

Rev. 12/2014



**STRD**  
**TRAILER MOUNTED DISTRIBUTOR**

**OPERATIONS/MAINTENANCE/PARTS  
MANUAL**

LP or Diesel Burner Systems



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

## *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**

## ***STRD Oil Distributor***

Thank you for selecting Stepp highway maintenance equipment. We are confident you will be satisfied with the Stepp STRD distributor. 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 STRD the fastest and most efficient distributor 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 STRD. 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 STRD, be sure to include the model number and serial 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 STRD Trailer Mounted Distributor. It is designed for spraying all types of emulsion based products.

# 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.

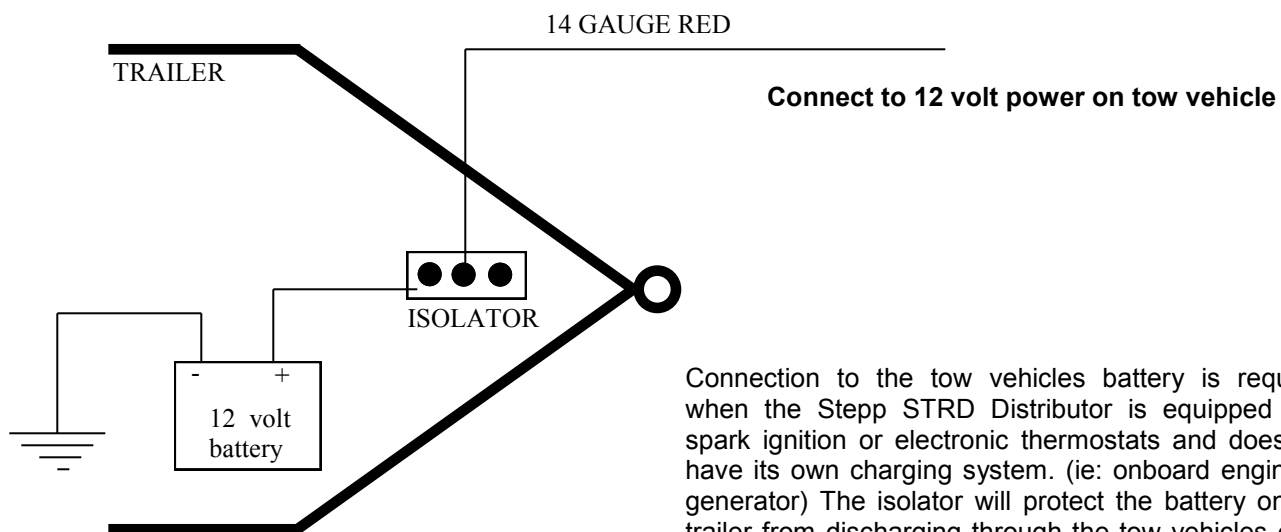


# OPERATIONS

**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. Assure hitch is engaged properly.
  - b. Attach safety chains to towing vehicle.
  - c. Connect battery charging circuit to tow vehicle if required. (see illustration below)
  - 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 STRD Distributor is equipped with spark ignition or electronic thermostats and does not have its own charging system. (ie: onboard engine or generator) The isolator will protect the battery on the trailer from discharging through the tow vehicles electrical system.



## OPERATIONS

## Diesel Burner

### WARNING

Before igniting the burners: Know the materials being used. **Do Not** exceed flash point or operating range temperatures. **Do Not** operate burners unless the flues are immersed in product. **Do Not** operate the burners when the amount of material in the tank is less than 4" above the flues. Allow 10 minutes cool-down time after the burners have been shut off before exposing the flues. Exposed flues will over-heat and cause an explosion and or fire. The cover of the tank must be unlatched to provide emergency venting in event of a flash. Failure to observe these warnings may cause damage to the equipment, personnel injury, or death.

### CAUTION

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 equipment damage. Contact your material supplier and/or manufacturer for proper handling instructions. Equipment malfunction due to improper handling or use of the materials is not covered by warranty.

This system incorporates a forced air diesel burner that fires down a flue in the lower part of the tank. The flue must be completely submerged at all times during burner operation.

The thermostat will control the burner and automatically maintain the desired temperature. The temperature of the material is shown on the burner window on the controller display

The truck engine must be running to supply the proper battery voltage (12.6 to 14) during burner operation. This is to assure the thermostats and burner function properly.

### To Heat Tank

1. Check fuel supply. Fill with #1 or #2 diesel fuel.
2. Start engine.
3. Turn ON burner control power switch and the burner will ignite.
4. Set thermostat to the product manufacturers recommended level.

### To Shut Off Heat

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



## **OPERATIONS**

## **LP Burner w/ Thermostat**

**NOTE:** *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.*

### **Igniting Burner**

1. Turn OFF burner and pilot valves.
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 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.*

## **OPERATIONS**

## **LP Burner w/ Baso Valve**

**NOTE:** *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  $\frac{1}{4}$  to  $\frac{1}{2}$  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.

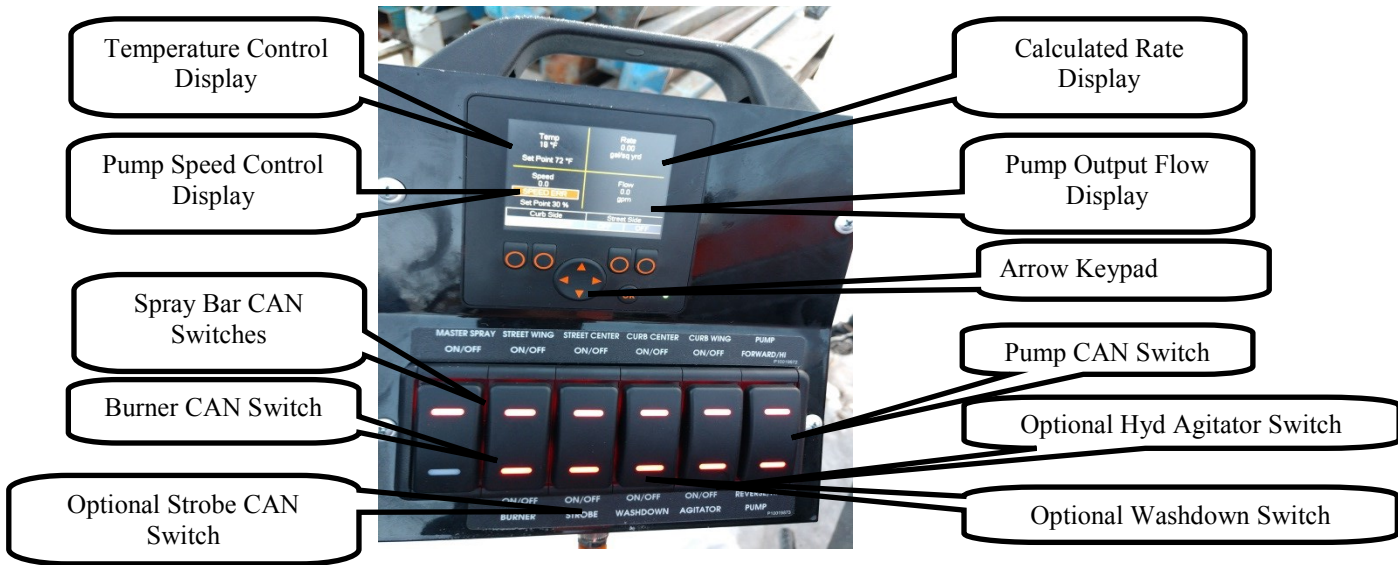
### **To Shut Off Burners**

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 personal injury and/or death.*

# OPERATIONS

# PLC Controller



The engine must be running to operate any of the control features.

## 1. Burner

- a. Determine the Temperature setpoint the product needs to be heated to. See the material manufacturers recommendations.
- b. Using the Arrow Keypad press the up arrow to select the temperature set point which will be highlighted in blue.
- c. Use the side arrow button to change the set point.
- d. Press the Burner CAN switch to turn burner ON. LED light will change from red to green.
- e. Press the Burner CAN switch to turn Burner OFF. LED light will change from green to red.

## 2. Pump

- a. Using the Arrow Keypad press the up arrow to select the Pump set point which will be highlighted in blue.
- b. Use the side arrow button to change the set point. The set point is displayed as a percentage of the range of speed available. NOTE: It's best to set the pump low and increase the speed as need once the pump is running.
- c. Press the Pump (Forward or Reverse) CAN switch to turn the pump ON. The light will turn from red to yellow.
- d. Press the opposite direction to turn the pump OFF.
- e. Press and hold the Pump CAN switch to shift the pump into HI speed. Press and hold again to shift back into LOW speed.

**3. Spray Bar**

The spray bar is split into 4 zones, Street Wing, Street Center, Curb Center, Curb Wing. Each zone has a CAN switch and corresponding indicator window on the display. Each zone can be controlled individually or together as a group.

- a. Verify pump is running at the desired rate
- b. Enable zone(s) by turning on CAN switch. Status display window will turn from gray to red and read STOP
- c. Press Master spray switch to turn ON spray bar. Status display window will turn from red to green and read SPRAY.
- d. Press Master spray switch to turn OFF spray bar. Status display window will turn from green to red and read STOP.

**4. Agitator (option)**

If equipped with a hydraulically operated agitator.

- a. Press Agitator CAN switch to turn ON. LED light turn from red to green
- b. Press again to turn OFF. LED turns from green to red.

**5. Washdown System (option)**

If equipped the washdown system is used to apply solvent to the tools or components on the machine to help prevent build up of asphalt material.

- a. Press Washdown CAN switch to turn ON. LED light turn from red to green
- b. A built in safety interlock will automatically turn the burner off to eliminate any open flame that may ignite the cleaning solvent
- c. Press again to turn OFF. LED turns from green to red.
- d. Press the Burner CAN switch to re-ignite the burner

**4. Strobe Light (option)**

- a. Press Strobe CAN switch to turn ON. LED light turn from red to green
- b. Press again to turn OFF. LED turns from green to red.

**PLC Error Messages**

PUMP ERR	No input from the pump	-Pump is not turned on -Cable is not connected properly -Sensor is not properly aligned -Sensor is not properly spaced
SPEED ERR	No input from GPS	-Tow Vehicle is stopped -Cable not connected properly -Obstructions or interference to GPS Sensor
RTD OPEN	RTD temperature sensor circuit is open	-Cable not connected properly -Sensor is defective
RTD SHORT	RTD temperature sensor circuit has a short	-Excessive moisture in sensor/ sensor well -Pinched or damaged cable -Sensor is defective
BURNER LOCKOUT	Burner start sequence has failed, burner has gone into lockout	See Burner troubleshooting guide on page 28.
LOW OIL	Hydraulic fluid is below safe level	-Hydraulic fluid is low -Cable is not connected properly -Level sensor is defective
OIL TEMP	Hydraulic fluid temperature is above safe level	-Hyd pressure relief valve is stuck open -System being operated at or beyond limits -Cable is not connected properly -Temp Sensor is defective





## OPERATIONS

### Agitator

**CAUTION:** Check lubrication level of gear reduction unit (if equipped) prior to initial operation and monthly thereafter.

#### Timer Operation for Agitator

- Verify material is at temperature as recommended by the material manufacturer
- Plug in timer to a 120 volt source
- Set the desired operating time (see inside timer cover for procedure)
- The agitator can be manually turned on by pressing the “OVR” button

\*Refer to the timer instructions located on the timer or in the appendix for more information.



### Electric Overnight Heat System (Optional)

This system incorporates electric heating elements to heat the product. The elements are thermostat controlled to prevent overheating of the product. It is the operator's responsibility to know the materials being used and **NOT** to exceed the flash point or operating range temperatures of the product.

Sufficient lead time must be allowed for the material in the tank to heat to the proper temperature. The lead time required will vary with the ambient temperature, the amount of material in the tank, and the type of material being heated.

Consult with the material manufacturer for the proper working temperatures and maximum heating periods.

**\*\* MAKE SURE PROPER VENTING HAS OCCURRED BEFORE OPERATING BURNER SYSTEM**



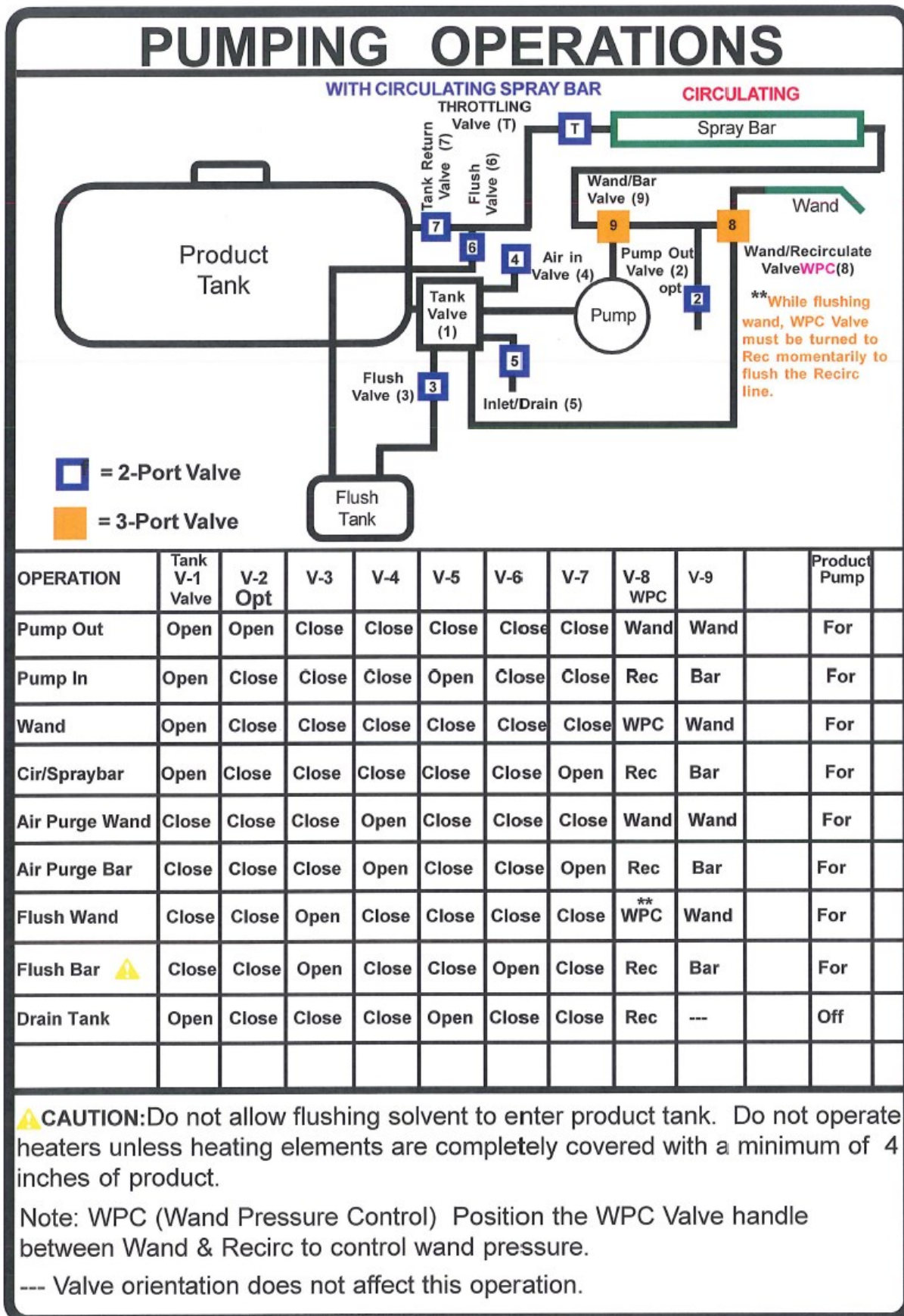
## **OPERATIONS**

## **Pumping System w/ Wand and 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, diesel, electric, 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 valves as shown in the Pumping Operations Chart on the following page and located on the machine.
  - b. 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 valves as shown in the Pumping Operations Chart on the the following page and located on the machine. Follow the directions at the bottom of the Pumping Operations Chart regarding the WPC valve.
  - b. Engage pump in forward direction.
  - c. Adjust WPC valve for desired flow.
- 3. Spray Bar.** In this operation the contents of the tank is pumped to the spray bar for application to the road surface.
  - a. Set the valves as shown in the Pumping Operations Chart on the following page and located on the machine.
  - b. Engage pump in forward direction.
- 3. System Purge.** (suck back) In this operation the pump has air introduced to purge the product from the system.
  - a. Set the valves as shown in the Pumping Operations Chart.
  - b. Engage pump in forward and open valve 4 (air valve) for two minutes.
- 4. System Flush.** Flushing solvent is pumped through the pump, spray bar, and wand to clean material from the system.
  - a. Disengage pump.
  - b. Set the valves as shown in the Pumping Operations Chart on the following page and located on the machine.
  - c. Place a suitable container under the spray bar.
  - d. Engage pump in forward to flush system.
  - e. Place suitable container under tank valve drain and open valve 5 to drain all tank valve content.
  - f. Dispose of flushing solvent in accordance with local, state, and federal laws.

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

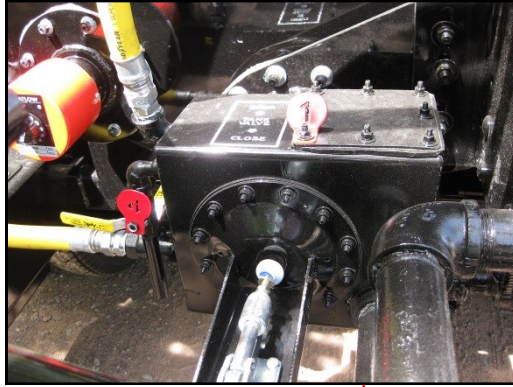




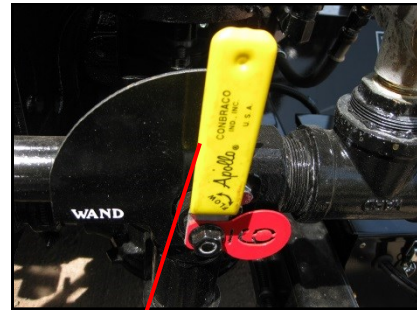
# OPERATIONS

# Diaphragm Tank Valve and Associated Plumbing

Tank Valve (1)



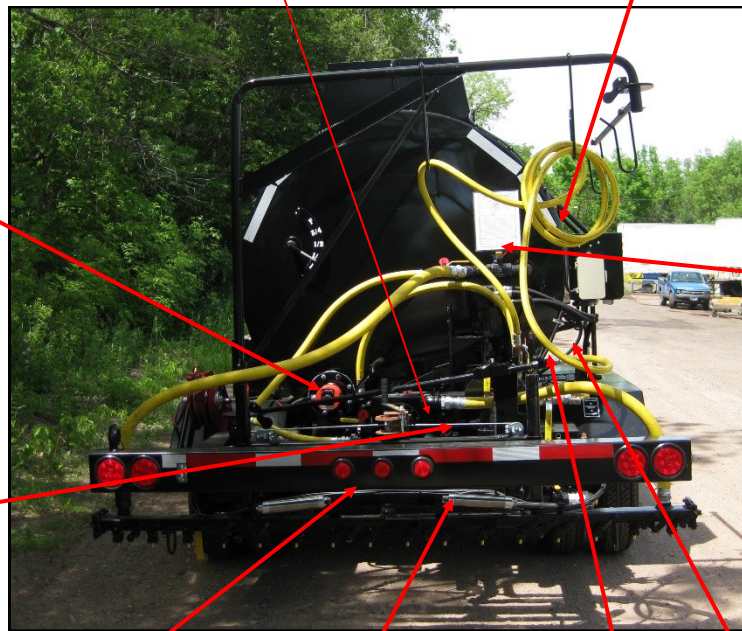
Wand/Bar Valve (9)



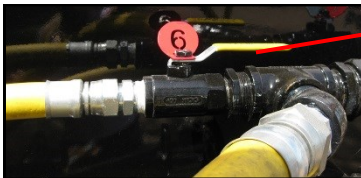
Air In Valve (4)



Flush Valve (3)

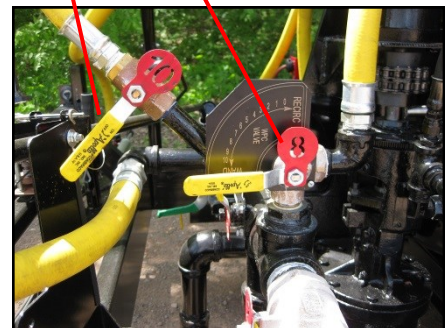


Tank Return Valve (7)

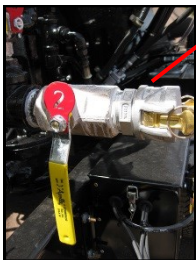


Flush Valve (6)

Wand/Recirculate Valve (8) WPC



Wand Valve (10)



Pump Out Valve (2)



Inlet/Drain Valve (5)

# **OPERATIONS**

## **Engine and Helpful Hints**

### **Engine Operations (optional)**

1. Starting Engine
  - A. Check all fluid levels.
  - B. Start engine. (see owners manual)
    1. Turn on key
    2. Press OK Button when menu screen appears
    3. Press and hold the Start Button
    4. Allow engine to warm up
    5. Press the Engine speed UP button to bring to operating RPM
2. Stopping Engine
  - a. Press the engine speed DOWN button
  - b. Allow engine to cool down
- C. Press the off button



\*Refer to the engine manufacturers operators manual for additional infor-

### **Burner Operating Tips**

1. Know the temperature required for the material being used. Do not over heat.
2. Allow for temperature "creep" when the temperature rises to the desired level. This is a result of continued heat being given off of the flues after the burner is shut down.
3. For safety in case of an accident or vehicle upset, do not operate the burner or heaters while transporting.
4. Do not operate the burners when the material level 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 overheat and cause an explosion and or fire.
5. Only use equipment that is in good condition. Be sure all scheduled maintenance items have been completed.
6. Wear proper clothing and protective gear as recommended by your safety director.
7. In case of skin contact with hot materials, dip into cool water immediately. Trying to wipe the product off may spread the burn.
8. Contact your safety director for instruction on the proper extinguishing of petroleum based fires.
9. Carry a fire extinguisher of the proper type and size as recommended by your safety director.
10. Notify your supervisor or the manufacturer if any questions arise concerning the operation or maintenance of this equipment.

# MAINTENANCE

# STRD DISTRIBUTOR 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.					<b>X</b>	
Product Pump	Grease Bearing			<b>X</b>			
Door Hinges And Slides	Lubricate with high temperature grease. Inspect for worn or damaged components.				<b>X</b>		
Hose Assembly On Spray Wand	Inspect for cracks, fraying, or deterioration. Replace if needed with original equipment hose.		<b>X</b>				
Hose Assembly On Spray Wand	Replace with original equipment hose.						<b>X</b>
Main Tank	Clean out and inspect for cracks or other damage. Weld or repair as needed						<b>X</b>
Heating Flues	Cleanout and inspect for leaks, cracks, or other damage.						<b>X</b>
Fuel Filter for Burner	Install new filter for diesel burner. Install new strainer for LP burner.					<b>X</b>	
Thermostats	Check for proper calibration, adjust as needed.	<b>X</b>					
Fuel Lines	Check for security, damage, and leaks. Replace with OEM type hose as needed	<b>X</b>					
Fuel Tanks	Check for damages and leaks.	<b>X</b>					
Brakes	Test for proper operation.	<b>X</b>					
Brake Adjustment/Inspection	Adjust brake shoes to proper clearance. Check brake shoes for excessive wear.				<b>X</b>		
Wheel Bearings	Inspect for corrosion and wear. Clean and repack, install with new seals.						<b>X</b>
Suspension Part	Inspect for bending, loose fasteners, and wear. Repair as needed.				<b>X</b>		
Axle Hangers	Inspect bolts for security.					<b>X</b>	
Wheel Nuts	Re-torque to proper specs.				<b>X</b>		
Tires	Check pressure. Inspect for wear, cuts, or other damage.		<b>X</b>				
Hitch	Check for damage and loose fasteners.	<b>X</b>					
Lights	Check for proper operations.	<b>X</b>					

# STRD DISTRIBUTOR MAINTENANCE SCHEDULE

ITEM	OPERATION TO PERFORM	DAILY	EVERY 50 hrs	EVERY 250hrs	EVERY 500 hrs		
<b>Engine</b>							
Check oil		<b>X</b>					
Check coolant		<b>X</b>					
Check Fan belt	Check for cracks or splits,	<b>x</b>					
Water separator	Drain water separator		<b>x</b>				
Radiator Hoses	Check clamps for tightnes, check for cracks			<b>X</b>			
Air Filter	Clean air filter element			<b>X</b>			
Fan Belt	Check adjustment of belt tension			<b>X</b>			
Engine oil	Drain and add new oil				<b>X</b>		
Oil filter	Replace cartridge				<b>X</b>		
Fuel Filter	Replace fuel cartridge				<b>X</b>		
Fan Belt	Replace				<b>X</b>		
Water Separato r	Replace				<b>X</b>		

# STRD DISTRIBUTOR 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.*





## **Fuel Filter Replacement (burner)**

1. Close fuel shut off 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.

## **Torques Specifications**

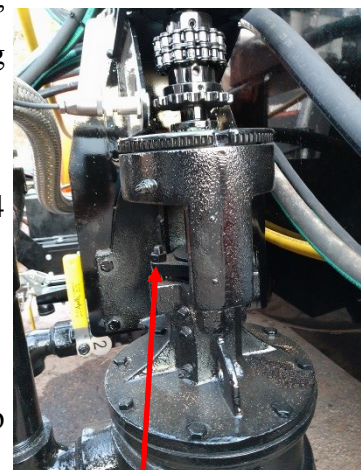
Tire Lug Nuts . . . . .	95 Ft lbs.
Hitch Nuts . . . . .	95 Ft lbs.
Shackles . . . . .	95 Ft lbs.

## **Pump Packing Adjustment**

The pump on this unit has a packing gland as a shaft seal. All “packed” pumps will weep a small amount of fluid. If the amount leaking gets to be excessive the packing need to be tightened.

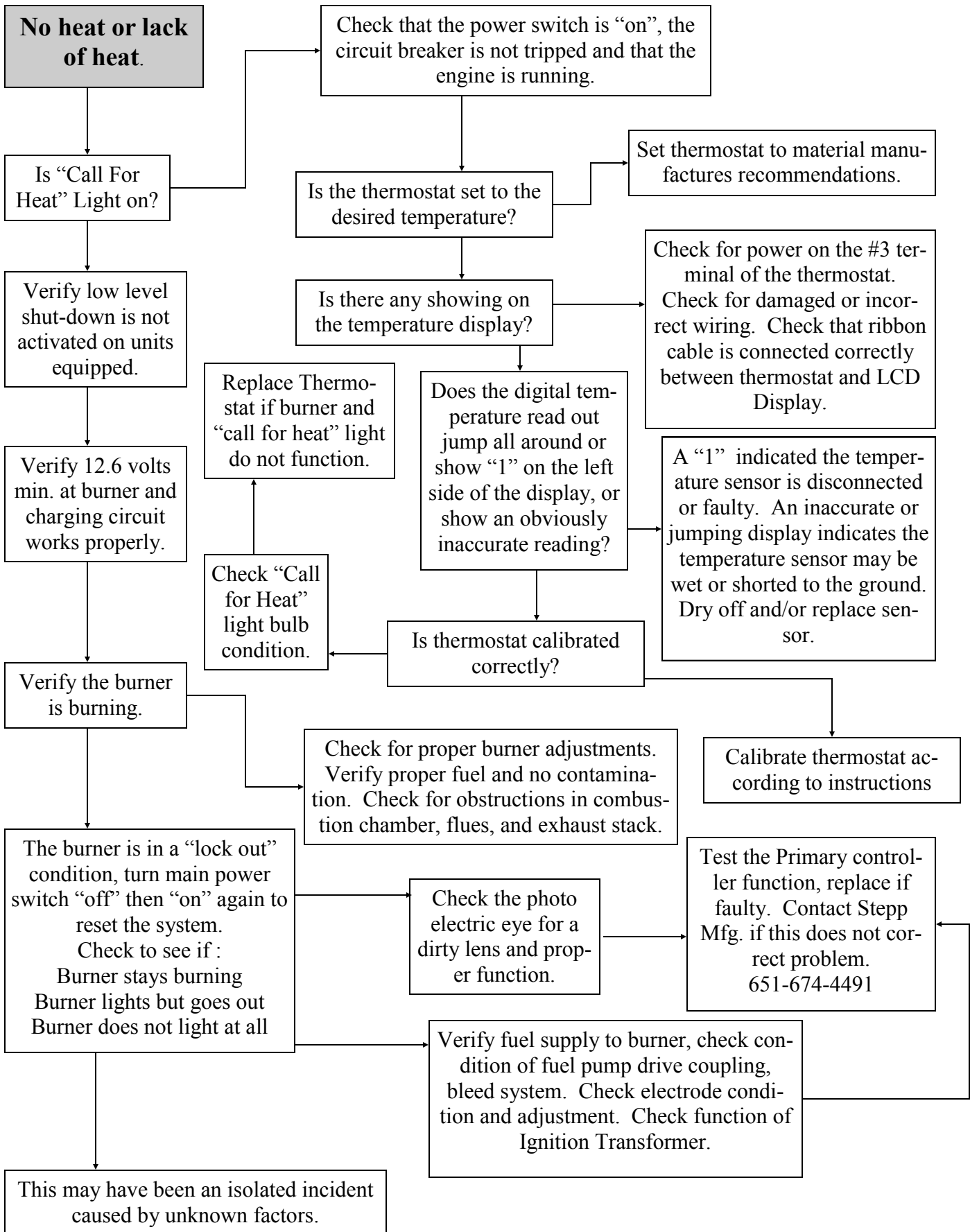
1. Turn the pump on to a low speed
2. Slowly tighten the 2 adjusting nuts on each side of the shaft a 1/4 turn at a time.
3. Give it 2-3 minutes to settle in and check seepage
4. Repeat step 2-3 until satisfied

If pump still leaks excessively, packing will need to be replaced. See pump manufacturer for replacement instructions.

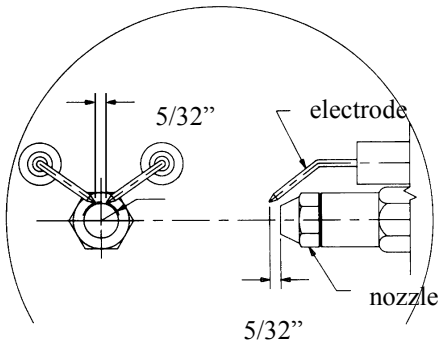


Adjuster Nut

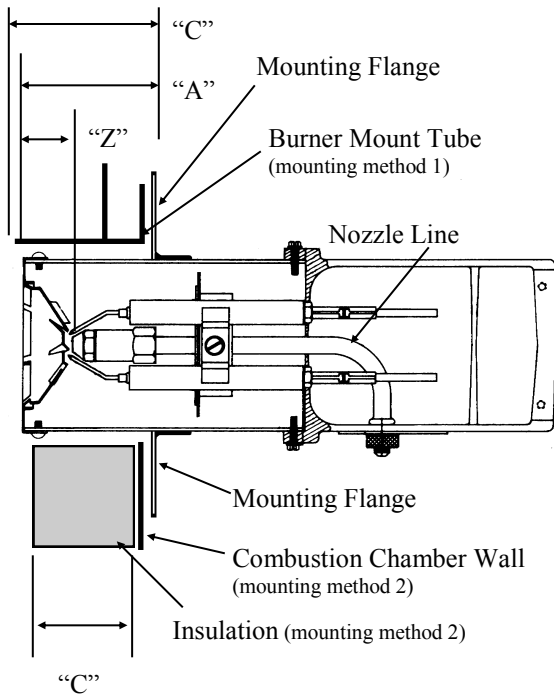
# TROUBLE SHOOTING



# Diesel Burner Adjustments



**Electrode Adjustment - Fig.1**

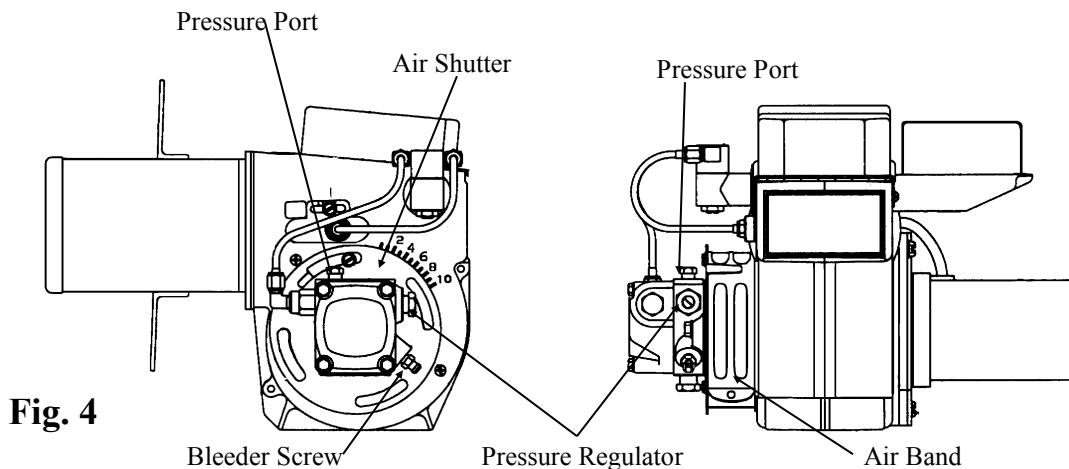


**Dimensional Adjustments - Fig. 2**

**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**

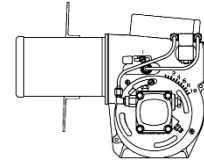


**Fig. 4**

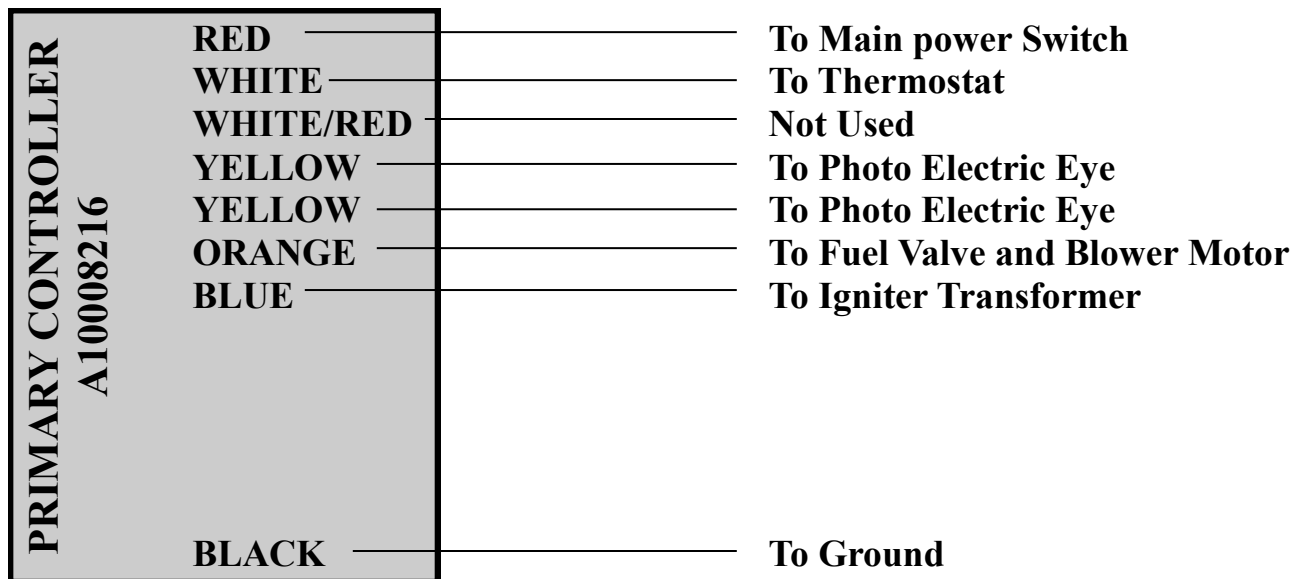
1. Bleed all air from fuel system through bleeder screw. See Fig. 4 (burner motor must be running).
2. Check and adjust igniter electrodes as shown in Fig. 1.
3. Verify dimensional adjustments. The "Z" in dimension is set to 1 1/8" by repositioning the nozzle line. The "A" dimension is set 1/4" less 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 CO<sub>2</sub> or O<sub>2</sub> levels. Then increase the air supply to *reduce* the CO<sub>2</sub> by 1%, or *increase* the O<sub>2</sub> 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.*



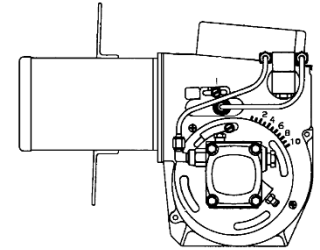
1. Remove controller from burner. Mark all wires for proper reassembly.
2. Using two test lights, or volt meters, connect one to the blue wire, and one to the white/orange wire of the controller. Connect the black leads of your test instruments to the negative (-) terminal of the battery.
3. Connect 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

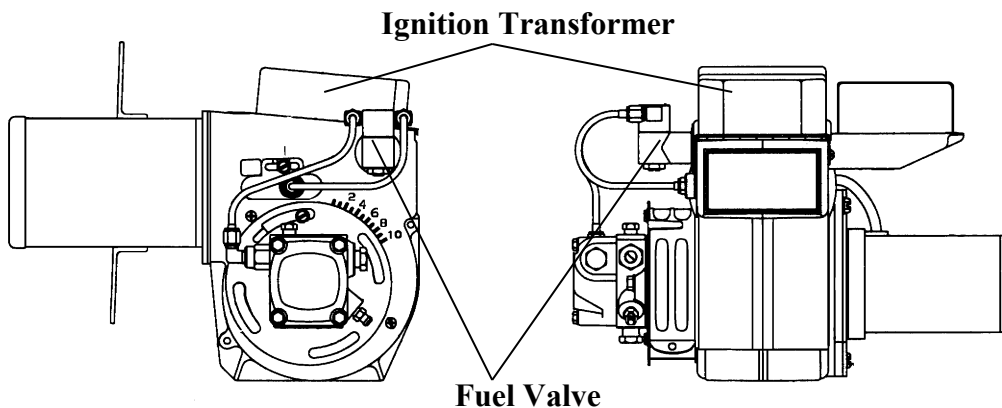
**NOTE:** The Fuel Valve can be bench tested for proper operation using an automotive type 12 volt battery as a power source.

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

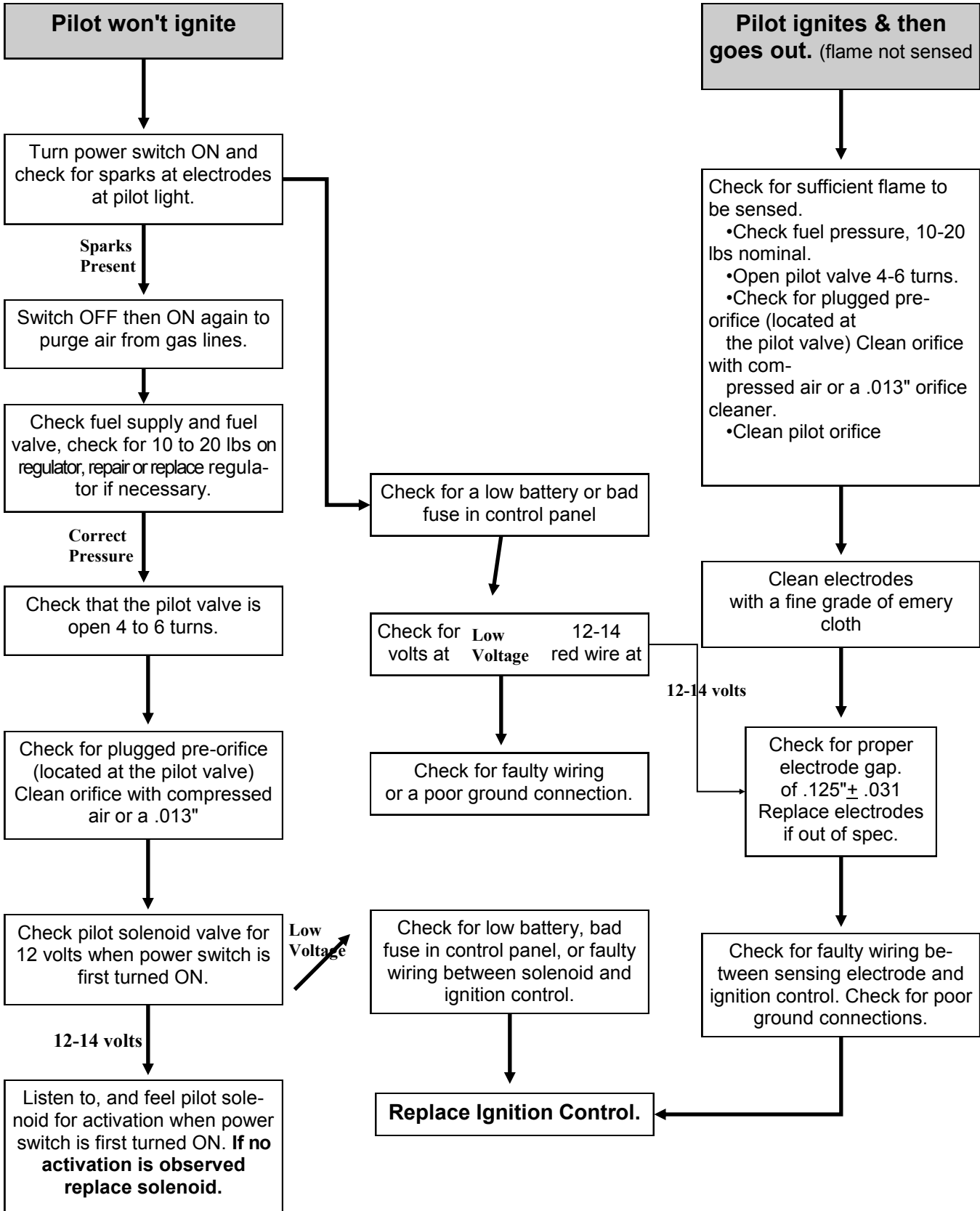
**WARNING:** Shock hazard, high voltage up to 20,000 volts.

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.



# 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.

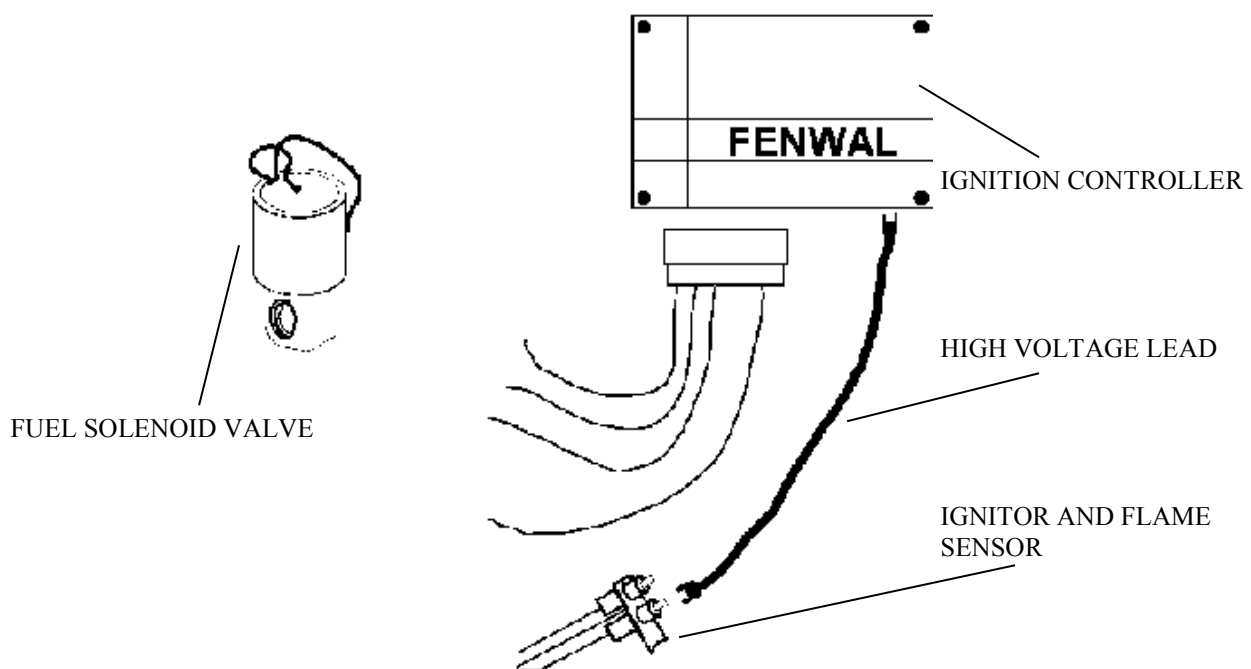
When the power switch is turned on, or when the thermostat calls for heat, a 12 volt signal is sent to the controller. The controller will then create sparks at the electrodes. At the same time, the controller also sends a 12 volt signal to the fuel valve causing it to open. This allows fuel into the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



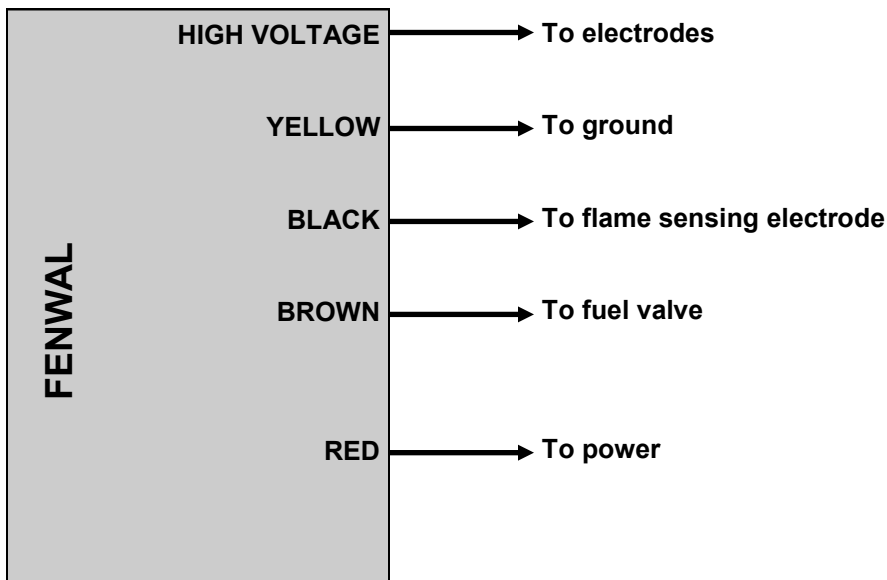
## **TROUBLE SHOOTING**

## **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.

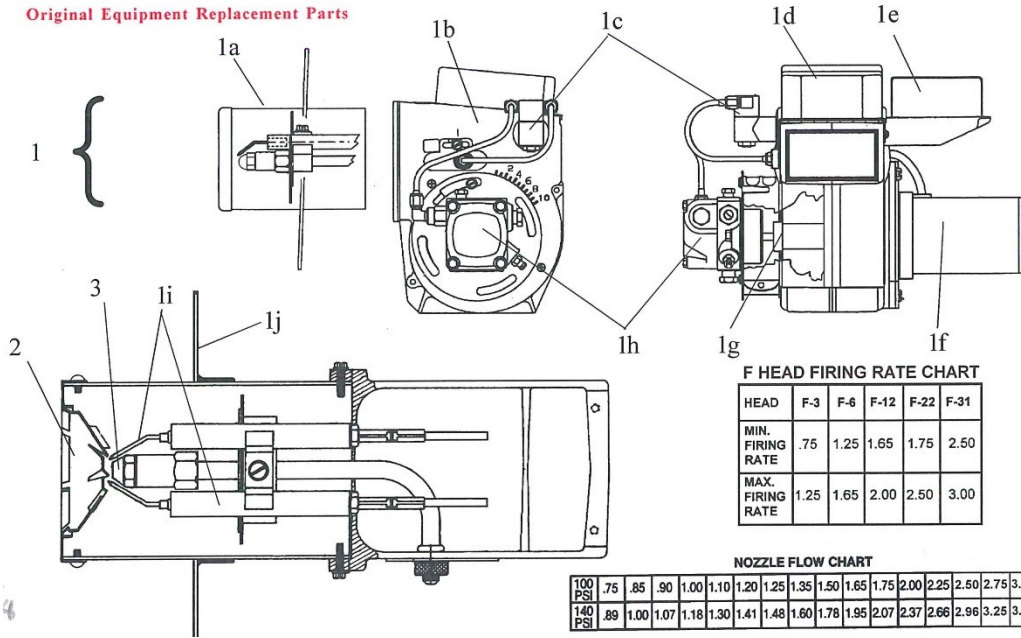


# REPLACEMENT PARTS

# REPLACEMENT PARTS

# 12V 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

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

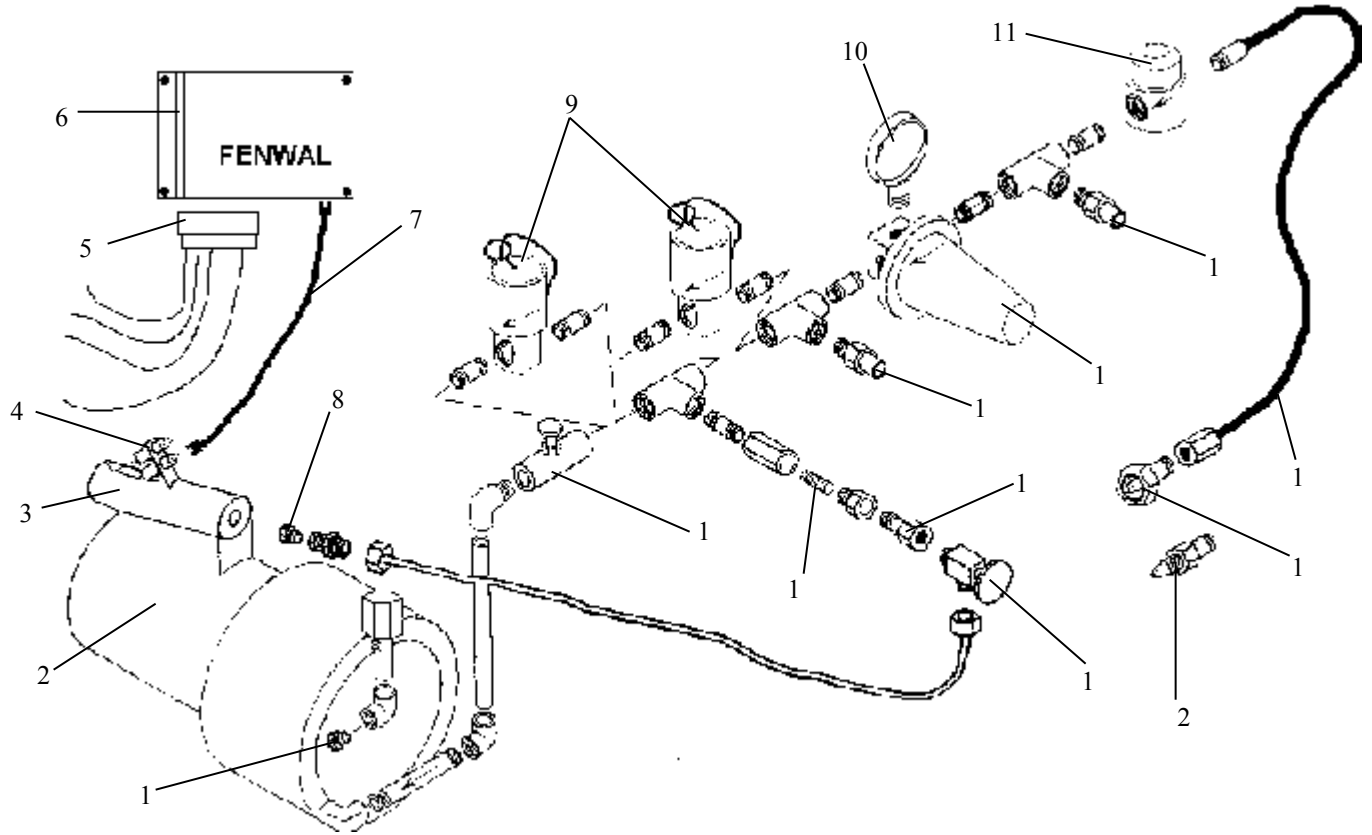
ITEM	QTY	DESCRIPTION	PART#
1	1	Burner assembly w/ Primary Control (less fuel retention head and nozzle) ...	A10008215
1	1	Burner assembly, complete w/ fuel retention head and nozzle .....	A10008105-004
1a	1	Air Tube .....	509070
1b	1	Photo electric eye (under ignition transformer)	
		-With Connectors .....	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

# LP Burner

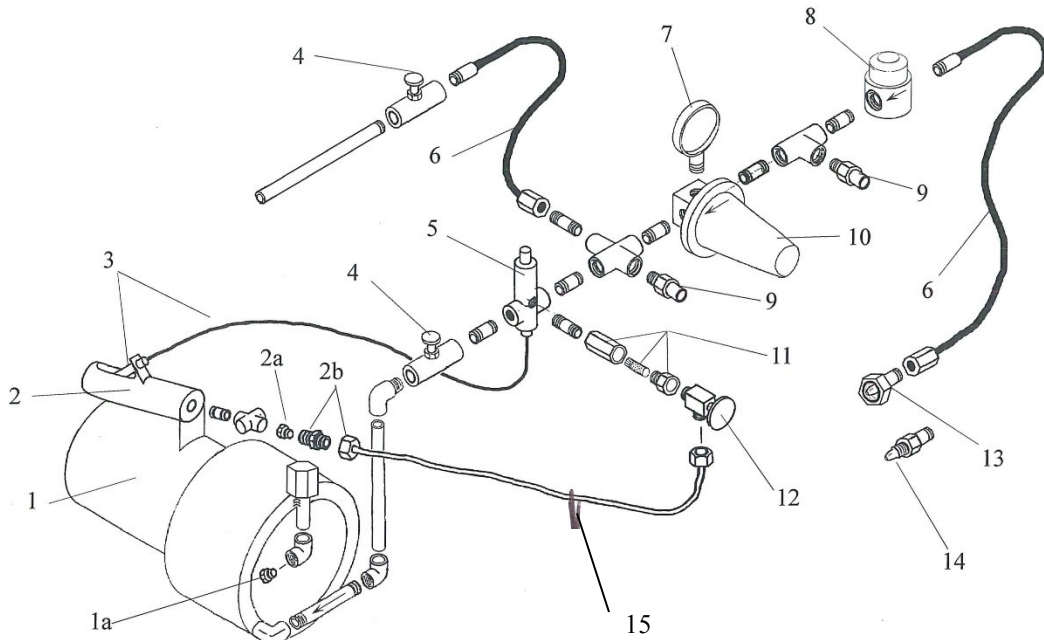


ITEM	QTY	DESCRIPTION	PART#
1	1	Orifice, main burner	call
2	1	Burner assembly.....	call
3	1	Pilot light, spark ignition.....	901101
4	1	Ignition electrode & flame sensor assy.....	P10005738
5	1	Low voltage cable assembly.....	P10005737
6	1	Ignition control box.....	P10005719
7	1	High voltage cable assembly.....	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)

# REPLACEMENT PARTS

# LP Burner w/ Baso Valve

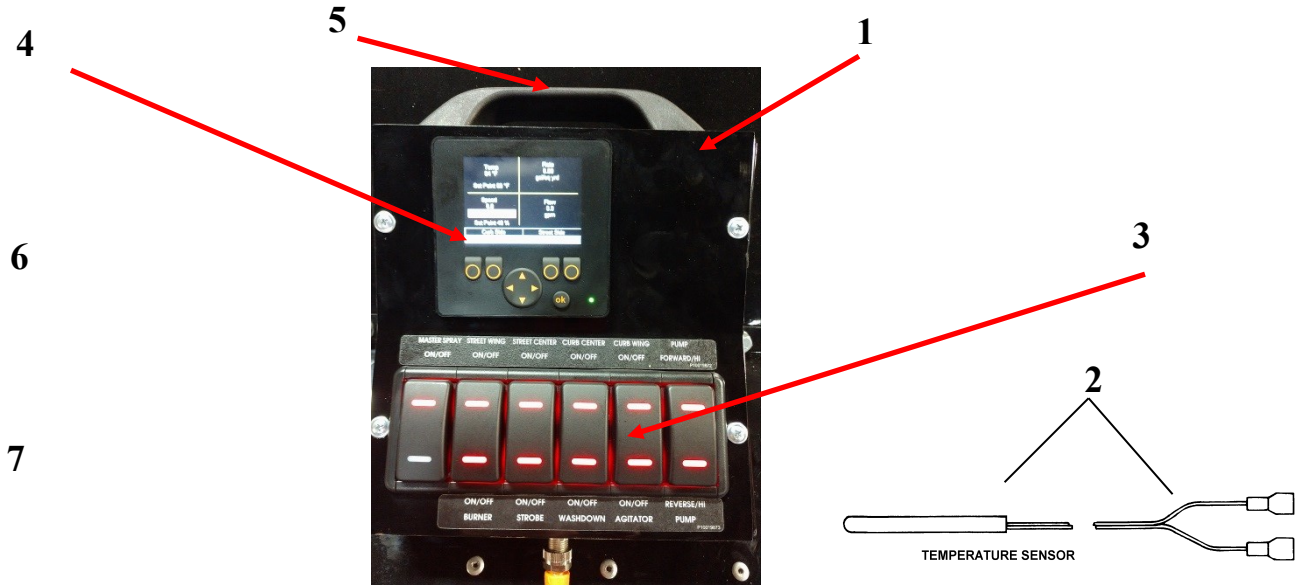


ITEM	QTY	DESCRIPTION	PART#
1	1	Burner assembly (depending on application) .....	call
1a	1	Orifice, main burner, (depending on application).....	call
2	1	Pilot light.....	901100
2a	1	Orifice, pilot light .....	P10005662
2b	1	Jet Fitting, pilot light.....	M10005660
3	1	Thermocouple, 72"- New Style .....	P10005658
4	2	Valve, LP, V104 .....	P10005655
5	1	Baso valve (safety valve) -New Style.....	P10006972
6	2	.25 x 5' LP hose.....	A10007881-060
	2	.25 x 10' LP hose (optional).....	523004
7	1	Pressure gauge .....	P10005630
8	1	LP filter assembly-complete .....	P10005654
8a	1	Filter element only (not shown).....	509028
9	2	LP relief valve (location may vary) .....	P10005656
10	1	LP regulator .....	P10002936
11	1	Strainer, pilot light .....	P10005653
12	1	Valve, pilot light .....	P10005652
13	1	Pol fitting, liquid LP - female (recommended).....	P10005657
14	1	Pol fitting, vapor LP - male .....	509021
**	1	ACME fitting, liquid LP .....	P10007921
15	1	Gas tube, Pilot Light .....	P10005689

\*\* Not Shown

# REPLACEMENT PARTS

# CONTROLS



ITEM	QTY	DESCRIPTION	PART#
1	-	Tether Box Assembly	A10019869
2	-	Sensor, RTD Watlow 0-550°	A10001017
3	-	PLC Switch Bank	P10019821
4	-	PLC Display	P10010420
5	-	Handle	P10011688
6	-		
7	-		
8	-		

# OVERNIGHT HEAT

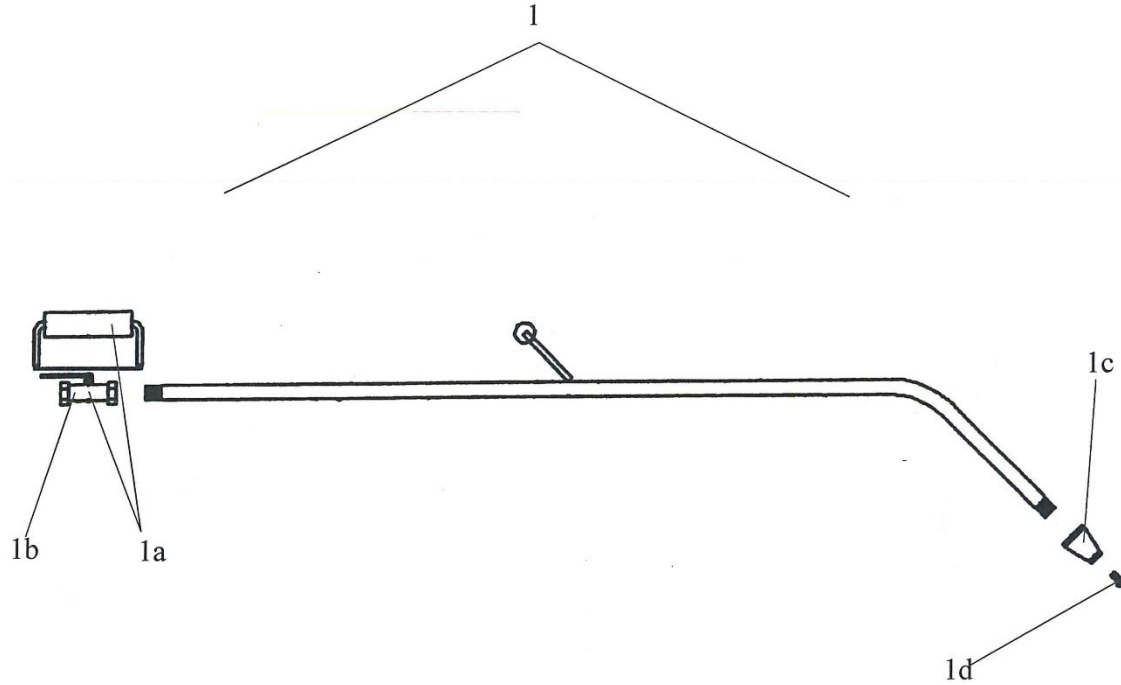
ITEM	QTY	DESCRIPTION	PART#
8	-	Heater 120V 1.5KW 2" NPT Immersion	A10018842

\*\* Not Shown



# REPLACEMENT PARTS

# SPRAY WAND



ITEM	QTY	DESCRIPTION	PART #
1	1	Wand assembly complete, steel .....	A10009038-002
	1	Wand assembly complete, light weight aluminum .....	A10009038
1a	1	Valve with "D" handle .....	901041
1b	1	Valve only .....	P10001772
1c	1	Coupling .....	P10006630-007
1d	2	Spray Nozzle, 9508 .....	P10002943

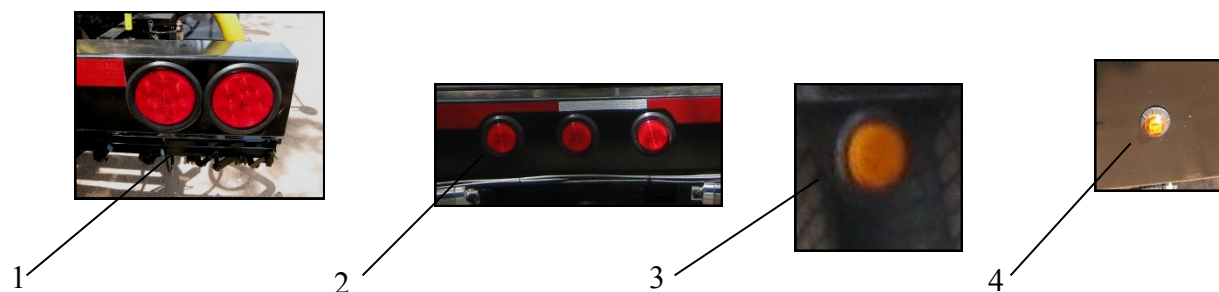
Indented item numbers with a letter suffix are included with preceding item number.

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



# REPLACEMENT PARTS

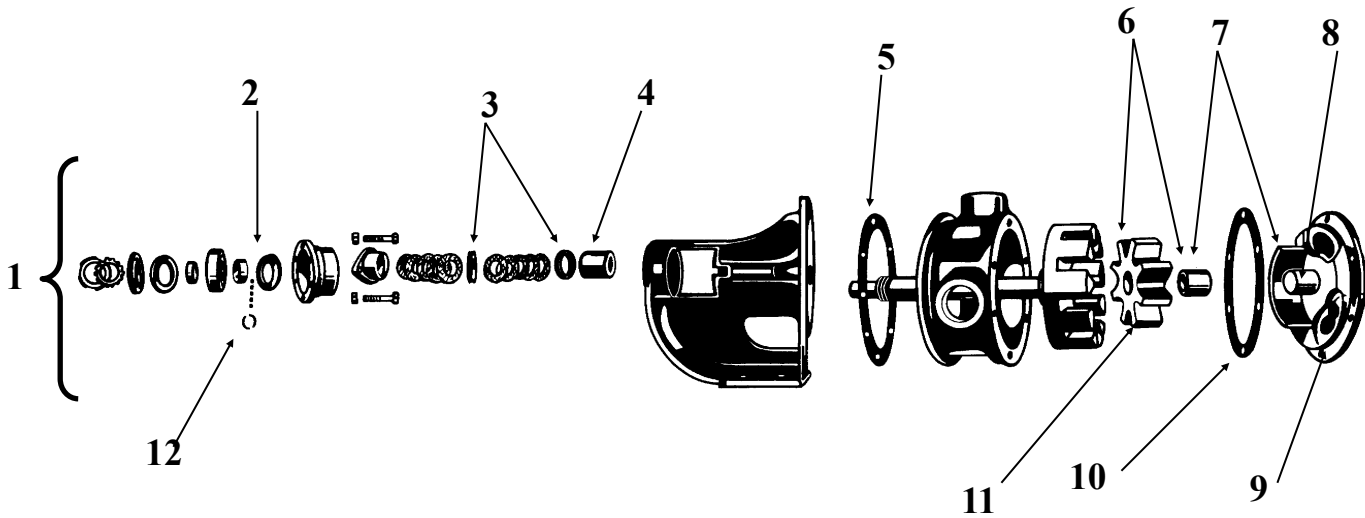
# LIGHTING



<b>Item</b>	<b>Qty</b>	<b>Description</b>	<b>Part #</b>
1	4	4" LED Red	P10012027
2	7	Light Clearance LED Amber	P10012029
3	2	Light Clearance LED 2.5" Amber	P10012028
4	2	Light Clearance LED 3/4" Amber	P10012016

# REPLACEMENT PARTS

# L124A PRODUCT PUMP



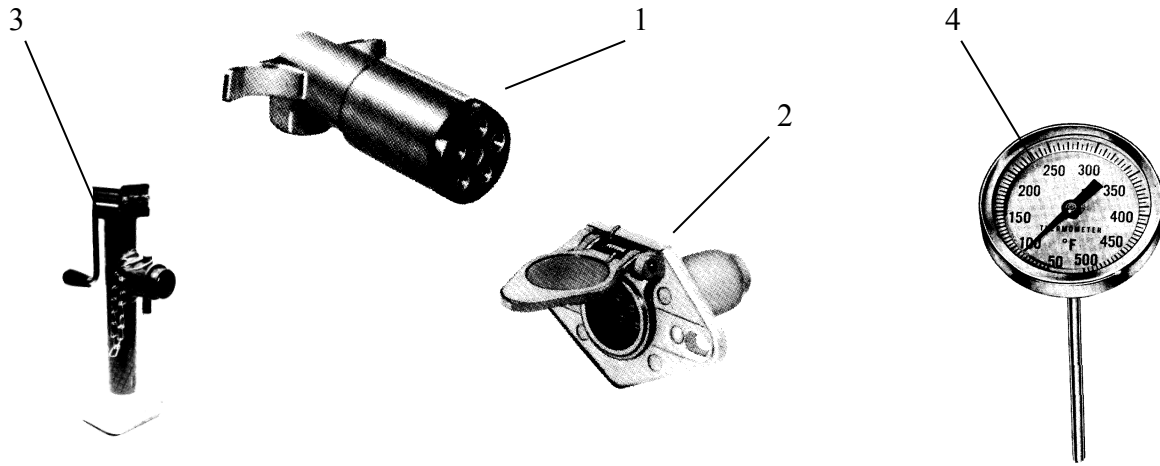
ITEM	QTY	DESCRIPTION	PART#
1	1	Product Pump, complete L124A L/RV	P10018614
2	1	Ball Bearing	Call
3	10	Packing seal, shaft	515018
4	1	Bushing, bracket	Call
5	1	Gasket, bracket	515087
6	1	Idler with bushing	Call
7	1	Bushing & Pin kit	Call
8	1	Idler Pin	Call
9	1	Head, with pin	Call
10	1	Gasket, head	Call
11	1	Rotor and Shaft	Call
12	1	Ring, half round (set)	Call

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

ITEM	QTY	PUMPING SYSTEM	PART#
00	1	Hyd Motor-- 4/8 CI	P10010076
00	1	Hyd Pump 3.00 Eaton	P10009199
00	1	Chain Only 4016	P10004556
00	1	Chain Hub 4016 x 1"	P1000455-004
00	1	Chain Hub 4016 x 1 1/8"	P1000455-005
00	1	Pump Control Valve	P10019806
00	1	Manifold—Diaphragm	P10018852
00	1	Manifold—Seal	P10018530
00	1		

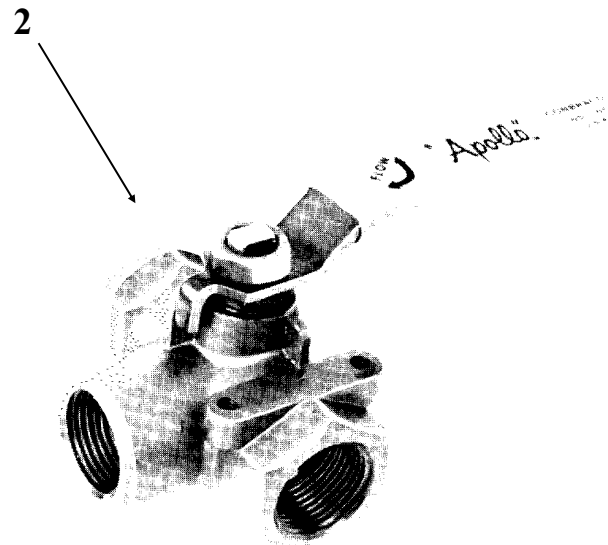
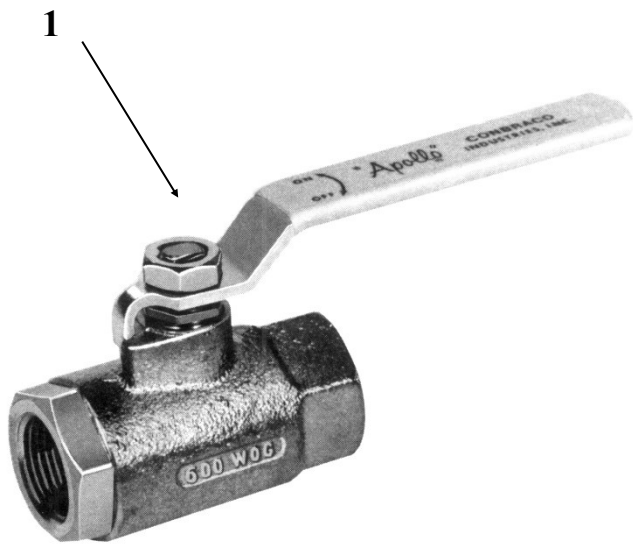
# REPLACEMENT PARTS

# CHASSIS



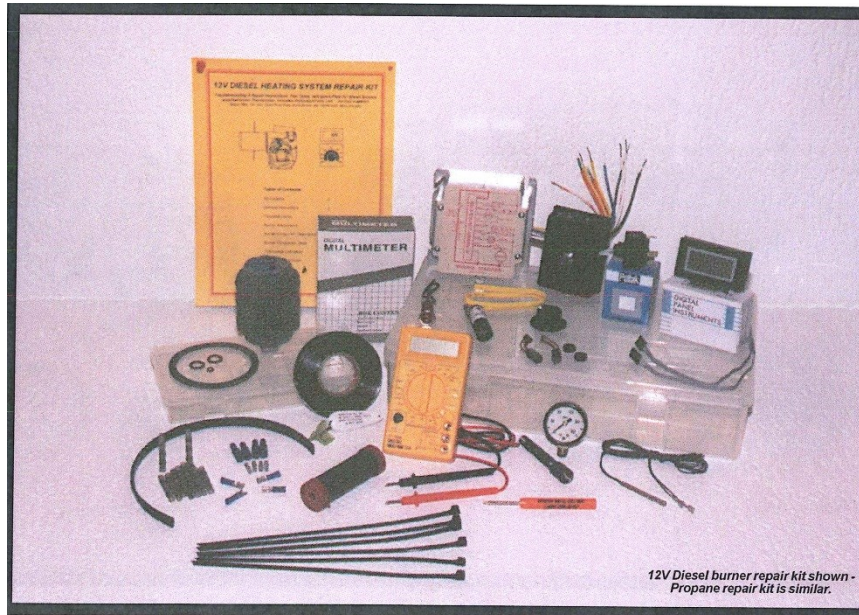
ITEM	QTY	DESCRIPTION	PART#
1	1	Connector, male, 6 prong round	526015
	1	Connector, male, 7 prong round	P10011887
2	1	Connector, female, 6 prong round	526031
	1	Connector, female, 7 prong round	526017
00	1	Tail Light assembly, right side	Call
00	1	Tail Light assembly, left side	Call
00	2	Marker Light assembly, side	Call
00	1	3-Light Bar assembly, center rear (required on OJK 400 only)	524007
3	1	Screw Jack	501052
00	1	Ring Hitch (not for hydraulic brakes)	901012
00	1	Ball Hitch, 2 5/16"	901038
00	1	Ring hitch-model 10 actuator, hydraulic brakes, OJK 165 and 250	901317
00	1	Break-away safety switch assembly	501049
4	1	Thermometer, 550 F. with 6" stem	516001

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



ITEM	QTY	DESCRIPTION	PART #
1	AR	2 Port Valve, Brass, 1/4" .....	P10012088
	AR	2 Port Valve, Brass, 1/2" .....	P10011740
	AR	2 Port Valve, Brass, 3/4" .....	P10001772
	AR	2 Port Valve, Brass, 1" .....	P10011742
	AR	2 Port Valve, Brass, 1 1/2" .....	P10008125
	AR	2 Port Valve, Brass, 2" .....	P10011744
	AR	2 Port Valve, Brass, 3" .....	P10004958
2	AR	3 Port Valve, Brass, 1/2" .....	517036
	AR	3 Port Valve, Brass, 3/4" .....	517022
	AR	3 Port Valve, Brass, 1" .....	P10004391
	AR	3 Port Valve, Brass, 1 1/2" .....	P10004378
	AR	3 Port Valve, Brass, 2" .....	P10006111

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



### 12V Diesel or Propane Heating System Repair Kit

These Kits are designed to eliminate down-time by organizing into one handy package the parts, troubleshooting procedures, and test tools, needed to complete virtually any repair of the Diesel or Propane burner systems and the electronic thermostats.

The Kit includes a comprehensive troubleshooting and repair guide, test instruments, and all the common (and some not-so-common) parts to complete most repairs.

The contents of the kit were carefully chosen to allow *easy field repairs* with the addition of only basic hand tools such as a screwdriver and wrench set.

This kit will pay for itself quickly by minimizing down-time. Keep one with each unit for maximum productivity.

**Watlow W A10008216 Primary- Part # 509101C**

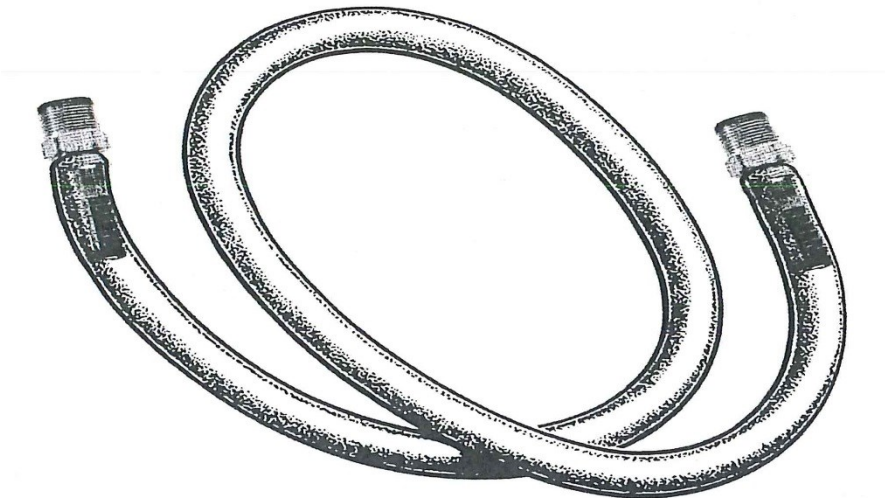
**Paktronic W A10007216 Primary Control- Part # 509101A**

**Watlow W A10007216 Primary Control- Part # 509101B**

**Paktronic Diesel Burner Repair Kit - Part # 509101**

**Paktronic Propane Burner Repair Kit - Part # 509102**

Note: Kits are shipped with a 0° - 550° thermostat.

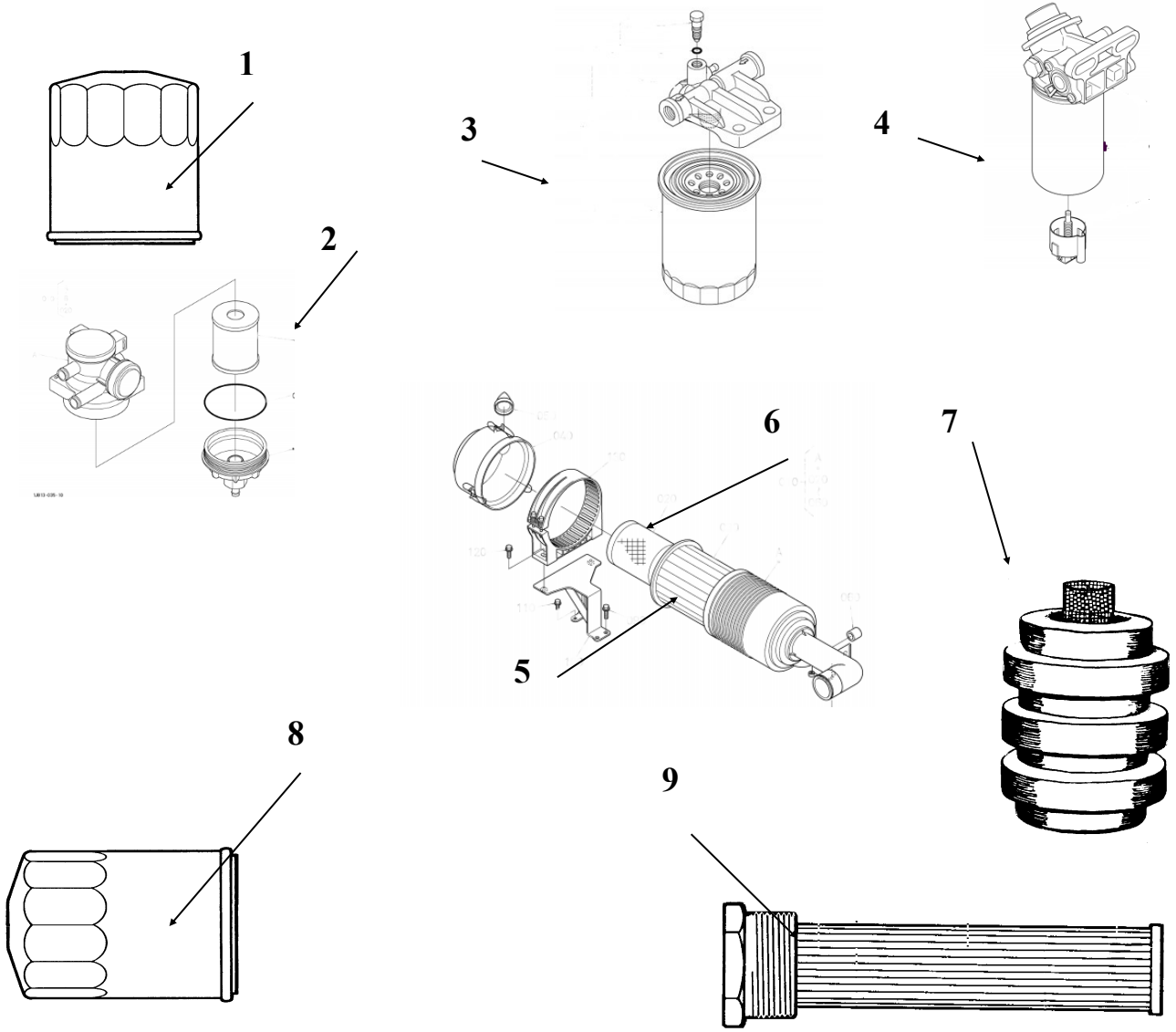


<b>ITEM</b>	<b>QTY</b>	<b>DESCRIPTION</b>	<b>PART #</b>
-	1	Hose, yellow ortec, 1/2" x 20 ft. (with fittings).....	523055
-	1	Hose, yellow ortec, 1/2" x 25 ft. (with fittings).....	523006
-	1	Hose, yellow ortec, 1/2" x 40 ft. (with fittings).....	523021
-	1	Hose, yellow ortec, 1/2" bulk per foot (no fittings).....	P10007809
-	1	Hose, yellow ortec, 3/4" x 15 ft. (with fittings).....	523007
-	<b>1</b>	<b>Hose, yellow ortec, 3/4" x 20 ft. (with fittings).....</b>	<b>523054</b>
-	<b>1</b>	<b>Hose, yellow ortec, 3/4" x 25 ft. (with fittings).....</b>	<b>523075</b>
-		Hose, yellow ortec, 3/4" bulk per foot (no fittings).....	P10007810
-	1	Hose, yellow ortec, 1" x 15 ft. (with fittings).....	523008
-	1	Hose, yellow ortec, 1" x 20 ft. (with fittings).....	523015
-	1	Hose, yellow ortec, 1" x 25 ft. (with fittings).....	523010
-		Hose, yellow ortec, 1" bulk per foot (no fittings).....	P10007811

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

# REPLACEMENT PARTS

# FILTERS

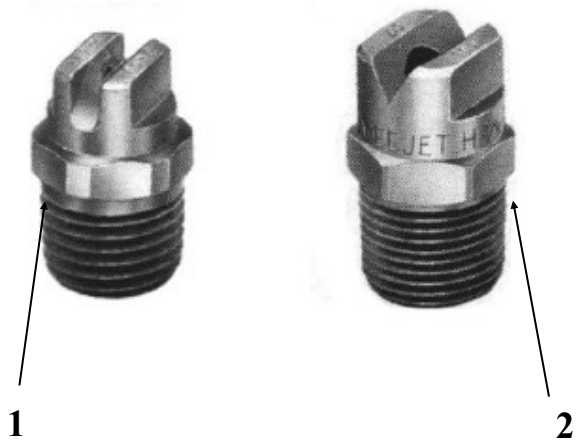


ITEM	QTY	DESCRIPTION	D905 - D1105 (3 cyl)
1	1	Oil Filter, Kubota	P10020297
2	1	Oil Separator Element. Kubota	P1002029
3	1	Fuel Filter Element, Kubota	P10020296
4	1	Fuel Water Separator Filter, Kubota	P10020298
5	1	Air Filter Element Outer, Kubota	P10020295
6	1	Air Filter Element Inner, Kubota	P10020300
7	1	Fuel Filter Element, General	509078
8	1	Hydraulic Filter	P10011745
9	1	Suction Screen, hydraulic system, Zinga	P10001124

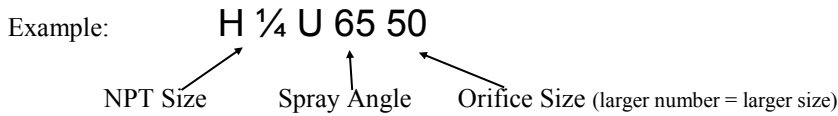
Note: Illustrations are for parts identification only. Illustrations may not represent actual parts.  
 \*\*Not Shown

# REPLACEMENT PARTS

# SPRAY NOZZLES



ITEM	QTY	DESCRIPTION	PART #
1	-	V-Jet Nozzle, H $\frac{1}{4}$ VV9508 (for spray wands)	P10002943
2	-	V-Jet Nozzle, H $\frac{1}{4}$ U4070 (for spray bars) .....	520088
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6515 (for spray bars) .....	P10002944
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6520 (for spray bars) .....	P10005342
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6530 (for spray bars) .....	P10005343
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6530 (for spray bars) .....	P10005343
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6540 (for spray bars) .....	P10005340
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6550 (for spray bars) .....	P10005345
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6560 (for spray bars) .....	P10005346
	-	V-Jet Nozzle, H $\frac{1}{4}$ U6570 (for spray bars) .....	P10005347
	-	V-Jet Nozzle, H $\frac{3}{8}$ U65100 (for spray bars) .....	520042



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



### 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.safercar.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.safercar.gov>.





# 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 **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 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				

# MATERIAL SAFETY DATA SHEET

<b>SECTION 1</b>	<b>PRODUCT AND COMPANY IDENTIFICATION</b>
------------------	---

## 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

<b>SECTION 2</b>	<b>COMPOSITION / INFORMATION ON INGREDIENTS</b>
------------------	---

## 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.

<b>SECTION 3</b>	<b>HAZARDS IDENTIFICATION</b>
------------------	-------------------------------

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.



<b>SECTION 4</b>	<b>FIRST AID MEASURES</b>
------------------	---------------------------

**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.

<b>SECTION 5</b>	<b>FIRE FIGHTING MEASURES</b>
------------------	-------------------------------

**EXTINGUISHING MEDIA**

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO<sub>2</sub>) 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

# MATERIAL SAFETY DATA SHEET

<b>SECTION 1</b>	<b>PRODUCT AND COMPANY IDENTIFICATION</b>
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**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**

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**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/m<sup>3</sup> - ACGIH TLV, 10 mg/m<sup>3</sup> - ACGIH STEL, 5 mg/m<sup>3</sup> - 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:

## 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.

<b>SECTION 9</b>	<b>PHYSICAL AND CHEMICAL PROPERTIES</b>
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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 mm<sup>2</sup>/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>
<b>Inhalation</b>	
Toxicity (Rat): LC50 > 5000 mg/m <sup>3</sup>	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.
<b>Ingestion</b>	
Toxicity (Rat): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
<b>Skin</b>	
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.
<b>Eye</b>	
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.

<b>SECTION 12</b>	<b>ECOLOGICAL INFORMATION</b>
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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.

<b>SECTION 13</b>	<b>DISPOSAL CONSIDERATIONS</b>
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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** 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.

<b>SECTION 14</b>	<b>TRANSPORT INFORMATION</b>
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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

<b>SECTION 15</b>	<b>REGULATORY INFORMATION</b>
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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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MHC: 0, 0, 0, 0, 0, 0

PPEC: A

DGN: 5007202 (1012936)

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# TIRE INFORMATION

# Tire Safety Information

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## 1. TIRE SAFETY INFORMATION

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This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

Section 2.1 contains "Steps for Determining Correct Load Limit - Trailer".

Section 2.2 contains "Steps for Determining Correct Load Limit – Tow Vehicle".

Section 2.3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

Section 2.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It". This brochure, as well as the preceding subsections, describes the following items;

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
  - A. Cold inflation pressure.
  - B. Vehicle Placard and location on the vehicle.
  - C. Adverse safety consequences of under inflation (including tire failure).
  - D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
  - A. Locating and understanding the load limit information, total load capacity, and cargo capacity.
  - B. Calculating total and cargo capacities with varying seating configurations including quantitative examples showing / illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases. This item is also discussed in Section 3.
  - C. Determining compatibility of tire and vehicle load capabilities.
  - D. Adverse safety consequences of overloading on handling and stopping on tires.

### **1.1. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TRAILER**

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

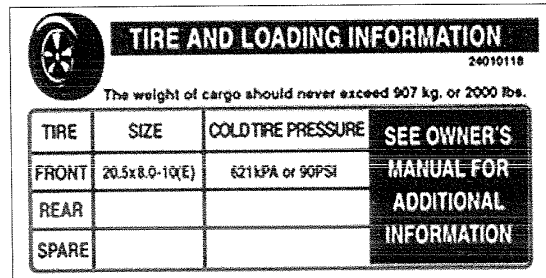
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

When loading your cargo, be sure it is distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

### **1.1.1. TRAILERS 10,000 POUNDS GVWR OR LESS**



The image shows a rectangular placard with a tire icon in a circle on the left. The title 'TIRE AND LOADING INFORMATION' is in a black box at the top. Below the title is the number '24010118' and the text 'The weight of cargo should never exceed 907 kg. or 2000 lbs.'. The placard contains a table with columns for 'TIRE', 'SIZE', and 'COLD TIRE PRESSURE'. The 'FRONT' row is filled with '20.5x8.0-16E' and '621kPa or 90PSI'. The 'REAR' and 'SPARE' rows are empty. To the right of the table is a black box with white text that reads 'SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION'.

TIRE	SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	20.5x8.0-16E	621kPa or 90PSI	
REAR			
SPARE			

*Tire and Loading Information Placard - Figure 1-1*

1. Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

The trailer's placard refers to the Tire Information Placard attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer.

### **1.1.2. TRAILERS OVER 10,000 POUNDS GVWR (NOTE: THESE TRAILERS ARE NOT REQUIRED TO HAVE A TIRE INFORMATION PLACARD ON THE VEHICLE)**

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer's VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

## **1.2. STEPS FOR DETERMINING CORRECT LOAD LIMIT – TOW VEHICLE**

1. Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo and luggage capacity. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).
5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step # 4.
6. If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

## **1.3. GLOSSARY OF TIRE TERMINOLOGY**

### **Accessory weight**

The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

**Bead**

The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

**Bead separation**

This is the breakdown of the bond between components in the bead.

**Bias ply tire**

A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

**Carcass**

The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

**Chunking**

The breaking away of pieces of the tread or sidewall.

**Cold inflation pressure**

The pressure in the tire before you drive.

**Cord**

The strands forming the plies in the tire.

**Cord separation**

The parting of cords from adjacent rubber compounds.

**Cracking**

Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

**CT**

A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

**Curb weight**

The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

**Extra load tire**

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

**Groove**

The space between two adjacent tread ribs.

**Gross Axle Weight Rating**

The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

**Gross Vehicle Weight Rating**

The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

**Hitch Weight**

The downward force exerted on the hitch ball by the trailer coupler.

**Innerliner**

The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

**Innerliner separation**

The parting of the innerliner from cord material in the carcass.

**Intended outboard sidewall**

The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

**Light truck (LT) tire**

A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

**Load rating**

The maximum load that a tire is rated to carry for a given inflation pressure.

**Maximum load rating**

The load rating for a tire at the maximum permissible inflation pressure for that tire.

**Maximum permissible inflation pressure**

The maximum cold inflation pressure to which a tire may be inflated.

**Maximum loaded vehicle weight**

The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

**Measuring rim**

The rim on which a tire is fitted for physical dimension requirements.

**Pin Weight**

The downward force applied to the 5<sup>th</sup> wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

**Non-pneumatic rim**

A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

**Non-pneumatic spare tire assembly**

A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

**Non-pneumatic tire**

A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

**Non-pneumatic tire assembly**

A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

**Normal occupant weight**

This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

**Occupant distribution**

The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

**Open splice**

Any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

**Outer diameter**

The overall diameter of an inflated new tire.

**Overall width**

The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

**Ply**

A layer of rubber-coated parallel cords.

**Ply separation**

A parting of rubber compound between adjacent plies.

**Pneumatic tire**

A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

**Production options weight**

The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

**Radial ply tire**

A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

**Recommended inflation pressure**

This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

**Reinforced tire**

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

**Rim**

A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

**Rim diameter**

This means the nominal diameter of the bead seat.

**Rim size designation**

This means the rim diameter and width.

**Rim type designation**

This means the industry of manufacturer's designation for a rim by style or code.

**Rim width**

This means the nominal distance between rim flanges.

**Section width**

The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

**Sidewall**

That portion of a tire between the tread and bead.

**Sidewall separation**

The parting of the rubber compound from the cord material in the sidewall.

**Special Trailer (ST) tire**

The "ST" is an indication the tire is for trailer use only.

**Test rim**

The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

**Tread**



That portion of a tire that comes into contact with the road.

**Tread rib**

A tread section running circumferentially around a tire.

**Tread separation**

Pulling away of the tread from the tire carcass.

**Treadwear indicators (TWI)**

The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

**Vehicle capacity weight**

The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

**Vehicle maximum load on the tire**

The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

**Vehicle normal load on the tire**

The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

**Weather side**

The surface area of the rim not covered by the inflated tire.

**Wheel center member**

In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

**Wheel-holding fixture**

The fixture used to hold the wheel and tire assembly securely during testing.

**1.4. TIRE SAFETY - EVERYTHING RIDES ON IT**

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

[http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires\\_index.html](http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html)

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes, and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling
- Help protect you and others from avoidable breakdowns and accidents
- Improve fuel economy
- Increase the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires

- Tire safety tips.

Use this information to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

## **1.5. SAFETY FIRST—BASIC TIRE MAINTENANCE**

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.

### **1.5.1. FINDING YOUR VEHICLE'S RECOMMENDED TIRE PRESSURE AND LOAD LIMITS**

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW—the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR—the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

### **1.5.2. UNDERSTANDING TIRE PRESSURE AND LOAD LIMITS**

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi)—a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.) Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

### **1.5.3. CHECKING TIRE PRESSURE**

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets. The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

#### **1.5.4. STEPS FOR MAINTAINING PROPER TIRE PRESSURE**

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

#### **1.5.5. TIRE SIZE**

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

#### **1.5.6. TIRE TREAD**

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

#### **1.5.7. TIRE BALANCE AND WHEEL ALIGNMENT**

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

#### **1.5.8. TIRE REPAIR**

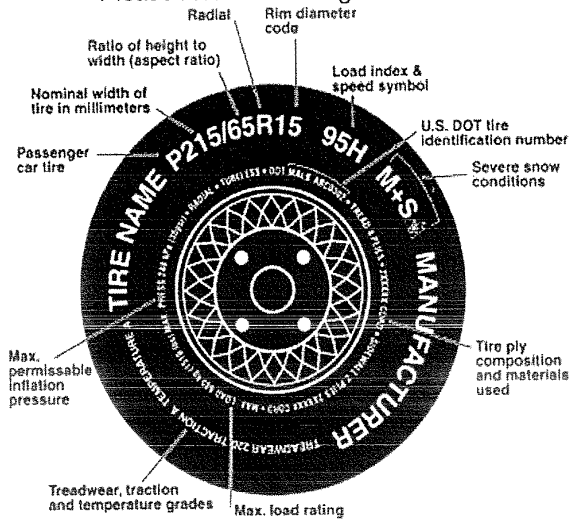
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

#### **1.5.9. TIRE FUNDAMENTALS**

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

### 1.5.9.1. Information on Passenger Vehicle Tires

Please refer to the diagram below.



#### **P**

The "P" indicates the tire is for passenger vehicles.

#### **Next number**

This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

#### **Next number**

This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

#### **R**

The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

#### **Next number**

This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

#### **Next number**

This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

#### **M+S**

The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

#### **Speed Rating**

The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed below. Note: You may not find this information on all tires because it is not required by law.

## Tire Safety Information

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

\* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.

### U.S. DOT Tire Identification Number

This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

### Tire Ply Composition and Materials Used

The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

### Maximum Load Rating

This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

### Maximum Permissible Inflation Pressure

This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

### 1.5.9.2. UTQGS Information

#### Treadwear Number

This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

#### Traction Letter

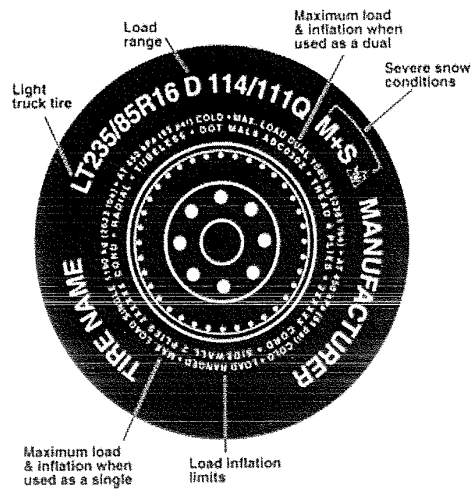
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

#### Temperature Letter

This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

### 1.5.9.3. Additional Information on Light Truck Tires

Please refer to the following diagram.



Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

#### **LT**

The "LT" indicates the tire is for light trucks or trailers.

#### **ST**

An "ST" is an indication the tire is for trailer use only.

#### **Max. Load Dual kg (lbs) at kPa (psi) Cold**

This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

#### **Max. Load Single kg (lbs) at kPa (psi) Cold**

This information indicates the maximum load and tire pressure when the tire is used as a single.

#### **Load Range**

This information identifies the tire's load-carrying capabilities and its inflation limits.

## **1.6. TIRE SAFETY TIPS**

### **Preventing Tire Damage**

- Slow down if you have to go over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.

### **Tire Safety Checklist**

- Check tire pressure regularly (at least once a month), including the spare.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.

# TIMER PROGRAMMING

# TORK<sup>®</sup>

## INSTRUCTION MANUAL

CLOCK OPERATED SWITCH

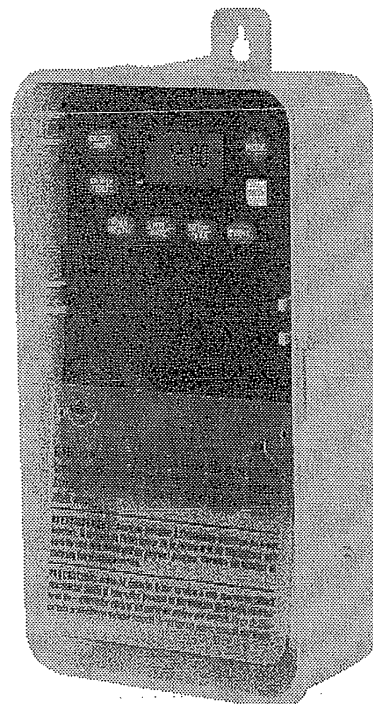


## DIGITAL TIME SWITCH

**E101B**

**E103B**

**E120B**





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## TORK MODELS E101B / E103B / E120B 24 HOUR DIGITAL TIME SWITCH

**READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL TIME SWITCH. SEE WARNING ON FRONT PANEL** – Failure to comply with instructions could result in personal injury and/or property damage.

### INSTALLATION:

- UNIT IS TO BE INSTALLED BY A LICENSED ELECTRICIAN
1. To remove unit from enclosure: Push the tab on right to swing unit the left and remove.
  2. Mount the enclosure at eye level using screws or other suitable fastening device. Bring supply and load wires in through or side knockouts. DO NOT USE TOP.
  3. Unit should be programmed with AC power only and not while on super cap back up power.
  4. Reinstall unit by reversing step #1 above and connecting wires to units as per suggested wiring diagrams. See illustration and warning on back page.
  5. To reset the timer, insert a paperclip on the small hole next to the EVENT key. This procedure will allow you to reset the time but will not clear the memory.

### CAPABILITIES

- 24 Hour Day scheduling.
- ON and OFF set points  
Total # - 20 per day
- Minimum setting: 1 minute

### FEATURES

- |                 |  |
|-----------------|--|
| Daylight Saving | Automatic (can be adjusted).   |
| Leap Year       | Automatic compensation.  |
| Display         | LCD  |
| Manual Override | Until the next schedule ON or OFF.<br>Automatic operation then resumes.              |
| Power Outage    | Permanent schedule retention.<br>Supercapacitor maintains real time<br>up to 4 days. |

#### KEY FUNCTIONS:

Unit should be program with AC power. Do not program on super cap back up power.

**Mode:** Press to go to the next mode.

**Enter:** Stores or saves current entry.

#### DAY/YEAR:

- a. Press to set the year in the DATE mode.
- b. Selects the desired day of the week in the DST (Daylight Savings Time) mode.

#### OVR:

- a. Press to change the load status in the AUTO (automatic) and the MAN (manual) mode.

#### DEL/PREV:

- a. Press to delete the displayed entry.
- b. Decrement the last selected entry.

#### HOUR/MONTH:

- a. Press to set hour in CLK (clock) mode and the SCH (schedule) mode.
- b. Press to set month in the DATE mode and DST (Daylight Savings Time) mode.

#### MINUTE/DATE:

- a. Press to set minutes in CLK (clock) mode and SCH (schedule) mode.
- b. Press to set date in the DATE mode.
- c. Press to select the week of the month in DST (Daylight Savings Time).

#### ENTER:

- a. Press to store the displayed information into memory. Information will not be stored until the ENTER key is pressed.

**Note:** During settings, each press of the key will advance one number. For rapid advance hold key in.

#### EVENT:

- a. Press to select ON/OFF in the schedule.
- b. Press to update the load status in the AUTO (automatic) mode.

#### PROGRAMMING YOUR E101B / E103B / E120B

**NOTE:** AFTER MAKING ANY CHANGES TO THE PROGRAM, PRESS **MODE** TO GO TO RUN MODE AND THEN PRESS **EVENT** TO UPDATE THE LOAD STATUS.

#### AT POWER UP:

When powering up the unit for the first time, the display will show E1 60 r - 0A, then 12:00 will flash on the display. NOTE: Allow 1-2 minutes for the supercap to charge before any display is shown.

Press the **MODE** key to go to the CLK mode. After pressing the **MODE** key the display will show:



#### 1.0 TO SET CLOCK

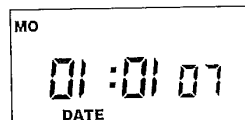
Press **HOUR** and **MIN** to advance to the present hour and mins. Check AM/PM, and press **ENTER**.

#### 1.1 TO MODIFY CLOCK

Press **MODE** until the display shows: CLK. Press **HOUR** and **MIN.** to modify clock and press **ENTER**.

#### 2.0 TO SET DATE

If you are setting for the first time, display will show:



Press **MONTH**, **DATE**, and **YEAR** key to advance to the desired Month, date and year, then press **ENTER**.

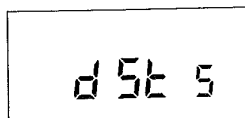
**NOTE:** The day of the week will be automatically set once the date is set.

### 2.1 TO MODIFY DATE

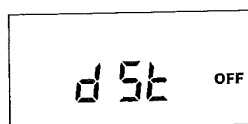
Press **MODE** until the display shows **DATE**. Press **MONTH**, **DATE** and **YEAR** to modify present settings and then press **ENTER**.

### 3.0 DAYLIGHT SAVING TIME

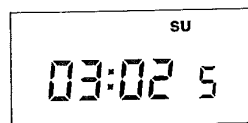
After setting or modifying the date, display will show:



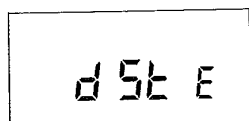
**NOTE:** If daylight saving time (DST) is NOT required, press **MODE**, display will show:



If daylight savings is required, press **ENTER**, display will show:

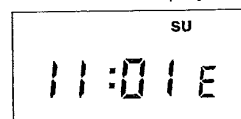


**NOTE:** Day of week will be assigned to the 1st, 2nd, 3rd or Last (L) Sunday of the month. Press **ENTER** to accept default dates (second Sunday in March) or press **MONTH**, **DATE**, and **DAY** to modify DST settings and press **ENTER**. The display will show:

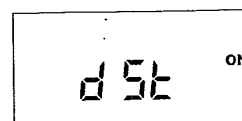


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Press **ENTER** and the display will show:



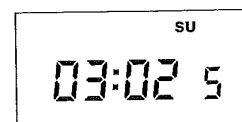
Press **ENTER** to accept default dates (first Sunday in November) or press **MONTH**, **DATE**, and **DAY** to modify DST settings and press **ENTER**. Press **MODE**, the display will show:



**NOTE:** DST OFF indicates Daylight Savings Time was not set.

### 3.1 TO MODIFY OR DELETE DAYLIGHT SAVING TIME SETTINGS.

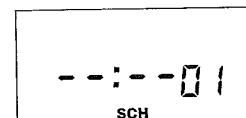
Press **MODE** until display shows:



Press **MONTH**, **DATE** and **DAY** to modify DST start settings, to delete, press **DEL**. Press **ENTER**. Press **MONTH**, **DATE** and **DAY** to modify DST end settings, to delete, press **DEL**. Press **ENTER**. Press **MODE** to return to **AUTO** mode.

### 4.0 SCHEDULE SET MODE

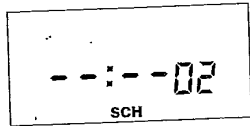
Press **MODE** until display shows:



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#### 4.1 SETTING HOURS AND MINUTES

Press **HOUR** and **MIN** to set desired time. Press **EVENT** to set desired event (ON/OFF) and then press **ENTER**. The display will show:



Follow the same procedures above to set more schedule entries.

#### 5.0 REVIEW, MODIFY AND DELETE

Press **MODE** to advance to any of the following MODES:

1. **CLOCK MODE:** Press **HOUR** and **MIN** to modify existing settings. Press **ENTER**.
2. **DATE MODE:** Press **MONTH**, **DATE** and **YEAR** to modify existing settings. Press **ENTER**. **DAY** is automatically adjusted.
3. **DST Daylight Saving Time:** To review press **ENTER**. To modify press **MONTH**, **DATE** and **DAY** to change existing setting. Press **ENTER**.
4. **SCHEDULE MODE:** Press **HOUR**, **MIN** and **EVENT** to modify time settings. Press **DEL** to delete. Press **ENTER** after each modification.
5. **RUN MODE:** The time, day, seconds, the load status and **AUTO** is displayed.

#### 6.0 OVERRIDE

**OVR** (Override) is effective in the **AUTO mode** and the **manual mode**. **OVR** on the **AUTO mode** is effective until the next event. **OVR** on the **manual mode** is effective indefinitely.

#### 7.0 NOTES:

1. **MAN mode:** Under this mode the unit disregards the settings in the schedule mode and remains in its manually set status **ON** or **OFF**. **NOTE:** To resume regular schedule execution press the mode key to return to **AUTO mode**.
2. Unit will go to **RUN MODE** automatically (except on the **MAN mode**) if no key is pressed for five minutes.
3. Clear all memory. All memory can be cleared using the following procedure: While in the **RUN mode**, press **ENTER**, display will show:



Use **EVENT** key to display:



Now press **ENTER** briefly and everything in the timer memory will be erased, including real time and date. **NOTE:** Unit has permanent memory and will not be erased unless done through procedure above.

5. Upon powering up your E101B/103B/120B the display will show at what frequency the unit is operating, 50 will determine 50Hz or 60 for 60Hz. **NOTE:** While in the **AUTO mode**, if **AC** power is absent, the display will show a **PF** (power failure) instead of the seconds scrolling up.
6. A "Lo" on the display indicates that the super cap has run low and the unit needs to be powered with **AC**. A minimum of 8 hours is required to fully charge the super cap.

**NOTE:** AFTER MAKING ANY CHANGES TO THE PROGRAM, PRESS **MODE** TO GO TO RUN MODE AND THEN PRESS **EVENT** TO UPDATE THE LOAD STATUS.

Sch.#	Load Description	Time	ON	OFF