X-600
INSTRUCTION MANUAL

Digital, High Power board preheater with very accurate temperature control for rework of SMT technology boards.

The only pre-heater which allows the operator to set the preheat temperature on the surface of the PCB and not the temperature of the air stream.

650 Scranton Pocono Hwy.
Covington Twp., Pa 18444, USA
Tel: (570) 842-2812 Fax: (570) 842-4290
E-Mail: bokar@bokar.com
www.bokar.com, www.SMTrepair.com,
www.SMTpreheater.com, www.ESDmeters.com,

Digital, High Power board Pre-heaters
For Rework of SMT Technology Boards

TABLE OF CONTENTS

PAGE

I.   INTRODUCTION

The most advanced and powerful pre-heater for SMT REWORK and REPAIR offering full Process Control, increased rework speed, board protection and operator convenience.

The X-600 was designed to reduce the workspace required for SMT Rework and Repair. The Pre-heater Units are microprocessor controlled to maintain accuracy and also to extend the life of the heating element.

The outstanding features include:
- **Upgradeable Firmware via DataStore Port without opening the unit**
- **DataStore Port allows customization of settings and changes by simple connection to PC via X-KAR or other RS-USB converter and downloading the upgraded or customized firmware received by e-mail from the Factory.**
- **Control of the AIR Volume by the user from Front Panel Controls**
- **Unmatched accuracy in setting the desire temperature on the surface of the reworked PCB**
- **User accessible offset to correct for differences between multi-layer boards, height of the board holders, room temperature, etc.**

II.   SAFETY

The purpose of this "SAFETY" section is to inform the users of the heading guidelines used in this manual to indicate special Notes, Cautions, Warnings or Dangers. Also included are precautions, which must be observed when operating or servicing this product.

These "NOTES", "CAUTIONS", "WARNINGS" and "DANGERS" are inserted in this manual whenever deemed necessary. They appear in a blocked off form with outline and a shaded background to highlight the information as shown below.

NOTE
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

NOTE
Used to indicate a statement of company recommendation or policy. The message may relate directly or indirectly to the safety of personnel or protection of property. NOTE is not associated directly with a hazard or hazardous situation and is not used in place of "CAUTION", "WARNING" or "DANGER".

CAUTION
Used to indicate a hazardous situation, which may result in minor or moderate injury. May also be used to alert personnel to conditions, procedures and practices which, if not observed, could result in damage to or destruction of the product or other equipment.

WARNING
Used to define additional information, that if not closely followed may result in serious damage to equipment and represent a potential for serious personnel injury.

DANGER
Defines additional information, that if not closely followed may result in severe personnel injury or death. Danger is not used for property damage unless personal injury risk is present.

PRECAUTIONS
The following are general safety precautions, which personnel must understand and follow when using or servicing this product. These precautions may or may not be included elsewhere in this manual.

CAUTIONS
1. The X-600 pre-heater area and top plate are hot when the system is "ON" and for a period of time thereafter. DO NOT touch neither the pre-heater area, top plate or direct heated air stream. Severe burns may result!
2. Utilize all standard electrical safety precautions when using this or any other electrical equipment.
3. Always use this system in a well-ventilated area. A fume extraction system (such as those available from XTRACTOR) is highly recommended to protect personnel from solder flux fumes.
4. Exercise proper precautions when using chemicals (e.g., solder paste). Refer to the Material Safety Data Sheet (MSDS) supplied with each chemical and adhere to all safety precautions recommended by the manufacturer.

DANGER
POTENTIAL SHOCK HAZARD – All repairs made on this product should be performed only by qualified service personnel. Line voltage parts will be exposed when equipment is disassembled. Service personnel must avoid contact with these parts when troubleshooting.

NOTES
To insure continued peak performance, use genuine X-Kar replacement parts.

III. PACKAGING

The box contains the following items:
1. X-600 Base Unit
2. Manual and Guarantee card

IV. UNPACKING

Prior to using the system, please check if the system is complete. Should you notice that any items are missing, please notify us, giving the details of model number, voltage, date of purchase, where purchased and what is missing. Missing items must be reported within 7 days from the date of purchase.

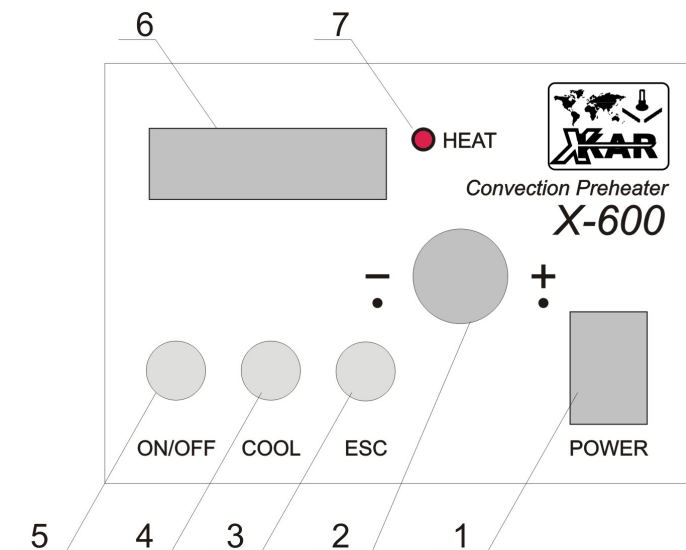| WARNING |
| --- |
| When unpacking, please be careful and read the manual prior to turning the system "ON". Please check that the voltage of the System corresponds with the voltage of your available supply. Connection to incorrect voltage supply may cause damage to the System! |

V. GENERAL INFORMATION

Fig. 2 X-600 Series Front Panel

1. **POWER Switch** – Turns the power to the system "ON" and "OFF".
2. **Control Knob** – View/Change temperature of the pre-heater.
3. **ESC** –
4. **COOL key** – Turns "OFF" the heater but keeps the blower on to allow cooling.
5. **Pre-heater ON/OFF key** – Turns the pre-heater "ON" and "OFF".
6. **Display** – Displays set or current temperature of the pre-heater and other menu functions.
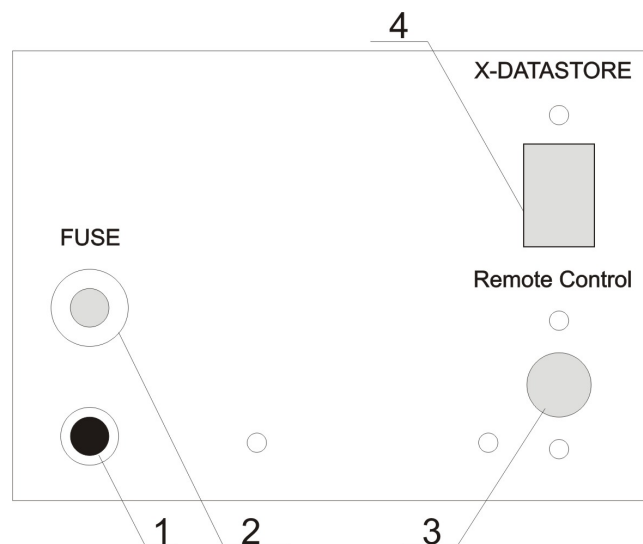7. **Heater indicator** – Illuminates red when the heater is "ON".

Fig. 3 X-600 Series Pre-heater Back Panel:

1. **AC power receptacle** - Provides AC power to the system through a power cord.
2. **Fuse holder** – Contains a fuse for overload protection. The fuse is 20 mm type (see table below).
3. **Remote Control** – connection with FOCUS Series. This way FOCUS can control bottom preheat.
4. **X-DataStore** – Factory calibration port <u>and connection to PC via RS-USB Converter.</u>

VI. SET-UP AND INSTALLATION

ELECTRICAL REQUIREMENTS

A separate, dedicated AC supply line circuit may be required to adequately power the system. If your power outlet cannot provide suitable power, arrange for a qualified, licensed electrician to install one for you.

Please note that you need the following current capacity:

System	X-600	
Voltage	110-115V AC	220-240 V AC
Power consumption	600W	
Fuse	6 A	3 A

SET-UP
1. Remove the Pre-Heater from its shipping box. Store the shipping box in a convenient location. Reusing these box/boxes will prevent damage if you ship or store the system.
2. The system should be located on a rigid and stable work surface.
3. Confirm that the power switch on the front panel is in the "OFF" position.

POWER UP
1. Insert the power cord into the AC Power Receptacle located on the rear panel of the power source.

CAUTION
To insure operator safety, the AC supply receptacle must be checked for proper grounding before initial system operation.

2. Plug the power cord into the AC supply receptacle.
3. Turn the Power Switch to the "ON" position.
4. When the system is turned "ON" the displays shows [On] for about 1 second. After 1 second, the display will turned off.

VII. SYSTEM DESCRIPTION and APPLICATION

The X-600 was primarily designed for SMT Rework and Repair of the printed circuit board assemblies using SMT components. The emphasis of the design was on observation of appropriate process control required for correct Rework and Repair.

This includes protection of the boards (and the vias inside them) against sudden thermal shock to prevent difficult to detect damages as well as damage to the components themselves, which are already connected to the board.

By using bottom convection pre-heat of the large area of the board you guarantee even and gradual thermal expansion. A board which has been Pre-heated to 130 degrees C needs much less additional thermal energy to de-solder or re-solder a component on the board. To de-solder the component only an additional 53 degrees C are needed to reach 183 deg. melting temperature of the solder.

To achieve this relatively low temperature differential, lower thermal capacity and lower air temperature tool can be used, which guarantees to be safer for the board and the component rework process. This lower temperature differential required to obtain solder melting point makes the rework process much faster than the one, which is done when using conventional rework tools.

For your convenience and to save the valuable bench space the system includes in one Base a Pre-heater, a temperature probe, and a tool holder (optional), giving you everything that is needed to do the

Rework or Repair of most of the SMT Technology Boards. Standard board holder XU-1S allows you to mount 12" (305mm) wide x not limited in length boards. Other, optional board holders are available to accommodate boards up to 21.5" wide. Available models are: XU-5, XU-Mini, XCBH-1, XU-1, XU-2 and XU-3.

The powerful Pre-heater will also allow you to rework high mass boards, which have through-hole components such as connectors. (you must use proper pre-heat temperature, which is lower than the maximum allowable value for the plastic from which your connectors are made).

The Pre-heater uses a closed loop temperature control system and maintains the set temperature with high accuracy.

The system can accommodate optional tool stand with adjustable Z-Axis control (This should be your preference for 4 sided components rework). The stand holds an XHT Series Hot Air Tool in vertical position for precise component removal and installation operations. The hot air tool is held vertically to the work platform of a base and bottom edges of any nozzle mounted on the tool are horizontal to a PCB, which is in a board holder placed on the work platform.

The System also accommodates Semi Automatic Vacuum Component Pick-up Option XCP-01, which attaches to the System for automatic component lift upon reflow of the solder.

NOTE
During component de-soldering, please use NC or fluxes to protect your boards from excess heat, to obtain even temperature distribution to the leads and to greatly shorten the amount of rework time.

SYSTEM OPERATION

CAUTION
When display shows alternately `not` `EnbL` you have pressed wrong key or the operation/function is not allowed.

WARNING
The display always shows set temperature **with** a dot at the right of the display. `888°.`   The display always shows current temperature **without** the dot in the display. `888°`

CHANGING OR VIEWING SYSTEM SETTINGS

1. Press and hold the Enter key for about 3 seconds. The displays will show alternately `USEr` `SEt`. After a few seconds the displays will change and show the first system setting.
2. Settings can be viewed by using Pre-heater SET (UP or DOWN) keys.

Settings, which may be changed:

Pre-heater display show alternately		Description
`LOC`	`On` or `OFF`	Changes on pre-programmed settings are possible only when a 4-digit code is entered. LOC feature can be "ON" or "OFF". To change the locking function from ON to OFF and vice versa, the 4 digits CODE MUST be entered. LOCK is set OFF as the factory setting. Factory set code is 1234 and the user can keep it or change it to another 4 digits combination.
`COdE`	`CHG`	Changes the lock code – described bellow.
`C-F`	`°C` or `°F`	Temperature scale in degrees Celsius or Fahrenheit. Can be °C or °F. Factory set: °C.

`cnt`	`UP` or `dn`	Sets the way in which acceleration time is displayed. Acceleration time can be displayed counting up (Up) or counting down (Down). Factory setting is: Up.
`Prht.`	`AutO` or `OnOF` or `OFF`	Allows control of the bottom pre-heater. `OFF` -- The pre-heater is not externally controlled by the FOCUS "X" system. `OnOF` -- Means that the FOCUS "X" can be programmed to turn the pre-heater "ON" or "OFF" in each zone. `AutO` -- Means that FOCUS "X" always controls the pre-heater. The unit is factory set to `AutO`. See below for more information.
`Snd`	`On` or `OFF`	Enables/disables the sound. Sound can be "ON" or "OFF". Factory setting is: ON.
`tc3`	`CALL`	Will allow re-calibrating or the external thermocouple low set point. See below for more information.
`tc3`	`CALH`	Will allow re-calibrating or the external thermocouple low set point. See below for more information.
`SPdA`	From 1800 to 2700	Will allow change speed of ventilator. You can set value from 1800 to 2700
	`End`	

3. To change the settings:
   a. Using Pre-heater SET (UP or DOWN) keys select the value to change.
   b. Press Enter key.
   c. The setting can be changed by using SET (UP or DOWN) keys.
   d. Press Enter to store selected value or option.

EXTERNAL THERMOCOUPLE CALIBRATION

NOTE
Please do not perform this calibration if it is not necessary. **The unit has been calibrated in the factory and should not need re-calibration.**

   a. When you are in the user settings menu and arrive at the window `tc3` `CALL` press ENTER.
   b. The display will show: `COdE`. Enter 4-digit code to access low calibration point.

NOTE
If the external TC is not connected to the unit the display will show Er. 17 and the pre-heater will beep to prompt you to connect the thermocouple

   c. When the code is entered correctly and the external TC is connected to the unit the display will show blinking temperature read by the external TC. Place the TC in known low temperature environment such as an ice bath, which you can measure with an independent and calibrated temperature meter. Enter the calibrated reading into X-600 unit using SET (up/down arrow) and ENTER key.
   d. The display will now show `tc3` `CALH`

e. Press ENTER and the display will show `CodE`.
f. Enter the 4-digit code to access high calibration point.
g. You may use a container with boiling water as a reference for high calibration point.
h. Place the TC into the high temperature environment. Read this temperature using the independent meter and enter it into X-600 unit using SET (up/down arrow) and ENTER key.
i. The external TC is now calibrated.

Protection against unauthorized change of pre-programmed settings

When the system is unlocked (system feature `LOC` is set to `OFF`) all of the system settings may be altered without restrictions. When the system feature `LOC` is set to `On`, the system will ask for a code number when someone tries to change the pre-programmed values. The display will show alternately: `CodE` `0000` (First digit blinking). To unlock the system, the previously selected code number must be entered. If the code entered is incorrect the display will show `Err` and a characteristic sound will be heard for about one second. The system will re-set to the state in which it was before an attempt had been made to change the settings. When a properly entered code is used the system will unlock and allow the settings to be changed until the system is locked again, the system is turned off by ON/OFF switch, or the unit is unplugging from the wall outlet). It is sufficient to enter an appropriate code once during the time when the system is powered on.

Changing the CODE:
`CodE` `CHG` has to be selected in system settings menu and then press the Enter key. The display will then show alternately `ocod` `----` (old code). Enter the previously used code number and press the Enter key. The display will show alternately `ncod` `----` (new code) and a new code number has to be entered. Display will then show alternately `REPt` `----` (repeat code) and a new code has to be keyed in one more time and the Enter key must be pressed to finish the Code Change operation. This new code will now be remembered by the system.

Special CODE numbers used by the system:
- **1234** - factory set code on delivery of the system to a customer.
- **XXXX** - „emergency code"; (call or e-mail Bokar International to obtain it. Proof of purchase will be required to release this code). This code will allow changing the code when entered in place of the old code.

USING PRE-HEATER
1. Turning the Pre-heater ON:
   a. Set the unit POWER Switch to "ON" position.
   b. Press Pre-heater On/Off key.
   The Pre-heater display will show `888°` set temperature for about 1 second and then it will show the acceleration time.
   - When acceleration time is set to any value grater than 0 (zero), the heating process is divided into two zones. Acceleration zone – heater works at full power and display shows alternately `ACLt` `8888` (remaining or elapsed acceleration time - depending on UP or DOWN time counting setting). When acceleration time zone ends or ON/OFF is pressed by the operator to end the Acceleration Zone on demand, the second zone starts and pre-heater will work to reach pre-set temperature.
   - When acceleration time is set to 0 (zero) the system has one preheating zone and the display shows `888°` current temperature. Pre-heater indicator illuminates red when power is supplied to the heaters.

NOTE
In the unit supplied to the user pre-heater display shows temperature of the sensor inside the pre-heater corrected by the offset to preheat double sided board. User should check the off set and

pre-set the value appropriate for his PCB.

2. Turning the Pre-heater "OFF":
    a. Press Pre-heater ON/OFF key.
    b. The Pre-heater display will turn off.

3. VIEW SET TEMPERATURE
    a. Press momentarily one of the Pre-heater SET (UP or DOWN) keys.
    b. The Pre-heater display will show `8889` set temperature for few seconds.

4. SET TEMPERATURE CHANGE
    a. Press one of the Pre-heater SET (UP or DOWN) keys momentarily.
    b. The Pre-heater display will show `8889` set temperature.
    a. Enter required value using SET (UP and DOWN) keys.
    b. Pres Enter key to finalize the entry.
       Note: If you do not press the ENTER key, the change will not be recorded by the system.

5. COOL Mode
    a. Press COOL key.
    b. The Pre-heater display will show `COOL` and the system heater will be turned off.
    c. The Pre-heater display will show `8889` current temperature.

NOTE
To turn on the pre-heater when it is in cool mode turn it off first by pressing "ON/OFF" key and press the ON/OFF key again (Press the pre-heater "ON/OFF" key twice).

6. OFFSET CHANGE

NOTE
Offset temperature can be changed in the range of –25 – +85 °C.
Offset temperature = temperature shown on the display minus temperature measured on the PCB placed in the holder above the pre-heater. Offset which is pre-set in the factory is for a double sided board to reach temperature of 140 deg. when placed in X-KAR board holder

    a. Press the Pre-heater UP key and the Enter key simultaneously for a second.
    b. The pre-heater display will show alternately `OFFS` `8889` offset temperature.
    c. Enter the required value using SET (UP or DOWN) keys.
    d. Press the Enter key to finalize offset number entry.

7. ACCELERATION TIME CHANGE

NOTE
Acceleration time can be changed in a range of 0-180 second.

    a. Press the Pre-heater UP key and the Enter key simultaneously for a second.
    b. The pre-heater display will show alternately `OFFS` `8889` .
    c. Press the Pre-heater UP key and Enter key again simultaneously for a second.
    d. The pre-heater display will show alternately `ACLt` and `8888` acceleration time.
    e. Enter the required value of acceleration time using SET (UP and DOWN) keys.
    f. Press the Enter key to finalize Acceleration Time setting.

USING THE PRE-HEATER CONNECTED WITH FOCUS "X"
    1. Connecting X-600 with FOCUS Units.

a. Turn the Pre-heater and the FOCUS "X" units "OFF".
b. Insert one end of the XCB-1 cable into the Remote Control socket located on the back panel of the X-600 unit and the other end of the XCB-1 cable into the PRE-HEATER connector located on the back panel of the FOCUS "X" unit.

NOTE
Please remember to turn "ON" X-600 PRE-HEATER before you start the process from the FOCUS unit.

WARNING
When X-600 is connected with the FOCUS "X" unit the pre-heater is locked. The Pre-heater ON/OFF key will not start the pre-heater.

2. When X-600 is turned on, the pre-heater display shows set temperature until the process is started.
3. The FOCUS unit controls the pre-heater.
4. When the pre-heater is turned "ON" by FOCUS, the operator can turn it "OFF" at any time by pressing ON/OFF key on the Pre-heater front panel.

CONNECTING XFS-2 FOOT SWITCH TO X-600 SERIES PRE-HEATER.
1. Turn the Pre-heater "OFF"
2. Insert the plug of the XFS-2 Foot Switch cable into Remote Control socket located on the back panel of the X-600 PRE-HEATER.
The X-600 pre-heater can now be turned "ON" or "OFF" by either the front panel ON/OFF Key or the by XFS-2 Foot Switch.

USING EXTERNAL THERMOCOUPLE
1. To activate the temperature measurement by the external thermocouple:
   a. Connect thermocouple to the thermocouple connector.
   b. Set the unit POWER Switch to "ON" position.
   c. Set the Thermocouple Switch to "ON" position. The thermocouple indicator illuminates red when the thermocouple is connected. The red indicator blinks when the thermocouple is not connected or it is broken (open).
   d. The Pre-heater display shows the temperature measured by the external thermocouple.
   e. To turn the measurement by external thermocouple "OFF", set the thermocouple switch to the "OFF" position.

VIII FIRMWARE UPGRADE

Checking firmware revision and SN in the device.

1. Connect the power cord
2. Turn the Power Switch to the "ON" position.
3. Press and hold "ESCAPE" button.
4. After a few second the display should show:

Display (example values)	Description
d06d	Device identifier
02.35	Software revision
202	Serial number

Reprogramming procedure

1. Turn the Power Switch to the "OFF" position.
2. Connect X485USB converter to the DATASTORE connector and to PC.
3. Press and hold "Enter" button on the device keyboard.
4. Turn the Power Switch to the "ON" position.
5. Release the "Enter" button.
6. Displays should show: "boot" "----".
7. Run program **flasher.exe** (from PC).
8. Select proper port number and press "Connect".
9. If connection is established You should see: "Vendor name: Bokar international"
10. If not please change port number and reconnect.
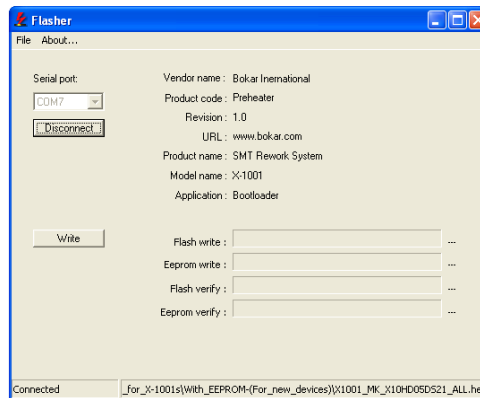
11. Select "File" from menu and choose file with firmware (*.hex).
    For example for X-600: "X600_X10HD05D_code.hex"
12. Press "Open"   13.   Press "Write"
13. If re-programming went satisfactory you will see the message "Write successful. Would you like to run application?" 14. Press "Yes"

IX. TECHNICAL SPECIFICATIONS

MODEL	X-600
Overall System	
Input Voltages	110-120, 220-240V AC
Power Consumption	Max. 600 W
Weight	5,5 kg (12.1 lbs.)
System dimensions	3.9" x 3.5" x 6.3" (100 x 90 x 160 mm)
Packaged weight	14.4 lbs. (6,5 kg)
Pre-heater Section	
Max. Power	600 W
Preheat temperature measured on a PCB	140-302 °F (60 -150 °C)
Chimney dimension	3.5" x 3.5" (90 x 90 mm)
Preheat area	More than 4" square
Average PCB preheat time to 150°C	Less than 2 min.

X. RECOMMENDED EQUIPMENT for use with X-600 Series Pre-heaters

1. **XU-1SH** Retractable Board Holder
    (Maximum board size 12" (305mm) x open end.)

2. **XU-2** Large Size Board Holder
    (Maximum board size 14" (356mm) x open end.
    XU-3 Extra Large Size Board Holder
    (Maximum board size 21" (533mm) x open end.

3. **X-BB1s** Basic Board Holder Set (Includes 2 XBB1 supports)
    Six adjustable heights from 3.6" to 5.2"

4. **MP-10K** - Hand held Paste and Flux Dispenser Kit.
    A great improvement over thin plastic plungers, to manually dispense a paste or flux with less fatigue and better accuracy.

5. **ESD Tweezers with quick-change Dissipative Tips**
    This series of Tweezers has solid ESD dissipative fiber tips that make them ideal for use in the semiconductor industry. They are resistant to chemicals, highly resistant to static charging, offer unequalled wear and heat resistance.

BOKAR International
650 Scranton Pocono Hwy.,
Covington Twp. PA 18444, USA

Tel: (570) 842-2812   Fax: (570) 842-4290
E-mail: bokar@bokar.com
www.bokar.com   US Master Distributor: **www.bomir.com**

www.ESDbrushes.com   **www.X-Reflow306.com**   **www.xkar.com**
www.ESDmeters.com   **www.ESDpackaging.net**   **www.No-Stat.com**   **www.ESDchair.net**
www.BestBatchOven.com   **www.ESDlabcoats.com**   **www.ESDapparel.com   www.FineRework.com**