FROSTFIGHTER WARRANTY

I.C.E. Mfg. Ltd. warrants the Frostfighter heater to be free from defects in workmanship and materials for a period of twelve (12) months from date of initial service not to exceed fifteen (15) months from date of shipment.

If during the warranty period, the heat exchanger fails under normal use and service due to a defect in material or workmanship said heat exchanger will be repaired or replace free of charge F.O.B. the Winnipeg Factory..

All mechanical and electrical components are covered by a one (1) year limited warranty. Normal maintenance items are excluded under the warranty. The warranty does NOT include any freight, labor or sales taxes incurred by the purchaser and is subject to the following conditions:

1. The heater shall be operated in accordance with the manufacturers operating and maintenance manual.

2. The heater shall be subject to normal use in service and shall not have been misused, neglected, altered or other wise damaged.

3. The unit shall be operated within the rated capacities and with the prescribed fuel.

4. The unit has not been allowed to exceed its proper temperature limits due to control malfunction or inadequate air circulation.

5. There is no evidence that the unit has been subject to tampering or deliberate destruction.

No representative of I.C.E. Mfg. Ltd., nor any of its distributors or dealers, is authorized to assume for I.C.E. Mfg. Ltd. any other obligations or liability in connection with this product, not alter the terms of the warranty in any way. This warranty is limited to the express provisions contained herein and does not extend to liability for labor costs incurred in replacing defective parts.

Parts can be obtained from I.C.E. Mfg. Ltd., Winnipeg, Manitoba on the basis that credit will be issued if the defective parts returned qualify for replacement pursuant to the terms and conditions of this warranty. Authorization to return any alleged defective parts must be first obtained from the factory prior to transporting the part. The transportation charges for the alleged defective part must be prepaid by the owner. I.C.E. Mfg. Ltd. will not accept charges for parts purchased unless the conditions of this warranty have been satisfied and prior authorization to purchase the parts has been received from the factory.

1500 NOTRE DAME WINNIPEG, MANITOBA
R3E 0P9, (204) 775-8252

SPECIFICIATIONS

MODEL	IHS-600	IHS-700
MAXIMUM INPUT	600,000 BTU/HR	700,000 BTU/HR
NOZZLE SIZE	3.50 USGPH 45'B (SOLID)	4.0 USGPH 45'B (SOLID)
PUMP PRESSURE	155 P.S.I. MAXIMUM	140 P.S.I. MAXIMUM
ELECTRICAL SUPPLY (consult factory for other voltages)	230V/1 PH 40A 230V/3 PH 30 AMP	230V/1 PH 40A 230V/3 PH 30 AMP
HEATED AIR (W/O DUCT)	4000 CFM	4500 CFM
APPROVAL AGENCY	CSA	CSA
DRY WEIGHT	1600 LBS	1600 LBS

Flue size - 6" on all units

NOTE: -These heaters are intended for use primarily as temporary heating of buildings under construction, alteration or repair

MAXIMUM ALLOWABLE DUCT LENGTHS

DISCHARGE/TWO 16” DUCTS	100 FEET COMBINED
INLET/TWO 16” DUCTS	DISCHARGE AND INLET PER SIDE

HAZARD DEFINITIONS

The following will be used throughout this manual to bring attention to hazards and their risk factors, or to special information.

DANGER Denotes presence of a hazard which, if ignored, will result in severe personal injury, death or substantial property damage.

WARNING Denotes presence of a hazard, which, if ignored, could result in severe personal injury, death or substantial property damage.

CAUTION Denotes presence of a hazard, which, if ignored, could result in minor personal injury, or property damage.

NOTICE Intended to bring special attention to information, but not related to personal injury or property damage.

To the owner -

WARNING Installation and adjustment of the burner requires technical knowledge and the use of combustion test instruments. Do not tamper with the unit or controls. Call your qualified service technician. Incorrect operation of the burner could result in severe personal injury, death or substantial property damage.

Have your equipment inspected and adjusted annually by your qualified service technician to assure continued proper operation.

Never attempt to use gasoline in your heating appliance or to store gasoline or combustible materials near the heating equipment. This could result in explosion or fire, causing severe personal injury, death or substantial property damage.

WARNING Never burn garbage or refuse in your heating appliance or try to light the burner by tossing burning material into the appliance. This could result in severe personal injury, death or substantial property damage.

Never attempt to use crankcase or waste oil in your heating appliance. This could damage the fuel unit or heating equipment, resulting in risk of severe personal injury, death or substantial property damage.

Never restrict air openings on the burner or to the room in which the appliance is located. This could result in fire hazard or flue gas leakage, causing severe personal injury, death or substantial property damage.

WARNING Read all the instructions before proceeding. Follow all instructions completely. Failure to follow these instructions could result in equipment malfunction, causing severe personal injury, death or substantial property damage.

This equipment must be installed, adjusted and started only by a qualified service technician - an individual or agency, licensed and experienced with all the codes and ordinances, who is responsible for the installation and adjustment of the equipment. The installation must comply with all local codes and ordinances with the National Fire Protection Standard for Oil-Burning Equipment, NFPA 31 (or CSA B 139-04).

NOTICE Concealed damage - if you discover damage to the burner or the controls during unpacking, notify the carrier at once and file the appropriate claim.

NOTICE High altitude installations - Accepted industry practice requires no derate of burner capacity up to 2000 feet above sea level. For altitudes higher than 2000 feet, derate burner capacity 4% for each 1000 feet above sea level.

.

INSTALLATION INSTRUCTIONS

1. The recommendations of local authorities having jurisdiction must be followed. For recommended installation practices refer to C.S.A. Standard B149. (CANADA) or NFPA 31 (USA).

2. When firing the unit in an enclosed area 3 square feet must be provided to allow the free entry of the air required for operation.

3. Do not operate the unit in partly ventilated areas without a flue pipe or in close proximity to combustible surfaces or materials.

NOTE: Installation clearances are as follows:

Top - 3 inches	Discharge End - 3 feet
Sides - 6 inches	Vent Connector - 18 inches
Burner End - 6 inches	Floor - Combustible

Fuel Supply

The fuel supply piping and tank must provide #1 or #2 fuel oil pressure or vacuum conditions suitable for the fuel unit (oil pump) on the burner.

When fuel supply is level with or higher than the burner fuel unit -
When the fuel is not required to lift the oil, the installation is usually suitable for either a one-pipe or two-pipe oil system. The oil pressure at the inlet of the fuel unit must not exceed 3 psig.

The fuel unit is shipped with the by-pass plug installed. **Leave the by-pass plug installed for all burners. Do not remove the by-pass plug.**

When fuel supply is below the burner fuel unit -
Use a two-pipe oil system when the fuel unit must lift the oil more than 8 feet if the burner is equipped with a B fuel unit - or more than 2 feet if burner is equipped with an H fuel unit. The return line provided by the two-pipe system is needed to purge the air from the fuel lines and minimize the likelihood of air-related problems during operation.

Vent System

The flue gas venting system must be in good condition and must comply with all the applicable codes.

OUTDOOR INSTALLATIONS:
For outdoor installation the supplied vent cap must be installed and fastened.

INDOOR INSTALLATIONS:
Must be done in accordance to NFPA 31 (or CSA B139-04) with local authorities having jurisdictions.

* The flue must be securely attached to the unit with tight joints.

* The flue must not be sized to have a cross-sectional area less then that of the flue collar at the unit.
* Other appliances must not be connected so as to vent through the vent of this unit.
* Do not use 90-degree tees or elbows greater than 45 degrees.
* Do not support the weight of the stack on the flue connection of the heating system.
* The maximum flue gas temperature is 550 F. "A" vent, or welded vents must be used.
* Minimize connecting pipe length and the number of bends by locating the unit as close to the flue pipe as possible.
* Maintain clearances between the flue pipe and combustible materials that are acceptable to the Federal, Provincial and local authorities having jurisdiction.
* Unit must be connected to a flue having sufficient draft to ensure proper operation of unit. The measure draft at the flue should be at least a positive 0.2" W.C.

VERTICALLY VENTED UNITS

1. Maximize the height of the vertical run of vent pipe. A minimum of five (5) feet (1.5m) of vertical pipe is required. The top of the vent must extend at least two (2) feet (0.61m) above highest point on the roof. A weatherproof vent cap must be installed to the vent termination.
2. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of ten (10) feet (3m). Horizontal runs should be pitched upward 1/4" per foot (21 mm) and should be supported at 3 foot (1m) maximum intervals.
3. Design vent pipe to minimize the use of elbows. Each 90 is equivalent to 5 feet (1.5m) of straight vent pipe run.
4. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, insulate vent pipe to prevent condensation inside vent pipe. Insulation should be a minimum of 1/2" (12.7mm) thick foil faced fibreglass, minimum 1 1/2# density.
5. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.

A field control, Block vent switch "MODEL WMO-1 200" must be added. See Appendix "A" for installation directions and Appendix "B" for wiring schematics.

HORIZONTALLY VENTED UNITS

Pressures in Category 111 venting systems are positive and therefore care must be taken to avoid flue products form entering the heated space. Use only vent material and components that are UL listed and approved for Category 111.

WARNING: Do not use Type B vent within a building on horizontally vented units.

1. All vent pipe joints must be sealed to prevent leakage into the heated space.
2. The total equivalent length of vent pipe must not exceed 25 ft (7.62 m). Equivalent length is the total of straight sections, plus 5 ft (1.52 m) for each 90 elbow and 2.5 ft (0.76 m) for each 45 elbow.
3. The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward 1/4 in per foot (21 mm per meter) towards the outlet to condensate drainage.
4. An approved vent cap must be used.

PREPARE THE BURNER FOR START-UP

Start-up checklist - Verify the following before attempting to start burner

o Combustion air supply and venting have been inspected and verified to be free of obstruction and installed in accordance with all applicable codes.
o Fuel connection is secure.
o Fuel supply line is correctly installed and shut-off valves are open.

START THE BURNER

WARNING Do not proceed unless all prior steps in this manual have been completed. Failure to comply could result in severe personal injury, death or substantial property damage.

WARNING Do not attempt to start the burner when excess oil has accumulated, when the appliance is full of vapor or when the combustion chamber is very hot. Do not attempt to re-establish flame with the burner running if the flame should be extinguished during start-up, venting or adjustment. Allow the unit to cool off and all vapors to dissipate before attempting another start. Failure to comply with these guidelines could cause an explosion or fire, resulting in severe personal injury, death or substantial property damage.

WARNING If the fuel unit valve is completely open, assuring no flow of oil to the burner oil nozzle, you can temporarily jumper the F-F terminals of an R8184 during the purge period to allow enough time for all the air to purge. Never leave the burner unattended while doing this. Remove the jumper when purging is completed. **This procedure should only be used by qualified burner technician, experienced in** burner operation and control. Improper application of this method can cause combustion chamber explosion, fire hazard or fuel leaking, resulting in severe personal injury, death or substantial property damage.

AIR SETTING

The air settings should be set at 4 1/2 on the drawer assembly, which is located on the right hand side of the burner. The primary air setting should be set at 10 shutter, 6 band on the main air shutter. In some cases these air-setting needs to be adjusted. To do this insert your flue gas analyzer into the flue, 6 inches above the top of unit. Measure your excess 02% and CO2% levels. Set your air shutter to bring your 02% levels between 4-5%. Your CO2% will be between 11-12.5% and your CO levels should be around zero.

PUMP PRESSURE

The pump pressure is 150 PSI. The pump pressure is adjusted on the side of the pump (See page 7 "Two-pipe oil flow with "B" pump").

Electrical Supply

Verify that the power connections available are correct for the Unit. All power must be supplied through the disconnect.

Installing the optional thermostat

To install the optional external thermostat. Plug the thermostat directly into the receptacle. **WARNING: THE RECEPTACLE IS USED FOR INSTALLING THE THERMOSTAT ONLY! THIS IS NOT A POWER SOURCE**.

CONNECT THE FUEL LINE(S)

WARNING Install the oil lines using the following guidelines. Failure to comply could lead to equipment damage and present a risk of severe personal injury, death or substantial property damage due to leakage of oil and potential fire hazard.

Use only flare fittings at joints and connections. Never use compression fittings.

Install fittings only in accessible locations to assure any leak will be detected.

Where joint sealing is needed, use only pipes dope. Never use Teflon tape. Tape strands can break free and damage the fuel unit.

On two-pipe oil systems verify that the suction line vacuum does not exceed the fuel manufacturer's recommendation.

WARNING Do not operate the burner unless a return line or a by-pass loop in installed. Failure to follow this guideline will cause damage to the fuel seals and consequent fuel leakage. This could result in severe personal injury, death or substantial property damage.

OIL SUPPLY / RETURN LINES

Install the oil tank lines in accordance with all applicable codes.

Use continuous lengths of heavy-wall copper tubing, routed under the floor, where possible. Do not attach fuel lines to the fuel unit or to the floor joists if possible. This reduces vibration and noise transmission problems.

Install a high quality shut-off valve in an accessible location on the oil supply line. Locate one valve close to the tank.

MAINTENANCE INSTRUCTIONS

!WARNING!: Heaters should be fully serviced annually to ensure proper performance. Maintenance should be performed by trained personnel only. Incorrect maintenance may result in improper operation and serious injury.

HIGH LIMIT SWITCH

The limit switch should be checked every heating season to ensure the burner will shut down if temperature exceeds 190 F. (This can be done by restricting the air flow through the unit. After tests are complete, remove restricters as both 16" ducts must be open for proper operation).

FAN SWITCH

The fan switch has been selected to allow for preheating of the heat exchanger to ensure that only heated air is allowed to enter the space. Upon satisfying the need for heat, the fan switch will continue to run the supply fan until the heat exchanger has cooled sufficiently. This feature will help prolong the life of your heat exchanger.

FUEL FILTER

Replace cartridge once every week of normal usage or sooner, depending upon fuel quality.

FLAME DETECTOR

When doing maintenance, turn on machine and run. After having machine run for over 10 seconds, press red button on primary control. Hold for one second and then release. If light flashes once or twice, cad cell is functioning properly. If flashes three times, check alignment and proper flame. If correct a cleaning of the face of the cad cell with a soft non abrasive cloth is recommended. If light flashes four times, follow above steps. If flashing four times persists, replace cad cell.

LED FLASHES	CAD CELL RESISTANCE
1	0-400 Ohms
2	400-800 Ohms
3	800-1600 Ohms
4	>= 1600 Ohms

BURNER

The electrode spacing must be checked and adjusted, if necessary after every nozzle change. Nozzle should be replaced monthly or sooner, depending on fuel quality and length of time unit is running or if burner cannot be set up to operate properly. Nozzle size and type are marked on the rating plate. Please see page 2 for recommendation of nozzle size.

ELECTRICAL

Ensure all conduit (BX) connectors are tight. Check inside connections in control box to ensure good connections.

FAN

Check for dust or dirt build up on blades. Check for tightness of the set screw. Run heater to check for vibration. Replace fan if vibration is noticeable.

FUEL SYSTEM

The quality of fuel oil will affect light off at low ambient temperature, #1 fuel oil or kerosene are recommended for temperatures below -10° C / 8° F.

FUEL PUMP

Check fuel pump pressure on a regular basis. This should be checked at the bleeder screw.

COMBUSTION AIR ADJUSTMENTS

***For proper combustion air adjustment a calibrated gas analyzer and smoke tester should be used to ensure complete combustion. Air adjustment should be made at the correct input and be adjusted to achieve 10-12% CO_2. For optimum combustion efficiency the combustion air control should be set to provide no more than a No. 1 smoke (Bacharach Scale). The Beckett burner has a calibrated air band, which will assist in adjusting the primary air for a good oil/air mixture. Adjust air band supply by loosening lock screws and moving air shutter (B48254) and if necessary the bulk air band. Begin by reducing the air until the unit begins to produce smoke. Increase air until no smoke is produced. Check for excessive heat build up in the heat exchanger. Insufficient air will cause flame impingment and reduced heat exchanger life. Increase air until heat build up has been eliminated. Check for proper ignition. Once satisfied re-tighten all screws and locking mechanisms.

This adjustment is to be carried out while the unit is operating and after 5 minutes of firing. Rotating the air bands on the burner housing makes the adjustment.

AIR SETTINGS

UNIT MODEL	SHUTTER	BAND	BURNER MODEL
IHS 600	10	4	CF 800
IHS 700	10	6	CF 800

***Note: The above settings are approximations based upon clean equipment in proper working order. Combustion air adjustments will vary with location, altitude and type of fuel used.

BEARING INSTALLATION AND MAINTENANCE

NOTE: To prevent premature failure - please ensure greasing instructions below are applied. As well, tighten bearing set screws, collars, and wheel lugs every four to six months.

ENGINEERING - BALL & ROLLER BEARINGS LUBRICATION

For bearings that are equipped with a hydraulic grease fitting threaded into the housing for ease of lubrication, the proper amount of lubricant in the bearing is important. Both excessive and inadequate lubrication may cause failure. The bearings should be re-lubricated while they are rotating (if it is safe to do so); the grease should be pumped in slowly until a slight bead forms around the seals. The bead in addition to acting as an indicator of adequate re-lubrication provides additional protection against the entry of foreign matter and helps flush out contaminates in the bearing.

By the time the slight bead is formed, it will be noticed that the bearing temperature will rise. It is not uncommon for the temperature to rise as much as 30 degrees Fahrenheit after re-lubrication. If necessary to re-lubricate while the bearing is idle, refer to the recommended re-lubrication grease chart tables on the following page for various sizes of the bearings.

Lubricant-Standard Bearings:

All bearing units are pre-lubricated at the factory with a lithium soap grease which is compatible with multi-purpose grease readily available from local suppliers. The lubricant selected for factory lubrication uses a highly refined mineral oil with a high viscosity index, thickened with lithium soap to conform to NLGI grade 2 consistency. A suitable additive package is added to protect the highly polished rolling contact surfaces from corrosion and oxidation of the lubricant. The lubricant is satisfactory for an operating temperature range of -30 F to +250 F.

Select standard industrial grade greases that conform to the following specification for optimum bearing performance:

General Duty Ball & Roller;
58-75 SUS @ 210 F
450-750 SUS @ 100 F

Premium Duty Ball & Roller;
68-75 SUS @ 210 F
600-750 SUS @ 100 F

Heavy Duty Roller Bearing;
82 SUS @ 210 F
886 SUS @ 100 F

NOTE: For heavy loaded roller bearing applications, grease with EP additives are often recommended for optimum performance.

Table III. Recommended Lubrication

Ball Bearings		Roller Bearings	
Shaft Size (inches)	Grease Charge (ounces)	Shaft Size (inches)	Grease Charge (ounces)
1/4 to 3/16	0.03	1-3/16 to 1-1/4	0.1
1/2 to 3/4	0.1	1-3/8 to 1-7/16	0.22
1-1/4 to 1-1/2	0.15	1-1/2 to 1-11/16	0.32
1-11/16 to 1-15/16	0.2	1-3/4 to 2	0.5
2 to 2-7/16	0.3	2 to 2-3/16	0.55
2-1/2 to 2-15/16	0.5	2-1/4 to 2-1/2	0.65
3 to 3-7/16	0.85	2-11/16 to 3	0.85
3-1/2 to 4	1.5	3-3/16 to 3-1/2	1.25
-	-	3-15/16 to 4	2.5
-	-	4-7/16 to 4-1/2	3.1

Frequency of re-lubrication depends upon operating conditions. The bearing operating temperature is the best index for determining a re-lubrication schedule. The following chart gives the frequency of re-lubrication based upon continuous operation for various operating temperatures and can be used as a satisfactory guide for determining when bearings should be re-lubricated.

Table 2. Lubrication Frequency

Speed	Temperature	Cleanliness	Greasing Interval
100 RPM	Up to 120 F	Clean	5 months
500 RPM	Up to 130 F	Clean	2 months
1000 RPM	Up to 210 F	Clean	2 weeks
1500 RPM	Over 150 F	Clean	Weekly
Any speed	Up to 150 F	Dirty	1 week to 1 month
Any speed	Over 150 F	Dirty	Daily to 1 week
Any speed	Any temperature	Very dirty	Daily to 1 week
Any speed	Any temperature	Extreme conditions	Daily to 1 week

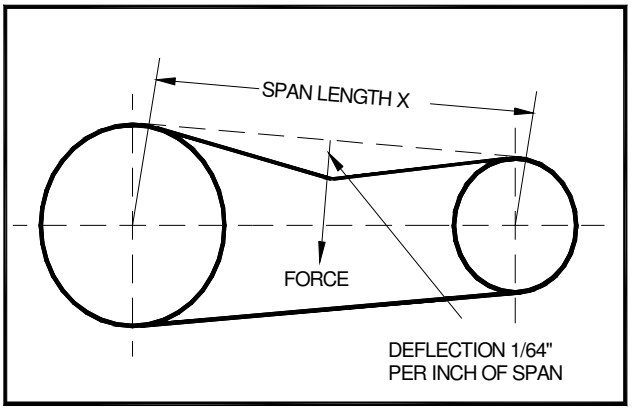
TENSIONING V-BELT DRIVES

1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24-48 hours of operation.
3. Over-tensioning shortens the belt and bearing life.
4. Keep belts free from foreign material that may cause slip.
5. Make V-drive inspection on a periodic basis. Tension when slipping. Never apply belt dressing as this will damage the belt and cause early failure.

Check and tighten belt tension. The following procedure is recommended for tightening belts:

a) Measure span "X" shown in Figure A.
b) At the center of span length "X", apply a force perpendicular to the span and large enough to deflect belt 1/64" for each inch of span length. Example- the required deflection for a 40" span would be 40/64" or 5/8".
c) Compare the force applied with the values given in Table III. If force is between the minimum and maximum range shown, the drive tension should be satisfactory. A force below the minimum value indicates an under tightened belt and force that exceeds the maximum value indicates an over tightened belt.

FIGURE A



ELECTRODE SETTINGS

- Check, and adjust if necessary, the critical dimensions shown in Figure 5. Verify that the oil tube assembly and electrodes are in good condition, with no cracks or damage.
-

Figure 5 - Nozzle and nozzle line assembly

Legend (Figure 5)

P	Nozzle centerline to electrode tip = 3/16"
Q	Nozzle face to electrode tip = 1/4"
R	Electrode spacing = 3/16" gap

SIDE PLATE SETTINGS FOR IHS 600 / 700 MODELS

Legend (Figure 7)

c Bottom acorn nut	e Indicator adjusting plate
d Fastener	f Secondary adjusting plate

THE SETTING OF THE "Z" DIMENSION

□ Install nozzle line assembly

* Insert the nozzle line assembly into the burner air tube.
Reference Figure 6
* Slide the secondary adjusting plate (Figure 7, item f) completely to the left on the indicator adjusting plate (item e). Finger tighten acorn nut (item C) to secure the two plates together. Slide both plates completely to the right (Indicator Plate will read 0). Tighten fastener (item d).
* Install the spline nut on the end of the nozzle line, leaving the nut loosely placed so the plates can be moved.

Figure 6 - Nozzle line assembly in burner

□ Set dimension Z

* Loosen fastener in Figure 7. Slide the nozzle line and plate assembly until dimension Z in Figure 6 is:

CF500 - 1 9/16" = 1/16"
CF800 - 1 3/4" = 1/16"

When dimension Z (from end of air tube to flat area of front face of head) is correctly set, tighten acorn nut (item c).

* Attach the oil line from the oil valve to the nozzle line end. Tighten securely.
* Before proceeding, check dimension Z once again. Loosen acorn nut c if necessary to reposition the nozzle line. Once dimension Z is set. Do not loosen the acorn nut (item c) again. Note that for the setting of fastener d refer to Initial Head Position procedure on Page 11.

TROUBLE SHOOTING GUIDE

ALWAYS DOUBLE CHECK FOR SUFFICIENT POWER , GAUGE OF CORD AND PROPER FUEL SUPPLY. POWER AND FUEL SUPPLY MUST BE SHUT OFF/DISCONNECTED BEFORE REMOVING OR REPLACING ANY COMPONENTS ON THE HEATER.

1. Unit is turned on, nothing happens after 5 second safe start.

a. Ensure proper voltage coming in, 115V AC.

b. Check for power across the secondary terminals on the transformer. If no power, remove fuses and check for continuity across the fuses. Replace faulty fuse. If 120 volt go to c.

c. Check for power on both sides of the circuit breaker. If power on one side only reset the circuit breaker. Go to d.

d. Reset the thermal overload on the motor starter by pressing in the red and blue buttons (not on UFD equipped units).

e. Check for 120 volt power between terminals 1 and 2 and between terminals 3 and 2 in the control panel. If 120 volt power is on terminal 1 and not on terminal 3, high is tripped. Reset the high limits located behind the small covers on the side of the unit.

f. Check manual reset button on motor and wiring connection to motor. If reset pushed and power going to motor, nothing is happening, replace burner motor.

g. On neutral line (white wires) make sure all connections are tight and secure, and unit is properly grounded.

h. If power coming into black wire on primary control, but no power out to orange wire, replace primary control.

i. If green light on primary control stays on, check to ensure transformer door is closed properly as cad cell is detecting light. Check cad cell is working. If light stays on and no obvious areas open, check OHM reading across two yellow wires. If you get a reading, replace cad cell. If you get no OHM reading from cad cell, replace primary control if light still on.

2. Burner motor starts but unit will not fire.

a. Check for power on blue wire on primary control going to ignitor. If no power there, replace primary control if powered, go to b.

b. Remove electrode assembly and check isolators for cracks or chips in the porcelain. Make sure electrode setting is proper. For electrode adjustments, please turn to page 8.Clean assembly if there is any soot or oil..

c The nozzle should be checked and ensure it is not clogged or blocked. Make sure nozzle is not loose.

d. Ensure air shutters are properly set to factory specifications.

e. Check for power on violet line on primary control. After pre-purge, if no power sent to violet line, replace primary control. If power on violet line, remove copper fuel line at electrode assembly to ensure fuel is coming out. If no fuel there, replace solenoid valve.

f. At the bleeder screw, check for proper out pump pressure (see maintenance section). If low or no pump pressure, go to g

g Check oil filter, oil pick up tube and oil lines to ensure free flow and they are not clogged or dirty.

h Check electrical polarity and grounding.

3. Burner fires then locks out.

a. Check oil pressure to ensure solenoid valve is opening. Check oil flow system, filter, pick up tubes and lines.

b. The nozzle should be checked to ensure it is clean and emitting a good spray pattern, as this could affect the cad cell operation.

c. Cad cell (flame detector) could be defective. Disconnect yellow cad cell wires from primary control. Start unit and when it fires, connect jumper across connections on

primary control. If unit continues to run, then check cad cell alignment with burner, clean face with a soft cloth and ensure no external light is affecting it. With an ohmmeter, check resistance across cad cell leads with machine running and primary control cad cell leads jumpered out. If resistance over 1200 OHMS, cad cell should be replaced. If unit locks out with jumper, replace primary control.
d. Wires between cad cell and primary control should be checked to see that they are not pinched or crimped..
e. Prime fuel pump by loosening bleeder screw till steady stream of fuel comes out to ensure no air or bubbles in fuel line..
f. If unit locks out three times in succession, it will go into restricted lock out mode. To reset, hold down reset button for 45 seconds until LED flashed twice. The unit will then resume in normal operating mode. After verifying primary control is not in lockout & light continues to flash, replace primary control.
g. Check polarity, ground & voltage must be between 108-132v AC.
h. Make sure high limit is functioning properly.

4. Smoky fire

a. Check nozzle, make sure is tight and not clogged.
b. Check combustion chamber for cracks or burnt out.
c. Check air band settings. (Air shutter and/or air band may be closed too much-restricting combustion air.
d. Check pump pressure.
e. Check slide plate to make sure it is in correct position.(See page 8 for settings)If necessary, open slightly.

5. Delayed ignition

a. Check for proper electrode setting.
b. Check the isolators for cracks or a conducting coat of soot or oil. Cracks sometimes occur under the electrode bracket, causing a short circuit.
c. Check to see that the air shutter is not overly open-too much air will blow out flame.
d. Check to ensure pump pressure is properly set..
e. Change nozzle.
f. Check fuel filter, replace if necessary.
g. Ensure that draft or wind is not blowing out flame-add 3 stack.

6. Main fan will not come on, unit shuts down on high limit..

a. Check temperature feeler, make sure it is in properly.
b. Jumper out fan switch to test motor. If you have voltage to motor and still does not start, replace motor. Check line voltage to ensure proper voltage. Also checks amp draw on motor, motor may be running too hot and not run due to thermal overload being tripped.
c. Replace fan switch if you have power on one side after unit heating up it does not make.
d. Replace high limit as it may be tripping too soon and not giving fan switch time to engage.
e. Ensure fan switch temperature is correct for weather conditions (see page 7 for settings)

7. Unit on, but cycles on high limit

a. Check air flow, ensure both ducts are in place and clear of obstruction and straight.
b. Check pump pressure, unit could be over firing.
c. Check nozzle that proper size of nozzle is installed.
d. Change high limit.
e. Maximum duct length 100 feet total per side. Any longer will create back pressure in the unit and trip the high limit.* SEE PAGE 2 FOR SPECS*

8. Combustion chamber turns red.

a. Nozzle may be firing side ways (replace or adjust)
b. Clogged nozzle (replace)
c. Temperature feeler not on properly or missing (Must be touching heat exchanger)
d. High limit not functioning (replace)
e. Excessive pump pressure. Check and reset if necessary.

Sequence of Operation of Honeywell R7184B Primary Control

1. STANDBY The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a 5 second delay while control performs a safe start check.

2. VALVE-ON DELAY The ignition and motor are turned on for a 15 second valve on delay. During this delay, the blower will circulate air through the heat exchanger, purging what ever fumes that have collected.

3. TRIAL FOR IGNITION (TFI) The fuel valve is opened. A flame should be established within the 15 second lockout time.

4. LOCKOUT If flame is not sensed by the end of the TFI, the control shuts down on safety lockout and must be manually reset. If the control locks out three times in a row, the control enters restricted lockout. To reset , hold down reset button for 45 seconds until LED flashes twice.

5. IGNITION CARRYOVER Once flame is established, the ignition remains on for 10 seconds to ensure flame stability before turning off.

6. RUN The burner runs until the call for heat is satisfied. The burner is then shut down and sent to standby.

7. RECYCLE If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and then repeats the above ignition sequence. If flame is lost three times in a row, the control locks out to prevent cycling with repetitious flame loss due to poor combustion.

DISABLE FUNCTION

Any time the motor is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held and will return to standby when released.

LED INDICATOR KEY

LED	STATUS
On	Flame sensed
Off	Flame not sensed
Flashing (1/2 second on, ½ second off)	Lockout/Restricted Lockout
Flashing (2 second on, 2 second off)	Recycle

Sequence of Operation
Beckett Genisys 7505

Burner States

1. Standby: The burner is idle, waiting for a call for heat.

2. Valve-on Delay: The igniter and motor are on while the control delays turning on the oil solenoid valve for the programmed time.

3. Trial for Ignition: The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time ("lockout time").

4. Lockout: The control has shut down for one of the following safety reasons:

a. The trial for ignition (lockout) time expired without flame being established
b. The cad cell detected flame at the end of the Valve on Delay state.

To reset the control from lockout click the button 1-second.

NOTE: A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a Hard Lockout state that must be reset only by a qualified service technician.

To reset from Hard Lockout, hold the reset button for 15 seconds until the yellow light turns on.

5. Ignition Carryover: Once flame is established, the igniter remains on for 10 additional seconds to ensure flame stability.

6. Run: The flame is sustained until the call for heat is satisfied. The burner is then sent to Motor-Off Delay, if applicable, or it is shut down and sent to Standby.

7. Recycle: If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to Recycle each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into Hard Lockout instead of recycle. This feature prevents excessive accumulation of oil in the appliance firing chamber.

8. Motor-Off Delay: If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motor-off delay time before the control returns to standby.

9. Pump Prime: The igniter and motor are on with the oil solenoid valve energized for 4 minutes. During Pump Prime mode, the cad cell is disregarded, allowing the technician to prime the pump without having to jumper the cad cell.

Reset Button Operation

Table 2 explains what action the control will take when the reset button is pressed for different lengths of time during the various burner operating states.

Priming the Pump

1. Prepare the burner for priming by attaching a clear plastic hose over the bleed port fitting and fully opening the pump bleed port. Use a suitable container to collect purged oil.

WARNING Hot Gas Puff-Back and Heavy Smoke Hazard

Failure to bleed the pump properly could result in unstable combustion, hot gas puff-back and heavy smoke.

- Do not allow oil to spray into a hot combustion chamber while bleeding air from the pump.
- Install a gauge in the nozzle discharge port tubing or fully open the pump bleed valve to prevent oil spray from accumulating in the combustion chamber during the air bleed procedure.
- Ensure that all bubbles and froth are purged from the oil supply system before tightening the pump bleed valve.
- Ensure that the appliance is free of oil and vapor before starting or resetting the burner.

2. Initiate a call for heat.

3. After the burner starts, press and hold the reset button for 15 seconds until the yellow light turns on. This indicates that the button has been held long enough.

4. Release the reset button. The yellow light will turn off and the burner will start up again.

5. At burner start up, click the reset button while the igniter is still on. This will transition the control to a dedicated Pump Prime mode, during which the motor, igniter and valve are powered for four minutes. The yellow light will be on.

6. Bleed the pump until all froth and bubbles are purged. If desired, terminate the call for heat or hold the reset button for at least one second to exit Pump Prime mode and return to Standby.

Table 2 – Reset Button Operation

If the burner is in the below state:	**Pushing the reset Button Click (press < 1 second)**	**Button will: Button Hold (press > 1 second)**	**Button Hold (press 15+ seconds)**
Lockout	Reset from Soft Lockout	Reset from Soft Lockout	Reset from Restricted (Hard) Lockout
Valve-on Delay, Trial for Ignition Carryover Run (Igniter is shut off)	Go to Pump Prime (see “Priming the Pump” above) Yellow light flashes to indicate cad cell resistance. See “Cad Cell Resistance Indicator” for table of resistance values.	Disable the Burner: Any time the burner is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held.	Enables Pump Priming: After the reset button has been held for 15 seconds, the button can then be clicked during the next ignition sequence to enter Pump Prime mode.
Motor-off Delay, Standby	No action		
Pump Prime	No action	Exit Pump Prime mode and return to Standby	Exit Pump Prime mode and return to Standby

Table 3 – Status Lights

Light Color	On Continuously	Flashing
Red	Restricted (Hard) Lockout	Soft Lockout
Green	Flamed sensed during normal operation (Could be stray light during standby)	Recycle
Yellow	Control is in Pump Prime model or Reset button currently held for 15+ seconds.	Cad Cell resistance. See "Cad Cell Resistance Indicator" on page 10 for a table of resistance values.

7. At the end of 4 minutes, the yellow light will turn off and the control will automatically return to standby mode.

8. If prime is not established during the four minute pump prime mode, return to step 5 to re-enter Pump Prime mode. Repeat steps 5 through 7 until the pump is fully primed and the oil is free of bubbles.

9. Terminate the call for heat, and the control will resume normal operation.

□ Cad Cell Resistance Indicator

- During the burner Run state, click the reset button (less than 1 second) to check the cad cell resistance range. The yellow light will flash 1 to 4 times, depending on the amount of light detected by the cad cell. See chart below:

Yellow Light Flashes	Flame Detection Range
1	Normal (0 – 400 ohms)
2	Normal (400 – 800 ohms)
3	Normal (800 – 1600 ohms)
4	Limited (1600 ohms – Lockout)

□ Resetting from Restricted or Hard Lockout

WARNING: Fire & smoke Hazard

Before starting or resetting the control from restricted lockout state, troubleshoot the heating system for the root cause(s) of the lockout.

- Make necessary repairs or adjustment to ensure a safe start condition.
- Ensure that the appliance is free of oil and oil vapors before starting or resetting the burner.

- If the control continues to lockout without a satisfied call for heat, or fails the motor relay check, the control enters Hard (restricted) Lockout in order to limit accumulation of unburned oil in the combustion chamber.

- To reset, hold the button down for 15 seconds until the red light turns off and the yellow light turns on.

- Always verify the control functions according to all specifications before leaving the installation site.

- Replace the control if it does not operate as specified.

□ Disable Function

- Any time the burner is running, press and hold the reset button to disable the burner. The burner will remain off as long as the button is held.

PRIMARY CONTROLS

48185B-R7184B HONEYWELL
THIS IS THE LATEST PRIMARY THAT HAS BEEN USED SINCE 2004. THERE IS TWO DIFFERENT MODELS THAT HAVE BEEN IN PRODUCTION, THE SERIES 4 & THE SERIES 5. THE SERIES 4 HAD WIRES ONLY COMING OUT OF THE BOTTOM OF THE CONTROL. THIS CONTROL IS NO LONGER AVAILABLE AND WAS REPLACED BY THE SERIES 5. THE SERIES 5 HAS TERMINAL SPADES INSTEAD OF WIRES FOR EASE OF REPLACING. WHAT IS REQUIRED FOR CONVERSION IS A STANDOFF (P/N 48000).

IHS
CF BURNER
ELECTRODE ASSEMBLY

“A” PUMP (#48139)

When replacing a fuel pump, ensure 1/16” by pass plug is installed in return port. Use a 5/32” allen wrench.

LIMITS

ADJUSTABLE MANUAL RESET HIGH LIMIT 200 F

IHS HIGH LIMIT
L190 – 40 F

IHS 700 SEQUENCE OF OPERATION

1. SYSTEM SWITCH "MANUAL"
The burner fan motor starts and after a 1 minute purge period the burner fires. When the burner fires a thirty second warmup period occurs (as set on timer #1), after which the supply fan starts and runs continuously. When the system switch is turned off the supply fan continues to run for 3 minutes (as set on timer #2) to cool down the heat exchanger.

2. SYSTEM SWITCH "THERMOSTAT"
Same as #1 above except the burner and blower operation are intermittent on a call for heat from the thermostat.

3. SYSTEM SWITCH "OFF"
Unit inoperative.

Notes:

1. The unit on light is only lit when the burner is on.
2. If the unit power is disconnected without a cool down period the high limit could trip. The limit will have to manually reset before the unit will run.
3.