Light– Call For Heat 12V	P10000181
7	-	20 Amp Breaker	P10000179
**	-	Switch– SPDT ON-ON 15A	P10002879
**	-	Switch– SPST– Toggle On/Off	P10000180

OVERNIGHT HEAT

ITEM	QTY	DESCRIPTION	PART#
8	-	Heater 240v 3KW 2” NPT Immersion	526202
**	-	Heater 240v 1.5KW 2” NPT Immersion	526203
**	-	Horn- Warning 12v– 8stone	59835T81

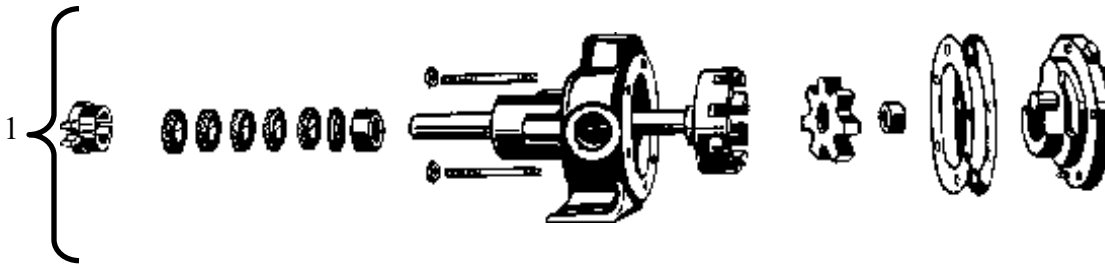
** Not Shown



REPLACEMENT PARTS

Product Pump

HL 32



ITEM	QTY	DESCRIPTION	PART#
1	1	Pump– HL32 Short Shaft	P10009202
**	1	Valve– Air Dump Over 80 PSI	517017
**	1	Chain Hub– 4016x5/8 Bore	P10004555-001
**	1	Chain Hub– 4016x3/4 Bore	P10004555-002
**	2	Valve– 1 1/2 2-way Ball	P10008125
**	1	Hyd. Motor– A-2 Bolt 1 1/4” KYD	104-1228

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.

** Item Note Shown

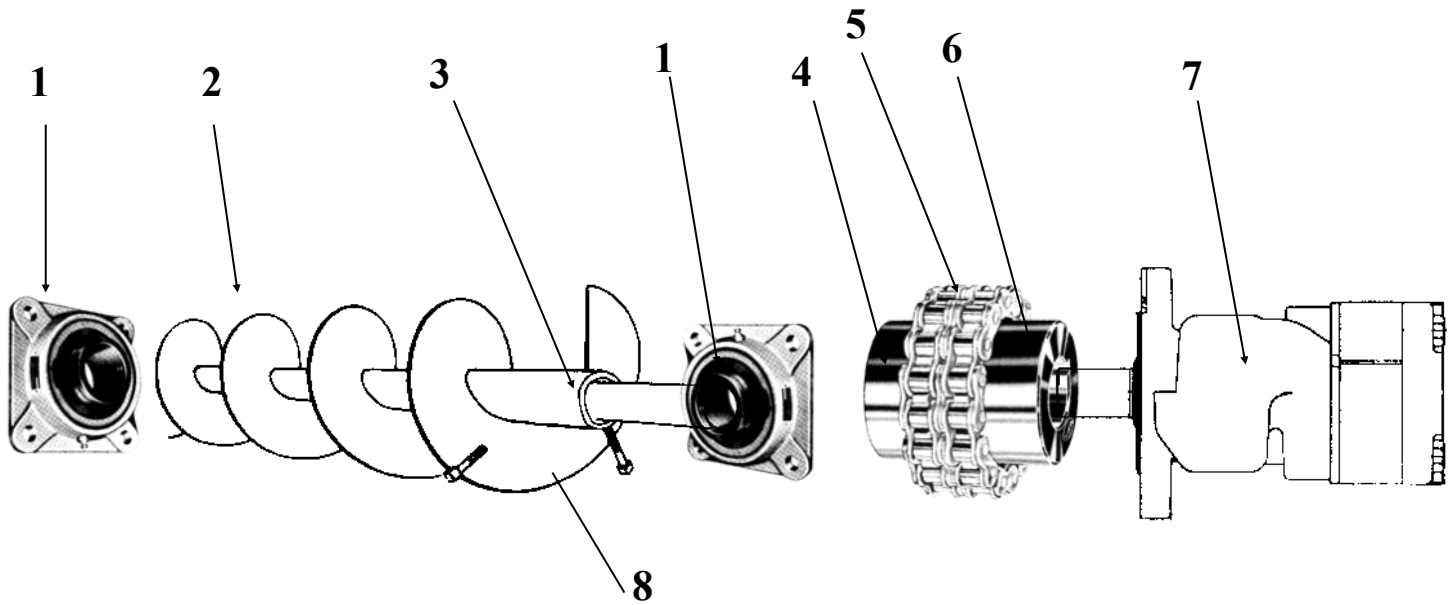
Hydraulic Pkg.

Item	QTY	DESCRIPTION	PART#
**	1	CHAIN HUB - 4012 X 3/4 BORE	507035
**	1	CHAIN ONLY - 4012	507036
**	1	CHAIN HUB - 4012 X 5/8	507039
**	1	CHAIN ONLY - 5018	507090
**	1	CHAIN HUB - 5018 X 1 1/4	507091
**	1	CHAIN HUB - 5018 X 1 1/2	507092
**	1	VALVE BODY 5 SPOOL STPH	510234-1
**	1	CHECK VALVE - 1/2 HYD	C820S
**	1	CPC MT PLATE - 7 THRU 16 WIRE	CPC-COV7-16
**	1	SHUTTLE VALVE SAE#4 PORTS	CSAB-XXN-ECH
**	3	KEY STOCK - 3/8 X 3/8	P10002021
**	2	GASKET-O-RING GEARBOX TO MOTOR	P10007471
**	1	MOTOR -HYD 2.2 CID 2-BOLT A MT	P10007535
**	2	HYD MOTOR– 9.7 CIA-2 1” KEYED	P10007583
**	2	VALVE– CROSS OVER CUSHION	P10007585

** Item Note Shown

REPLACEMENT PARTS

Auger Drive Line



ITEM	QTY	DESCRIPTION	PART #
1	2	Bearing, auger	502019
2	1	Auger Front Half Replacement	901110F1-10A1
2	1	Auger Rear Half Replacement	901110F2-10A1
3	1	Shaft, auger	901110SH-10
4	1	Chain Coupling Half, 1 1/2" bore	507092
5	1	Coupling Chain, 5018	507090
6	1	Chain Coupling Half, 1 1/4" bore	507091
7	1	Motor, Hydraulic	Give Serial #
8	1	Ribbon Flighting	520082

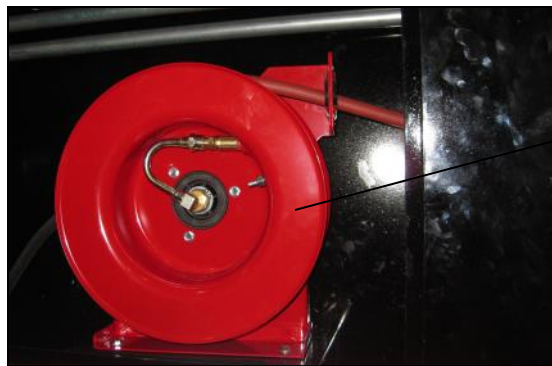
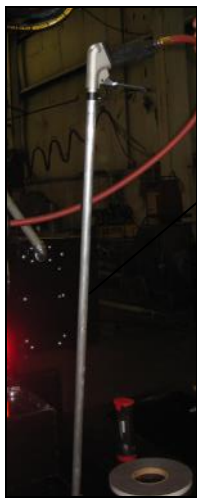
Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.
 Part description and unit serial number are required to place orders for parts without numbers.

REPLACEMENT PARTS

Misc. Parts

ITEM	QTY	DESCRIPTION	PART #
1	1	Hose –Red Ortec 1/4”x25’	523047
**	1	Wand, wash down - Spraying Systems (Optional)	
2		Trigger Valve	P10000198
		Extension	P10000196
		Adjustable Jet	P10000197
3	1	Fuel Pump, wash down	P10000156
4	1	Fuel Filler Cap	P10001133
**	1	Valve– Air Dump over 80 PSI (for AIR BLAST OPTION)	517017
5	1	Air Gun (AIR BLAST OPTION)	P10005611
6	1	Hose Reel for Air Blast– includes 1/4”x25’ Red Ortec Hose	5227K11
**	2	Bearing, door, 1" Flange	502004
**	2	Door Motor, hydraulic - Mid America	TBO-099AS
**	2	Reduction gear, door - Mid America	HFQ430SRRFXDX
**	2	Cushion valve, hydraulic door	510057
R1	1	Relay #1 - Grainger	2XC00
R2-3	1	Relay #2 and 3 - Grainger	6C873
R4	1	Relay #4 - Grainger	3A958
R4A	1	Relay #4A - Grainger	5ZH60
R4B	1	Relay #4B - Grainger	5ZH60
R5	1	Relay #5 - Grainger	5B111
R6	1	Relay #6 - Grainger	1V600
**	1	Circuit Breaker, 20A	526094
**	1	Circuit Breaker, 10A	526093
**	-	HEAT TRANSFER OIL T100	603022

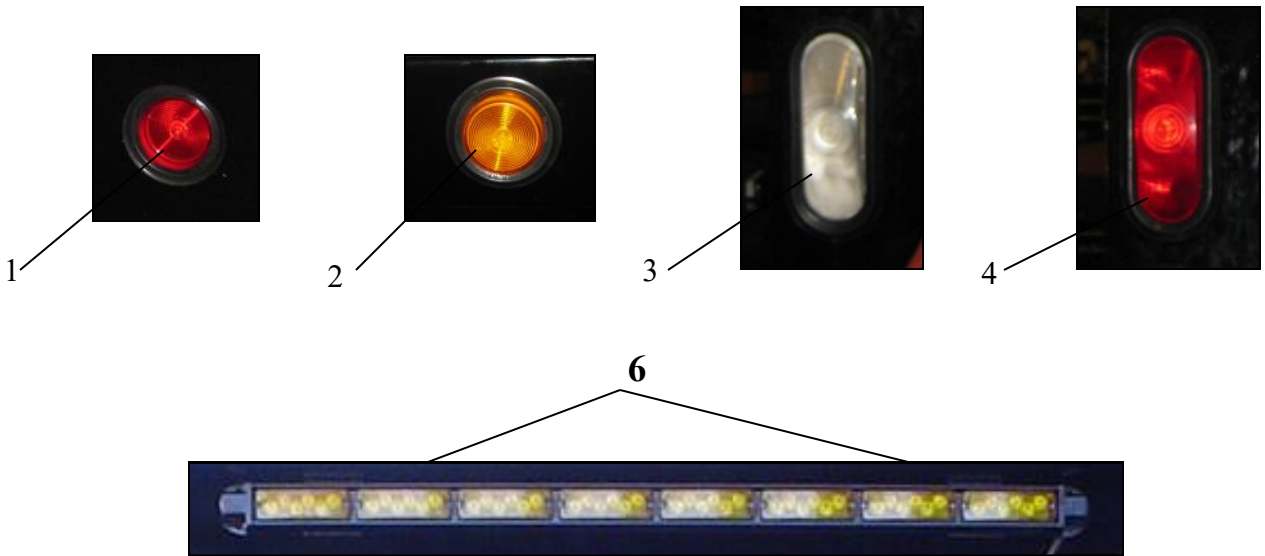
** Item not pictured.



REPLACEMENT PARTS

Lights

ITEM	QTY	DESCRIPTION	PART #
1	7	Clearance LED- Red	P10002891
2	2	Clearance LED- Amber	P10002894
3	2	Light Back Up- Oval LED	P10005551
4	4	Lights- Tail 6" Oval LED Red	P10007080
5	**	Lights- License plate	P10006767
6	1	Arrow Stick	P10004138
7	2	Strobe Light 6" Oval LED	P10005138





Consumer Warranty Guide



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 **PRI-OR** 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 its 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 <i>0-90 Days</i>	100%	0%
3-6 Months <i>91-180 Days</i>	70%	30%
6-7 Months <i>181-211 Days</i>	60%	40%
7-8 Months <i>212-242 Days</i>	50%	50%
8-9 Months <i>243-273 Days</i>	40%	60%
9-10 Months <i>274-304 Days</i>	30%	70%
10-11 Months <i>305-335 Days</i>	20%	80%
11-12 Months <i>336-365 Days</i>	10%	90%
After 12 Months	0%	100%

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



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
<i>Describe the symptoms in detail, be as specific as possible. Ex: Burner ignites and runs for 35 seconds, then goes out.</i>	<i>Describe issues found, be as specific as possible. Ex: Part failed due to loose connection, resulting in misalignment and premature wear.</i>	<i>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.</i>

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 in the programming procedure in the following pages.

able to exceed the maximum point as shown in the

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.

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

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).

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

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.

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

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 display and **SEt** will be in the lower display. Press the **advance key** to enter the global menu.

	<u>Parameter</u>	<u>Value</u>	<u>Description</u>
11-1	C_F Advance key	F	display units
11-2	AC.LF Advance key	60	AC line frequency

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.

	<u>Parameter</u>	<u>Value</u>	<u>Description</u>
13-1	Ad.5 Advance key	1	Address Standard Bus

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 **Fli** 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.

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

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

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. **CUSr** will be in the upper display and **FCty** will be in the lower display.

Factory Page

Step 21: Once **CUSr** 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 **CUSr** 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 **CUSr**. 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 **CUSr**. 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 **CUSr**. 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, **CUS**t will be in the upper display and **FC**ty 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 **FC**ty will be in the lower display. Press the **advance key** to enter the Lock out submenu.

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

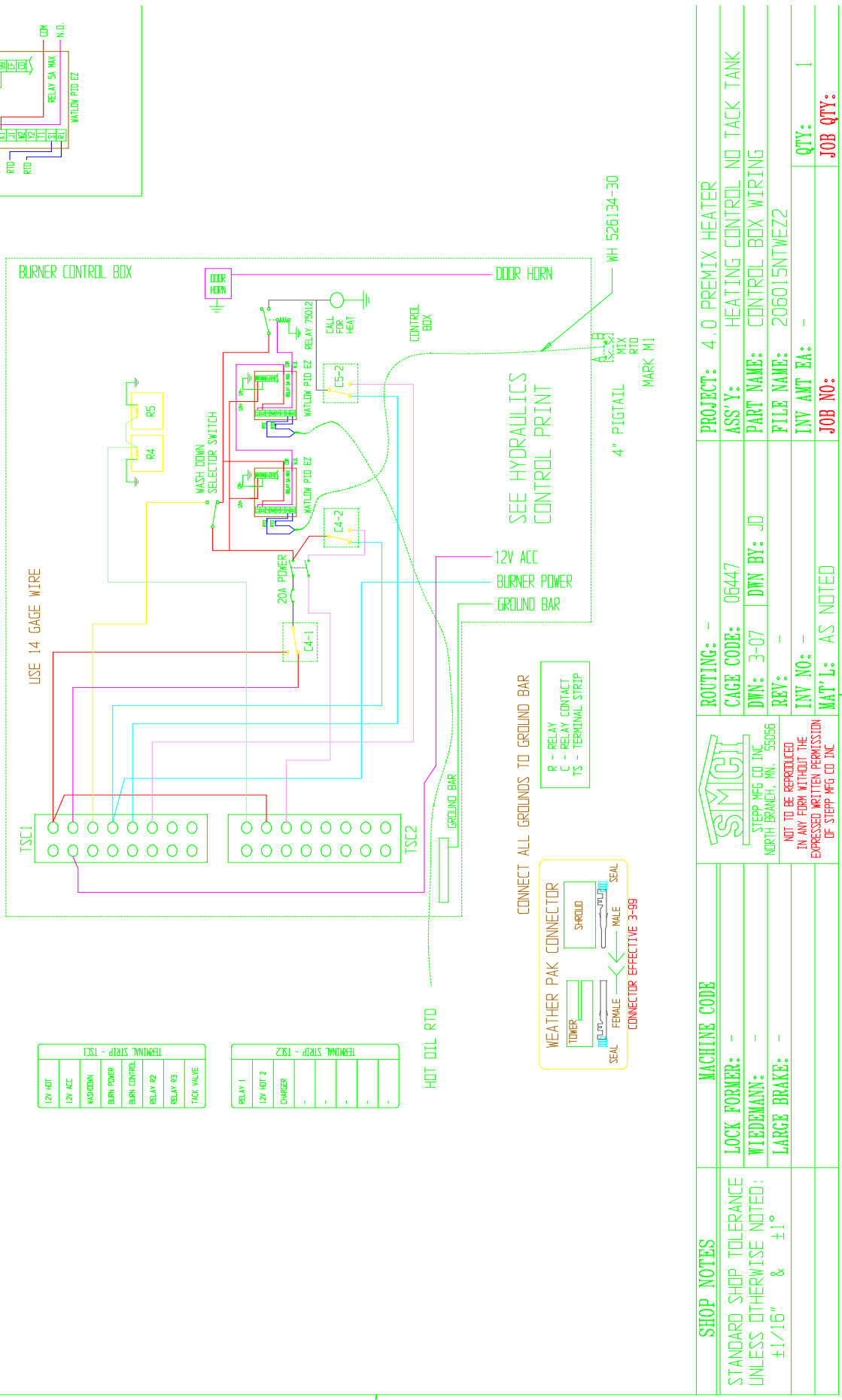
Step 31: Pressing the **advance key** at parameter **SLoC** will advance you to back to parameter **LoC.o**. Press the **infinity key** to return you to the Lockout submenu.

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

Congratulations! Programming is Complete.

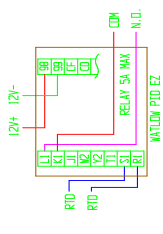
SCHEMATICS

4.0 OIL JACKETED PREMIX HEATING CONTROL SYSTEM WITH WATLOW EZ CONTROLS



12V HOT	12V ACC	WASHDOWN	BURN POWER	BURN CONTROL	RELAY R2	RELAY R3	TACK VALVE
TERMINAL STRIP - TSC1							

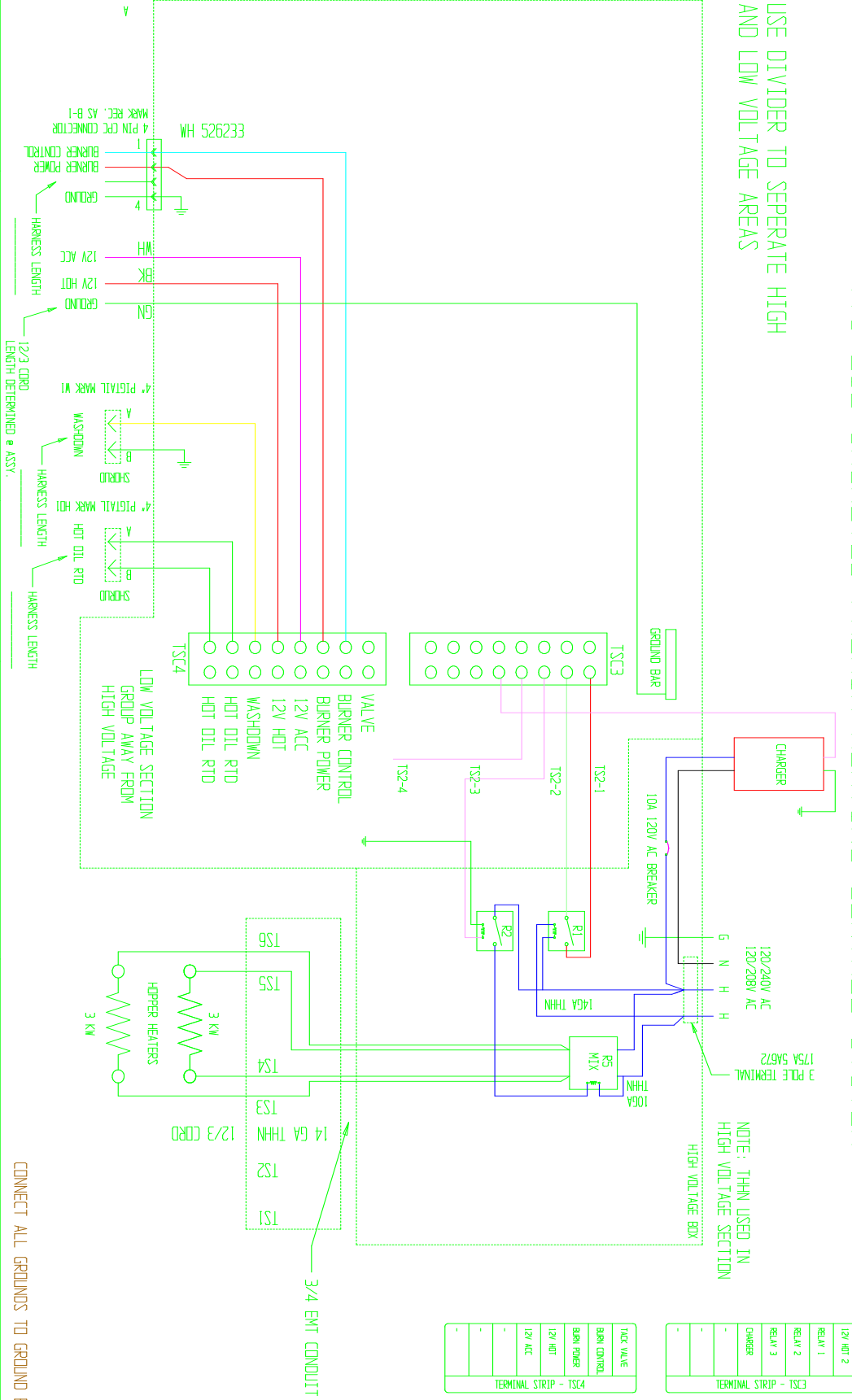
RELAY 1	12V HOT 2	CHARGE
TERMINAL STRIP - TSC2		



SHOP NOTES	MACHINE CODE	ROUTING: -	PROJECT: 4.0 PREMIX HEATER
STANDARD SHOP TOLERANCE UNLESS OTHERWISE NOTED: ±1/16" & ±1°	LOCK FORMER: -	CAGE CODE: 06447	ASS'Y: HEATING CONTROL NO TACK TANK
	WIEDEMANN: -	DWN: 3-07	DWN BY: JD
	LARGE BRAKE: -	REV: -	PART NAME: CONTROL BOX WIRING
		INV NO: -	FILE NAME: 206015NTWEZ2
		WAT'L: AS NOTED	INV AMT EA: -
			QTY: 1
			JOB NO: -
			JOB QTY: -

4.0 OIL JACKETED PREMIX HEATING CONTROL SYSTEM

USE DIVIDER TO SEPERATE HIGH AND LOW VOLTAGE AREAS



12V HOT 2
RELAY 1
RELAY 2
RELAY 3
CHARGER
-
-

TERMINAL STRIP - TSC3

VALVE
BURNER CONTROL
BURNER POWER
12V HOT
12V ACC
-
-

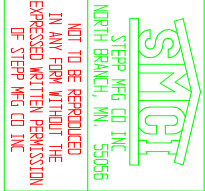
TERMINAL STRIP - TSC4

SHOP NOTES

STANDARD SHOP TOLERANCE UNLESS OTHERWISE NOTED:
 ±1/16" & ±1°
 Rev: 1-06 added washdown

MACHINE CODE

LOCK FORMER: -
 WIDEMANN: -
 LARGE BRAKE: -



NOT TO BE REPRODUCED IN ANY FORM WITHOUT THE EXPRESSED WRITTEN PERMISSION OF STEPP MFG CO INC

ROUTING:

AGE CODE: 06447
 DWN: 12-05 | DWN BY: JD
 REV: 1-06 4-06
 INV NO: -
 MAT'L: AS NOTED

PROJECT:

4.0 PREMIX HEATER
 ASS'Y: HEATING CONTROL
 PART NAME: HIGH VOLTAGE BOX WIRING
 FILE NAME: 4PJHNTWD-HV
 INV AMT EA: -
 QTY: 1
 JOB QTY: -

CONNECT ALL GROUNDS TO GROUND BAR

4.0 OIL JACKETED PREMIX HEATING CONTROL SYSTEM

WITH SERIES EZ WATLOW CONTROLS

CONNECT ALL GROUNDS TO GROUND BAR
CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY

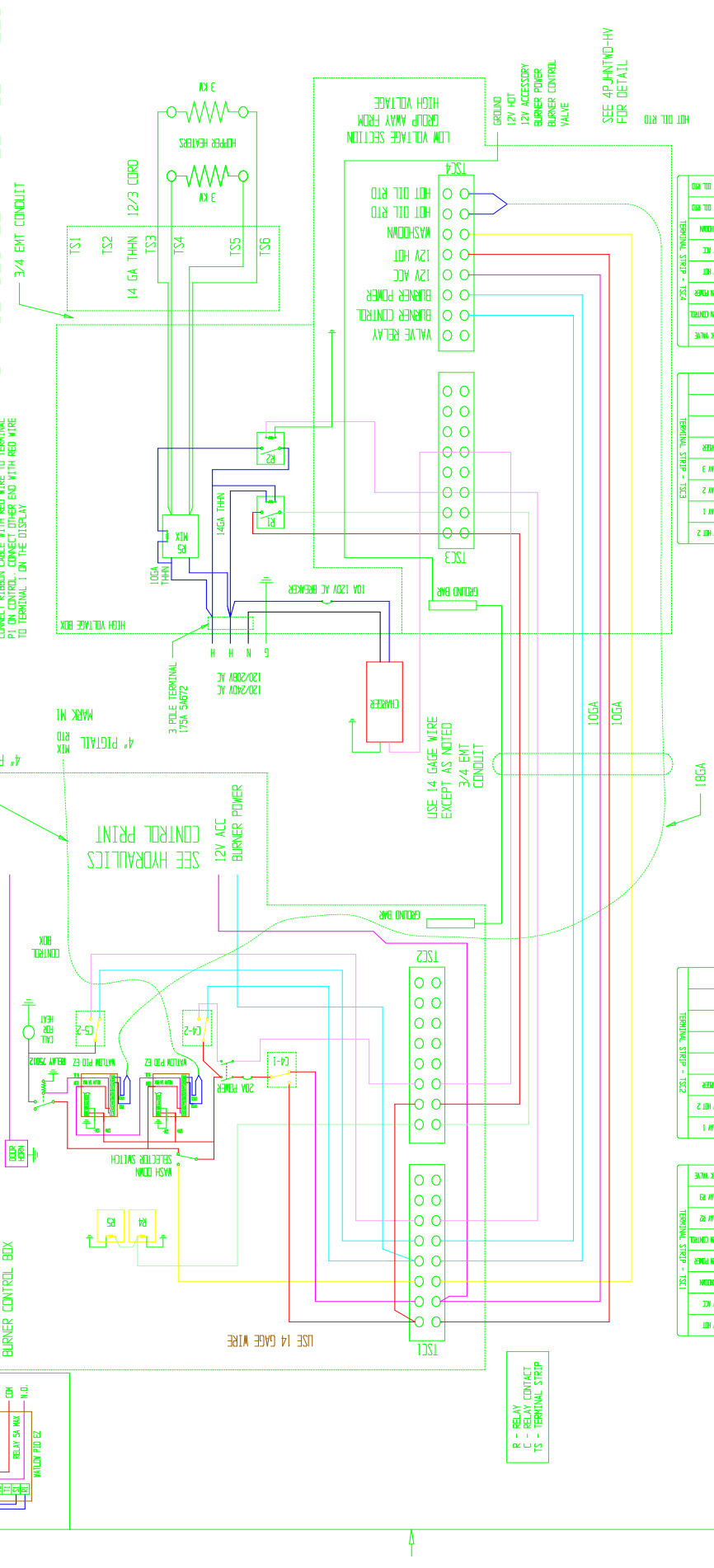
CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY

CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY

CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY

CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY

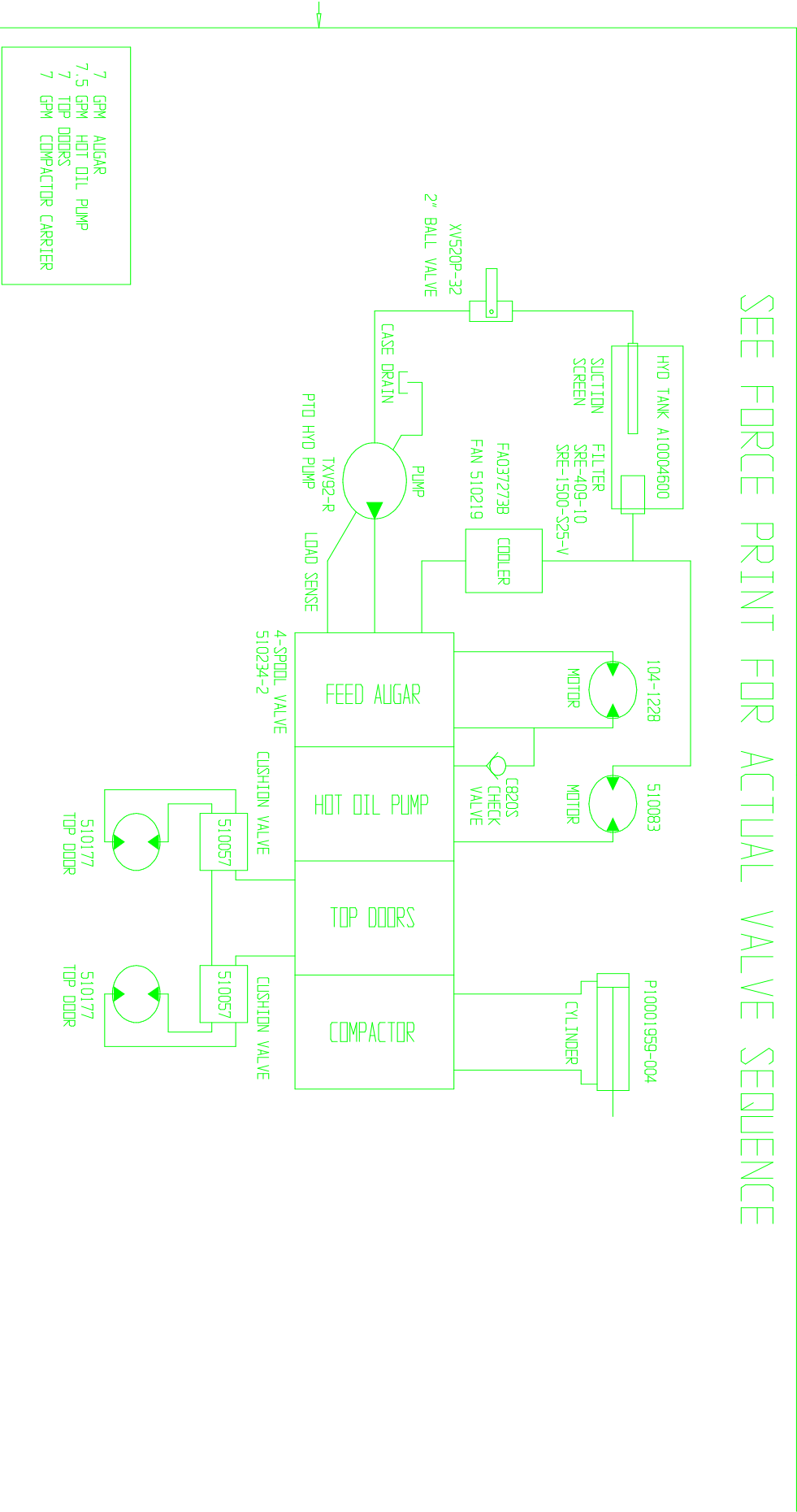
CONNECT RIBBON CABLE WITH RED WIRE TO TERMINAL
P1 ON CONTROL. CONNECT OTHER END WITH RED WIRE
TO TERMINAL 1 ON THE DISPLAY




ROUTING:	PROJECT:	4.0 PREMIX HEATER
CAGE CODE: 06447	ASS'Y:	HEATING CONTROL
DWN: 7-08	DWN BY: JD	PART NAME: WIRING SCHEMATIC
REV: -	FILE NAME: 206015NTWEZ1	INV AMT EA: -
QTY: 1	JOB NO:	JOB QTY: 1
INV NO: -	MAT' L: AS NOTED	

NOT TO BE REPRODUCED
IN ANY FORM WITHOUT THE
EXPRESSED WRITTEN PERMISSION
OF STEPP MFG CO INC

SEE FORCE PRINT FOR ACTUAL VALVE SEQUENCE



- 7 GPM AUGAR
- 7.5 GPM HOT OIL PUMP
- 7 TOP DOORS
- 7 GPM COMPACTOR CARRIER

SHOP NOTES	MACHINE CODE
STANDARD SHOP TOLERANCE UNLESS OTHERWISE NOTED: ±1/16" & ±1°	LOCK FORMER: - WIDEMAN: - LARGE BRAKE: -
	 <small>STEEP MFG CO INC NORTH BRANCH, MN. 55056</small>
	ROUTING: - CAGE CODE: 06447 DWN: 2-09 DWN BY: JD REV: - INV NO: - MAT'L: AS NOTED
	PROJECT: STPH 4 SPOOL VALVE ASS'Y: HYDRAULIC PART NAME: HYDRAULIC SYSTEM FILE NAME: STPH-4-SPOOL-LAYOUT-CC INV AMT: - JOB NO:
	QTY: 1 JOB QTY:

NOT TO BE REPRODUCED
IN ANY FORM WITHOUT THE
EXPRESSED WRITTEN PERMISSION
OF STEEP MFG CO INC

HEAT TRANSFER OIL MSDS

MATERIAL SAFETY DATA SHEET

SECTION 1	PRODUCT AND COMPANY IDENTIFICATION
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PRODUCT

Product Name: EXXON TERESSTIC 100
Product Description: Base Oil and Additives
Product Code: 16013
Intended Use: Circulating oil

COMPANY IDENTIFICATION

Supplier: Canada Imperial Oil Limited, An Affiliate of Exxon Mobil Corporation
P.O. Box 2480, Station M
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
------------------	---

No Reportable Hazardous Substance(s) or Complex Substance(s).

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.

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.

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.

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

FLAMMABILITY PROPERTIES

Flash Point [Method]: 220C (428F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: 330°C (626°F)

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. In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable 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 affect 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 house-keeping.

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): 0.83

Flash Point [Method]: 220C (428F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: 330°C (626°F)

Boiling Point / Range: N/D

Vapor Density (Air = 1): N/D

Vapor Pressure: [N/D at 20 °C] | < 1 kPa (7.5 mm Hg) at 38C

Evaporation Rate (n-butyl acetate = 1): < 1

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: 100 cSt (100 mm²/sec) at 40 C

Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -12°C (10°F)

DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10	STABILITY AND REACTIVITY
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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

<u>Route of Exposure</u>	<u>Conclusion / Remarks</u>
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
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 test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

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

3 = IARC 1

5 = IARC 2B

2 = NTP SUS

4 = IARC 2A

6 = OSHA CARC

SECTION 12	ECOLOGICAL INFORMATION
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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
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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, corrosivity 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 Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. **DO NOT PRESSURISE, 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.**

SECTION 14	TRANSPORT INFORMATION
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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
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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: None.

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
DIPHENYLAMINE	122-39-4	5, 9
XYLENES	1330-20-7	5, 9

--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

SECTION 16	OTHER INFORMATION
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N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

- Revision Changes:
 Section 13: Empty Container Warning was modified.
 Section 08: Hand Protection was modified.
 Section 01: Company Mailing Address was modified.
 Section 15: List Citation Table - Header was modified.
 Section 06: Notification Procedures was modified.
 Section 15: TSCA Class 2 Statement was deleted.

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PPEC: A

DGN: 5014320 (1012313)

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HYDRAULIC OIL MSDS

MATERIAL SAFETY DATA SHEET

SECTION 1	PRODUCT AND COMPANY IDENTIFICATION
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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 Affiliate 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
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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
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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
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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

<u>Route of Exposure</u>	<u>Conclusion / Remarks</u>
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m ³	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

3 = IARC 1

5 = IARC 2B

2 = NTP SUS

4 = IARC 2A

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, corrosivity 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
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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
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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.

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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Internal Use Only

MHC: 0, 0, 0, 0, 0, 0

PPEC: A

DGN: 5007202 (1012936)

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