Contents

How to Use This Manual:

- Before operating your system: **Read** and comply with Safety Information.

  Operating Personnel: **Read** Operating Procedure.

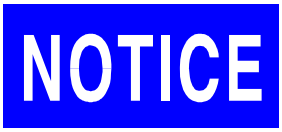
  Maintenance/Installation Personnel: **Read** Installation & Initial Start-Up Procedures, followed by Periodic Maintenance Requirements, Component Manufacturer's Publications, and Drawing & Specifications.

- This system utilizes electrical sources, which is dangerous if not connected and used properly.

Before Operating Your System:

- Comply with the following checklist.

  - ✓ **Read** the Section of this Customer Manual, which contains important safety information.
  - ✓ **Read** the Operating Procedures.
  - ✓ **Read** the Component Manufacturer's Manuals found on each manufacturer's website.
  - ✓ **Ask** your Maintenance Department if the system is safe to operate; then double check for danger tags, lockout tags, defective equipment, etc.



WARNING: *Serious personal injury or death may result if this information is ignored.*

Before Operating This Machine The Following Must be Ensured:

- ✓ The machine has been thoroughly inspected for any damage that may have occurred during transit.
- ✓ All fasteners which may have come loose during transit have been tightened.
- ✓ The machine's base has been properly secured and leveled.
- ✓ The machine's interior spaces have been thoroughly vacuumed or otherwise cleaned of debris.
- ✓ The Installation and Initial Start-up Procedures in this manual have been understood and complied with.
- ✓ The Safety, Operating & Periodic Maintenance Instructions in this manual have been understood and complied with.

WARNING: Failure to comply voids the Manufacturer's Warranty.

Questions pertaining to these instructions?

Please call ITS at (414) 902-5300

SECTION 1: Safety Information:

ITS Safety Information

-Warning Label "Signal Word" Definitions
-General Safety Information
-General Safety Info/Heated Equipment

Definitions of Warning Label "Signal-Word Headers"

The following meanings are ascribed to these Warning Headers:

1. Equipment performance impairment or damage may result if information is ignored.
2. Moderate personal injury of a temporary nature or minor personal injury of a permanent nature may result if information is ignored
3. Serious personal injury of a temporary nature or moderate personal injury of a permanent nature may result if information is ignored.
4. Death or serious personal injury of a permanent nature may result if information is ignored.
5. Equipment damage is inherently possible if information is ignored that is related to Caution, Warning and Danger signal-word headers

General Safety Information:

- This procedure has been written to warn of the common hazards encountered in industrial environments. It is **NOT** a comprehensive Safety Manual of specific warnings for specific types of industrial equipment, but instead is general in nature, covering general hazards.

- Along with this insert, **read** '**General Safety Information Pertaining to Heated Equipment**', located in this Section, as well as the safety information contained in the individual Component Manufacturer's Publications.

- **Remember**: Your system uses dangerous sources of energy, which can severely injure and even kill. **Do NOT** try to use any part or feature of your system until you are sure you know how to safely use it. Be sure you know the limits and the machinery of your system, as high temperatures and speeds can be very easily and very quickly achieved by industrial equipment.

- Parts of your system may start at any time! Lockout all sources of energy before placing your fingers, hands, arms, feet, legs, head, etc., into areas of the system containing motorized or other parts that can move. Comply with your local Energy Lockout/Tagout Program. Serious personal injury or death may result if this information is ignored.

Warning: Do not attempt to start your system without first ensuring all guards are properly secured in place.

Serious personal injury may result if this information is ignored.

- **NOTE:** It is the responsibility of the purchaser to assure that all operations and maintenance personnel are properly trained. Training is available through International Thermal Systems. ITS recommends training at the time of installation. Subsequent new employee training is also the responsibility of the purchaser, and again ITS is available to aid in this endeavor. Contact ITS Technical Service Department for costs and details.

- Like all industrial systems, this system must be used with a healthy amount of respect. If you do not show respect, sooner or later you will suffer injury.

- Do not attempt to start your system without first making sure that all guards and electrical, etc., cabinets, doors, etc., are in place.

- Do not enter any part of the machine unless the machine is first stopped, then locked-out.

- Do not remove guards unless the machine is first stopped, then locked-out and tagged out in accordance with your company's procedures

Before starting your system, make sure:

- ✓ It is clear of all people.
- ✓ No one is working in the machines of the system.
- ✓ Everyone around the system is aware it is going to be started.

- Don't touch any of the exposed, hot parts that may be around the places you will be working. (As with any heated system, not all of its hot parts can be insulated or guarded.)
- Remember that high-temperature systems (those rated over 600°F/315°C) have parts - especially inside that stay hot for a long time.
- Be aware of parts taken out of heated equipment: They may not appear to be hot, even though they may be hot enough to severely injure. Therefore, make sure that everyone walking towards areas containing hot parts is made aware of the hazard (preferably by signs and cordoning (roping)-off areas containing hot parts)... even simply leaning on such hot parts can cause serious burns.

High Voltage Hazards

- Because high voltages are used throughout the system (for conveyors, fans, motors, pumps, reject gates, dampers and other automated parts), you must not try to fix any part unless you are fully qualified to do so safely.

• Equipment, which is to be maintained, **must be locked-out** from all energy sources **prior** to maintaining them, according to the authority having jurisdiction in your area. **ONLY** qualified personnel should maintain this equipment. Serious personal injury may result if this information is ignored. • Many of this systems' components are operated at high voltages, amperages, temperatures **AND** speeds, **AND** may involve the use of flammable fuels that are explosive under certain conditions. **Observe** all Fire, Lockout and Personal Protection safety rules. **Replace all guards after removal**. **ONLY** qualified personnel should maintain the system. Read and understand the information and warnings contained in Section 1 of this manual **before** maintaining this system. **See also** the component manufacturer's manuals and bulletins for specific safety-related information and warnings. Serious personal injury or death may result if this information is ignored. • Over Temperature Devices must **NOT** be bypassed **NOR** adjusted to a setting higher than originally set by **ITS**. Consult **ITS** for the correct settings for your system. Serious personal injury or equipment damage may result if this information is ignored. • The Purge Timing Device must **NOT** be bypassed **NOR** adjusted to a setting lower than originally set by **ITS**. Consult **ITS** for the correct settings for your system. Serious personal injury or equipment damage may result if this information is ignored. • Blowers operate at high speeds. Eye	   

protection is required downwind. **ONLY** qualified personnel should maintain them. **See also** the manufacturer's manuals and bulletins for specific safety-related information and warnings. Equipment, which is to be maintained, **must be locked-out** from all energy sources **prior** to maintaining them, according to the authority having jurisdiction in your area. **Lock** the blower's impeller to prevent wind-milling. Serious personal injury or death may result if this information is ignored.

- After maintaining blowers, perform the Initial Start-up Checks listed in Section 2 of this manual. They cover important items, which must be ensured **prior** to re-starting blowers. Serious personal injury or death may result if this information is ignored.

- There will always be some dust and small metal chips that will be blown around during the initial start-up of blowers. Therefore: **Clear** personnel from all areas, which are in the direct path of airflow. **Ensure** all personnel in the general vicinity of the system are aware that blower start-up is about to take place, **and ensure that they are wearing eye protection**. Serious personal injury may result if this information is ignored.

General Safety Information Pertaining to

Heated Equipment

- As most companies have their own safety/educational programs, we will not present a method of informing or protecting personnel. We do, however, point out that Safety Procedures should be determined and instituted by the purchaser of our equipment such that safe conduct is ensured, related to your installations of: Un-insulated, heated piping and ducts, handles, combustion housings burners and similar equipment

- Boilers, heaters, vaporizers, heat exchangers, burners, etc., can and usually do have components at elevated temperatures. The temperature of some equipment is HARMFUL to HUMAN TISSUES when TOUCHED or otherwise HANDLED. Therefore, place railings, guards, warning placards (signs), etc., where applicable in order to alert personnel of the hazards of those items and areas they are approaching.

- Refer to the ANSI Z535 Series for more information

- Operating temperatures greatly affect the areas, surfaces and items to which warning placards should be associated and/or affixed. Surface temperatures exceeding 140°F (60°C) **certainly** should be brought to the attention of all personnel **prior** to their encountering the hazard.

- Personal protective equipment (PPE) usage should be rigorously enforced so as

to preclude injury, **particularly** when chemicals are involved.

- Where PPE is inappropriate or ineffective, other protective means should be employed, such as guards, guardrails, screens, etc., particularly along frequently traveled routes.

- Latched doors with this sticker affixed are utilized for explosion relief. It is recommended that the end user of this equipment use cautionary measures to insure personnel are restricted from entering the door swing perimeter area while equipment is operating.

SECTION 2: Installation & Initial Start-up Procedures

Installation Procedures

- Normal precautions pertaining to the handling and installation of sensitive machinery and electronics must be taken to ensure such equipment will operate properly

Receiving

- Upon receipt of equipment, inspect boxes or crating for obvious mishandling or physical damage. If damage is evident, uncrate and inspect equipment.
- **NOTE**: Any damage caused in transit must be reported immediately to the mover so receiver can file a claim for damage.
- Before moving equipment from unload area; prepare a space for final location. This space should have all services (air, electric, drain, water and any other required for operation) in close proximity to equipment. Also, the space should be level and free of jagged or broken flooring.
- **CAUTION**: The electrical controls for this unit are subject to failure or erratic performance when exposed to temperatures above 120°F. The panel must be ventilated. Please consult ITS, if this problem exists.

NOTICE

Uncrating

- This unit was crated and packaged with as much protective material as required for safe shipment. Care must be exercised in removing crating lumber, braces and other packing material from interior of unit.

- **NOTE**: If unit is skidded for shipment, leave on skid until unit is in final location. This will allow for safer and easier handling.

- After unit is in final location, anchor as required, open doors and remove packing material. It is essential that a general inspection of the unit be conducted at this time.

✓ **Check** all bolt mounted components for proper tightness.
✓ **Check** all wiring for terminal tightness.
✓ **Check** blowers for freedom of rotation.
✓ **Check** blower belts for proper tightness.
✓ **Check** sensing element(s) for proper position.

Physical/Component Mounting

- While moving and securing the machine, take care not to damage any of its mechanical or electrical components. If you must walk on top of the machine, do not step on any tubing or components. Use only the fasteners supplied with the machine to assemble items that were disassembled for shipping.

Wiring

- Some wiring may have been disconnected for shipping. Reconnect all such wiring according to the wire markers affixed to them (they correspond to the terminal strip positions to which they are to be connected). Ensure all electrical connections are properly tightened.

Utility Connections

- For electrical supply requirements, refer to the electrical schematic or the machine data-plate.

- Electrically ground the machine and connect the electrical supply according to your local and/or national electrical codes. A constant supply of pressurized air may be required to operate the pneumatic equipment. Check assembly for connection size, location, and pressure required. This unit may require final field adjustments.

- All electrical connections should be made in accordance with the appropriate local and national codes. Where more strict codes do not exist refer to NFPA 70 "National Electric Code"

- Properly size the electrical supply using information on the machine data plate. Electric supply must include a safety shut off such as a circuit breaker or fused disconnect switch between your power supply and your equipment.

NOTICE

- The machine must be adequately

grounded. Grounding wire must be sized in accordance with local codes. Where more strict codes do not exist refer to the National Electrical Code – NFPA 70.

- Care must be taken during installation of electrical service to the control panel that metal chips of filings do not get into electrical components. Cover components when drilling or cutting control panel.

- Your equipment may also need water and drain connections.

Start-up and Adjustments

- Refer to the Initial Start-up Procedures, located later in this Section of this manual, for instructions.

- Should you have questions concerning the installation of your system, call ITS Service at 414-902-5300.

- This system utilizes electrical and fuel sources, which are dangerous if not connected and used properly

- **Before** performing these Initial Start-up Procedures, read Section 1 of this manual, which contains important safety information. Equipment, which is to be maintained, **must be locked-out** from all energy sources **prior** to maintaining them, according to the authority having jurisdiction in your area.

- **ONLY** qualified personnel should perform initial start-up. Serious personal injury or death may result if this information is

ignored

- This procedure provides information for ensuring equipment is not damaged or destroyed. Ignoring this information and the Notices and Warnings provided in this procedure may result in equipment damage or destruction.

- **NOTE**: This procedure is intended ONLY for those who are qualified to maintain electrical based systems.

- Also, note that this insert contains information of a **generic** nature only (i.e., applicable to most **ITS** systems). Specific Operating Instructions, if applicable to your system, can be found in The Sequence of Operations of this manual.

- Persons who will be operating this system on a daily basis are referred to The Sequence of Operations of this manual for Operating Instructions.

NOTICE

Pre Start-Up Inspection

System Electrical Sources

- **Before** energizing your system, check your System's Specification Label for the rated voltage, phase, and frequency for your system against actual measurements made at the line terminals of the system's Main Disconnect Switch.
- Improper voltage and frequency can damage or destroy electrical equipment. Equipment that is not contained inside enclosures may severely injure personnel.

Ensure the correct voltage and frequency is present at the system's Main Disconnect Switch before placing it into its ON position.

- Serious personal injury, or equipment damage or destruction, may result if this information is ignored.

System Fuel Sources

- Most gas-burner systems require a supply whose pressure does not exceed 10psi. See Gas Train Print in Section 8 of this manual.
- Gas regulators regulate the pressure supplied to downstream devices. Gas regulators regulate the pressure supplied to downstream devices. Regulator settings must not exceed the inlet ratings of those downstream devices. Exceeding a downstream device's maximum inlet pressure can cause its failure, resulting in uncontrolled gas delivery. This in turn may lead to an explosion at the point of final delivery (e.g., the burner).
- ONLY qualified personnel should maintain gas regulators and downstream devices. DO NOT attempt to re-adjust gas regulators without proper calibration equipment being connected as directed by the various device manufacturers. See also the manufacturer's manuals and bulletins for specific safety-related information and warnings. Serious personal injury or death may result if this information is ignored.

Initial Start-up: Inspections & Procedures

Blowers & Air Flow Items

Initial Inspection

- **Before** performing the following inspection, **lockout** all electrical and fuel sources connected to the system and its components.

- Serious personal injury, or equipment damage or destruction, may result if this information is ignored.

- This document's procedures and checklists must be complied with before energizing the system's blowers. Equipment damage will result if this information is ignored.

- **<u>Complete the following checklist:</u>**

✓ Ensure all blower assemblies and associated ducting are sturdily mounted and securely assembled. Ensure blower assemblies (motors as well as the blowers themselves) are adequately grounded, in order to prevent static electricity build-up.

✓ Check all sheaves against the appropriate ITS drawings (provided in Section 8 of this Manual): Ensure the proper sizes are installed on motor and blower shafts. Excessive speeds or inability to reach specified blower speed will result if sheave sizes are reversed or incorrect.

✓ Ensure sheaves and all other rotating parts are adequately secured and have not been damaged during transit.

✓ Manually spin blower impellers; so as to ensure no damage has occurred during transit. They should rotate freely and not appear to be out of balance.

✓ Inspect the interior of all intake and

exhaust ductwork, and blowers: Ensure there are no foreign objects that can be drawn into or blown through the ducting and blowers.

- ✓ If applicable, check belt sets against the appropriate ITS drawings. Organize the sets according to their blower, and install them onto their respective blower assembly's sheaves.
- ✓ Ensure belt (or coupling, if it is the case) is properly aligned.
- ✓ Tension belts with a belt tensioner, to the tension specifications for the belts in relation to the distance they span between sheaves (pulleys) and number of belts-per-blower. Over- or under-tensioning can lead to excessive bearing and belt wear.
- ✓ Check motor and blower bearings for proper lubrication (See Section 5 of this manual for specific information).

Initial Powered Start-up of Blowers

- Before initially starting blowers, read, understand, and comply with the safety information located in Section 1 -**and** the blower manufacturer's manual(s) located in the proper section of this Customer Manual.
- **Secure** all safety guards in their proper place. Serious personal injury or death may result if this information is ignored.
- There will always be some dust and small metal chips that will be blown around

during the initial start-up of blowers. Therefore: **Clear** personnel from all areas, which are in the direct path of airflow. **Ensure** all personnel in the general vicinity of the system are aware that blower start-up is about to take place, **and ensure that they are wearing eye protection.**

- Serious personal injury may result if this information is ignored.

Initial Powered Start-up Checklist

- ✓ Before unlocking the electrical power source to the system:
- ✓ Re-check belt (or coupling, if it is the case) alignment.
- ✓ Close and secure access doors and panels, as applicable.
- ✓ Note which rotation direction is marked with each blower.
- ✓ Ensure no tools are left near the rotating parts of the machine.
- ✓ Clear the area around the blowers of all personnel, and ensure that the application of power to the system will be safe.

Initial Powered Start-up Procedure

- After performing the above checklist, remove the lock-out device from the system's power source, and apply power to the system via switching the system's Main Power Switch to its ON position.

- Select a blower, determine its proper rotation by viewing the rotation sticker located near the motor, monitor its rotation (or have someone do it for you if it's not in sight from its Control Panel switch), and momentarily energize it. Note whether it is rotating in the correct direction. Repeat Step for each blower.

- If they all rotate in the wrong direction, lockout the building's electrical power source that's wired to the system and reverse 2 of the phase conductors that are wired into the system's Main Disconnect. If only one or a few blowers rotate in the wrong direction, lockout the system's Main Disconnect Switch and reverse two of the phase conductors that are wired to their respective motors. If they all rotate in the correct direction, proceed to the next step.

- Once correct rotation has been established for all the blowers, check each one individually for:

✓ Excessive Vibration and unusual noises
✓ Proper running speed at the blower-end (see the proper drawing for values)
✓ Nominal current draw, to ensure motor is not overloaded

- Problems? Immediately de-energize blower.

- If there are any problems with blower operation: After it has been de-energized and locked-out, investigate possible causes. See Section 4 of this manual for troubleshooting information pertaining to blowers.

- As with any mechanical system, there is a break-in period. Note that it is normal for some fasteners to loosen somewhat during the first eight hours or so after initial start-up (from being bumped around during transit). Other problems may make themselves known during this period.

- Therefore: For the first 8 hours of operation, periodically check...

✓ Blower motor current draw

✓ Blower and blower motor bearing temperatures (see the manufacturer's manuals in this manual for maximum values)

✓ After 8 hours of operation, de-energize the blowers, lock-out the System's Main Disconnect Switch, and check all associated...

✓ Bearing temperatures
✓ Set screws, mounting means, and other fasteners
✓ Belt or coupling alignments
✓ Belt tensions;

✓ And lubricate, re-adjust, tighten or replace them as necessary. Contact the person listed on the Spare Parts List for warranty replacement parts

- After 24 hours of operation, de-energize the blowers, **lockout** the System's Main Disconnect Switch and check belt tensions with an appropriate belt tension-measuring device.

Procedures for balancing an oven, for air flow, and temperature

- Preliminary check

- All temperature and high limit controllers should be checked for calibration. Temperature controllers should be set at the desired bake temperatures and the high limit controllers set approximately 1000 F. above the bake temperature.

- Oven Exhaust Fan Check

- Capacity - Take traverse check of exhaust stack using air velocity measuring device. Check should be made at least four straight pipe diameters downstream of fan outlet. After initial check is made and results calculated, adjust exhaust damper for rated exhaust capacity. Recheck exhaust capacity taking traverse of stack.

- Zone Fresh Air Inlets

- The fresh air inlets are to be adjusted to balance the oven so that the conveyor entrance and exit openings are neither positive nor negative. This can be checked with a smoke bomb. The smoke should neither go into the oven nor be blown out of the oven with any velocity. If either condition should exist, the blast gate would be adjusted accordingly. Blast gate will be located directly above burner on heater house assembly.

- NOTICE: Damage can result to an oven that is not properly balanced. If an oven is spilling heat (oven positive) the external steelwork, sheet metal, access doors, conveyor bearings, controls, etc. subjected to this heat can be damaged beyond repair. An oven that is negative or drawing air in through the conveyor openings will result in uneven air temperatures in the work space which will decrease the temperature your parts will see and lengthen their heat-up time.

- Fresh air entering the oven must be drawn in through the fresh air inlets. The fresh air, which is approximately 70 F. when entering the oven will then be preheated as it flows past the burner, which will reduce the temperature variance in the work space.

- A temperature curve should be run to check the temperature uniformity of the oven. In the event one side of the oven is higher or lower in temperature than the other side, it will be necessary to either open or close the fresh air dampers on its respective side to bring the temperature variation within specified tolerance.

- Cooler Zone Balancing Procedures

- Cooler exhaust fan capacity - it usually will not be necessary to take a traverse check of the exhaust stack to determine the volume of air being exhausted since the cooling system is not as critical as the oven. A check should be made to insure that the exhaust fan motor does not exceed its rated amps. In the event the amp load exceeds the rated amps, the

NOTICE

exhaust fan damper should be adjusted to handle less air.

- The cooler supply fan damper should be adjusted so that the conveyor entrance and exit openings are neither positive nor negative. This can be checked with a smoke bomb. The smoke should neither go into the oven or be blown out of the oven with any velocity. If either condition exists, the supply dampers should be adjusted accordingly.

Burners

- The Burner has been installed, adjusted and checked at ***ITS***.
- If applicable, your ***ITS*** Field Service Representative has re-adjusted all parameters pertaining to proper Burner operation at your facility.
- Therefore, only the normal burner-start sequence need be performed. Refer to The Sequence of Operations of this manual for the burner-start sequence for your system.

COMPONENTS NOT LISTED IN THIS INSERT

- If there is a system component that is not listed in these Initial Start-up Procedures, you may find information in one of two places in this Customer Manual:
    - A custom-written Initial Start-up Procedure may have been written for it (which would be located in this Section); or
    - There may be a Component Manufacturer's Manual for it in

Section 7. • Special start-up of other components may not be required, or may be obvious (in which case you may check Section 7 of this manual if necessary). • See also the Operating Procedures contained in The Sequence of Operations of this manual for mention of them.	

SECTION 3: Operating Procedures

- This system uses electrical, fuel, pressurized air/gas, and other energy sources, which are dangerous if not connected and used properly. Before operating your system, read Section 1 of this Customer Manual, which contains important safety information. Failure to comply with this information may result in serious personal injury or death.

- This insert is primarily intended for those who will operate this system. Therefore, some of the wording is not as technical as is found in other sections of this Customer Manual. This insert contains information which is generic in nature: It applies to the typical operation of most ITS automated / motorized/ conveyorized systems.

- For specific operating steps related to your system: Along with this Insert, refer to the **Machine Operation Sequence**, also located in this ITS Customer Manual.

Part 1 Safety & General Information

1. Safety Information First, read Section 1 of this Customer Manual. Second, read this Section before attempting to operate your system. Follow all rules and instructions, and comply with all warnings contained in this Customer Manual.

2. **DO NOT** turn off the Recirculation Blower until the temperature indicated on the Temperature Controller is below 200°F/93°C. Equipment damage will result if this information is ignored.

3. Preparing to Operate Your System First, read the above information. Comply with all the instructions found there and in the places mentioned there. Make sure the system's guards are in place, and people are away from the machine. Check the inside areas of the machine for objects that could jam the system. Especially check conveyor systems. Make sure all access doors and windows, etc., are secured. Make sure the fuel and air sources are turned on. (If a gas supply had been turned off, a safety device may have to be reset. See your Maintenance or Repair Department for help.)

4. Go onto Part 2 of this Section now.

Part 2 Operating Heating Systems

System Set-Up

- Parts of your system may start at any time! Lock-out all sources of energy before placing your fingers, hands, arms, feet, legs, head, etc., into areas of the system containing motorized or other parts that can move. Comply with your local Energy Lock-out Program. Serious personal injury or death may result if this information is ignored.

- NOTE: Since most ITS systems are custom made to Customer specifications, each system has various lights, switches and other accessories that other systems do not. For detailed descriptions of their operation after going through the following checklist, see the Operation Sequence for specific direction.

- Comply with ALL of the following points before turning the burner(s) or heater bank(s) on:

- Check blower operation:
  When each blower is turned on, it's related SAFE (or 'ON') light should illuminate (light up).

- Make sure the Temperature Controller(s) have their Set Point adjusted to the temperature(s) you require (in each stage or zone).

- Check the settings of all other controls and accessories on the system's Control Panel (and other Switch Boxes, valves, etc., if applicable).

- Before conveying parts into the system, make sure the system has stabilized at

the temperature, airflow, conveyor speed, etc., that you need for those parts.

Temperature Controllers

- **Definition:** Load --The item(s) being placed, or continuously transported into and out of an oven, washer, etc. Just as placing cargo into a boat "loads its motor down", placing items into an oven loads that oven down: Its burner will soon respond by increasing the amount of heat it produces! The load absorbs heat from the air surrounding it, which the Temperature Controller's thermocouple senses, thereby causing the Temperature Controller to increase the burner's output.

- **Overview:** A number of things affect how an oven acts on the items placed into it: Size of the objects placed into the oven; Conveyor speed; How well the oven is balanced; Temperature Controller Settings; System (or stage) temperature (as set according to the Temperature Controller's "Set Point").You will have to watch how these and other things affect how your system reacts, in order to learn how to fine-tune your system. This will take time...Every system's adjustable features will be set differently, depending upon the application (warming as opposed to completely drying) and the load (how big, how cold they are, how fast they are being transported through the system, etc.) Getting to know your system will allow you to know exactly what should be adjusted, leading to your satisfaction! You'll know things such as whether the conveyor should be sped up

or the Temperature Controller's "Set Point" should be increased, or both, etc.

- **Fine-Tuning Your Temperature Controller:** The High Limit Temperature Controller is adjusted to prevent permanent damage to the system from excessive temperatures, as well as fires. Do not change any adjustments of the High Limit Temperature Controller. Equipment damage or fire may result if this information is ignored.

- Temperature Controller adjustments are **VERY** sensitive. Small adjustments can lead to big results, such as large temperature changes, oscillations (repeated swings), etc. Be careful not to make any changes, which may lead to exceeding the load's maximum temperature. Damage to the items being placed into the system may result if this information is ignored.

- Most systems have a Temperature Controller that has various fine-tuning adjustments. If we installed your system, we fine-tuned your temperature controller and no further adjustments should need to be made.

- However, sometimes the load or other things change which affect how the system reacts. This, in turn, affects if the job gets done satisfactorily.

- Before adjusting any of the Temperature Controller's settings: Check with your Maintenance or Repair Department, so everyone knows what's going on. Make

sure the problem (say, the load not being up-to-temperature by the time it exits the system) is not being caused by something else: an open door, colder air around the oven, colder load, etc.

- Then, if all else fails and you change the Temperature Controller's fine-tuning settings, do so in small steps and **WAIT FOR THE CHANGE TO RESULT IN SOMETHING REPEATABLE/RECOGNIZABLE** (some movement, swing, oscillation, (repeated swinging), more stable temperature readings, etc., that is different than before the setting change was made).

- Waiting for repeatable, recognizable results will take some time and will take longer as the system gets bigger. As you're watching for changes: Think...First (for example), how much heat will be absorbed by the load before the air around it will be able to heat up further. (You'll get a feel for things like this as you get familiar with your system.)

- Typical times for recognizable results to appear are: 10-15 minutes for small ovens, 15-20 minutes for medium-sized ovens, and 30 minutes or longer for larger ovens.

- If you have any problems in making these adjustments, call **ITS Service Department at (414) 902-5300.**

Blower & Related Air-handling Equipment

- Unless you're responsible for the periodic maintenance of your system's motors, blowers, filters, etc., as System Operator

your involvement with blowers and air-handling equipment is minimal. Otherwise, as stated previously in this insert under 'Safety and General Information', your involvement is limited to the monitoring of blowers and motors for unusual noises. (Do not attempt to maintain this equipment unless qualified and authorized.)

- The air-handling equipment related to blowers is dependent upon the components included in your system. For further information concerning manual adjustments, see the various Component Manufact**urer's Publications in** this Customer Manual.

- (Typically, such items include blast (or 'slide') gates and other manual dampers, which require your involvement only when necessary, such as when fine-tuning system stabilization by adjusting air flow into (fresh air) or out of (exhaust) the oven. This would only be necessary if your load changed drastically, and again, will take some time to get to know which adjustments cause what results.)

Chart Recorders

- See the 'Operation Sequence' insert and any Component Manufacturer's publications for specific instructions

concerning the use of chart recorders. Also note that your recorder may be equipped to select among a number of thermocouples (temperature probes) for recording. Again, see the 'Operation Sequence' insert.

Timers

- Timers are used for a variety of purposes, from...
    - Starting a system at a certain time every day, to...
    - Continually starting and stopping a motorized device, to...
    - Delaying the complete shut-down of a system (such as at the end of a workweek when a large or high-temp heating system's burner is shut off and you can't wait the hours it takes for the system cools down enough to shut the blowers off).

- See the 'Operation Sequence' insert, in this Section, and Section 7's Component Manufacturer's Publications for how to use timers, and how they affect your system.

Automatic Operation

- Timers are used for a variety of purposes, from...
    • Starting a system at a certain time every

day, to...
• Continually starting and stopping a motorized device, to...
• Delaying the complete shut-down of a system (such as at the end of a workweek when a large or high-temp heating system's burner is shut off and you can't wait the hours it takes for the system to cool down enough to shut the blowers off).

- Your system may include electronics other than simple timers, which control the automatic operation of your system. These electronics generally take the form of 'Programmable Controllers', which are specialized computers that control the sequential operation of complex machines.

- Since automatic systems have sensors, which are used to prevent unsafe conditions from either being entered into or occurring during automatic operation, your involvement as System Operator will simply be to begin and stop the automatic operation of your system:

- You must make sure that nothing gets into the system, which could jam it prior to beginning an Automatic Start. If the system will not go into its Automatic Mode for any other reason than minor, easily correctable mechanical jamming,

you are advised to call your Maintenance or Repair Department for help. Do not attempt to make adjustments or repairs to your system's electronics or sensors. • Your Periodic Maintenance Responsibilities. As stated previously in this Insert, there are a number of things you may be made responsible for, such as the periodic lubrication of blower and their motors. Please refer to Section 5 of this Customer Manual for periodic lubrication information and guidance.	

SECTION 4: Troubleshooting

- This Section contains generic information. Your system may require specific actions and precautions in order to achieve safe and proper operation. Therefore, read and become familiar with Sections 1, 3 & 5 of this manual before attempting any maintenance.

- Many of this system's components are operated at high voltages, amperages, temperatures, speeds, AND involve the use of flammable fuels that are explosive under certain conditions. Observe all Fire, Lockout and Personal Protection safety rules. Replace all guards after removal. **ONLY** qualified personnel should maintain this system. Read and understand the information and warnings contained in Section 1 of this manual before maintaining this system. See also the component manufacturer's manuals and bulletins for specific safety-related information and warnings. Serious personal injury or death may result if this information is ignored.

Part 1 Master Troubleshooting Guide

- Acronyms Used in this Part:
  XT = Over-Temperature Device
  TAS = Temperature Controller
  T/C = Thermocouple
  LLC = Liquid Level Control

- **General Information:** This Part is intended to steer you to the various Parts of this Section (and this Customer Manual) for further troubleshooting guidance.

- **Symptom:** Oven or Washer does not reach

temperature. **See** Temperature Control programming (see its Manufacturer's manual in Section 7), Burner, Mod Motor, or Safeties

- **Symptom:** Alarm light is illuminated and will not go off. **See XT, Airflow switch*, LLC*.**

Part 2 Over-Temperature Devices (XT's)

- Acronyms Used in this Part:
  XT = Over-Temperature Device
  TAS = Temperature Controller
  T/C = Thermocouple

- The Over Temperature Device must NOT be bypassed NOR adjusted to a setting higher than that set by ITS. Consult ITS for the correct settings for your system. Serious personal injury or equipment damage may result if this information is ignored.

- If the XT's Set Point*is reached (as sensed by its own T/C); It will: Cause the XT to switch its contact open. The XT's switching its contact open in turn, which will typically trip out the heating circuit, and will stay open until the TAS is reset manually.

- **Problem :** System's 'Safety' indicator does not illuminate, and the XT is suspect.

- Indicator's light bulb is burned out. Replace light bulb
- Temperature sensed by the XT exceeds its programmed Set Point.
- XT is tripped (contact open) Reset XT.
- XT is incorrectly adjusted or defective. Check or replace
- XT's thermocouple is defective. Check or replace.
- XT's T/C mounted too close to heat source. Consult ITS before moving the T/C.

Part 3 Motors

- Motors operate at high voltages, currents and speeds. ONLY qualified personnel should maintain them. See also the manufacturer's manuals and bulletins for specific safety-related information and warnings. Equipment, which is to be maintained, must be locked-out from all energy sources prior to maintaining them, according to the authority having jurisdiction in your area. Serious personal injury or death may result if this information is ignored.

- See Section 5 of this manual for periodic maintenance information. Following the maintenance suggestions therein will prevent most problems commonly associated with motors.

- **Troubleshooting Suggestions:**

- **Problem: Motor vibrates more than usual.**

Possible causes: Unstable Mounting, or Coupling imbalance. **Remedies:** Check mounting means. Etc., and ensure couplings are balanced and tight.

- **Problem: Excessive noise from motor:** Possible causes: Dirt/foreign material contamination, Improper coupling, Faulty or impaired bearing(s). **Remedies:** Clean/vacuum all accessible ports, Check sheave (pulley) tightness and line-up, Check, lubricate or replace as necessary
- **Problem: Motor case temperature exceeds nameplate temperature rise rating (as measured from ambient temperature). Or Motor can't drive load.** Possible causes: Ventilation restricted, Motor overloaded, Winding failure. **Remedies:** Clean/vacuum vent ports and air deflectors, Remove load to determine if problem is elsewhere, Remove power; verify resistance between leads and from each lead to ground. Measurements between leads should be equal and from lead to ground should be infinite for a good motor.
- **Problem: Motor fails to start.** Possible causes: Loss of power, one or more phases, Blown fuse(s), Motor starter failure, Phase(s) wired incorrectly, Motor leads incorrectly labeled, Motor windings grounded, Rotor locked. **Remedies:** Check power supply phase(s), Remove power and check fuses, Check starter's overload relay and contact set, check against schematics and nameplate, Check numbering/lettering against schematics, Remove power, measure resistance-to-case, Determine if bearings are cause; replace.
- **Problem: Motor cannot reach rated speed:** Possible causes: Excessive load, Fuses; Overload devices, Higher H.P. – rating required. **Remedies:** Check load; Check

Possible Causes	Possible Remedies
Unstable mounting	Check mounting means, etc.
Coupling imbalance	Ensure couplings are balanced and tight

Dirt/foreign material contamination	Clean/vacuum all accessible ports
Improper coupling	Check sheave (pulley) tightness and line-up
Faulty or impaired bearing(s)	Check, lubricate or replace as necessary

Ventilation restricted	Clean/vacuum vent ports and air deflectors
Motor overloaded	Remove load to determine if problem is elsewhere
Winding failure	Remove power; verify resistance between leads and from each lead to ground. Measurements between leads should be equal and from lead to ground should be infinite for a good motor

Loss of power, one or more phases	Check power supply phase(s)
Blown fuse(s)	Remove power; check fuses
Motor starter failure	Check starter's overload relay and contact set

sheaves (pulleys) against systems specifications, Check power supply Phase(s), Ensure they are of sufficient rating, check load requirements.

Part 4 Blowers

- Blowers operate at high speeds. Eye protection is required downwind. ONLY qualified personnel should maintain them. See also the manufacturer's manuals and bulletins for specific safety-related information and warnings. Equipment, which is to be maintained, must be locked-out from all energy sources prior to maintaining them, according to the authority having jurisdiction in your area. Lock the blower's impeller to prevent wind-milling. Serious personal injury or death may result if this information is ignored.

- After maintaining blowers, perform the Initial Start-up Checks listed in Section 2 of this manual. They cover important items, which must be ensured prior to re-starting blowers. Serious personal injury or death may result if this information is ignored.

- DO NOT turn off the Oven Blowers until the temperature indicated on the Temperature Control is under 200°F (93°C). Equipment damage will result if this information is ignored.
- See Section 2 for initial start-up information. See manufacturers literature for related motor information.

- See your system's specifications for rated speed and H.P. requirements of the motor driving each blower. Replace worn or defective components ONLY with direct

Phase(s) wired incorrectly	Check against schematics and nameplate
Motor leads incorrectly labeled	Check numbering/lettering against schematics
Motor Windings grounded	Remove power; measure resistance-to-case
Rotor locked	Determine if bearings are cause; replace

Excessive load	Check load; check sheaves (pulleys) against systems specifications
Low phase voltage	Check power supply phase(s)
Fuses; Overload devices	Ensure they are of sufficient rating
Higher H.P.-rating required	Check load requirements

replacements, including belts.

- Ensure belt (or coupling) is aligned before starting blower, and then start blower only momentarily (while monitoring blower) to ensure maintenance has been performed correctly.

- Belts must be tensioned with a belt tensioner to the specifications for the belts in relation to the distance they span between sheaves (pulleys) and the number of belts-per-blower. Over- and under-tensioning can lead to excessive bearing and belt wear.

- Periodically check the blower bearings for noises and vibrations that could indicate their imminent breakdown. Replace before such occurs.

- Non-permanently-sealed bearings must be lubricated periodically. See Section 5 of this manual for instructions and schedules. Over-lubrication of bearings (lubricating more frequently than instructed in Section 5), and under-lubrication, can lead to premature bearing failure.

- See Section 5 of this manual for periodic lubrication instructions pertaining to the motors that drive your blowers.

NOTICE

- Troubleshooting blowers is a fairly straightforward affair as there are so few parts, and problems make themselves readily apparent, due to the high speeds involved (most problems can be located strictly by sound). Since much information

has been given under 'General Information', the warnings and notices on the two previous pages, and in Part 3 (Motors), no procedures are provide

Part 5 Airflow Switches

- The primary purpose of these devices is to verify the proper operation of all blowers prior to allowing their associated heater to be ignited. Air movement is sensed in the ducts and air spaces into which their pilot tubes are placed (these switches can be hooked up negatively, positively, or differentially.)Verifying airflow also ensures blower shafts do not overheat.

- The Exhaust Blower's airflow switch confirms air movement that prevents flammable gases from collecting, thereby creating an explosive atmosphere. Until this airflow switch verifies proper airflow (followed by the Purge Timer's cycle being completed) the heater will not be allowed to be engaged.

- Airflow Switches are interlock devices designed to preclude heater ignition if certain blowers are not functioning correctly. **Do NOT** by-pass these devices at any time. **ONLY** qualified personnel should maintain these switches and their associated components. Serious personal

injury or death may result if this information is ignored.

- Troubleshooting airflow switches is a fairly straightforward affair: One of five basic fault conditions can be attributed to most airflow switch-associated problems:

- An obstruction in, or kinking of the pilot tubing.-Check all supply tubing to see if it is kinked to the point of restriction or plugged with some debris

- Incorrect Set Point adjustment - Defective airflow switch

- Vibration, causing the switch's sensing assembly to falsely indicate intermittent or nonexistent air pressure. The performance of the blower may become less than design after time creating less air flow past the pilot tube to the switch. Examples are: the wheel of the fan spinning on the shaft, contaminants building up on the fan blades, or the ducts becoming plugged.

- Some Air Flow Switches have a gauge on the switch assembly, which can be used for troubleshooting. Simply disconnecting the tubing from the switch is also a viable troubleshooting practice.
  If you know the blower that's related to the switch is operating, and the switch's gauge (only for Antunes Controls airflow switch) is

not indicating a normal air pressure (or you're unsure of its reading), disconnect the tubing from the switch. You'll feel a negative or positive pressure from the end of the tube, if it's unobstructed.

- Setting the Airflow Switch's Set Point: Having verified a negative pressure to be present at the Airflow Switch-side of the tubing, connect the tubing to the Airflow Switch. (Note that the Airflow Switch has a positive pressure and a negative pressure port. Connect the tubing to the proper port.) With the tubing connected to the Airflow Switch's proper port and with the associated blower operating: Adjust the Airflow Switch's Set Point screw until the switch's output turns on. Then turn the Set Point screw an additional 1/4-turn. (This will prevent small fluctuations in airflow pressure or suction, or machine vibrations from causing false Airflow Switch trips, leading to an alarm condition.)

- **Note** – If equipped, monitor the Airflow Switch gauge's indicator, and note gauge "bouncing", if any. (Normally, the gauge's indicating arm will not bounce if set correctly.) For further information please see section for the Manufacturer's Literature.

Part 6 Air Balance Procedure

- Air adjustments should not be tampered with unless balancing problems exist. Generally, five (5) sources of air intake or exhaust are available on the ITS ovens. When properly balanced, only the exhaust should be exhausting air. All four other oven openings should be under some

degree of negative pressure (i.e. air should be entering the oven at all other four locations.

- Basic adjustments for obtaining a negative pressure oven: With heater and belt conveyor running at the maximum operating temperature, adjust the exhaust damper to the Full Open Position.

- Adjust entrance and exit close-off plates to allow for the thickest possible part to clearly pass through the oven without touching the clearance adjustment. NOTE: We suggest 1" additional clearance to avoid jamming up of imperfect parts.

- Under these conditions the oven should be under the maximum possible negative pressure.

NOTICE

- Tear a small piece of paper (approximately 2" square) and place it on your finger. Move your finger as close to entrance and exit as possible and notice the effective suction of the oven at entrance and exit. Check both ends. If the paper is drawn into the oven at the entrance and exit, you have confirmed that the oven is under negative pressure. NOTE: If the oven is not sufficiently negative to draw the paper from your finger, make some quick checks

for blockage.

- Check that the exhaust fan damper is indeed open and that the damper has not shifted on the shaft. Check that the fan rotation is correct. If you have not yet found and resolved the problem, contact: ITS.

- As a neutral oven is what will perform best for you, you should now close the exhaust damper until the oven just becomes positive. Open it back up very slightly and lock it in place.

Part 7 Liquid Level Controls (LLC)

- Acronyms Used in this Part:
  LLC = Liquid Level Control
  XT = Over-Temperature Device
  T/C = Thermocouple

- The Liquid Level Control must NOT be bypassed NOR adjusted to a setting higher than that set by ITS. Consult ITS for the correct settings for your system. Serious personal injury or equipment damage may result if this information is ignored.

- **TYPICAL OPERATION**
  • If the LLC's Low Level is reached (as sensed by the liquid level probe); It will:
  • Cause the LLC to switch its output OFF, which in turn,
  • Shuts off the Washer Pump,
  • Disables the safety circuit causing the heater to shut down.

- **Troubleshooting Suggestions:**
  Problem: The Washer heater will not start, the pump will not run, and the LLC is

suspect. **Probable Causes:** The tank liquid level is low, Tank liquid level is correct, but LLC is not sensing it, LLC sensing probe is dirty or loose, LLC is defective, Ground between LLC relay and tank or probe is loose. **Remedies:** Fill tank, Check float level control, Clean & Tighten, Check or replace, Check & Tighten.

The tank liquid level is low	Fill tank, Check float level control
Tank liquid level is correct, but LLC is not sensing it	
LLC sensing probe is dirty or loose	Clean & Tighten
LLC is defective	Check or replace
Ground between LLC relay and tank or probe is loose	Check & Tighten

SECTION 5: Periodic Maintenance Requirements

- NOTE: For equipment not described in this Insert, see its Manufacturer's Manual for periodic maintenance requirements.

- This insert provides information for ensuring equipment is not damaged or destroyed. Also, read the various Component Manufacturers Publications located in this Customer Manual. Ignoring this information and the Notices and Warnings provided in this Section and in the Component Manufacturer's Publications may result in equipment damage or destruction.

- Approximately every thirty (30) days:
  All belts, sheaves, sprockets, etc. should be checked for proper alignment. Damage to equipment will result if this information is ignored

NOTICE

Part 1 Pillow & Flange Type Bearings

- LUBRICATION INSTRUCTIONS

- Before conforming to the following lubrication schedules, read Section 1 of this manual, which contains important safety information. Equipment which is to be maintained must be locked-out from all energy sources prior to maintaining them, according to the authority having jurisdiction in your area. ONLY qualified personnel should maintain this equipment. Serious personal injury may result if this information is ignored

WARNING

- Re-greasing frequency will vary depending upon environmental conditions (dust conditions, bearing temperature, etc.) and the number of hours a day the machine is operated. Unusual noises or vibrations should be immediately investigated. Use ONLY the lubricants recommended below. Damage to equipment will result if this information is ignored.

- **Lubrication Schedule**

NOTICE

Environmental Conditions (Typical, Industrial)	Bearing Temperatures (Operating)	Recommended Greasing Intervals
Fairly Clean	32-120°F (0-49°C)	1-2 months
	122-160°F (50-71°C)	1-4 weeks
Dirty	32-200°F (0-93°C)	1-4 weeks

- Ensure the proper lubricants are used for the process involved (e.g., silicone-based lubricants should never be used in conjunction with painting processes). Due to wide variations in such applications, it is recommended you consult with ITS. We can recommend and supply the proper lubricants if such is your need.

- **Recommended Greases**

- **NOTE: Consult your lubrication dealer for the grease he would recommend for your conditions and equipment. He may be able to consolidate your inventory of greases, as well as ensure you've the right lube for the job.**

Manufacturer	Product Name & Part No.
Atlantic Refining Co	Atlantic 54
Gulf Oil Corp	Gulcrown #2
Humble	Lidock #2
Imperial Oil, Ltd	Andok 280
Keystone Lubricating Co	Keystone 44H
Master Lubricants Co	Lubriko M-21
Mobil Oil Co	Mobilux 2
New York Lubricant Co. F-925 New Jersey Lubricant Co	F-925
Phillips Petroleum Co.	Philube 1B, RB
Shell Oil Co.	Anvania #2
Sinclair	Litholine Multipurpose
Standard Oil Co. (IN, USA)	Amolith #1
Standard Oil Co. (NJ, USA)	Andok B
Sun Oil Co.	Sunoco 844-X
Texaco, Inc	Marfak Multipurpose #2

Part 2 Electric Motors

- **Lubrication Instructions:**

- Before performing the following lubrication procedures, read Section 1 of this manual, which contains important safety information. Equipment which is to be maintained, must be locked-out from all energy sources prior to maintaining them, according to the authority having jurisdiction in your area. ONLY qualified personnel should maintain this equipment. Serious personal injury may result if this information is ignored.

- Grease motor bearings only at 6-month intervals, or at the interval recommended by the motor manufacturer. Over-greasing is every bit as bad as under-greasing. If incorporated, remove greasing drain plug prior to pumping grease. Wipe gun and motor fittings completely clean prior to greasing. Use a low-pressure grease gun and a compatible grease. Avoid over-greasing. Run the motor for 15 to 30 Minutes with the drain plug removed to allow purging of excess grease. Damage to equipment will result if this information is ignored

- Periodically inspect your motors for signs of dirt build-up, internal friction, and vibration. Use compressed air to clean hard-to-reach places being careful not to blow dirt into the motor itself. Keep cooling vents clean in order to allow free passage of air. Keep drain holes clean in order to prevent liquids from pooling inside the motor.

- **NOTE: Consult your lubrication dealer for the grease he would recommend for your**

conditions and equipment. He may be able to consolidate your inventory of greases, as well as ensure you've the right lube for the job.

Part 3 Combustion Air Filters

- If your oven has burner(s) that are equipped with combustion air filters, they must be regularly checked for dirt build-up. Remove the filters. Small amounts of dirt may be blown out with compressed air. Dirtier filters may be washed in warm, soapy water, then rinsed. If the dirt cannot be removed with these methods, the filters must be replaced.

- **NOTE: Failure to keep the combustion air filters clean will result in damage to the burners or oven.**

Manufacturer	Product Name & Part No.
American Oil Co.	Amolith #2
Arco, Inc.	Litholine Industrial #2
Ashland Oil & Refining Co.	Val-Lith #2EP
Cities Service Oil Co.	Trojan Grease H-2
E.F. Houghton & Co	Cosmolube #2
Fiske Bros. Refining Co	Lubriplate Multi-Lube A
Keystone Lubrication Co	Keystone Grease #81 (light)
Mobil Oil Co.	Mobilux #2
Phillips Petroleum Co	Philube 1B, RB
Pennzoil Co	Multipurpose Lube #705
Shell Oil Co	Alvania #2
Standard Oil (CA)	BRB-2
Standard Oil Co. (OH)	Bearing Guard
Sun Oil Co	Prestige #42
Sunray D-X Oil Co	#646 DX (All-purpose grease)
Texaco, Inc.	Regal AFB #2
Tidewater Oil Co.	Veedol (all-purpose grease)
Union Oil Co. (CA)	Unoba #2

SECTION 6: Recommended Spare Parts & Warranty

Spare Parts

- **Why Keep Recommended Spare Parts On-hand?** Keeping on-hand the spare parts contained in the following list, along with operating your system within its designed limits and performing the Periodic Maintenance & Lubrication as set forth in Section 5 of this Customer Manual will ensure your system operates satisfactorily and with minimum down-time. Properly size the electrical supply using information on the machine data plate. Electric supply must include a safety shut off such as a circuit breaker or fused disconnect switch between your power supply and your equipment.

- **Spare Parts Policy:** Obtain a P.O.# (Purchase Order number); gather the part number(s) of the part(s) you wish to order; then call or fax International Thermal Systems Spare Parts Department at the numbers listed on this page. Freight costs to/from ITS is the Customer's responsibility. Request a Spare Parts list if not given.

- **Pricing Policy:** Any prices for Spare Parts are effective for 30 days after the system arrives at your location. For updated prices thereafter, call or fax ITS Spare Parts Department at the numbers listed at the bottom of this page.

- **Service:** For all problems not related to spare parts or remedied by their replacement, contact your ITS Technical Support, or Service Representative at the numbers listed.International Thermal Systems can be reached at (414) 902-5300, 8am- 4pm Central, Monday through Friday. Fax (414) 672-8800, attention Spare Parts Dept., Technical Support, or Service Department or at http://www.internationalthermalsystems.com/Please have the following ready: System's ITS Serial No., Located on control cabinet ITS Data Plate, or your Operation and Maintenance Manual. Your ITS Customer Manual, and Electrical Drawings.

ITS – Parts Warranty Policies & Procedures

- **Part 1: Procedures for Procuring Parts under Warranty:**

- When your system's operation is interrupted by a faulty component, you require immediate parts replacement. We understand that! To ensure this, please take the time to review this policy and feel free to contact our service department, if you have any questions.

- Our Warranted Parts Replacement Policy

requires a Purchase Order number (P.O.#) when parts that are under warranty are ordered. This policy only applies to items that total two hundred and fifty dollars ($250.00) and above domestic, five hundred dollars ($500.00) international, including any shipping charges. For warranty items under these amounts no Purchase Order number is required. If the defective parts are not received within thirty (30) days at our facility your account will be invoiced for the full amount. This does not apply to items not requiring a P.O.

- Once part failure has been validated as described in paragraphs 2 & 3 of Part II below, you will be reimbursed (or your account credited), as applicable.

  See Part II below, for detailed warranty information.

- Following is the procedure for procuring parts that are covered under warranty:

- Check the Recommended Spare Parts Listing included in this Section to determine if you may have a replacement part on-hand for immediate use.

- Determine if the defective part is under warranty. (note: Component Manufacturer Parts -those not manufactured by ITS -are warranted differently than ITS-manufactured parts; see Part II, below).

- Obtain a P.O. #; gather part number(s) of the defective part(s); then call ITS's Spare

Parts Dept. at 414-902-5300, fax (414) 672-7760 or http://www.internationalthermalsystems.com/informing us of which parts you believe are under warranty.

- An invoice will accompany the replacement part(s). When the conditions defined in Part II below, have been satisfied, your account will be credited or you will be reimbursed, whichever is applicable.

- Manufacturers must confirm that parts are actually under warranty (confirmed via recorded serial numbers, for example). They must also confirm that parts, which became defective during the warranty period, were not subjected to conditions that exceeded the design capabilities, or were not otherwise abused.

- **Part 2: Warranty Policies:**

- **General Policy:** Seller warrants to the original Buyer only, that the products covered hereby conform to the description and specifications, if any, on the attached quotation. All materials produced by the Seller are warranted for twelve (12) months from date of shipment to be free of defects in materials or manufacture. All items of other manufacture will be covered by the warranties by those manufacturers. All other warranties are excluded, whether expressed or implied by operation of law, course of dealing, usage of trade or otherwise, including, but not limited to, all implied warranties of merchantability or fitness. Seller shall not be liable for consequential damages, loss of profits, or special damages, directly or indirectly arising from the breech of any of the terms hereof, or from the sale, handling, or use of products sold. Seller's liability hereunder, either for breach of warranty or for negligence, is expressly limited at the option of the Seller: A) To the replacement at the agreed point of delivery of product found to be defective, or not to conform to the specifications set forth herein; B) to the repair of such products; or C) to the credit or refund to the Buyer of the price of such products. Seller will not accept any back charges for work done by Buyer, unless authorized in writing by Seller.

- **Component Manufacturer-warranted Parts:** These parts, once received by ITS, are forwarded to their respective manufacturers. Once the Component

Manufacturer notifies us that they have confirmed a valid, warranted failure, your account will be credited or you will be reimbursed whichever is applicable. • **ITS Warranted Parts:** Similar to the preceding policy, we reserve the right to inspect parts for valid, warranted failures. Once we validate a warranted failure, your account will be credited or you will be reimbursed, whichever is applicable. See Part I above, for the procedure to follow for procuring replacement parts. • **Shipping:** International Thermal Systems policy is to pay for shipping from our site to your site. Return freight charges from your site to our site is your responsibility. • **Return of Defective Part(s) to International Thermal Systems:** When you receive your replacement part(s), return the defective part(s) using the new parts packaging. Please identify the package with the International Thermal System's SERIAL NUMBER, YOUR COMPANY NAME, and a CONTACT NAME with a TELEPHONE NUMBER. Send the package to the attention of "W NUMBER COORDINATOR" and tag the package, DEFECTIVE RETURN FOR CREDIT.	•The shipping address for International Thermal Systems is: **International Thermal Systems, LLC .** **4697 West Greenfield Avenue** **Milwaukee, WI 53214**

SECTION 7: Sequence of Operation Please see separate Sequence Document	
SECTION 8: Component Manufacturer's Publications	Please refer to the manufacturer's website for any information on a part you need to research.
SECTION 9: Replaceable Parts List	See SPL .pdf Document for pricing

-- End of Procedure –