
SUNFIRE®

RADIANT HEATERS

OPERATING MANUAL

MODEL: SF-150



SUNFIRE 150 PORTABLE RADIANT HEATER

Important: Read this entire manual carefully before operating or performing any maintenance on this Radiant Heater. Misuse may result in serious or fatal injuries due to burns, fire, explosion, electrical shock, or asphyxiation from carbon monoxide.

Warning: Must use diesel or #2 fuel. Do not use gasoline.

TABLE OF CONTENTS

NOTE: A Special Bulletin (which appears just after the Table of Contents) has been added to your manual to highlight important information about the adjustment and operation of your Radiant Heater. Be sure to read this sheet before beginning any procedures in this manual.

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SECTION 1: INTRODUCTION

Guide to this Manual

IMPORTANT! *This manual provides all the instructions necessary to safely use the SUNFIRE Radiant Heater. Please refer to this manual for instructions on operating and maintaining your SUNFIRE Radiant Heater.*

Consult the Table of Contents for a detailed list of topics covered in this manual. You'll find the step-by-step procedures easy to follow and understand. Should questions arise, please contact your SUNFIRE dealer before starting any of the procedures in this manual.

Please read all sections in this manual carefully--including the following safety information--before beginning any installation procedures; doing so ensures your safety and the optimal performance of your SUNFIRE Radiant Heater

FOR YOUR SAFETY...

For your safety, documentation may contain the following types of safety statements (listed here in order of increasing intensity):

- **NOTE:** A clarification of previous information or additional pertinent information.
- **ATTENTION:** A safety statement indicating that potential equipment damage may occur if instructions are not followed.



CAUTION: A safety statement that reminds of safety practices or directs attention to unsafe practices which could result in personal injury if proper precautions are not taken.



WARNING: A *strong* safety statement indicating that a hazard exists which can result in injury or death if proper precautions are not taken.



DANGER! *The utmost levels of safety must be observed;* an extreme hazard exists which would result in high probability of death or irreparable serious personal injury if proper precautions are not taken.

IMPORTANT! Review the list of general safety precautions provided in your Radiant Heater Operator's Manual. These precautions *must be heeded* to ensure proper, safe operation.

WARNING!



STOP

**YOUR SAFETY IS AT STAKE!
DO NOT INSTALL, OPERATE, OR
MAINTAIN THIS EQUIPMENT
WITHOUT FIRST READING
AND UNDERSTANDING
THIS MANUAL!**

SPECIFICATIONS & CLEARANCES

BTU/Hour

High Setting: 147,000 (43kW)

Low Setting: 130,000 (38kW)

Fuel Requirements

Diesel or No. 2 Fuel Oil

Flow Rate (Gallons per Hour)

High Setting 1.10

Low Setting 0.97

Minimum Clearance to Anything Combustible

Front	72"	Back	N/A
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Left Side	36"	Right Side	36"
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Above	N/A	Below	N/A - For use on non-combustible flooring only
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Failure to comply with the minimum clearance can be dangerous and may become a fire hazard. Additional clearances may be needed for accessibility or to comply with local code.

Overall Dimensions

29"W x 36"L x 41"H Metric: 73.7cm x 91.44cm x 104.1cm

Electrical Requirements

120V 2A 60HZ

12V Pure Sine Power Inverter (800W Minimum)

Fuel Tank Capacity

19 US Gallons (72L)

Weight

195 LBS Empty (88kg)

320 LBS Full (145kg)

Air Band Setting

1.50

Nozzle

.85 x 45A

WARRANTY INFORMATION

Rock Energy Systems, LLC warrants that its Radiant Heaters and component parts will be free from defects in material and workmanship for a period of 12 months from date of purchase when properly installed, operated, and maintained in accordance with the installation and maintenance instructions, safety guides and labels contained with each unit. If any component proves defective in either material or workmanship during the limited warranty period, Rock Energy Systems, LLC, at its option, may repair the defective part or equipment or replace the equipment or relevant parts. Proof of purchase and warranty qualification must be established at time of all returns and exchanges.

BILL OF SALE: A copy of the bill of sale must be provided at time of return.

CLAIM PROCEDURE: All claims are to be submitted to your AUTHORIZED SUNFIRE DEALER or call (855) 251-1649 for assistance.

This limited warranty does not apply to heater, component or replacement part damage resulting from incorrect installation, misuse, abuse, accident, act of God, neglect, mishandling, contaminated fuel, modification, incorrect environments, or wear from ordinary use. The warranty set forth above is the exclusive warranty provided by Rock Energy Systems, LLC and all other warranties, including any implied warranties or merchantability or fitness for a particular purpose, are expressly disclaimed. In the event any implied warranty is not hereby effectively disclaimed due to operation of law, such implied warranty is limited in duration to the duration of the applicable warranty stated above. The remedies set forth above are the sole and exclusive remedies available hereunder. Rock Energy Systems, LLC will not be liable for any incidental or consequential damages directly or indirectly related to the sales, handling or use of the equipment, and in any event Rock Energy Systems, LLC in connection with the equipment, including for claims based on negligence or strict liability, is limited to the purchase price. Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

TRADEMARKS

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SPECIAL SAFETY BULLETIN

IMPORTANT INFORMATION CONCERNING SAFETY GUIDELINES

SAFETY GUIDELINES

DANGER:

Carbon monoxide asphyxiation can be fatal.

CARBON MONOXIDE ASPHYXIATION:

The first symptoms of carbon monoxide asphyxiation are similar to that of the flu, headaches, dizziness and/or nausea. These symptoms could be caused by the malfunction of the Radiant Heater. In this case go outside immediately. Have the Radiant Heater repaired. Then you may start it again. Some people are more affected by the effects of carbon monoxide than others, especially pregnant women, those who suffer from heart or lung disease or people with anemia; also those who have consumed alcoholic beverages, and those who are at high altitudes. Be sure to read and understand all of the warnings. Save this manual for future reference: it will provide you with instructions to operate your radiant heater safely and correctly.

USE ONLY DIESEL OR NO. 2 FUEL OIL

WARNING: To diminish the risk of fire or explosion, never use gasoline, crankcase drainings, naphtha, paint thinners, alcohol or other highly flammable materials.

FILLING THE TANK

- a. The person filling the tank should be qualified and completely familiar with the factory instructions for the operation of the radiant heater.
- b. Use only diesel or No. 2 fuel oil. Never use gasoline, waste oil, or any other flammable material.
- c. Before filling the tank, extinguish all of the flames, including the radiant heater and wait for the radiant heater to cool down.
- d. While filling the tank inspect all of the fuel lines and their junctions to check for fuel losses. Any losses must be repaired before starting the radiant heater again.
- e. All fuel tanks and containers should be located a minimum safety distance from the heater, (like current government regulation), as well as oxyhydrogen blowpipe/ torches, welding equipment and similar ignition sources (with the exception of the fuel tank incorporated in the Radiant Heater).
- f. The fuel should be stored in areas where the flooring will not soak up any fuel spills or any drips of fuel line, the flame underneath that could cause a fire.
- g. All fuel storage must be stored in compliance with the current regulations.

SAFETY GUIDELINES CONT...



GENERAL OPERATION GUIDELINES

NOTICE: The installation of the unit shall be in accordance with the regulations of the authorities having jurisdiction.

- Never use the Radiant Heater in rooms and area where aerosol cans, gasoline, and paint thinner, or other highly flammable materials are located.
- Minimum clearances listed in the *specifications and clearances* section on page 1-2 must be observed while the heater is in operation.
- Follow all of the local codes while the heater is in use.
- Heaters used close to large pieces of fabric, curtains or other similar materials must be situated at a safe distance from those objects.
- For use in well ventilated areas only.
- Supply the Radiant Heater with the proper voltage as specified on the identification plate.
- Use only extension cords with three wires correctly connected to a grounded plug.
- The minimum safety distance is the distance required by local code.
- Use the Radiant Heater on level and non-combustible surfaces only to avoid a fire hazard.
- When you move or store the Radiant Heater, maintain it in a level position in order to avoid fuel loss.
- Keep children and animals away from the Radiant Heater.
- Disconnect the Radiant Heater from electrical power when it is not in use and has completed a post-purge cycle after power button has been placed in the off position.
- When it is controlled by another device (like a thermostat or a timer), the heater could turn itself on at any time. Please be aware of this and observe all safety precautions.
- Never place the Radiant Heater in unoccupied or unattended areas.
- Never use for this radiant heater for a residential application.
- Never block vents.
- When the heater is in use and connected to the power supply, it should never be moved, handled, or refilled and no maintenance should be performed on it.
- Smoke that is produced from the first combustion is due to the evaporation of organic materials (ceramic) present in the combustion chamber and anti-corrosion oil present on the surface of the burner. After a few minutes this will stop.
- The operating temperature is **-20°F to +80°F**
- **WARNING: This appliance is equipped with a three-prong (grounding) plug for your protection against electric shock hazard and should be plugged directly into a grounded three-prong receptacle**


SECTION 2: OPERATION

RADIANT HEATER MAIN CONTROLS IN ENGLISH AND FRENCH


CAUTION! ⚠


HOT SURFACE: DO NOT TOUCH!



PRUDENCE! ⚠

SURFACE CHAUD: NE PAS TOUCHER!






MODEL

SF-150


STARTUP

- 1 Turn power switch on. Heater will start to fire in 15 Seconds. Green light on.
- 2 If heater fails to start press reset switch for 1 second. If the heater does not start follow troubleshooting or contact your Dealer.

ON



HIGH



CALL FOR HEAT



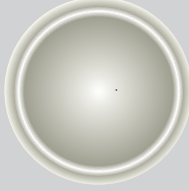
COMMENCEZ

- 1 Mettre l'interrupteur d'alimentation sur. Heater va commencer à feu dans 15 secondes. Feu vert sur.
- 2 Si le radiateur ne démarre commutateur de réinitialisation de la presse pendant 1 seconde. Si l'appareil ne démarre pas suivre le dépannage ou contactez votre revendeur.

FERMER

- 1 Tourner le commutateur de mise hors tension. Le ventilateur continue de fonctionner pendant 300 secondes.
- 2 Ne débranchez pas jusqu'à ce que le ventilateur se ferme en cours d'exécution.

RESET



SHUTDOWN

- 1 Turn off power switch. Blower will continue to run for 300 seconds.
- 2 Do not unplug until blower quits running.

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RADIANT HEATER OPERATION

Following is an outline of the Radiant Heater basic operation process:

Keep unit on a level, non-combustible surface at all times. If the unit is on sitting on a 25° angle or more the tip switch will turn the heater off and/or prevent the heater from starting.

1. Fill tank with Diesel or #2 Fuel Oil only.
2. Plug into a grounded outlet or extension cord.
3. Switch to high fire.
4. Turn power switch ON.
5. The blower will come on and run for 15 seconds prior to lighting (pre-purge).
6. After a few seconds the green light will come on letting the user know it is calling for heat and will fire within a few seconds.
7. When shutting down the heater, turn power switch to off. Allow the burner to complete the post-purge cycle (300 seconds) before disconnecting power. **WARNING:** Allow the heater to complete its post-purge of heat and fuel vapors to reduce the risk of a fire hazard.

Generators: The SunFire 150 can operate using a generator or a with a 12V Pure Sine Power Inverter (800W minimum). If generator has not been used for an extended period, it is recommended to run for 20 minutes to recharge the capacitor before operating the heater. Otherwise, there may not be sufficient voltage and the heater may not start or may shut off prematurely after running briefly.



WARNING: DO NOT OPERATE RADIANT HEATER WITHOUT THE BURNER COVER SECURELY ATTACHED.

THERMOSTAT INSTALLATION INSTRUCTIONS

REQUIRED PARTS

Qty	Part	
1	Female Bullet Connector (18 Gauge)	Included
1	Male Bullet Connector (18 Gauge)	Included
1	Wall Thermostat	Not Included
Desired Length	18 Gauge CU CL2 Thermostat Wire	Not Included

Two bullet connectors are already included in the same packet that contained this service manual.

TYPE OF THERMOSTAT

The SunFire 150 does not require an authorized or specific thermostat to regulate the temperature. A simple wall thermostat is all that is necessary. The only requirement is that the thermostat must not require a power source because it will damage the primary control of the heater. Please use a basic manual or battery operated thermostat.

THERMOSTAT WIRE CONNECTION

You will be connecting the thermostat wires to the two wires sticking out of the back of the burner control box as seen in the image on the right.

THERMOSTAT PLACEMENT

You can place the thermostat at your desired distance on a wall or on the SunFire burner control box but there is no specific mounting location included or required. The most popular location is on a wall about 10 – 20 feet away.



STEP 1

- Cut thermostat wire to desired length.
- Strip the outer layer a few inches to expose the white and red conductor wires.
- Strip the outer layer of the white and red conductor wires to expose ¼" of the copper wire.

STEP 2

- Slide the male and female bullet connectors over the white and red wires to cover the exposed copper wire. (Connect male or female to white or red wire. Makes no difference)
- Crimp the connectors to the copper wires to secure them in place.

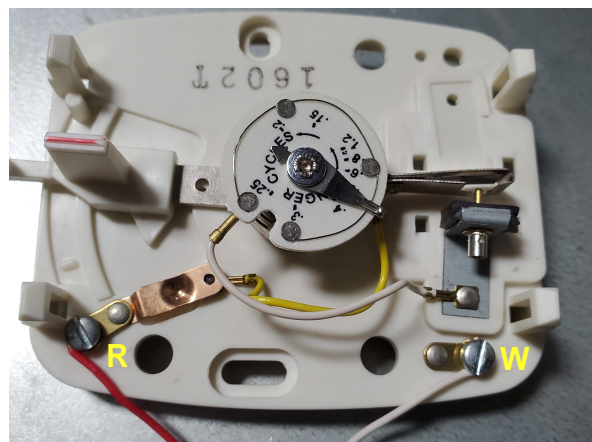
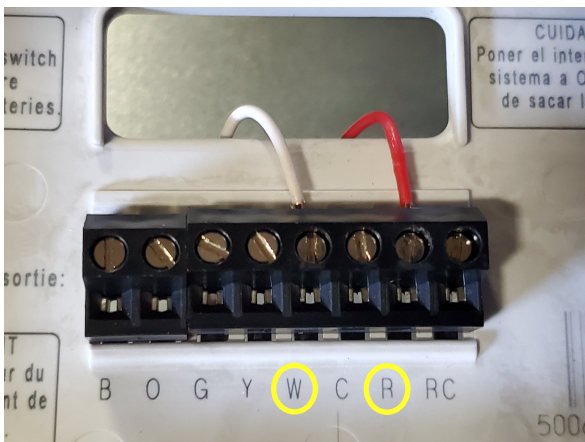
STEP 3

- Connect the male bullet connector of the thermostat wire into the female bullet connector of the thermostat wire coming out of the SunFire burner box.
- Connect the female bullet connector of the thermostat wire into the male bullet connector of the thermostat wire coming out of the SunFire burner box.

STEP 4

- Connect the white wire to the terminal inside of the thermostat labeled with a W.
- Connect the red wire to the terminal inside of the thermostat labeled with a R.

See images below for examples using two different basic thermostats



SECTION 3: MAINTENANCE

REMOVING / INSTALLING HEAD ASSEMBLY



WARNING: Only attempt to handle burner components after the unit has fully cooled down. Components can be hot and could cause severe personal injury.

NOTE: You will need to remove the burner assembly for inspection of the nozzle and electrodes.

To remove the burner assembly:

1. Remove the four nuts securing the burner assembly to the outer cone of the heater.
2. Pull gently to remove the burner assembly from the outer cone of the heater, taking care not to disconnect any wiring.
3. If nozzles or electrodes are in need of replacement, gently prop the burner assembly on the heater tank to allow access to nozzle assembly, again taking care not to disconnect any wiring.

To remove the nozzle assembly:

1. Loosen, and then rotate the two screw clamps securing the ignitor plate in place. Swing the ignitor plate open.
2. Unscrew the oil line fitting and thumb nut at the burner housing. (Figure 2A)
3. Remove the retention head (Figure 2B).
4. Gently push the nozzle assembly through the front of the burner.
5. Handle the nozzle assembly with care to avoid bending/moving the electrodes, or damaging the electrode ceramic insulators and spinner assembly.
6. Inspect the gasket on the bottom of the ignitor cover. The gasket prevents air from escaping from the housing. Replace the gasket if not in good condition.
7. Inspect the ignitor contact clips. Clean or replace if necessary to ensure reliable contact with the electrodes.

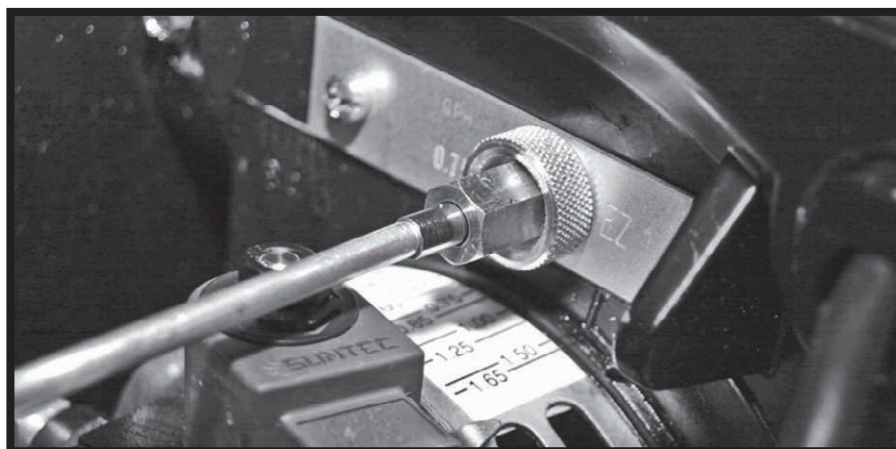


FIGURE 2A: OIL LINE FITTING

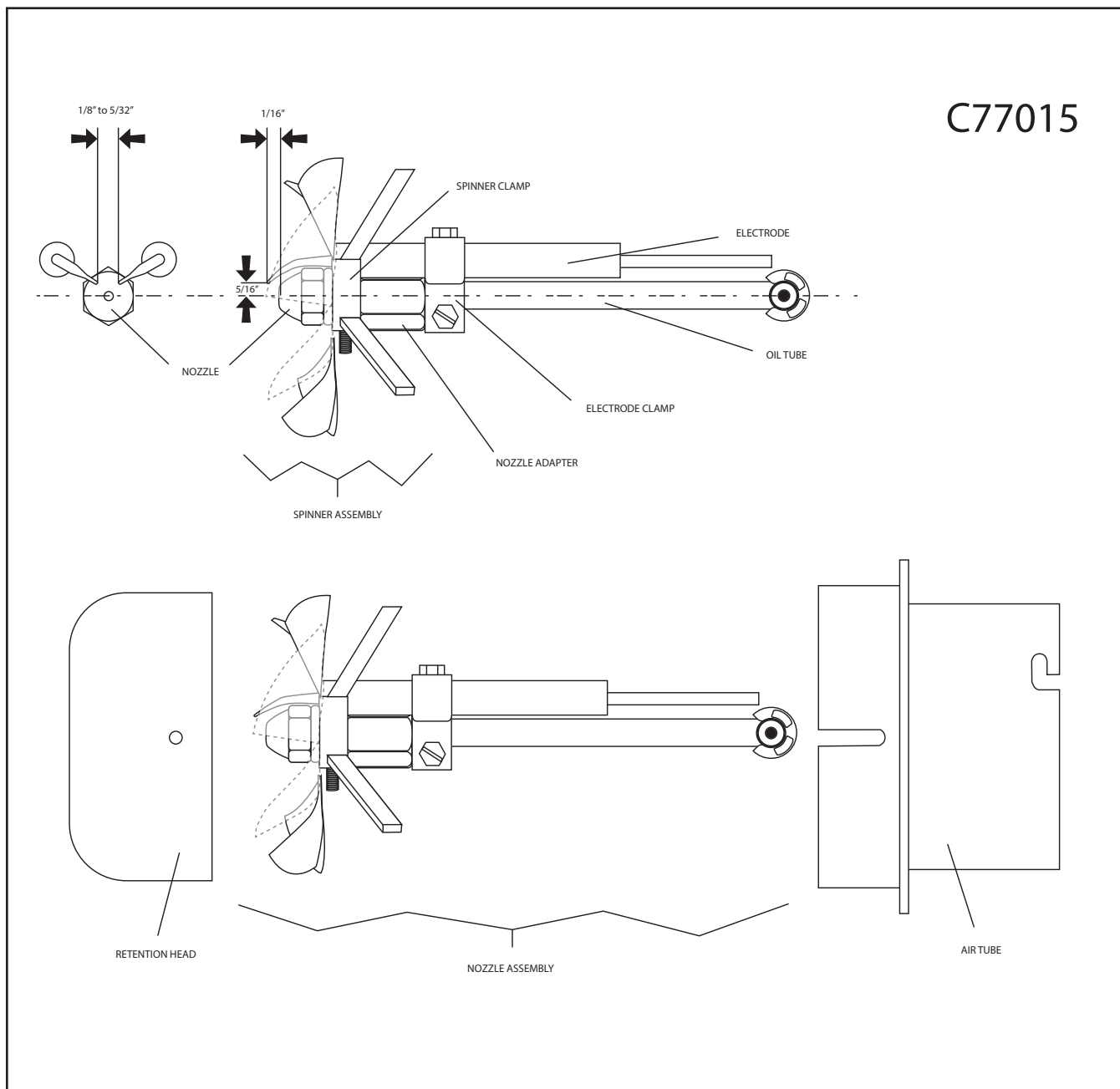


FIGURE 2B: INSERTING / REMOVING NOZZLE HEAD ASSEMBLY

Reinstall nozzle/check electrodes



WARNING: Inspect the nozzle adapter before replacing the nozzle. If the threads have been damaged or shows score marks, replace the nozzle line/adaptor assembly.

1. Loosen electrode clamp using 5/16" nut driver, and remove electrodes.
2. Loosen set screw on spinner assembly using 3/32" hex key. Remove spinner assembly from nozzle assembly
3. Remove nozzle using two crescent wrenches as shown in Figure 3A.
4. Reinstall spinner assembly onto nozzle assembly.
5. Slide electrodes through holes in spinner.
6. Set electrodes to proper gap, using Carlin electrode gauge (see Figure 2A).
7. Tighten electrode clamp.
8. Tighten spinner assembly set screw using 3/32" hex key.
9. To replace the nozzle assembly, reverse remove the nozzle assembly sequence.

Use care when tightening the oil line fitting to oil tube extension. Tighten securely, but do not cross-thread or over-tighten.



**Figure 3A : CAREFULLY SUPPORT THE NOZZLE ADAPTER
WHEN REMOVING OR INSTALLING NOZZLE**

Air Band Adjustment

Air band adjustment may be necessary based on fuel and location.

- 1) To adjust air band, loosen screw and rotate air-band open or closed until desired flame is attained.
- 2) Re-tighten Screw to re-secure Air Band in newly adjusted position.

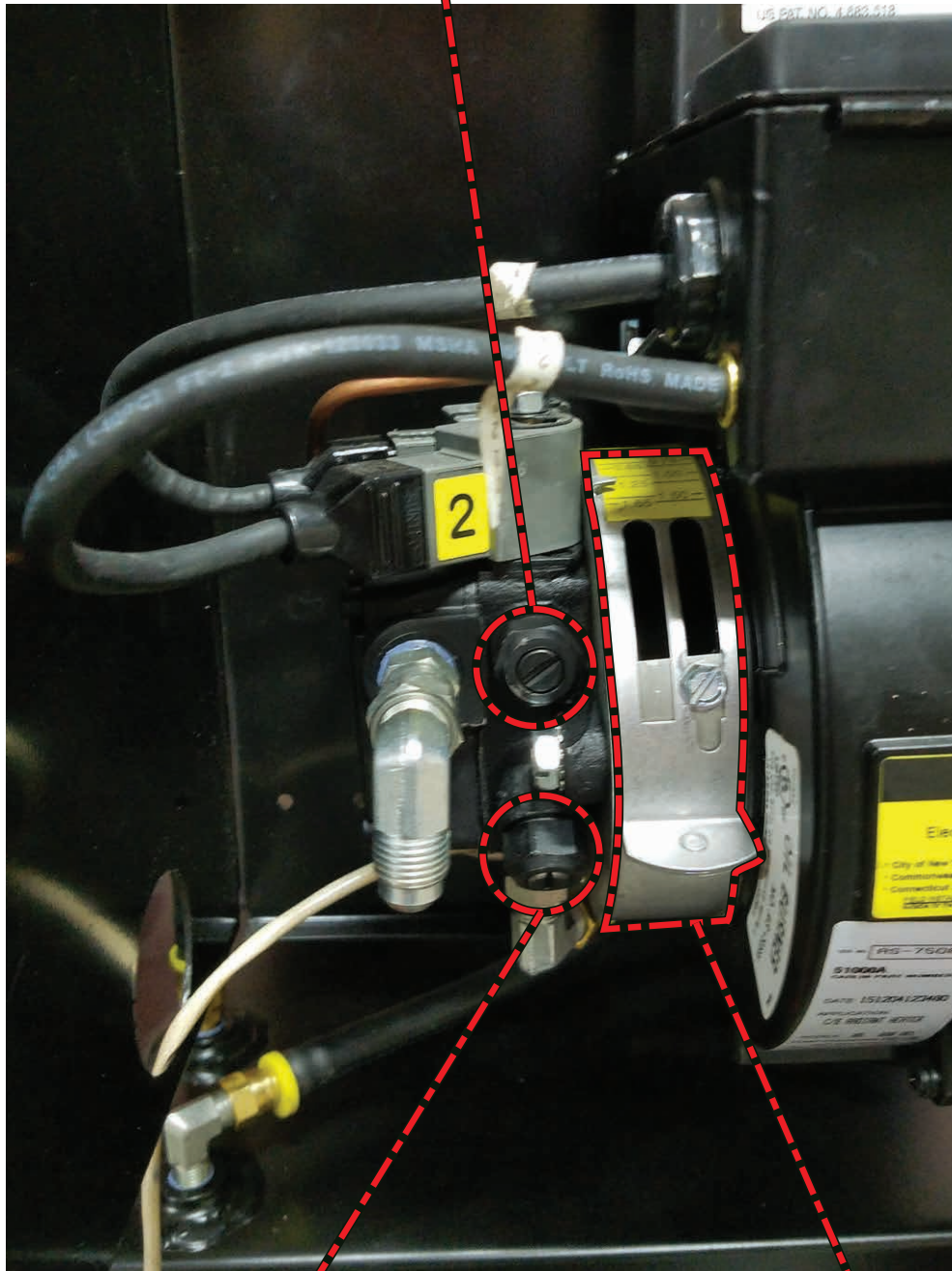
Burner Flame Adjustment

Due to the difference of flow in nozzles even those of the same size it will be necessary to adjust the pump pressure High and Low when changing nozzles. When making adjustments always start with the high setting. (See Figure 4A)

1. Set Air Band at 1.50 to start.
2. Start the Radiant Heater and allow to run for 5 minutes.
3. Check the heat transfer disk on the front of the heater is it glowing bright orange or is it dull. This can best be seen in a shady location and not in direct sun.
4. If it is bright orange check the side profile of the transfer disk and make sure no flames are coming through the openings of the transfer disk.
5. If flames are coming through the face of the transfer disk, the fuel pressure may be too high and will may need to be turned down and/or the Air Band is set too low and needs to be set to 1.50.
6. If the heat transfer is dull orange the fuel pressure may need to be turned up to achieve the desired glow.
7. Make sure the flames do not come through the face of the heat transfer disk.

Turning the adjustment screw clockwise will increase the fuel pressure. Turning the adjustment screw counterclockwise will decrease the fuel pressure. The top screw changes the pressure for the low setting, and the bottom changes it for the high setting (See Figure 4A).

Top Adjustment Screw
(LOW FIRE)



Bottom Adjustment Screw
(HIGH FIRE)

Air Band

Figure 4A : Flame Adjustment Controls

Annual Maintenance and Service Procedures

NOTE: Maintaining and Cleaning your heater at the end of each heating season is important to prolong the life of your radiant heater and keep it operating in peak condition.



WARNING: Turn off power to appliance when servicing burner. Failure to comply could result in severe personal injury, death or substantial property damage.

Replace fuel filter after 200 hours (approximately 12 tanks of fuel).

Clean the blower wheel

The blower wheel accumulates dust and debris from normal operation. You will need to clean the wheel blades periodically to prevent reduction in airflow.

1. Inspect the blower wheel by removing the blower wheel access cover.
 - a. To remove the cover, open the ignitor plate and loosen the blower wheel access cover screw about three turns.
 - b. Inspect the blower wheel to see if it needs to be cleaned. Dirt and lint on the wheel reduce air flow, and must be removed if the burner is to operate correctly.
2. To clean blades, remove the two bolts securing the motor to blower housing.
 - a. Slide the motor out and rotate to remove and access blower wheel.
 - b. Use a brush and vacuum to clean each blade and the blower housing interior.
3. Replace motor/wheel in blower housing and secure with the two bolts.
4. Push wire slack back into junction box.

Replacing blower motor or wheel

1. If either the blower wheel or motor must be replaced, remove the two bolts securing the motor to housing.
2. Disconnect the motor wires in the burner junction box.
3. Loosen the Allen screw securing the blower to the motor shaft and remove the wheel.
4. When assembling the replacement assembly, slide the wheel onto the motor shaft and use feeler gauges to set a space of 3/64 inch between the blower wheel and the motor face.
5. Replace the motor/wheel assembly in the housing, wire the motor leads and secure the motor with the two bolts.

Motor maintenance

The PSC motor is constructed with permanently-lubricated bearings, and requires no oiling.



CAUTION: Any time you replace a component or disassemble any part of the burner for service/maintenance, perform a complete operational test after reassembly to verify the burner operates correctly. Failure to verify operation could result in severe personal injury, death or substantial property damage



WARNING: CHECKING IGNITOR

Never test an ignitor by placing a screwdriver (or other metallic object) across the high voltage clips. Check the ignitors only by observing spark at appliance ignition electrodes, with fuel supply OFF. Using any other method could cause ignitor damage and severe personal injury.

Carefully energize ignitor and check for spark arcing at the high voltage terminals. If spark jumps the gap, ignitor is good.

Tank maintenance

If it becomes necessary to drain the fuel tank there is a drain plug located on the bottom of the tank.



WARNING: CERAMIC FIBER MATERIALS

The appliance may contain ceramic fiber and/or fiberglass materials. Ceramic fiber materials, such as chamber liners, may contain carcinogenic particles (chrysotbalites) after exposure to heat. Airborne particles from fiberglass or ceramic fiber components have been listed as potentially carcinogenic by the State of California. Take the following precautions when removing, replacing and handling these items.

Avoid breathing dust and avoid contact with skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves and eye protection.

Use a NIOSH N95 certified respirator. This respirator meets requirements for protection from chrysotbalites. Actual job requirements or NIOSH regulations may require other or additional protection. For information, refer to the NIOSH website, <http://www.cdc.gov/niosh/homepage.html>.

Ceramic fiber removal

To prevent airborne dust, thoroughly wet ceramic fiber with water before handling. Place ceramic fiber materials in a plastic bag and seal to dispose. Avoid blowing, tearing, sawing or spraying fiberglass or ceramic fiber materials. If such operations are necessary, wear extra protection to prevent breathing dust. Wash work clothes separately from other laundry. Rinse clothes washer thoroughly afterwards to prevent contamination of other clothing.

NIOSH First aid procedures:

Eye exposure — irrigate immediately

Breathing — fresh air.

APPENDIX A

Technical Reference Materials

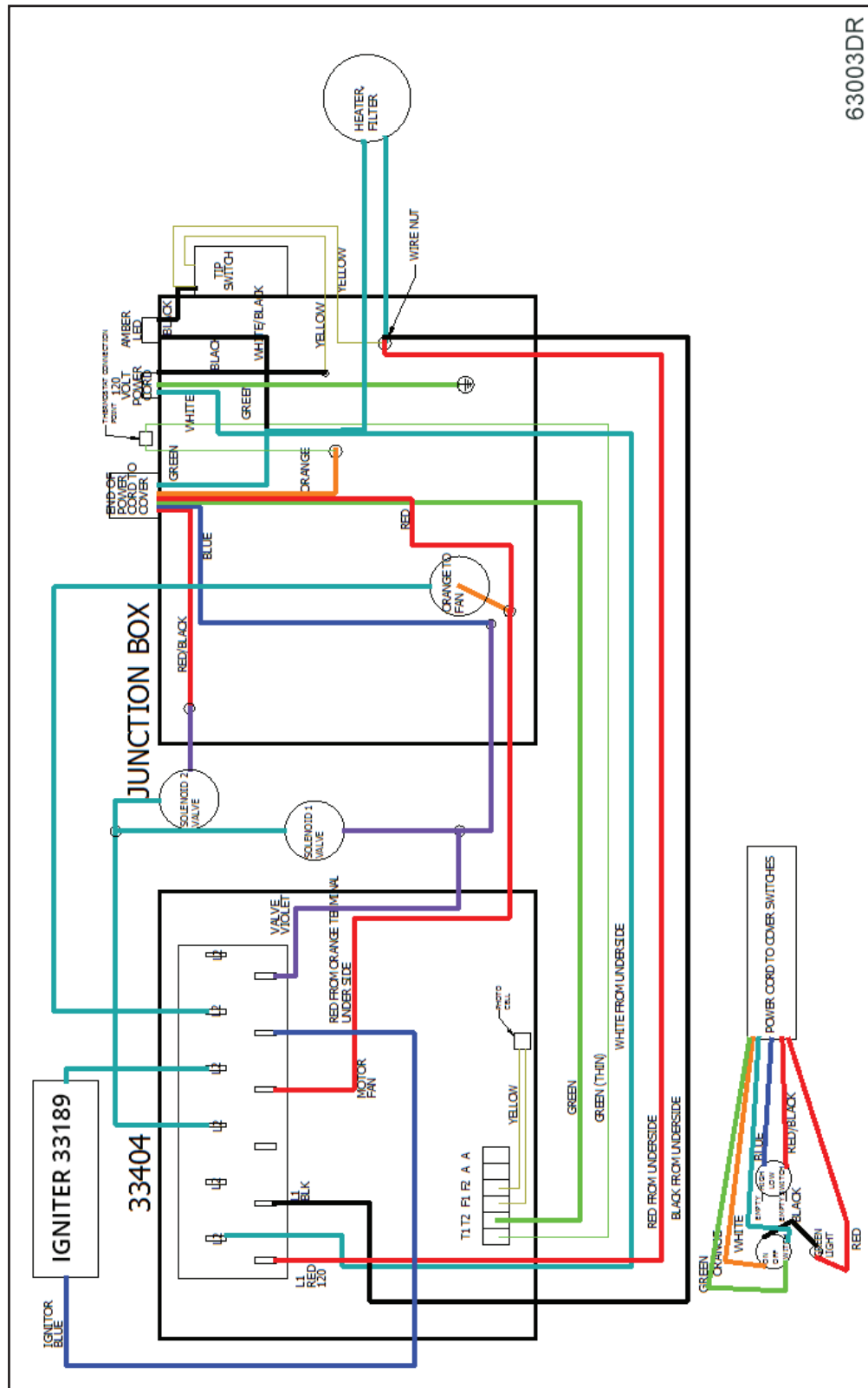


FIGURE A1 - COMPLETE WIRING SCHEMATIC

Troubleshooting

Symptom	Possible Cause	Corrective Action
Will not start	Main electrical power circuit breaker tripped	Reset breaker
	Primary control safety tripped/defective	Reset/test components, replace if needed
	Tip switch contacts are closed	If plugged in, verify amber light is on. If not, it is a tip switch issue. Make sure SunFire unit is level. If level, tip switch may be defective and need replacement or wires are loose.
Attempts to fire but does not establish a flame	Dirty fuel filter	Clean or change filter
	Air bubble in fuel line	Can sometimes be cleared by attempting to start several times. Contact your local dealer or call (855) 251-1649 for additional instructions.
Fires and then fails <u>Only if fails continually within 30 seconds</u>	CAD cell is dirty	Clean CAD cell with cloth. If issue still persists, contact a local dealer or call (855) 251-1649.
Fires and then fails <u>Other</u>	Contaminated fuel supply	Drain tank from side plug, clean, and fill with clean fuel
	Dirty fuel filter	Clean and replace filter
	Plugged nozzle or pre-heater assembly	Clean or replace nozzle.
	Improper power supply	Check power supply. If using a generator, run generator for 20 minutes and retry. If using an inverter, try a clean power supply. Try different power supply.
Black smoke or whisking flame <u>Whisking - flames protrude through holes in dome face</u>	Nozzle is dirty or clogged	Replace nozzle
	Improper Air flow	Adjust air band to 1.5 position
	Improper fuel flow rate	Adjust fuel flow rate (Only after replacing nozzle)

For further assistance, please contact your local AUTHORIZED SUNFIRE DEALER or find more information at sunfireheater.com/support where you can access the latest support information and manuals. Or call the manufacturer directly at (855) 251-1649 for further assistance.

Symptom	Possible Cause	Corrective Action
Amber lamp does not light	Loose wires	Check all power and tip-switch wires for cut or loose wires and secure or fix if needed.
	Tip switch is closed	Level SunFire or replace tip switch
	Bad Light	Replace light
	Defective primary control	Replace primary control
Won't fire (If using a thermostat)	Check temperature setting.	Set thermostat to a higher temperature if desired.
	Check for loose wires	Tighten wires for improved connection to thermostat.
	Defective thermostat	Replace thermostat. (Note: Thermostat must not require an external 24V power source - if used it will damage the primary)
No green light when turned on	Check the reset button	Push and hold the reset button
	If using thermostat	See thermostats issues above
	Defective Primary	Replace primary
Bad flame	Clogged Nozzle	Soak Nozzle in parts cleaner/degreaser and blow it out. Or replace nozzle.
	Clogged/dirty filter/dirty fuel	Replace filter. Drain and fill with clean fuel.
Smoky flame	Air flow is restricted	Check air band and increase the air flow until smoke is no longer visible.
	Improper seal between fuel filter and filter assembly.	Check the seal on the fuel filter to make sure there are no obstructions between the filter and the filter assembly that could allow air to become mixed in the fuel, causing an improper fuel mixture.
	Bad fuel	Drain fuel from tank and add new clean fuel.
	No fuel or clogged nozzle.	Add fuel or replace nozzle.
No flame	fuel is not spraying	There are multiple possibilities. Call your local dealer or the manufacturer at (855) 251-1649.
Other issues	We are here to assist you.	Call us at (855) 251-1649



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