DRS25

Users Manual #0025.00.902

203.888.9900 | www.air-vac-eng.com

AIR-VAC ENGINEERING COMPANY, INC.
INSTALLATION AND TRAINING

Customer:		Date:	
Address:		Machine Type:	
		Serial Number:	
Contacts:			

	Phone:		E-mail/Fax:	
	Phone:		E-mail/Fax:	
	Phone:		E-mail/Fax:	

This is to certify that the Air-Vac Representative _____ has installed the above machine and that all items have been received or are noted below. The machine is in good working order, and initial training was provided.

Customer Signature/Date:

Air-Vac Representative Signature/Date:

Issues:

Items Missing:

Please fax this completed document to:
Air-Vac Engineering (203) 888-1145, Attn: Brian Czaplicki

Table of Contents

DRS25 User Manual
Part Number 0025.00.902
Rev 07.00
April, 2023

1: Introduction/Getting Started

1 Introduction/Getting Started

Air-Vac is always willing to assist our customers with any technical or operating questions. If you have any questions on machine parameters, correct nozzle requirements, options, procedures or maintenance, please do not hesitate to call.

Air-Vac Engineering Company, Inc.

30 Progress Avenue

Seymour, CT 06483

Tel: 203-888-9900

Fax: 203-888-1145

http://www.air-vac-eng.com/

airvac@air-vac-eng.com

1.0 Warranty - General

Air-Vac Engineering Company warrants its equipment for a period of one (1) year from date of shipment on all parts, materials and labor costs required to repair the system except for component parts that are considered "wear and tear" items that are warranted for ninety (90) days. These include, but are not limited to, heaters, belts, lights, vacuum cups and tubing.

Air-Vac agrees to repair or replace any or all such equipment that may prove to be defective within the warranty period, without expense, excluding shipping to the owner. This warranty shall not apply to any products that have been repaired or altered except by Air-Vac Engineering. Services under warranty shall not affect an extension of the warranty period, nor will a new warranty period be granted for the parts, which were replaced/repaired. The title of the replaced parts will automatically pass to Air-Vac.

Air-Vac reserves the right to reject replacement under this warranty where, in the sole opinion of Air-Vac, the defect is due to obvious misuse and/or improper maintenance of the module or any part thereof. The express and/or implied warranty of Air-Vac is limited to the replacement and/or repair of any item defective in material and/or workmanship. Other damages, if any, direct or consequential are expressly excluded from this warranty.

Air-Vac shall be liable under this warranty only if 1) Air-Vac receives notice during the appropriate warranty period (90 days or 1 year as applicable); 2) The products are operated in accordance with the supplied documentation; and 3) Such products are, to Air-Vac's satisfaction, determined to be defective.

When contacting Air-Vac for warranty inquiries, please provide the *Order Number that the parts were shipped, Model and Serial Number of the product and the Reason for Warranty.* Products cannot be returned to Air-Vac without authorization – please call for an RMA #.

1.1 Heater Limited Life Warranty

Air-Vac Engineering Company warrants the heaters for a period of ninety (90) days from date of shipment.

Air-Vac agrees to repair or replace any or all such equipment that may prove to be defective within the warranty period, without expense, excluding shipping to the owner. This warranty shall not apply to any products that have been repaired or altered except by Air-Vac Engineering. Services under warranty shall not affect an extension of the warranty period, nor will a new warranty period be granted for the parts, which were replaced/repaired. The title of the replaced parts will automatically pass to Air-Vac.

Air-Vac reserves the right to reject replacement under this warranty where, in the sole opinion of Air-Vac, the defect is due to obvious misuse and/or improper maintenance of the module or any part thereof.

> Heating element life is affected by several factors, temperature, airflow, condition of incoming air (water and oil contamination) and overall process cycle. These products are considered a "consumable" item. The length of useful service will vary based on the conditions under which they are run. Higher temperatures and/or lower flows will cause shortened life.

The express and/or implied warranty of Air-Vac is limited to the replacement and/or repair of any item defective in material and/or workmanship. Other damages, if any, direct or consequential are expressly excluded from this warranty.

Air-Vac shall be liable under this warranty only if 1) Air-Vac receives notice during the warranty period; 2) The products are operated in accordance with the supplied documentation; and 3) Such products are, to Air-Vac's satisfaction, determined to be defective.

When contacting Air-Vac for warranty inquiries, please provide the *Order Number that the parts were shipped, Model and Serial Number of the product and the Reason for Warranty.* Products cannot be returned to Air-Vac without authorization – please call for an RMA #.

1.2 Material Check List

The following items are shipped with all DRS25 systems.

User Manual 0025.00.902

Calibration Components	Part Number	Use
Flow Meter	FLM5	Verify flow settings
Flow Meter Hose	9001.15.036	
Flow Meter Fitting	9001.00.013	
Temperature Calibration Nozzle	NCAL1	Verify temperature settings
Vision Alignment Nozzle	N27EZ27	Verify vision alignment
Vision Alignment Board	9002.14.017	
Vision Alignment Component (QFP)	9002.14.005	
Allen Wrench Set (Metric)	9008.99.766	Adjust vision alignment
Force Weight	0032.14.091	Verify load cell setting

Training Components	Part Number	Use
Practice Board	9002.14.044	
PBGA676 (2)	9002.14.056	27 x 27mm BGA
Thermocouples (2)	9002.12.047	

Operator Components	Part Number	Use
Nozzle Handling Tool	1022.02.040	Nozzle load/unload
Nozzle Stand	GNS1	Holds nozzles
O-Ring Assortment (Silicone)	ORASST	Nozzle o-rings
Board Support Set (2-12", 2-6", 4-9", 2-standalone)	0025.01.010	Supports flexible boards
Grounding Clip	9002.01.065	Grounding
Vacuum Probe Tubing (6')	9001.15.018	Parts handling
By-Pass Probe	3CP100	Parts handling
Probe Tip	29A3	Parts handling
Silicone Cups	VASST	Parts handling/nozzle vacuum cup
Syringe (5cc)	TS5LL/PP	Apply flux
Needle	TS5LL-1	Apply flux

Maintenance	Part Number	Use
Filter Element	0001.11.101	Site clean filter
Allen Wrench Set (American)	12055	
Fuse, 10 amp (2)	9002.04.108	
Fuse, 4 amp (2)	9002.04.033	
Fuse, ½ amp (2)	9002.04.038	
Fuse, 12 amp (2)	9002.04.055	
Anti-Seize (1 oz)	AS15	Lubricate
Filter Element	F1AE	Vacuum filter
Steel Brush	STB7	Clean vacuum ports

Installation	Part Number	Use
Black Adhesive Mounts (2)	9002.18.013	Supports diffuser hose

1.3 Options

1.3.1 Site Cleaning System (0029.03.012)

Objective

- Removal of residual site solder without damaging the pads or solder mask. Eliminates the need for traditional solder iron/solder wick process and associated issues (ie. manual intervention, mechanical contact of pads).

How It Works:

- Hot gas reflows the residual solder on the pads.
- While viewing through the microscope, the operator moves the board with the x/y adjustment wheels to clean the pads on the site.
- A vacuum sensor continuously adjusts the height of the composite vacuum tip to provide non-contact site cleaning.

Notes Of Interest:

- Non-contact site cleaning is critical for lead-free rework due to the significantly higher temperature required to reflow the residual site solder.
- Small, medium and large composite vacuum tips provided.
- Custom designs available for hard to access areas.

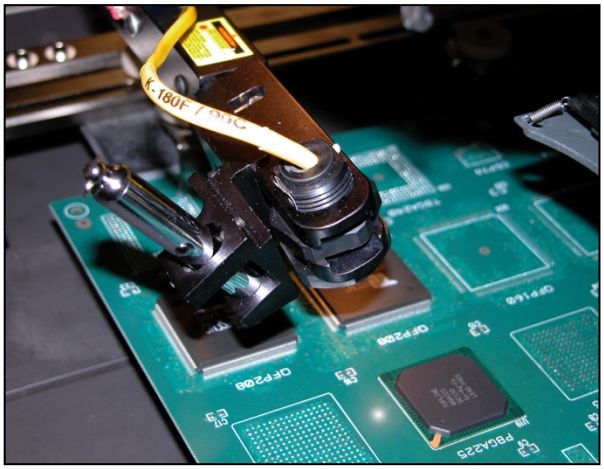
1.3.2 Pivoting IR Probe with Laser Pointer (1012.02.017)

Objective

- Provides process repeatability by insuring that the board is at the exact same target temperatures each time before localized reflow begins.

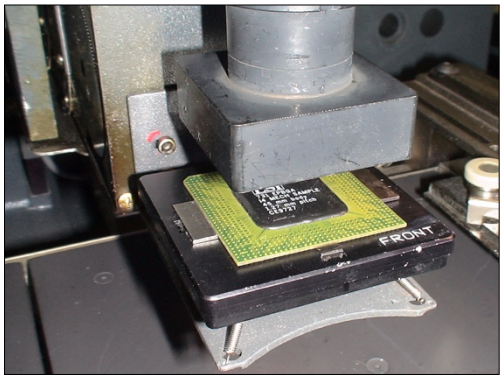
How It Works:

- Operator is instructed to position the laser pointer at the beginning of the process.
- The non-contact temperature sensor monitors topside board temperature and automatically triggers the localized reflow process once the target temperature is reached.



1.3.3 Universal Insertion Tool (AU6LGA47R)

- Mechanically self-centers any square or rectangular device for accurate pick up.
- Used in conjunction with component shuttle.

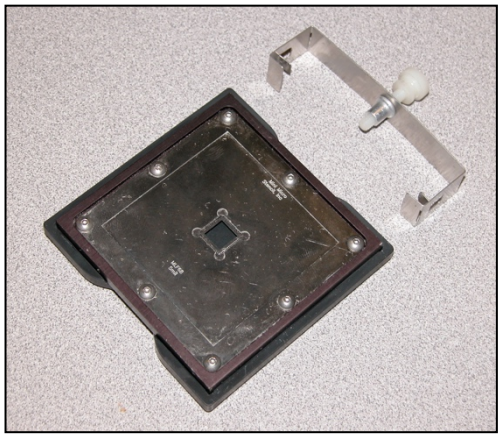


1.3.4 Paste-On-Device Micro Stencil Adapter (0024.24.111)

- Component-specific micro stencil applies solder paste directly to the component spheres.
- Pasted device in stencil is placed in micro stencil adapter, which is used in conjunction with the component shuttle to pick the pasted device.

Notes Of Interest:

- Air-Vac does not supply the component-specific micro stencils. Recommended supplier is Mini Micro Stencil (760-591-3804).
- Micro stencil installed into adapter for direct pick from shuttle.

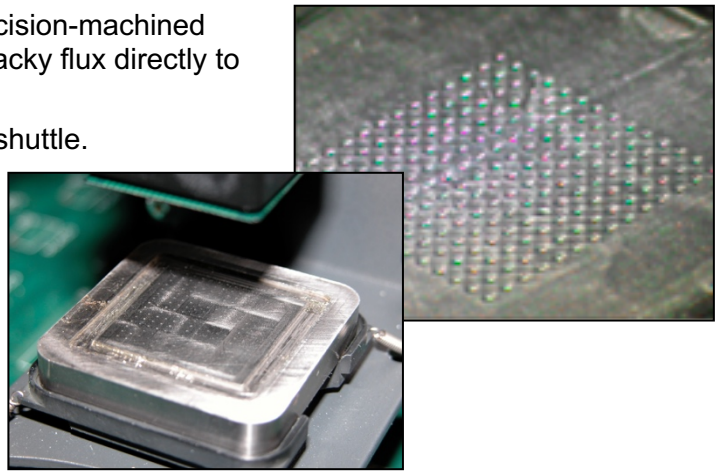


1.3.5 Flux Dip Pedestals (FASET1)

- Stainless steel fluxing pedestals with precision-machined depth provides controlled application of tacky flux directly to the solder spheres on the device.
- Used in conjunction with the component shuttle.

Notes Of Interest:

- Various sizes and depths available. Recommended depth is 50% of ball height.



1.3.6 Ergonomic Workstation with CPU Holder (1003.05.010)

Objective

- Provides a self-contained work cell environment for the machine and operator.

Features:

- 60"W x 36"D ultra-sturdy construction with anti-static laminate surface.
- Workstation includes CPU Holder.

Options:

- Monitor Stand (1003.05.005)
- Nozzle Stand (1003.05.006)
- Locking Drawer (1003.05.007)

1.3.7 Direct View HD Camera with HD Monitor (0025.03.016)

Objective

- Provides operator viewing of the site cleaning process and placement/reflow.

How it works:

- Video is activated by operator. Focus/zoom/lighting adjustments are made to optimize clarity.

1.4 Safety

The DRS25 system was designed with safety of the operator in mind. The operation and maintenance of the system must be performed cautiously due to the nature of the hot surfaces and the hazardous chemicals involved in the assembly and rework of printed circuit cards.

NOTE: When operating the AIR-VAC DRS25 system, follow all local codes for safe operation of the machine. Disposal of materials used in the processing of Printed circuit boards must be done in compliance with each Manufacturers recommendation in accordance with local codes.

Other safety mechanisms include:

- A latching E-stop.
- Operator safety warning labels and markings are employed.
- Gas nozzle handling tools has been included and should be used when handling hot nozzles.

1.4.1 General Safety

Machines and tools of Air-Vac can only be used with maximum efficiency and safety by well trained personnel.

Do not attempt to operate or maintain this system without proper training from qualified personnel.

Machine Operation

- Both the top and bottom heating elements can be programmed to reach high temperatures. Use caution near heated surfaces including the nozzle and the bottom heater.
- Always use the gas nozzle handling tool when installing or removing nozzles.
- The nozzle and vision systems are powered by stepper motors and are programmed to move during operation. Use caution near these two moving areas.
- Observe the legal and specific national regulations concerning accident prevention and protection of the environment.
- Observe the general safety regulations concerning working with solder and flux. Fume extraction should be seriously considered.

Maintenance

- As a basic rule, disconnect the main 220 Vac power before servicing the machine or when the machine is taken off line.
- Only use the tools for their defined purpose.
- Never remove or disable any DRS25 safety features or software.
- Make sure that all electrical devices are leakage current protected and are stored and used in dry, dust-free surroundings.
- The machine contains static sensitive devices. Use caution to avoid static discharge when handling DRS25 machine parts.
- Use original spare parts only.

1.4.2 Additional Safety Precautions

- Upper heater housing protects the upper heating element - marked with hot label.
- Bottom heater plate surface can be hot – protective covers are marked with hot label.
- Flux vapors can be hazardous to operators - fume extraction should be employed.
- Flux liquid is flammable and hazardous to operator health and safety.
- Nozzle and vision motion can cause injury to the operator.

Handling of Hazardous Solder and Flux Products

AIR-VAC does not supply the solder or flux products with the DRS25 system. The end user of the DRS25 system should follow proper handling and disposal instructions for the materials as supplied by their vendors.

Nozzle Changeover: Safety Equipment Requirements

When changing out the part-specific gas nozzle, use the special nozzle removal tools (1022.02.040) that are supplied in the tool kit of the system whenever handling a hot nozzle.

Removing a nozzle:

- Hold the hot nozzle with the nozzle removal tool.
- Turn the nozzle locking jaws counter clockwise and the nozzle fingers will open to free the nozzle.
- With the hot nozzle held firmly in the removal tool, place the nozzle in a container that can handle the heat of the nozzle.

To install a nozzle, reverse the above procedure.

1.4.3 Label Description and Placement

The following metal placards are affixed to the DRS25 system:

This label describes the electrical and air requirements for the system. The overall system requirements can be found in the facilities section of this manual.

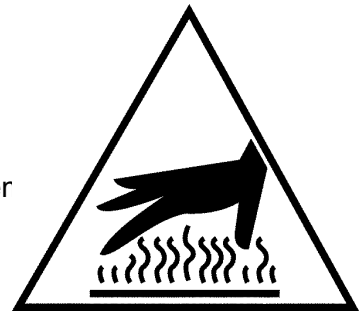
AIR-VAC ENGINEERING COMPANY, INC.
SEYMOUR, CONNECTICUT 06483 • U.S.A.

DRS25

Serial Number
Voltage 220 VAC +/- 5%, 50/60Hz, 30A
Air/Nitrogen Pressure 90-130 PSI

Warning Label Description and Placement

The warning and hot surface labels found on the DRS25 system are intended to prevent injury to the operators and users of the DRS25 syster



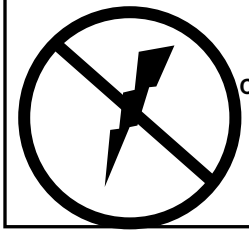
Warning HOT – the upper heater and diffuser plates of the system are required to reach temperatures well above 100°C. Labels are found on the covers of each heated surface.

CAUTION – HOT SURFACE AVOID CONTACT WITH DIFFUSER PLATE

High power and static-sensitive warning labels advise personnel of potential issues when the machine covers are opened.

CAUTION HIGH VOLTAGE

DISCONNECT POWER BEFORE OPENING



CAUTION

CONTENTS SUBJECT TO DAMAGE BY STATIC ELECTRICITY

DO NOT OPEN

1.4.4 DRS25 System Alarms

The following alarms to the DRS25 system will halt the process until the problem has been corrected and the alarm is cleared:

This alarm type occurs when one of the following conditions is detected:

Machine Hardware Alarms

```
*     SerialPort_Failure
      Z_Axis_Motor_Comm_Restart
      Vision_Axis_Motor_Comm_Restart
      Nozzle_TempControl_Comm_Restart
      Left_Preheat_TempControl_Comm_Restart
      Right_Preheat_TempControl_Comm_Restart
      Center_Preheat_TempControl_Comm_Restart
      DeviceIO_Communication_Restart
      Low_Pressure_Air_Regulator
      Low_Pressure_N2_Regulator
```

Process Alarms

```
      Nozzle_Temperature_Limit,
      Nozzle_TC_Error,
      Left_Preheater_Temperature_Limit,
      Left_Preheater_TC_Error,
      Right_Preheater_Temperature_Limit,
      Right_Preheater_TC_Error,
      Center_Preheater_Temperature_Limit,
      Center_Preheater_TC_Error,
      Below_Minimum_Nozzle_Flow_Rate,
      Nozzle_Flow_Sensor_In_Position_Failed,
      Exceeded_Max_FootSwitch_Delay,
      Exceeded_Max_TC_Control_Delay,
      TC1_Not_Connected,
      TC2_Not_Connected,
      TC3_Not_Connected,
      TC4_Not_Connected,
      TC5_Not_Connected,
      TC6_Not_Connected,
      TC7_Not_Connected,
      TC8_Not_Connected,
      Site_Clean_Tool_Clogged
```

* Computer must be rebooted to clear.

The various alarms are explained in further detail in the Software section.

2: Installation

IMPORTANT! If the Optional Workstation has been purchased, please assemble it first using the instructions in Section 2.1.

2 Installation

2.0 Unpacking/Packing

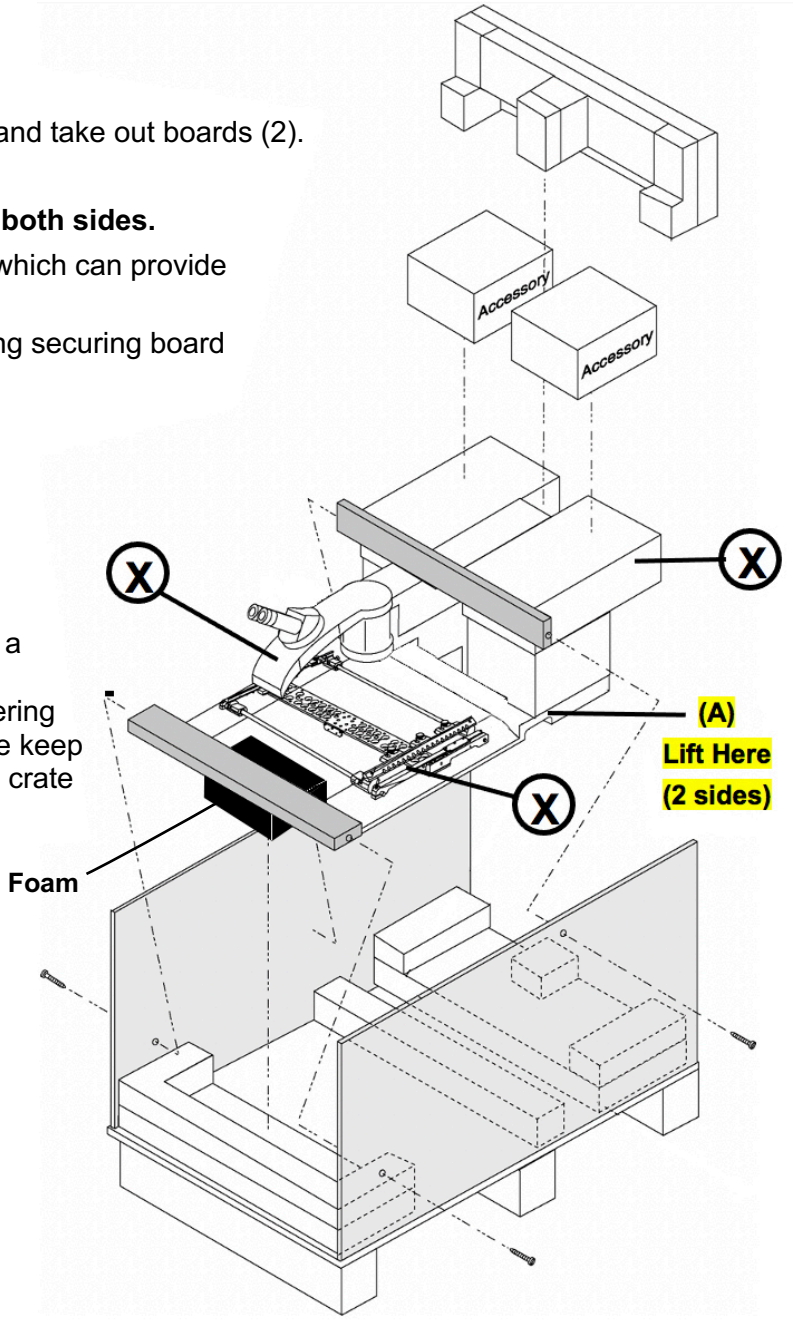
NOTE:

WEIGHT IS UNBALANCED. BACK END OF UNIT IS HEAVIEST. PLEASE BE CAREFUL OF DELICATE ELECTRICAL CABLES AND PNEUMATIC CONNECTIONS.

IMPORTANT:

DO NOT LIFT BY TROLLEY, BOARD CARRIER SYSTEM OR UPPER BOX SECTIONS AS DAMAGE WILL OCCUR.

- Removing Module:
  1. Remove screws in the side of crate and take out boards (2).
  2. Break down crate (sides & top).
  3. **Lift by *openings in casting (A)* on both sides.**
  4. Position module on a level surface, which can provide adequate support for weight.
  5. Remove any strapping and/or packing securing board carrier and vision systems.



Shipping Weight: 515 lbs.

Shipping Dimensions: 48L" x 48W" x 37H"

Shipping Cartons: The system is shipped in a wooden crate. Accessories are individually packaged and secured inside the crate covering the system or in separate containers. Please keep crate in upright position when moving. Save crate for future shipping.

2.1 Facility Requirements

Electrical (also see Operating Notes):

- Machine Power (3 Phase): 208/230VAC, 50/60Hz, 30 amp (DRS25(T) & DRS25XL(T)), **Plug: Nema L15-30P**
- PC Power: 220VAC, 50/60Hz, 1 amp (power from DRS25)
- Monitor Power: 220VAC, 50/60Hz, 1 amp (power from DRS25)
- Camera Power: 120VAC, 60Hz, 18 watts
- Speaker Power: 120VAC power cube, 60 Hz, 125 ma

Pneumatic: 2 ports (21 cfm total, 90-130 psi)

- Upper Heater: 90-130 psi, 3 scfm, air or nitrogen. Clean, dry air (non-condensing) source. 1/8"-27 NPT male fitting x 6' hose supplied.
- Accessories: 90-130 psi, 18 scfm. Clean, dry air (non-condensing) source. 1/4"-18 NPT male fitting x 6' hose supplied.

Operating Notes - IMPORTANT!:

Electrical:

- This system is designed to operate on 220 VAC.
- **Under full load conditions**, power must not drop below 208 VAC. Full load is defined as DRS25 fully operating, plus all other equipment down the line fully operating. If 208 VAC is not met, a buck up transformer or another line must be connected. Under general conditions, expect incoming line voltage to drop approximately 3-10 volts.
- Under no load conditions, power must not exceed 240 VAC. No load is defined as DRS25 off and all other equipment down the line turned off.
- Removing supplied plug will invalidate machine warranty/UL approval.
- In areas susceptible to frequent power disturbances, line filtering/protection may be required.

Air/Nitrogen:

- With top heater and accessories operating at 100% flow, system consumes up to 18 scfm @80 psi. With all systems activated, 70 psi. must be maintained. Requires both gas lines be direct plumbed (no quick disconnect).
- These requirements must be addressed prior to the Air-Vac installation and training visit. This will assure that you receive a productive training program within the scheduled visit time.

Physical:

- Machine Operating Dimensions (W x D x H): 60" x 50" x 27"
- Workstation Dimensions (W x D x H): 60" x 36" x 30"
- Machine Weight: 275 lbs.
- Monitor Dimension (W x D x H): 16" x 8" x 20"
- Monitor Weight: 15 lbs.
- Operator Viewing Height (from module base): 21-24" (adjustable height chair recommended)

2.2 Pneumatic Connections: Top and Bottom Heater

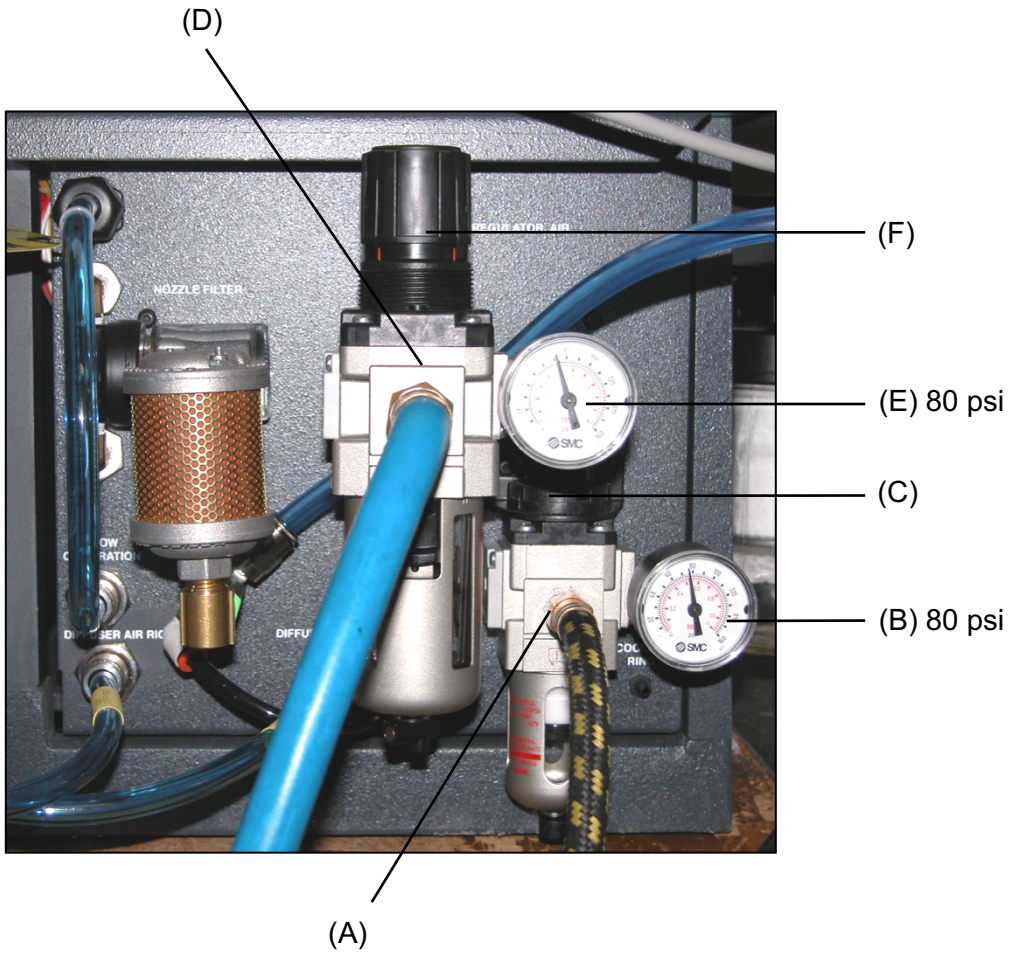
All Pneumatic and electrical connections described in the following sections must be done prior to powering on the DRS25.

Upper Heater Pneumatics:

- Connection **(A):** 1/8-27 NPT (male fitting) x 6 ft. hose (1/4" diameter, blk/yellow)
- Pressure Setting **(B):** 80 psi, adjust as required **(C)**
- Air/Nitrogen Consumption: 3 cfm

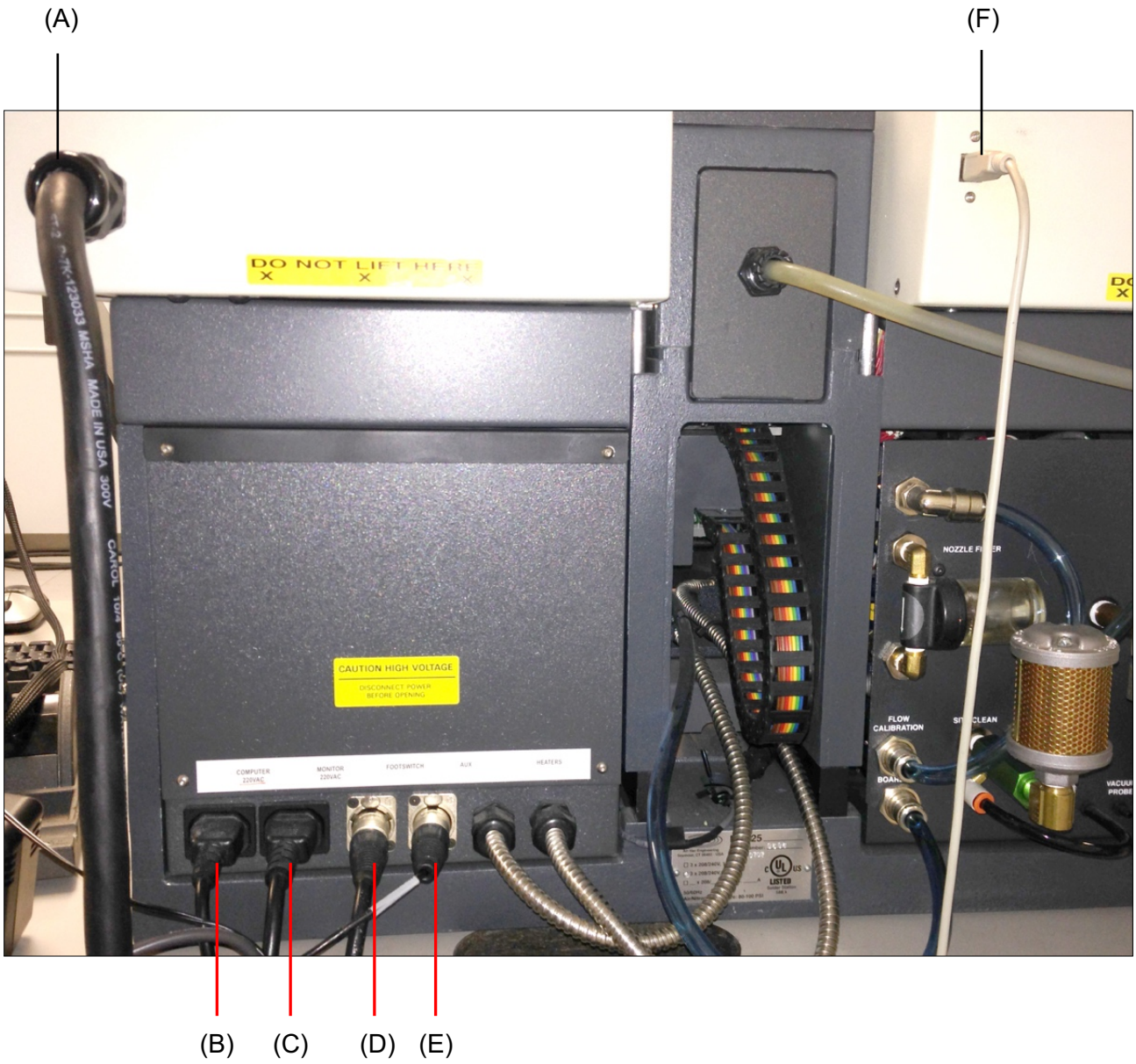
Other Pneumatics (nozzle vacuum, site cleaning vacuum, board cooling option):

- Connection **(D):** 1/4-18 NPT (male fitting) x 6 ft. hose (3/8" diameter, blue)
- Pressure Setting **(E):** 80 psi, adjust as required **(F)**
- Air Consumption: 18 cfm

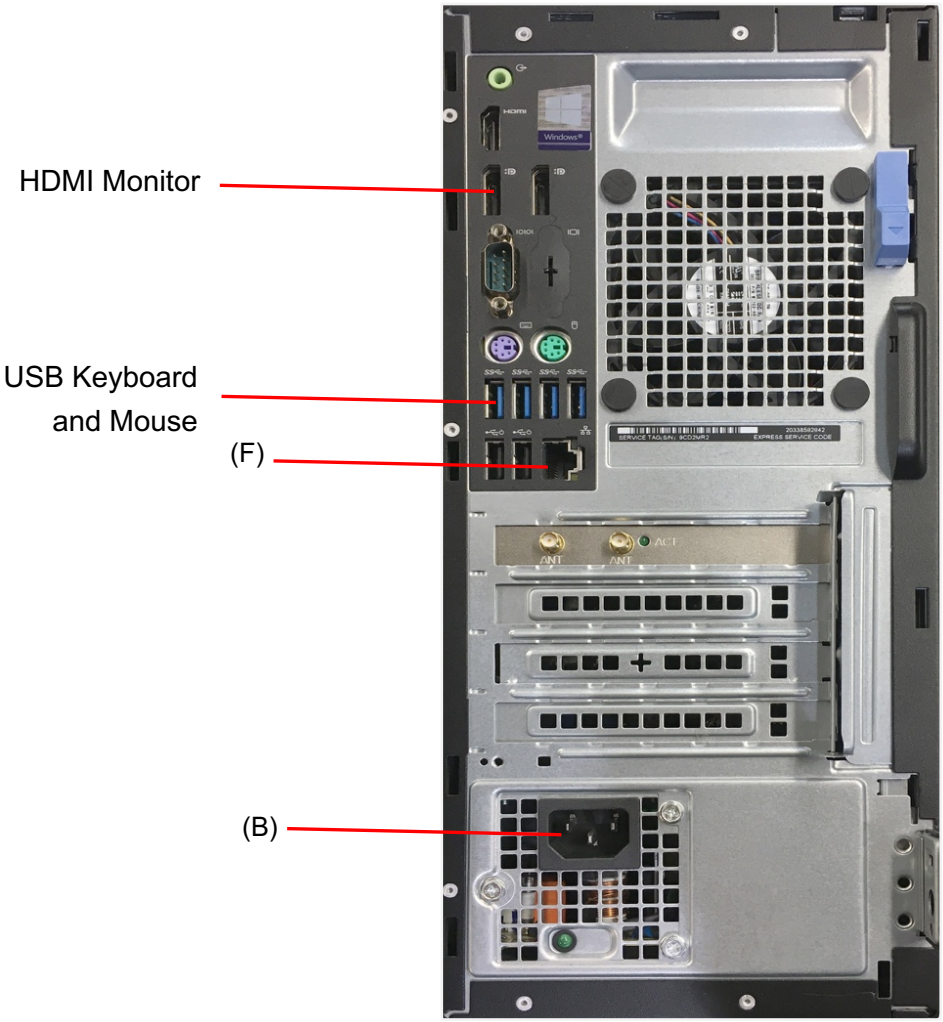


2.3 Electrical Connections

- Machine Power **(A)**
- Machine to PC Power **(B)**
- Machine to Monitor Power **(C)**
- Machine Footswitch **(D)**
- Machine to Optional Direct View Camera **(E)**
- Machine to PC Communication Cable **(F)**

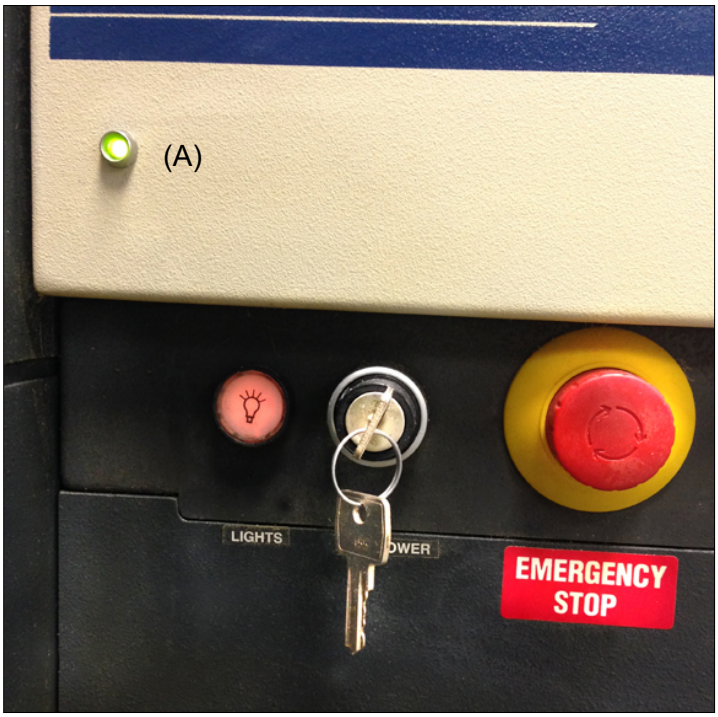


- Machine to PC Power **(B)**
- Machine to PC Communication Cable **(F)**

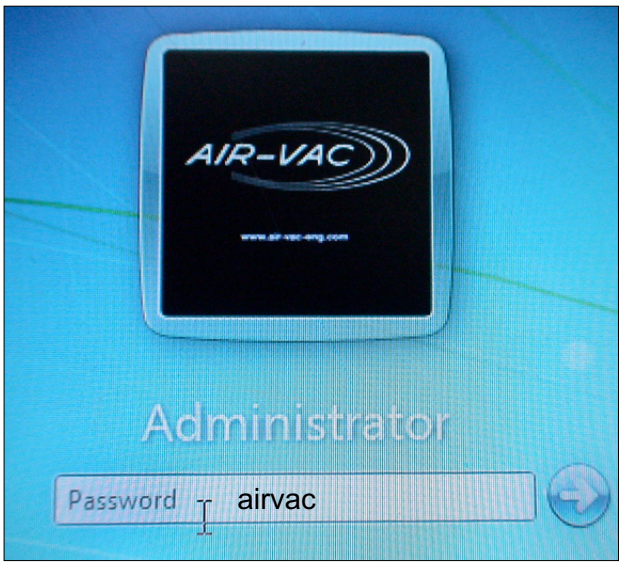


2.4 Powering Up the Machine/PC and Login

Turn on machine power by releasing the Emergency-Stop if depressed and turning the key to the right. The green machine power indicator light **(A)** will illuminate.



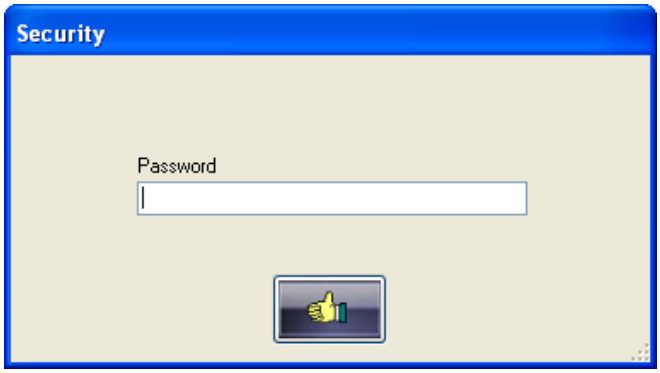
Turn on the PC and Monitor. The PC will boot to the Administrator screen as shown below. The password is **"airvac".**



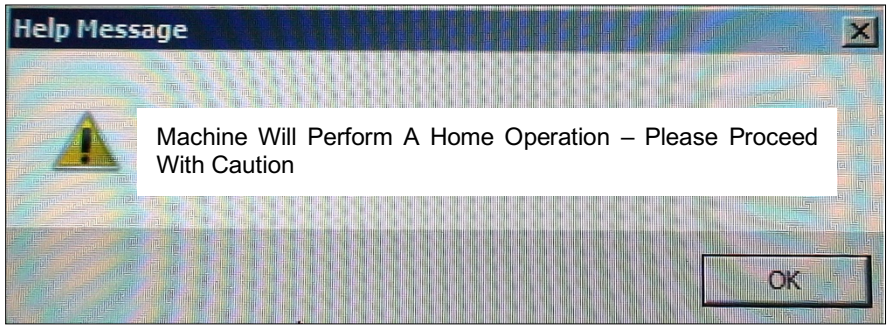
Double click on the **AV DRS25.exe icon** to start the software.

Type in **"DRS25"** at the Operator Login screen, then click **Thumbs Up.**

The default password is left blank. Click **Thumbs Up.**



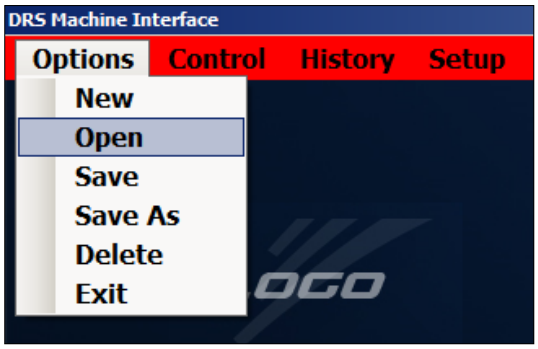
Machine will perform a home operation. Click on **OK button.**



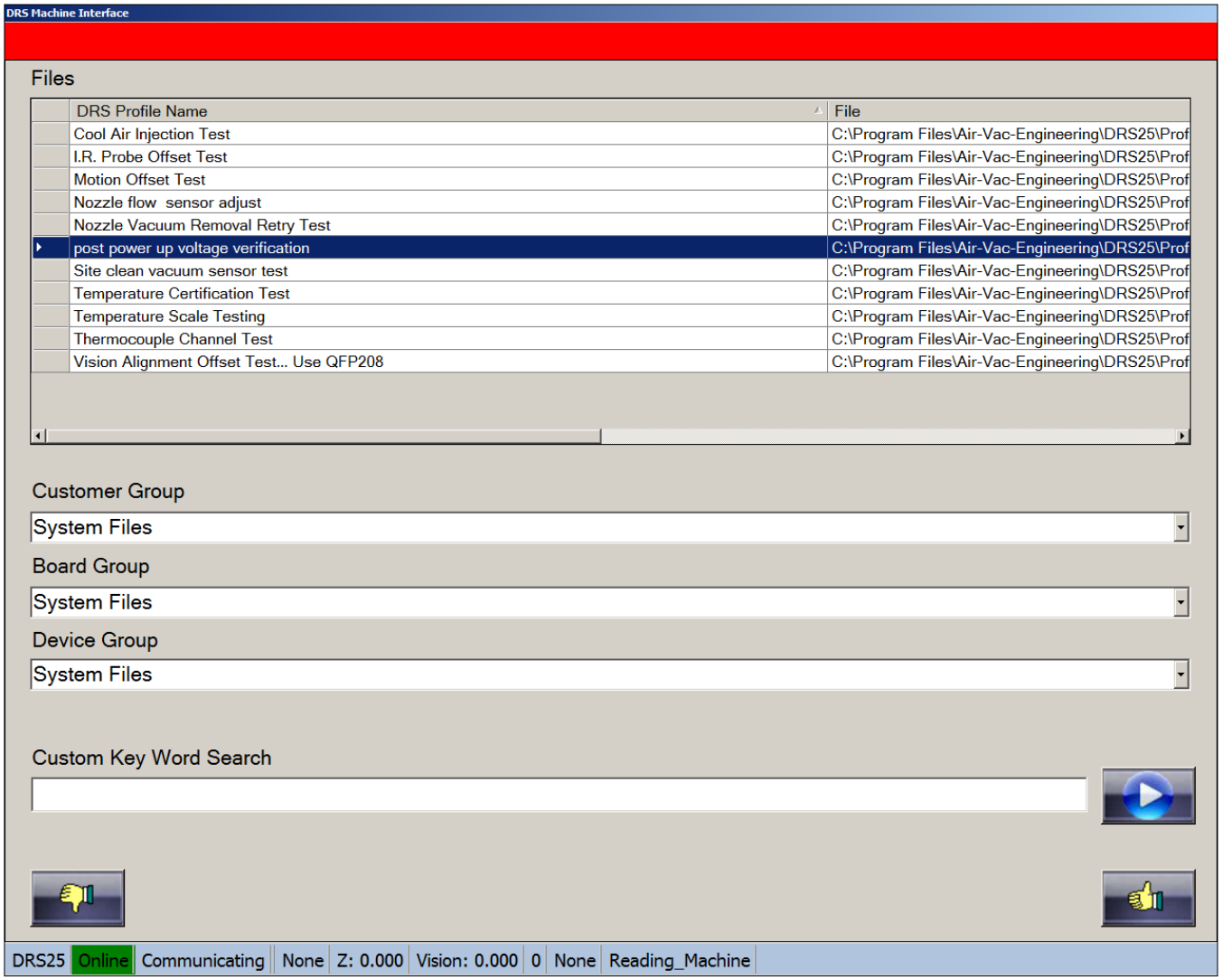
2.5 Voltage Verification

Note: Voltage Verification has to be done by a Certified Electrician.

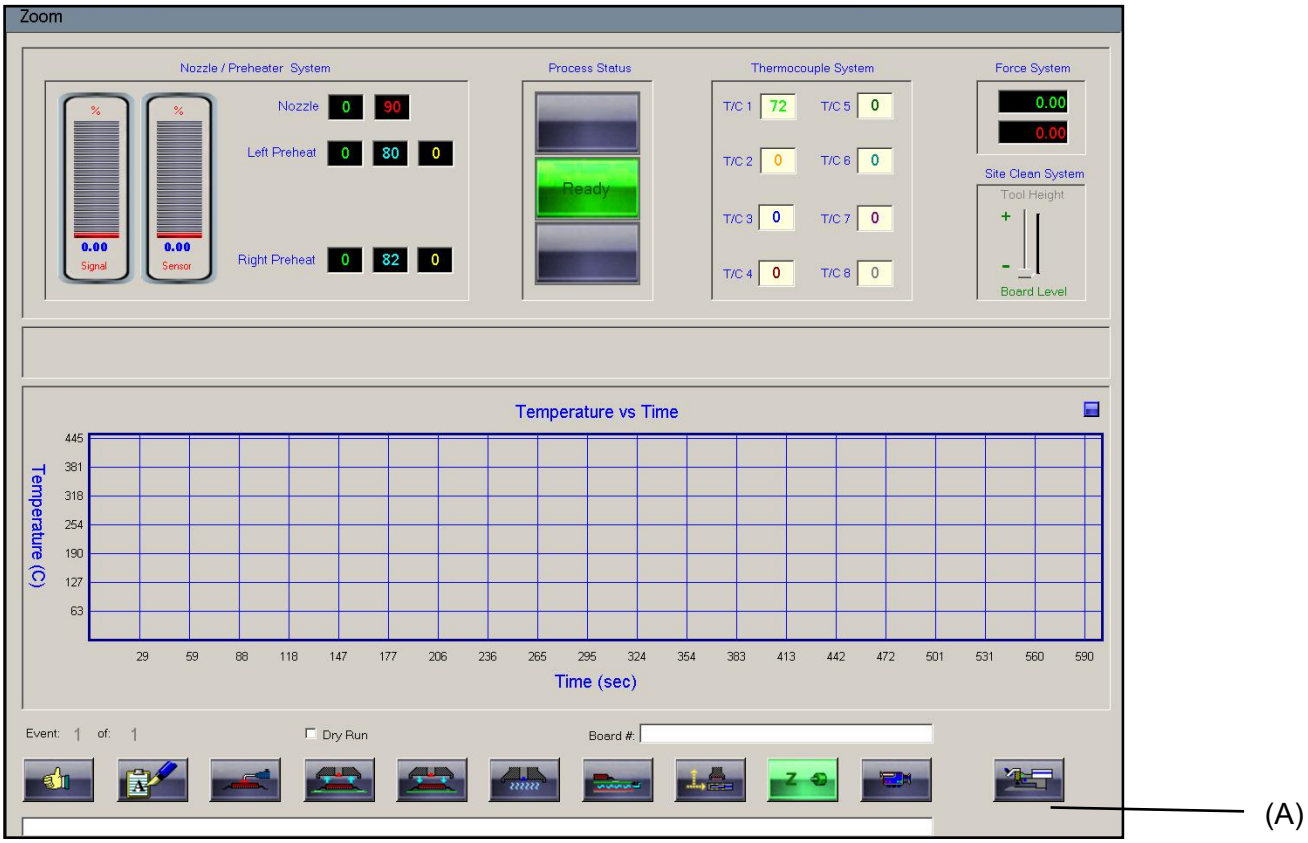
1. Open the right electrical box.
2. Using the right side mouse button, click over the Air-Vac logo on the screen (main menu background color will change to red). You are now in the "Hidden" setup window.
3. Select Options from the menu bar.
4. Select Open.



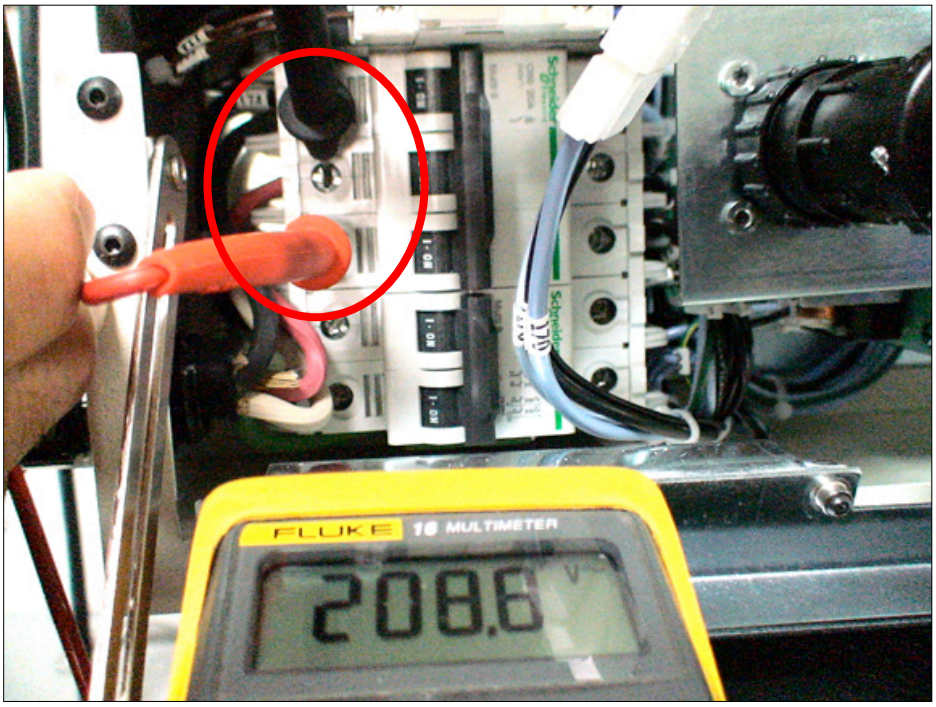
5. The file group should default to System-System-System.
6. Select the Post-Power-Up Voltage Verification profile. Click on the thumbs up icon. Click on the thumbs up icon to advance to the run screen.



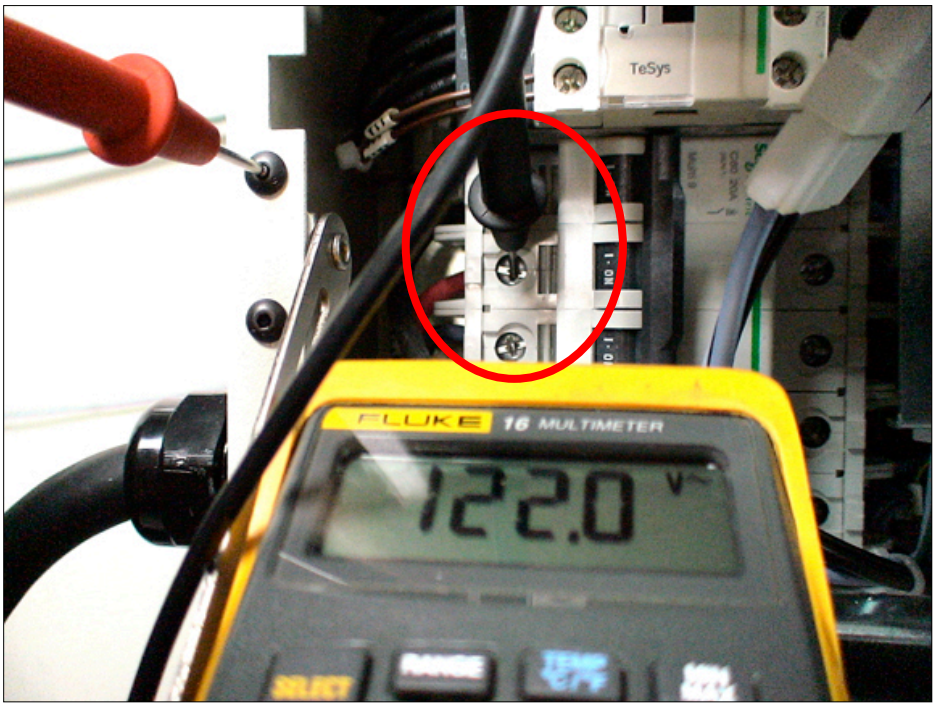
7. Click on the cycle start icon **(A)** to begin the process.



8. Verify that the machine voltage is between 208 and 240 volts while the process is running.



9. Each leg (3) must be approximately 120 volt.



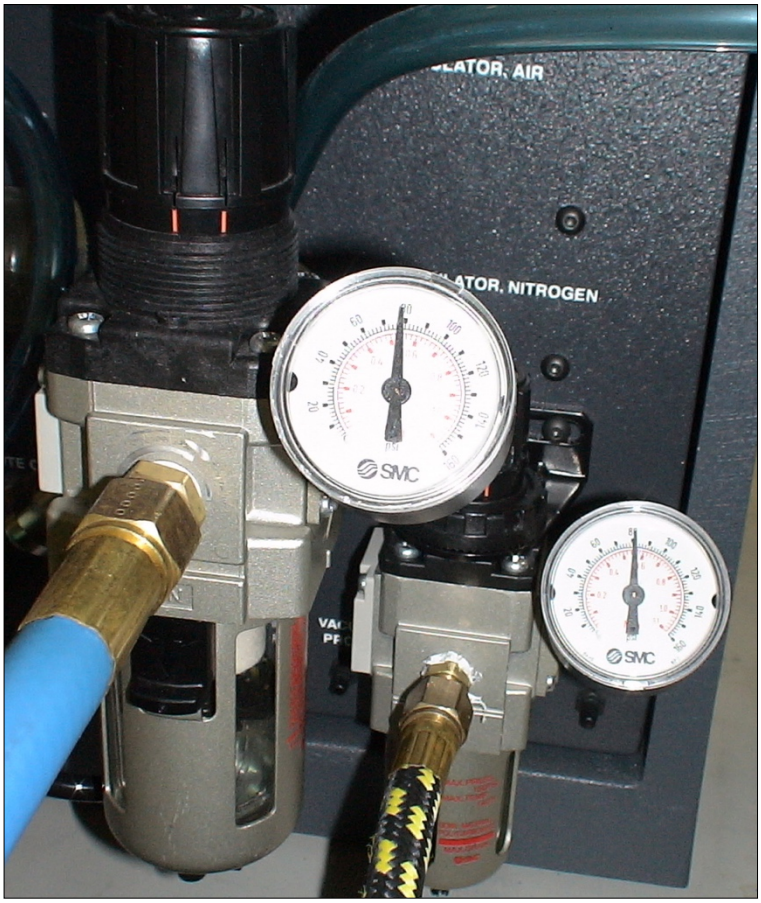
10. Voltage should not be below 208 volts. See facility sheet regarding buck up transformer if the voltage drops below 208 volts.
11. Close the machine cover and re-install the hold down screw.
12. Stop the process. Click on Thumbs Up icon to exit the screen.

2.6 Pressure Verification

1. Check the air pressure to the upper heater and accessory ports.

Important:

THE PRESSURE GAUGE FOR THE UPPER HEATER AND ACCESSORY PORTS MUST READ 80 PSI. ADJUST REGULATORS AS NEEDED.



Important:

THE AIR REQUIREMENT FOR THE ACCESSORY PORT IS 18 CFM. THE AIR REQUIREMENT FOR THE UPPER HEATER IS 3 CFM. IF AIR LINE IS COMBINED, 21 CFM MUST BE MAINTAINED AT 80 PSI.

INSUFFICIENT AIR SUPPLY (LOW VOLUME DUE TO QUICK DISCONNECTS, SMALL DIAMETER LINES OR ANY LINE RESTRICTION WILL CAUSE A PRESSURE DROP.

INSUFFICIENT AIR WILL RESULT IN PREMATURE HEATER DAMAGE AND/OR PROCESS REPEATABILITY ISSUES. IN ADDITION, TRANSFERRING PROFILES FROM MACHINE TO MACHINE WILL NOT BE POSSIBLE.

2.7 Direct View Camera & Mount Assembly Installation (option)

Mounts to workstation or table as shown.

Objective

- Provides high magnification site viewing including the ability to verify component reflow has occurred.

How It Works:

- Operator is instructed to position the DV camera on the site. Focus, zoom and lighting adjustments are made to optimize clarity.

Notes Of Interest:

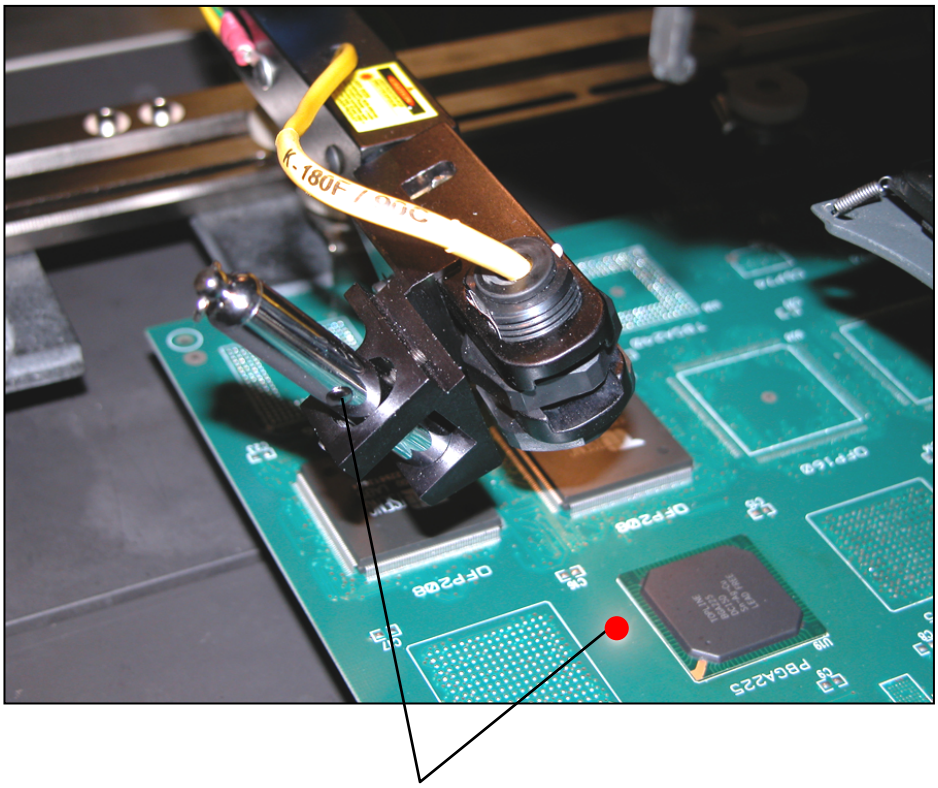
- The DV camera is a valuable process development aid especially for difficult to see tiny devices.

Photos:

- Camera/mount assembly.
- Close-up view of BGA spheres.

2.8 IR Sensor Installation (option)

- The IR Sensor option is installed by Air-Vac prior to shipment. No installation is required. Install the Thermocouple Plug on the IR Sensor into thermocouple channel #1.



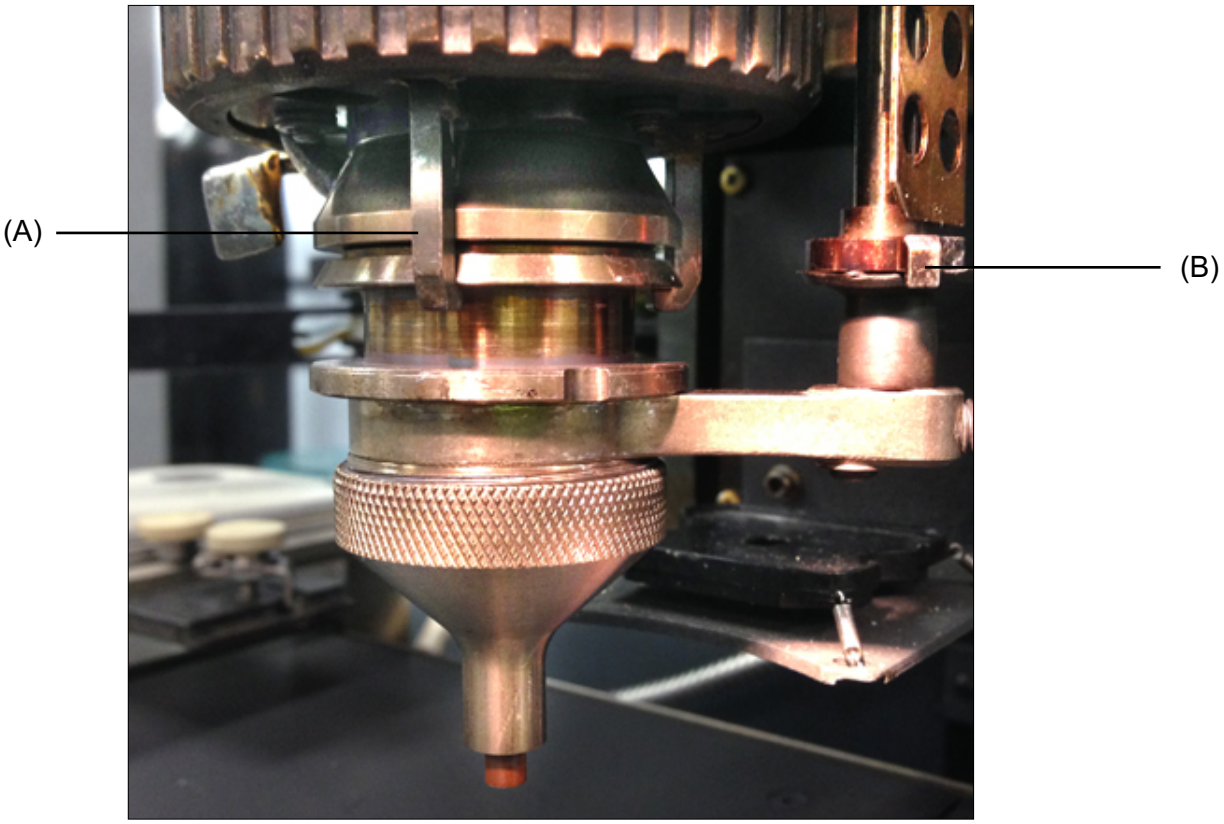
Light Pointer to indicate area being monitored by Sensor.

2.9 Site Solder Removal System Installation

The Vacuum Jar Assembly is mounted on the side of the module.

Installation Steps:

- The Site Cleaning Nozzle installs in the Locking Jaws **(A)** as a regular nozzle. The vacuum cup on the Site Cleaning Nozzle must mate with the vacuum interface **(B)**.



2.10 Workstation Assembly

ATTENTION NOTES:

IAC Industries takes great care in the packaging of its products, however damage can occur during shipment. Check all packages and parts for any signs of damage. If damage is evident STOP and contact the carrier that delivered your order. Request a freight claim inspector to document the damage and begin the freight claim process.

Tools required to assemble your WM BENCH products are:

7/16" and 1/2" wrench or socket with ratchet.
Phillips screwdriver 8" long.
Utility knife.
Safety glasses and light duty protective gloves.

NOTE: Power tools are NOT recommended unless they are equipped with a torque limiting device which can limit the torque to 10 foot lbs maximum at aluminum attachment points, and 15 foot lbs maximum for all other attachment points.

Unpack your order and separate like parts into separate areas. Be careful not to damage parts as they are being moved around and put into position. Also be sure all parts are removed from the packing materials before these materials are thrown away.

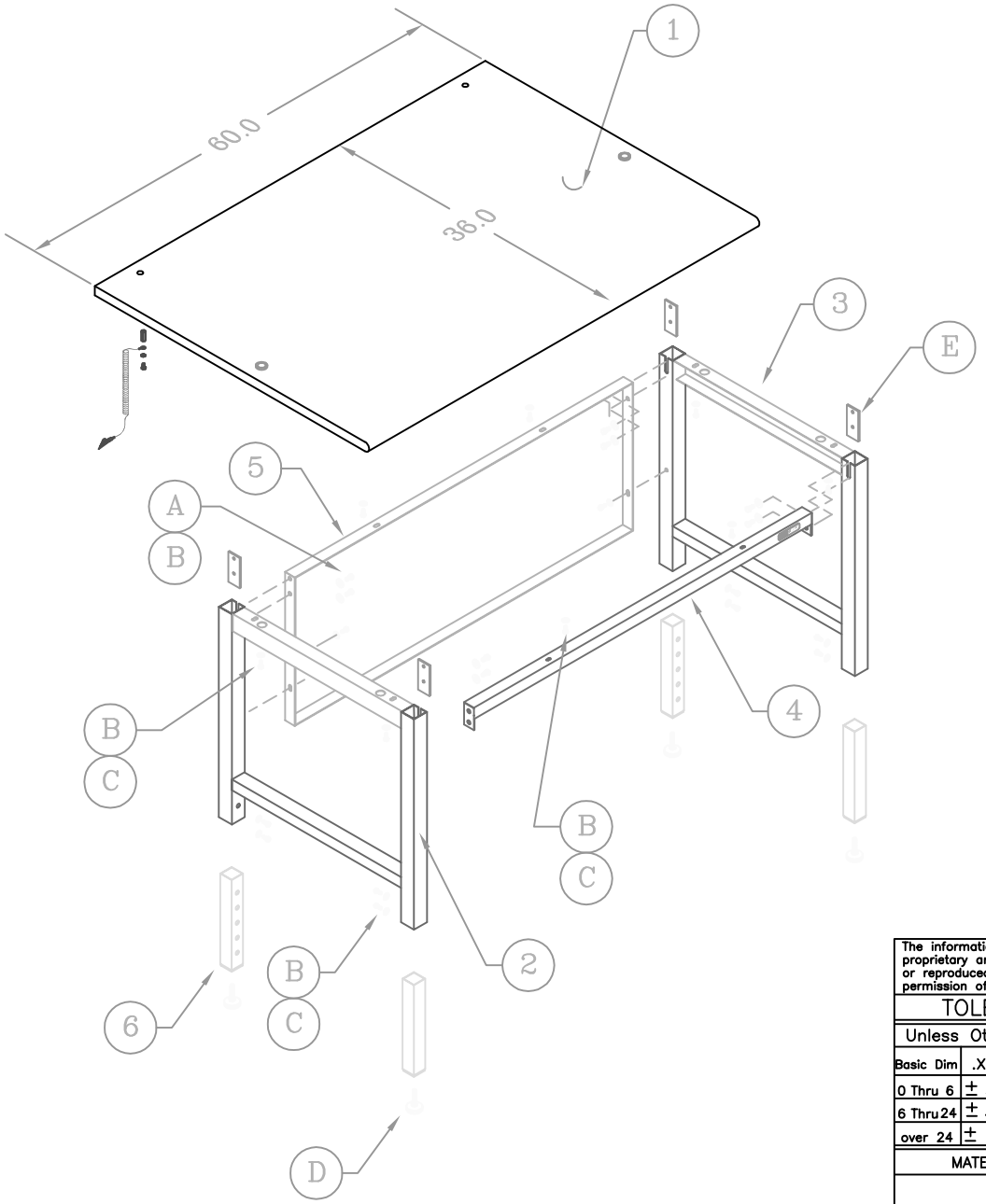
Locate the Hardware Kits and keep them in a central area. If the assembly is going to take more than one day, all individual hardware pieces should be returned to a central location.

Check all parts and Hardware Kits against the itemized packing list found with the assembly instructions. If you believe there are parts missing from your order please contact IAC Industries customer service HOTLINE at 800-989-1422.

If your order has ESD worksurfaces or accessories please review this section for helpful instructions and cautions before you begin assembling the workstations.

HARDWARE KIT		
HWR NO.	DESCRIPTION	QTY
HWR014	HWR KIT R-B ESD TOP	1
193133-HWR	HWR KIT R-A AIR VAC E BENCH MP	1

REVISIONS-ORIGINAL ISSUE SYMBOL A			193133-000	B
ECR	LTR	DESCRIPTION	DATE	APP
	A	ORIGINAL RELEASE TO PRODUCTION	4-27-07	JCN
DV-1024	B	UPDATED DWR FOR SECOND BUSHING	12-09-14	JCN



BILL OF MATERIALS			
ITEM	PART #	DESCRIPTION	QTY
1	193133-005	WKSF SUB-ASSY 36X60L ESD AIR VAC RFE	1
2	191215-010	PEDESTAL WLDT 30X28H MP LT	1
3	191215-011	PEDESTAL WLDT 30X28H MP RT	1
4	12000802	SUPT BEAM SUB-ASSY 1.5X52.00L	1
5	193133-031	MODESTY PANEL SUB-ASSY 52.00L	1
6	11120501	LEG EXTENDER SUB-ASSY 12L	4

SPECIAL HWR KIT 193133-HWR			
ITEM	PART #	DESCRIPTION	QTY
A	900044	BOLT 5/16-18 X .750 HHW BLACK	8
B	900068	WASHER 1/4 FLAT BLACK	26
C	900032	BOLT 1/4-20 X .750 HHW BLACK	18
D	920028	FLOOR GLIDE 5/16-18 X 1.75 X 1.625 DIA	4
E	900412	PLATE STOCK BENCH CONNECTOR PLATED	1
F			

NOTES:

TOLERANCES

Unless Otherwise Specified

Basic Dim	.XX	.XXX	Angles
0 Thru 6	± .02	± .005	±1/2°
6 Thru 24	± .04	± .010	
over 24	± .06	± .015	

MATERIAL	S.R.D #

DWG APPROVAL	DATE
DWN JC NOTTI	4-27-07
CHK	
MGR	

NEXT ASSY	USED ON

FIRST APPLICATION
JOB# IB06293

IAC INDUSTRIES, INC.
895 BEACON ST.
BREA, CA 92621

ISLES ADVANCE CF&A

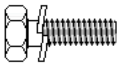
AIR VAC
EAXX-36X60L ESD 1.5" FB MP 2 BUSHING LT
ASSEMBLY

SIZE	CODE	DRAWING NUMBER	REV
A	SPL	193133-000	B

SCALE NONE SHEET 1 OF 1

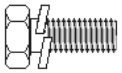
PRE ASSEMBLY CHECK LIST

Your bench has been carefully packed at the factory to prevent damage during shipment. Unpack all parts and examine them for damage. Contact your freight carrier for freight claims information if your order was shipped "freight collect" or "pre-pay and add". Contact IAC Industries at **800 989-1422** if parts are missing.

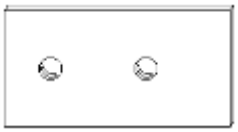


1/4-20x.75 Hex Head Bolt

1/4 Flat Washer



5/16-18x.75 Hex Head Bolt

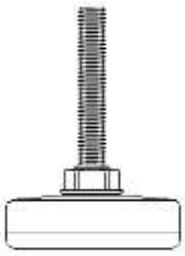


Beam Connector Plate

Description	**Qty**
Worksurface	1
Pedestal Leg	2
Support Beam	2
Support Beam	2
Leg Extender	4

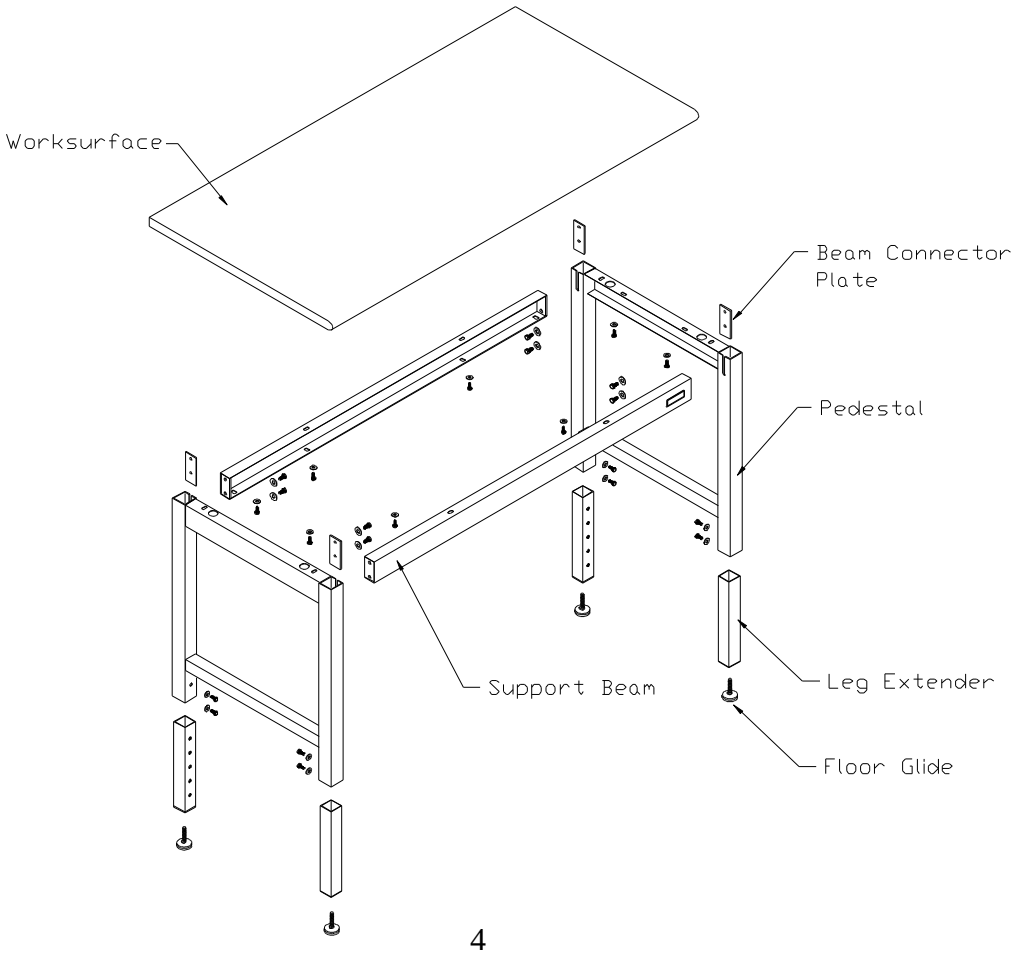
HARDWARE KIT #HWR001

Description	**Qty**
1/4-20 x .75" Hex Head Bolt	16
1/4 Flat Washer	24
5/16-18 x .75" Hex Head Bolt	8
Beam Connector Plate	4
Floor Glide	4



Floor Glide 5/16-18

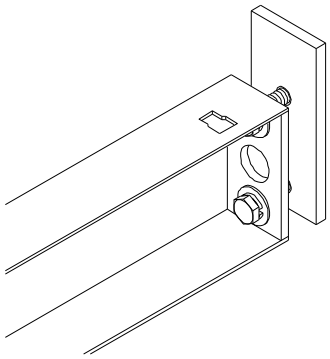
Workmaster E Series Bench Exploded View:



Workmaster E Series Bench Assembly:

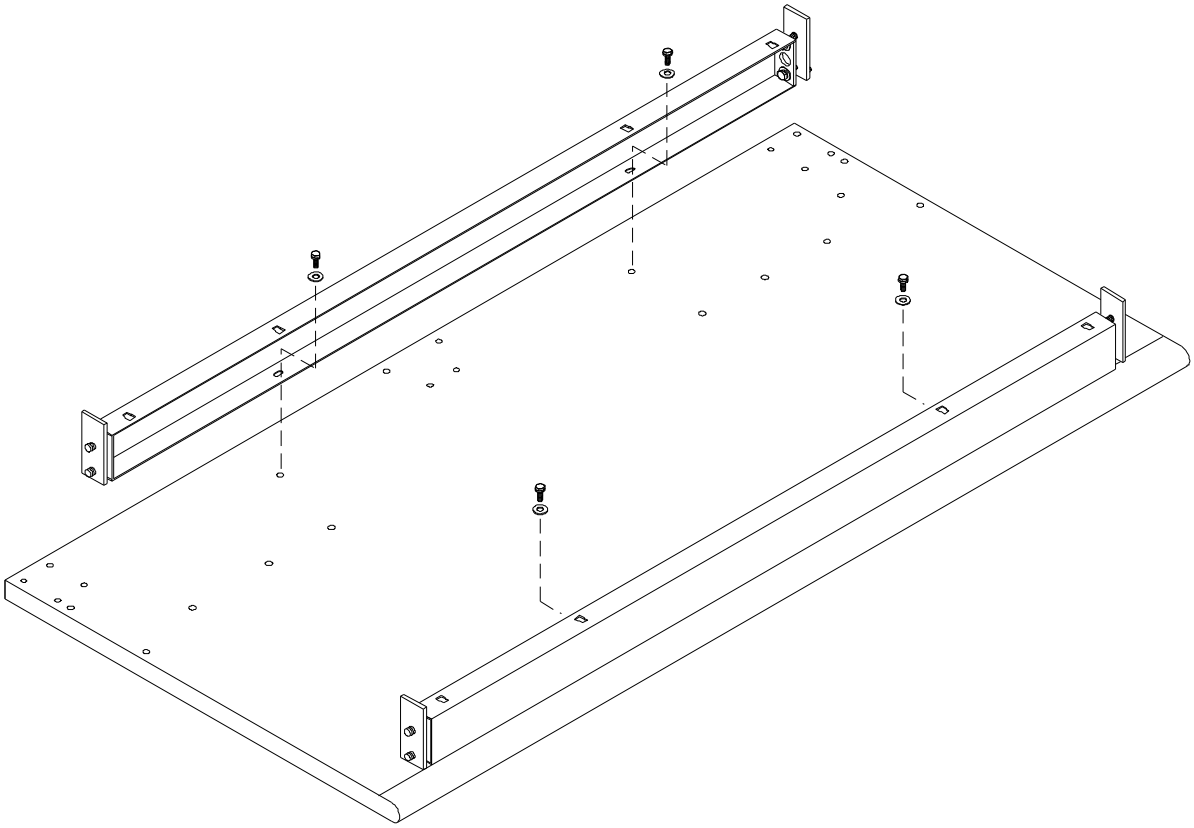
Step 1:

Attach beam connector plates to the ends of the bench support beams using the 5/16-18 x .75 hex head bolts and 1/4 flat washers supplied as shown. DO NOT TIGHTEN THE HARDWARE. If you have ordered a TE1 Electrical Channel it installs in the same way as the standard support beam and can be installed in the front or rear beam location.



Step 2:

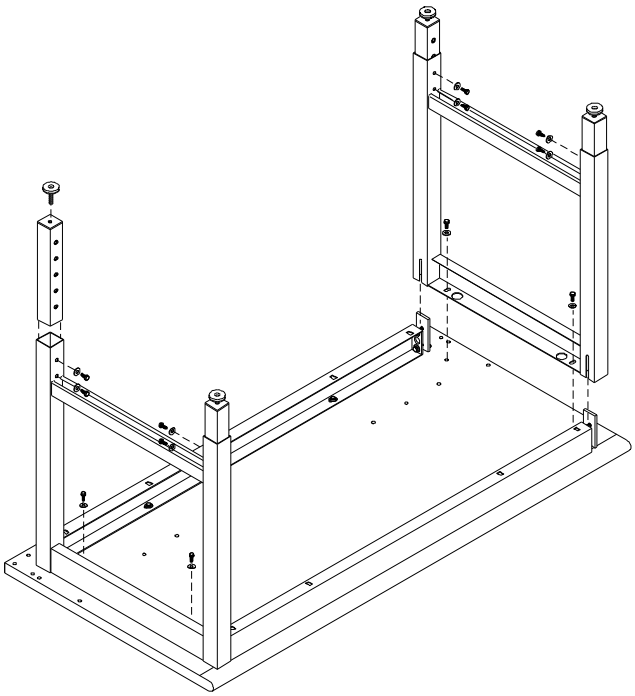
Place worksurface topside down on smooth flat surface being sure to protect it from damage by foreign objects. IAC recommends the use of packing type blankets or clean cardboard. Place the support beams on the worksurface with the open side toward the center of the worksurface and align the slots of the support beams over the threaded inserts in the worksurface as shown. Thread 1/4-20 x .75 hex head bolts and 1/4 flat washers into the threaded inserts to attach the beams to the worksurface. DO NOT TIGHTEN THE HARDWARE.



Workmaster E Series Bench Assembly:

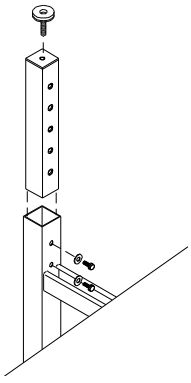
Step 3:

Align the workbench pedestals over the ends of the support beams and lower them down over the beam connector plates so that the plates are on the inside of the pedestal tubing. Align the slots in the pedestal support beam over the inserts in the worksurface and thread the 1/4-20 x .75 hex head bolts with the 1/4 flat washers into the inserts. Tighten the beam connector hardware. The frame should now be aligned on the worksurface to even the overhangs on the right and left sides tighten the beam attachment and the pedestal support hardware. NOTE: Do not over tighten the hardware that goes into the threaded inserts in the worksurface as this could cause the inserts to pull out of the worksurface.



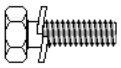
Step 4:

Slide the workbench leg extender into the pedestal tube making sure the plastic insert in the end of the leg extender is exposed. Align the threads of the leg extender with the holes in the pedestal tube and select the desired height of the bench. Thread the 1/4-20 x .75 hex head bolts with the 1/4 flat washers into the threaded holes in the leg extender and tighten. Thread the floor glide into the plastic insert of the leg extender. The floor glides are used to level the bench when assembly is complete and it is put into position.



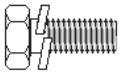
If you have ordered footrests, drawers, lower shelves or suspended cabinets for this bench please see pages15 thru 26 for assembly instructions. If not the workbench can be turned over for assembly of above the worksurface accessories or it can be put into place.

Workmaster E Series with Pedestal Cabinet Assembly:



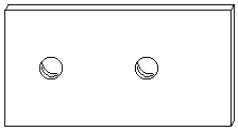
1/4-20x.75 Hex Head Bolt

1/4 Flat Washer



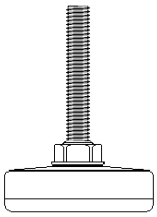
5/16-18x.75Hex Head Bolt

#14 X 1.00 Screw



Beam Connector Plate

Item	Description	Qty
1	Worksurface	1
2	Pedestal	1
3	Support Beam Assy (Front)	1
4	Support Beam Assy (Rear)	1
5	Leg Ext. 12L Sub-Assy	2
6	Cabinet Pedestal Sub-Assy	1



Floor Glide 5/16-18

HARDWARE KIT #HWR002

A	1/4-20x.75 Hex Head Bolt	16
B	1/4 Flat Washer	20
C	Hex Head Bolt 5/16-18	4
D	Floor Glide 5/16-18	6
E	Beam Connector Plate	2
F	Screw, #14 X 1.00 PPH SMS Black	4

Ratchet Plug Cap Black

HARDWARE KIT #HWR021

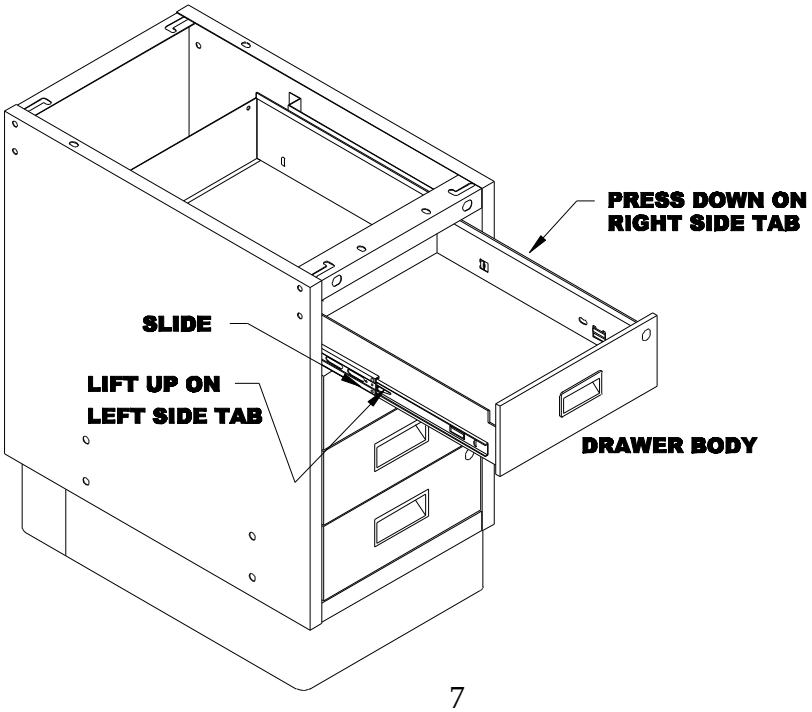
G	Ratchet Plug Cap Black	12

Step 1:

To assemble the beams and pedestal to the worksurface follow the instructions on pages 5 and 6. Do not tighten hardware until the pedestal cabinet is in place and is aligned properly. Be sure to set the height of the leg extenders to match the height of the pedestal cabinet.

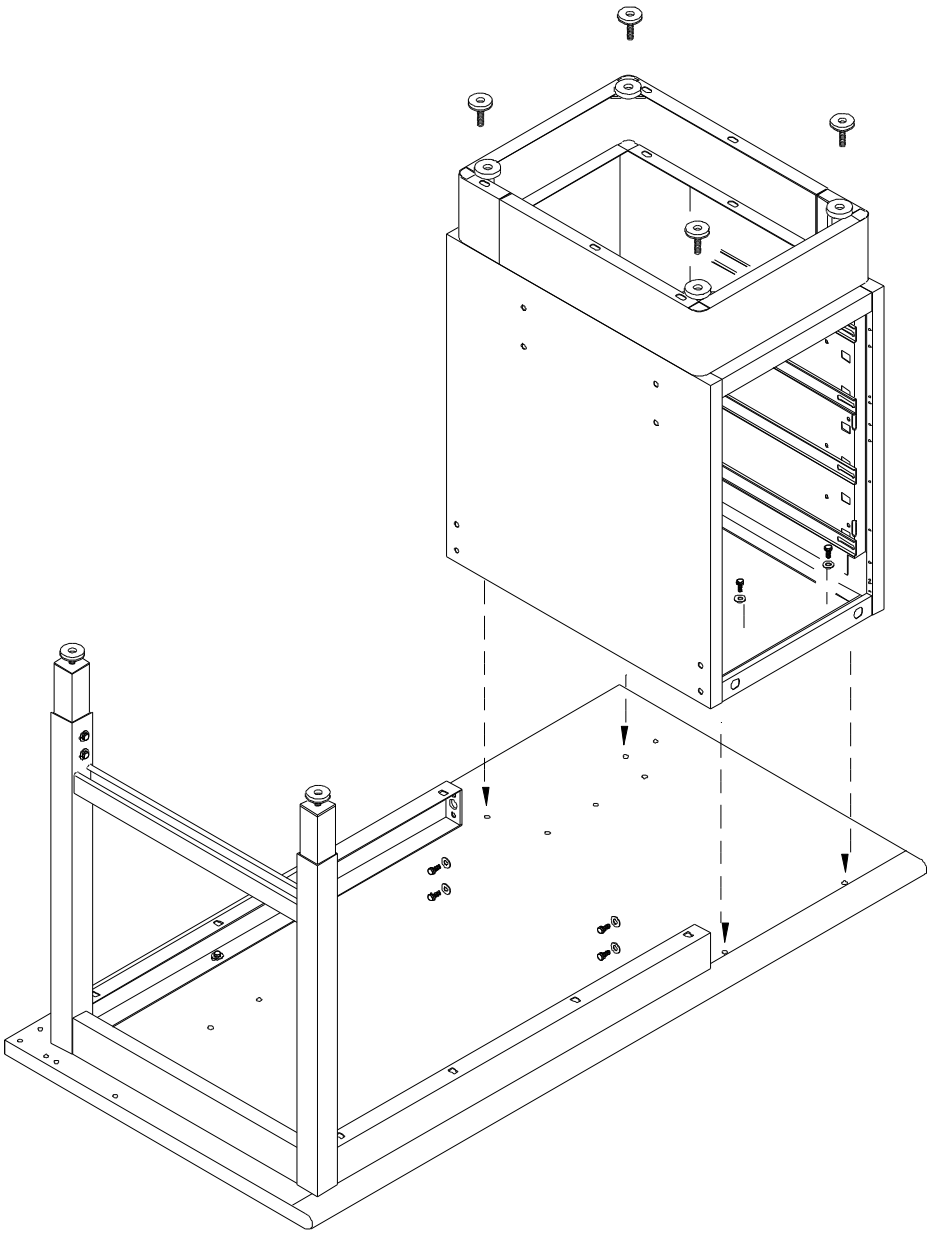
Step 2:

Remove the all the drawer bodies of the pedestal cabinet by pulling them all the way out and depressing the plastic retainer clips found on each of the drawer slides. One clip will be pushed down and the other clip will be pulled up. Set the drawers aside carefully so they do not get damaged.



Step 3:

Carefully turn the pedestal cabinet up side down and position it onto the worksurface and align it with the support beams and the inserts in the worksurface. Attach the pedestal cabinet to the support beams using four #14 X 1.00 screws and 1/4 flat washers and attach the worksurface using the 1/4-20 x .75 hex head bolts and 1/4 flat washers as shown. Tighten all hardware at this time being sure not to over tighten the bolts going in the inserts in the worksurface. If you have purchased items such as footrests, lower metal shelves or CPU holders please see pages 17- 26 for assembly instructions.



Step 4:

Install floor glides into pedestal cabinet base. With the help of at least another person carefully roll the workbench right side up. Install the drawer bodies into the pedestal cabinet in their original locations.

Step 5:

Use the Ratchet Plug Caps found in hardware kit 021 to cover all open holes in the cabinet.

Workmaster Modesty Panel

Item	Description	Qty
1	Modesty Panel	1

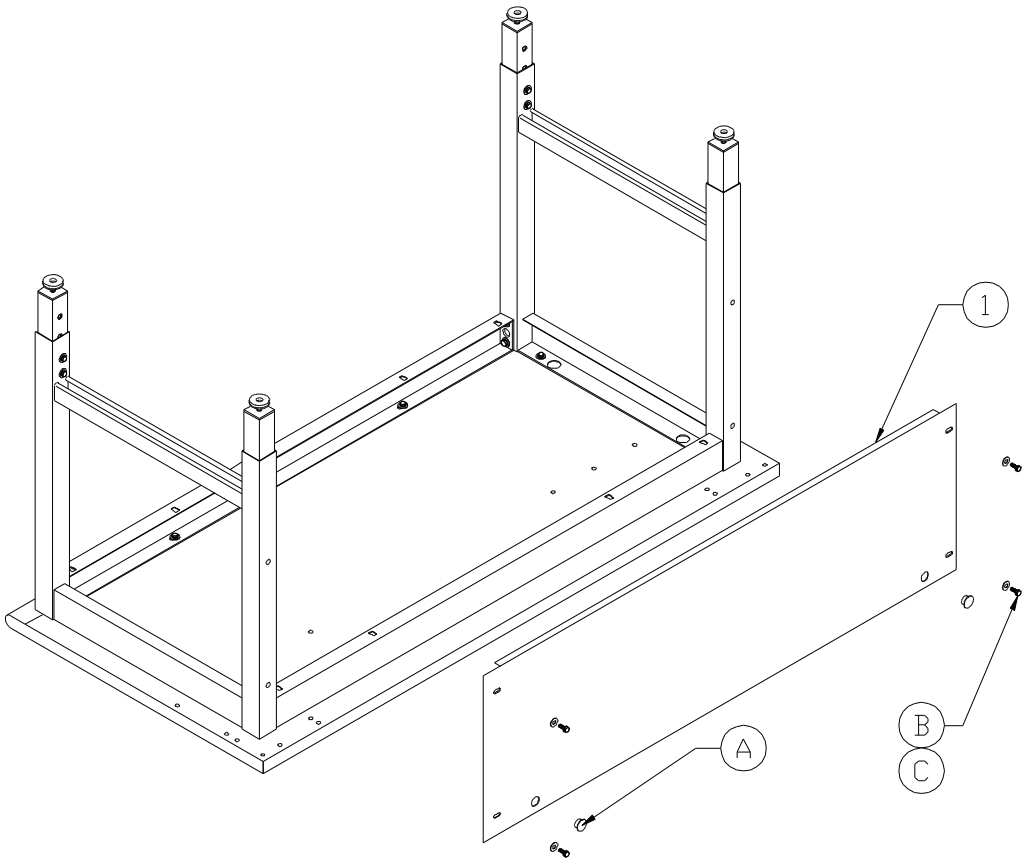
HARDWARE KIT HWR030

A	Cap, Plug .875 DIA Black Heyco #2703	2
B	Washer, 1/4 Flat Black	4
C	Bolt, 1/4-20 X .75 HHW Black	4
D	Screw, #14 X 1.00 PPH SMS Black	4

Note: This instruction can also be used for mounting modesty panels to benches with one and two cabinets.

Step 1:

Install the modesty panel to the back of the pedestal legs of the bench by using four 1/4-20 x .75 hex head bolts item C and four 1/4 flat washers item B. Install plastic caps as needed.



Please Note: To retrofit a modesty panel to an existing workbench place the modesty panel against the rear of the pedestal legs and using the slots in the modesty panel as a template drill four 7/32" diameter holes in the pedestal legs. Attach the modesty panel using four # 14 x 1.00 screws item D and four 1/4 flat washers item B.

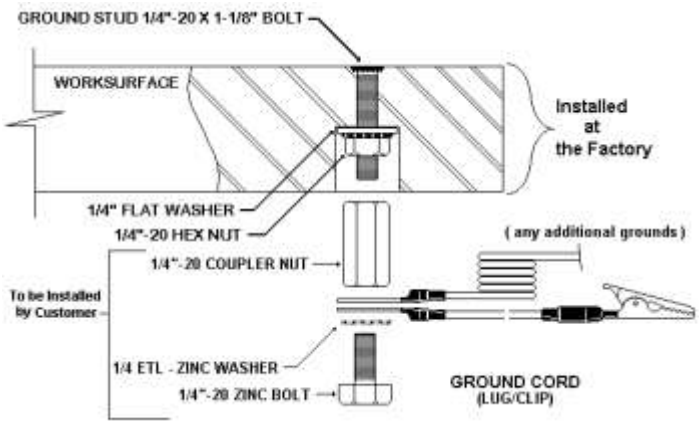
ESD Grounding

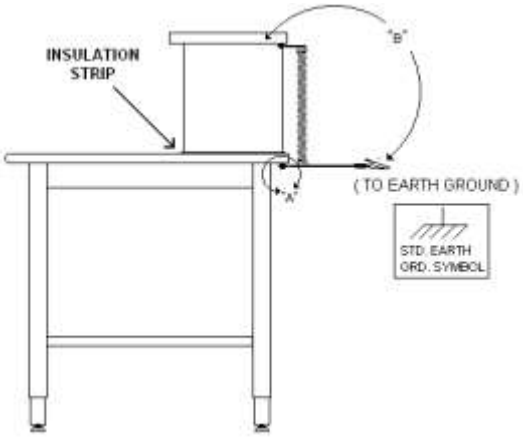
HARDWARE KIT HWR014 and HWR016

Note: do not use power tools for installation of ground cords.

Step 1:

For ESD worksurfaces and instrument shelves to dissipate static electricity they require the connection of a ground cord to an earth ground. IAC install grounding studs on each rear corner of all ESD worksurfaces and instrument shelves as well as insulation strips between work surface and riser boxes. Thread the 1/4-20 coupler nut onto one of these ground studs and tighten it being careful not to over tighten. Over tightening this coupler nut can cause damage to the connection between the ground stud and the laminate. Place the eyelet of the ground cord (or cords if you are also grounding an instrument shelf to the same ground stud) over the 1/4-20 x 1/2" bolt and thread the bolt into the coupler nut. The alligator clip must attach to an earth ground.





ESD Laminate Testing:

Although IAC conducts connectivity and surface resistance tests at the factory on all ESD worksurfaces and instrument shelves, IAC recommends that customers conduct their own tests on all ESD worksurfaces and instrument shelves to ensure that the ground cord installation has been completed correctly and that the ESD material is working properly.

Cleaning ESD Materials:

ESD laminates are designed to resist abrasion, scuffing, scorching, and most solvents. Intense exposure to any of these conditions can damage the ESD properties of the laminate and will require the replacement of the worksurface or instrument shelf. ESD laminate worksurfaces and instrument shelves are cleaned much the same as non-ESD laminated surfaces with a damp cloth and light soapy cleanser. A mild chemical cleaner can also be used as long as the laminate is not exposed to the chemical for long periods of time. Stains can be removed with a two-minute exposure to a 5% hypo chloride bleach solution immediately followed by a light soapy cleanser.

ESD Ground Precautions:

1) Connect each workbench worksurface individually to the earth ground.
2) The green wire in a standard wall duplex can be used if it has been absolutely determined that it is attached to an earth ground.
3) Do not use power tools to install grounding hardware and components.
4) If benches are relocated IAC recommends the ground cords connections be re-tested.
5) Never use abrasive pads or cleansers to clean ESD surfaces.
6) Never wax ESD surfaces and avoid cleaners with wax-based properties.
7) Test ESD worksurfaces and instrument shelves frequently to ensure it is working properly.

3: Machine Function Verifications

3 Machine Function Verifications

3.0 Verification Overview

Once the DRS25 has been setup according to the instructions as outlined in Chapter 2, critical machine functions including pressure, gas flow rate, temperature and vision must now be verified to ensure proper machine performance. It is important that the verification procedures be done sequentially as outlined in this section.

Machine verification should be done:

- After initial setup
- Anytime the system is physically moved or disconnected
- At regularly scheduled intervals such as every six (6) months.

Verification processes are stored in a hidden menu, to enter the hidden menu please do the following:

- Right click on the **Air-Vac logo (A)** and the **toolbar (B)** will change color from blue to red.
- To return to the main menu, right click anywhere else on the screen and the toolbar will return to normal.

3.1 Flow Rate Verification and Adjustment

Once the pressure verification is complete (see Chapter 2), the gas flow rate should be verified. Accurate gas flow through the nozzle is critical for achieving repeatable results. The DRS25 incorporates a Mass Flow Controller with closed loop control to monitor and regulate gas flow rates.

The two areas of flow verification include the Nozzle Flow Controller, which controls actual flow rates and the Nozzle Flow Sensor, which controls the Computer Digital Flow Display. Nozzle flow verification is required for initial installation, or any time the machine is disconnected and/or moved.

3.1.1 Nozzle Flow Controller Verification and Adjustment

Materials required:

- Scribed reference flow meter supplied with the machine.

Initial conditions:

- Pressure to upper heater must be set precisely to 80 psi (+/- .5psi).

Set-up:

- Disconnect the current Blue Hose from the **Flow Cal Fitting (A).**
- Connect the Blue Hose from the Flow Meter into the **Flow Cal Fitting (A).**

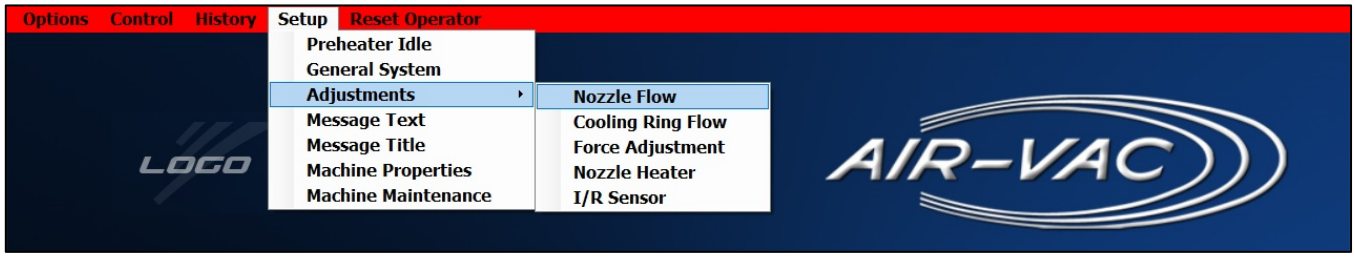
WARNING:

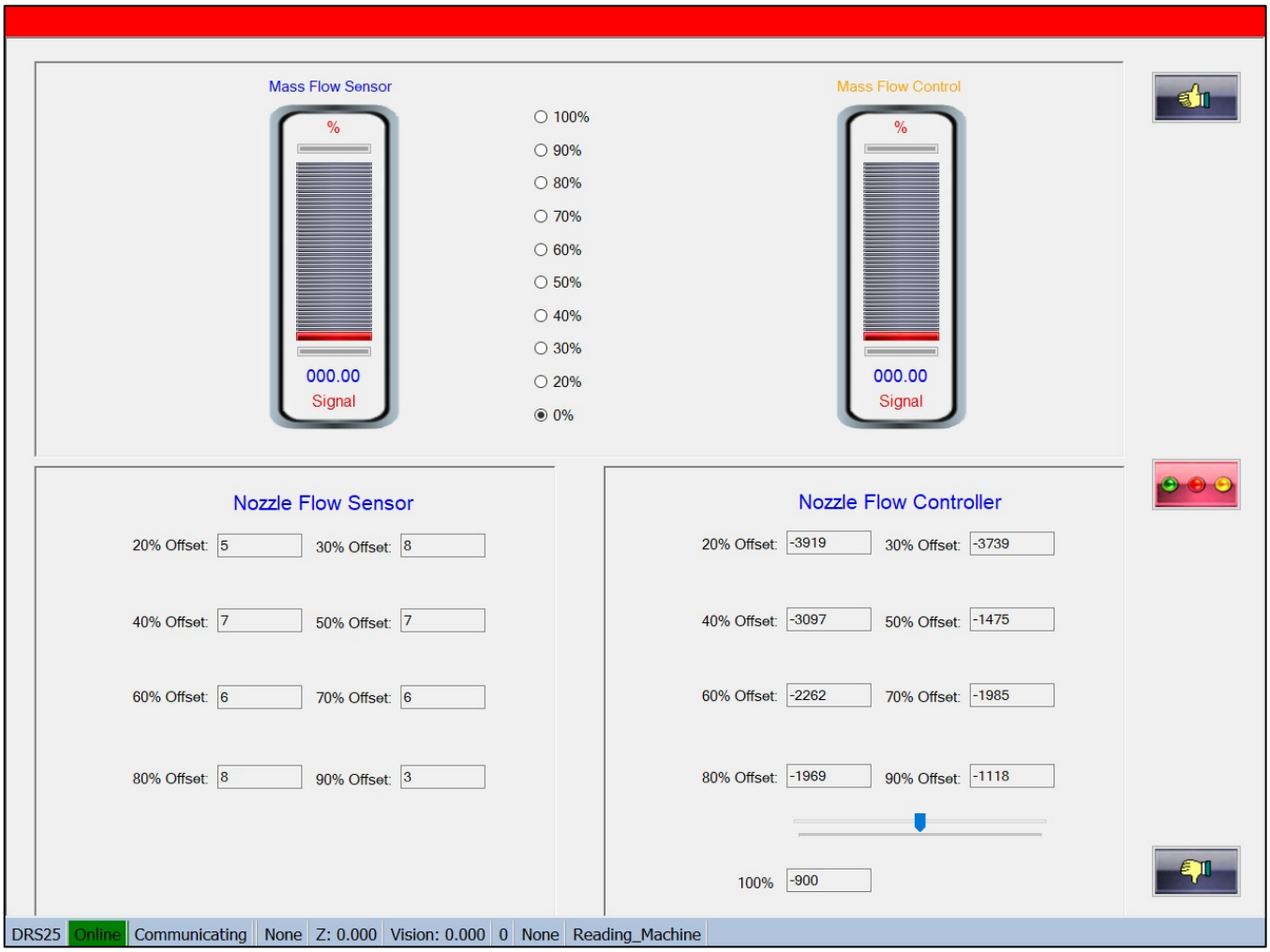
BE CERTAIN ALL HOSES ARE INSERTED INTO FITTINGS COMPLETELY. A BAD CONNECTION CAN RESULT IN A BURNED OUT HEATER OR ERRONEOUS CALIBRATION READINGS.

(A)

To access the Flow Adjustment Screen:

1. Log on as "DRS25" or any "high level" security operator and select the Thumbs Up icon.
2. Using right side mouse button, click the Air-Vac logo, the toolbar will turn red. You are now in the 'Hidden' Setup window.
3. Select **Setup, Adjustments, Nozzle Flow.** The Nozzle Flow Adjustment screen will appear as shown below.





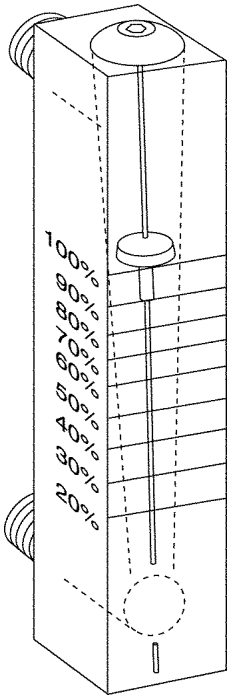
Making Flow Controller Verifications and Adjustments:

1. Click on the **100% radio button (A)** on the Flow Adjustment Screen. Check the air pressure gauges to the upper heater to insure no pressure drop from 80 psi (set). Install larger air line or remove restrictions if needed.
2. Wait 45 seconds before making any adjustments.
3. Check the 100% scribe line on the flow meter. The bottom of the float should be at the scribe line. If the flow meter reads too high or too low, adjustments can be made immediately by dragging or clicking on the track bar within the **Nozzle Flow Controller group box (B).** The airflow should not be interrupted. The adjustments will be automatically applied and stable within 3-5 seconds. The track bar is always connected to the active flow rate helping to minimize incorrect adjustments.

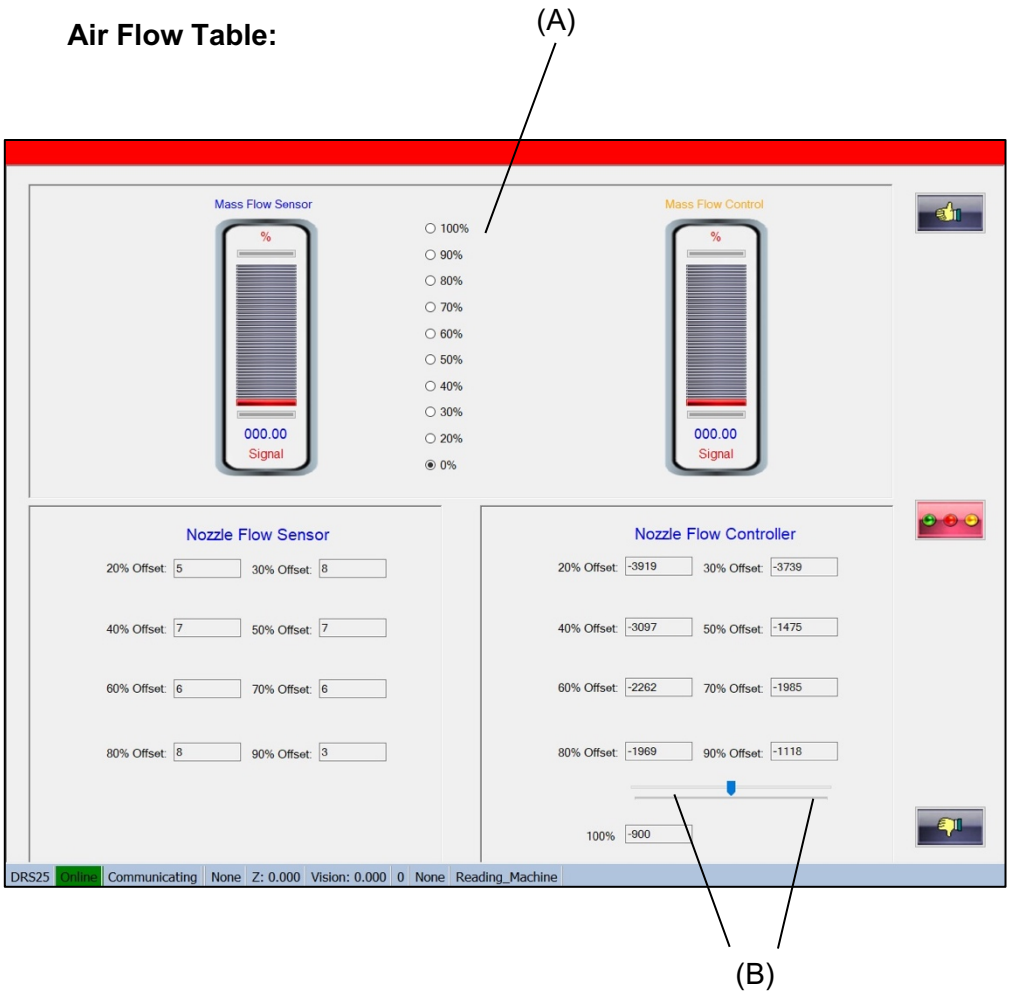
Note:

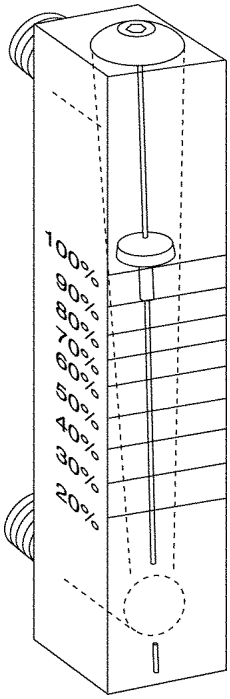
NO ADJUSTMENT IS NECESSARY IF THE FLOW IS OFF BY LESS THAN THE THICKNESS OF THE FLOAT +/-. READ THE BOTTOM OF FLOAT HEAD (LARGEST DIAMETER).

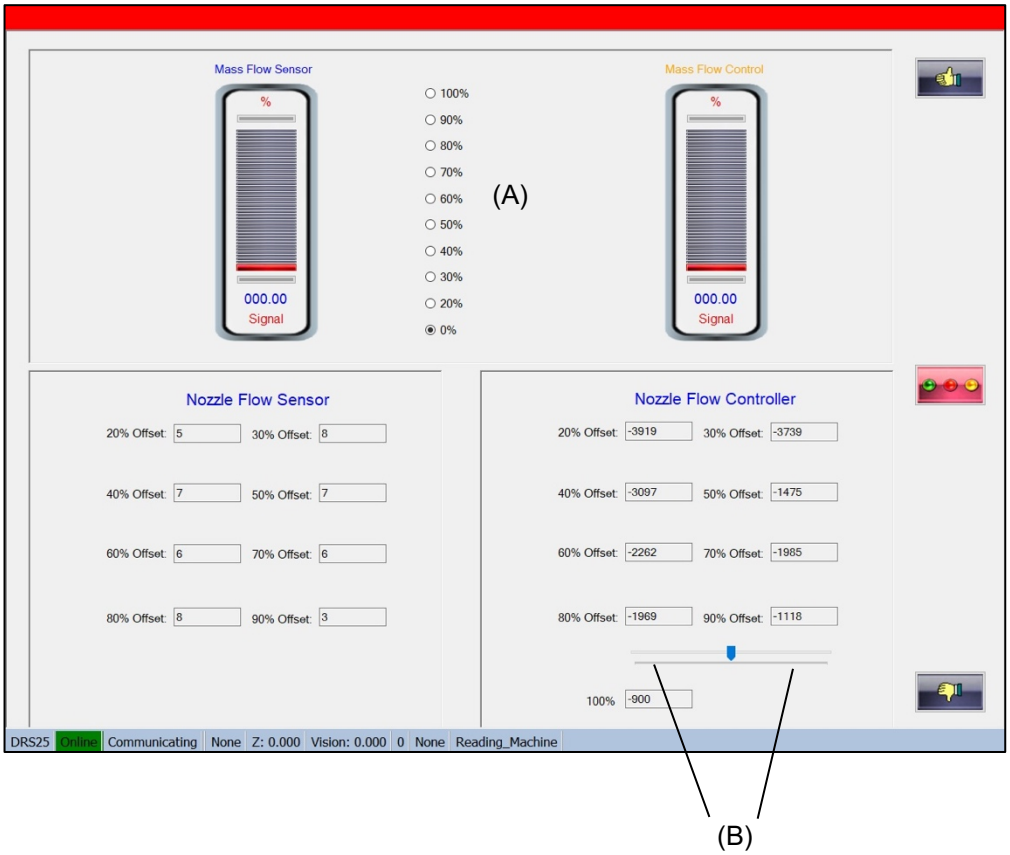
Flow Meter:



Air Flow Table:







Note:

IT IS RECOMMENDED THAT YOU USE THE TAB KEY TO ENTER INTO THE ADJUSTMENT BOX TO CHANGE THE SETTING.

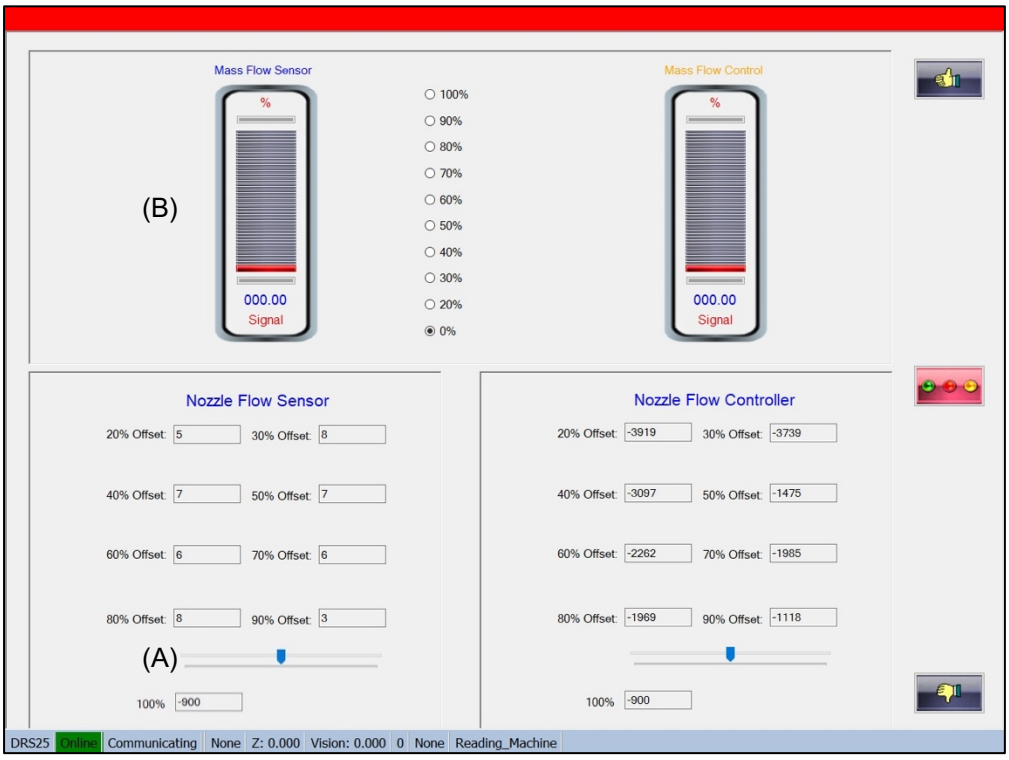
4. If the flow meter reads too high, decrease by the left side of the **track bar (B).**
5. If the flow meter reads too low, increase by the right side of the **track bar (B).**

Once the 100% Flow Controller value has been set, check flow controller verifications for 30-90% settings **(A).** With the nozzle flow system activated for the various settings, check the flow using the meter. Adjust the nozzle flow controller computer value **(B)** as required until the float corresponds to the scribed setting.

Software Screen	**Flow Meter** *Target Value*
30%	(30% scribe): .82 scfm
40%	(40% scribe): 1.10 scfm
50%	(50% scribe): 1.37 scfm
60%	(60% scribe): 1.65 scfm
70%	(70% scribe): 1.92 scfm
80%	(80% scribe): 2.20 scfm
90%	(90% scribe): 2.47 scfm
100%	(100% scribe): 2.75 scfm

3.1.2 Nozzle Flow Sensor Verification and Adjustment.

Re-run the 30-90% flow rates. Use the **track bar (A)** to increase or decrease the **flow sensor values (B)** to match the 30-90% settings.



6. Select the Thumbs Up icon to save changes and exit the Flow Adjustment screen.

IMPORTANT!!!

DISCONNECT THE BLUE FLOW METER HOSE FROM THE FLOW CALIBRATION FITTING AND RECONNECT THE BLUE UPPER HEATER HOSE. FAILURE TO RECONNECT THE UPPER HEATER HOSE PRIOR TO RUNNING THE TOP HEATER WILL CAUSE THE TOP HEATER ELEMENT TO FAIL.

3.2 Temperature Verification

After the machine pressure and flow have been verified, the next step is to verify heater temperature accuracy.

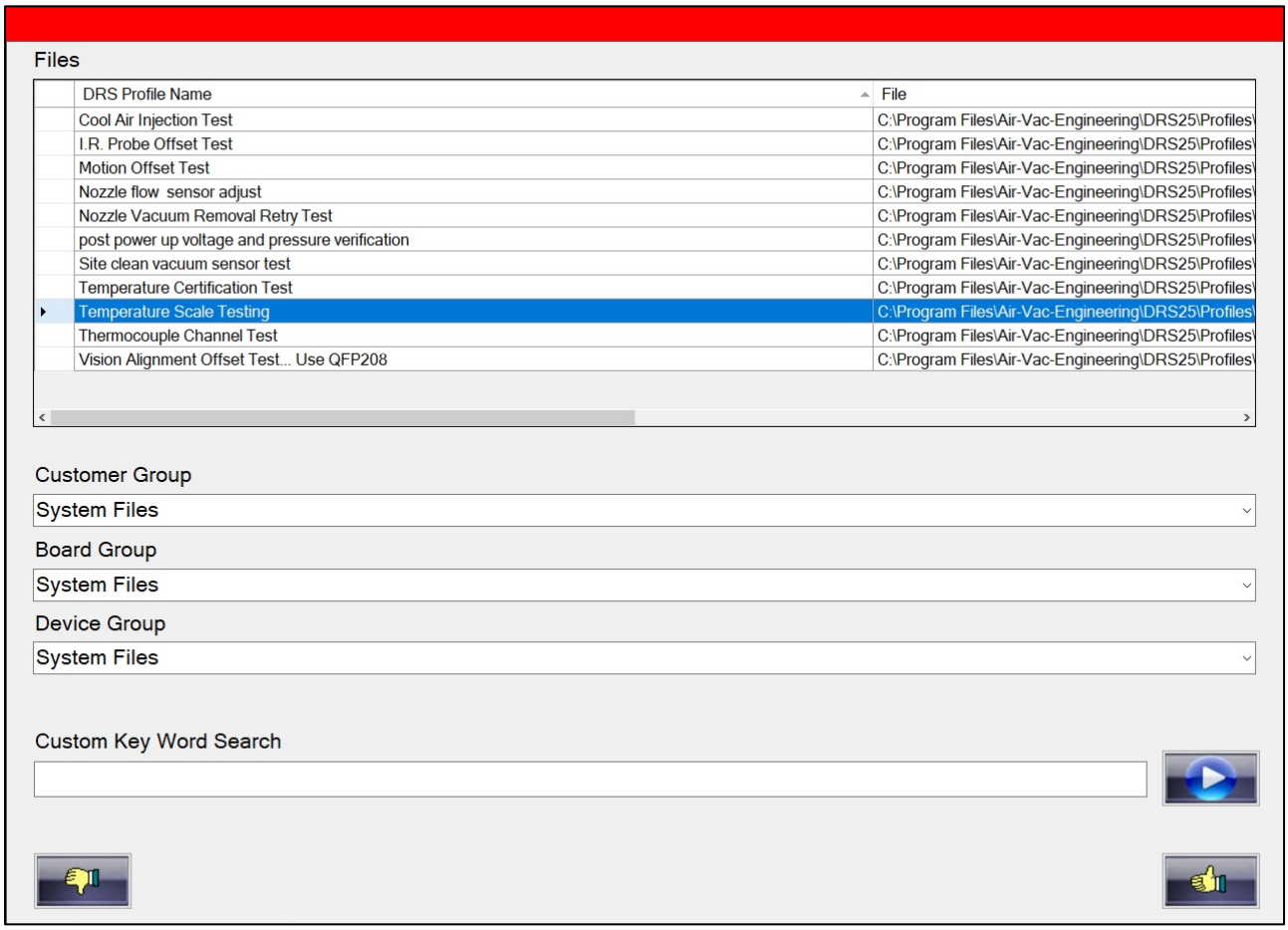
IMPORTANT!!!

DISCONNECT THE BLUE FLOW METER HOSE FROM THE FLOW CALIBRATION FITTING AND RECONNECT THE BLUE UPPER HEATER HOSE. FAILURE TO RECONNECT THE UPPER HEATER HOSE PRIOR TO RUNNING THE TOP HEATER WILL CAUSE THE TOP HEATER ELEMENT TO FAIL.

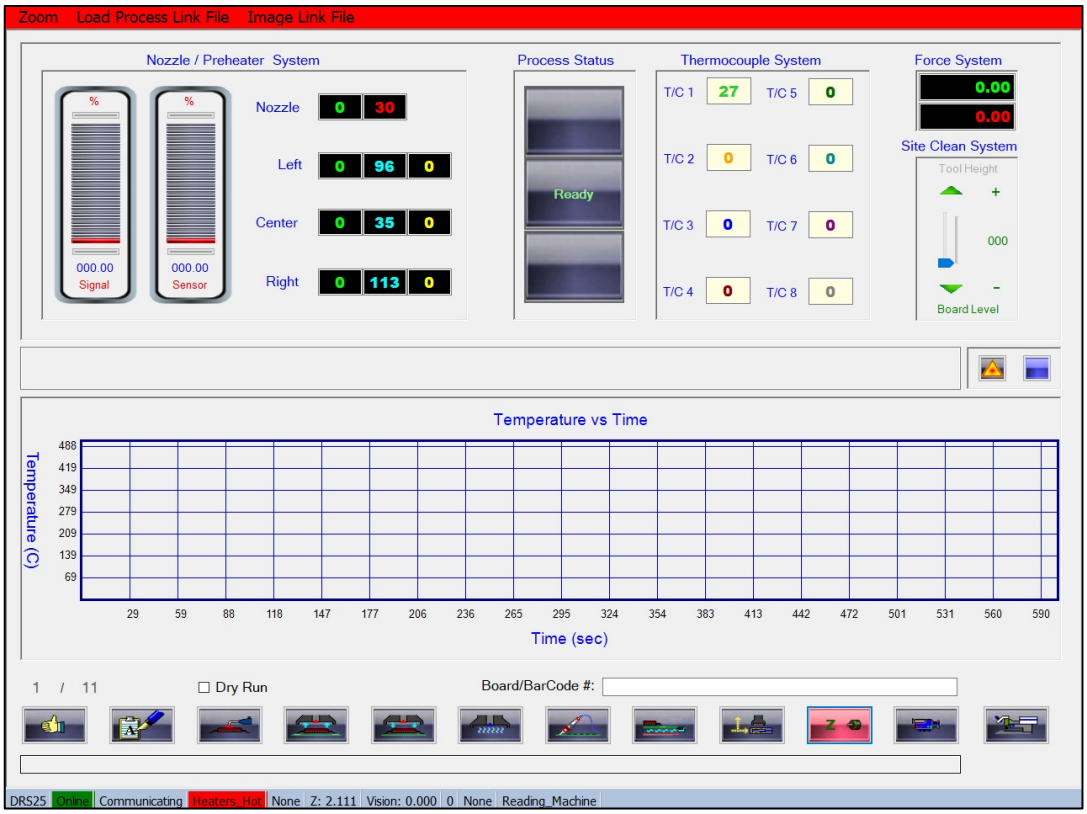
3.2.1 Upper Heater Verification

1. Perform Temperature Scale Test, select **Options, Open** from the red (hidden) menu bar.

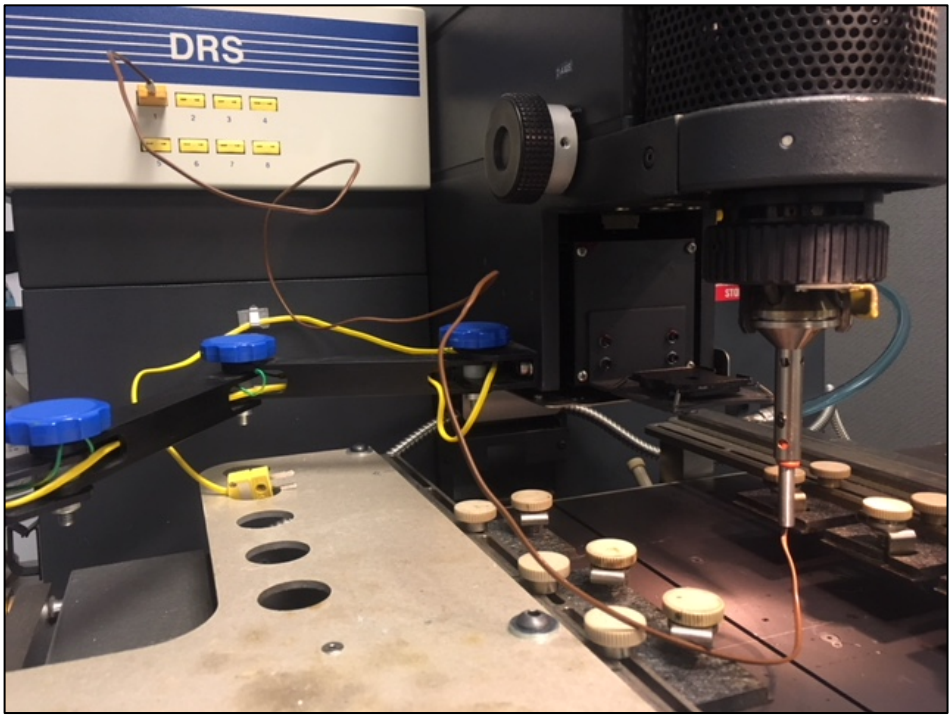
2. Select (File Group: System/System/System).
3. Select the Temperature Scale Testing profile and click on the Thumbs Up icon.



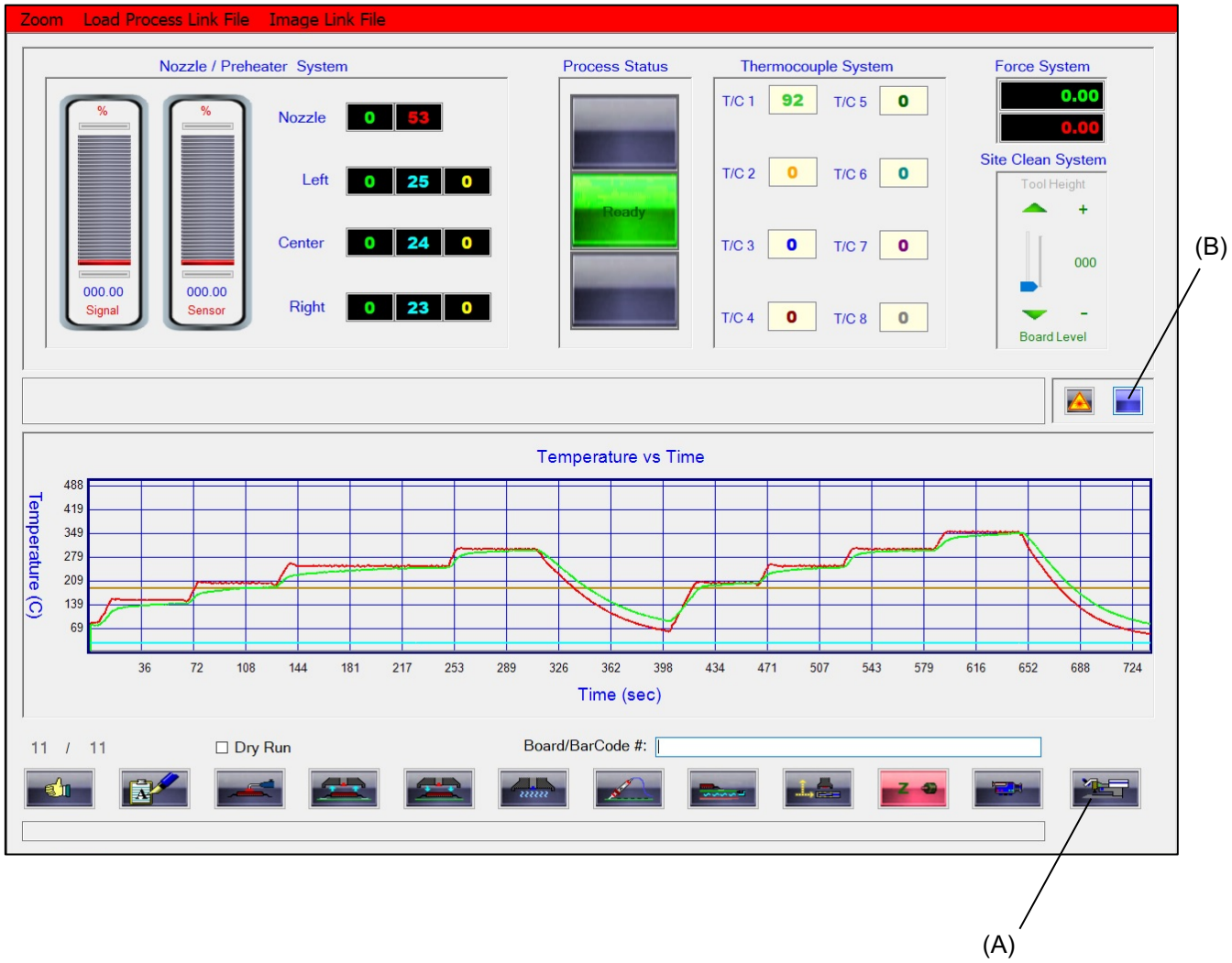
4. Click Thumbs Up again. The Run screen for the Temperature Scale Testing profile will appear.



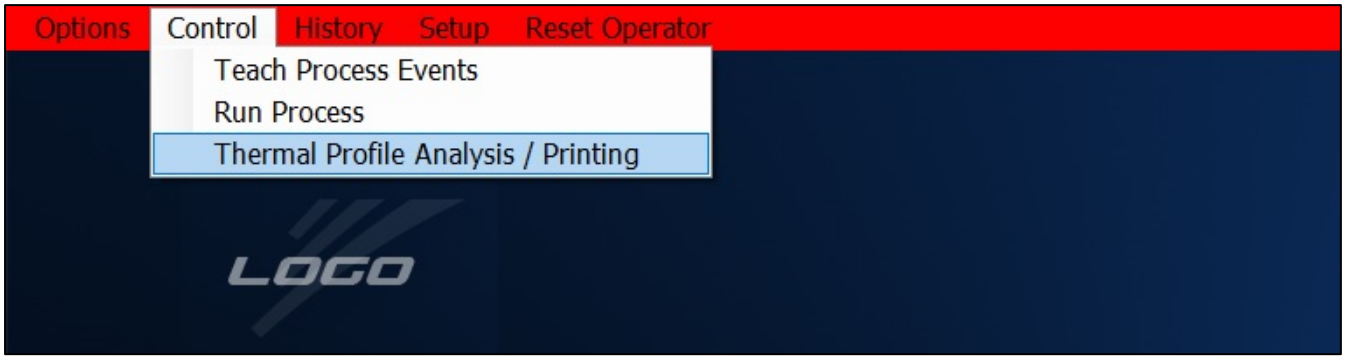
5. Install the NCAL-1 Temperature Calibration Nozzle into the machine.
6. Plug the nozzle thermocouple into channel #1.



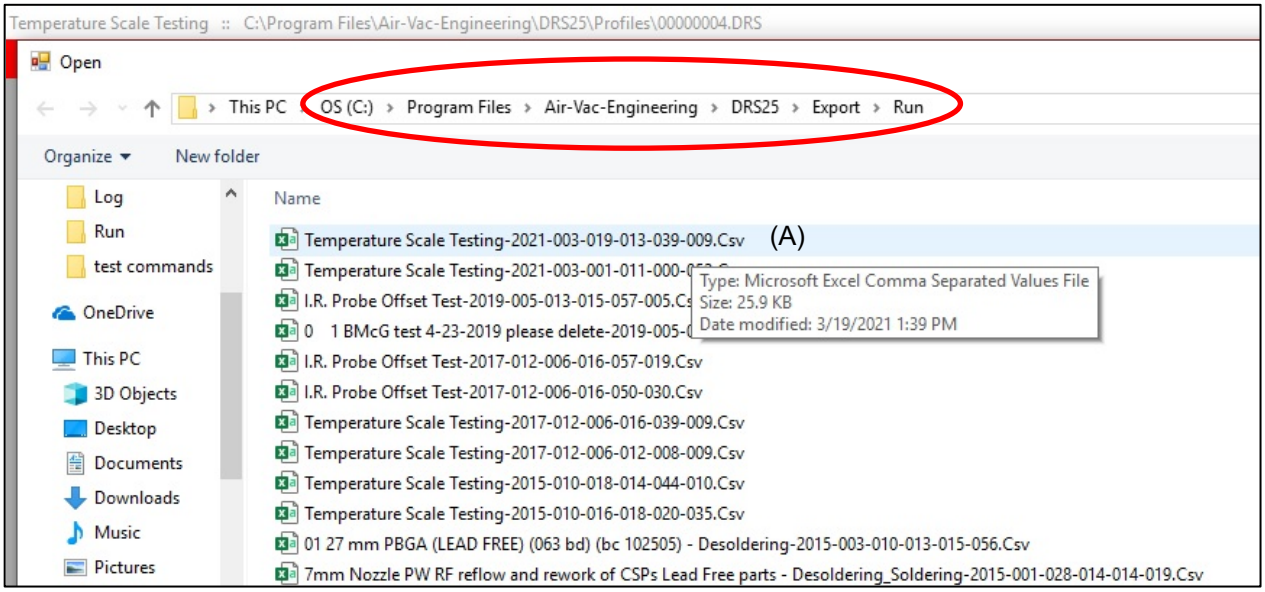
7. Click on the **Cycle/Start icon (A)** to start the profile. The profile will run a scaled sequence of various temperatures and flow rates and will plot the Upper Heater temperature (red line) and the NCAL-1 Nozzle Temperature (green line). After the initial scale up sequence, the profile executes a cool down stage and then scales up the temperature and flow rates a second time. This is necessary to insure that the machine has been properly heated prior to verifying the temperature accuracy.
8. Allow profile to run, when complete click on the **Save Data button (B)** (small, blue), this saves the graph and data points to the Export directory for analysis. The button will turn green, click on OK.



9. Thumbs up out of profile, click anywhere on screen to return to the regular (blue) menu. Go to "Control" "Thermal Profile Analysis". Scroll through files in directory folder, located the correct file be date-time stamp (file name will have temperature scale test label). Double click on this file so graph is displayed.
10. To verify, go to **Control/Thermal Profile Analysis/Printing**.

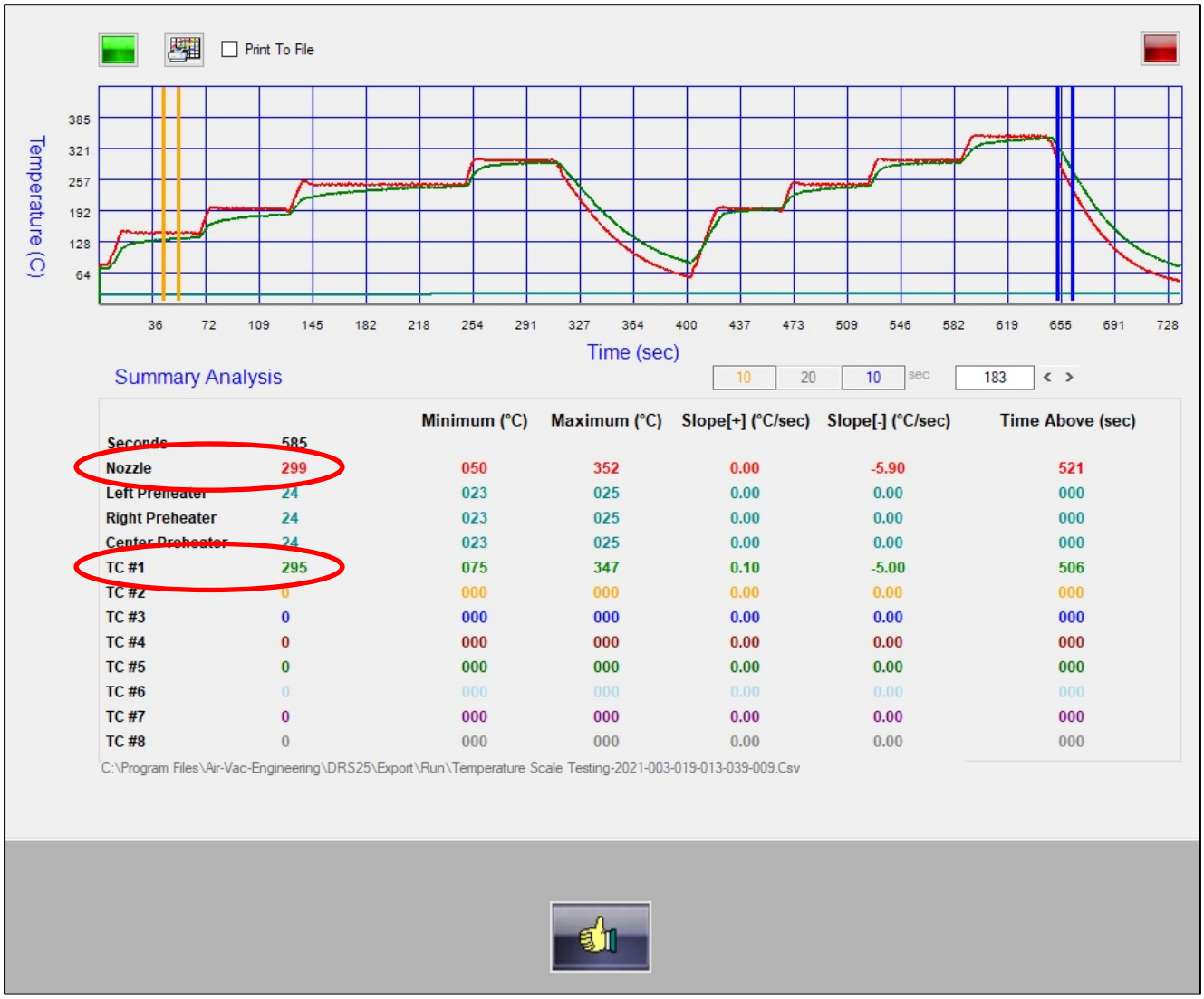


11. Click on **Program Files/Air-Vac Engineering/DRS25/Export/Run.**



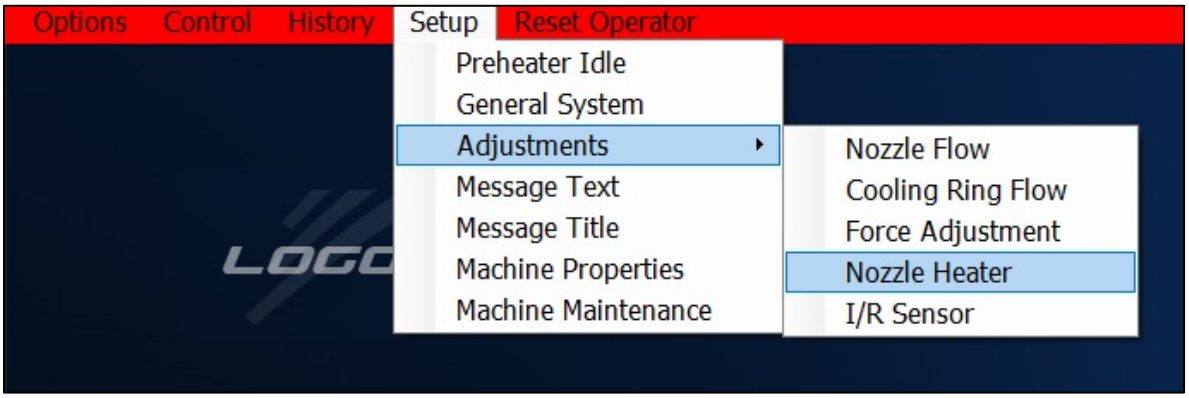
12. Click on the **Temperature Scale Testing Profile (A)** with the current date.

13. The Thermal Profile Analysis screen will appear.
14. Move the cursor to the end of the 4 events to compare the nozzle temperature to TC#1.
15. Verify that the nozzle heater and NCAL-1 (thermocouple channel #1) chart lines match within a +/- 7 degree range for the last 4 events of the process profile. If they match you are done.

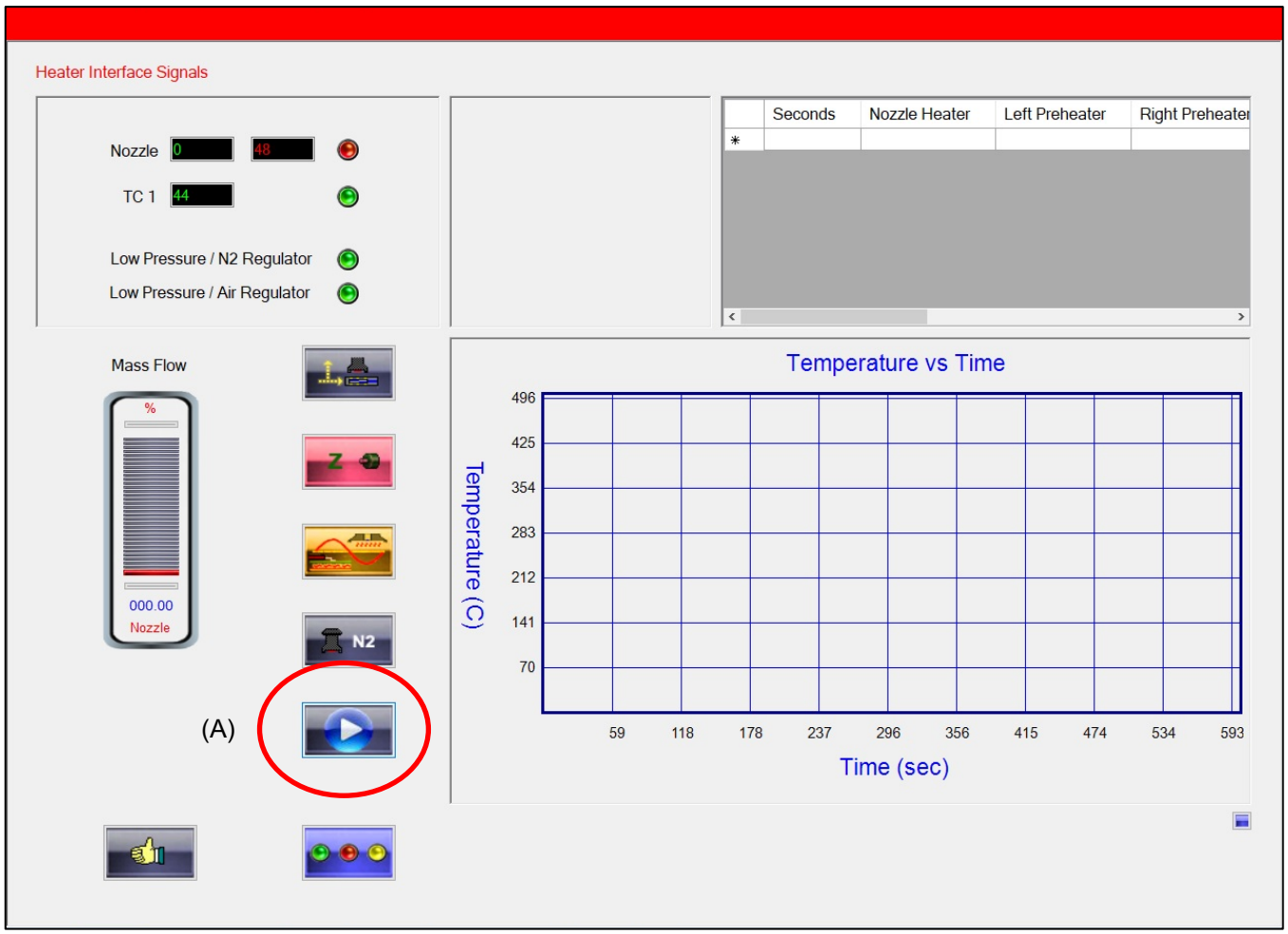


		Minimum (°C)	Maximum (°C)	Slope[+] (°C/sec)	Slope[-] (°C/sec)	Time Above (sec)
Seconds	585					
Nozzle	299	050	352	0.00	-5.90	521
Left Preheater	24	023	025	0.00	0.00	000
Right Preheater	24	023	025	0.00	0.00	000
Center Preheater	24	023	025	0.00	0.00	000
TC #1	295	075	347	0.10	-5.00	506
TC #2	0	000	000	0.00	0.00	000
TC #3	0	000	000	0.00	0.00	000
TC #4	0	000	000	0.00	0.00	000
TC #5	0	000	000	0.00	0.00	000
TC #6	0	000	000	0.00	0.00	000
TC #7	0	000	000	0.00	0.00	000
TC #8	0	000	000	0.00	0.00	000

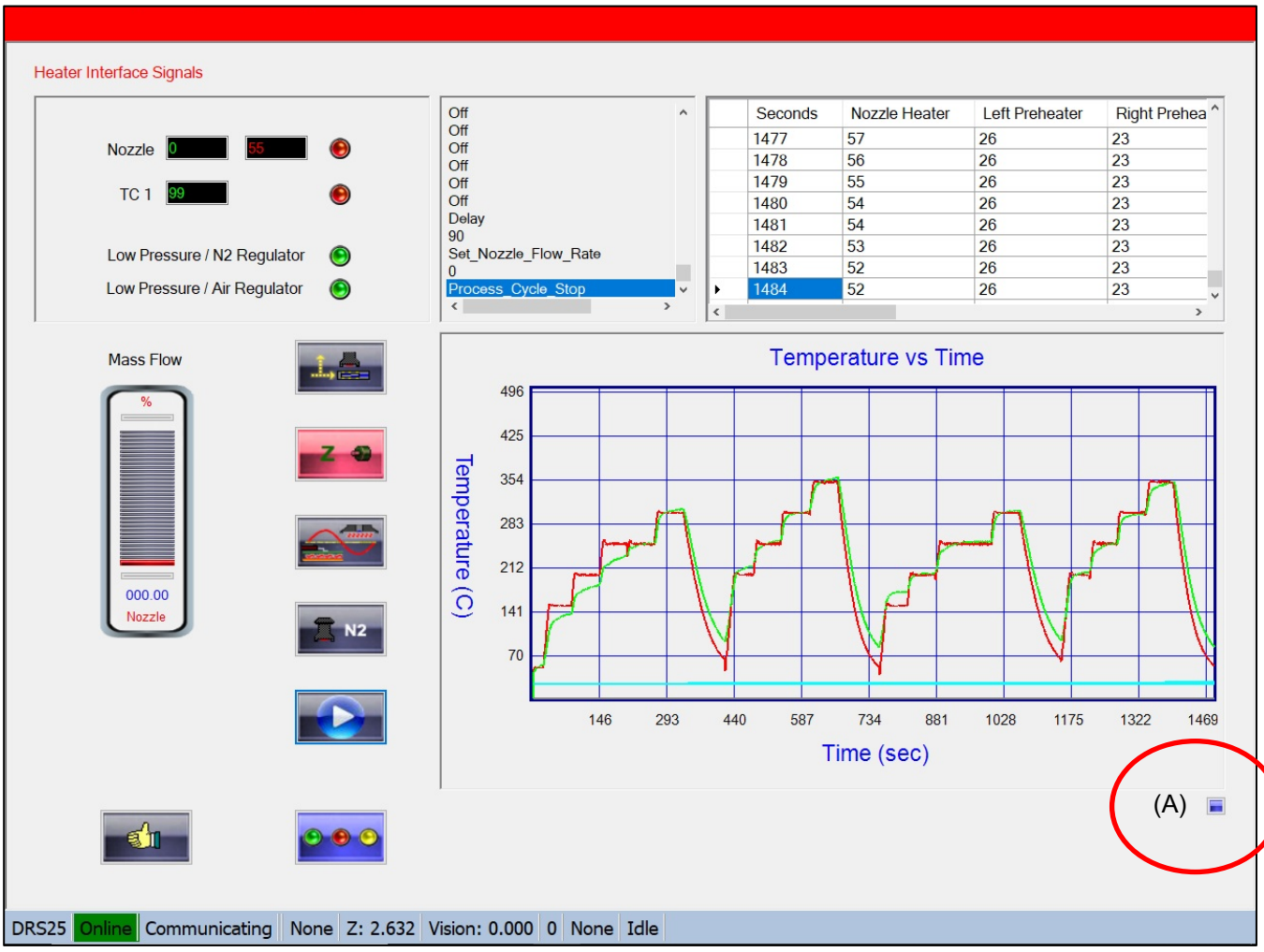
16. If adjustments are necessary, temperature calibration can be performed using the automatic calibration utility available from the menu **Setup/Adjustments/Nozzle Heater**. The user does not need to be involved in the calculation of these offset parameters; the software will automatically determine the necessary adjustments during the process cycle.

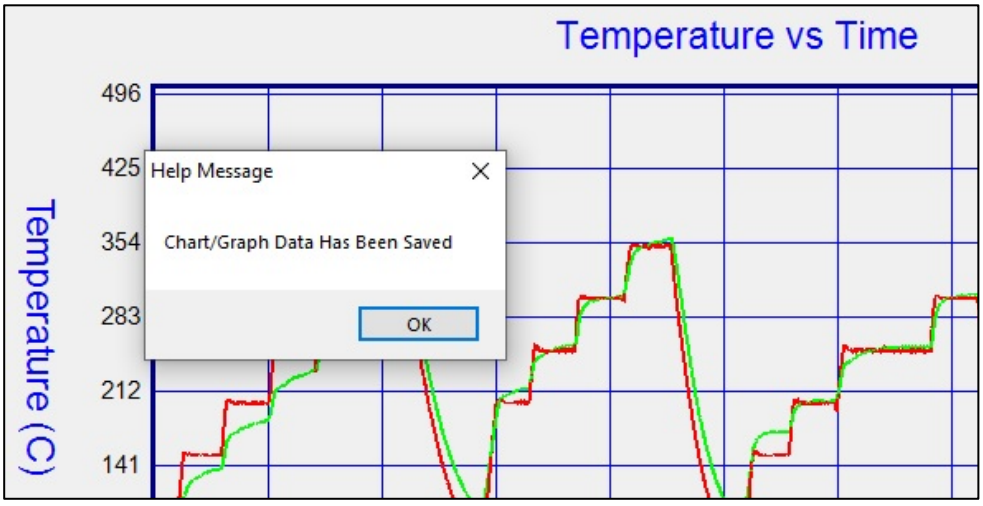


17. Click on the **Start Calibration Cycle icon (A).**

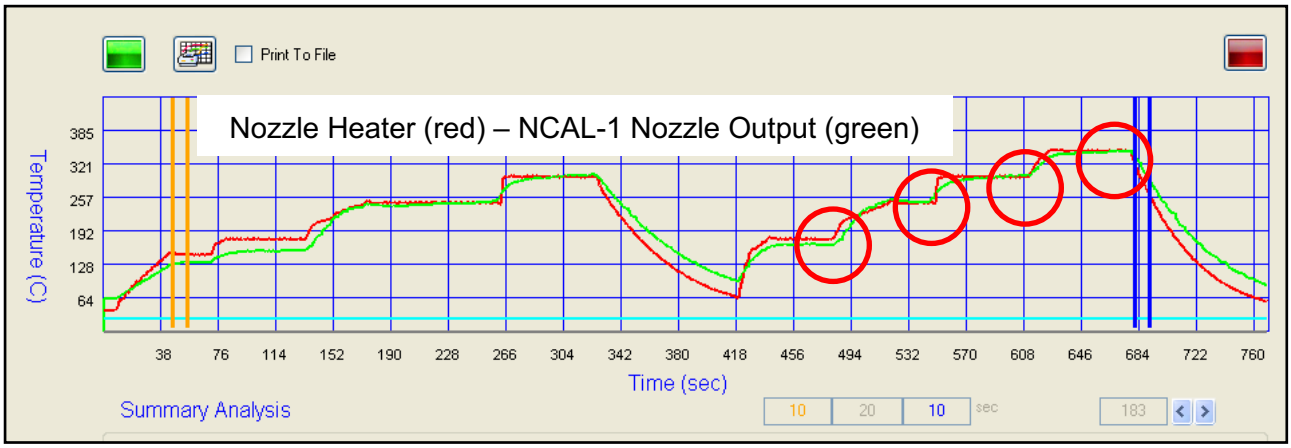


18. Run the program to insert the new temperature offset.
19. Click on the **Save icon (A)** to save.





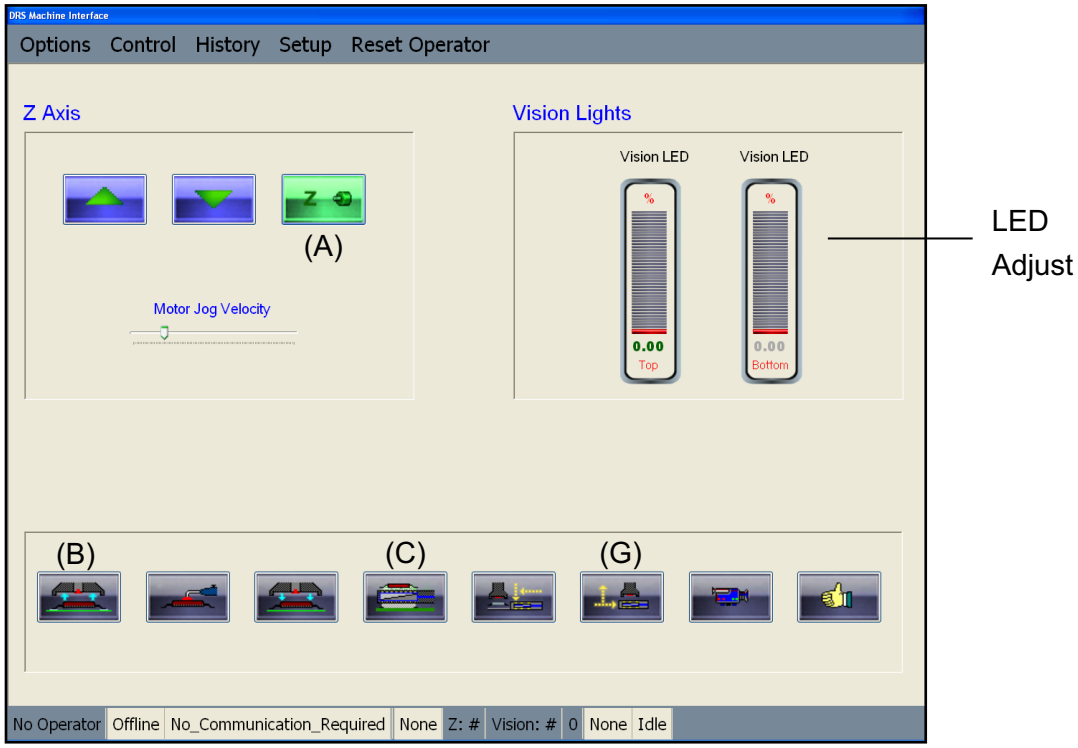
20. Go back and run "Temp Scale Testing" again, and verify the difference between set heater temperature and actual nozzle temperature (only for the last 4 events of the process profile). If temperatures are within +/- 7C, you are finished.



3.3 Vision Alignment Verification and Adjustment

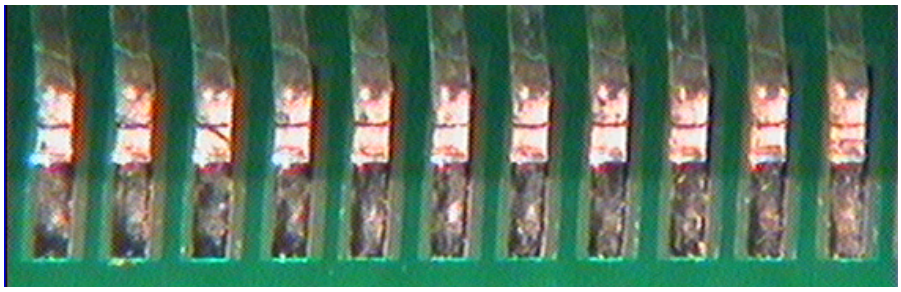
The LTP Beamsplitter Vision System is calibrated at Air-Vac prior to shipment. However, physical movement (such as shipping) and continual use require that the Vision System be periodically verified to insure placement accuracy.

1. Log on as "DRS25" or any high level operator.
2. Select Set-Up (Main menu) then Vision System from (Main menu). The Vision Adjustment screen will appear as shown below.



3. Install the Vision Alignment Board (supplied with system) with the QFP160 site into the carrier.
4. Click on the Enable/disable button **(A)** to de-power the z-axis (red background).
5. Unlock clamping fingers and install the N27EZ27 nozzle (supplied with system).
6. Put the QFP160 under the nozzle using caution as not to bend the leads.
7. Activate Nozzle Vacuum **(B).**

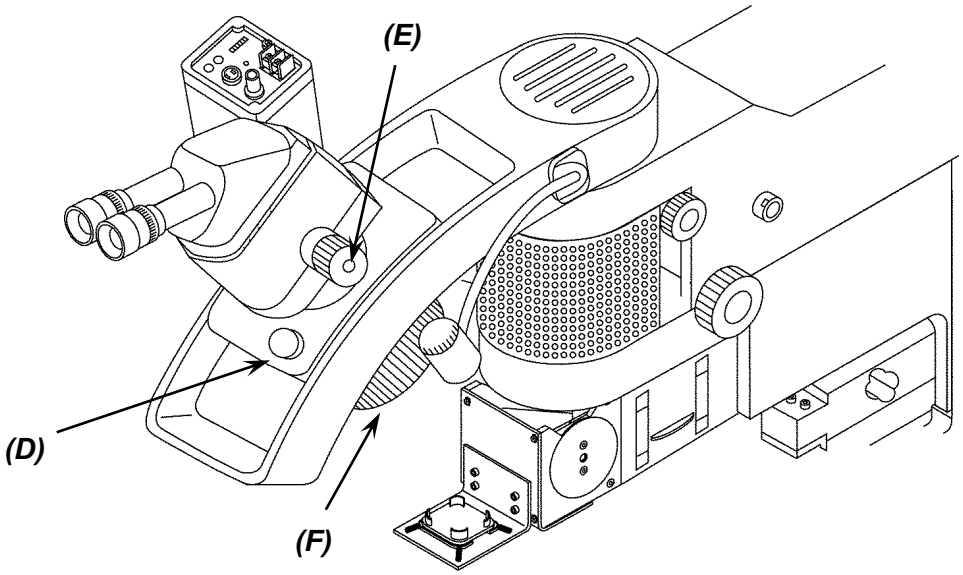
8. Align the QFP160 at board level by using the X, Y and Theta adjustments while viewing through the microscope. Once the front side of the device is aligned (photo below) pivot the microscope to the two sides and continue the alignment process until the device is perfectly aligned on three sides. Use maximum zoom to enhance accuracy.



9. Once the device is aligned at board level, lock the table to prevent future movement.
10. Select the Vision Alignment icon **(C).** The device will automatically move to the vision position.
11. Press microscope Slide Lock **(D).**
12. Push microscope along track to the top (highest) position. This step ensures that the microscope is in the proper (highest) position for vision alignment.

Note:

LOWERING THE MICROSCOPE FOR ALIGNMENT WILL RESULT IN PLACEMENT ERROR DUE TO INCORRECT VIEWING ANGLE DURING ALIGNMENT.



13. Adjust the Zoom Lens **(E)** as required.
14. Refocus until pads are a clear image **(F)**.
15. Manually raise or lower the nozzle to adjust the height of the component leads until the leads are in focus (same viewing distance). Click on power to hold vertical position. To enhance the lead to pad contrast, select the LED adjustment icon. Adjust the lighting for the leads (top) and/or pads are required to provide a clear image.

- Figure 1 is an illustration of proper lead to pad alignment in the vision system with the leads (dark) properly centered over the pads. No vision adjustment is required in this case. Figure 2 is an illustration of incorrect lead to pad alignment in the vision system due to theta error.

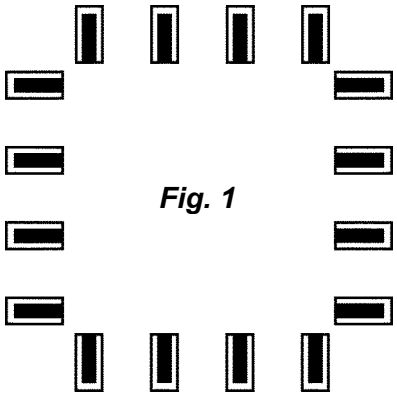


Fig. 1

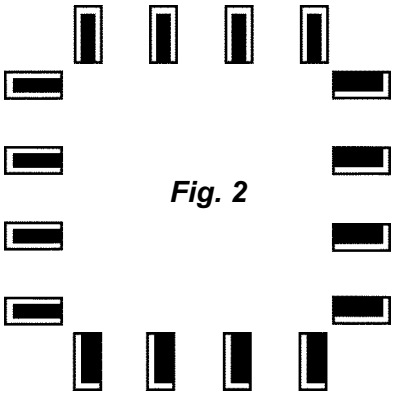
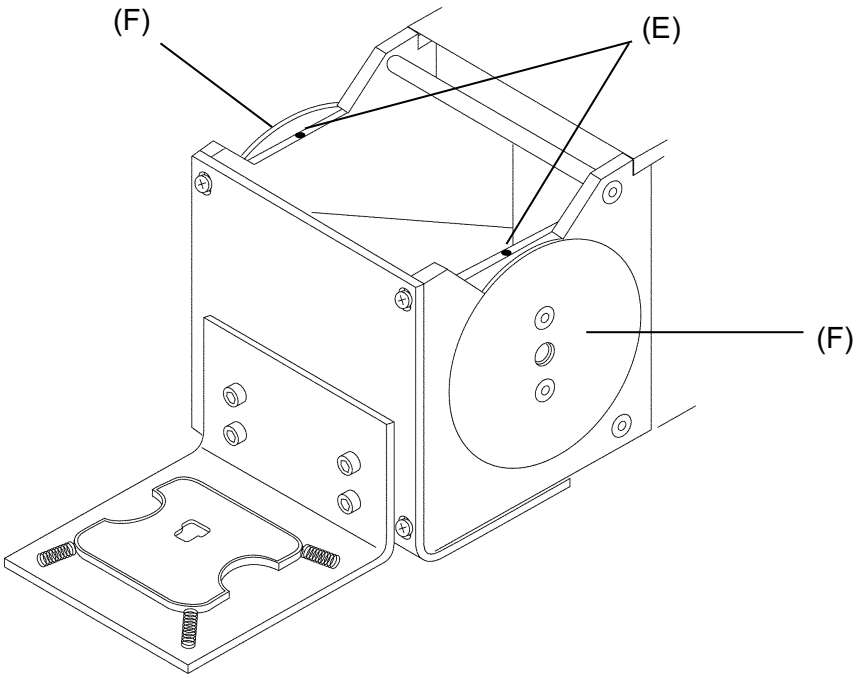


Fig. 2

16. If the leads and pads are not aligned in the vision system after alignment at board level, loosen (but do not remove) the two 1.5mm set screws **(E)** which hold the two Vision Adjustment Disks **(F)** in place.
17. Rotate the two disks slightly until component part is aligned.
18. Increase the zoom lens magnification to check your work. Increase magnification to maximum.
19. Tilt field of view up and down to insure leads are 100% in center of pad. Viewing a few leads under high magnification may reveal minor errors not seen while aligning the entire device.
20. Slowly and carefully retighten the set screws while continuing to view the alignment. This will insure that no movement of the cube occurs while tightening the screws.
21. Click on the **Home Z/Vision Axis button (G).**



22. Click on the **Z Axis Power button (A).** It will turn red.
23. Manually lower the nozzle to check at board level. Put the QFP160 holder under the component and click on the **Vacuum button (B)** to stop the vacuum.

4: Process Development for Engineers

4 Process Development for Engineers

4.0 Profile Tutor Software

4.0.1 Overview

The DRS25 Process Development Guide is designed to allow novice users to create and run new processes.

There are five (5) steps to creating and running a new process:

- Physical Setup
- Profile Tutor
- Thermal Profile Analysis
- Auto Profile Build
- Program Execution

Each of the five steps is documented in detail in this Process Development Guide.

4.0.2 Physical Setup

TC#1: Board
If you purchased the IR Sensor Option, plug it into TC Channel #1. If you do not have the IR Sensor, use Kapton tape to attach a TC to the board. Position the IR Sensor/TC on an open area of the board 2-3 inches away from the rework site.

Thermocouples
Air-Vac uses .003" gauge K-type TC's (1-888-TC-OMEGA, Part #5 SRTC-TT-K-40-36).

TC#2
Slide at least one TC (two or more recommended) underneath the BGA as far into the BGA as possible. Plug the TC into channel #2 (#3 etc).

Apply Kapton tape to hold the TC in place. If desired, x-ray will show the exact positioning of the TC head, however this is not critical.

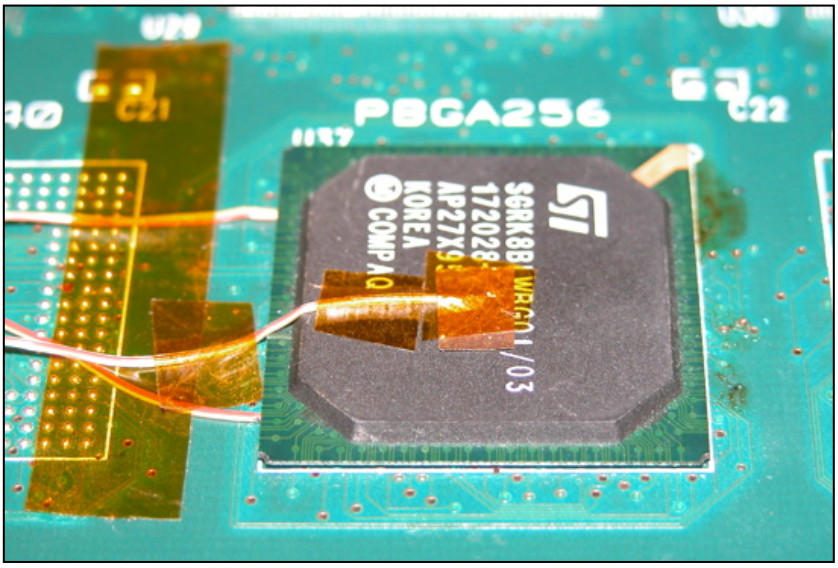
Studies have shown that TC's underneath the BGA that are not in direct contact with a solder joint are typically within –5 to 0 degrees of the joint temperature. This approach will work in 90% of the cases.

Use multiple thermocouples for larger BGA's and plug them into TC channels 2, 3, 4, etc.

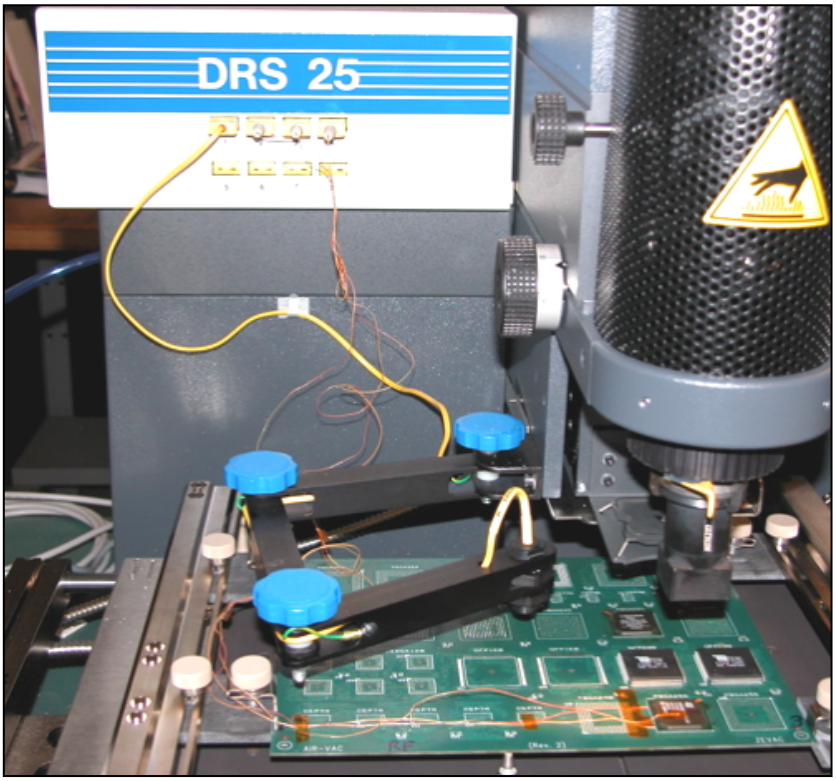
If the standoff height or ball density does not allow a TC to be slid underneath it, a scrap board should be drilled, TC's installed into the pad or joints and then epoxied in place. If this is not possible, reflow of the device can be visually observed through the microscope.

The major advantage of this approach is that it is non-destructive yet still highly accurate.

- Board/device with two .003" gauge thermocouple's slid underneath BGA. One TC attached to top of device with copper tape, then covered with Kapton tape.



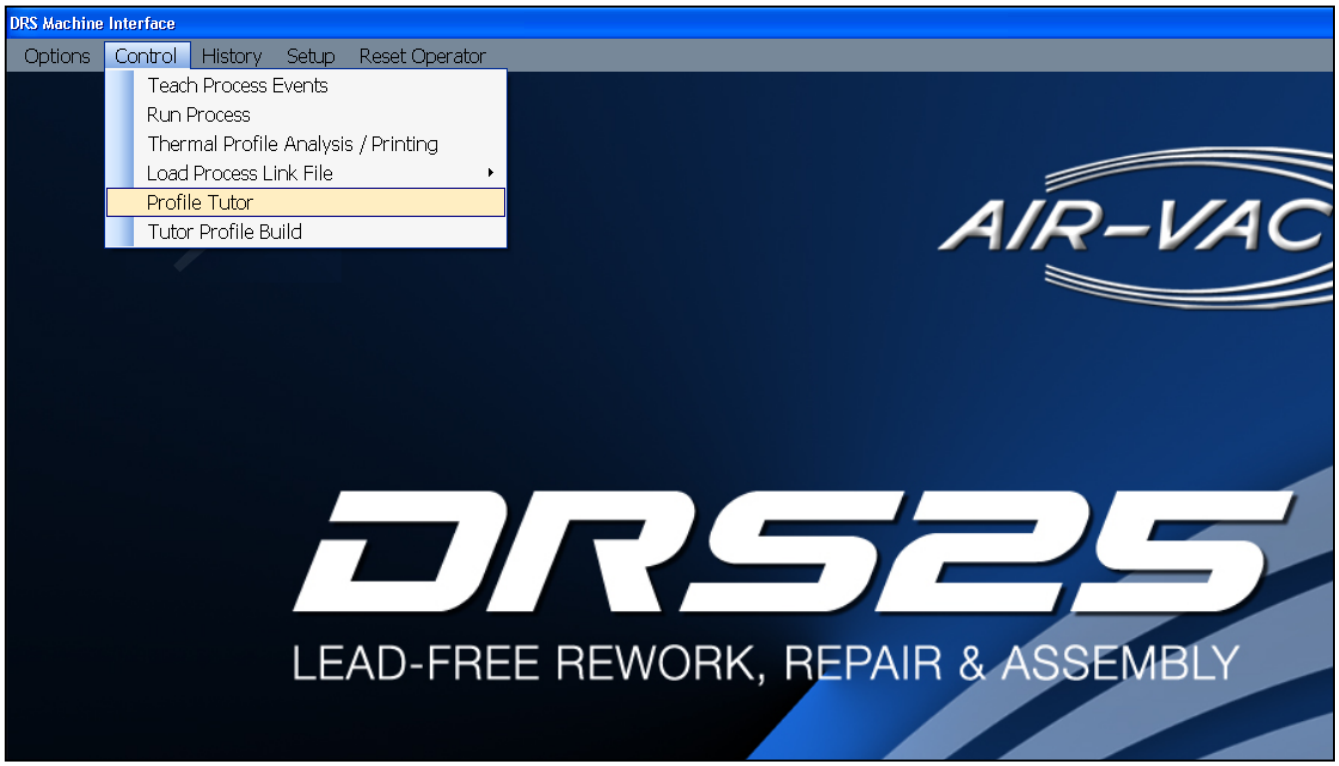
- TC#1: IR Sensor (Board)
- TC#2: Top of Device
- TC#3: Joint #1
- TC#4: Joint #2.



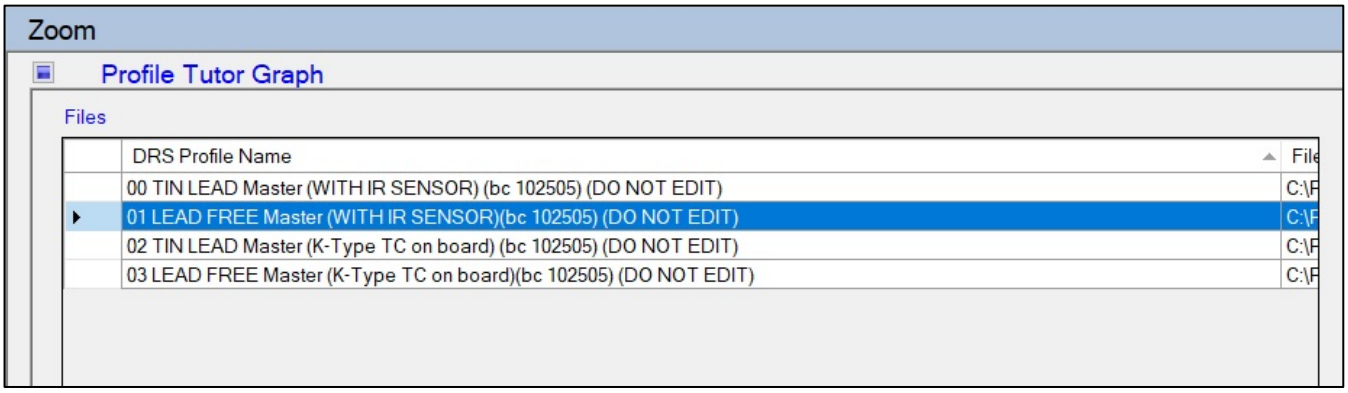
4.0.3 Profile Tutor

Profile Tutor is the process whereby a thermal profile for a new application is created.

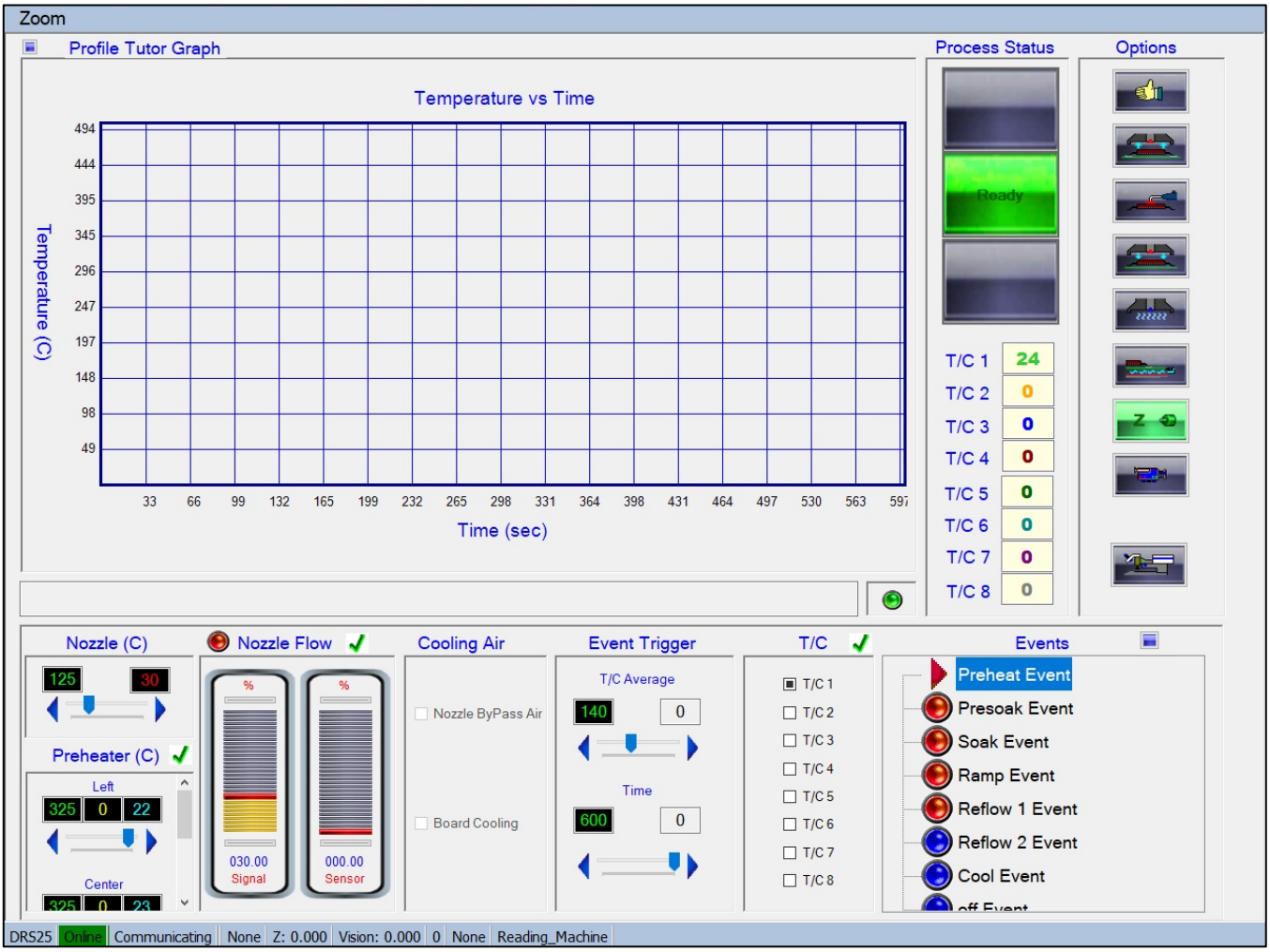
- From the menu bar select **Control/Profile Tutor.**



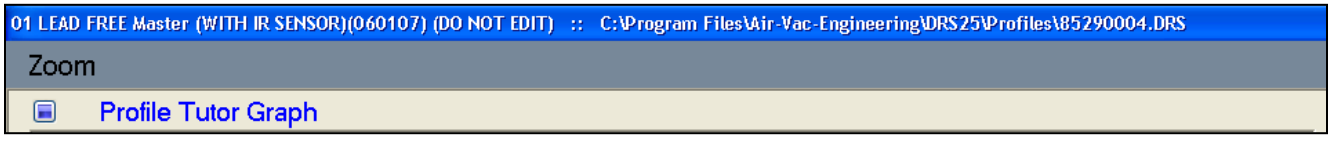
- Select (double click) one of the **Thermal Profile Master Templates** that most closely matches the new application.



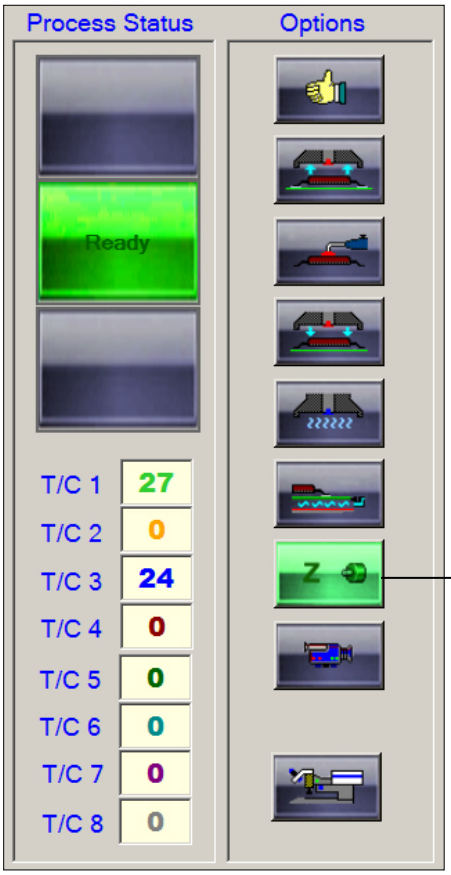
The Profile Tutor screen will appear.



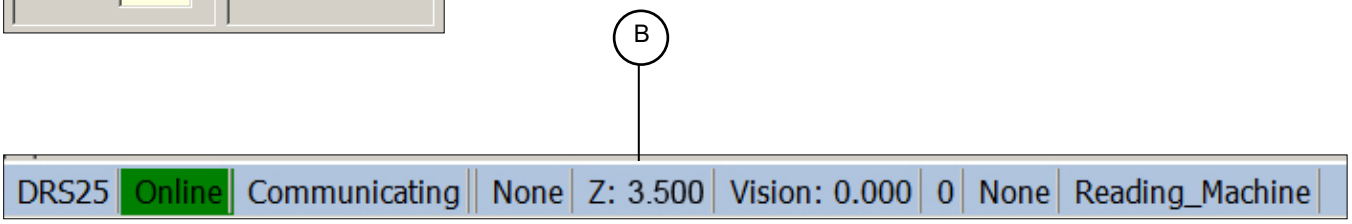
The master profile name will be displayed at the top of the page.



All master profiles typically have seven (7) stages (Events): Preheat, Presoak, Soak, Ramp, Reflow 1, Reflow 2, and Cool.



- Under **Options**, click to depower **Z-Axis (A) button** (box turns red).
- Position nozzle over component.
- Lightly touch component with nozzle o-ring, then retract approximately .080" (2mm), use **Z position value (B)** at bottom of screen as reference.
- Click to repower **Z-Axis (A)** (box turns green).



The following is a brief description of each stage (Event):

1. **PREHEAT:** Preheats the entire board to minimize the thermal differential between the reflow site and the rest of the board. Preheat minimizes board warpage and reduces the amount of component heating required to achieve reflow.
2. **PRESOAK:** Presoak is the period between preheat and soak.
3. **SOAK:** Flux is activated during the soak stage. Typically, significant voiding will occur without proper soak.
4. **RAMP:** Quickly takes the solder joints from the end of soak to the beginning of reflow.
5. **REFLOW 1:** Time over liquidus until the heaters are shut off.
6. **REFLOW 2:** Time until the joints fall back below liquidus. NOTE: Total time over reflow equals the total of Reflow 1 and 2 stages.
7. **COOL:** Cools the component and board down to a temperature that allows the reworked assembly to be safely handled.

The following are typical time/temperature targets for each stage (Event):

	Tin/Lead	Lead-Free
PREHEAT		
- Topside Board Temp (°C)	90-110	130-150
PRESOAK		
- Temp (°C)	101-139	141-169
- Time (seconds)	15-30	15-30
SOAK (joint)		
- Temp (°C)	140-165	170-200
- Time (seconds)	45-75 (60)	45-75 (60)
RAMP (joint)		
- Temp (°C)	166-182	201-216
- Time (seconds)	15-45	15-45
REFLOW 1 (joint)		
- Temp (°C)	183-210	217-240
- Time (seconds)	45-60	45-60
REFLOW 2 (joint)		
- Temp (°C)	210-183	240-217
- Time (seconds)	5-15	5-15
COOL (joint)		
- Temp (°C)	100	150
- Time (seconds)	60-180	60-180
• Typical solder liquidus temp (°C)	183	217
• Typical max joint temp (°C)	210	240

Parameter Adjustments
Prior to starting the cycle, the user should assess the following:

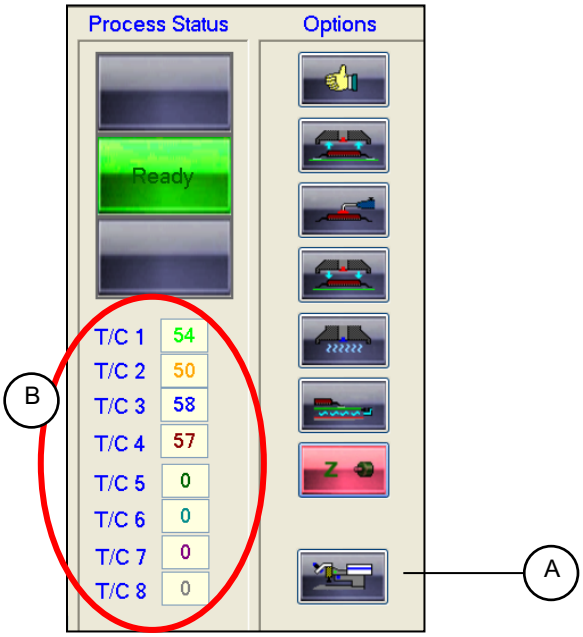
1. Should any of the nozzle temperature settings in any event in the master profile be adjusted? If you know specific information about the new application, adjust temperature targets, if not, leave as is.
2. Adjust the nozzle flow rate for the new application based on the nozzle size below.

The default nozzle heater flow rate in the template is 55% (50% of 2.75 scfm, 1.5 scfm). Change the nozzle flow rate based on the nozzle you are using as shown below.

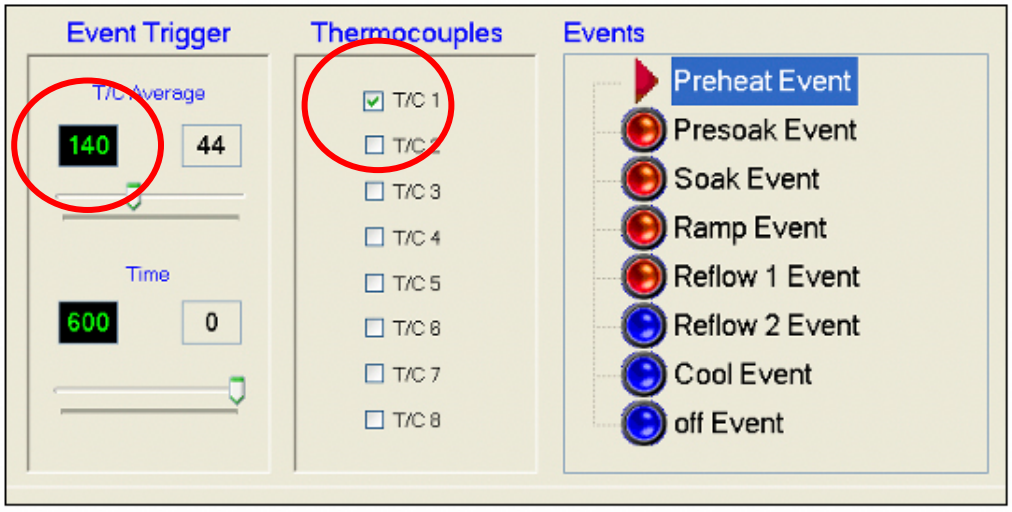
Nozzle Size (mm)	Nozzle Heater Flow (%)
Less than 10mm	30%
10-15mm	40%
16-26mm	50%
27-30mm	55%
31-34mm	65%
35-40mm	75%
40+ mm	85%
NMX Nozzles	60%

Be sure to change the flow in all events except Preheat (click on each event radio button to access the event flow rate).

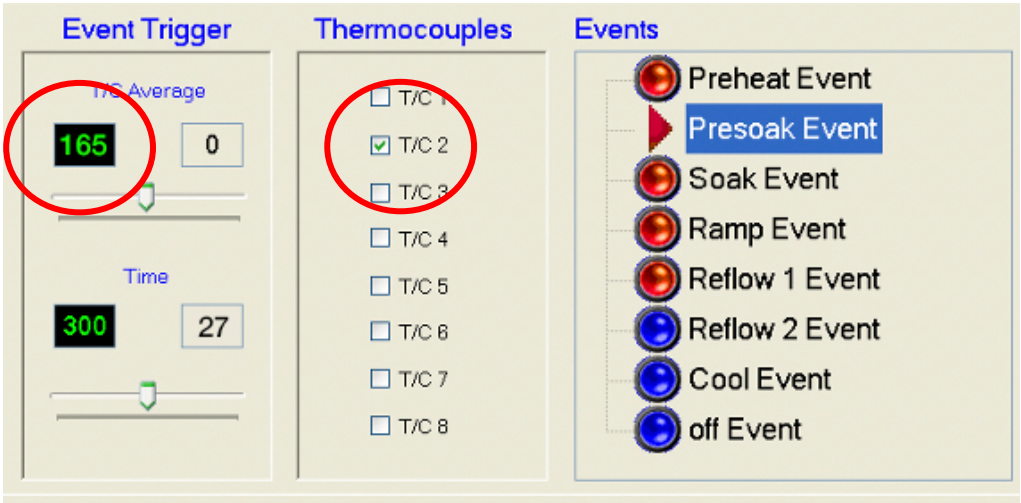
3. Click on the Cycle Start icon **(A)** to start the Thermal Profiling process.
   - If any of the T/C's are above 60C, the board cooling system and nozzle cool down will come on automatically and remain on until all T/C's are below 60C.
   - The graph will begin to plot temperatures for the top heater, bottom heater and all thermocouples. T/C temperature is also digitally displayed **(B)**.
   - During all events except Preheat, nozzle temperature can be adjusted on-the-fly if required to help achieve the event trigger target or the desired event time.
   - If an on-the-fly adjustment is made, an additional event will be automatically created and displayed.



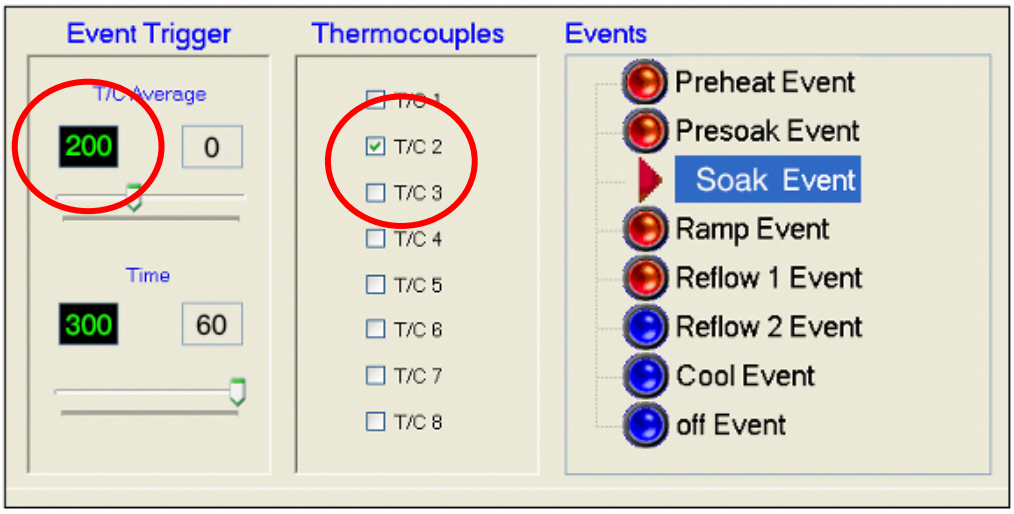
The **Preheat Event** will continue until T/C#1 (IR probe) reaches the target board temperature (140˚C in this example).



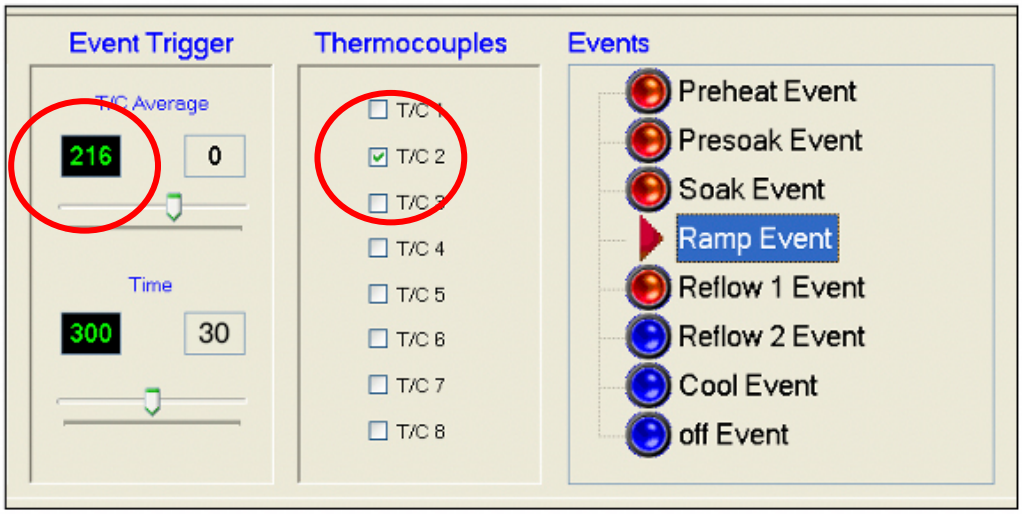
The **Presoak Event** will continue until T/C#2 reaches 165°C (Lead-Free profile). Time in Presoak stage is automatically recorded.



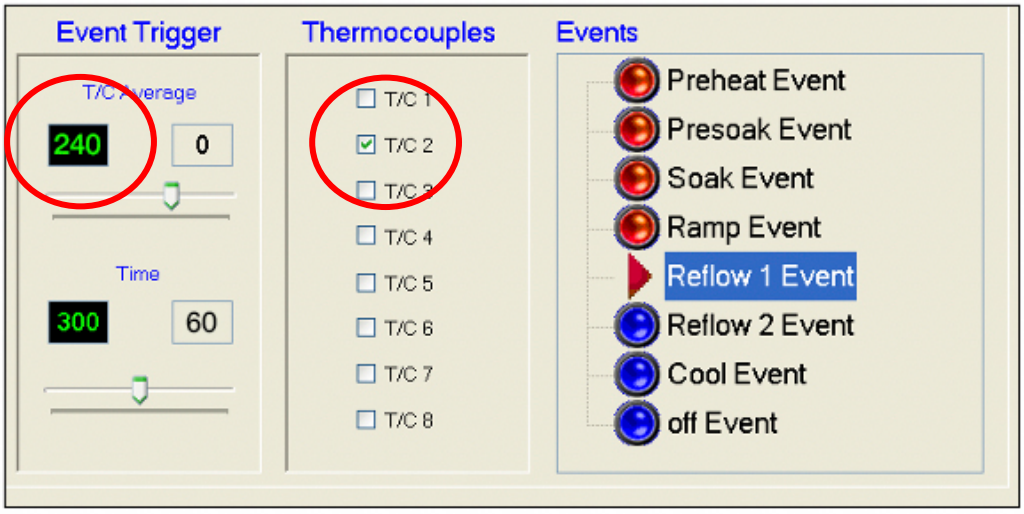
The **Soak Event** will continue until T/C#2 reaches 200°C (Lead-Free profile). Time in Soak stage is automatically recorded.



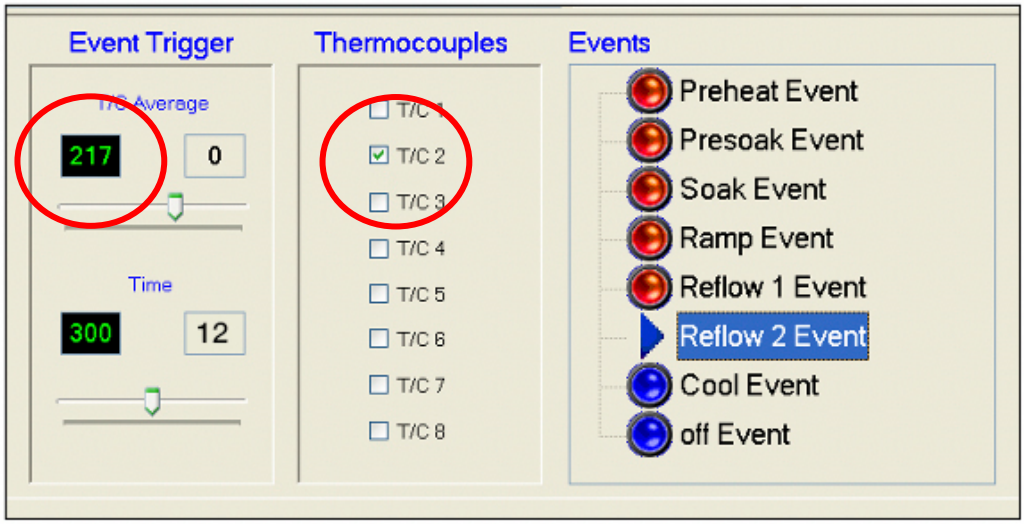
The **Ramp Event** will continue until T/C#2 reaches 216°C (Lead-Free profile). Time in Ramp stage is automatically recorded.



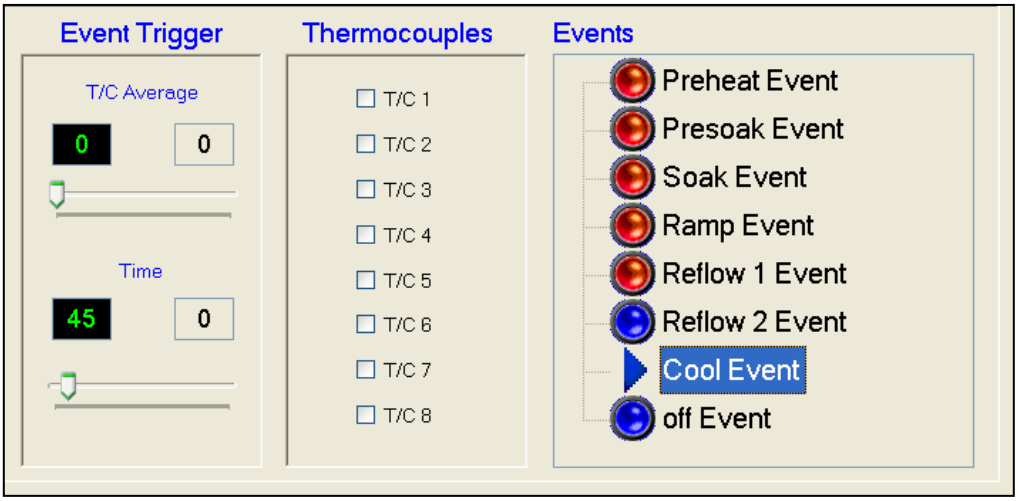
The **Reflow 1 Event** will continue until T/C#2 reaches 240°C (Lead-Free profile). Time in Reflow 1 stage is automatically recorded.



The **Reflow 2 Event** will continue until T/C#2 drops down below 217°C (Lead-Free profile). NOTE: Total time over reflow is the sum of Reflow 1 and Reflow 2. Time in Reflow 2 stage is automatically recorded.



The **Cool Down Event** – 45 seconds



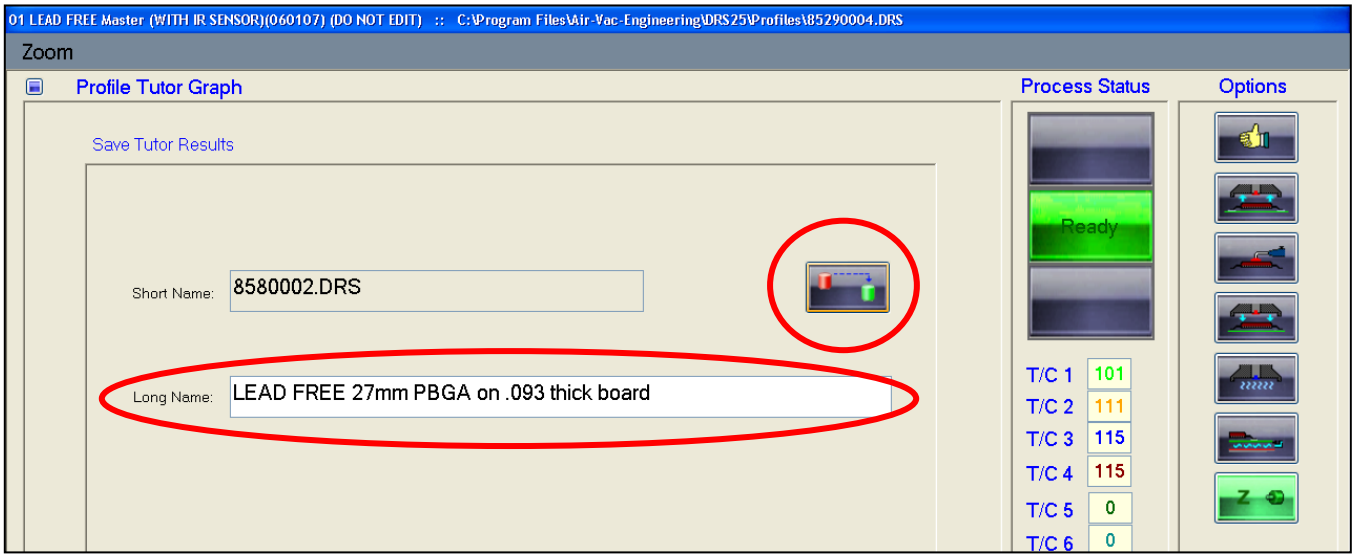
Automatic prompt to name and save new thermal profile.

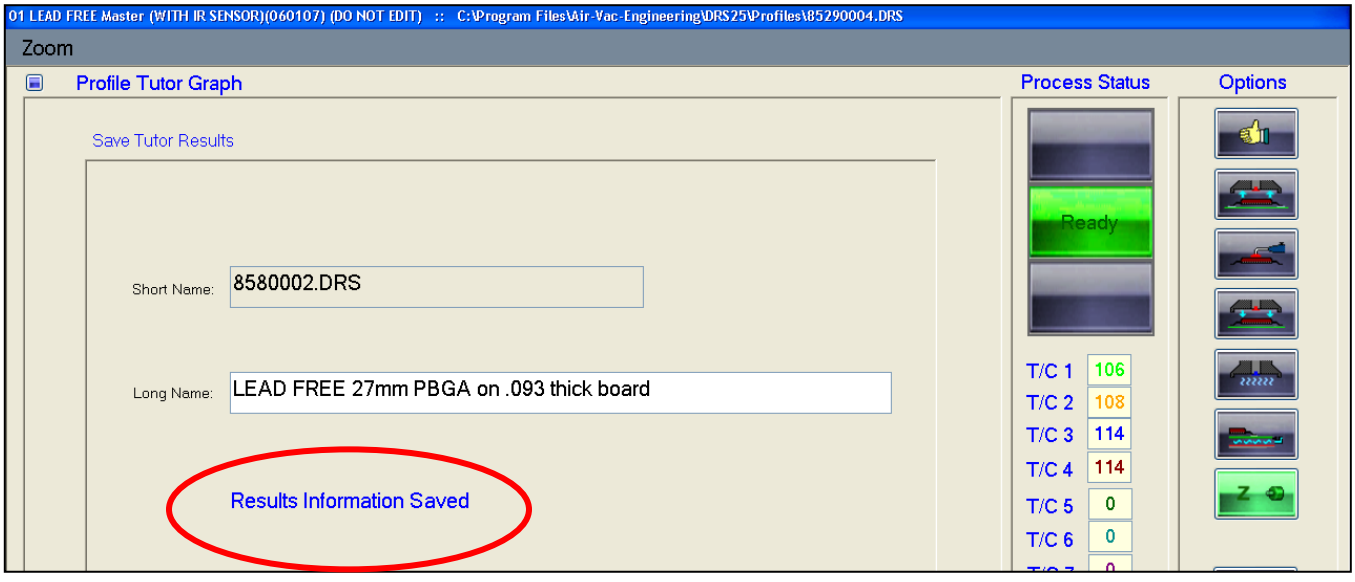
- Click on the **red/green** icon to save the thermal profile.

Confirmation of save.

IMPORTANT!!!

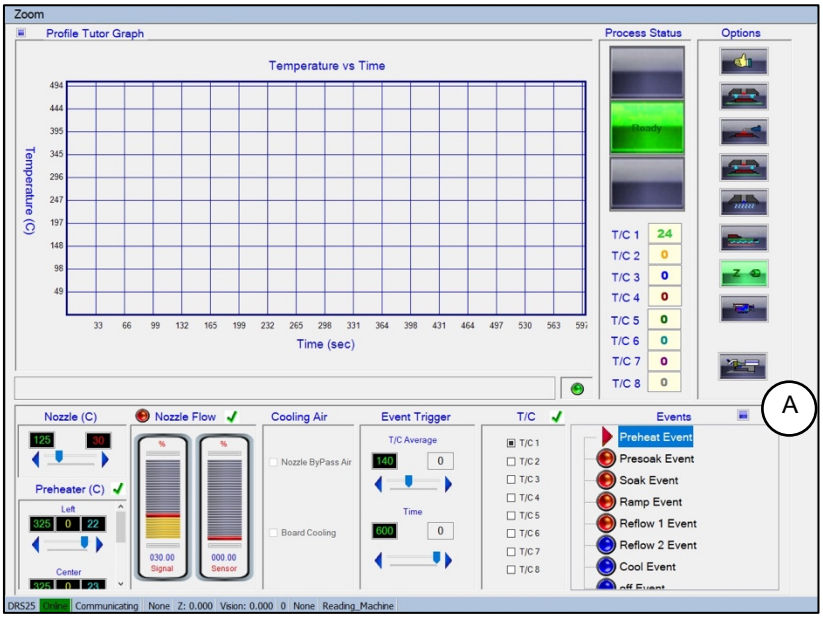
NOTE: If you exit Tutor without saving the graph, the process information will be lost.

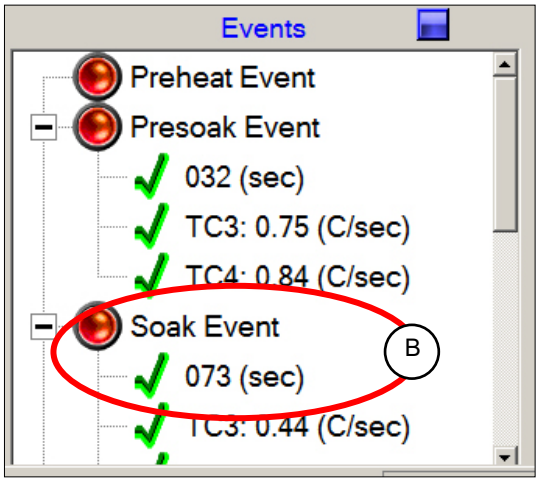


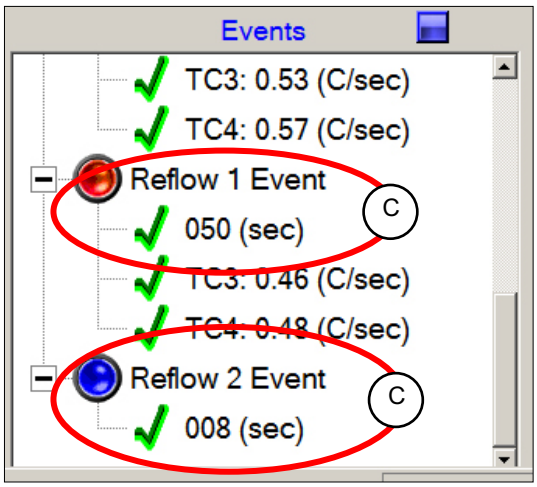


4.0.4 Thermal Profile Analysis

After the new thermal profile is saved it must be analyzed to see if it meets the typical rework profile targets. Clicking on the small blue **Toggle Tutor Analysis Display box (A)** will display the time in each stage along with the degrees per second heating stage of the joint thermocouples.







- Compare the actual time in the **Soak Event (B)** to the Target Soak time of 45-75 seconds (60 sec. is ideal).

- Compare the total actual time in the **Reflow 1 & 2 (C)** Events to the Target Reflow time of 45-75 seconds (60 sec. is ideal).

- If the actual Soak and Reflow times fall within the targeted time ranges, you have created a good thermal profile. Proceed to the Profile Build section.

- If the Soak and/or Reflow stage(s) are less than the minimum target of 45 seconds, the profile has run too fast.

- If the Soak and/or Reflow stage(s) are greater than the maximum target of 75 seconds, the profile has run too slow.

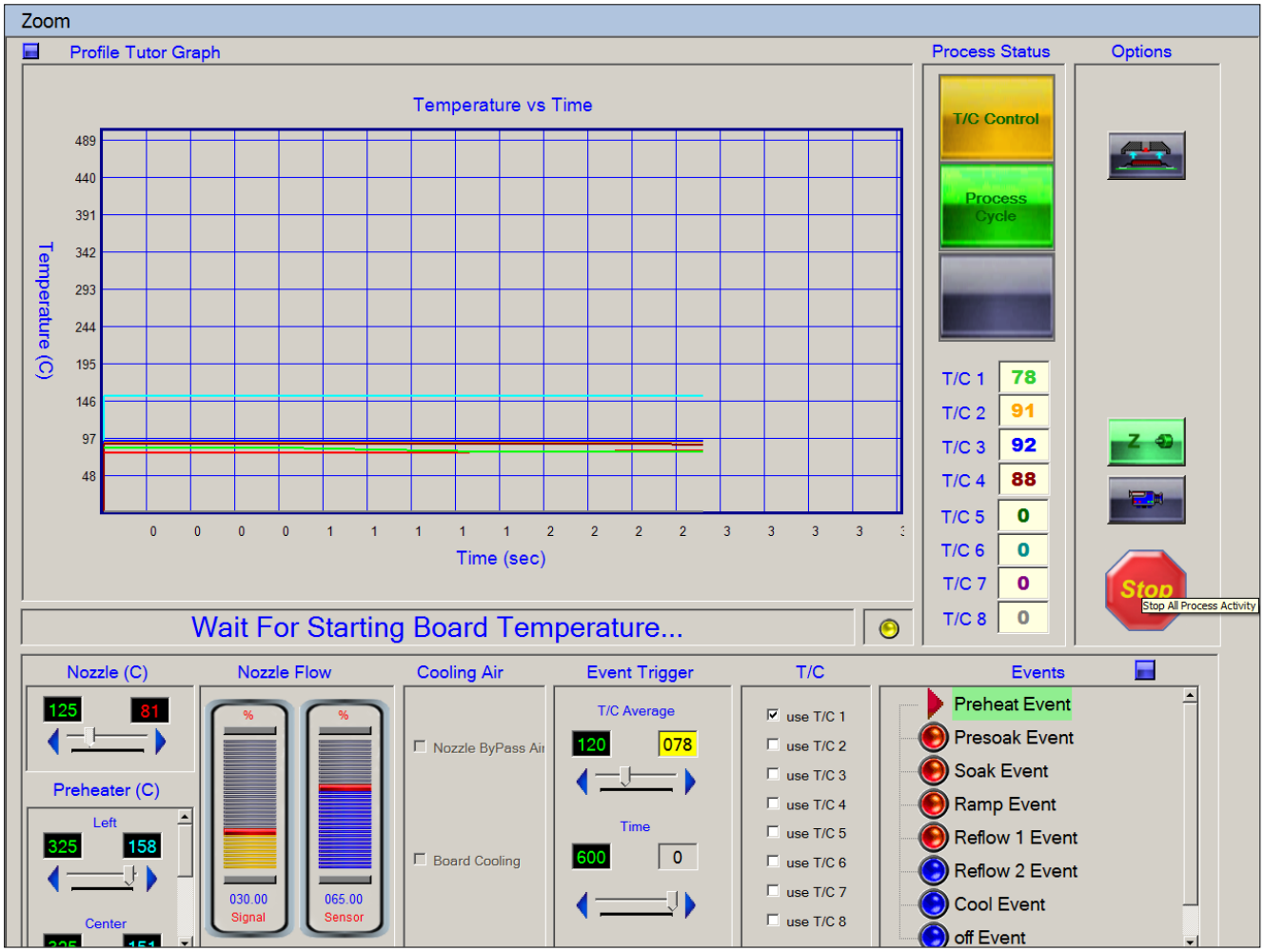
- **NOTE: High thermal mass components on high thermal mass assemblies have a 45-75 second soak range, however, the reflow stage may be as long as 120 seconds due to the longer time required to return to minimum liquidus temperature.**

- If the first iteration is too hot or too cold, a second iteration is required.

4.0.5 Required Changes Prior to Running a Second Thermal Cycle if Necessary

If the time in the Presoak, Soak, Ramp or the total time above reflow (Reflow 1 plus Reflow 2 stages) is too short or too long, a second thermal cycle must be run.

- Decrease the Nozzle temperature in the Presoak/Soak/Ramp/Reflow 1 stages. Decreasing the Nozzle temperature will slow the profile down and increase the time in each event.
- Increase the Nozzle temperature by in the Presoak/Soak/Ramp/Reflow 1 stages. Increasing the Nozzle temperature will speed up the profile and reduce the time in each event.

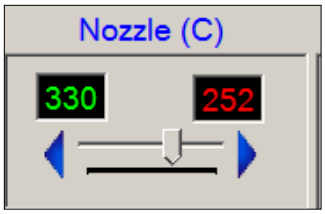


- Click on the Cycle Start icon to begin the second cycle. Cooldown of all thermocouples to 60˚C will occur at the beginning of the second cycle**.**
- Run the second thermal cycle exactly the same way as the first cycle.
- Save second thermal cycle and analyze the time in Presoak, Soak, Ramp and Reflow to insure it is acceptable.
- Thermally challenging application considerations:
  - Increase flow rate (5-10%)
  - Increase nozzle size
  - Increase preheat temperature setpoint

4.0.6 Optional On-The-Fly Adjustments of Temperature

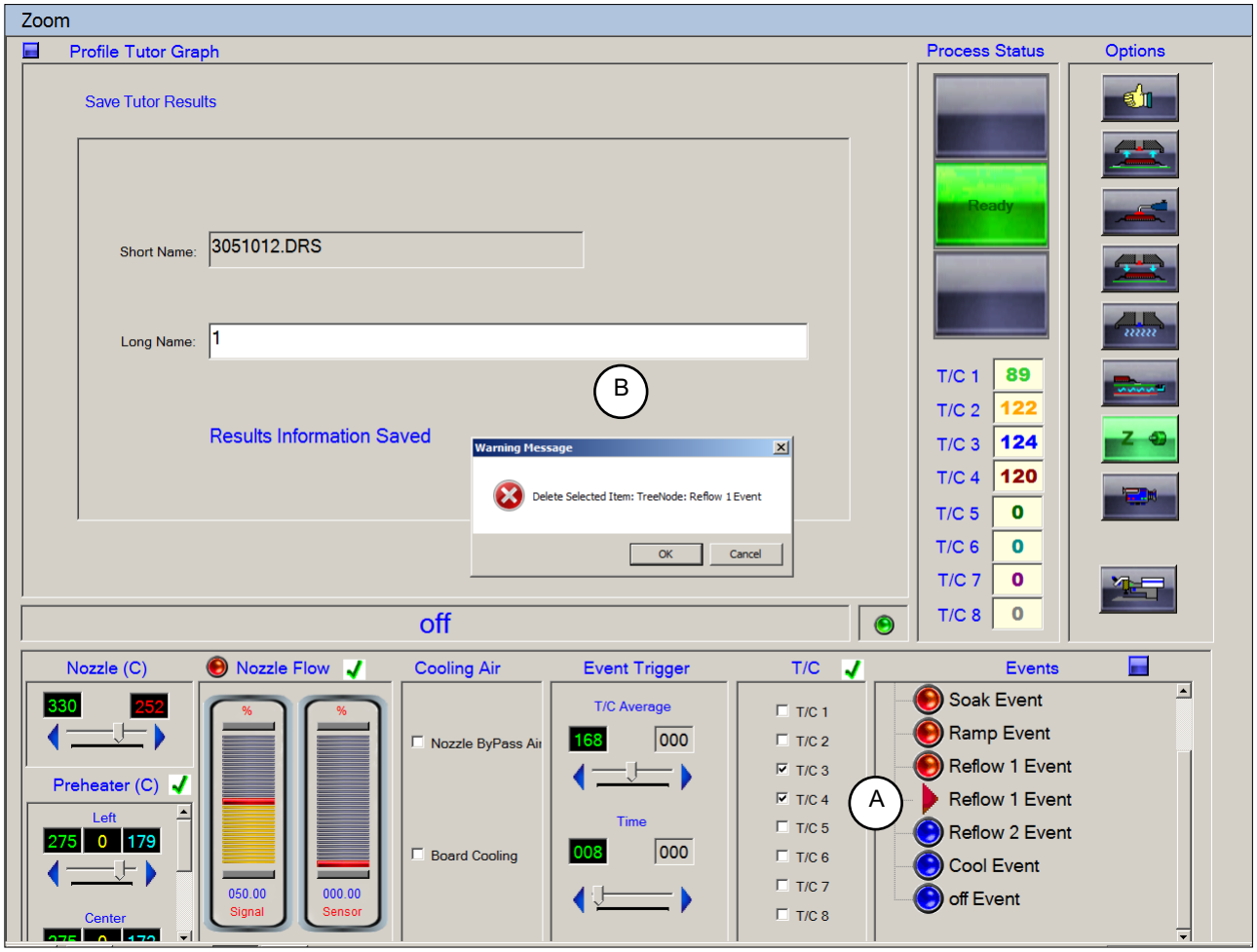
On-the-fly adjustments to increase or decrease the nozzle temperature can be made at any time, during any event, while running a thermal profile cycle (except during preheat).

To increase or decrease the nozzle temperature, use the slide bar to adjust.

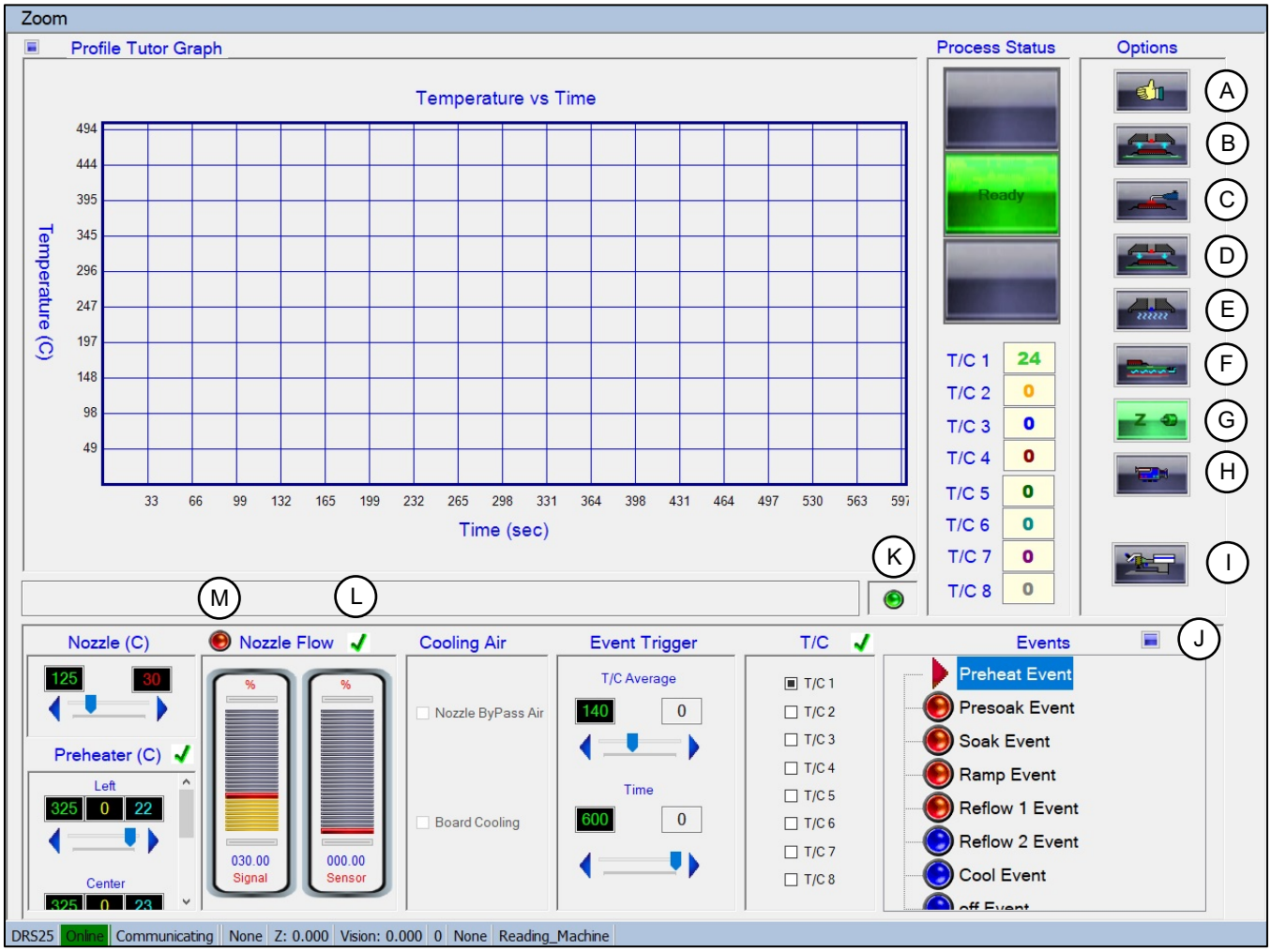


If an on-the-fly adjustment was made during the first cycle, two events with the same name but different temperatures and time will be shown. If you wish to run a second thermal cycle:

- Click on the second of the two events and a red arrow will appear **(A).**
- Right click on the event and a delete event message will appear **(B).**
- Click on OK to delete the event that was created on-the-fly.



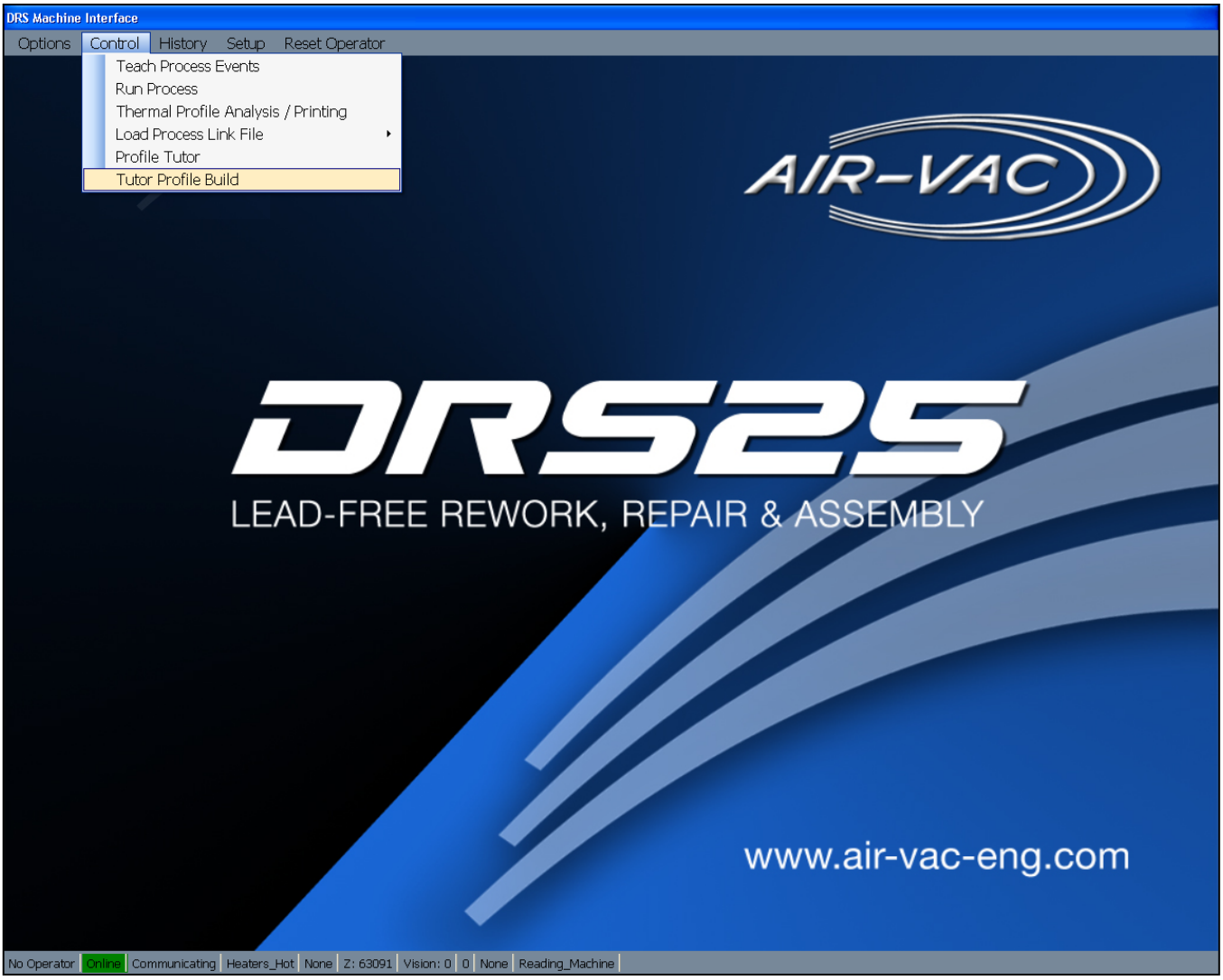
Profile Tutor Icons: Overview Reference



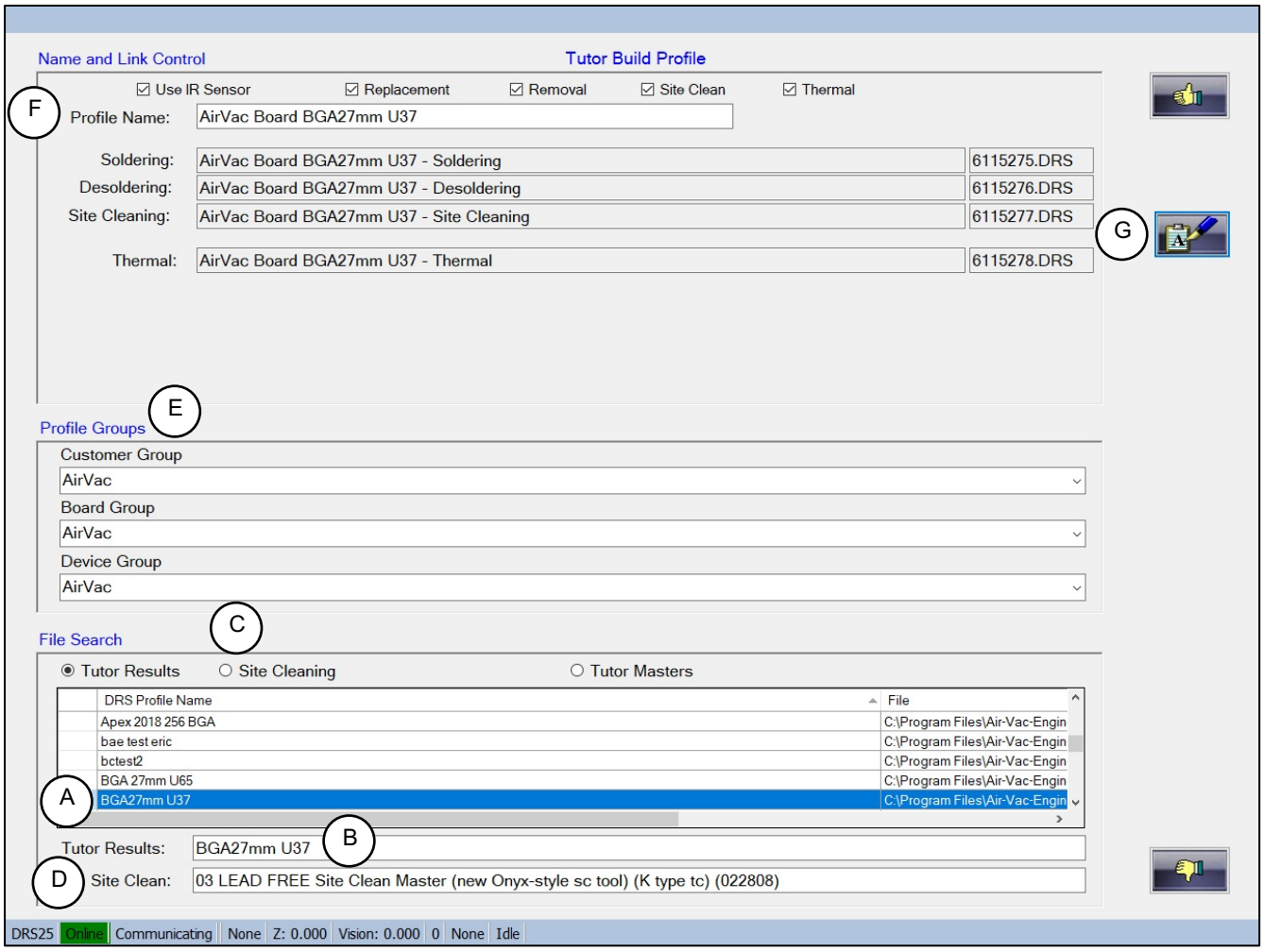
A – OK/Exit Screen
B – Nozzle Vacuum
C – Vacuum Probe
D – Nozzle Blow Off Air
E – Nozzle By Pass Air
F – Board Cooling
G – Toggle Z Motor Enable
H – Direct View Camera Lights
I – Start Process Cycle
J – Toggle Tutor Analysis Display
K – Update TC for all Events
L – Update Air Flow Rate for all Events
M – Enable Manual Flow Control

4.0.7 Auto Profile Build

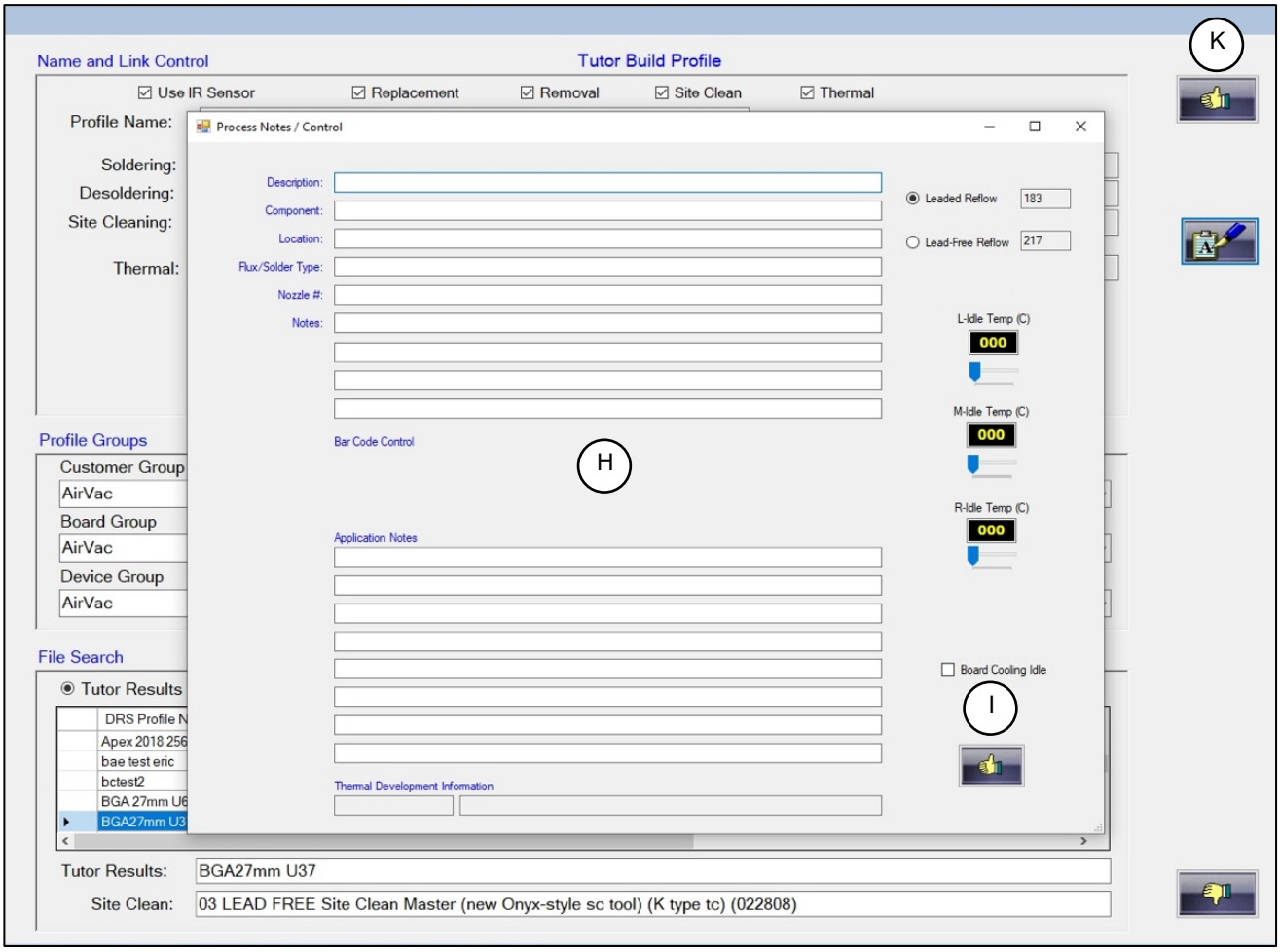
Now that a good thermal profile has been created and saved for the new application, the Automatic Profile Build function is used to integrate the new thermal profile into a complete rework process that enables the user to remove, site clean and replace the new application.



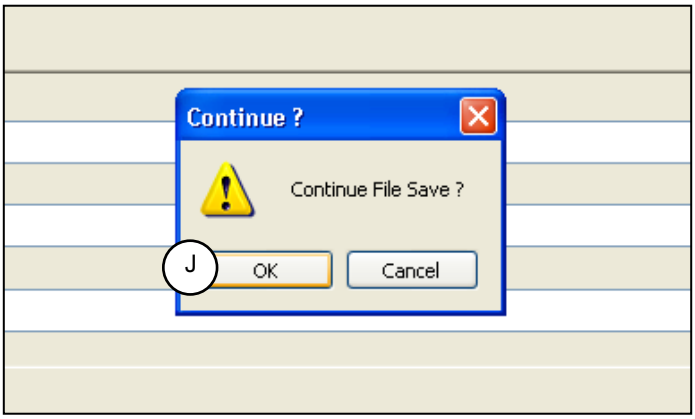
- Select (double click) the thermal profile that you created **(A)**, saved and analyzed.
- The thermal profile will be shown in the **Tutor Results box (B)**.
- Click on the **Site Cleaning radio button (C)**. Select the appropriate site clean profile. It will be displayed in the **Site Clean box (D)**.
- Select/create the **Profile Groups (E)** where you want the profile to be saved to or create new groups by typing in the name in the Group box.
- Name the new profile **(F)**.
- Click the **Process Notes screen button (G)**.



- The **Process Notes screen (H)** displays and allows information prior to running the program. Insert notes such as nozzle size, flux type, etc. that is important for setup.
- Select **Thumbs Up icon (I)** to save and exit.

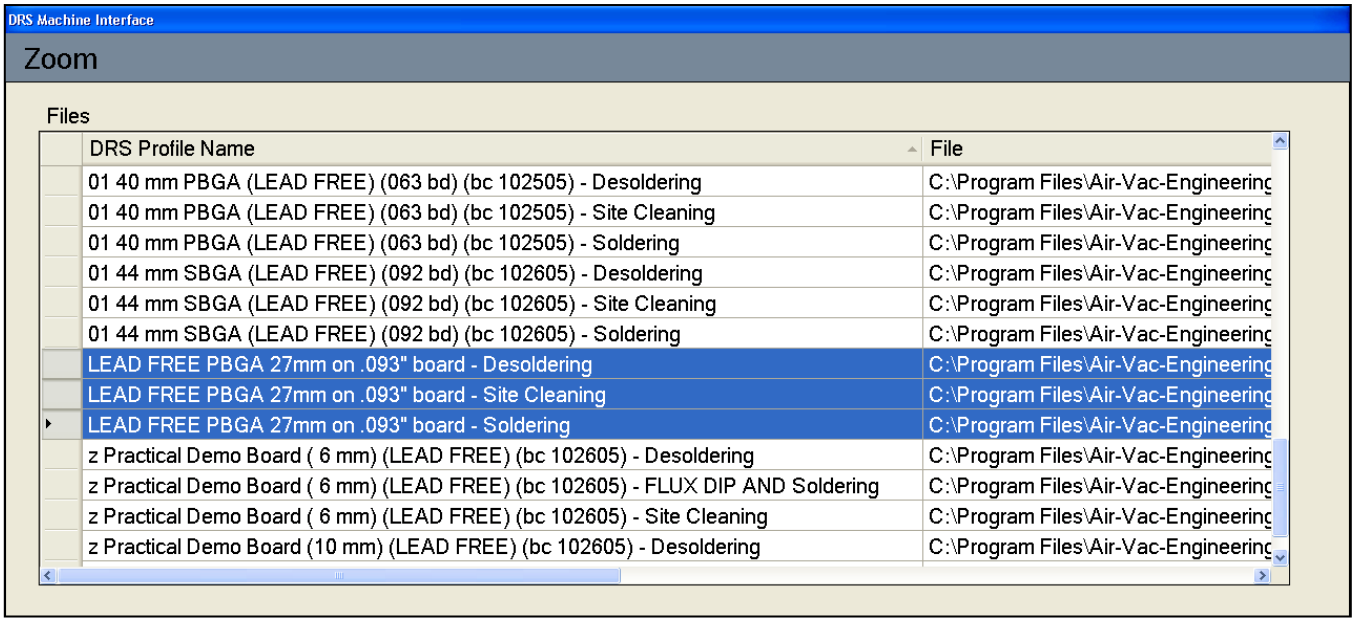


- Click **OK (J)** to continue file save.
- Click **Thumbs Up (K)** to save and exit.



4.0.8 Program Execution

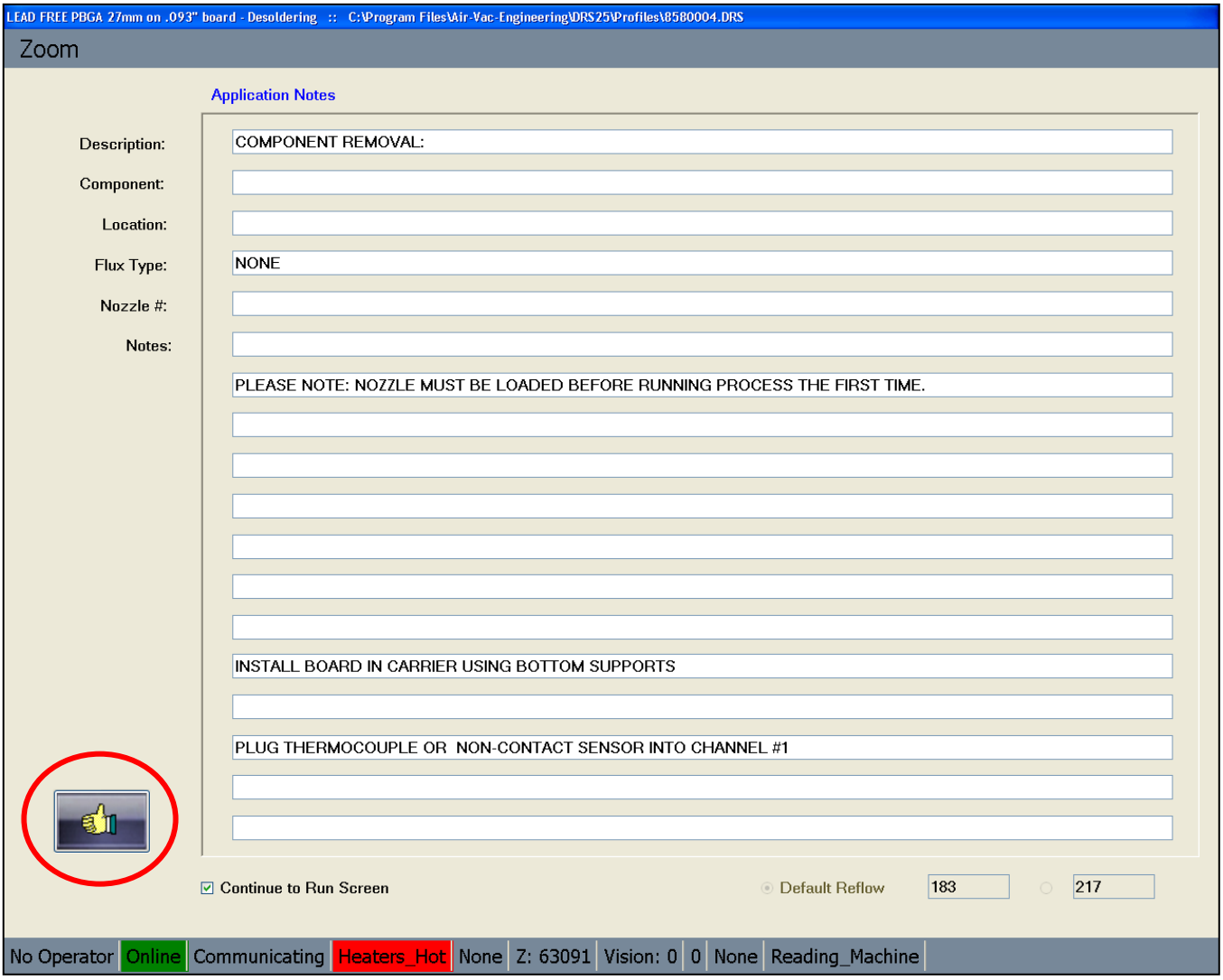
Three new profiles should now be available under **Options/Open** and the appropriate Customer/Board/Device Group. "Desoldering", "Site Cleaning", and "Soldering" is automatically appended to the file name you created.



- Double click on the **Desoldering** profile to open it.

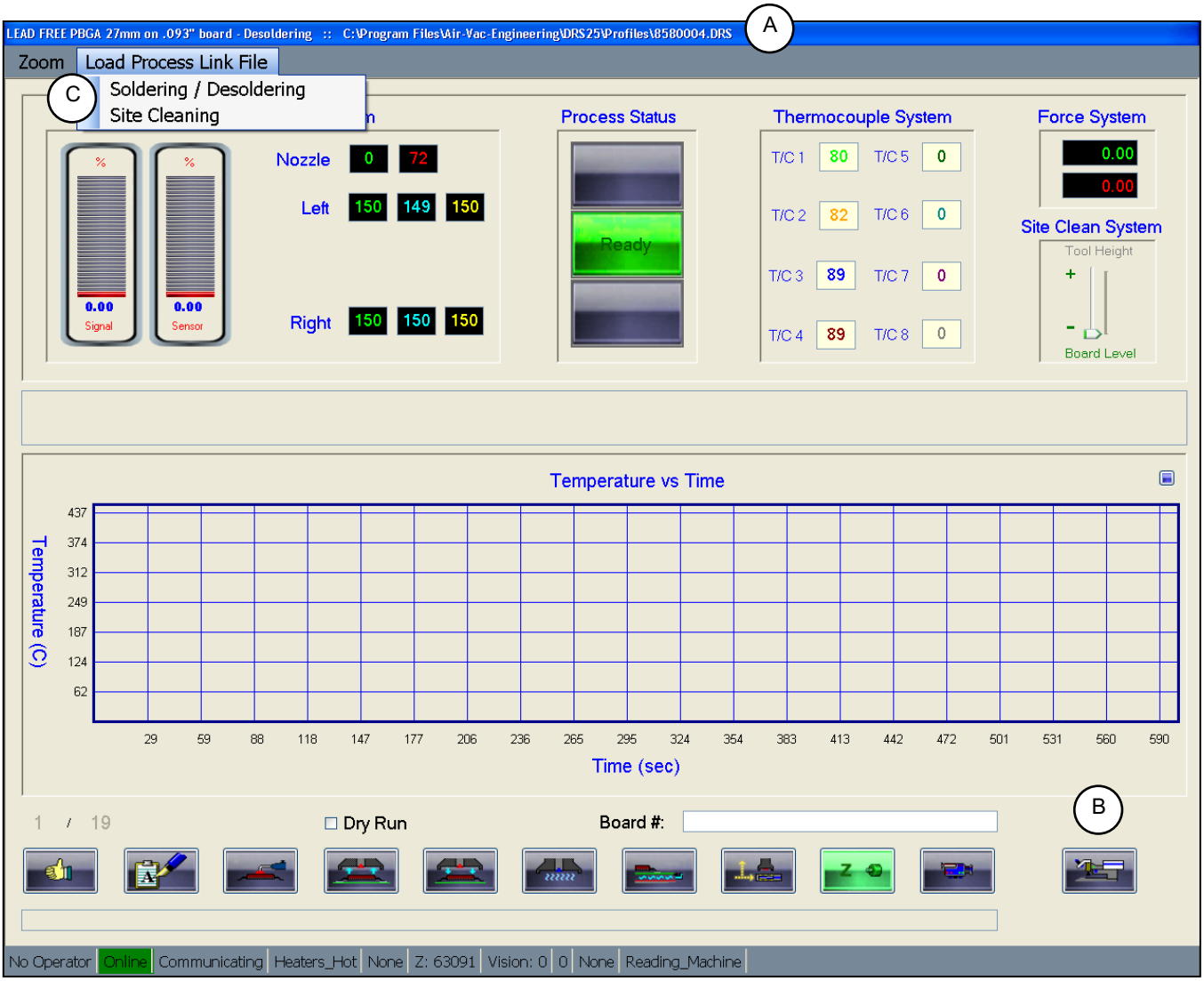
The **Application Notes** page is then displayed for the operator.

- Click **Thumbs Up** to continue to the Run screen after reviewing the setup notes.



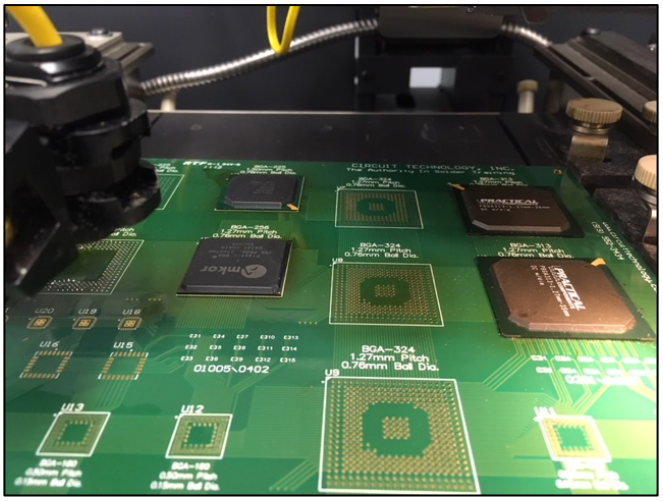
The profile name **(A)** will be displayed at the top of the page.

- Select the **Cycle Start button (B)** to start the profile. Follow all prompts.
- After the component is removed, select **Load Process Link File (C)** for Site Cleaning. Execute and reiterate for Soldering/Desoldering. Reduce the temperature for demo boards.

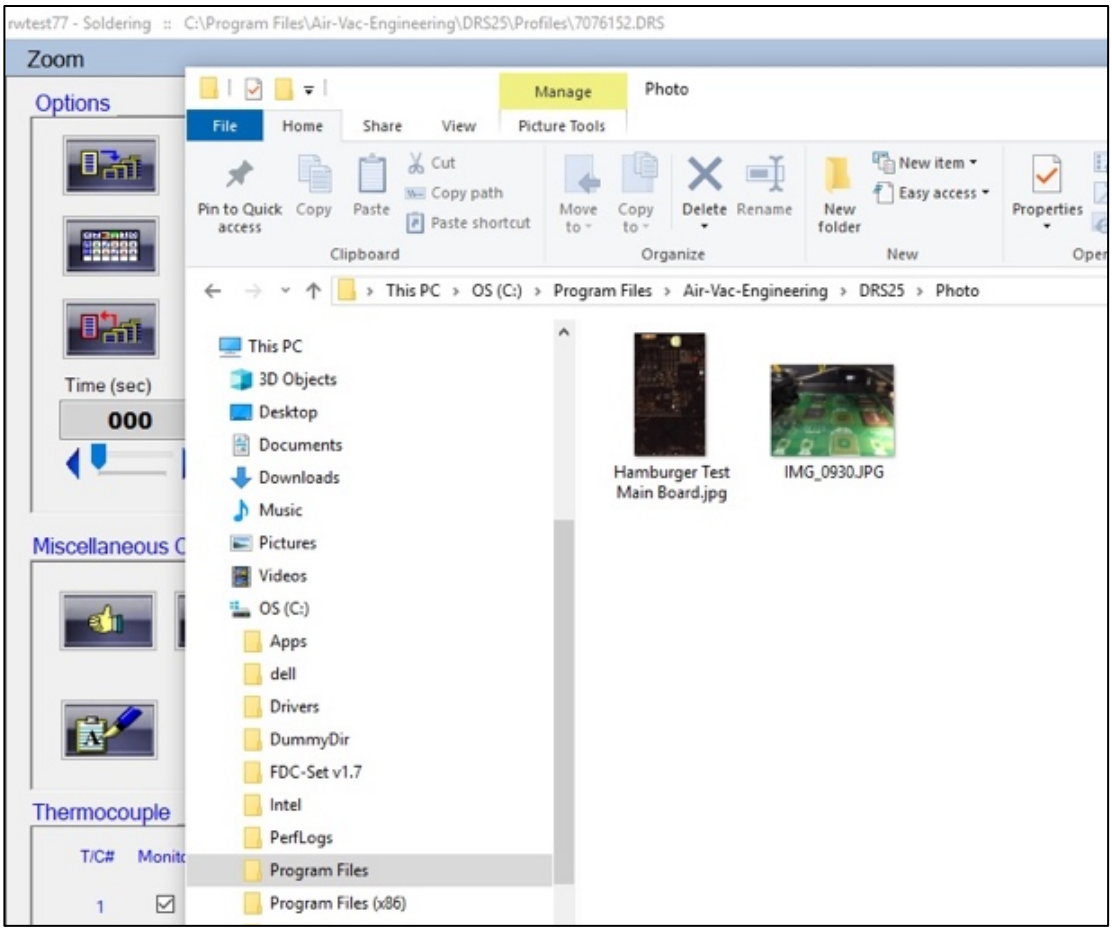


Adding Photos to the Profile.

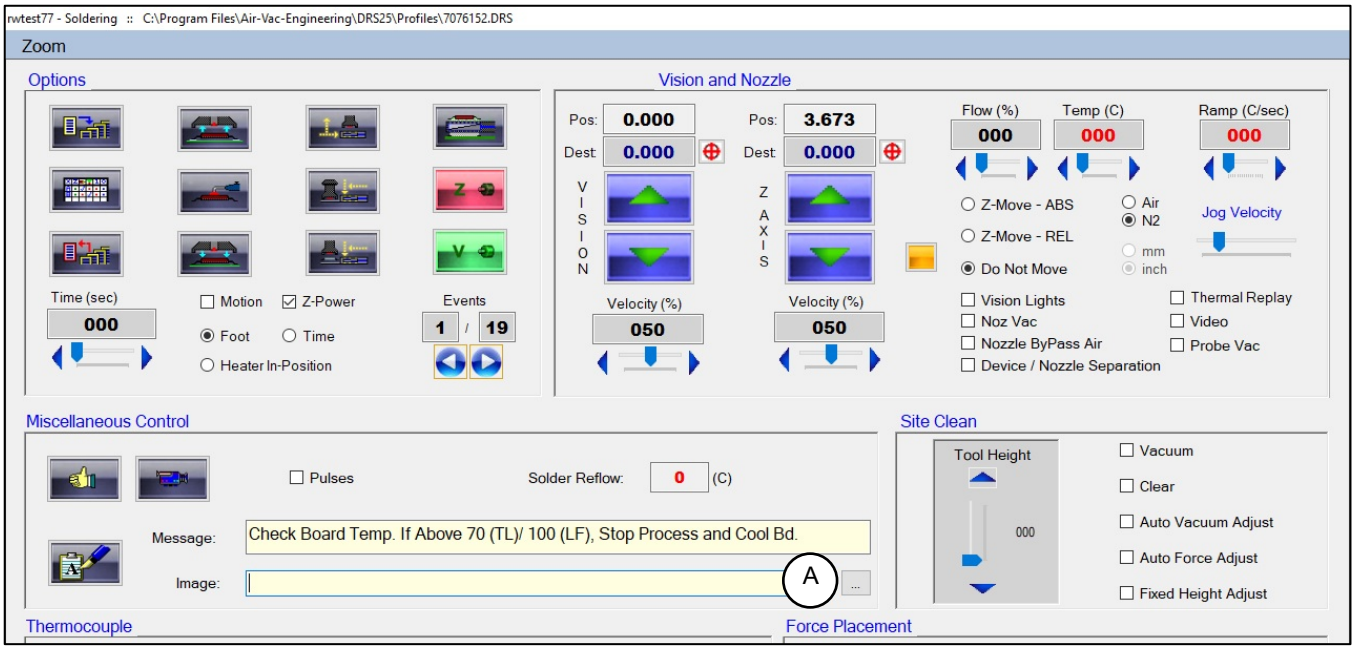
- Take the photo you wish to attach to the profile, store on a memory stick and copy to a photo directory on the computer.



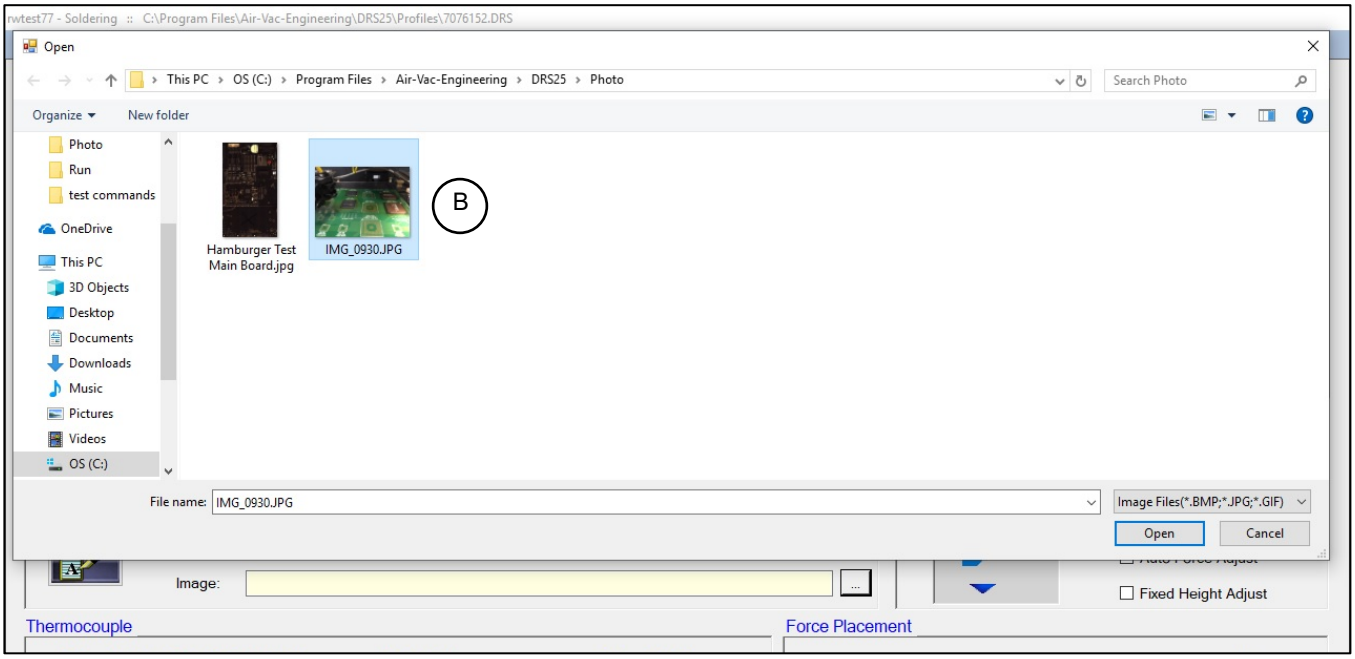
- Go to the photo file on the memory stick and copy and past into the directory **OS (C)/Program Files/Air-Vac Engineering/ DRS25/Photo.**



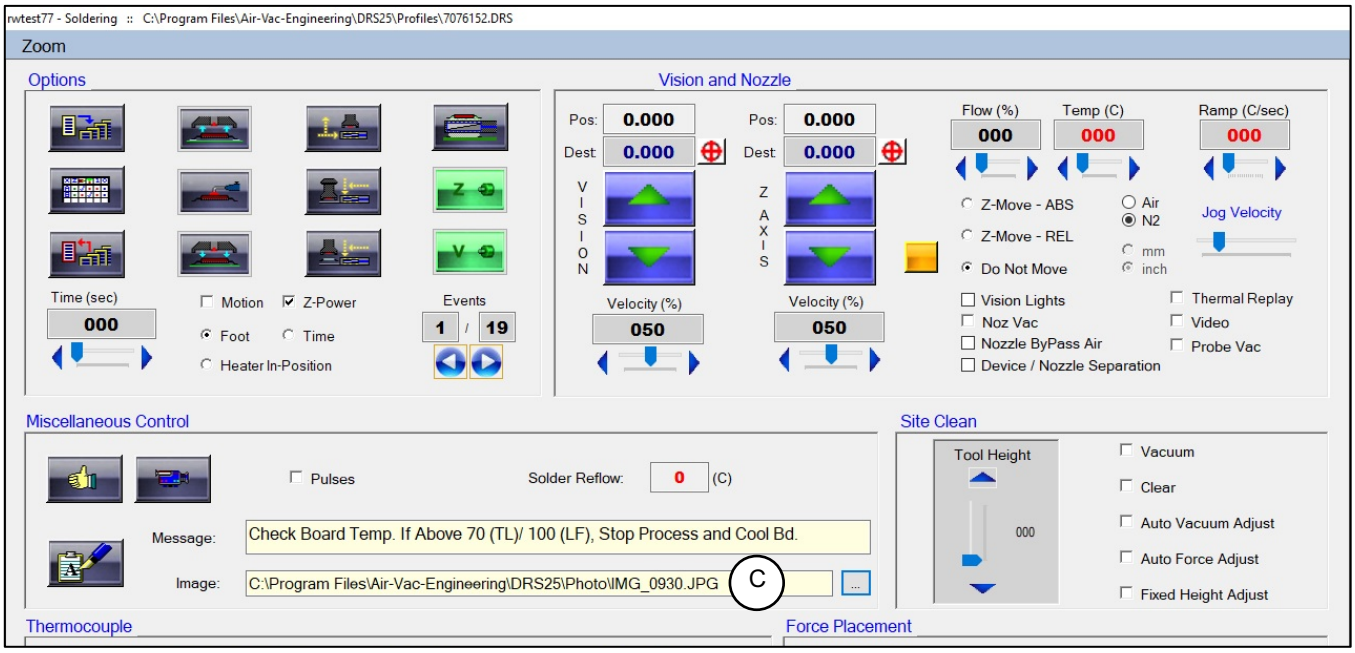
- Go to the Teach Screen of the profile and click on the **Image box (A)**.



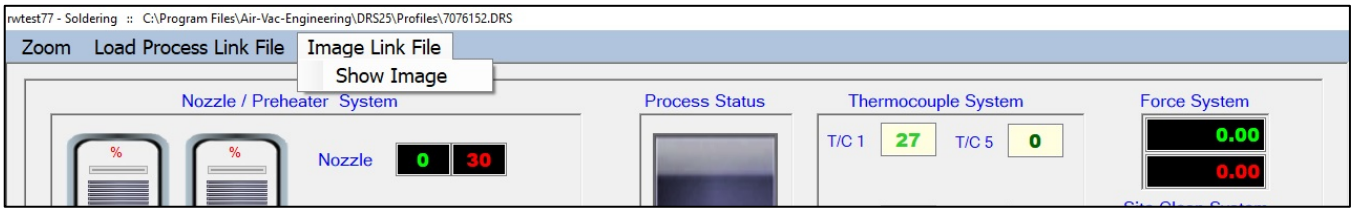
- Click on the **photo (B)** to be attached.



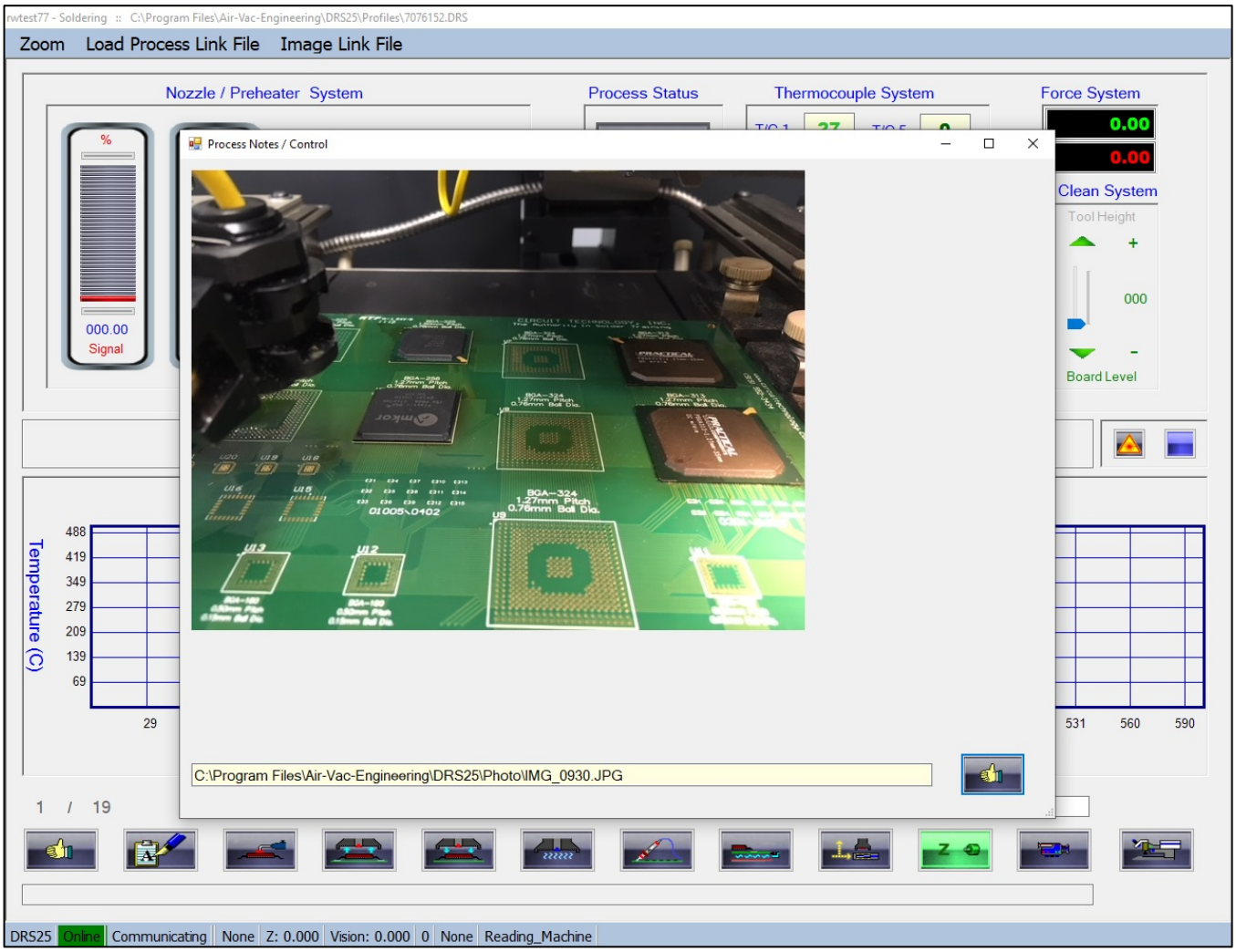
- The **image (C)** will be attached to the program.



- To open the image on the run screen go to **Image Link File/Show Image.**



- The image will appear.



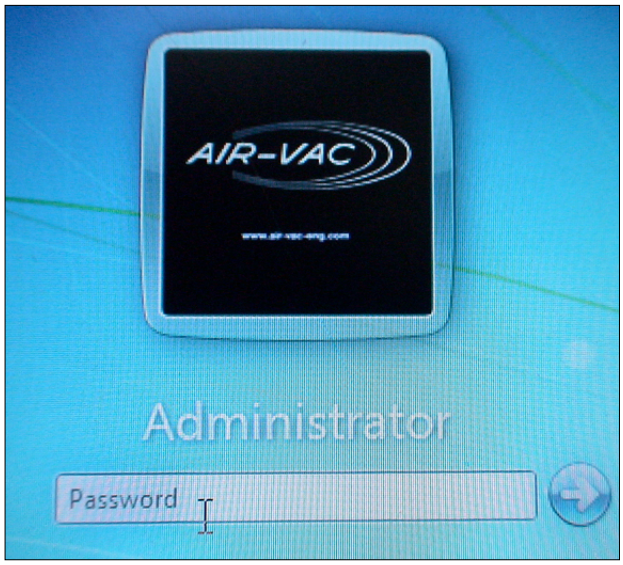
5: Operator Training

5 Operator Training

5.0 Power-Up and Log In

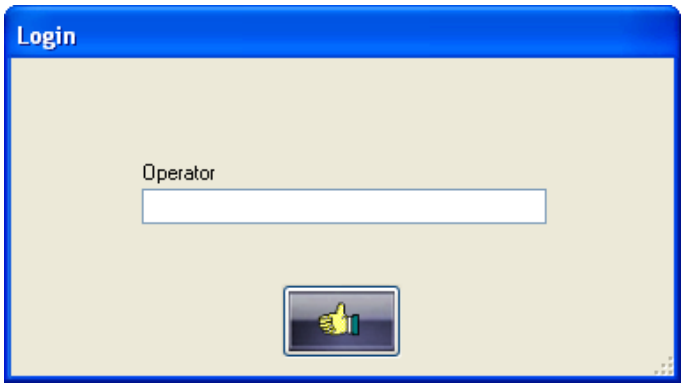
Turn on machine power by releasing the Emergency-Stop if depressed and turning the key to the right. The green machine power indicator light will illuminate.

Turn on the PC and Monitor. The PC will boot to the Administrator screen as shown below. Click on the black Air-Vac Administrator icon. The password is "airvac".

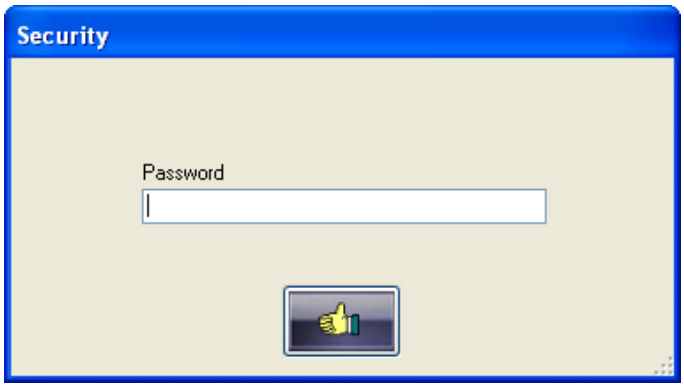


Double click on the AV DRS25.exe icon to start the software.

Enter an operator name and click the Thumbs Up icon to continue. If access is denied, consult supervisor.



The Password screen will automatically appear after the Operator Registration screen.



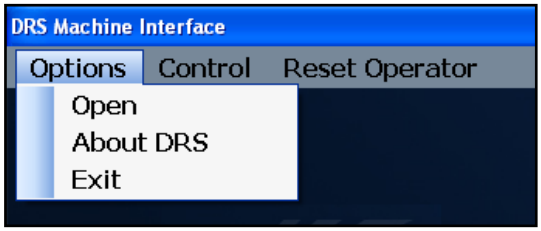
Enter a password and click on the **Up Thumb** icon to continue. If access is denied, consult supervisor. (Passwords are installed and must be correct to access software. Low priority will only allow access to minimal screens. The machine is shipped with "operator" and "no password- blank" under low priority/limited access.)

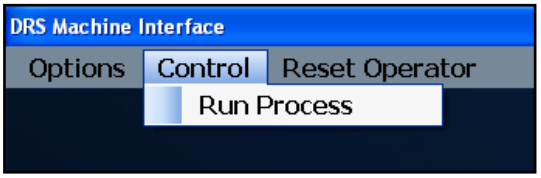
The machine will perform a home operation. Click on the OK button.

5.1 Main Screen Overview

Note:

USING THE LOW PRIORITY PASSWORD LIMITS THE OPERATOR ACCESS TO CERTAIN COMPUTER SCREENS AND RESTRICTS PARAMETERS FROM BEING CHANGED. THIS ALLOWS ALL PROFILES TO BE RUN AS PROGRAMMED AND MINIMIZES OPERATOR RESPONSIBILITY.





5.1.1 Open

The programs are opened/selected by clicking **Open**. A file directory will be shown listing all created programs. See next page for screen.

5.1.2 About DRS

Provides the current version of the software on the machine. Please note software upgrades are available; use the order form on our website at www.air-vac-eng.com.

5.1.3 Exit

Closes the software prior to shutting the machine down.

Note

DO NOT TURN OFF MACHINE PRIOR BEFORE CLOSING THE SOFTWARE.

5.1.4 Run Process

Activates screen to run the program. This screen is automatically displayed after a program is opened and the **Open Profile screen** is presented.

5.1.5 Reset Operator

Allows a new operator to log on.

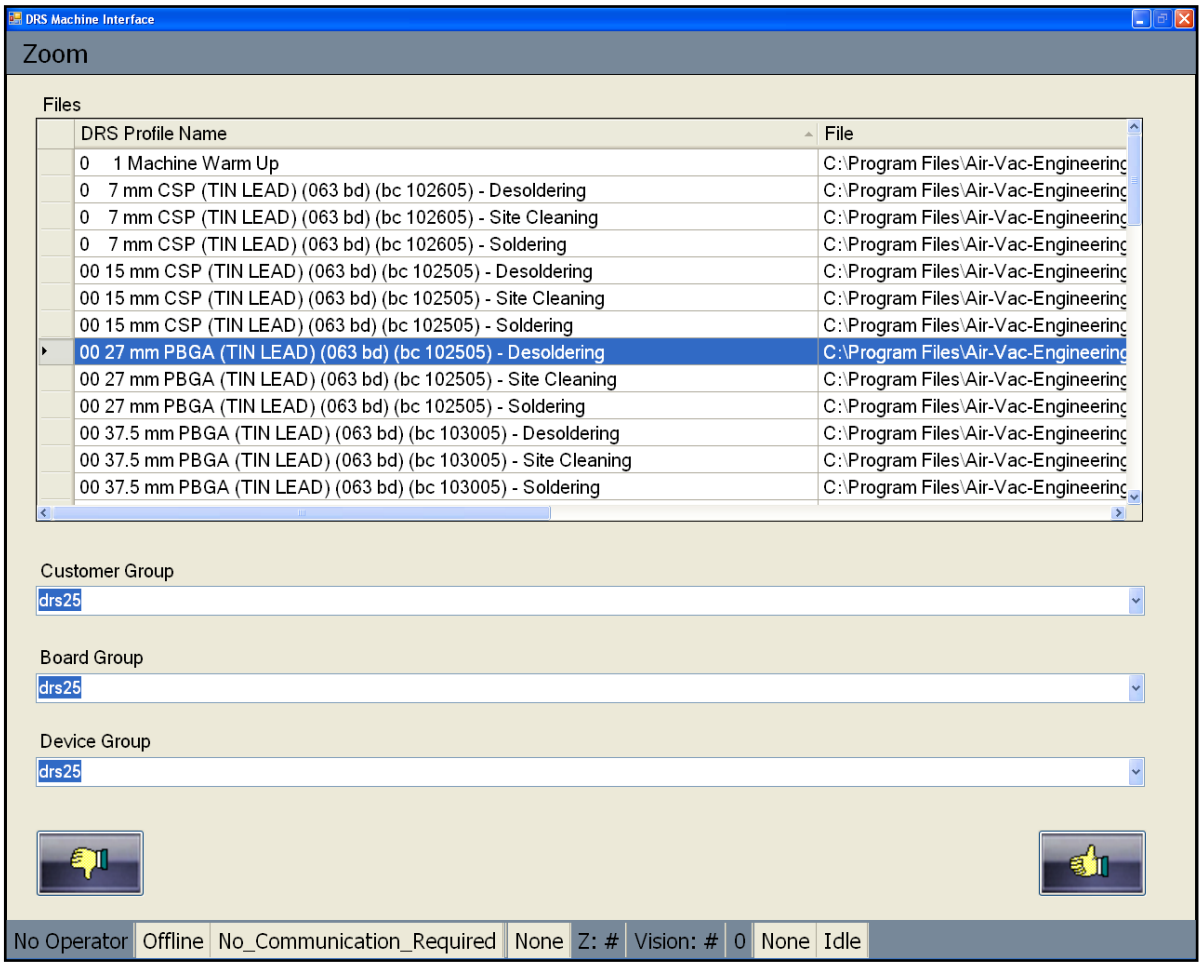
Note

IT IS GOOD PROCEDURE TO PRESS **RESET OPERATOR** WHEN LEAVING THE MACHINE. THIS PREVENTS UNQUALIFIED PERSONNEL FROM USING THE MACHINE (UNDER THIS OPERATOR'S NAME). PROGRAMS AND OPERATOR NAMES ARE RECORDED IN A **HISTORY FILE.**

5.2 Open A Typical Program

5.1.6 Open Profile (All Listings Screen)

Selecting **Options**, then **Open** will present the **Open Profile – All Listings Screen**

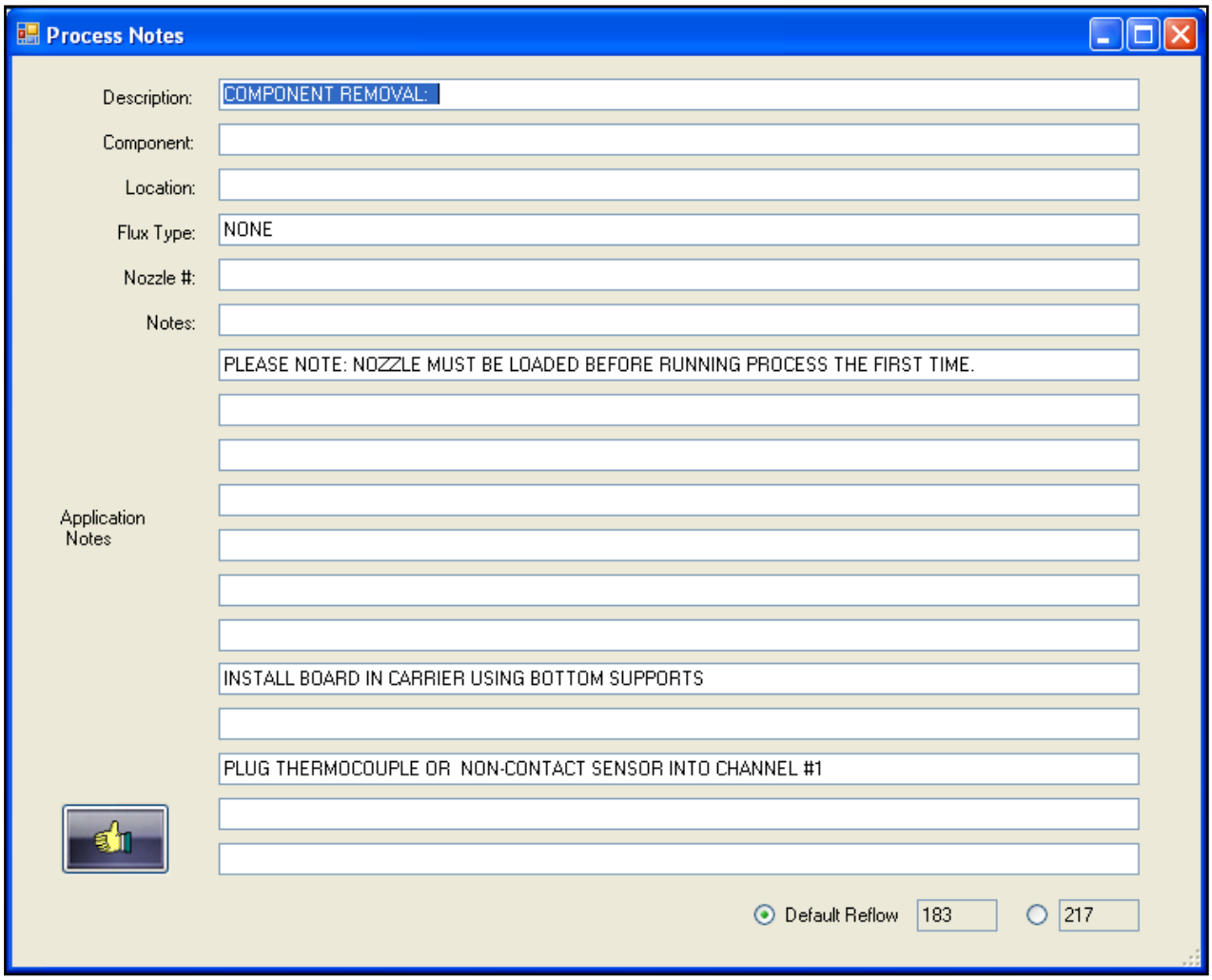


1-Select Group. The operator must select the correct Customer, Board and Device Group directory. Using the Up/Down Arrows at the right side of the each group box to select a BGA removal "file".

2- Select Program. Under files highlight a BGA removal program file (i.e. BGA 27mm: Removal).

3- Click on Thumbs Up icon.

The **Open Profile Note screen** will appear. It provides information prior to running the program.

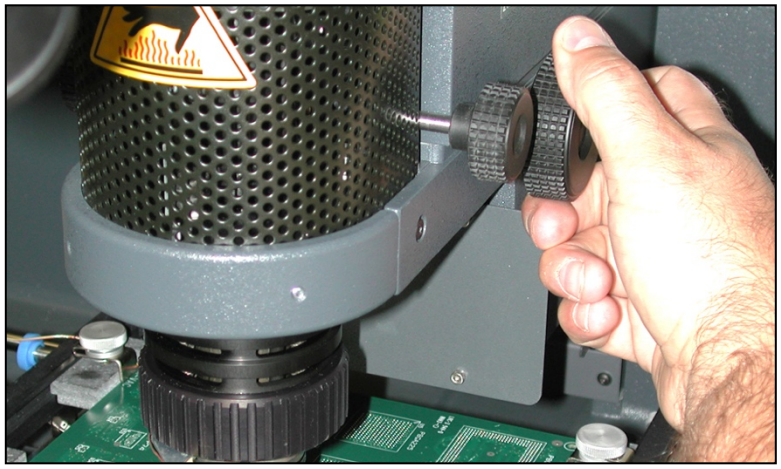


- Follow all instructions on the Open Profile.

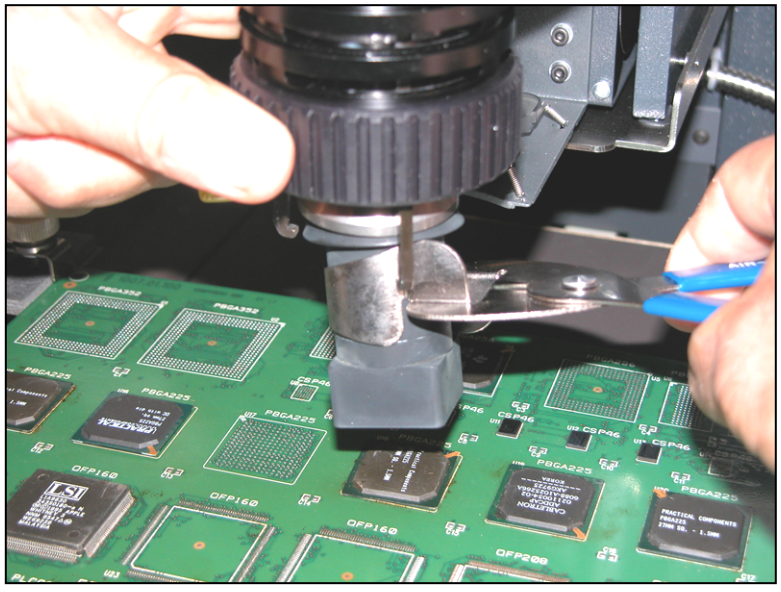
Description	Provides generic program title. For example, BGA225 Component Removal
Component	Describes the device to be reworked. For example, BGA225.
Location	Describes position on the board. For example, U43.
Flux Type	Describes the flux to be used. For example, manufacturers name and flux type.
Nozzle #	The nozzle used. For example, N27EZ27.
Notes	Saves helpful information about the assembly. Provides operator tasks and checks prior to running the program. (Prior to going to the Run Screen.)

- INSTALL NOZZLE
- INSTALL BOARD INTO CARRIER
- POSITION BOARD SUPPORTS
- PLUG IR TEMPERATURE SENSOR OR INTO CHANNEL #1, OR
- PLUG THERMOCOUPLE INTO CHANNEL #1 AND TAPE TO BOARD.

5.1.7 Install Nozzle



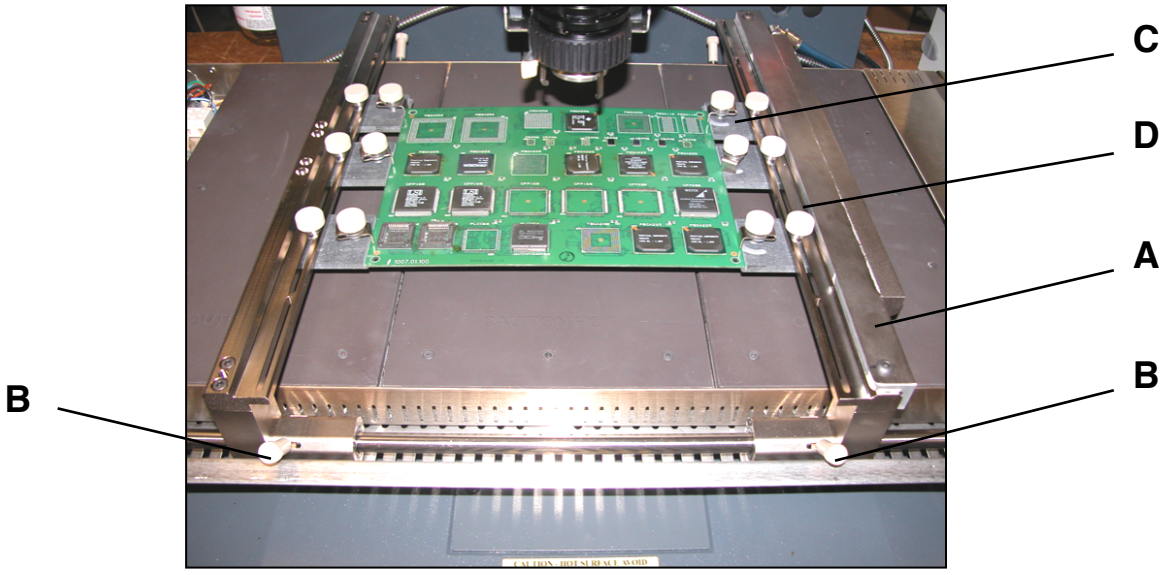
- Use the z-axis knob to lower the heating assembly.



- Rotate the nozzle ring counter clockwise to open nozzle fingers. The nozzle part number is engraved on the side of the nozzle. For BGA's, the nozzle part number will have "EZ" on it.
- Install the nozzle relatively square in the nozzle fingers.
- Rotate the nozzle ring clockwise to close the nozzle fingers.

Note: The nozzle fingers may be hot during operation. Do not touch nozzle fingers.
Note: The nozzle may be hot during operation. Use the nozzle pliers supplied to install and remove the nozzle.

5.1.8 Install Board



- **Board Rails (A)** adjust to board width.

Note: Optional board carrier extensions are available in 24" & 30" widths for wider boards. The standard width is 18".

- Center board rails to allow the board to be centered over the preheater.
- Hint: It may be beneficial to have the smaller side of the board positioned left and right to provide maximum holding stiffness.
- Hint: It may be beneficial to allow left side area for the Temperature Sensor IR probe to be positioned without interference from the vision system extended.

- Loosen the **Carrier Lock Knobs (B)** (left and right) to allow the carrier arms to adjust to the board width. Tighten the carrier lock knobs to secure the board.
- Hint: Tighten on carrier board rail lock knob to secure one side while placing board in **Board Edge Supports (C).**
- Hint: Locking the carrier with the table lock may hold the carrier in place for easier adjustment.

- Adjust the **Board Edge Supports (D)** to enhance the overall board stiffness.
- Hint: Optional fixturing may be required for thin or boards which warp easily.

- Slightly tighten the **Board Edge Supports (C)** to secure the board.

5.1.9 Position Board Supports under BGA

- Pull the carrier to the front.
- Raise the nozzle using the z-axis knob.
- Lock the carrier using the table lock.
- Raise the carrier/board until the carrier catches on the side supports.
- **Note:** The bottom heater will be hot during operation. DO NOT TOUCH THE BOTTOM HEATER DURING OPERATION.
- Move the board supports in a 3-4 inch square pattern under the BGA against the board material.

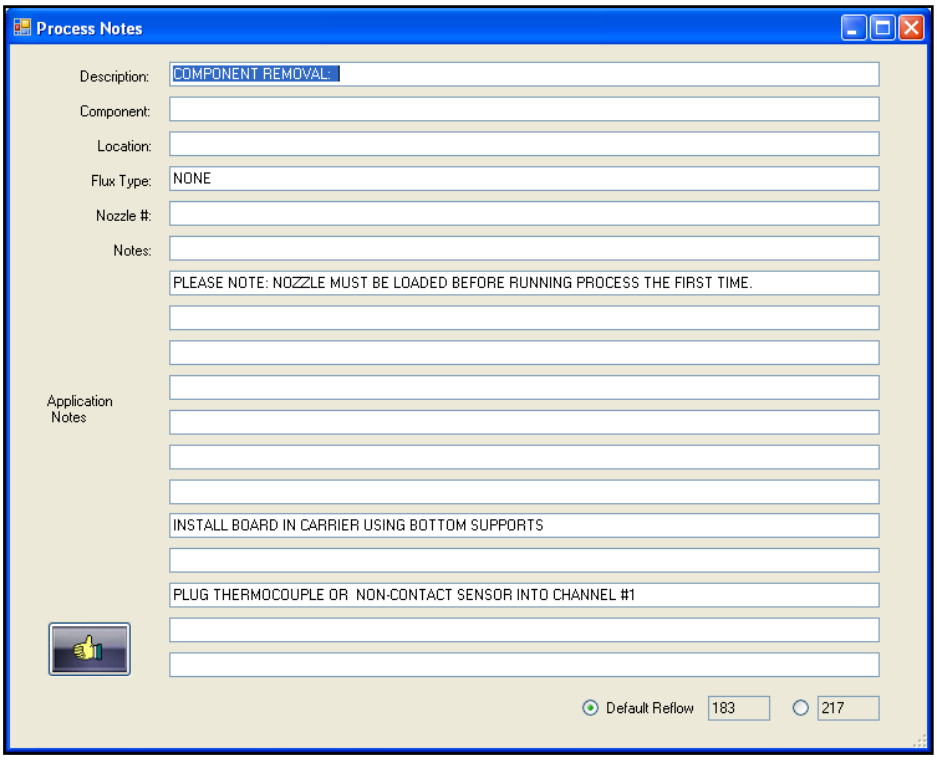
Note: Do not place the board supports against any device. The board will bend when placed against the preheater.
Note: During actual operation the board may flatten by the bottom heat. The board will also expand. The carrier is spring-loaded to allow for expansion.

5.1.10 Plug IR Temperature Sensor into Channel #1 or Plug Thermocouple into Channel #1 and Tape to Board

The program uses the thermocouple or temperature sensor to record board temperature, as the bottom heater heats it. It also controls when the bottom heater in events prior to and following the board preheat event. It must be plugged in for this program.

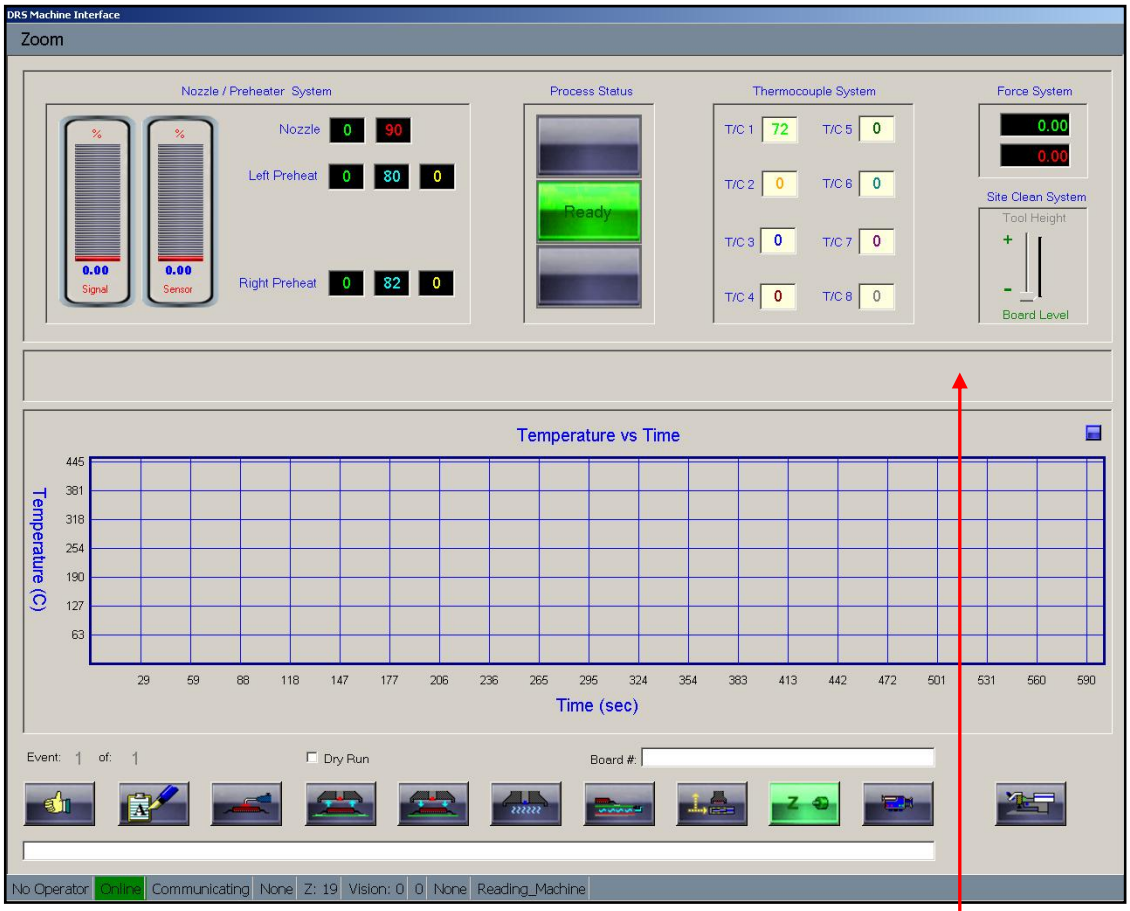
Note: Failure to have a thermocouple or temperature sensor plugged into channel #1 will result in an alarm and will stop in running the program in the Run (next) screen.
Note: The thermocouple or temperature sensor may not be used for certain programs. For those programs an alarm will not occur.
Note: The programmer has the ability to insert or change any notes on the Open Profile Note screen to make procedure easier and with more detail.

- Click on the Thumbs Up icon to proceed.



5.3 Running A Typical Removal Program

The **Run screen** will automatically appear after the Open Profile Notes screen.



The operator's only task is to follow the instructions on the screen.

A program consists of a number of steps or events. The **Message Box** will change for each event to provide instructions.

The information on the screen is only for recording to a history file. The operator is not responsible for process development. Temperatures, times and air flow settings cannot be changed on this screen.

Click on the Cycle Start/Stop icon. The Cycle Start/Stop Button is located at the bottom right side of the screen. Move the cursor to the icon and click.

Click on the stop sign symbol will stop all process activity

Event #1

Install Nozzle

The upper heater moves down.

It is a footswitch event. The operator loads the nozzle.

This is shown at the bottom left side of the Run Screen.

Press the footswitch to continue.

Note: The operator has as much time as needed as this is a "footswitch", not a time-controlled step.

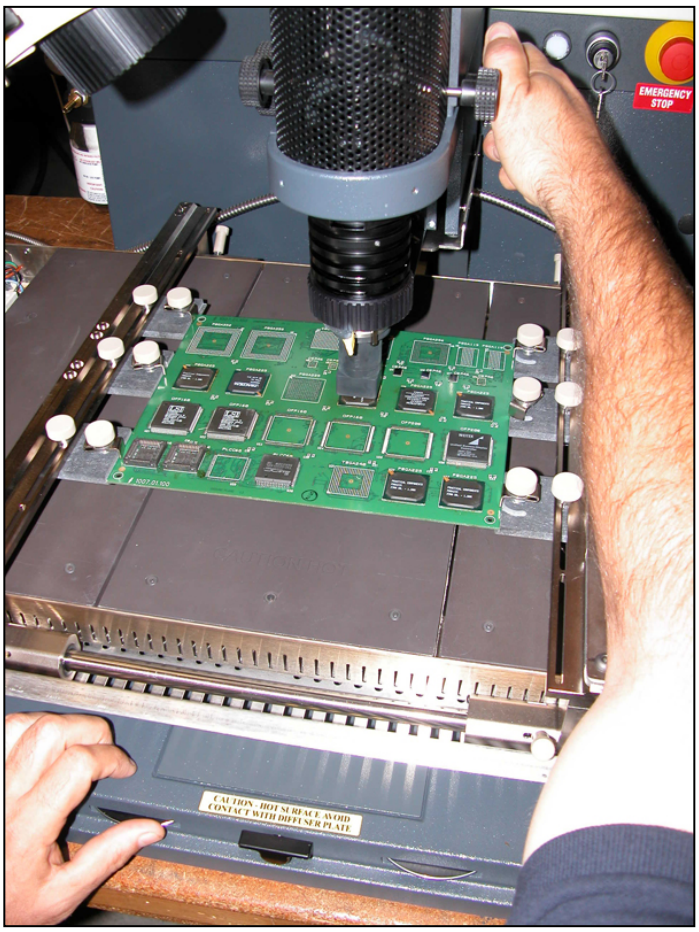
Event #2

Position Nozzle Over Device. O-Ring Should Touch Top Of Device.
Press Footswitch to Continue.

Move carrier to center BGA under nozzle.

Using the z-axis knob lower the nozzle using it slightly touches the top of the BGA.

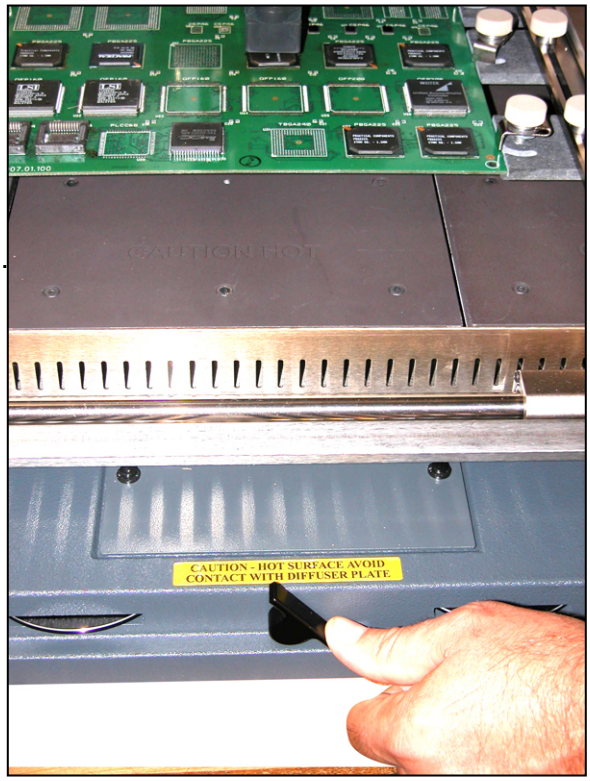
Press footswitch to continue.



Event #3 **Lock Table and Position IR Temperature Sensor.**

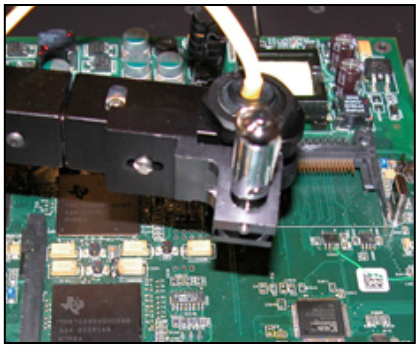
Lock table using the carrier lock knob.

Rotate the temperature sensor over the board.
OR, be sure a thermocouple is taped to the board.



It is a timed event.

This is shown at the bottom left side of the Run Screen.
After programmed timed has occurred,
Event #2 will automatically
be actived.



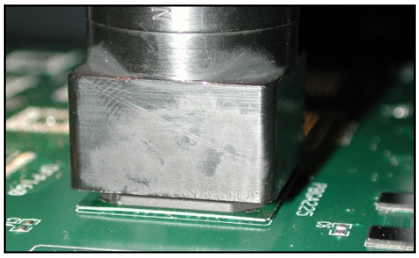
Note: The temperature sensor is meant to read the board temperature. It is important to position the temperature sensor/thermocouple away from the nozzle and not on or over another device or at the edge of the board.

Press the footswitch to continue.

Event #4 **(nozzle automatically retracts)**

There is no operator involvement during this event.

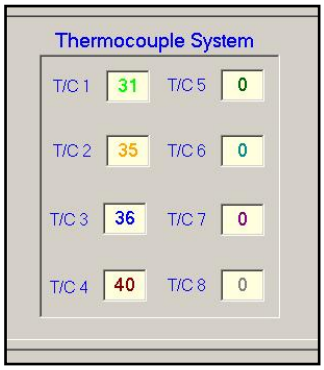
The nozzle automatically moves up .075 of an inch
from the BGA.



Note: A relative move will move the programmed distance from where the operator last leaves the nozzle/z-axis. It is important that the nozzle be positioned at the right height. In this case slightly touching the BGA. During operation the heated air heats the component and exhausts. Space is required for the heated air to exhaust.

Event #5 **(preheat)**

There is no operator involvement during this event.
This is a temperature based event.



The thermocouple or temperature sensor will monitor the board temperature. It is displayed under **Thermocouple System**.

The bottom heater is displayed and will heat the board until the set/programmed temperature is reached.

The next event will occur automatically when the preheat temperature is reached.

Note: Board preheating does time will vary depending on the initial temperature of the bottom heater, board and machine.
Note: Board preheating temperature may be programmed differently for various assemblies.

Event #6-9 **(presoak, soak, ramp, reflow)**

There is no operator involvement during this event.
The programmed heating of the BGA is automatic and is based on the thermal profile developed by the engineer in Profile Tutor.
This is a timed event. The total time is displayed at the bottom left of the Run screen. These segments are broken up into separate events.

Event 10

There is no operator involvement during this event. The nozzle vacuum is turned on.

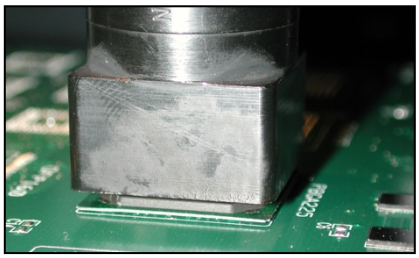
Event #11 **(vacuum-based removal)**

There is no operator involvement during this event.
The nozzle will automatically move (slowly) to the BGA with the nozzle vacuum activated.
The DRS25 has a vacuum sensor to sense the BGA, stop the Z-motion and automatically go to the next event.

Event #12 **(relative move)**

There is no operator involvement during this event.

The nozzle vacuum will be on to the hold the component.
The nozzle automatically move up to approximately 3/16 of an inch from the board.

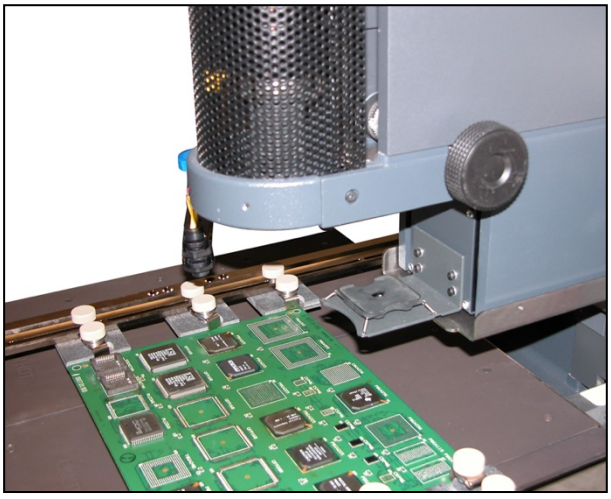


Event #13

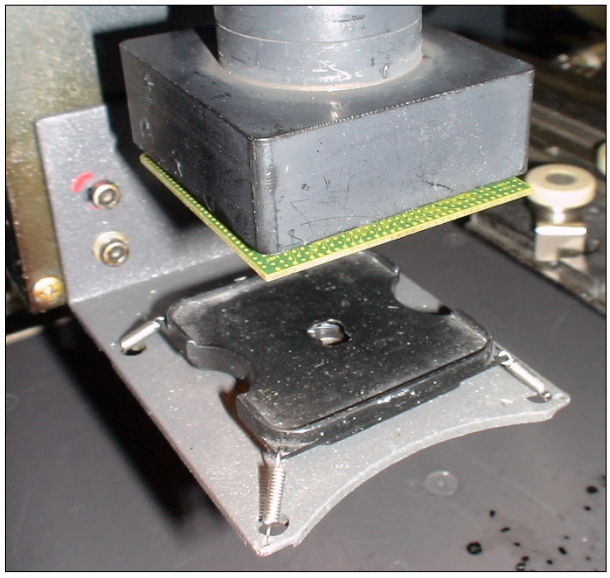
There is no operator involvement during this event.

The nozzle vacuum will be on the hold the component.

The nozzle will automatically move up to component drop off position.



Event #14



There is no operator involvement during this event.

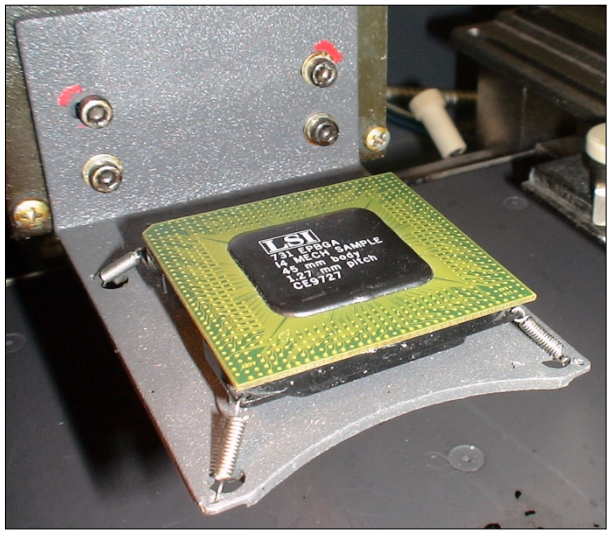
The nozzle vacuum will be on to hold the component.

The component unload/load platform will automatically extend. The nozzle will move down to just above the unload/load tray. The universal insertion tool should NOT be in the unload tray.

Event #15

(component drop off)

There is no operator involvement during this event.



The nozzle vacuum will be turned off and low pressure air will be applied (to insure the component drops).

Event #16

Remove BGA

This is a timed event (5 seconds). The operator is to remove the BGA.

Note: The event may be changed to allow more time for the operator to remove the part. Or, this event may be changed to footswitch based allowing the operator as much time as required.

The nozzle moves up to the highest position.

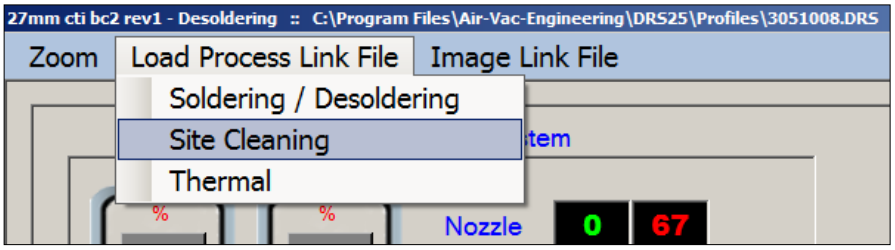
Event #17

(process complete)

There is no operator involvement during this event.

At the end of the removal process the operator has three options.

- Select the "Load Process Link File" for the Site Cleaning Program.

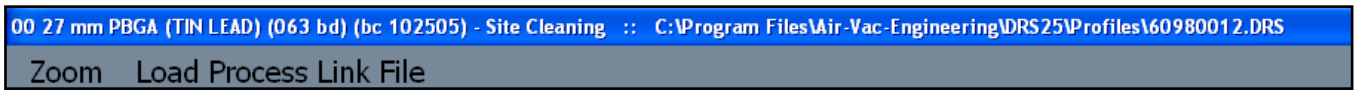


- Press the Start/Stop Cycle icon to start another Removal cycle.

- Press the Thumbs Up icon to exit the screen

5.4 Running A Typical Site Cleaning Program

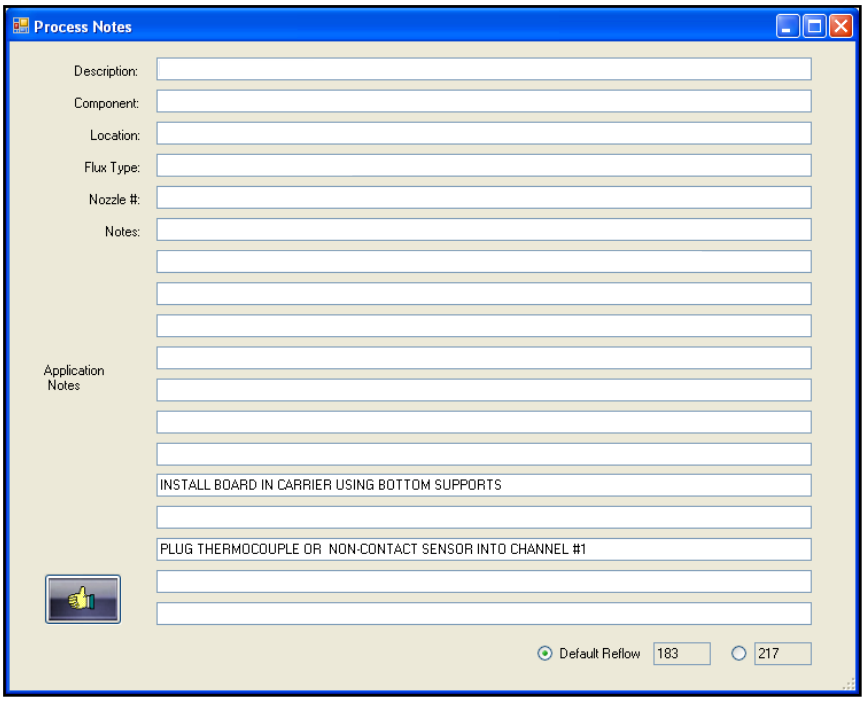
After the "Load Process Link File" is selected the profile name at the top of the Run Screen will change to the Site Cleaning Program.



To review the Application Notes for the Site Cleaning Program select the Application Notes icon.

The **Open Profile Note screen** will appear. It provides information prior to running the program.

It is important that the site cleaning nozzle be clean. See Maintenance Section.



Select the Cycle Start/Stop icon to begin the site cleaning program.

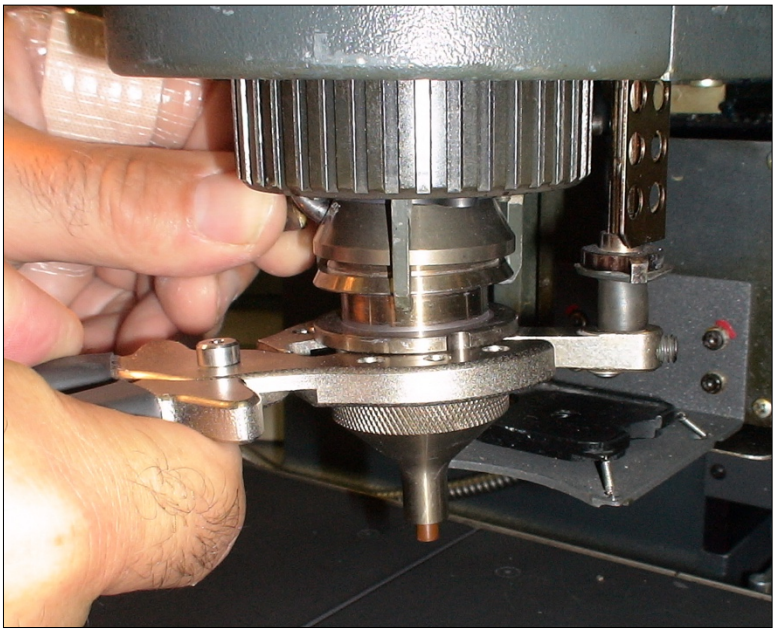
Process Hints:
Running the site cleaning program immediately after the removal program will take advantage of the board being preheated. Less time will be required to heat the assembl

Event #1

Remove Nozzle, Caution Hot, Install Site Cleaning Nozzle, Unlock table.
Press Footswitch to Continue.

The BGA nozzle will automatically be lowered.

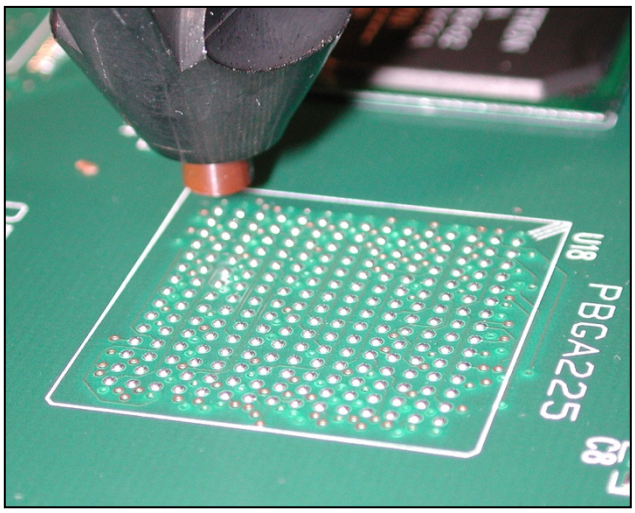
- Use the nozzle pliers supplied with the machine to hold the nozzle. Rotate the nozzle ring counterclockwise to open the nozzle fingers and remove the BGA nozzle.
- Install the Site Cleaning nozzle in the same manner. Be sure that the Site Cleaning vacuum cup interfaces properly with the vacuum stalk as shown. Rotate the nozzle ring clockwise to close the nozzle fingers.



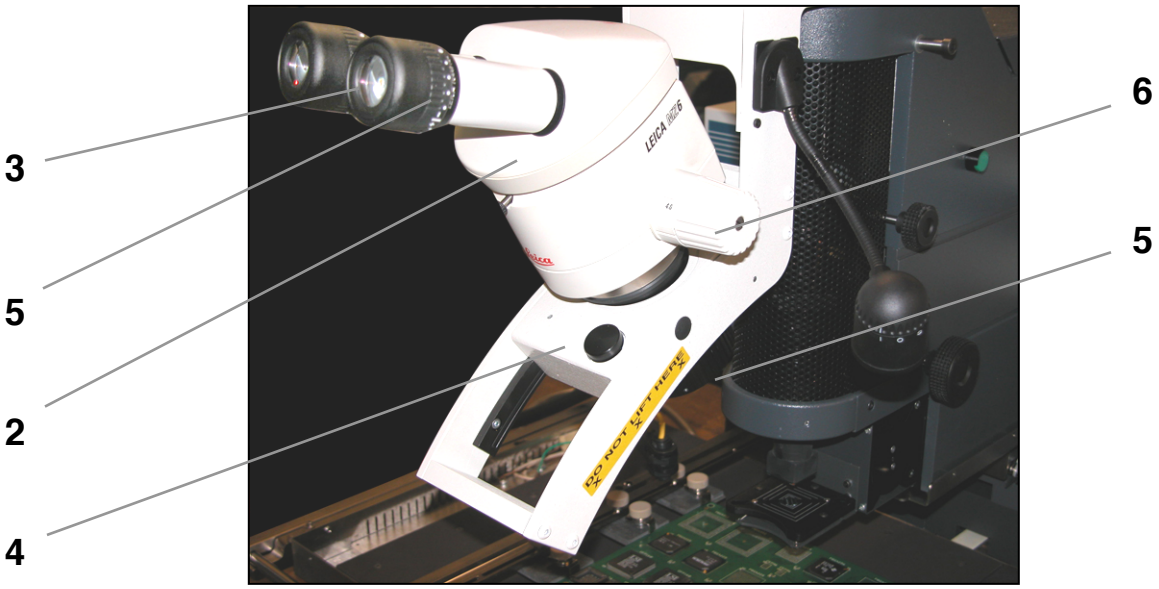
Event #2

Position Nozzle Tip At Back Left Corner of Site, Focus Microscope.
Press Footswitch to Continue

- Using the z-axis knob, lower the nozzle until the tip is just above the solder at the rear left corner of the site.

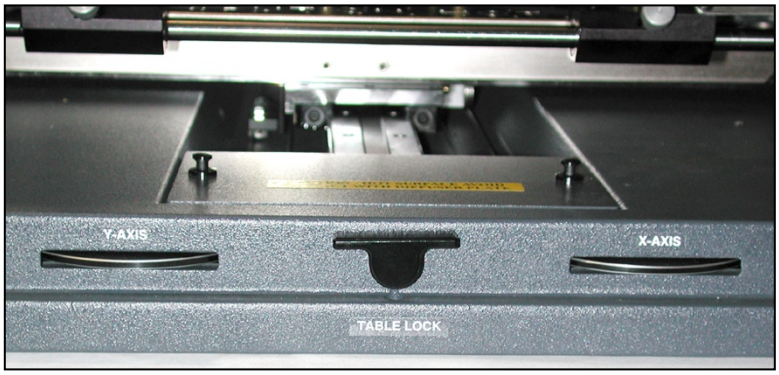


Use the microscope to provide the best possible viewing for the operator. It is important to have the operator ready to use the site cleaning nozzle prior to heat being applied to the board.



- Tilt the microscope until the site cleaning tip is in the center of the microscope viewing.
- Adjust oculars to operator.
- Lower (rotate) microscope to the lowest position to allow a better viewing angle.
- Focus microscope using the focus ring and adjustable eyepieces.
- Adjust the zoom lens to the maximum setting for magnification of the site cleaning operation. Refocus as needed.
- Use the x and y thumb wheels of the carrier to move to the left corner of the site under the site cleaning tip.

Option: A Direct View camera may be provided for operator viewing on the computer screen.



Event #3

Apply Paste Flux On Pads. Position Temperature Sensor (nozzle preheat)

The nozzle will automatically move up.

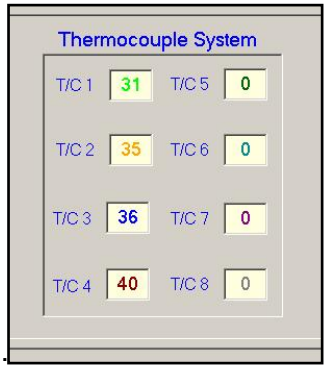
This is a timed event (75 seconds) with the nozzle being heated during this time as the operator applies flux and positions the IR Sensor.

- Apply flux paste generously over the entire site. Do not use a low solids flux.

Note: The IR Sensor is meant to read the board temperature. It is important to position it 2-3 inches away from the rework site on an open area of the board.

Event #4

(preheating board)



There is no operator involvement during this event.
This is a temperature based event.

The IR Sensor will monitor the board temperature. It is displayed under **Thermocouple System (TC 1)**.

The bottom heater is displayed and will heat the board until the programmed board temperature is reached.

The next event will occur automatically when the preheat temperature is reached.

Note: Board preheating time will vary depending on the initial temperature of the bottom heater, board and machine.

Board preheating takes time but it is critical for thermal repeatability.

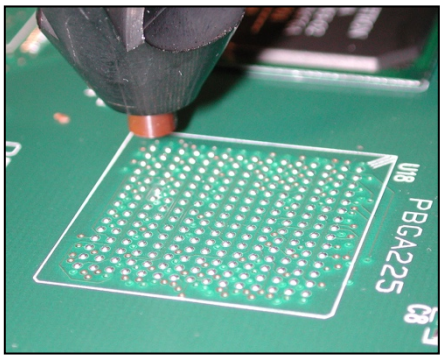
Event #5

(heating site area)

There is no operator involvement during this event.
This is a timed event.

The nozzle will automatically be lowered to just above the board.

The heated air will melt the solder.

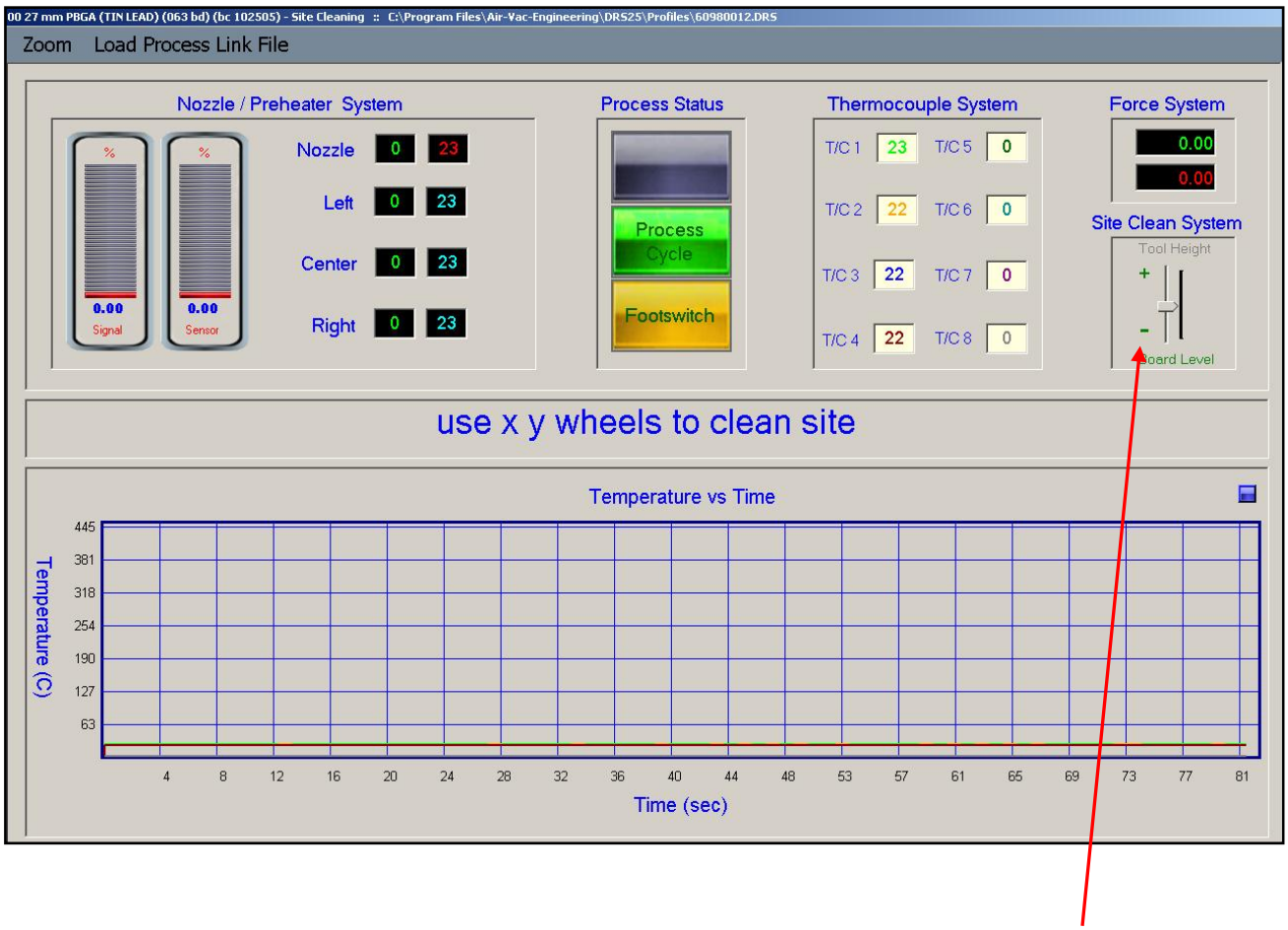


Event #6

(Please wait until tip touches board – auto height adjust)

There is no operator involvement during this event. This is a timed (10 seconds) event. The site cleaning vacuum will automatically be activated.

The tip will adjust up and down according to programmed settings. The distance from the bottom of the tip to the board may be different on various boards as determined by the programmer.



Note

The overall controlling height (auto adjust mode) of the site clean nozzle can be adjusted during a process cycle. The site clean slide bar can be used to raise or lower the auto height position.

If the nozzle is moving to close to the board, move the slide bar slowly upwards until the overall position is optimized.

If the nozzle is moving to far from the board (not collecting enough solder), move the slide bar slowly downwards until the overall position is optimized.

IMPORTANT: If the Site Cleaning Nozzle is not reflowing the solder on the pads, stop the process immediately and contact a supervisor.

Event #7

Use X,Y Wheels to Clean Site. (press footswitch when finished)
Press Footswitch to Continue

Use the x and y fine adjustment wheels to move the board under the tip. The solder will be vacuumed into the nozzle. It is advised to start at the rear left corner and move the x wheel only. The table will move along the rear row of pads. The large tip can remove approximately 3 rows of solder.

This is an important portion of BGA/CSP rework as damage is most likely to occur if solder mask or pads are damaged. It is important that the operator:

- Not leave the tip at an area for a long time.
- Not move the tip until the solder is definitely melted as damage may occur to the pads. Do not move the tip to areas in which the operator cannot see.

Event #8

There is no operator involvement during this event.
The site cleaning nozzle moves up.

Event #9

Inspect Site - If Touch Up Is Necessary Flux Site and Reheat.
Press Footswitch to Continue

After raising the nozzle moves, the operator can clean the site with additional flux and a brush. The nozzle can be manually lowered to touch up areas of not completely removed solder. The pads should be flat. The pads and via's must not have the solder mask removed before the soldering process.

Note: There are various tip sizes and fittings to allow site cleaning on very small area's and on boards with tall devices. Consult supervisor if you believe a different tip would work better.

Event #10

(board and machine cool down)

This is a timed event (60 seconds).
There is no operator involvement during this event.
The upper heater heater temperature is set to 100C. The lower heating system temperature is turned off.
The carrier air is turned on (low flow).

Event #11

Clean Site and Inspect

Operator should clean the pads and inspect that the pads are cleaned correctly (flat). Operator should inspect site and area prior to component replacement (soldering process).

Event #12

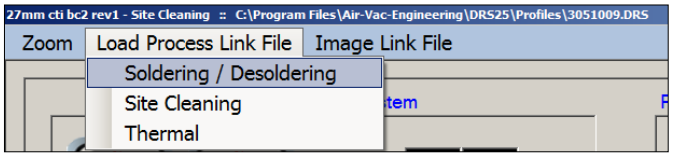
Remove Site Clean Nozzle and Reinstall Nozzle
Press Footswitch to Continue

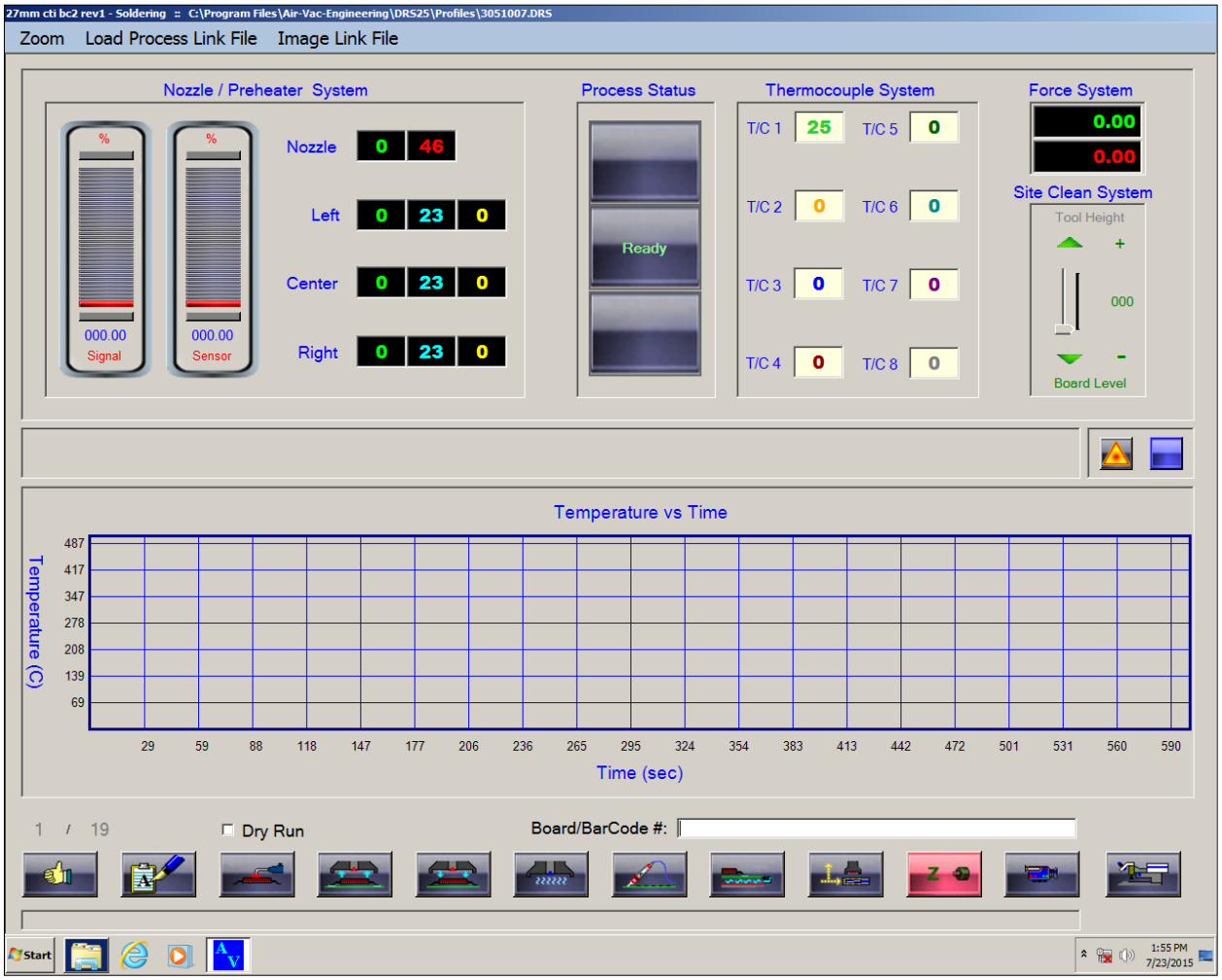
Caution: The Nozzle is Hot. Use the Nozzle Pliers to remove nozzle.

Note: It is important to place the Site Cleaning Nozzle in the Site Cleaning Holder. If the site cleaning nozzle is left on its side after a site cleaning process solder may clog the tool. Reference: Maintenance Section.

Event #13

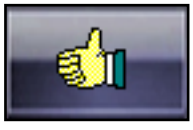
After the site cleaning process is complete, select the "Load Process Link File" for the Soldering Program (or Removal Program).





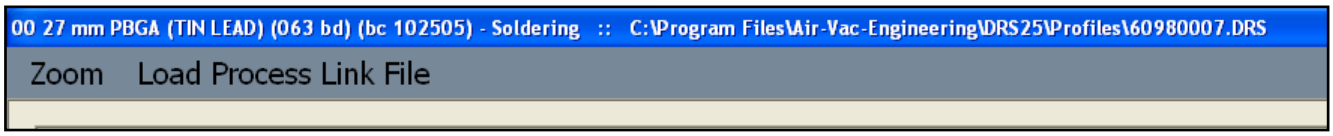
- Click on the Start/Stop Cycle icon to start another Removal cycle.

- Click on the Thumbs Up icon to exit the screen



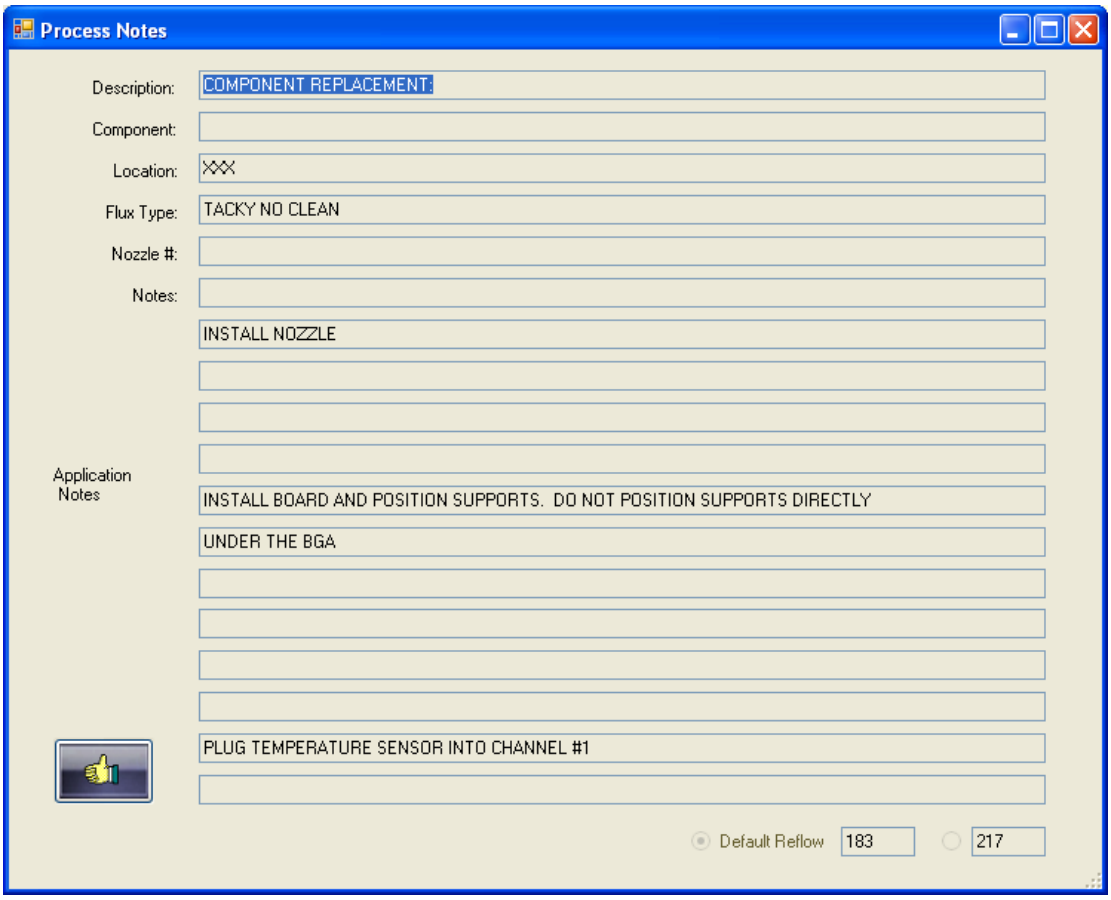
5.5 Running A Typical Soldering Program

After the "Load Process Link File" is selected the profile name at the top of the Run Screen will change to the Site Cleaning Program.



To review the Application Notes for the Soldering Program select the Application Notes icon.

The **Open Profile Note screen** will appear.
It provides information prior to running the program.



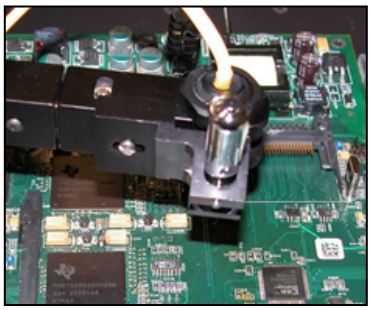
- Click on the Thumbs Up icon to proceed to the Run screen.

- Select the Cycle Start/Stop icon to begin the replacement.

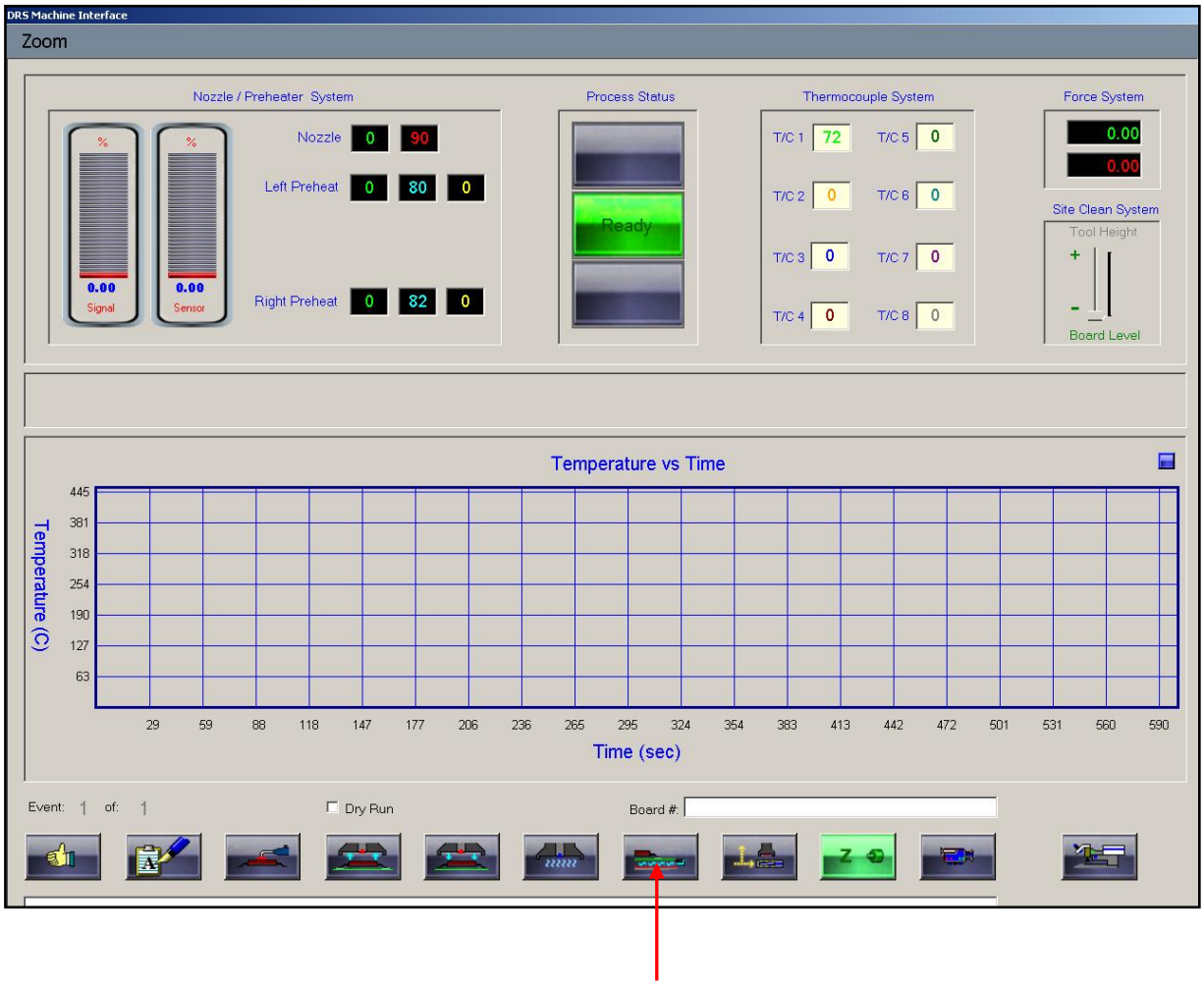
Event #1

Check Board Temp. If Above 70 (TL)/100 (LF) Stop Process and Cool Board.
Press footswitch to continue**.**

It is important that the board be at the same conditions as when the program wa initially created to insure process repeatability.



Position the IR sensor over the board. If a thermocouple is used, use Kapton tape to attach it to the board (material).
Note: The IR sensor is meant to read the board temperature. It is important to position the sensor/thermocouple 2-3 inches away from the nozzle on an open area of the board



Note

If the starting board temperature is too high, the operator can activate the board cooling option prior to starting the process.

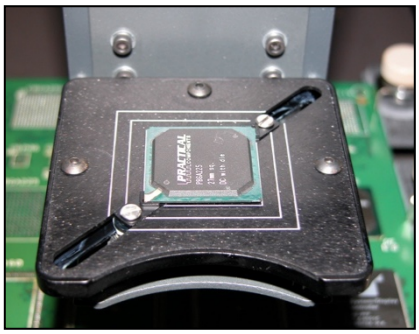
Event #2

It is a timed event – 30 seconds.

Event #3

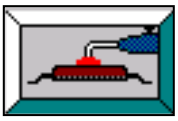
Place Device Into Loading Tray, check polarity.
Press footswitch to continue**.**

The loading tray will move forward to the operator.
Place component into loading tray.



Note: Component orientation (polarity) must be correct.

Note: The parts handling vacuum will turned on. If the Component is delicate or it is company policy not to have operators handle components with their fingers, theparts handling vacuum probe can be used.



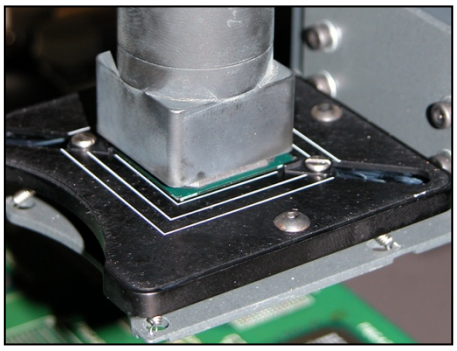
Note: If component tray is not purchased, this event should be changed To allow operator to insert component manually under nozzle.

Note: If component tray is not purchased, event should be changed to no nozzle movement and time to allow operator to move hand.

Event #4

(component pick up).

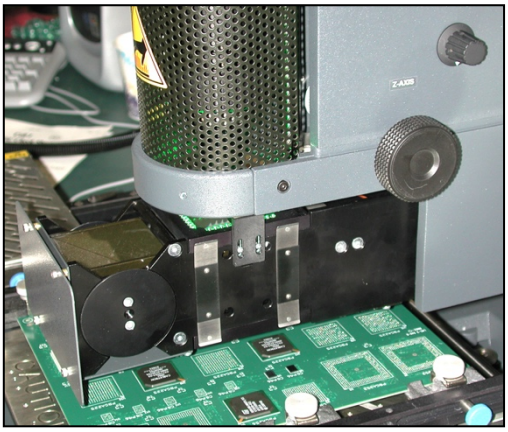
The nozzle will automatically move to the component pick up position and the nozzle vacuum will be turned on to pick the BGA.



Event #5

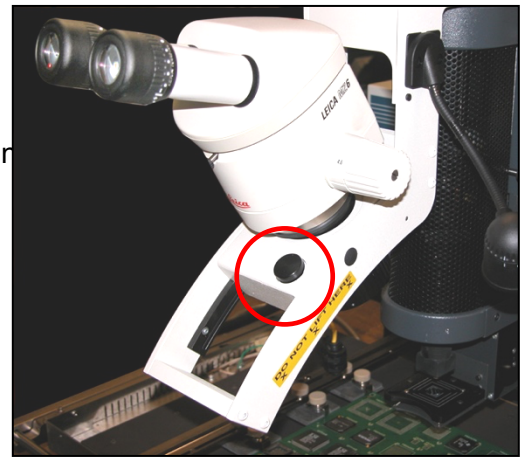
Align Device, Lock Board Carrier
(Press Footswitch to Continue)

The vision system will automatically be presented.



This is the most important step for component replacement. Please spend adequate time to align components properly.

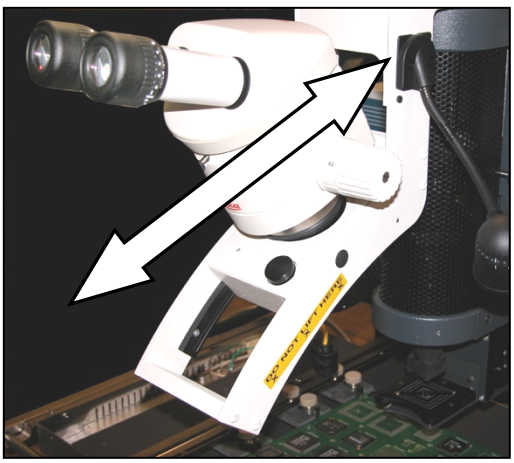
1 - Check that the microscope is in the top (highest) position. Press the microscope slide lock. Push the microscope along the track to the highest position.



Note: Lowering the microscope for alignment will result in placement error due to incorrect viewing angle during alignmer

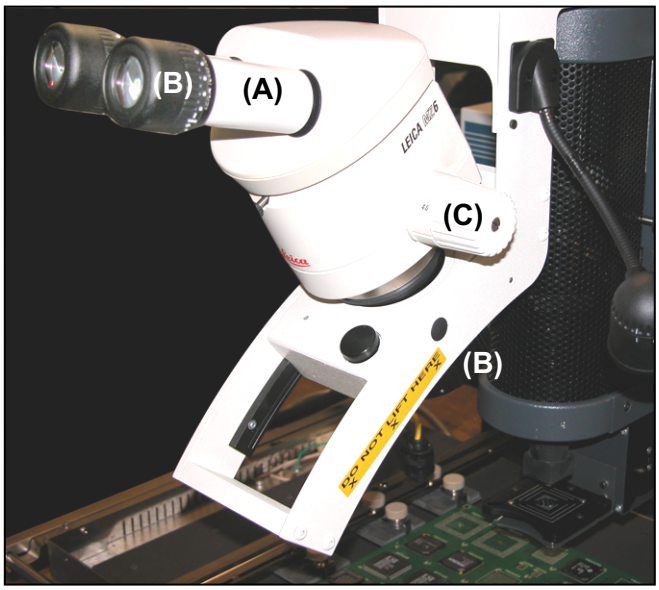
2 - Use the x/y adjustment wheels of the table to move the board so that the leads and pads are in the field of view.

3 - Tilt the microscope, as required, to see the site and BGA in vision system.



4- Adjust the oculars to operator **(A)**.

Focus microscope <u>on the pads of the board</u> using the focus ring and adjustable eyepieces **(B)**.



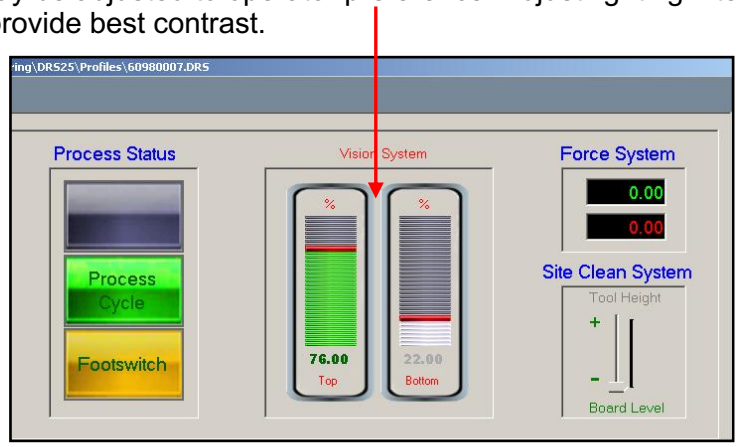
5 - Adjust the zoom lens **(C)** to increase magnification to enhance viewing. Refocus as required.

Note: The programmed vision height may not be correct. With the microscope focused correctly for the pads the BGA may be out of focus. The BGA leads/balls must be at the same level/plane as the pads. The operator has the ability to adjust the BGA height position. Click and toggle the Z-axis enable button to red. The z-axis is now de-powered and free to move.

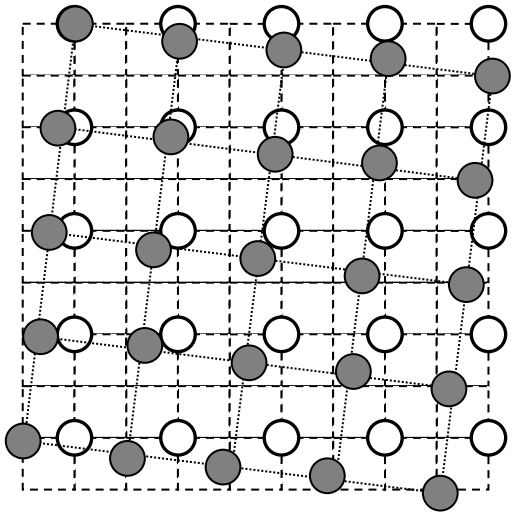
Using the z-axis knob, slowly raise or lower the nozzle until the component leads are in focus. The leads/balls will appear to be at the same "height" as the pads of the board. If the nozzle is too high or low they will appear to be above or below the board pads.

Click and toggle the Z-axis enable button to green to lock/power the z-axis motor.

Note: The LED Lighting may be adjusted to operator preference. Adjust lighting intensity of BGA (top) and/or board (bottom) to provide best contrast.

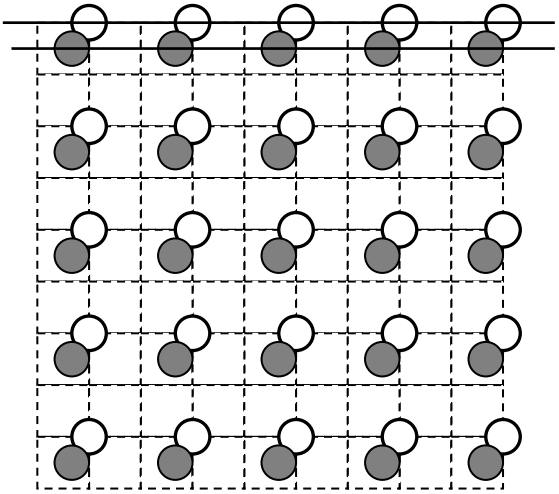


Align top left lead to pad using the x and y adjustment wheels to align BGA to pads.



Each lead must be centered to each pad. Check top right side lead to pad alignment. If the top right side is aligned, theta adjustment is required. This is not uncommon. Multiple x, y and theta adjustments are normal. Use the theta adjustment to make correction until leads are in a horizontal row.

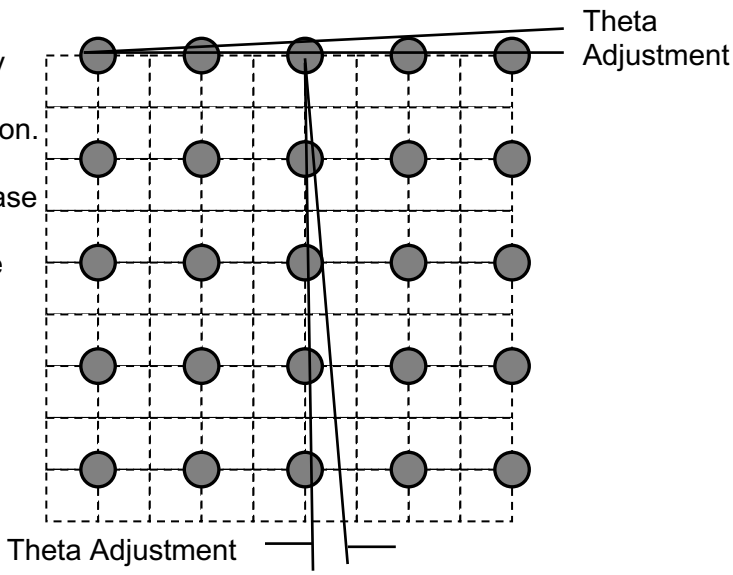
Balls must be parallel to pads.



Finalize the alignment by readjusting with the x and y fine adjustment wheels. Check alignment of top row and bottom row to insure correct theta, x and y position.

Option: Use zoom lens at maximum setting to increase operator alignment accuracy. Viewing under high magnification may reveal minor errors not seen while aligning the entire device. Tilt the microscope up and down to view overall site for theta error.

Check for slightest theta adjustment. Magnify image and tilt microscope up and down.



Event #6

Flux Site Unless Solder Paste Has Been Applied.
Press Footswitch to Continue.

The vision system will automatically close.

Apply flux paste generously over the entire site. Do not use a low solids flux. If solder paste has been applied for your application, the board must stay cool until the component is placed and the heating cycle has been started.

Event #7

Position IR Sensor then HANDS OFF MACHINE for Placement

This is a timed event – 15 seconds.
The nozzle will move down to approximately 1/2 inch from board. It is important that the component does not hit the board. Advise programmer if the height is too low or excessively high.

Position the thermocouple or IR sensor option over the board. If a thermocouple is used, use Kapton tape to attach it to the board (material). This must be done prior to this event.

Note: The IR sensor is meant to read the board temperature. It is important to position the sensor/thermocouple 2-3 inches away from the nozzle on an open area of the board.

Event #8

Keep Hands Off Machine During Event. (force placement)

BGA will automatically be lowered to board until the programmed force is reached.

Note: Operator must not touch machine. If machine senses pressure on the board carrier, it will automatically go to the next event. The nozzle vacuum will be turned off and the component will be dropped (out of alignment).

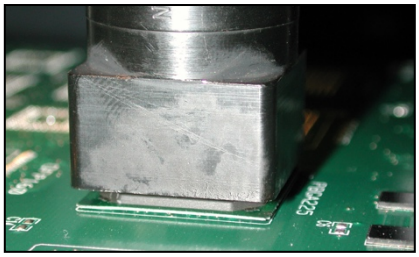
Event #9 **(device/nozzle separation)**

The nozzle vacuum is automatically turned off and nozzle pressure is applied.

Event #10 **(nozzle retracts to reflow position)**

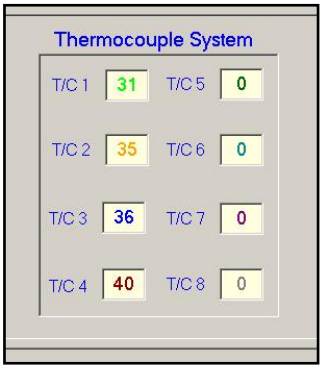
There is no operator involvement during this event.

The nozzle automatically move up .075 inches from the BGA.



Event #11 **(preheat)**

There is no operator involvement during this event. This is a temperature based event.



The thermocouple or temperature sensor will monitor the board temperature. It is displayed under **Thermocouple System (TC1)**.

The bottom heater is displayed and will heat the board until the set/programmed temperature is reached.

The next event will occur automatically when the preheat temperature is reached.

Events #12-15

(presoak, soak, ramp, reflow 1)

There is no operator involvement during these events.
The programmed heating of the BGA is automatic.
These are timed events. The total time is displayed
at the bottom left of the Run screen.

Event #16

(reflow 2)

There is no operator involvement during this event.
The heating events are finished. Cool air will be controlled through the nozzle and the board cooling system.
This is a timed event based on the programmer.

Event #17

(cooldown)

There is no operator involvement during this event.
This is a timed event for 45 seconds.
The board cooling system air flow is set to high flow.

Event #18

There is no operator involvement during this event.
This is a timed event for 1 second.
The board cooling system air flow is turned off.

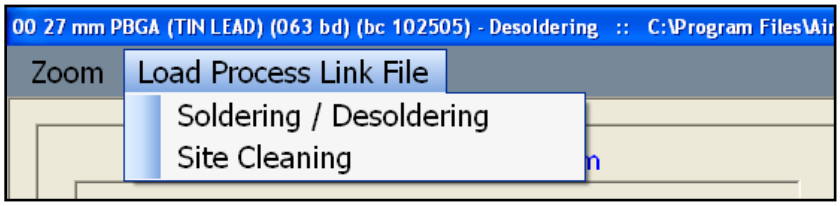
Event #19

(process complete. heater cooldown.)

This is a timed event for 30 seconds. The purpose of this event is to provide process repeatability for the next cycle.

The nozzle heater is set to 50% air flow at 100C and the board cooling system air flow is set to low air flow.
At the end of the process the operator has three options.

- Select the "Load Process Link File" for the Removal Program.

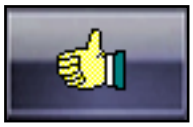


OR:

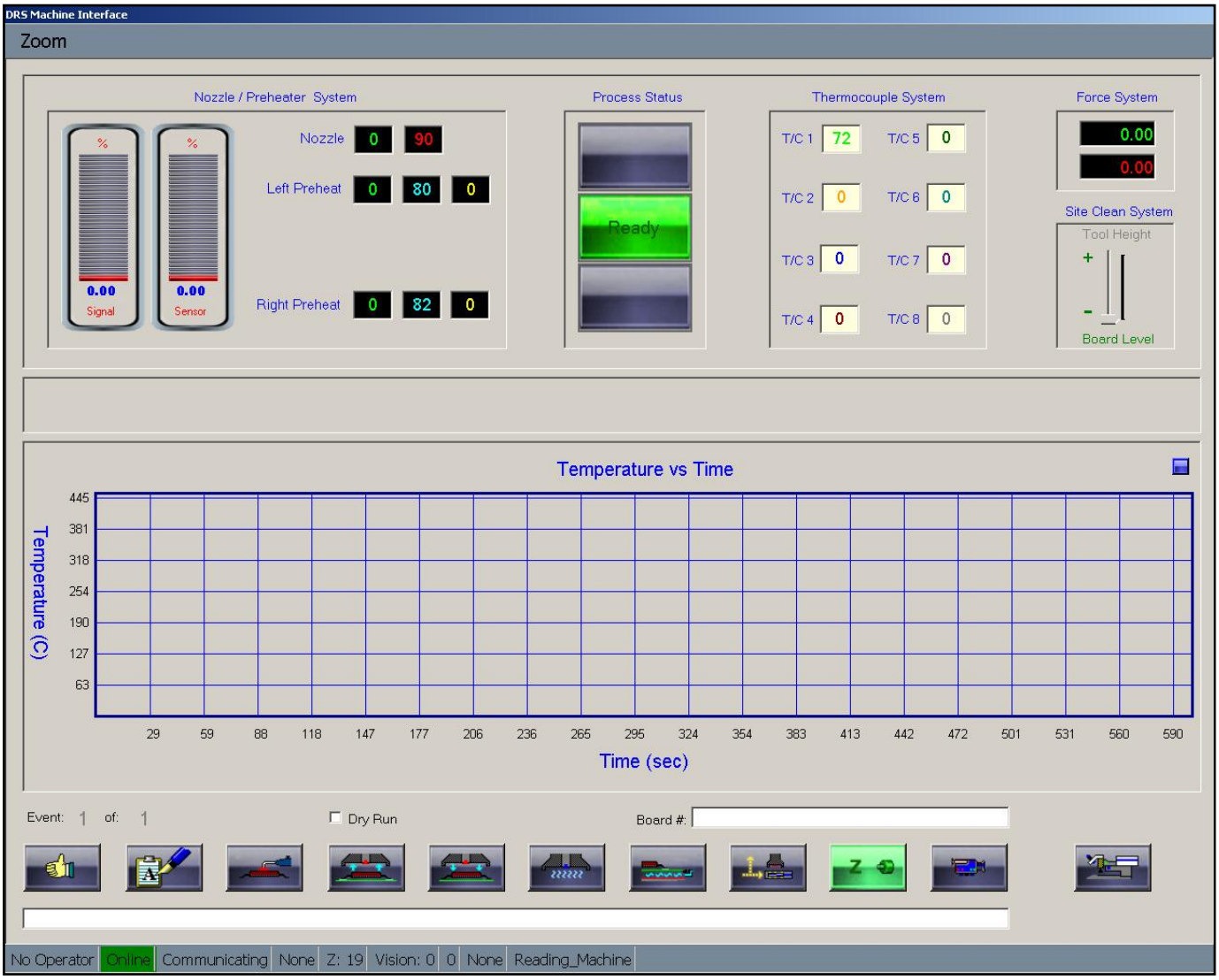
- Press the Start/Stop Cycle icon to start another Removal cycle.

OR:

- Press the Thumbs Up icon to exit the screen



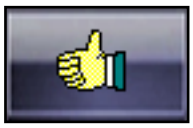
5.6 Reference: Run Screen - Operator Controls



Common Icon Controls

Cycle Start/Stop: Starts the program. Repressing the Start/Stop icon will stop the program. The program will default back to the start of the program.

Click on the stop sign symbol will stop all process activity.



Thumbs Up: Exits the Run screen to the Main screen.

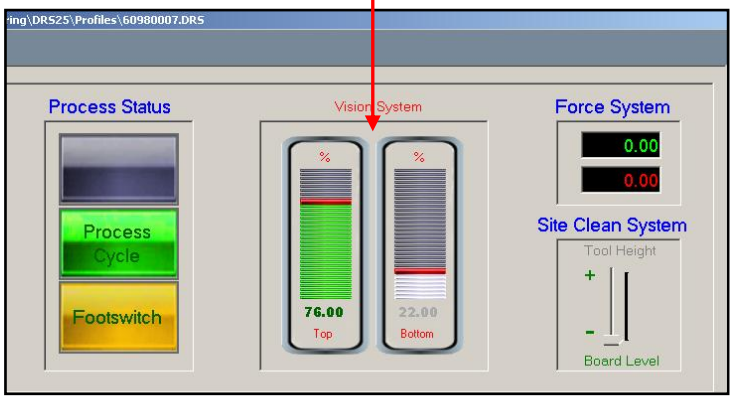
Application Notes: Allows the operator to review profile notes prior to running the program. It may be useful to open when a linked profile is opened.

Z-Power Enable/Disable: Allows the operator to de-power (or re-power) z-axis.

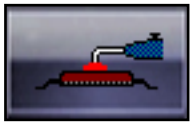
LED Adjustment: Allows operator to change the lighting of the component leads and/or board pads. Is shown in the soldering program during the alignment event when it is programmed.

Adjust Top LED to control component lead contrast.

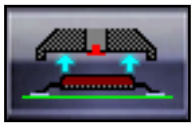
Adjust Bottom LED to control board contrast.



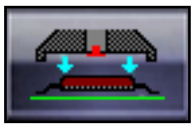
Secondary Icon Controls



Probe Vacuum: On/off vacuum for vacuum probe port.



Nozzle Vacuum: On/off vacuum for nozzle vacuum.



Device/Nozzle Separation: On/off pressure for nozzle vacuum, used to gently blow the part away from the nozzle.

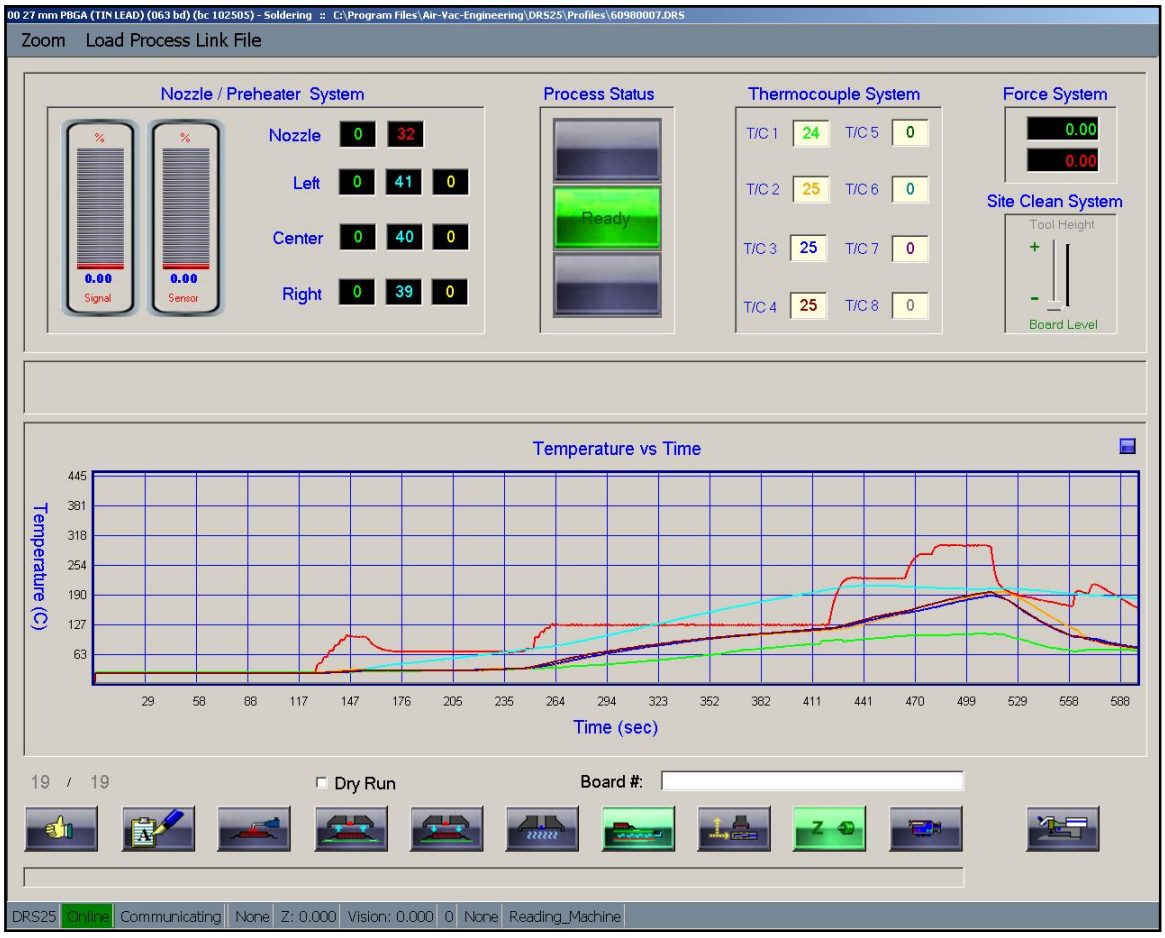
Site Cleaning Vacuum: On/off vacuum for the site solder removal system.

Camera/Live Video: May turn on video lights for the direct view camera option.

Machine Cooling: Allows upper heater and bottom heater to perform rapid cool down. The nozzle cool down involves a bypass operation to delivery cool air directly into the nozzle chamber (does not cool down the heating element).

Home All Machine Axis': The vision and z axis will perform a home operation.

5.1.11 Run Screen: General Operator Information



Nozzle System (Upper Heater)

- **Nozzle %** Blue signal: Indicates set flow rate.
  Sensor: Indicates actual flow rate.
- **Set Point** Programmed temperature setting display (green).
- **Actual** Actual temperature setting display (red).

PreHeater

- **Set Point** Programmed temperature setting display (green)
- **Actual** Actual temperature setting display (blue)
- **Idle** Temperature setting when machine is not used (yellow).

Thermocouple System

- **Top Box** Set point temperature. This is the target temperature for that event.
- **Bottom Box** Actual temperature.

Note: The system has a maximum of 8 thermocouple channels. Only pre-programmed (active) channels will be displayed. Each channel has an identification number. When a thermocouple channel is controlling the process the T/C Control LED will change to yellow.

Note: All active thermocouple channels must be connected to a thermocouple sensor before the process cycle is started. Failure to do so will result in an alarm condition

5.7 Process Tips

General

- Use height adjustable chair to allow comfortable viewing of microscope at the top and bottom position.
- It is advisable to run the warm up cycle every 6-8 hours if the machine is not used.
- Machine must be recalibrated if moved or air or electrical lines have been changed.
- If bridging occurs, examine for mask damage. It is important to use the DRS25 for removal and site cleaning.
- Use minimal amounts of flux.
- Do not open electrical compartments.
- Do not mix flux or solder types for the same site.
- Use as many board supports as possible.

Gas Nozzles

• Select the proper gas nozzle.
• Use the GNT handling tools to hold hot nozzles.
• Store nozzles in tray. Do not drop nozzles.
• Remove arrows from repair components. Vacuum port will clog and device will not pick up.
• Remove o-ring or vacuum cup to clean nozzle in cleaning solution.

Software

• Alert supervisor to correct profile, if flawed, rather than bypassing the process.
• Please note the correct removal and site preparation process must occur for the correct soldering process. It is advised to use the DRS programs for removal and site preparation for all applications.
• Open the appropriate software profile and be sure to follow all set up notes.
• Footswitch must be held until yellow radio button goes out.

Microscope/Vision System

• Always use the microscope whenever possible for process work, including inspection of pads and mask prior to soldering process, the application of flux, site preparation, soldering, solder removal, viewing nozzle positioned to device, nozzle at correct board height, inspecting overall site and assembly, etc.
• Correct eyecup focus, eyepiece width opening, and tilt to individual.
• Keep all optics clean for crisp, clean viewing.
• Always use maximum magnification to maximize accuracy.

Turning off the DRS25

Important: Do not turn off the machine without following the proper sequence.

- Exit the program using the Thumbs Up icon.
- Click on Exit under Options.
- Click on the Windows Start icon at the bottom of the screen and select "Shut Down".
- Press the Emergency Stop knob when the computer screen indicates that it is now safe to turn off the machine.

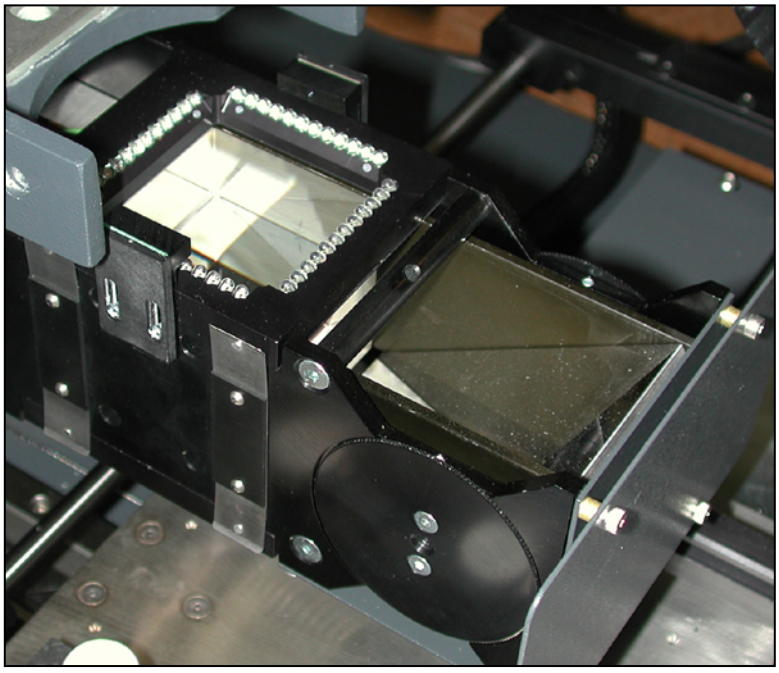
5.8 Preventative Maintenance Schedule Procedure

Daily
- Report any problem to supervisor.

Weekly
- Clean carrier area of fallen parts.
- Clean microscope and vision system optics with lens cleaner kit.
- Clean site cleaning tool.

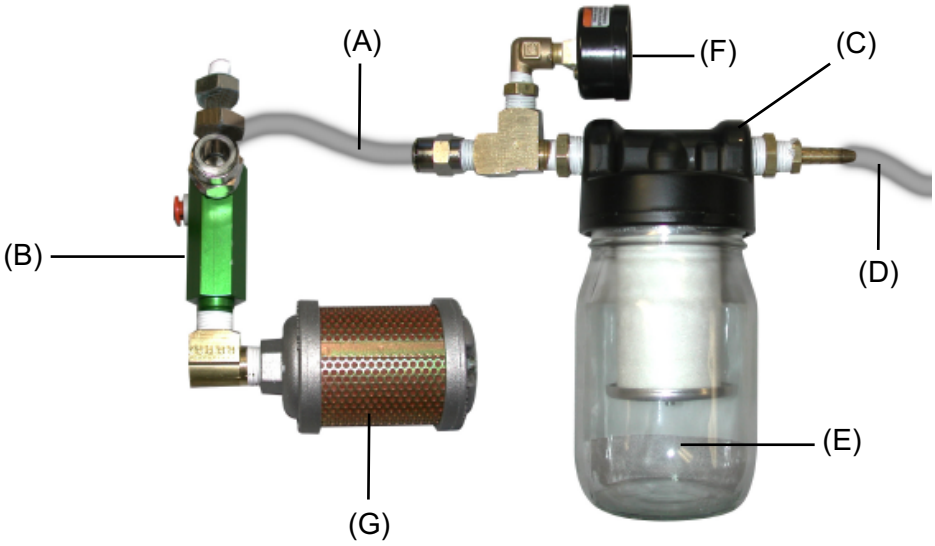
Quarterly
- Wipe flux from table, carrier arms, and overall machine.
- Clean nozzles with flux remover and soft brush.
- Advise maintenance to perform preventative maintenance procedures.
- Check and clean site cleaning tool system. Clean as required.

Clean microscope and vision system optics with lens cleaner kit or alcohol.
- Wipe eyepieces, mirror, top and bottom of vision cube.



Verify Vacuum of Hoses, Filter and Vacuum Pump

To Activate Site Cleaning Vacuum use icon from Run Screen.



(Site Clean Nozzle)

A - 9001.15.036 (Tubing blue-18") **D** - 9001.15.031 (Tubing silcicone-3') **G** - S147AV Muffler, Air
B - HAV147HDRS24 (Vacuum Pump) **E** - 9001.12.027 (Filter, Vacuum Canister)
C - 1015.70.025 (Canister Kit) **F** - VG30 (Vacuum Gauge)

- **Vacuum gage must read 8" Hg or less with system open.**
  - Turn on site cleaning vacuum. If vacuum gage reads over 8" Hg, material is clogging system.
  - Remove hose from Filter to Site Cleaning Nozzle to determine if hose must be replaced.
  - Remove Filter element and recheck to determine if Filter element must be replaced.
  - Remove Vacuum pump muffler and recheck to determine if muffler must be replaced.
  - Disassemble Vacuum pump, clean and recheck to determine if vacuum pump must be cleaned or replaced.

- **Vacuum gage must read at least 18" Hg with system closed**.
  - Close end of hose with your finger and turn on site cleaning vacuum. If vacuum gage reads under 18" Hg, system has vacuum leakage or vacuum pump is clogged.
  - Tighten Filter jar. Tighten all connections.
  - Remove Vacuum pump muffler and recheck to determine if muffler must be replaced.
    - Disassemble Vacuum pump, clean and recheck to determine if vacuum pump must be cleaned or replaced.
    - Replace Filter element.
    - Replace Hose from Site cleaning nozzle to Filter. Replace Hose from vacuum pump to Filter.

- **Recheck system with Site Cleaning Nozzle connected.**
  - Vacuum gage must read 8" Hg or less with system open.
  - Vacuum gage must read at least 18" Hg with system closed.

6: Software Overview

6 Software Overview

6.0 Windows Tools Overview

DRS25 Software – Main Screen

6.0.1 Buttons:

Icon buttons are generally used to activate a procedure or function. Moving the cursor over the top of the icon and clicking on the left mouse button will initiate the button's functionality.

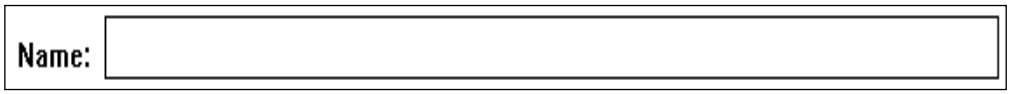
Button icons have a popup message that tell the operator what the purpose of the button is; this automatically occurs when the cursor is placed over the top of the icon.

Note:

IF A BUTTON IS COMPLETELY GRAY, THE FUNCTIONS ASSOCIATED WITH THAT BUTTON ARE DISABLED.

6.0.2 Edit Boxes:

Edit Boxes allow information to be entered by placing the cursor over the top of the box and clicking on the left mouse button. Characters are entered directly into the edit box from the computer key-board.



6.0.3 Trackbar Buttons:

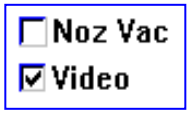
Trackbar Buttons are used to directly modify information within an edit box. Click and drag (using left button) slider to adjust the value in the edit box. Single increment adjustments can be made by single clicking on the range line. (tick marks - connected to the slider).

6.0.4 Check Boxes:

Check boxes are generally used to program a DRS25 function or activity.

- Inactive Clear state: ☐
  A blank check box indicates the ***Off*** or the inactive state.
- Active Black state: ☑
  A black check mark indicates the ***On*** condition or the active state.

For Example:

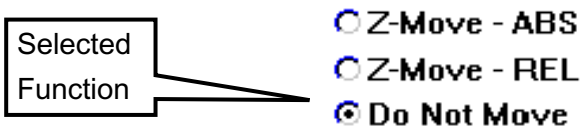


The nozzle vacuum is off and the live video camera system is programmed to be active.

6.0.5 Radio Buttons:

Similarly, radio buttons allow a functions or activities to be programmed. Typically, radio buttons are grouped together by related functionality. Within a group, only one option can be selected at a time.

For Example:

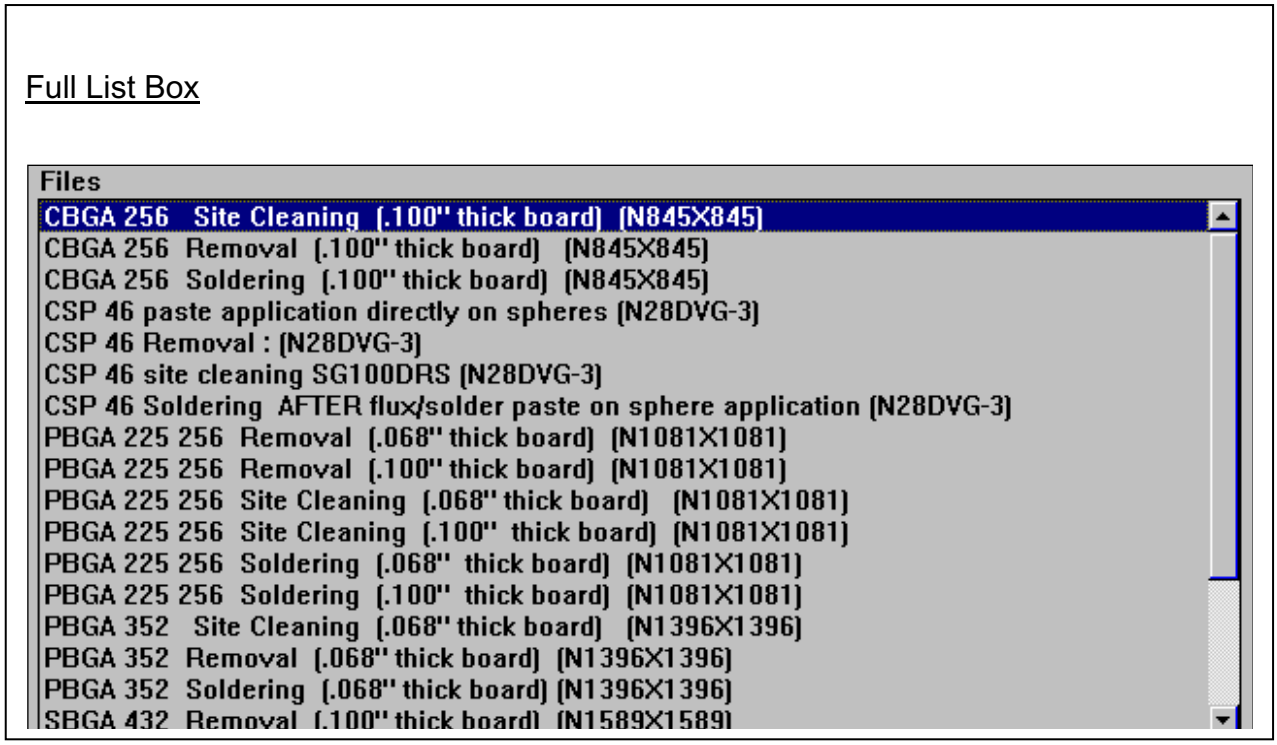


The **Vision and Nozzle System** group, located on the **Teach** screen, provides 3 motion types: Absolute (**ABS**), Relative (**REL**) and **Do Not Move**. This can be used in the following way: After a component has been placed, selecting the **Do Not Move** button will keep the nozzle from moving in subsequent events.

6.0.6 List Boxes:

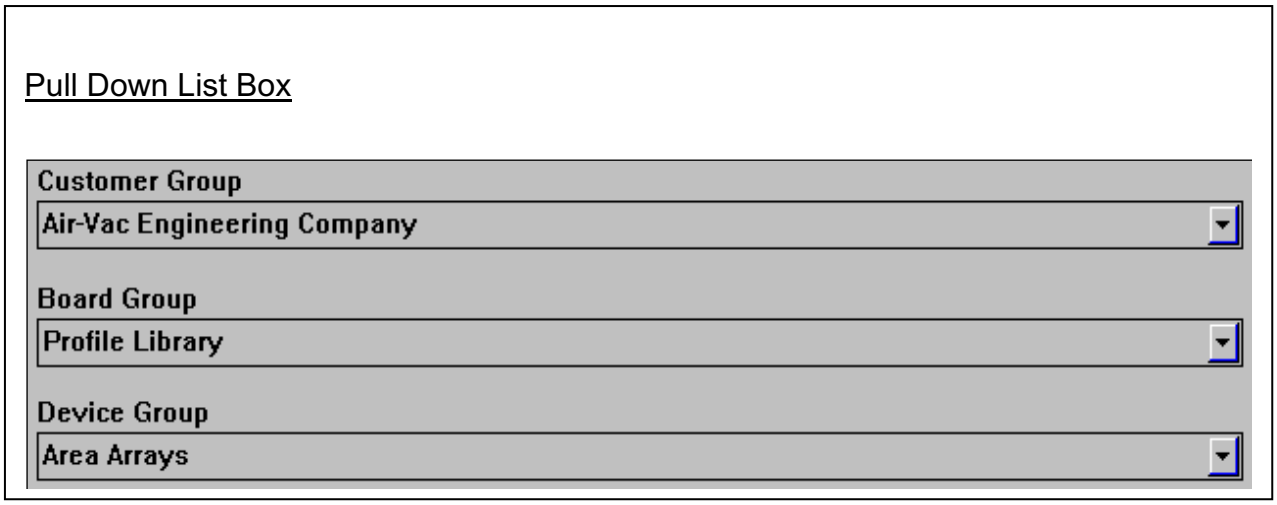
A list box is a multiple line display of information. The operator can scroll through the list using the scroll bar to the right of the list box. The operator can select any line within the list by moving the mouse to that line and clicking (left button) on that line.

Full List Box



To select an entry, the operator can highlight the line (click) and then select the OK button (Up Thumb). The operator can also select an entry by double-clicking on the line.

A pull down list box is very similar to a full list box, except that this control is displayed on a single line and provides a pull down arrow. By clicking on that arrow the list box expands to display several lines of information on the screen. After making a selection, the list box collapses back down to one line.



For Example:

By clicking (left button) on the down arrow, the board group list box will expand to show more of the possible choices. The operator can select any line within the list box by simply clicking (left mouse) on that line. The edit box will return to its original state with the new selection being displayed.

6.1 Options Menu Functions

View of the Options Menu

6.1.1 New:

The **New** option, located on the **Options** menu, will automatically clear the current profile from memory and display the teach screen. The system is ready to teach a new profile.

6.1.2 Open:

The **Open** option is used to load an existing profile from a library. Selecting the **Open** option will display the **Open Profile** screen.

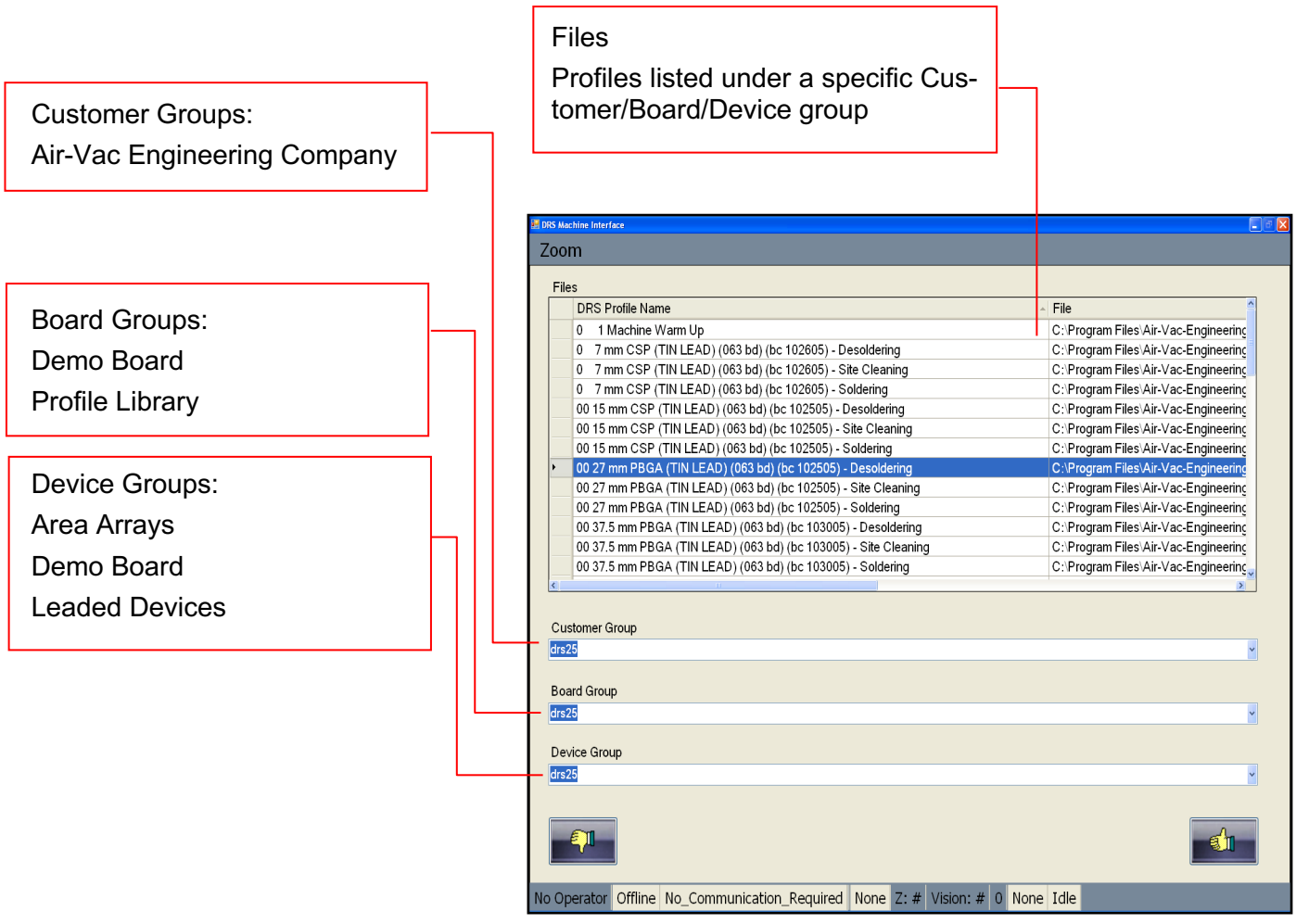
Three group categories are available to organize profiles into common or related processes:

- Customer
- Board
- Device

New groups can be easily added to expand the profile library organization.

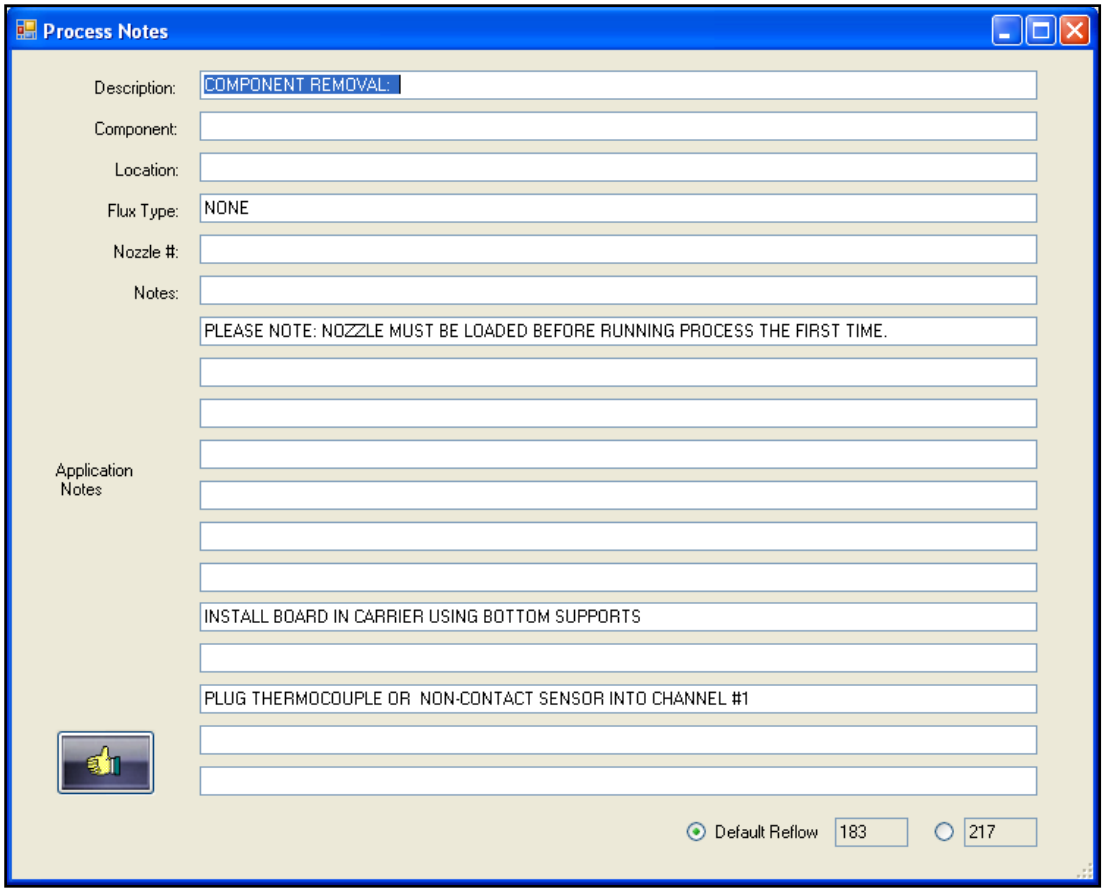
The profile list can be adjusted by changing the group selection combination.

Clicking on the down arrow (of a group list box) will display a window with all the available options for that group. Use the scroll bar to view any additional entries beyond those that are currently displayed.



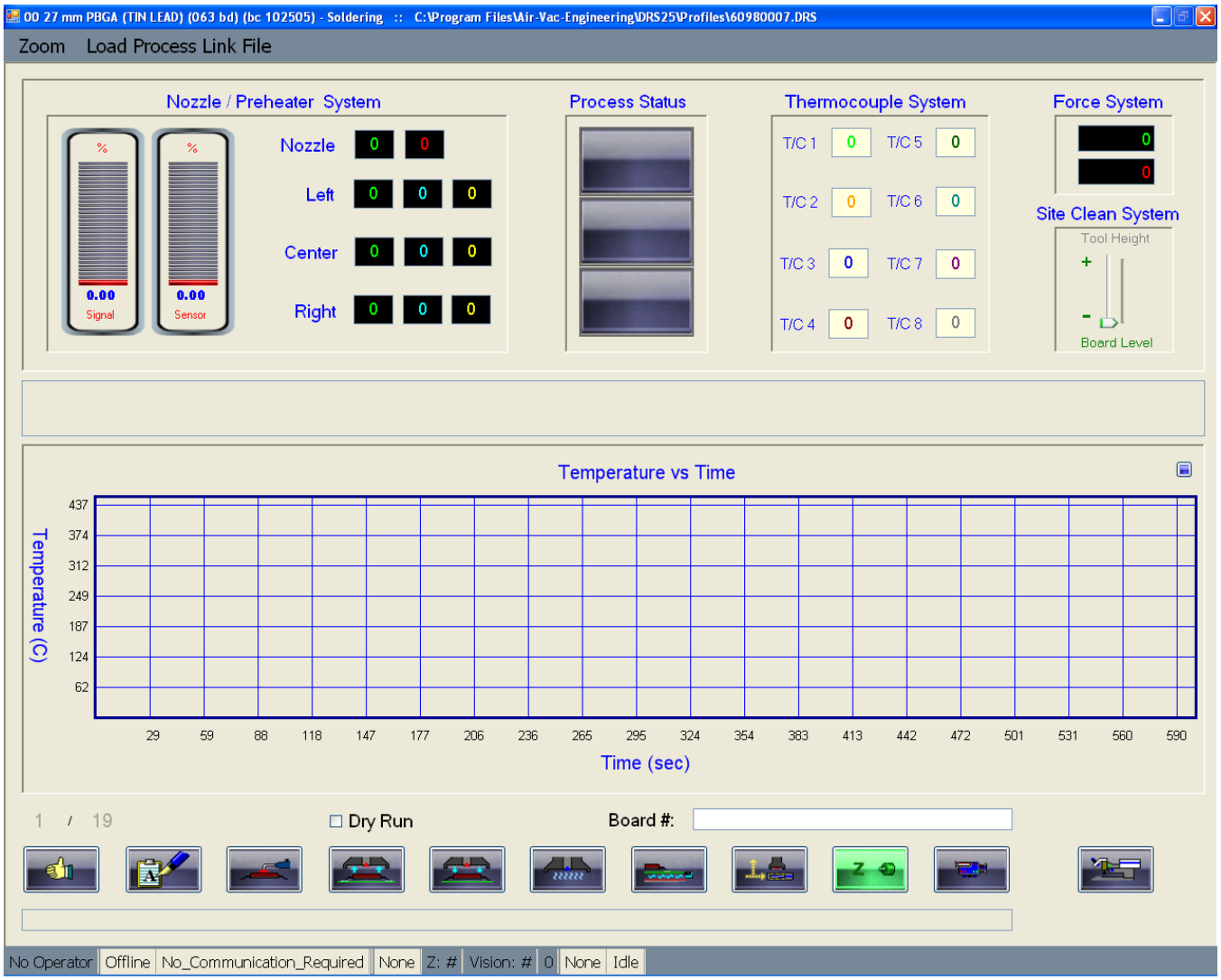
To make a profile selection, click on the desired entry (File list box), then, click on the **Ok** button to open this file.

After selecting a file, the system will automatically take the operator to the **Open Profile Notes** screen.



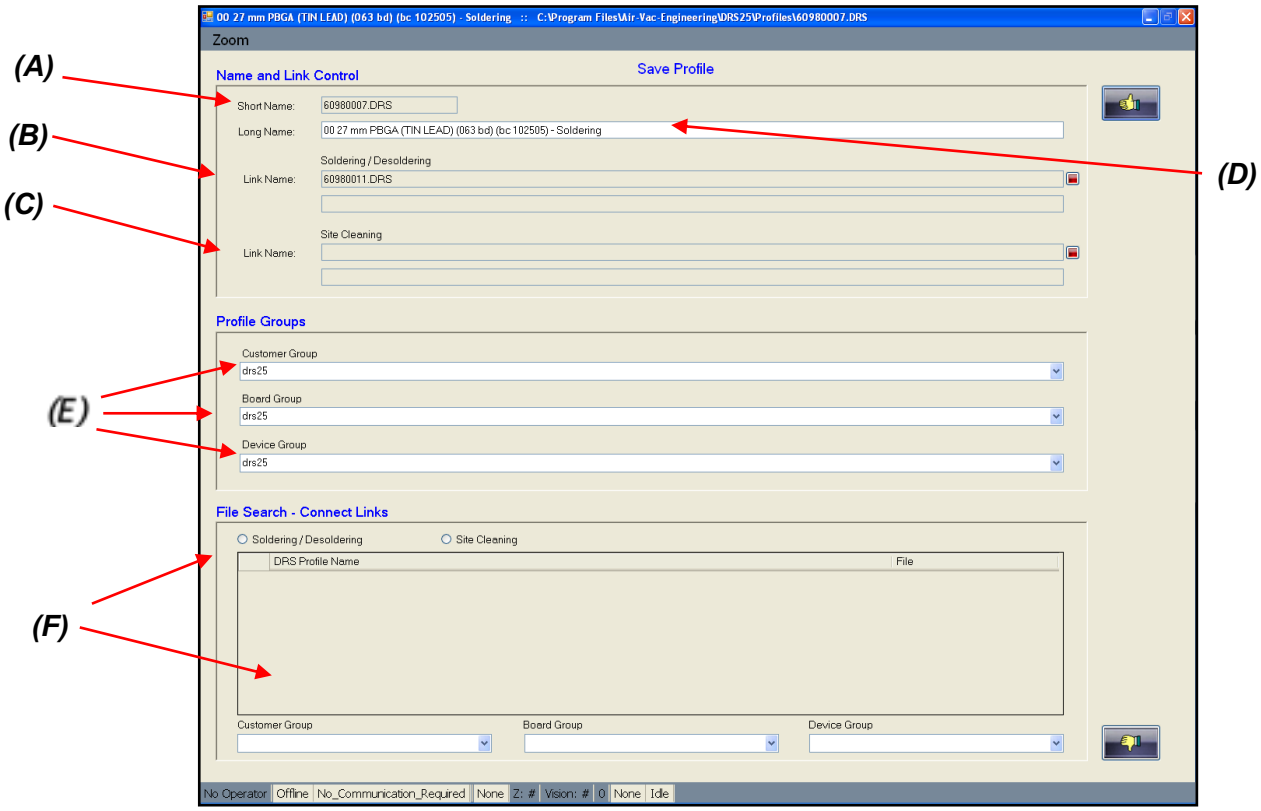
This screen is used to display general setup or process related information. Clicking on the **Ok** button will take the operator to the **Run** screen.

This screen allows the operator to process an application. In general, this screen provides the operator with messages, heating and flow rate information, thermocouple readings and the overall progress of the cycle. Please see the **Run** screen section for detailed information.



6.1.3 Save:

The **Save** option is used to save a new profile or re-save an existing profile.



- Short Name:

The **Short Name** *(A)* is used to uniquely identify the profile. The **Short Name** is automatically generated and is composed of two separate elements. The first four characters of the **Short Name** are taken from the DRS25 machine serial number. The remaining numbers represent a sequence number. This sequence number changes as new profiles are saved. The file extension for all short file names must be [.DRS].

- Link Name – Soldering/Desoldering:

A soldering/desoldering link *(B)* allows the operator to quickly open a related profile (soldering or desoldering) without leaving the **Run** screen. The **Link Name** is not automatically generated. The operator must enter this information. The **Link Name** identifies (points to) to a previously created profile with process related functionality.

Typically, a soldering profile has the desoldering **Short Name** entered as the Link Name.

- Link Name – Site Cleaning:

After the component has been removed, a **Site Cleaning** profile *(C)* is generally cycled to remove the excess solder from the site. The **Link Name** is not automatically generated. The operator must enter this information. **The Link Name** identifies (points to) to a previously created profile with process related functionality. Typically, a desoldering profile has the site cleaning **Short Name** entered as the **Link Name**.

- Long Name:

The **Long Name** *(D)* is used to describe the overall function (purpose) of the profile. Long names are used by the **Open** option to help the operator accurately select a profile. The **Long Name** can be up to 60 characters long. The **Long Name** is not automatically generated. The operator must enter this information.

Warning:

THE OPERATOR SHOULD BE CAREFUL NOT TO ENTER (EXACTLY) A LONG NAME THAT ALREADY EXISTS. THE SYSTEM WILL ALLOW IDENTICAL LONG NAMES TO EXIST IN THE PROFILE LIBRARY.

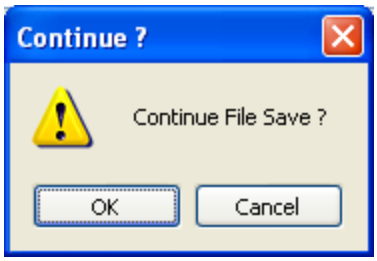
- Customer, Board and Device Group:

These groups *(E)* allow profiles to be organized using a combination of customer, board and device name. New groups can be easily created (see **Setup** – **Group**). Categorizing profiles by group can significantly improve the operator's ability to find the correct application profile.

- File Search:

These controls allow the user to interactively search for the necessary file links. The group drop-down list boxes can be used to help the operator filter file listings.

When the operator clicks on the thumbs up button to save a profile, the system may notify the operator about the pending activity



To complete the save, the operator must click on the **Ok** button.

When the operator completes the save function, the system will automatically return to the main menu.

6.1.4 Save As:

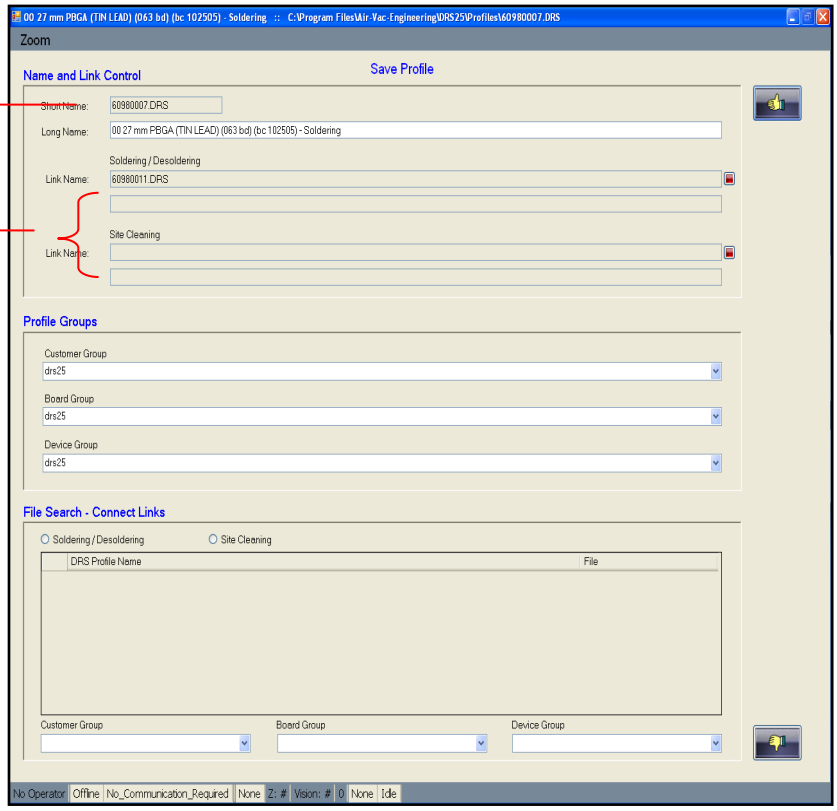
The **Save-As** option functions very similar to the **Save** option, however, the **Save-As** option also allows the operator to make a copy of an existing profile. The Short name is always automatically updated (incremented) to the next available sequence number (see the **Save** option).

- The operator can change the long name to reflect the new functionality of the profile.
- The operator has the option to move the new profile to a different group.
- New link names can be added at any time.

The **Short Name** will automatically be updated with a new, unique name.

The operator should edit the **Long name** to reflect the new functionality of the profile.

The **Link Names** for Soldering/Desoldering and Site Cleaning will automatically be cleared.



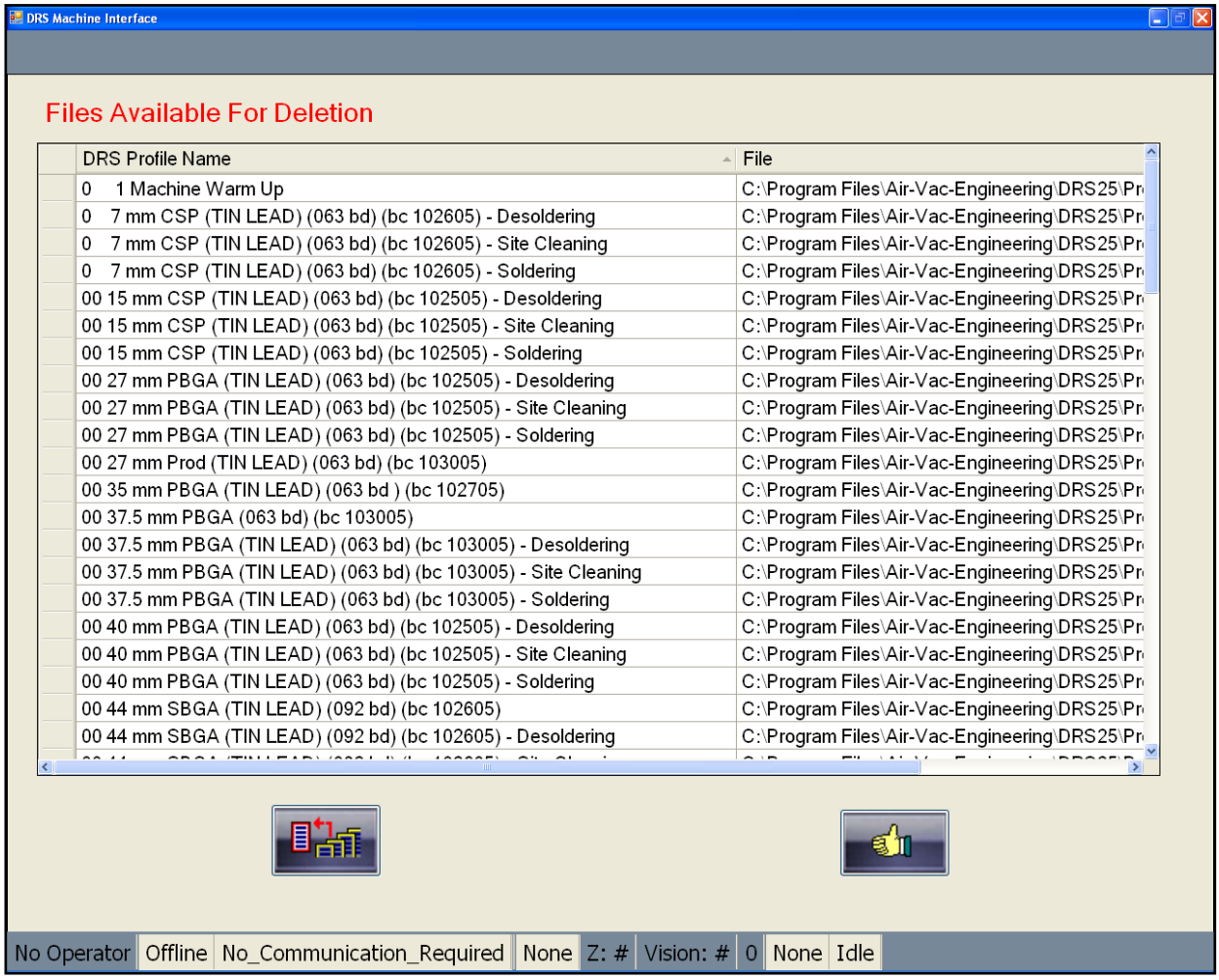
Note:

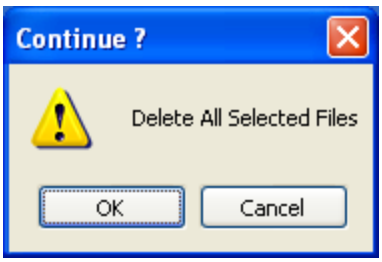
THE ORIGINAL PROFILE REMAINS UNCHANGED AND COMPLETELY INTACT.

THE OPERATOR SHOULD BE CAREFUL NOT TO ALLOW (EXACTLY) A LONG NAME THAT ALREADY EXISTS. THE SYSTEM WILL ALLOW IDENTICAL LONG NAMES TO EXIST IN THE PROFILE LIBRARY.

6.1.5 Delete Profiles:

The **Delete Profile** screen allows the operator to delete files based on the Long Name (similar to the **Open** option). The operator will be prompted before any files are removed.





6.1.6 About DRS:

The **About** screen contains general information about Air-Vac Engineering and the current software version.

6.1.7 Exit:

It is ***very important*** to shutdown the DRS25 system correctly. Click on the **Options** menu and select the **Exit** option. This will close the DRS25 software and shut down any active devices (vacuum, air flow, etc). The **Windows Desktop** screen will be displayed.

Click on the **Start** menu located in the lower left corner of the screen.

DRS25 Machine E-Stop Button:

The **E-Stop** button will de-power the DRS25 machine. It should only be used in the case of an emergency or after Windows has been properly shut down.

Warning:

FILE DAMAGE MAY OCCUR WHEN PRESSING THE E-STOP BUTTON IF WINDOWS HAS NOT BEEN SHUT DOWN PROPERLY.

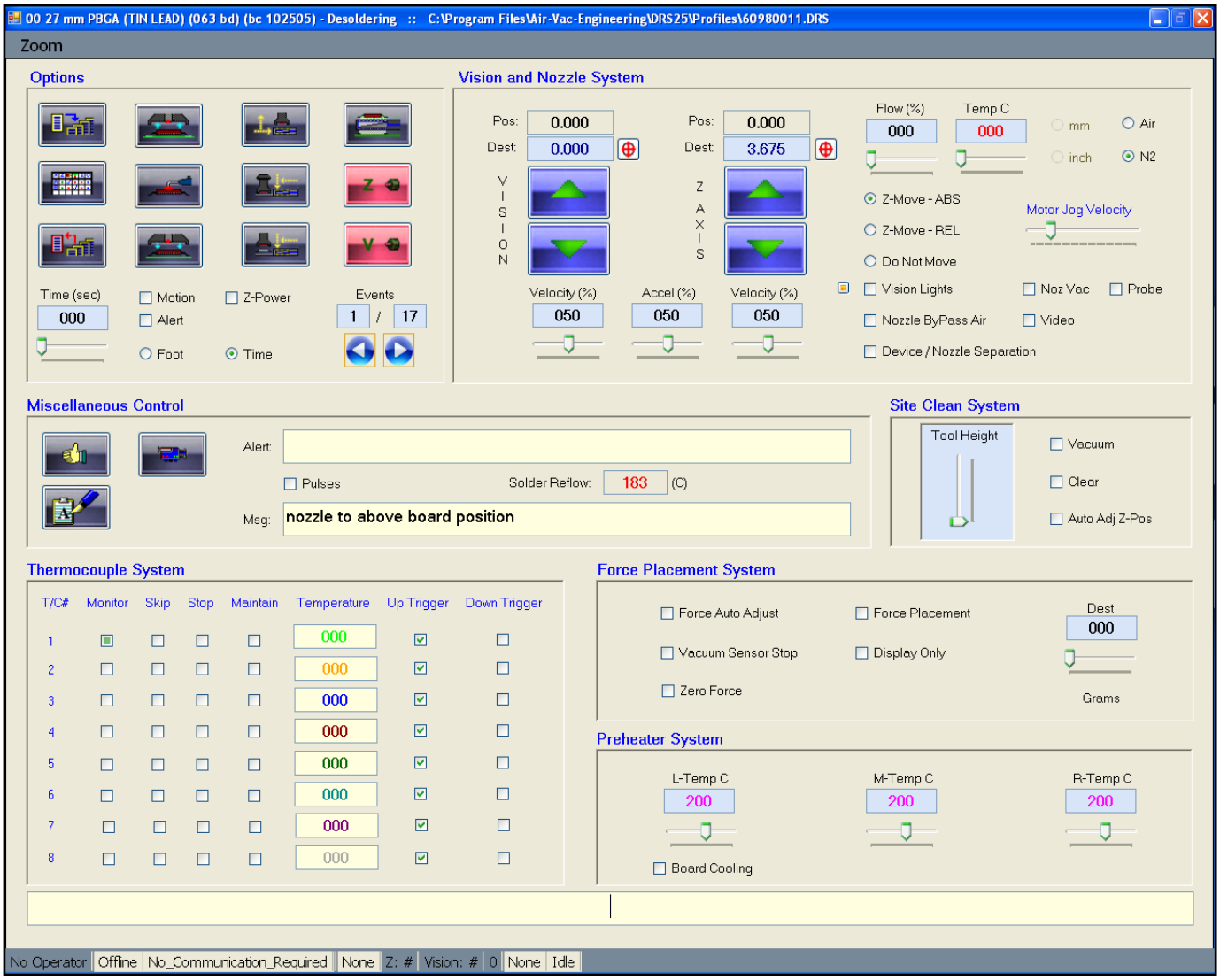
6.2 Control Menu Functions

View of the Control Menu

6.2.1 Teach Process Events:

Selecting the **Teach Process Events** option (from the **Controls** menu) will present the operator with the **Teach** screen. The **Teach** screen allows profile control parameters to be quickly and easily adjusted. A control profile is developed by combining together simple events to create a complex motion and control sequence.

Events can have any combination of [1] motion, [2] device control or [3] time. Events can be added or deleted based on the application's processing requirements.



Teach Screen Button Summary

Insert Event:

The **Insert** event button allows the operator to temporarily add a new event in between two existing events. The inserted event will be an exact copy of the current event. The inserted event will be added ahead of the current event.

Delete Event:

The **Delete** event button is used to temporarily remove the current event.

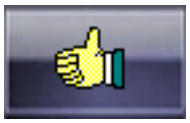
Table Editor:

The **Table Editor** button allows the operator to adjust all control parameters using a tabular form. This button will present the operator with a popup menu. This menu will allow the operator to quickly position the table editor to the correct control column.

Cycle Start/Stop

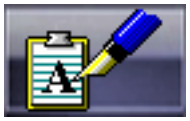
The **Cycle Start/Stop** button is used to activate or terminate the process cycle. This button will display a stop sign symbol when the cycle is active or a machine symbol when the cycle is not active. Clicking on the button when the stop sign symbol is visible will terminate the cycle.

OK / Thumbs Up:



The **OK / Thumbs Up** button will exit the **Teach** screen and return to the **Main** screen.

Profile Notes:



The **Profile Notes** button will display the application notes page. This page is used to add any instructions that may be required to correctly process the application.

Home Z/Vision Axis:

The **Home Z/Vision Axis** button will reposition the Z and Vision axis to their respective home locations. This button executes a general motion utility. This general motion utility cannot be directly programmed as a complete function, however, the results of this motion can be saved to an event.

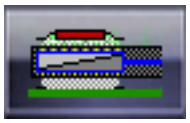
Nozzle Load:

The **Nozzle Load** button will activate a series of predefined motion events.
This will allow the operator to semi-automatically load the nozzle. Initially, the Z and Vision axis will be moved to their respective home locations. Next, the system will ask the operator to perform the following manual tasks: [1] Open nozzle clamps. [2] Load nozzle. [3] Close nozzle clamps. This button executes a general motion utility. This general motion utility can not be directly programmed as a complete function.

Component Pickup:

The **Component Pickup** button will position the nozzle to a predefined set of Z and Vision coordinates. This button executes a general motion utility. This general motion utility can't be directly programmed as a complete function, however, the results of this motion can be saved to an event. Typically, this general position is adjusted to exactly match the specific component pickup requirements.

Vision Alignment:



The **Vision Alignment** button will position the component to a predefined set of Z and Vision coordinates. This position will be graphically displayed using a green button background. The vision fiber optic lights will be automatically turned ON after all the axis motion has been completed. This general motion utility can't be programmed as a complete function, however, the results of this motion can be saved to an event. Typically, this general position is adjusted to exactly match the specific vision alignment requirements. This button can also be used to close and home the Z and Vision axis.

Live Video:

The **Live Video** button will activate the camera system and generate a live video image on the computer monitor. In addition, this button may turn on video lights for the direct view camera option (additional camera used to view the active process).

Motion Control:

Events have three basic elements of operation:

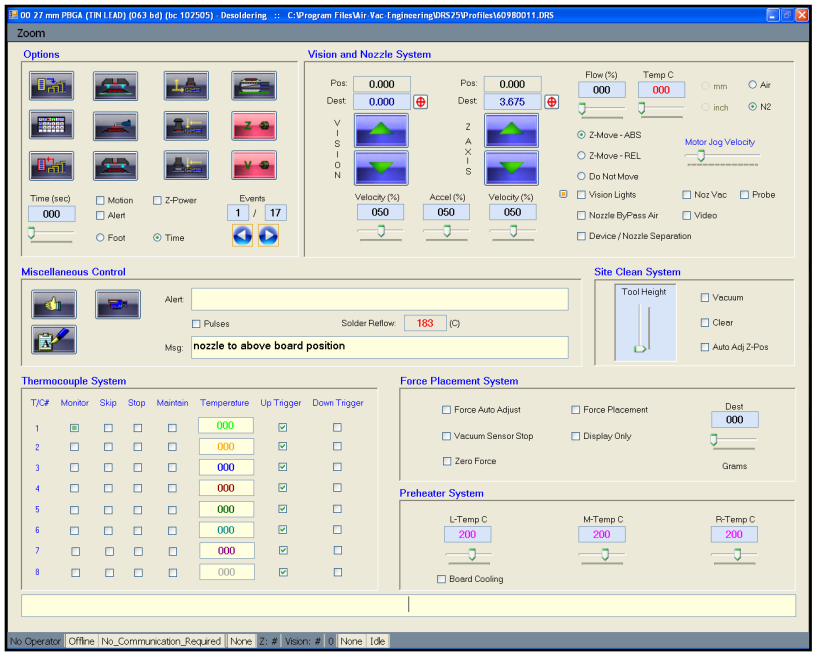
1. **Motion**
2. **Device**

Events are processed using the following control sequence:

***Highest** priority:* *Motion*
Force place/remove

***Middle** priority:* *Device control*

***Lowest** priority:* *Time or foot switch*



Note: Entering the **Teach** screen will display the control parameters for the first event (if any events exist).

Motion control:

Motion control involves activities that relate to movement in the **Z** or **Vision** axis. Force placement (removal) is also considered motion control.

Device control:

Device control involves activities that relate to the following items: temperature, flow rate, vacuum, lights, video and thermocouple control.

Time or footswitch control:

Time control involves activities that require a fixed ***or*** unknown duration. Fixed time is represented by standard seconds. An unknown time is represented by the use of a foot switch event. During a foot switch event, the process will not continue (change events) until the operator presses the foot switch.

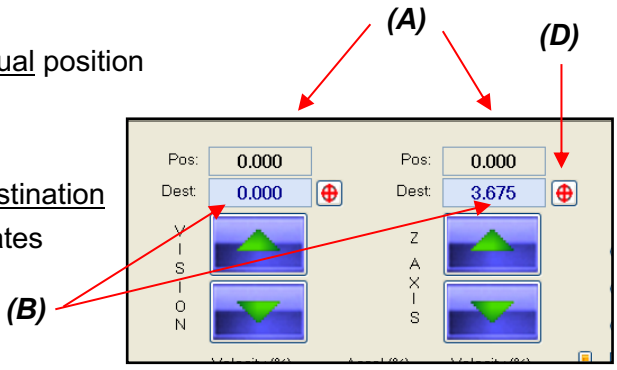
Note: Adjusted Teach screen data is automatically saved. This is a temporary save until the operator decides to permanently record the adjustments using the Save/Save As options.

Motion Check Box: ☑ Motion

The **Motion** check box helps to control which parameters are saved during the **Teach** function. Also, the operator can use this check box to suspend any future motor activity, allowing event selection to be quickly and easily completed (up/down event buttons). Additionally, this check box can be used to re-synchronize the actual and destination motor coordinates (**Z** and **Vision** axis).

Display (A) - These motor coordinates represent the actual position for the **Z** and **Vision** axis.

Display (B) – These motor coordinates represent the destination event position for the **Z** and **Vision** axis. These coordinates are taught during the profile motion development phase.



Usage:

When the **Motion** check box is clear (default), the destination positions *(B)* *will not* be adjusted each time a **Teach** function is performed. This mode allows the operator to quickly scroll through the events without having to wait for motor synchronization.

When the **Motion** check box is selected (checked), machine motion may occur and destination motor positions will be used as the target motor positions. New or adjusted destination motor positions can only be set by pressing the target (crosshair) icon located next to the destination edit boxes *(D)*.

When the **Motion** check box is toggled from a clear state to a checked state, the **Z** and **Vision** axis will be repositioned using the destination coordinates. This motion will include a complete (**Z** and **Vision**) home axis procedure. A **Warning Message** is displayed to the operator before any motion is initiated.

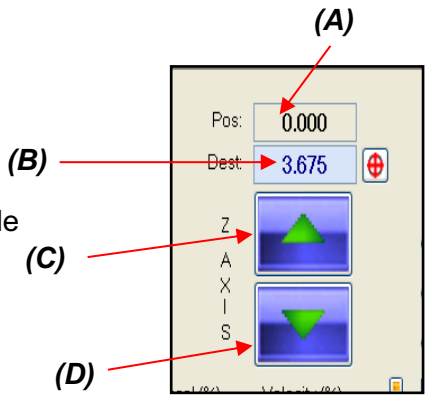
Note: **The Motion check box protects the destination coordinates from accidental modification.**

Z and Vision Axis – Jog Buttons:

Z-Axis:

Display (A) – This motor coordinate represents the actual position of the **Z** axis.

Display (B) – This motor coordinate represents the destination event position of the **Z** axis. This coordinate is taught during the profile motion development phase.

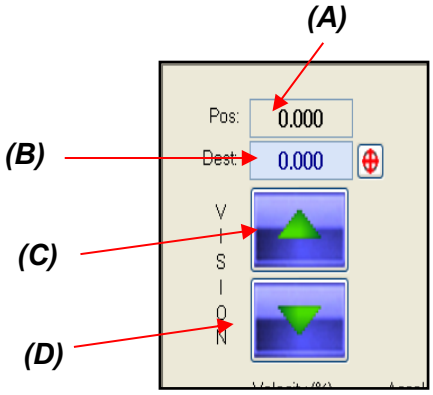


The **Z-axis Up** button *(C)* will raise the nozzle.
The **Z-axis Down** button *(D)* will lower nozzle.

Vision Axis:

Display (A) - This motor coordinate represents the actual position of the **Vision** axis.

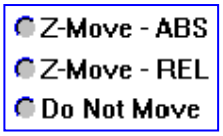
Display (B) – This motor coordinate represents the destination event position of the **Vision** axis. This coordinate is taught during the profile motion development phase.



The **Vision Up** button *(C)* will close the **Vision** axis (toward back of machine).
The **Vision Down** button *(D)* will open the **Vision** axis (toward front of machine).

Note: The **Jog** check box controls the axis velocity.

Note: If the **Motion** check box is selected (checked), the **Z** and **Vision** axis coordinates will be saved each time the **Teach** function is performed (current event).



Z-axis motion can be defined as an **Absolute**, **Relative** or **Do Not Move** event. An **Absolute (ABS)** move positions the **Z-axis** directly at the specified motor coordinate. A **Relative (REL)** move positions the **Z-axis** a fixed number of pulses from the current motor coordinate. Selecting the **Do Not Move** option prohibits any motion from occurring during the current event.

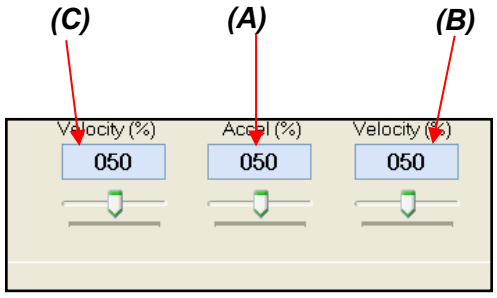
Z and Vision Axis - Velocity/Acceleration Buttons:

Velocity and acceleration parameters provide the ability to fine-adjust the overall motion.

Velocity controls the maximum speed that the axis will reach. To achieve a maximum velocity, set the axis parameter to 100%.

Acceleration controls the length of time the axis will need to reach the maximum speed. The **Z** and **Vision** axis share a single event acceleration parameter. To achieve a maximum acceleration, (shortest time) set the event parameter to 100%.

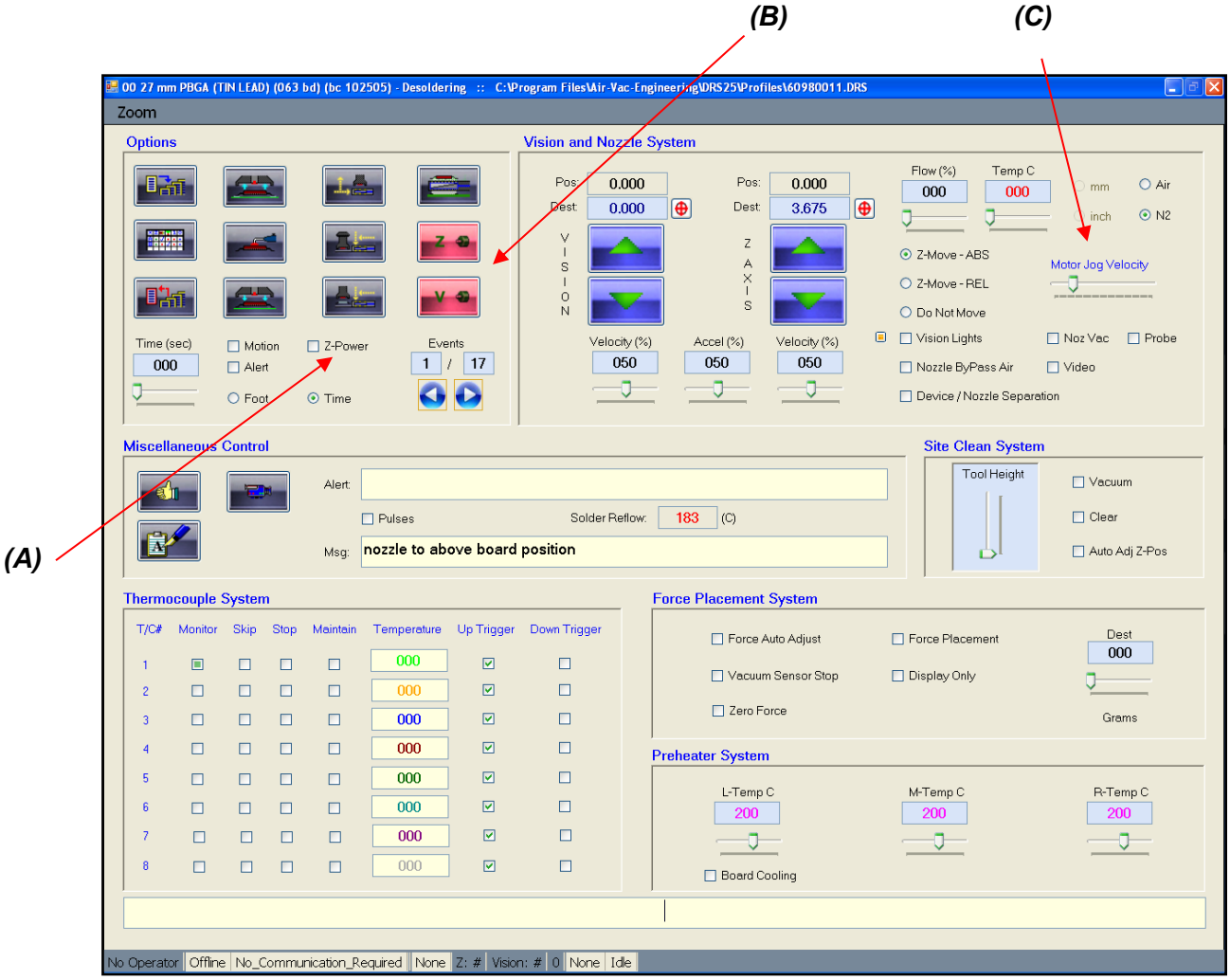
Note: The default values for velocity and acceleration are 50%.



Power Check Box / Enable, Disable Buttons:

The **Power** check box *(A)* helps to provide maximum **Z** axis flexibility to the operator during the **Teach** and **Run** procedures. This check box can be used to program the state (powered/de-powered) of the **Z** axis motor, after completing any required event motion (**Run** screen).

In addition, this **Enable/Disable** buttons *(B)* can be used to immediately adjust the state of the **Z/Vision** axis' motor power during the development process (**Teach** screen). When the **Z/Vision** axis motor is de-powered, manual adjustments can be made.

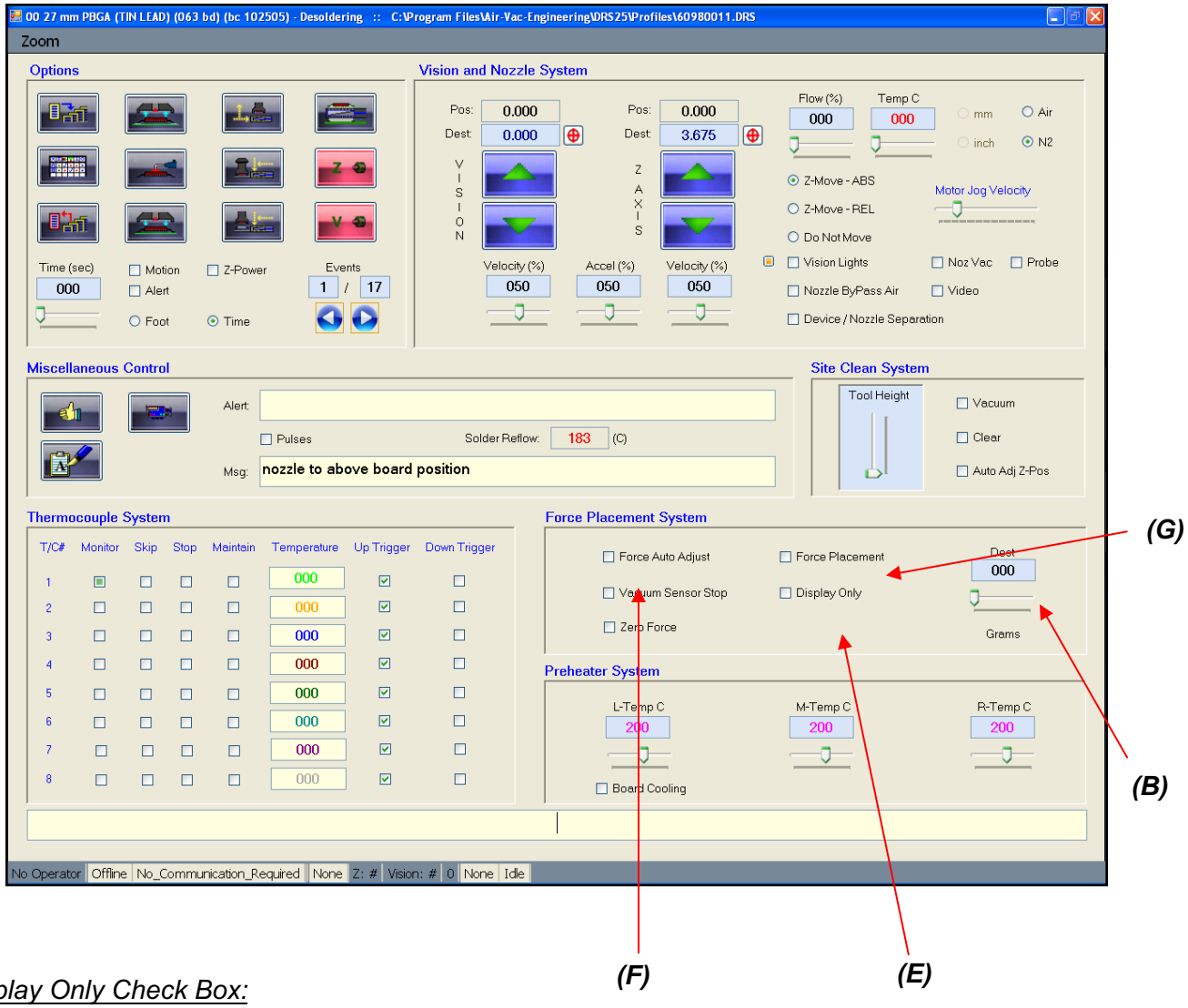


Jog Check Box:

The **Jog** trackbar *(C)* controls the maximum axis (**Z** and **Vision**) velocity that is used when the jog buttons *(C)* are pressed.

Force System:

The force system, when combined with Z-axis motion, can be used to develop a close-loop component placement (removal) event.



Display Only Check Box:

The **Display Only** check box *(E)* will allow the force value to be displayed/programmed during the entire event (**Run** screen). There are no force control actions associated with this option.

Display Only Check Box:

The force Destination (B) value allows the operator to fine tune the applied placement (removal) force. Force is measured in grams or newtons.

Placement/Removal:

The **Placement/Removal** check box *(G)* allows the operator to program a force placement (removal) event. Force placement detects and controls a positive, downward motion. Force removal detects and controls a negative, upward motion. Typically, negative force is created when a component is being lifted before the required solder reflow temperature has occurred.

Auto Adjust:

During the heating process, the nozzle, the board or the component may experience expansion or growth. The **Auto Adjust** *(F)* check box allows the operator to adjust/control the applied force that occurs during an event (**Run** screen). The force **Destination** and **Range** values are used as a target/control points for the adjustment procedure.

For **Force** removal testing, the nozzle can be lowered to the component engagement position. At this point, the nozzle vacuum should be activated. Clicking on the **Zero Force** *(A)* button will clear any currently applied force that may have been generated during the **X/Y/Z** axis positioning. The operator can then manually (powered or de-powered) raise the component while watching the **Actual** *(H)* force display. A negative force will be displayed just before the nozzle breaks loose from the component. This negative force can be used to determine the success of a removal process (**Run** screen).

Examples: Force Placement

Standard Force Placement

Step 1: Program a **Z-axis** component position that is slightly above the board. Select the **Zero Force** check box.

Step 2: To the same event, the operator must enter a **Destination** *(B)* force value.

Step 3: All events beyond the actual force placement event (steps 1,2) must be designed to eliminate any **Z-axis** motion. This is accomplished by checking the **Do Not Move** radio button.

Note:

STANDARD FORCE PLACEMENT DOES NOT CONSIDER ANY FORCE CHANGES THAT MAY OCCUR DURING SUBSEQUENT HEATING EVENTS.

Force Placement / Auto Adjustment

Step 1: Program a Z-axis component position that is slightly above the board. Select the **Zero Force** check box.

Step 2: To the same event, the operator must enter a **Destination** *(B)* force value.

Step 3: All events beyond the actual force placement event (steps 1,2) must be designed to eliminate any **Z-axis** motion. This is accomplished by checking the **Do Not Move** radio button.

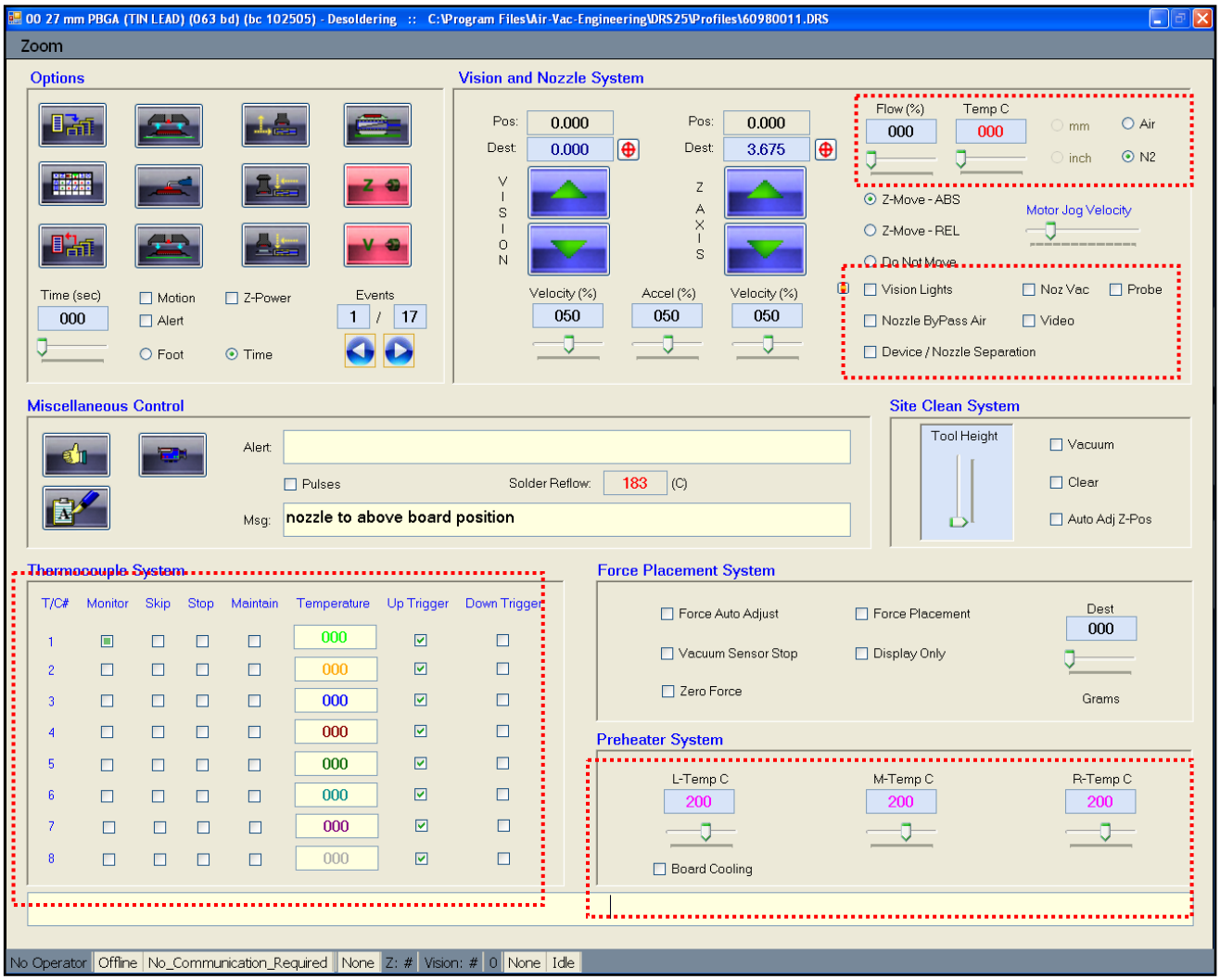
Step 4: Any event that has the **Auto Adjustment** check box selected will allow the system to make force corrections. These corrections may be necessary due to board, nozzle or component expansion and will only be applied if the actual force is outside the force/range tolerance.

Device Control:

Device control includes the following programming tools: flow rate, temperature vacuum, video, lights and thermocouples. These event elements are activated after all the required motion has been completed (**Z, Vision** and **Force** placement).

Note:

IT IS IMPORTANT TO REMEMBER THE PRIORITY OF EVENT PROCESSING. SOME DEVICE CONTROL ELEMENTS SHOULD BE ACTIVATED BEFORE THE CURRENT EVENT IS PROCESSED. FOR EXAMPLE, IT IS IMPORTANT TO ACTIVATE NOZZLE VACUUM IN THE EVENT PRIOR TO THE COMPONENT REMOVAL MOTION EVENT.



Nozzle Heater Temperature, Flow Rate and Temperature:

The nozzle heater temperature **(TempºC)** *(B)* can be programmed from 0ºC to 450ºC.

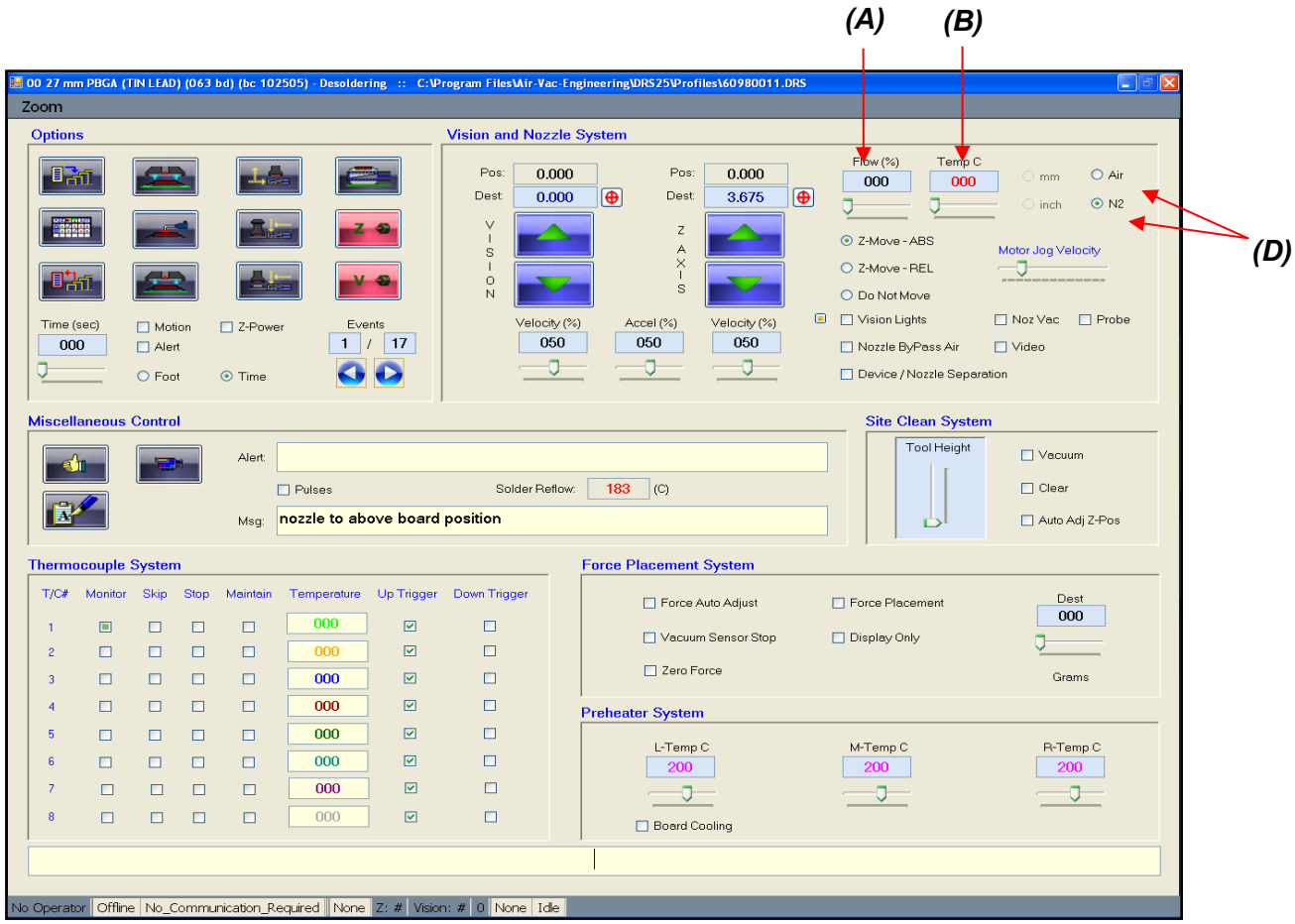
The nozzle flow rate **(Rate%)** *(A)* can be programmed from 15% to 110% (100% represents 2.75 scfm). A flow rate range between 15% and 19% allows a maximum temperature of 325ºC.

Air / Nitrogen Option:

The pressure source connection for the upper heater can be **Air** or **Nitrogen** *(D)*. Selecting the **Air** option automatically connects to the upper heater to the main air source (large blue hose). The main air source is also used by the vacuum and cooling systems. Selecting the **Nitrogen** option automatically connects the upper heater to the secondary pressure connection (smaller blue hose or yellow/black hose). This secondary pressure source is generally connected to nitrogen. If nitrogen is not available, this required connection must be made to air.

Note: The secondary pressure connection typically provides a more stable flow rate environment and should be considered for all placement/soldering events.

Note: If nitrogen conservation is a critical facilities issue, applications can be programmed to only use the nitrogen option during process steps where stabile flow rate is essential.

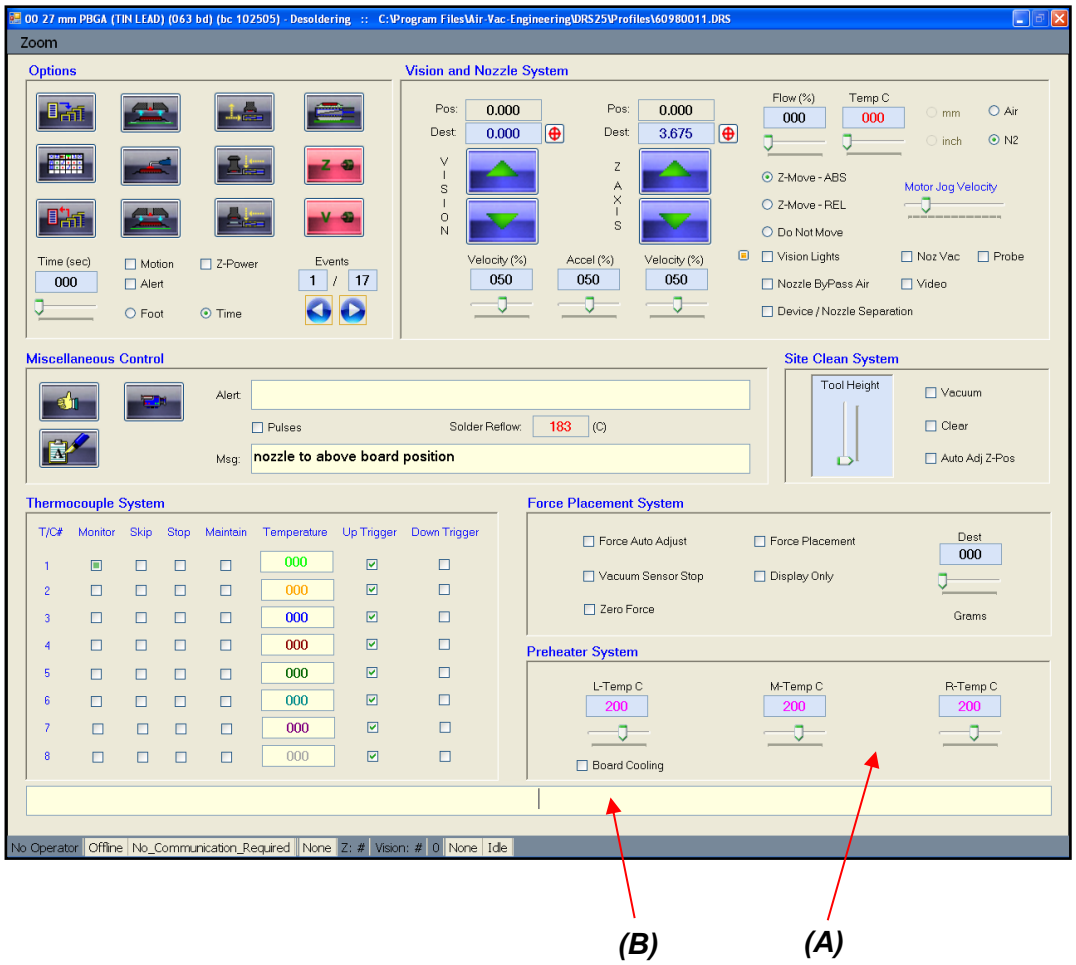


Lower Heating System Temperature and Flow Rate:

The lower heating system (bottom) can independently (A) control (flow rate and temperature) the left, right and middle side heating panels. For example, the left side panel can be used for soldering/desoldering a component, and the right side can be used for board cooling or solder pasting.

The lower heating system temperature **(TempºC)** can be programmed from 50ºC to 350ºC.

Note: During the process cycle (**Run** screen), the panel event controls will override any global diffuser idle that may have been activated.



Board Cooling (B) controls the air for the board cooling system.

- Unchecked means the system is off.
- Blue check means the air is set at low flow.
- Black check means the air is set at high flow.

Probe Vacuum Check Box:

The **Probe** check box *(B)* allows the operator to program a special vacuum port used for the probe handling tool. The probe handling tool helps to minimize any potential damage, to the component, during the load/removal procedure. Programming this check box (checked) will activate the vacuum for the current event (**Run** screen). A clear check box will deactivate the vacuum for the current event (**Run** screen).

Device / Nozzle Separation Check Box:

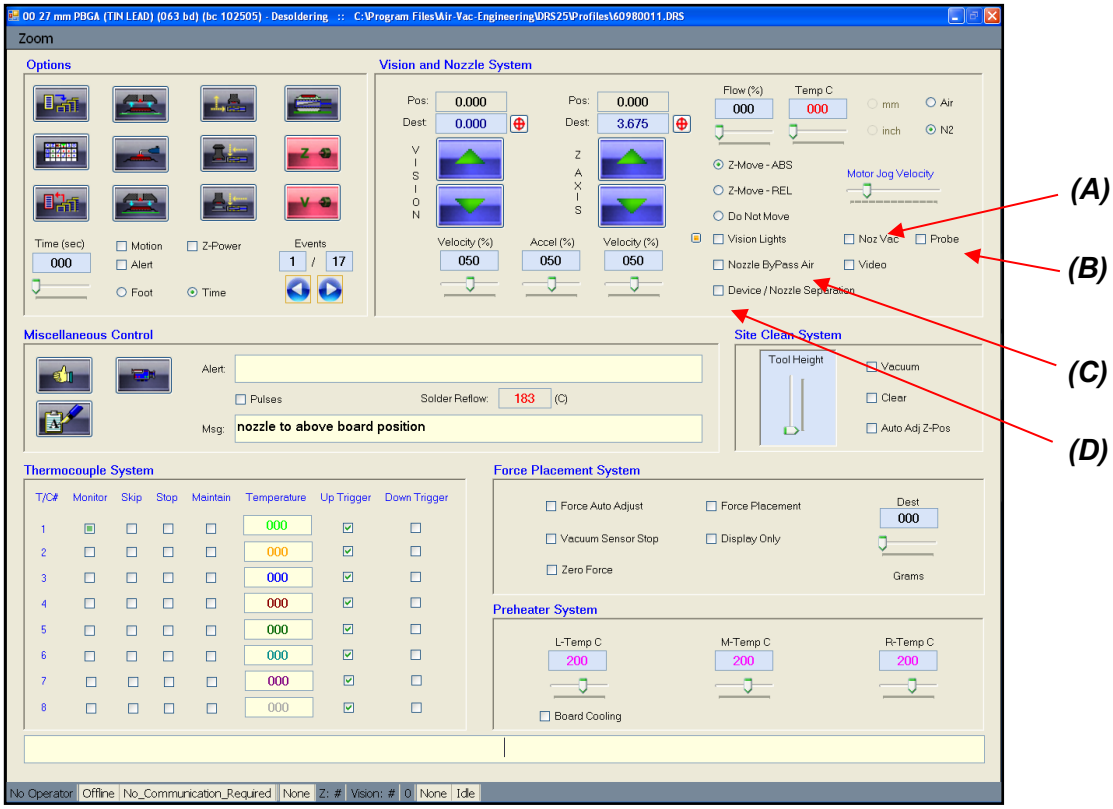
The Device/Nozzle Separation check box *(D)* allows the operator to program a small volume of air back through the nozzle vacuum tube. This puff of air helps to separate the component from the nozzle. Programming this check box (checked) will activate the air flow for the current event (**Run** screen). A clear check box will deactivate the air flow for the current event (**Run** screen).

Nozzle Vacuum Check Box:

The **Nozzle Vacuum** check box *(A)* allows the operator to program nozzle vacuum. The operator can use this device control to pick up or release the component at the appropriate process time. Programming this check box (checked) will activate the vacuum for the current event (**Run** screen). A clear check box will deactivate the vacuum for the current event (**Run** screen).

Cool Air Injection Check Box:

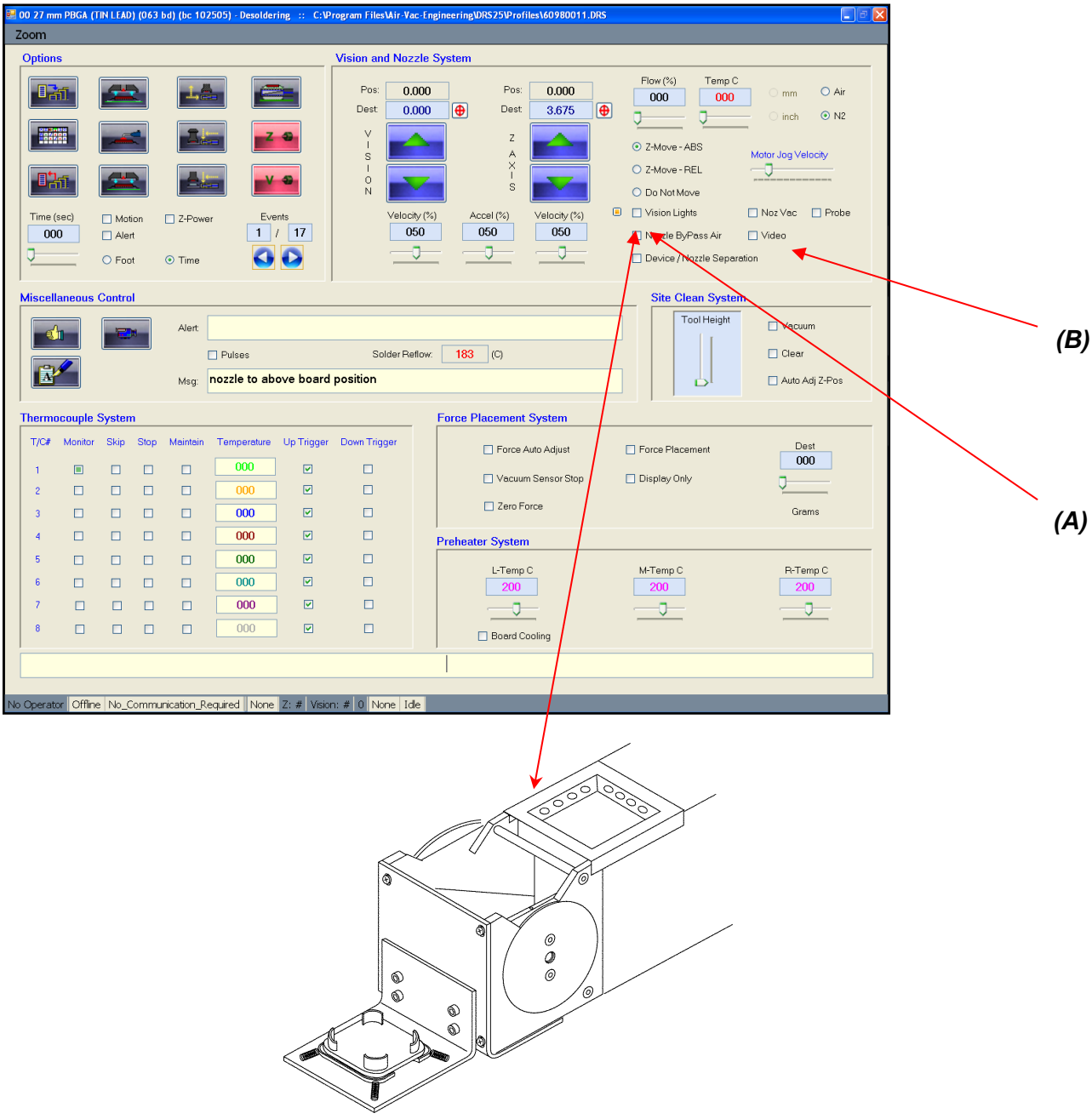
The **Cool Air Injection** *(C)* check box allows the operator to program an air flow bypass of the upper heating element (nozzle). If this option is installed, air can be routed around the heating element, producing cool air through the nozzle. Component cool down is an example of the potential usage.



Vision Lights and Video Check Box:

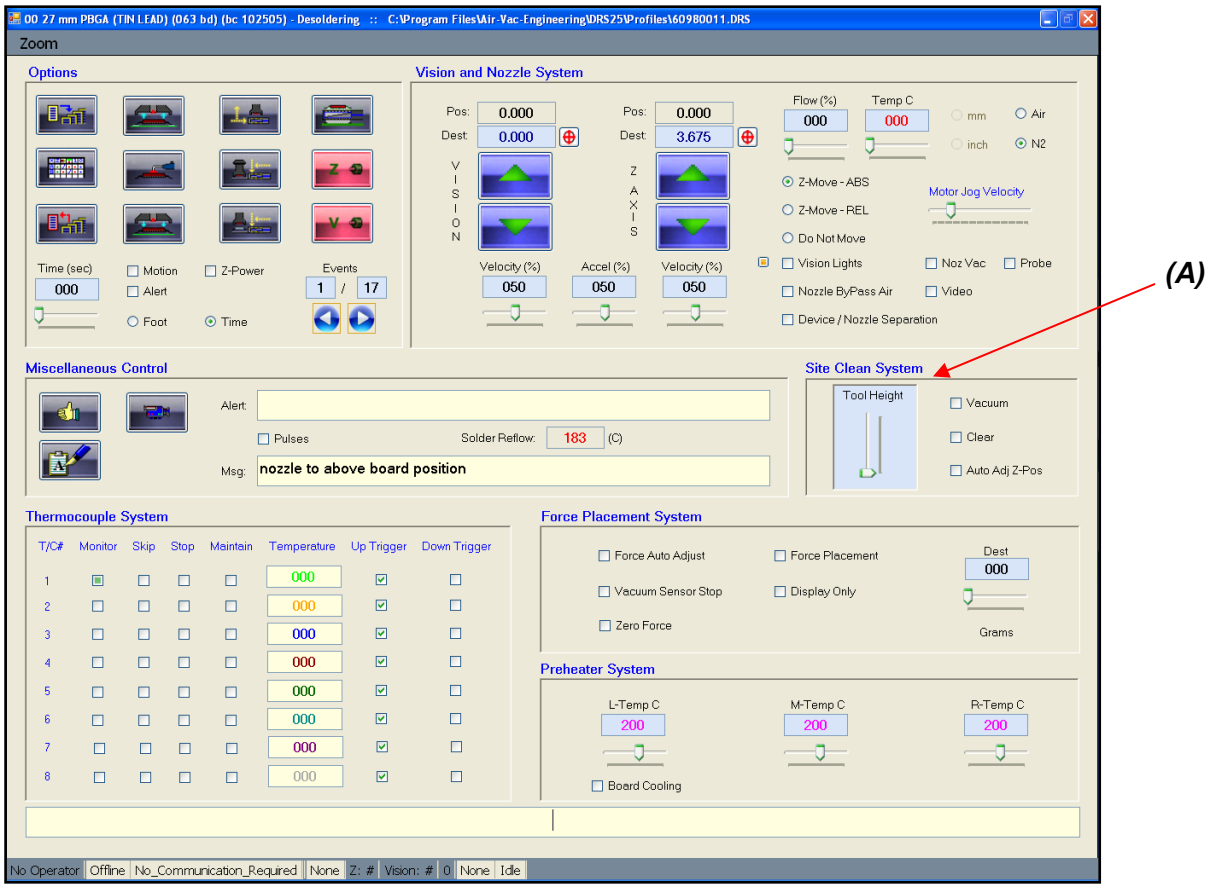
The **Vision Lights** check box *(A)* allows the operator to activate the vision system's fiber optic lighting. These lights are required for the component alignment procedure. Programming this check box (checked) will activate the fiber optic lighting for the current event (**Run** screen). A clear check box will deactivate the fiber optic lighting for the current event (**Run** screen).

The **Video** check box *(B)* allows the operator to activate the live video camera system. This video system can be used to display images on the computer monitor. Programming this check box (checked) will activate the video system for the current event (**Run** screen). A clear check box will deactivate the video system for the current event (**Run** screen).



Site Cleaning:

The **Site Cleaning System** *(A)* allows the operator to program a special vacuum port used for site cleaning. The site cleaning tool requires a vacuum source to remove the molten solder from the site. Programming this check box (checked) will activate the vacuum for the current event (**Run** screen). A clear check box will deactivate the vacuum for the current event (**Run** screen).

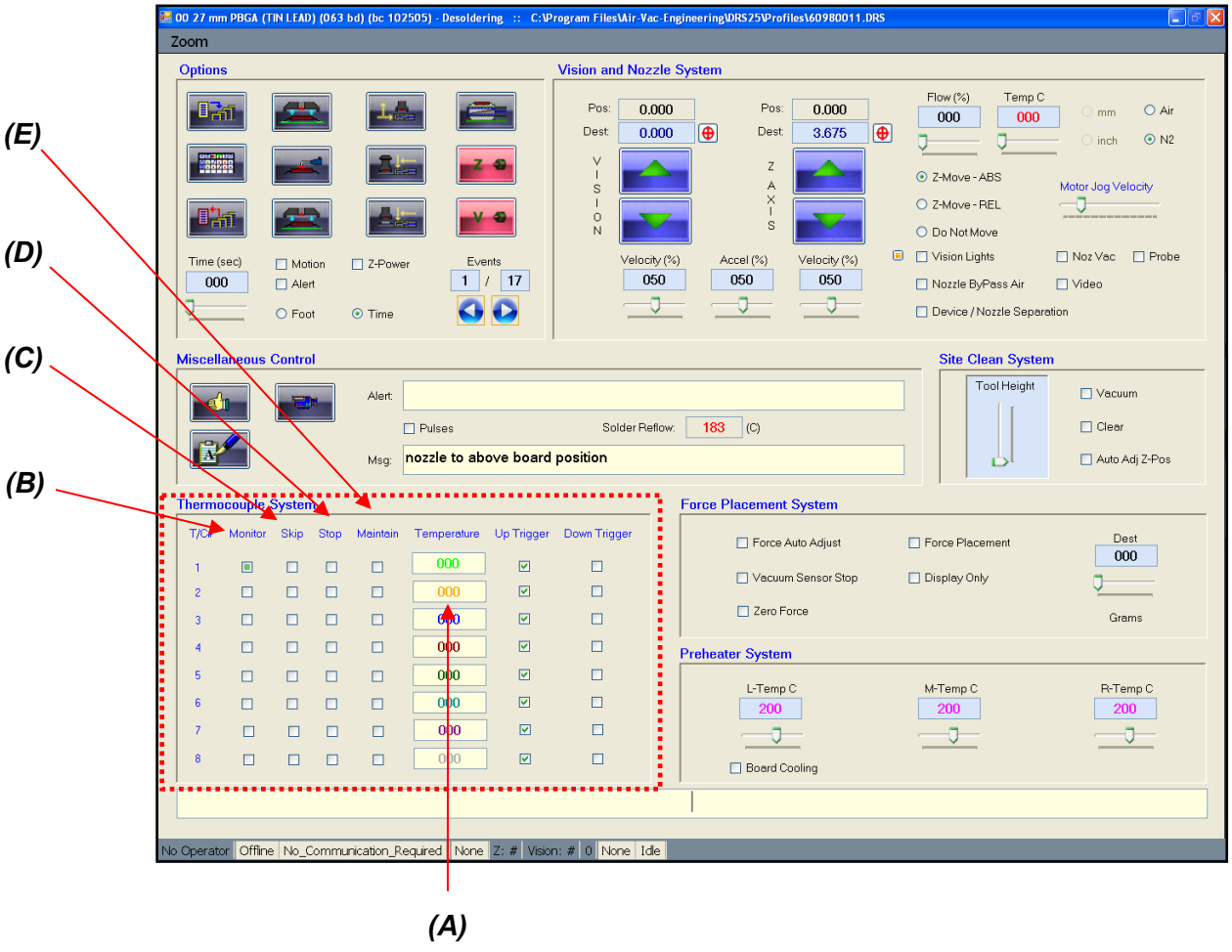


Thermocouple System:

The **Thermocouple** system allows the operator to program process control thermocouples (K-type, maximum of 8). This system provides the operator with several control options: **Monitor**, **Skip**, **Stop** and **Maintain**. These control options can be used in a variety of ways to monitor, control or thermal-profile applications. Thermocouple control options can be changed from event to event.

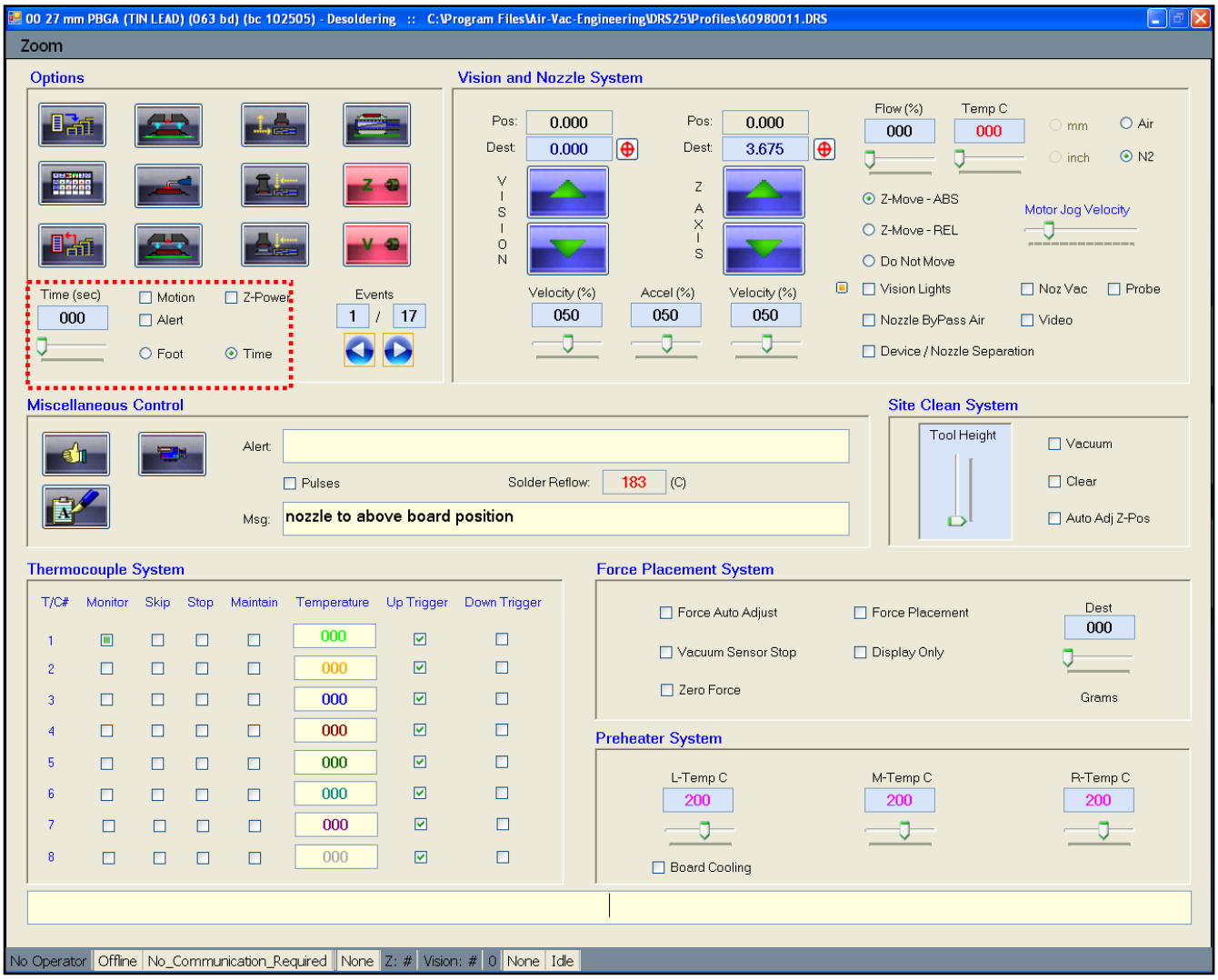
Process Control Options

- **Monitor** *(B):* This control option monitors a thermocouple channel during the process cycle.
- **Skip** *(C):* This control option monitors a thermocouple channel during the process cycle. In addition, this control option requires a target temperature *(A)* to be programmed. This target temperature is used to trigger an event change. Target temperatures can be defined as increasing (heating cycle) or decreasing (cool down cycle).
- **Stop** *(D):* This control option monitors a thermocouple channel during the process cycle. In addition, this control option requires a target temperature *(A)* to be programmed. This target temperature is used to stop the process cycle. Target temperatures can be defined as increasing (heating cycle) or decreasing (cool down cycle).
- **Maintain** *(E):* Not functional.



Duration - Time or Foot Switch:

After programming any motion and device control (for a specific event), the operator has the ability to add a time delay (duration). This delay can be **Time** (fixed seconds) or **Foot** switch based. A **Time** based event can be programmed from 0-600 seconds. A **Foot** switch based event is only limited by the maximum profile time (45 minutes). Delays typically allow activities, such as heating cycles or operator interaction (component alignment), to be time-tracked and graphically plotted.



Application Notes:

This screen allows application specific notes to be entered. These notes are made available to the operator during the **Run** cycle.

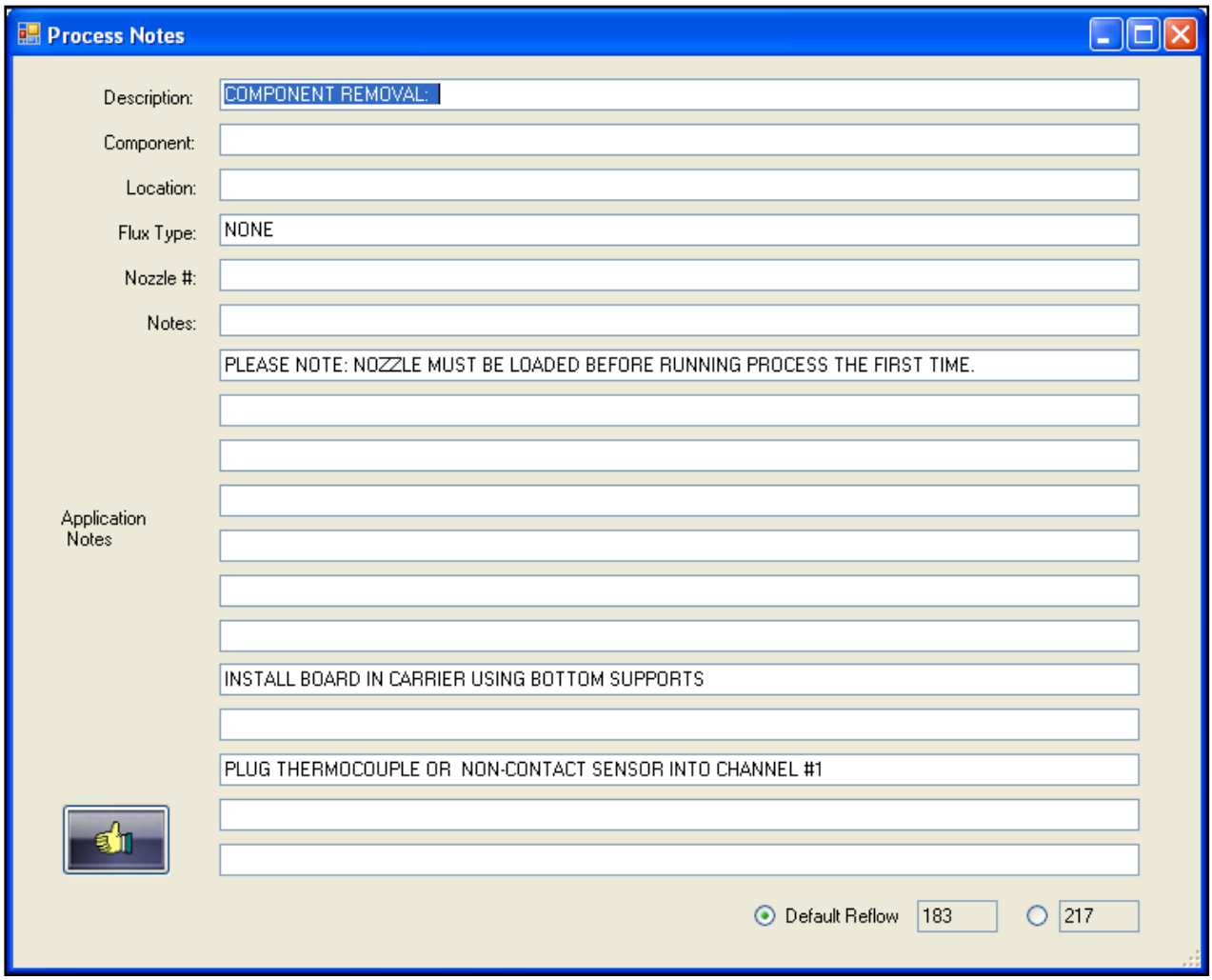
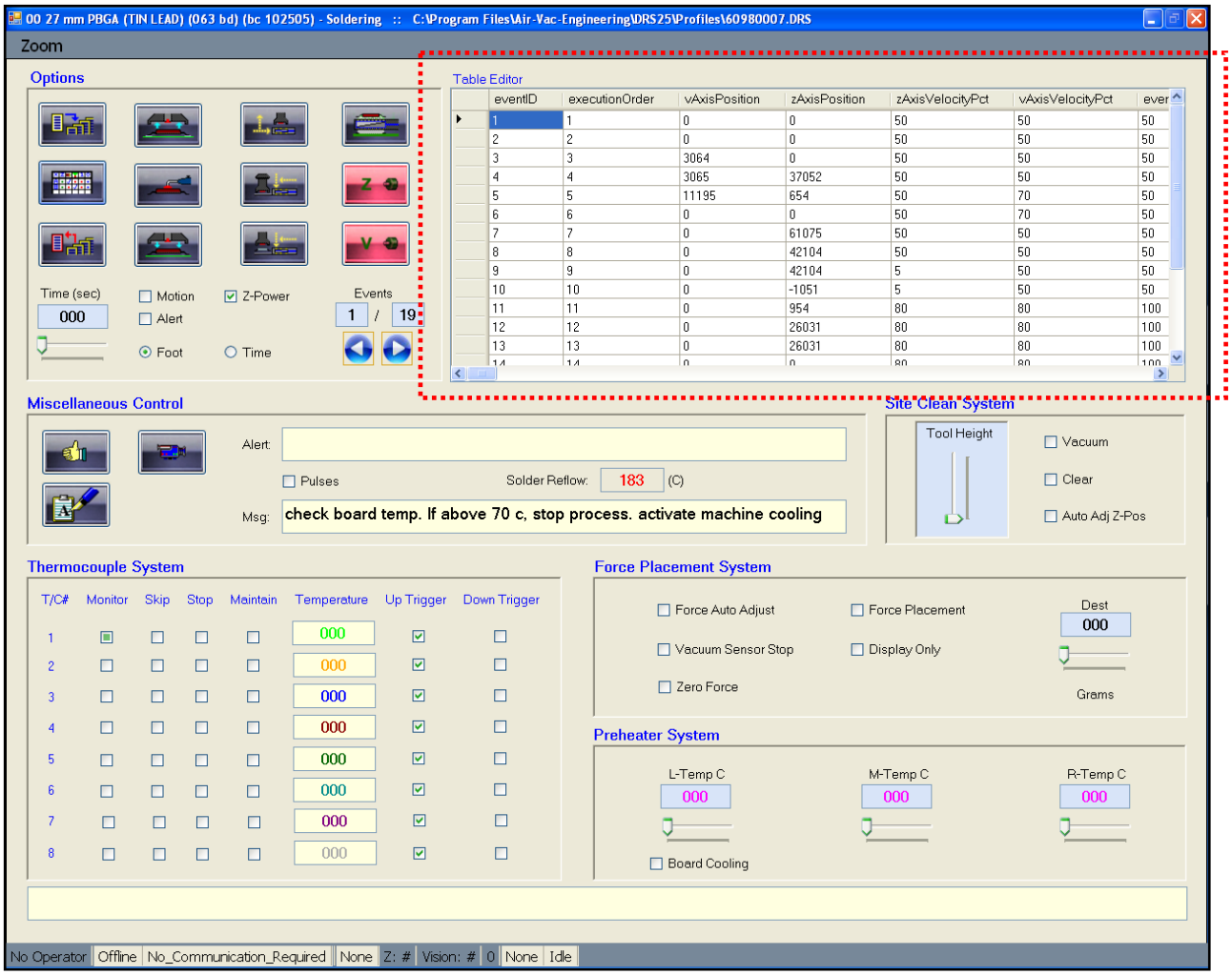


Table Event Editor:

The **Table Event Editor** allows the operator to adjust all profile control parameters using a tabular form.



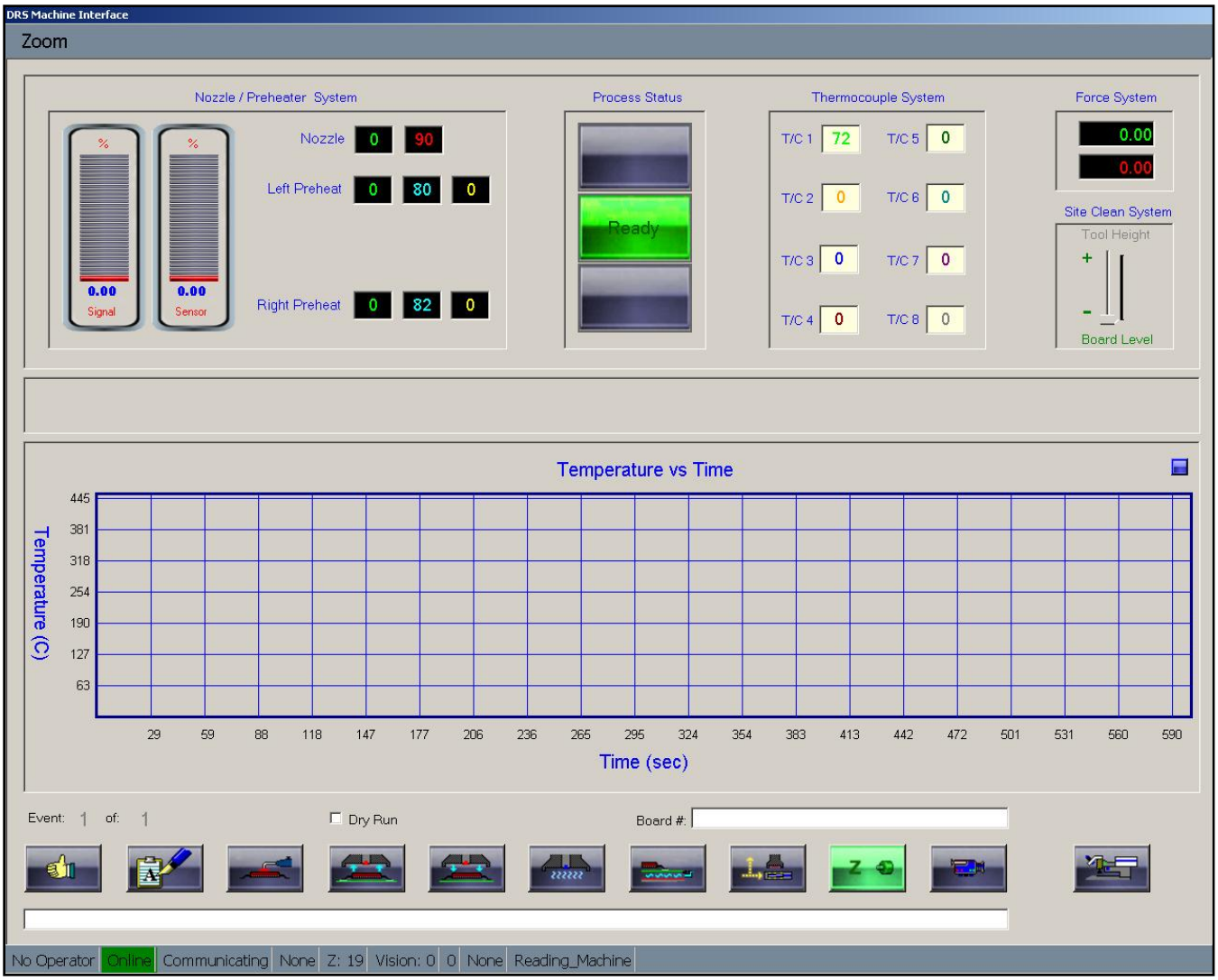
The Table Event Editor provides the operator with the ability to quickly adjust any information contained in the parameter control table.

Run Process:

The **Run** screen allows the operator to cycle a process profile. A profile must first be opened using the **Open** option or created using the **Tutor / Teach** options. During each event of the cycle, the system continuously monitors and reports the following control information:

- Heater and thermocouple temperatures.
- Nozzle and diffuser flow rates.
- Force placement (removal) procedures.
- Foot switch control.
- Alarm conditions.

Event messages and temperature plotting graphically show the progress of a cycle.



The **Cycle Start/Stop** button is used to activate or terminate the process cycle. This button will display a green background when the cycle is active or a gray background when the cycle is not active. Clicking on this button when the background is green will terminate the cycle.

Note:

DURING THE CYCLE, THE OPERATOR MAY BE PROMPTED TO PRESS THE FOOT SWITCH BEFORE ANY PROCESSING CAN CONTINUE. SOME EVENTS ARE DESIGNED TO ALLOW THE OPERATOR TO PERFORM A MANUAL TASK (FINAL COMPONENT ALIGNMENT).

Alarm Control

The DRS24 constantly monitors the controlling sub-systems. If any sub-system fails due to a process or hardware issue, the system will respond with an alarm.

There exist 2 types of software alarms:

1. Machine Hardware Alarms
2. Process Alarms

Machine Hardware Alarms

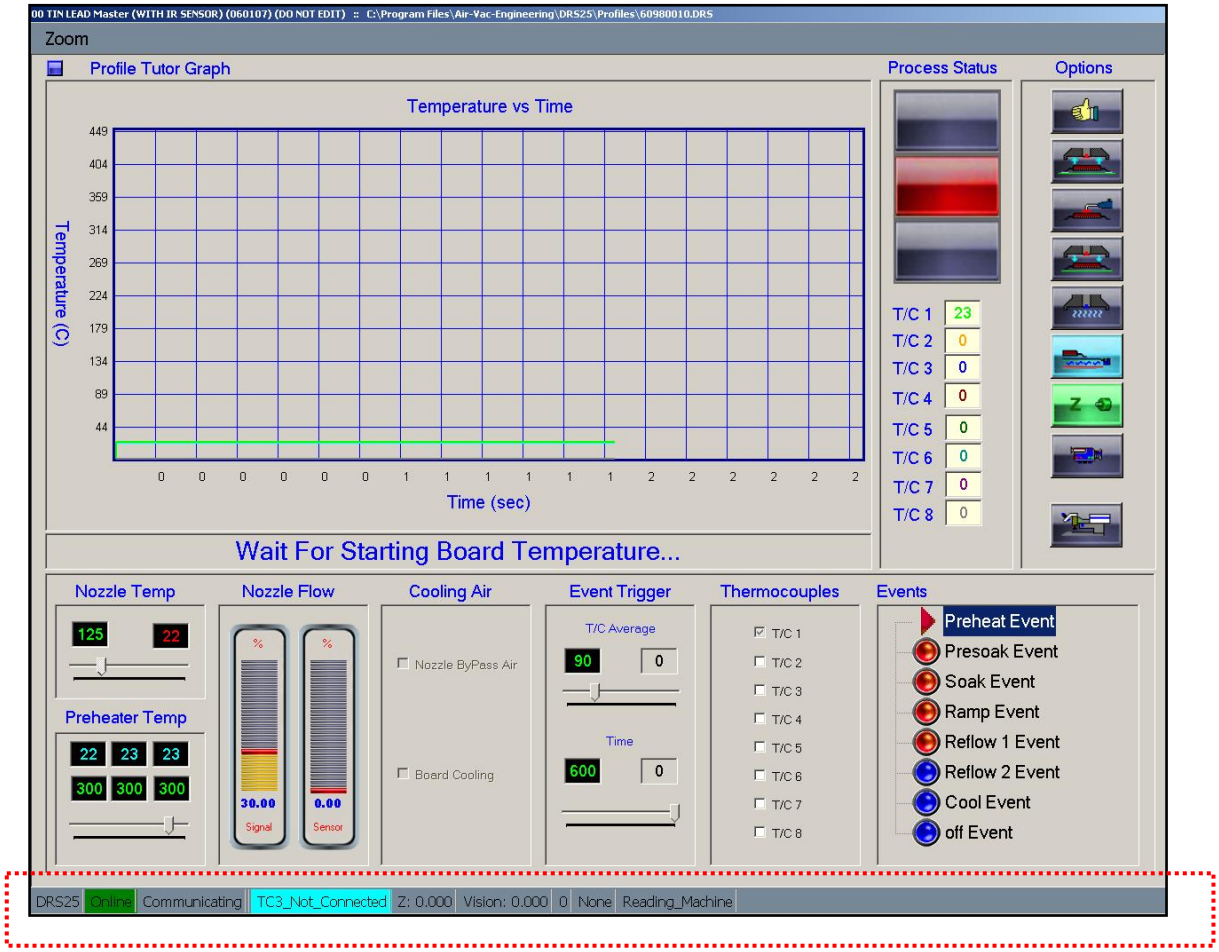
This alarm type occurs when one of the following conditions is detected:

```
SerialPort_Failure
Z_Axis_Motor_Comm_Restart
Vision_Axis_Motor_Comm_Restart
Nozzle_TempControl_Comm_Restart
Left_Preheat_TempControl_Comm_Restart
Right_Preheat_TempControl_Comm_Restart
Center_Preheat_TempControl_Comm_Restart
DeviceIO_Communication_Restart
Low_Pressure_Air_Regulator
Low_Pressure_N2_Regulator
```

Process Alarms

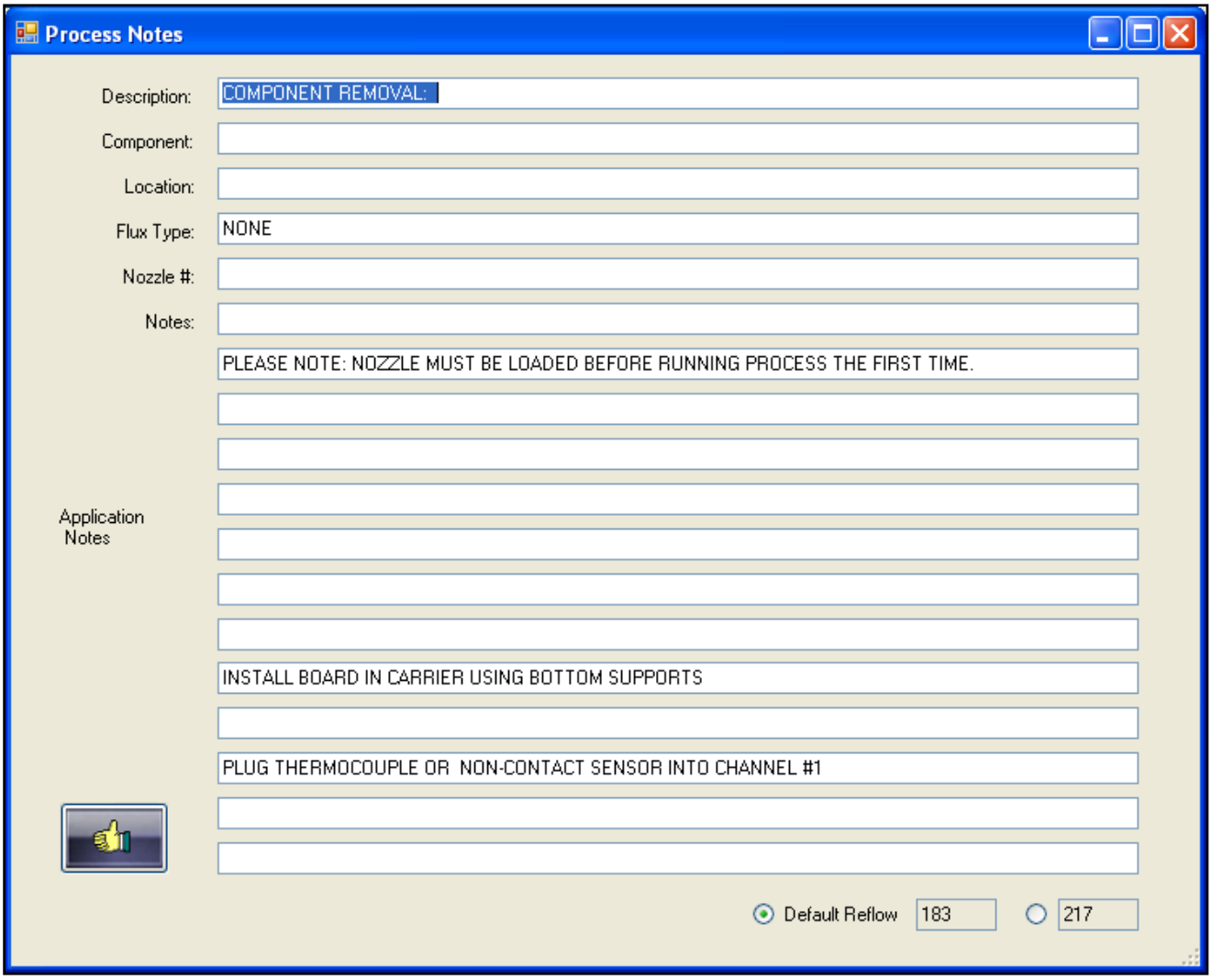
This alarm type occurs when one of the following conditions is detected:

```
Nozzle_Temperature_Limit,
Nozzle_TC_Error,
Left_Preheater_Temperature_Limit,
Left_Preheater_TC_Error,
Right_Preheater_Temperature_Limit,
Right_Preheater_TC_Error,
Center_Preheater_Temperature_Limit,
Center_Preheater_TC_Error,
Below_Minimum_Nozzle_Flow_Rate,
Nozzle_Flow_Sensor_In_Position_Failed,
Exceeded_Max_FootSwitch_Delay,
Exceeded_Max_TC_Control_Delay,
TC1_Not_Connected,
TC2_Not_Connected,
TC3_Not_Connected,
TC4_Not_Connected,
TC5_Not_Connected,
TC6_Not_Connected,
TC7_Not_Connected,
TC8_Not_Connected,
Site_Clean_Tool_Clogged
```



Profile Notes Page

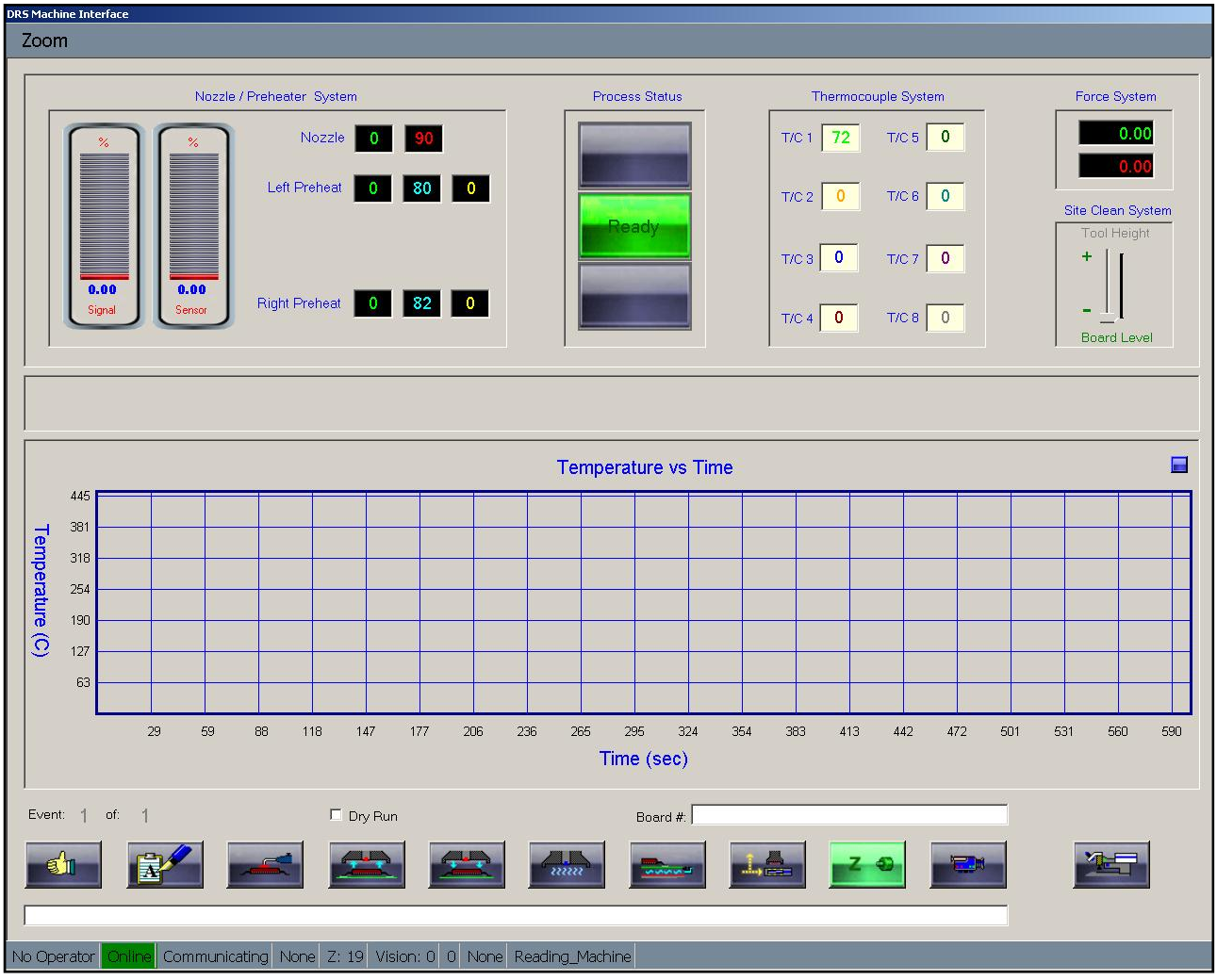
The **Profile Notes** button allows the operator to refer to any application related notes that may have been setup by the process engineer. The operator cannot access these notes while a cycle is active.



General Run Screen Layout:

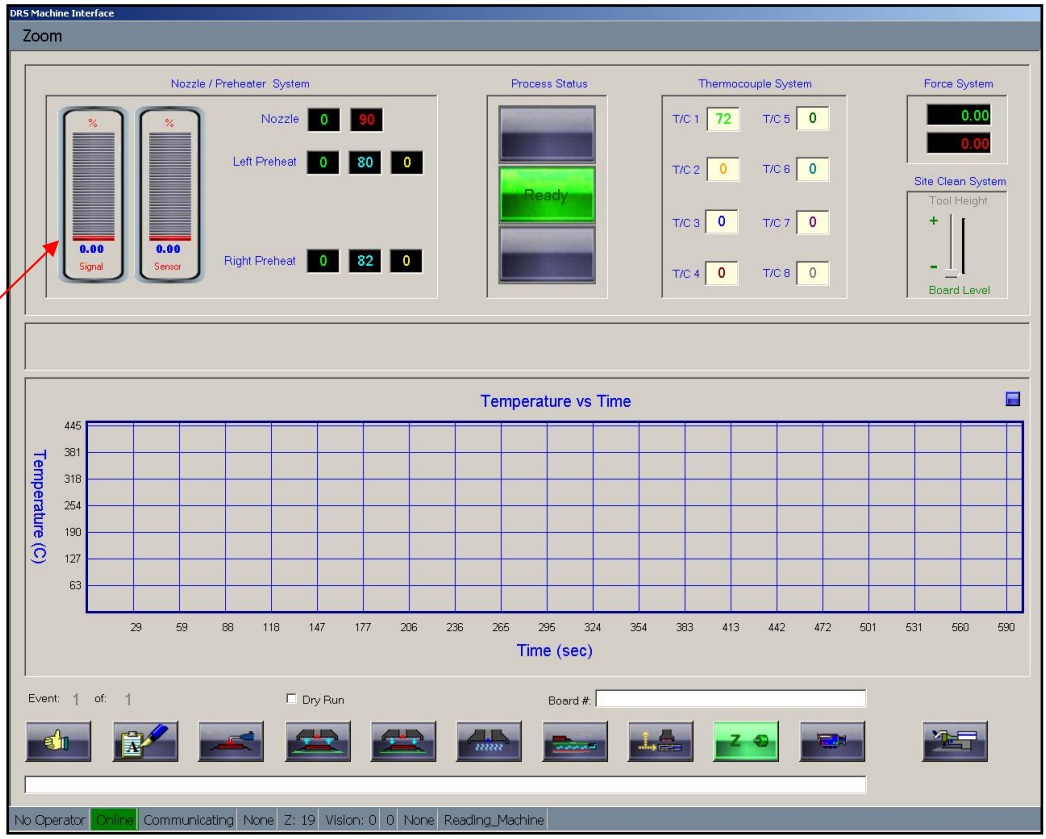
The Run screen is organized into the following sections:

- Numeric Process Information
- Profile Event / Alert / Foot Switch Messages
- Graph Process Information
- Event Time
- Event Counter
- Process Time
- Button Functions
- Software/Hardware Communication Link Error Status
- Bar Code / Board Serial Number Tracking
- Menu Functions

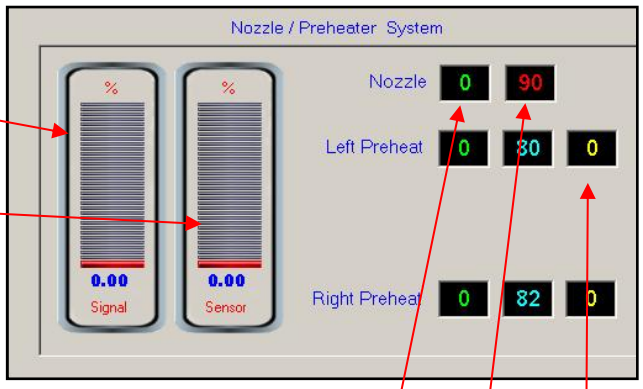


Numeric Process Information (A)

This section of the **Run** screen displays numeric information associated with process temperature, flow rate, force and thermocouples.



(A)



(A)

(B)

(C) *(D)* *(E)*

Nozzle and Preheater System:

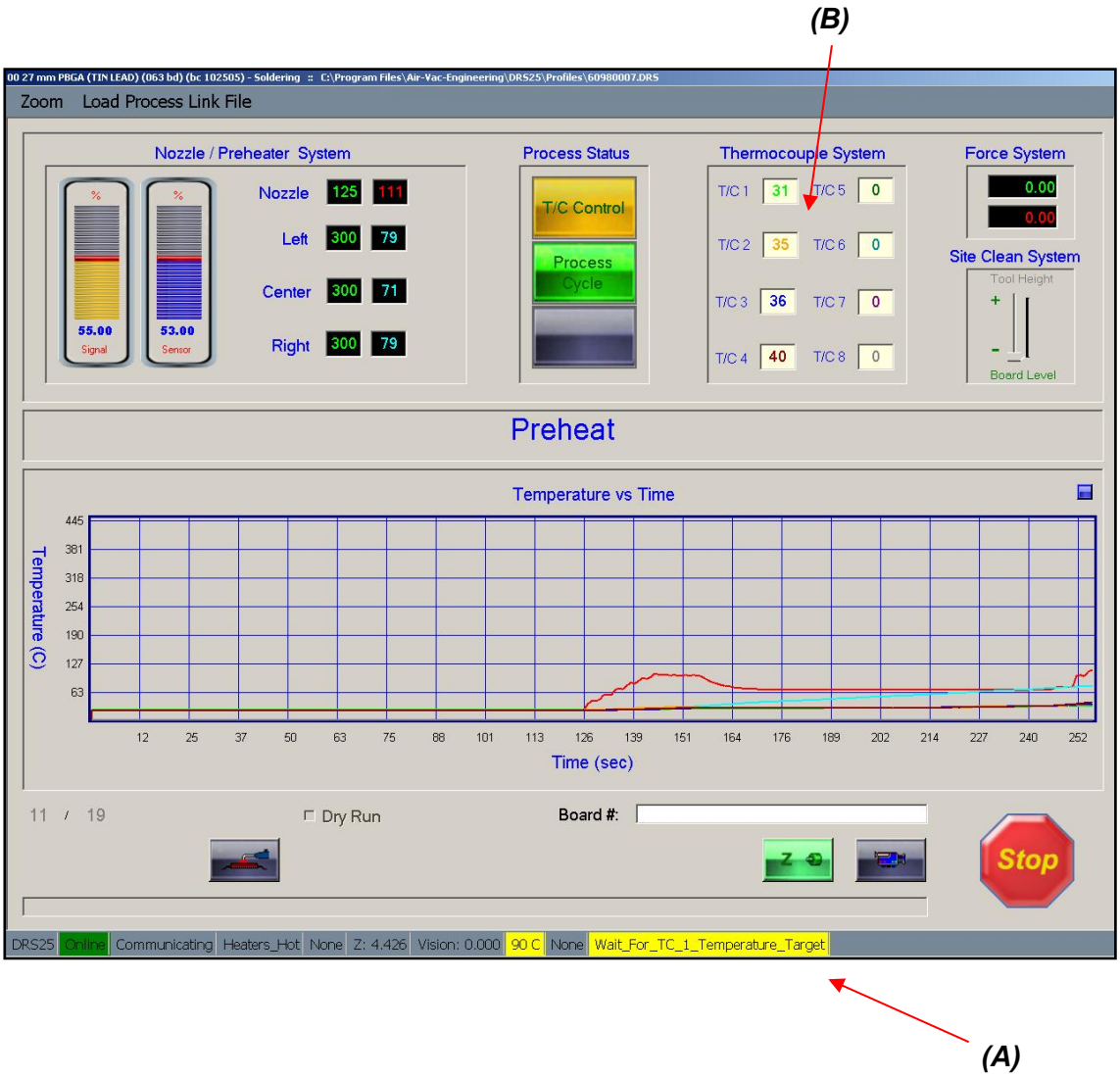
The **Nozzle System** (upper heater) graphically displays the following control parameters:

- Nozzle flow rate percentage (set point) *(A)* – yellow needle
- Nozzle flow rate actual percentage *(B)* – blue needle
- Nozzle target temperature (set point) *(C)* – green number
- Nozzle actual temperature *(D)* – red number
- Preheater idle temperature (E) – yellow number

Thermocouple System:

The **Thermocouple System** has maximum of eight thermocouple channels. Only pre-programmed (active) channels will be displayed. Each channel will display an actual and a set point temperature. Each thermocouple channel has an identification number positioned between the set point and actual displays.

When a thermocouple channel is controlling the process, a yellow **T/C Control** *(A)* message will be displayed at the bottom of the screen. This message will define the type of thermocouple activity and the temperature target. A real-time display offers the current temperature of all thermocouple channels (B).



Note:

All active thermocouple channels must be connected to a thermocouple sensor before the process cycle is Started. Failure to do so will result in an alarm condition.

Force System:

This system monitors and controls the activities associated with component force placement, force removal or force adjustment.

The **Force System** graphically displays the following control parameters:

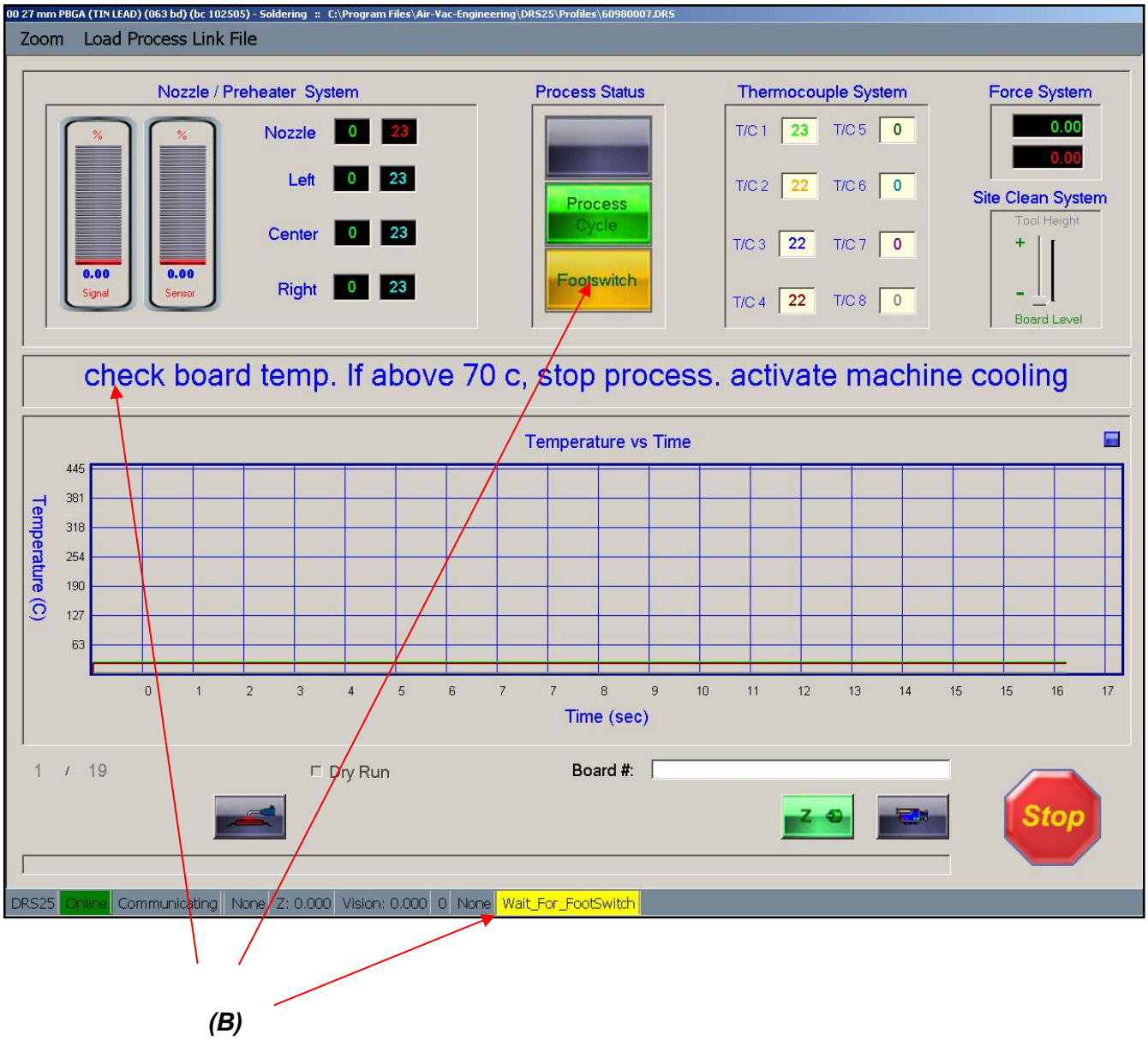
- Force target (set point - green).
- Force actual (applied force - red).

Note:

DURING ANY FORCE-CONTROLLED ACTIVITY (PLACEMENT/REMOVAL/ADJUSTMENT), THE OPERATOR SHOULD NOT TOUCH ANY PART OF THE MACHINE.

Profile Event and Foot Switch Messages (B)

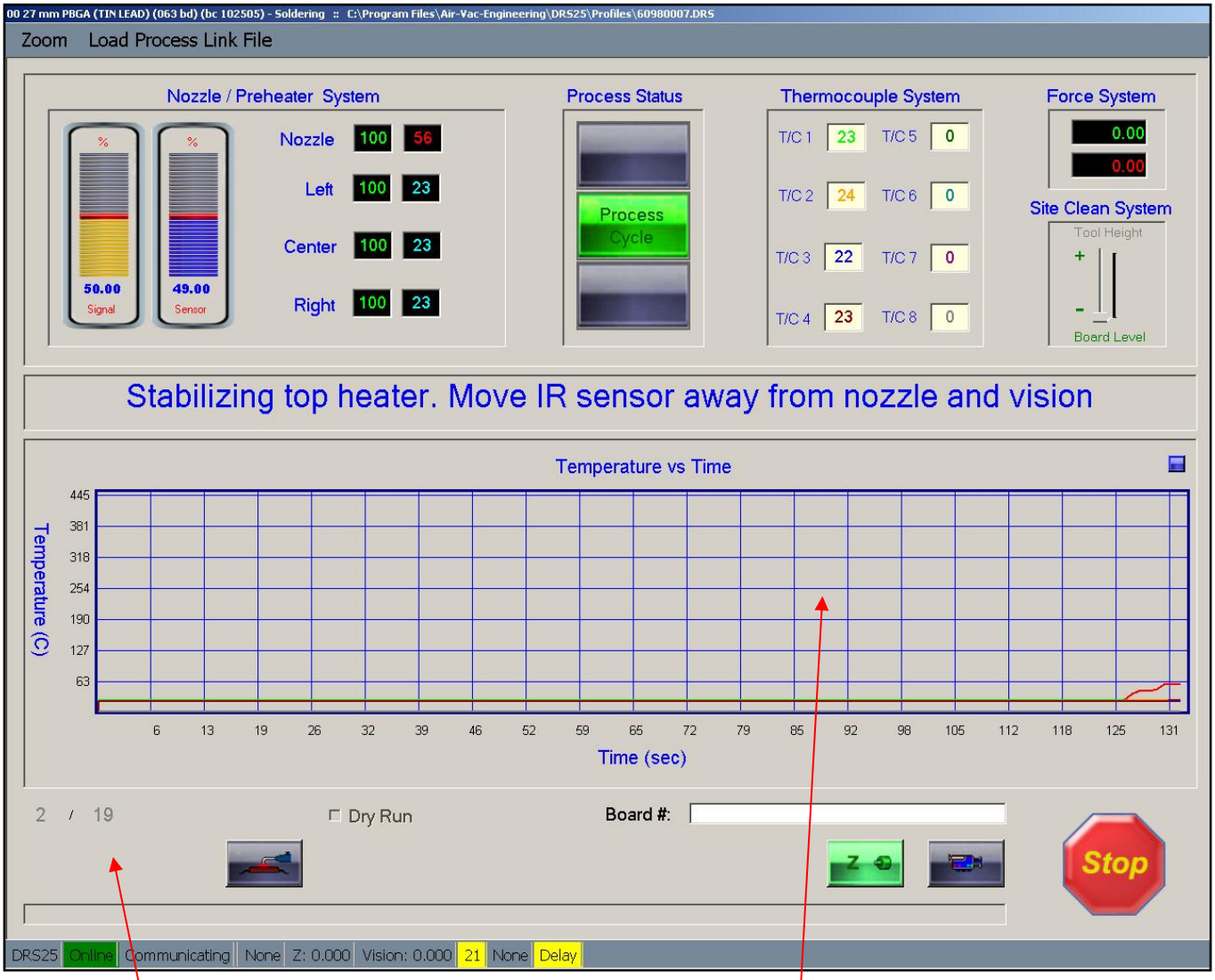
This section of the **Run** screen displays system (foot switch) messages or pre-programmed event/alert messages. Messages are used to inform the operator when machine interaction is required, or to communicate the general progress of the profile cycle.



(B)

Graph Process Information (C)

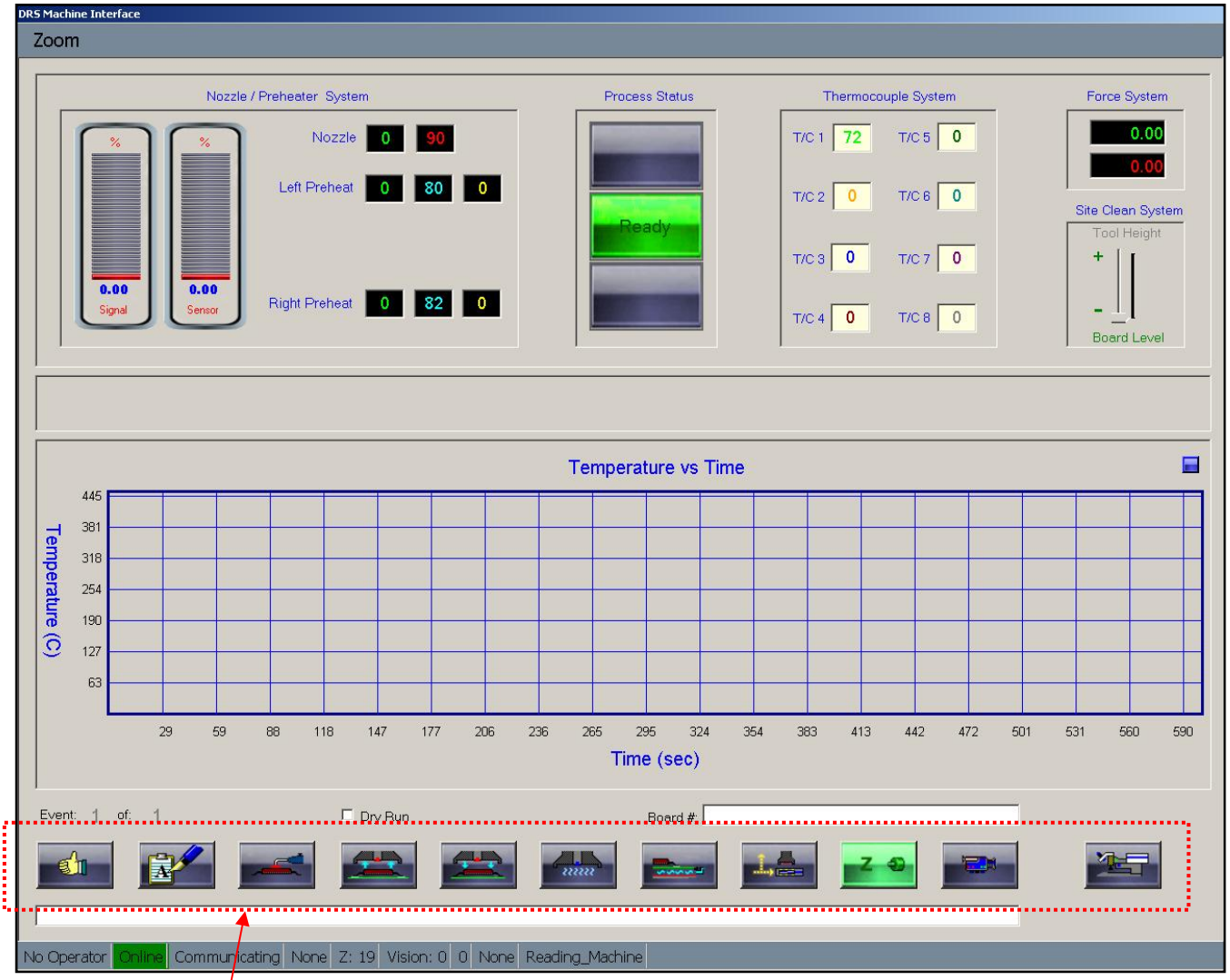
This section of the **Run** screen displays the **Temperature vs. Time** graph.



- Event Time (D) – Time remaining in the current event.
- Event Counter (E) – Current and maximum profile event counters.
- Process Time (F) – Total (overall) cycle time (all events) is plotted on the chart display.

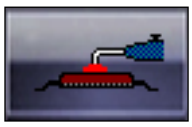
Function Buttons (G)

This section of the **Run** screen displays the function buttons that are available to the operator.



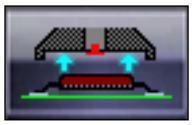
(G)

Probe Vacuum



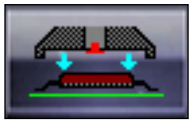
The **Probe Vacuum** button will activate or deactivate the special vacuum probe port (used with component handling tool).

Nozzle Vacuum



The **Nozzle Vacuum** button will activate or deactivate the nozzle vacuum. When this function is active, the button background will be display in green.

Nozzle Device Separation (Blow Off)

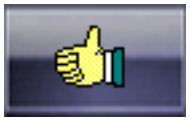


The **Device/Nozzle Separation** button will activate a small volume of air back through the nozzle vacuum tube (helps to separate the component from the nozzle). When this function is active, the button background will be display in green.

Cycle Start/Stop

The **Cycle Start/Stop** button is used to activate or terminate the process cycle. This button will display a stop sign symbol when the cycle is active or a machine symbol when the cycle is not active. Clicking on the button when the stop sign symbol is visible will terminate the cycle.

Thumbs Up / OK / Exit



This button will exit the **Run** screen and return the operator to the **Main** screen.

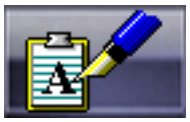
Board Cooling (High / Low Flow Rate)

This button will activate (toggle) through the available board cooling flow rates (low, high and off).

Nozzle Heater Air Flow By-Pass

This button will activate the nozzle heater by-pass flow rate. Cooling air flow will be directed around the nozzle heater and enter the nozzle chamber directly.

Application / Process Notes



This button will provide a form to review the application / process notes.

Home All Motors

This button will home all the Z and Vision motor axis.

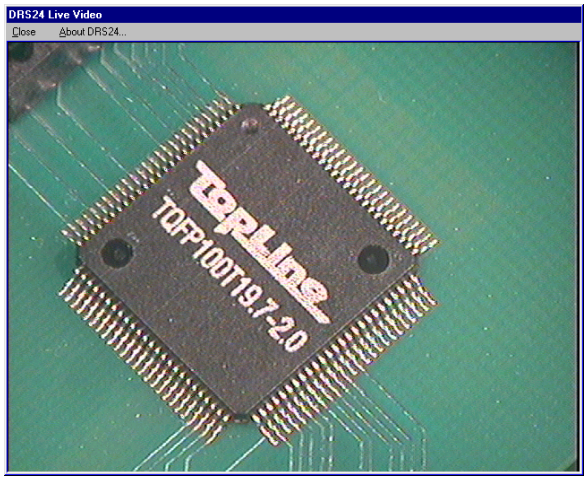
Live Video:

The **Live Video** button will activate the camera system and generate a live video image on the computer monitor. In addition, this button may turn on video lights for the direct view camera option (additional camera used to view the active process).

Note:

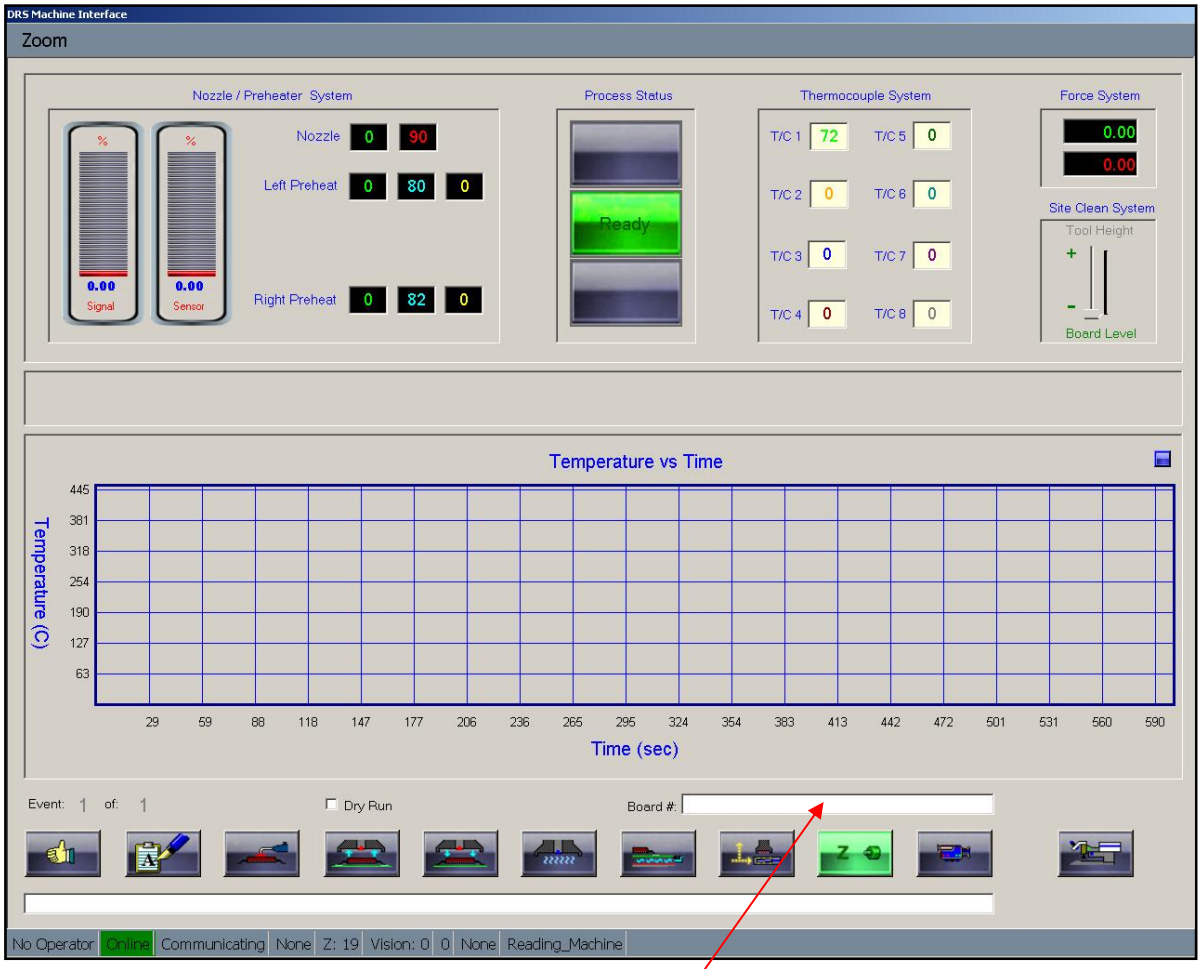
THE **ABOUT DRS25…** MENU OPTION WILL DISPLAY THE SOFTWARE VERSION NUMBER FOR THE **LIVE VIDEO** PROGRAM.

Live Video Window



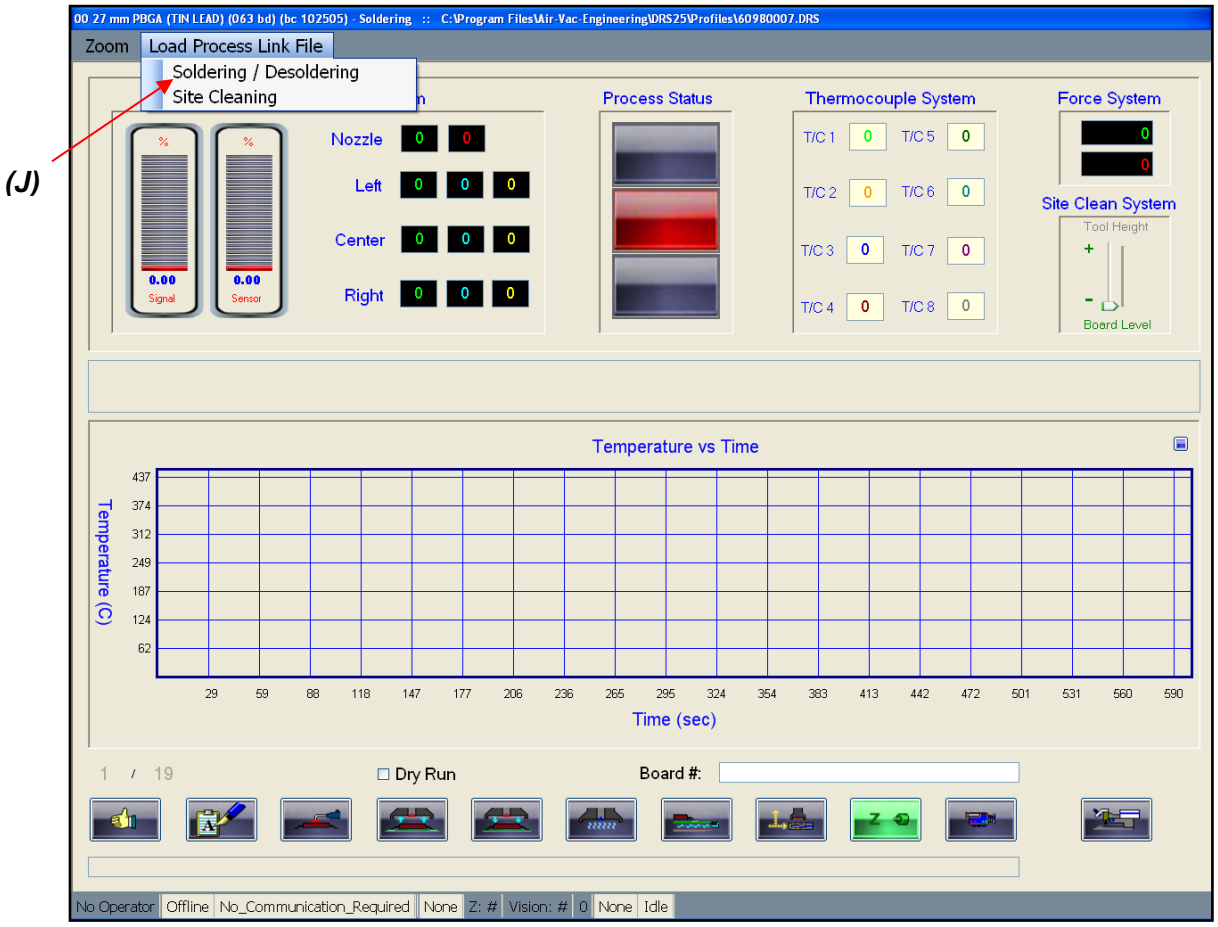
Bar Code / Board Serial Number Tracking (I)

This section of the **Run** screen allows a board serial number to be tracked and recorded in the cycle history file. The operator has the option to enter this information using the standard keyboard or to use the optional bar code scanner.



Menu Functions

This section of the **Run** screen displays the function menus that are available to the operator.



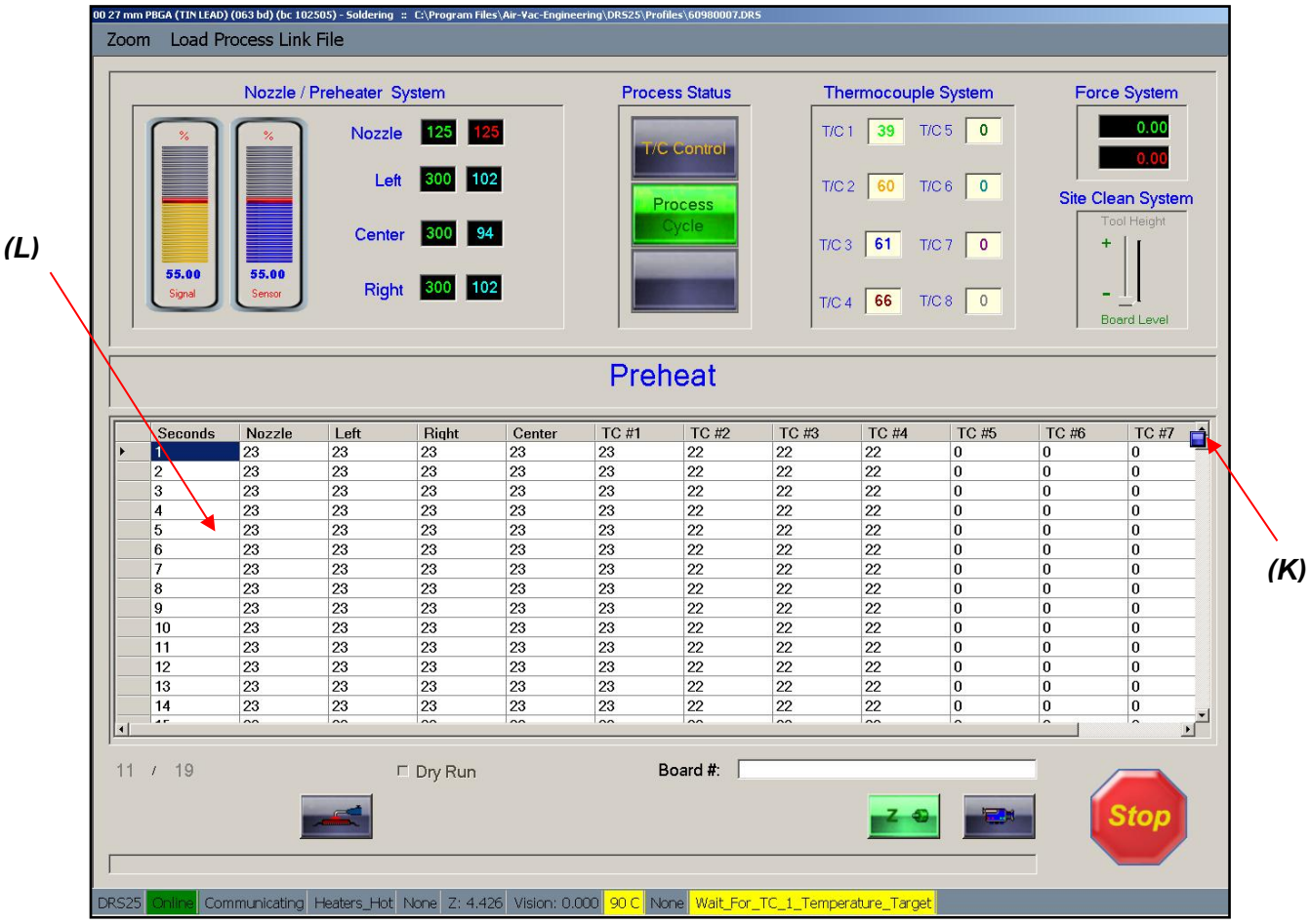
Load Process Link File Menu Option:

The **Load Process Link File** menu (J) allows the operator to toggle between the soldering, desoldering and site cleaning profiles. This allows related profiles to be cycled without leaving the **Run** screen. This menu option is only available when the process is not cycling.

Chart Data and Export History Option:

Graph data can be interactively reviewed or manually save to the export folder.

Double clicking on the chart display (L) will toggle the display from line graphics to a to data point table.



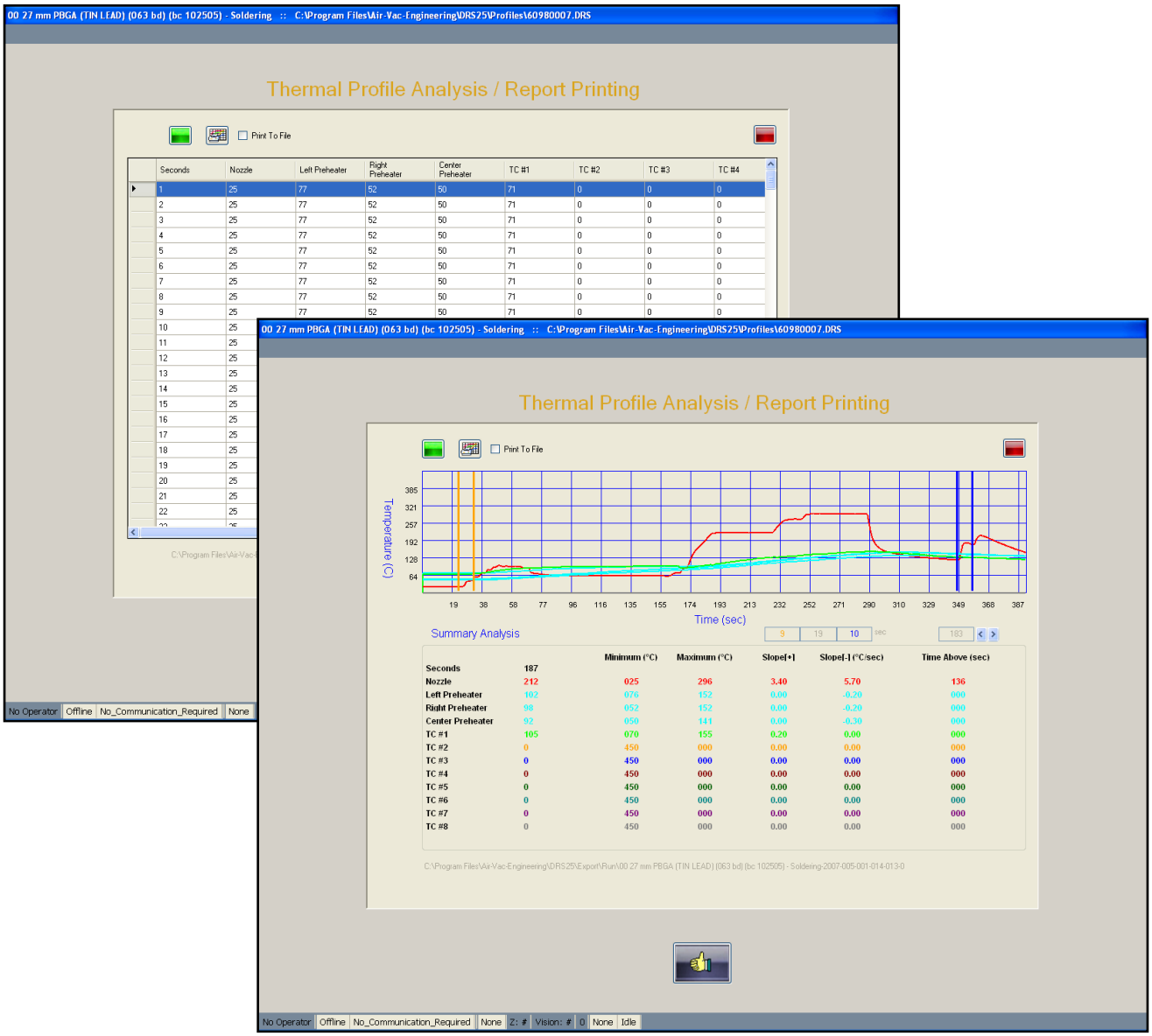
- Clicking on the small blue button (K) will export the chart data to the export folder **Export** directory:

  C:\Program Files\Air-Vac-Engineering\DRS25\Export\Run

- This information can be retrieved at a later time using the **Thermal Profile Analysis** utility.
- A help message will inform the operator that the graph data was successfully saved.

Thermal Profile Analysis / Printing:

This import menu allows the operator to reload and analyze historical graph data. Graph data is organized and stored using an 8 digit file sequence number.



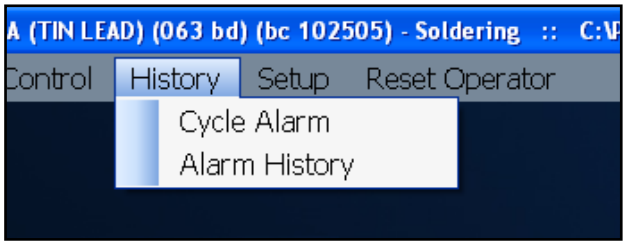
- Clicking on the green button will present a file browse window allowing the operator to select chart data files from one of the following folders:

  C:\Program Files\Air-Vac-Engineering\DRS25\Export\Run
  C:\Program Files\Air-Vac-Engineering\DRS25\Export\Tutor

- Clicking on the red button will toggle the display from line graphics to a to data point table.

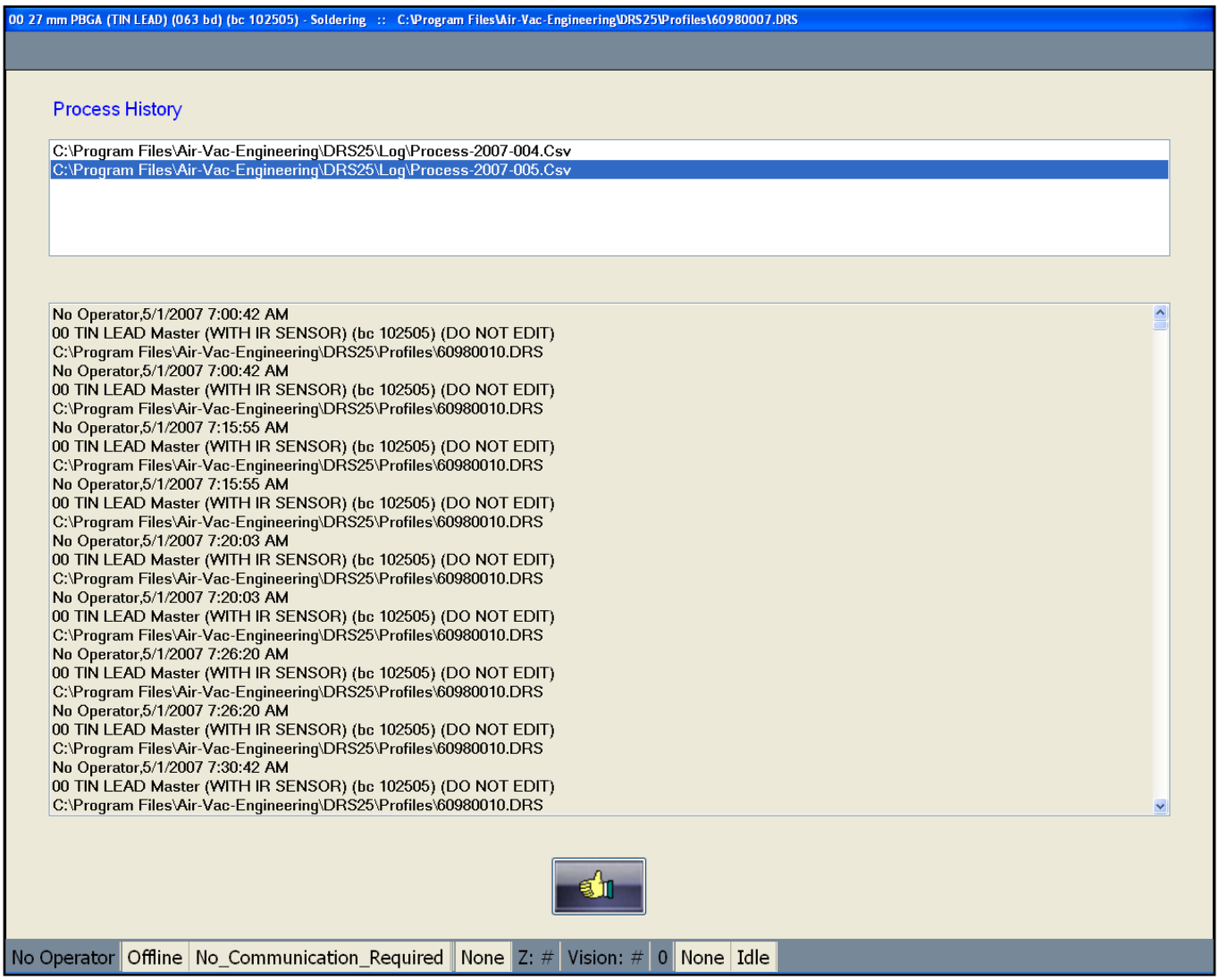
6.3 History Menu

The **History** menu has two options: **Cycle** and **Alarm**.



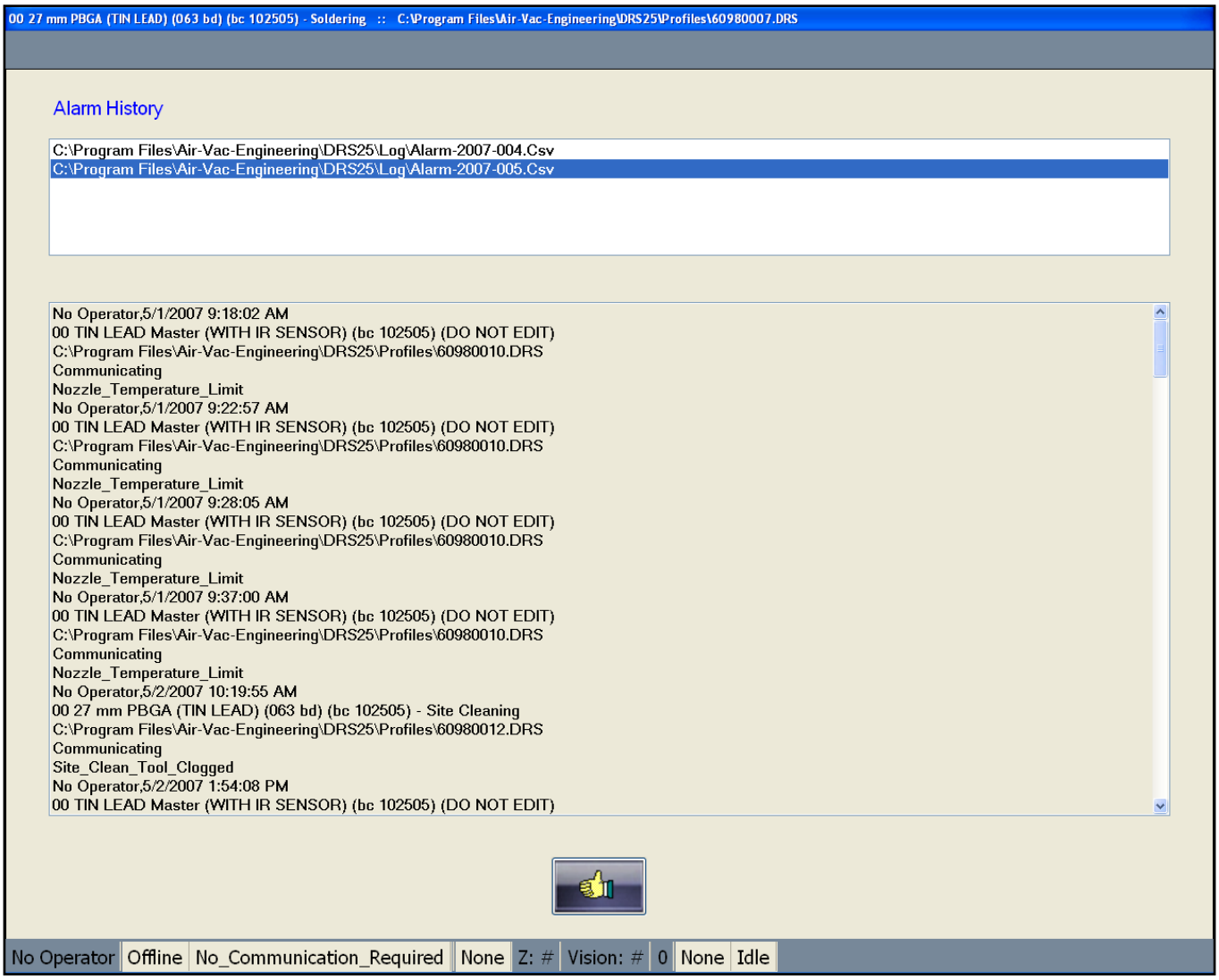
6.3.1 Cycle History:

A **History** file entry is recorded each time the operator cycles a process profile.



6.3.2 Alarm History:

The software continuously monitors the controlling sub-systems. If an alarm condition occurs for any process or hardware issue, an **Alarm** file entry will be recorded.

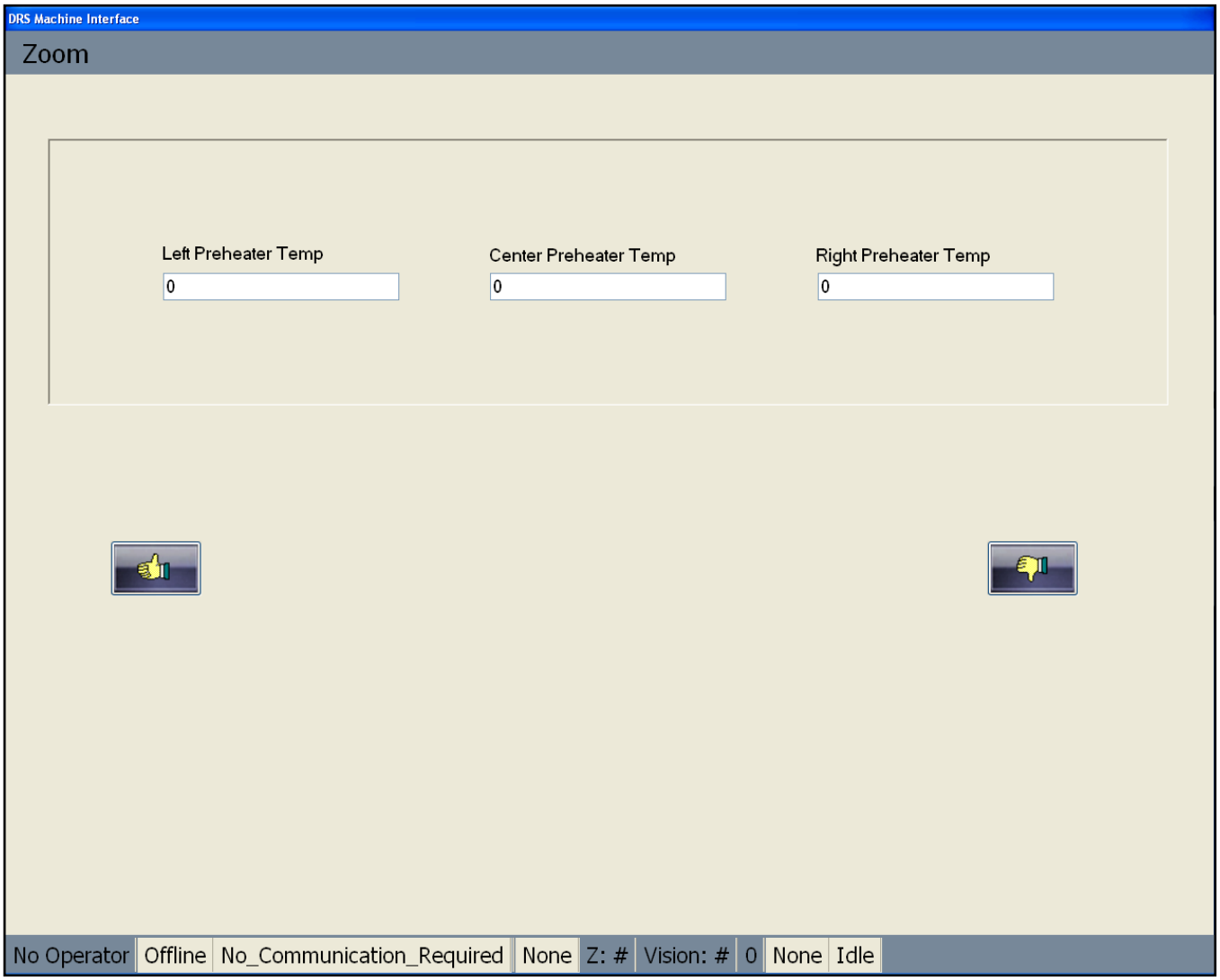


6.4 Setup:

The standard **Setup** menu allows the operator to adjust machine related setup or control parameters. These options are only available to high priority operators.

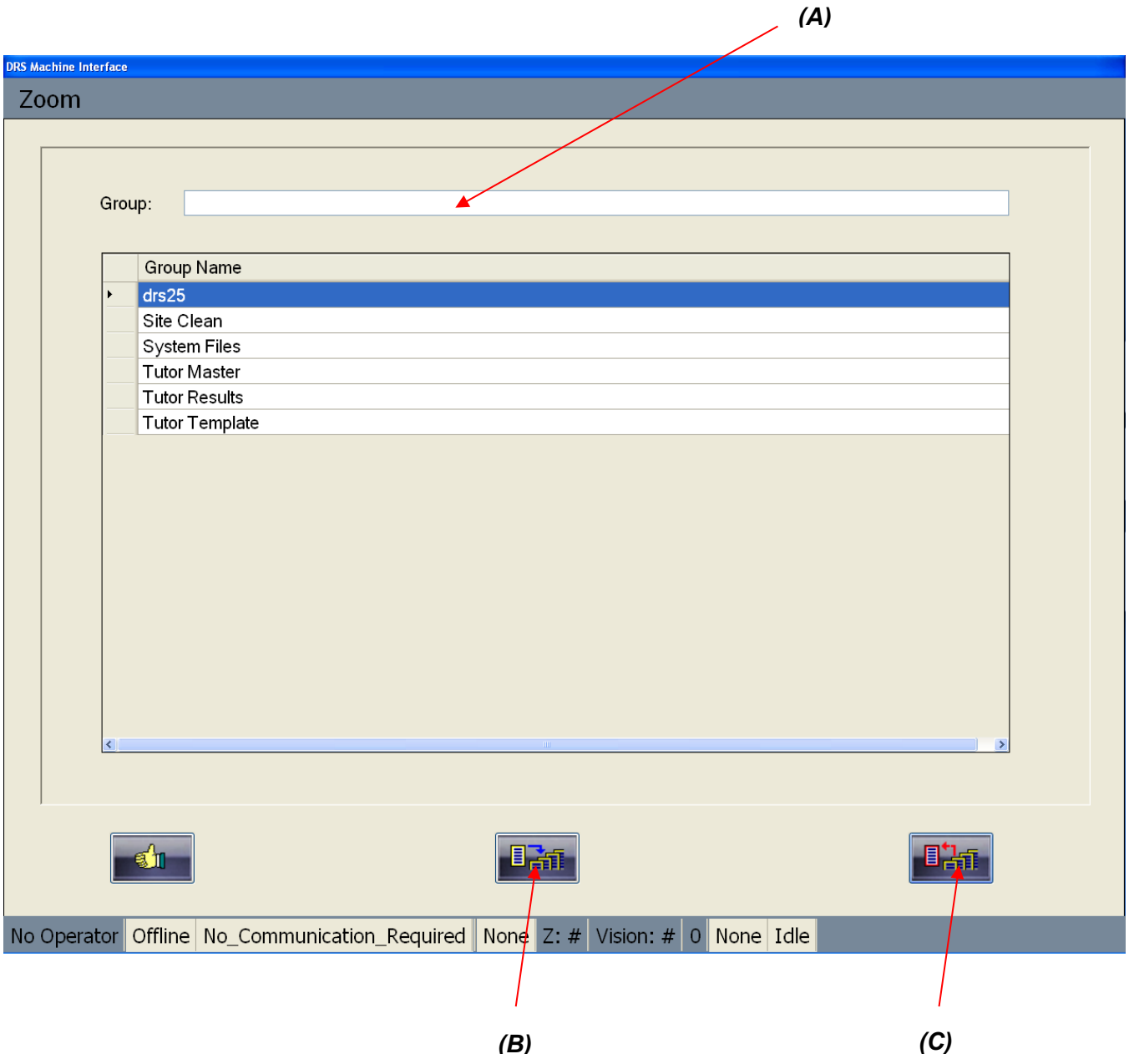
6.4.1 Preheater Idle:

Selecting the **Preheater Idle** from the **Setup** menu will present the operator with the **Preheater Idle Control** screen. These settings are global and will control the preheater during all screens except the **Run** screen. Individual profiles will control the preheater based on process requirements.



6.4.2 Customer, Board and Device Group Setup Screens:

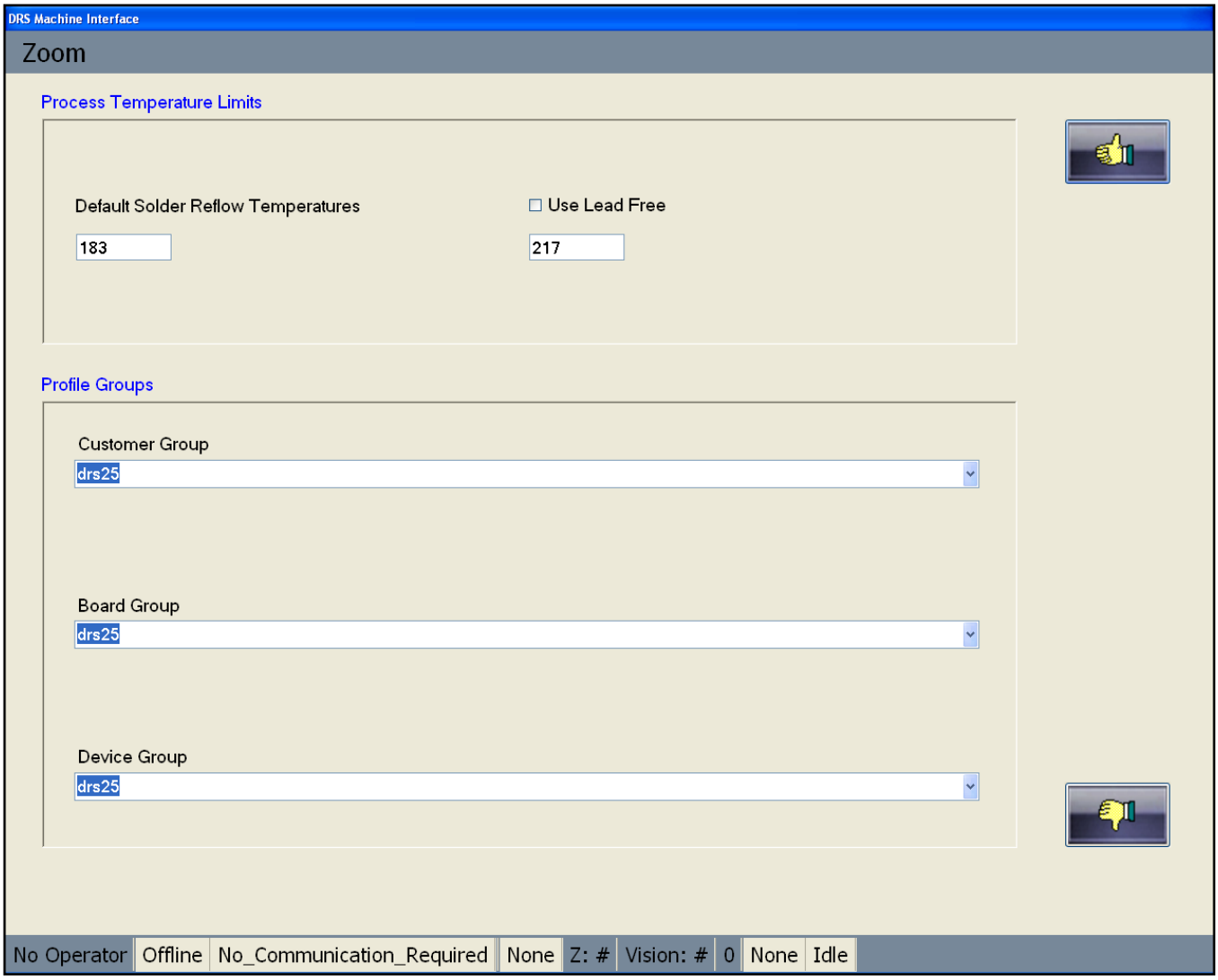
The group maintenance screens allow the operator to create or delete a group. To create a new group name, type the desired group name into the group edit box (A). Click on the **New / Add Entry** button to insert the new group into the existing list (B). To delete a group, the operator must first highlight the group. Next, the operator can click on **the Delete Highlighted Entry** button (C) to remove the entry from the list. To save these changes, click on the **Thumbs Up** button. To cancel any changes, click on the **Thumbs Down** button.



6.4.3 Limits and Defaults:

This screen is used is primarily used to modify the default profile groups used by the Open profile option.

The process temperature limits are for reference only.



6.4.4 Operator / Password Setup Screen:

This screen is used to modify the registered operator list. Operators are grouped into two categories:

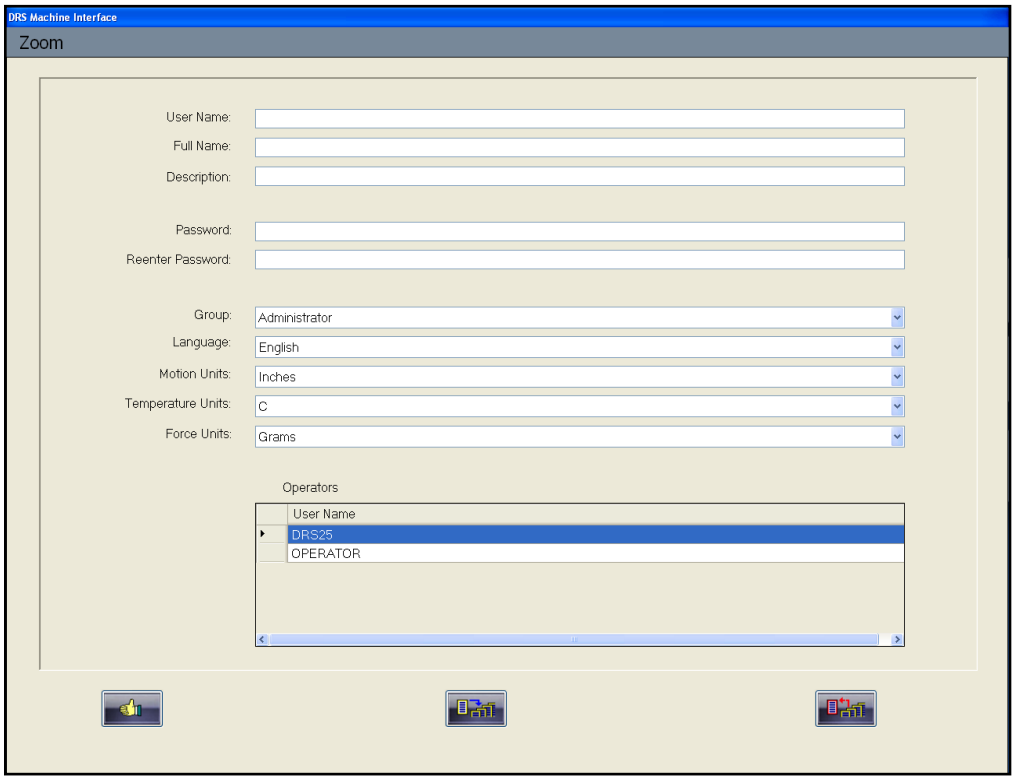
High priority (Administrator): These operators have access to all screens. Caution should be taken when defining these operators. All critical machine parameters or process profiles can be adjusted.

Low priority (Operator): Operators can only run existing profiles and are not allowed to make process adjustments.

The password edit boxes are used is used to enter/modify/verify the password associated with each operator priority level.

- To add an operator, click on **OPERATOR** under **Operator.**
- Under **User Name** type new entry. Type **Password** and **Reenter Password** for the new entry.
- Change **Group** to **Operator.**
- Click on the Insert icon at the bottom center of the screen.

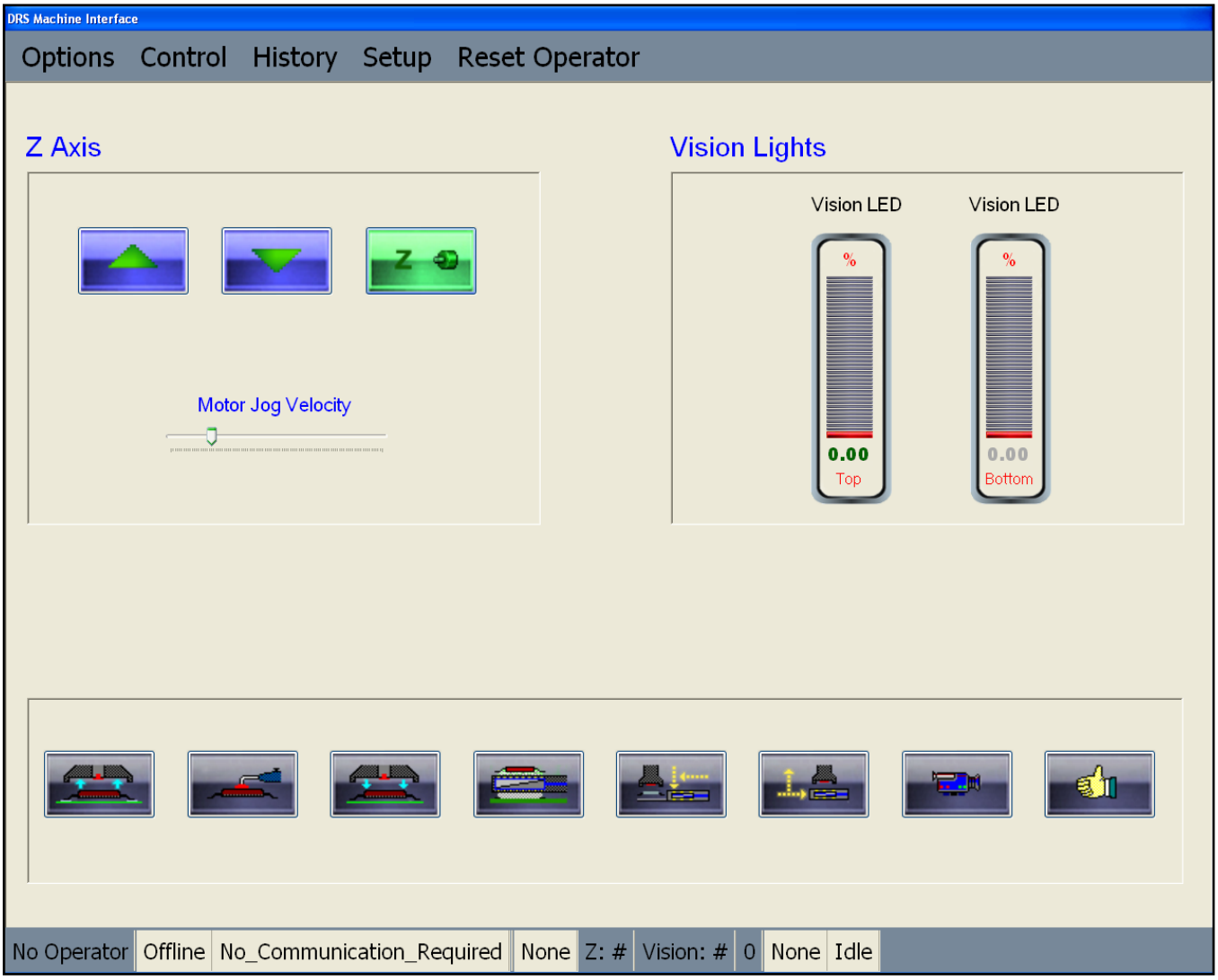
- To add a high priority name, click on **DRS25** under **Operator.**
- Under **User Name** type new entry. Type **Password** and **Reenter Password** for the new entry.
- Change **Group** to **Administrator.**
- Click on the Insert icon at the bottom center of the screen.



Users can have different machine units (Motion, Temperature and Force) defined as a login preference.

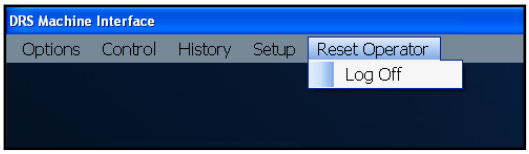
6.4.5 Vision System:

This screen is used to provide access to the basic machine vision controls. This screen is normally used to assist the user during a vision calibration procedure.



6.5 Reset Operator:

Click on the **Reset Operator / Log Off** option on the menu bar and the **Operator Login** screen will be displayed. Log in again followed with your security access code to gain access to the DRS25 machine.



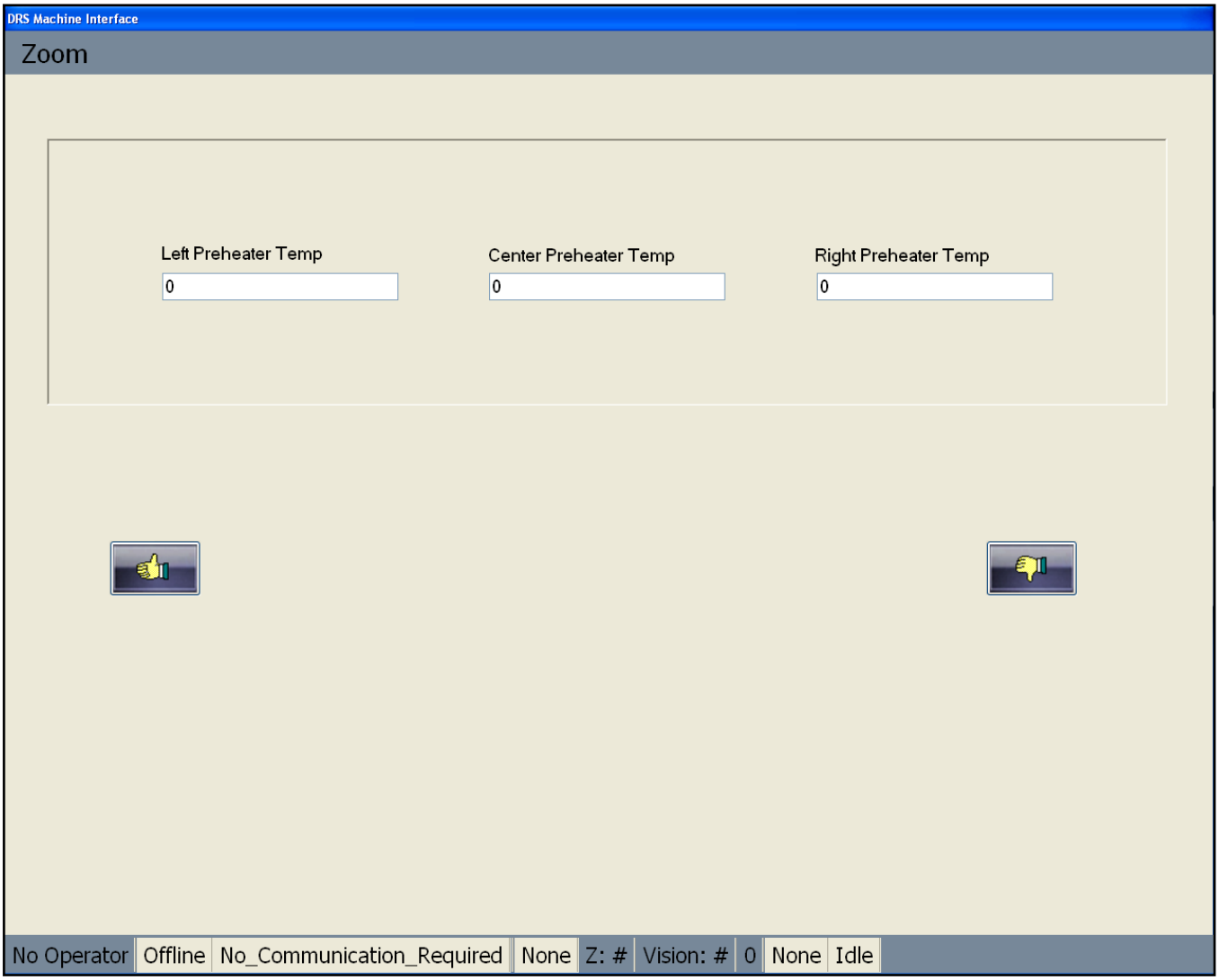
6.6 Protected System Security Access:

To access the Protected System Menu, the operator must click on the Air-Vac logo with the right mouse button. The menu background color will change to red. The menu options will be changed to allow access to machine calibration and critical properties / parameters.

6.6.1 Preheater Idle

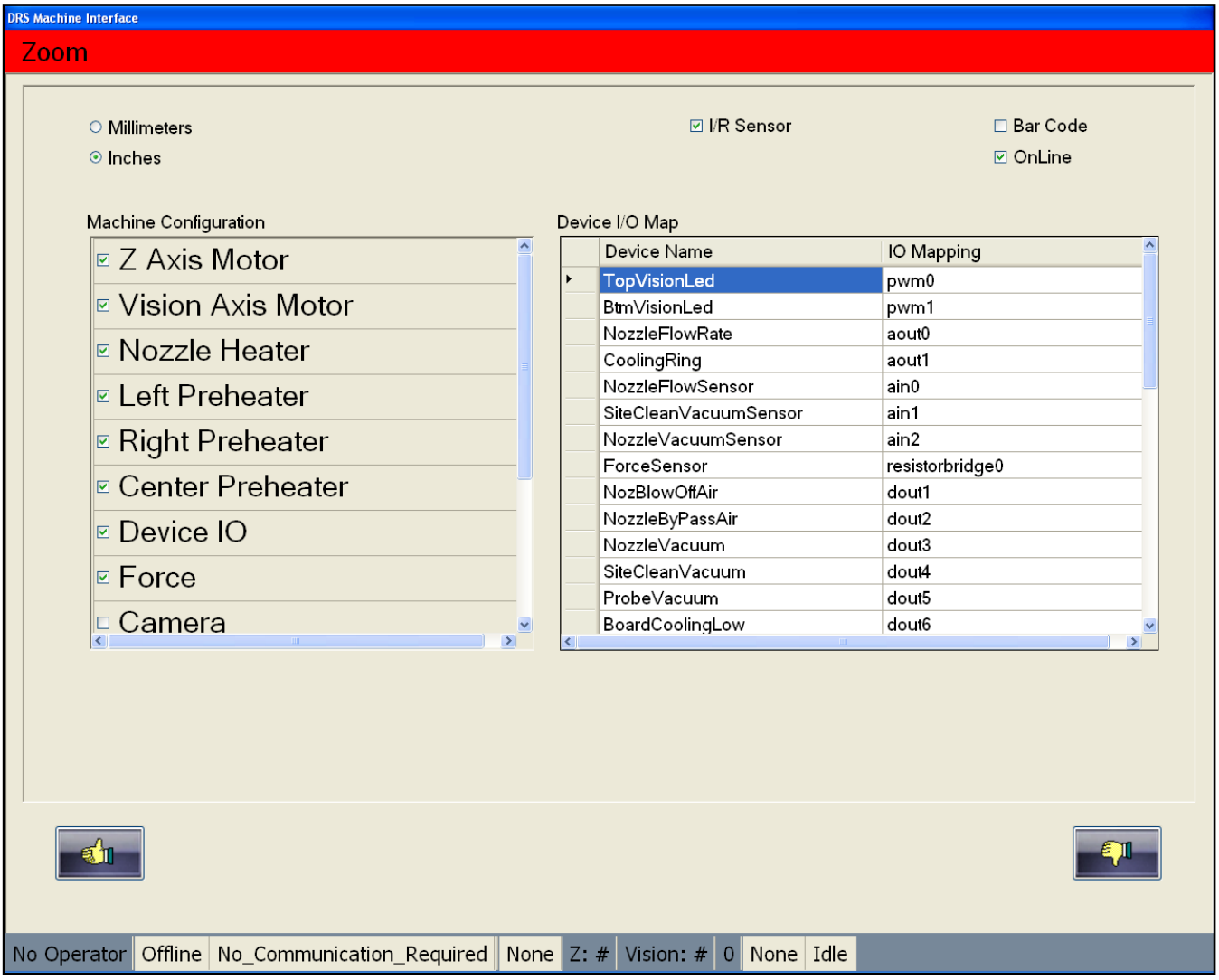
This menu option performs the same functionality as the standard operator idle option.

Selecting the **Preheater Idle** from the **Setup** menu will present the operator with the **Preheater Idle Control** screen. These settings are global and will control the preheater during all screens except the **Run** screen. Individual profiles will control the preheater based on process requirements.



6.6.2 General System

The General System setup page is used to configure the software to match the type of DRS25 system hardware.



6.6.3 Adjustments:

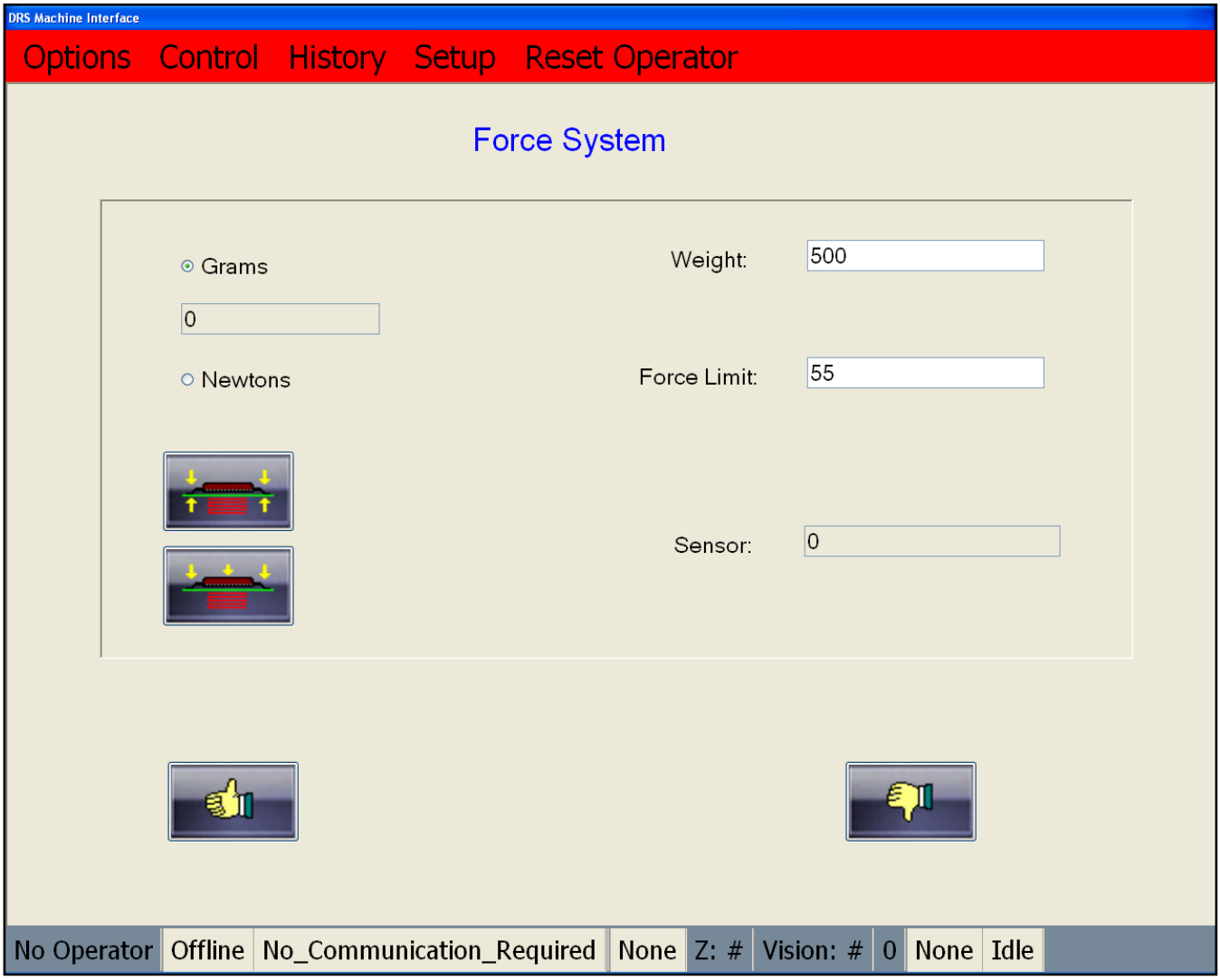
6.6.3.1 Nozzle Flow

The Nozzle Air Flow is calibrated by adjusting the offset parameters. These offsets are set for each air-flow percentage reference, and calibrated to a certified flow meter. The Flow Sensor and Flow Controller have individual dial indicators and are adjusted individually starting at 100%.

Slide bars make adjustments easier and only the target flow rate that is currently being change; this reduces accidental adjustment to different flow rate parameters.

6.6.3.2 Force Adjustment

This screen is used to provide adjustment and calibration to the force system. This activity is performed at the factory and normally does required customer adjustments.



6.6.3.3 Nozzle Heater

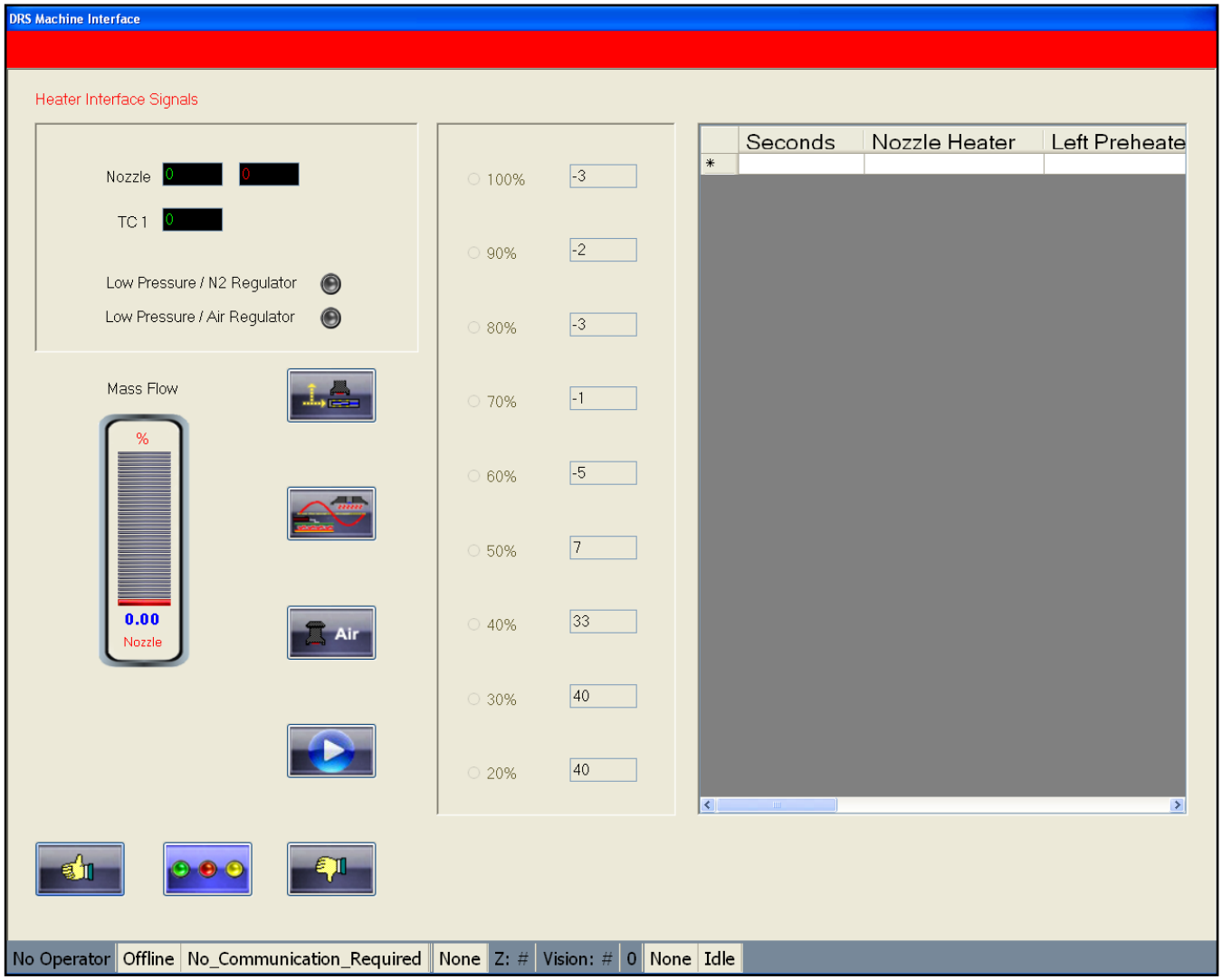
This screen is used to perform the automatic nozzle heater calibration.

Temperature offsets are calibrated based on flow rate (20-100%).

Adjustments to individual calibration points should not be made.

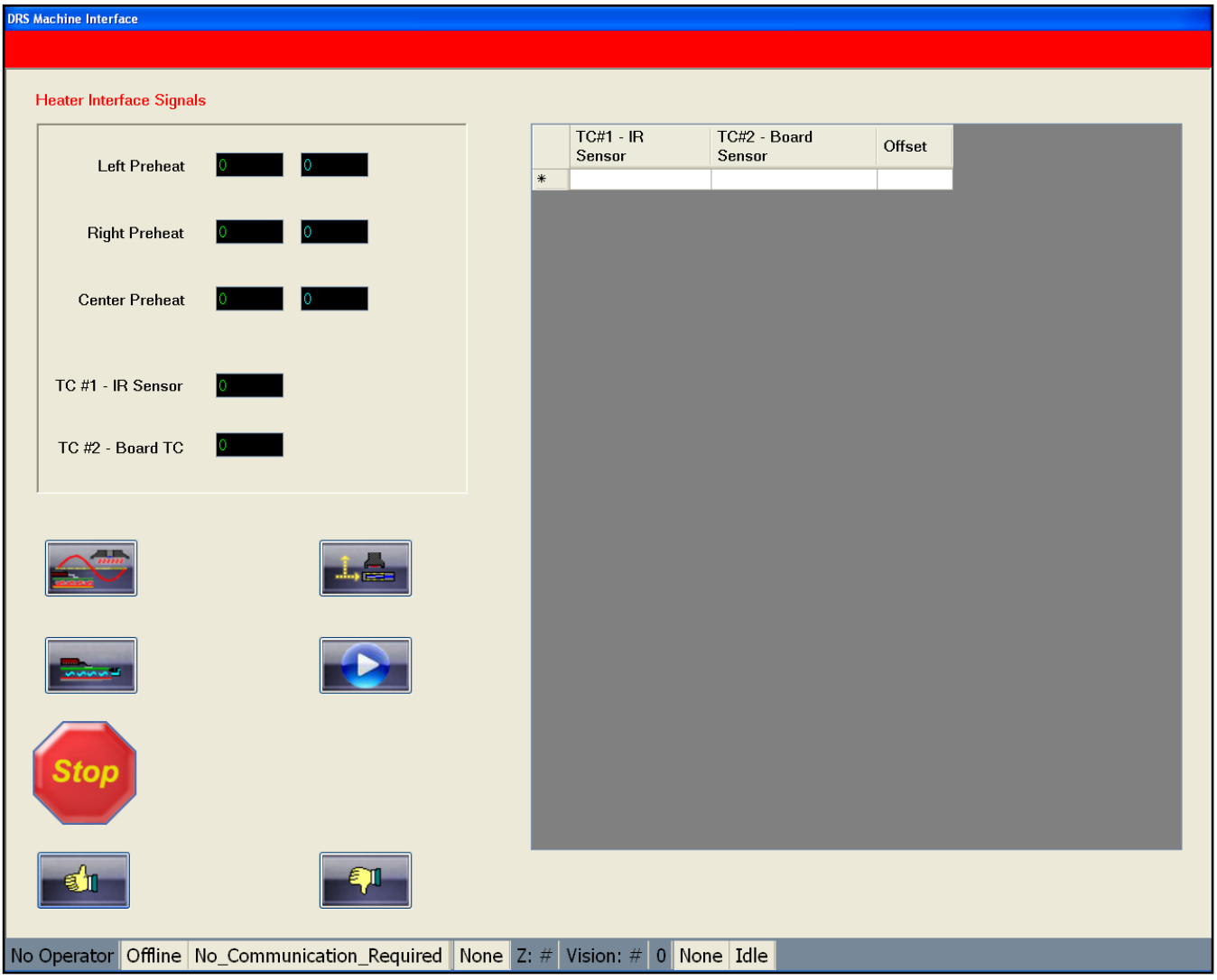
Adjustments are available to influence the automatic adjustment/decision logic (contact Air-Vac factory technicians).

To start the calibration sequence the operator need only plug the NCAL-1 nozzle into thermocouple channel #1 and click on the start button. The cycle will run for 25-35 minutes. All necessary offsets are automatically computed. Click the up-thumb button to save the results.



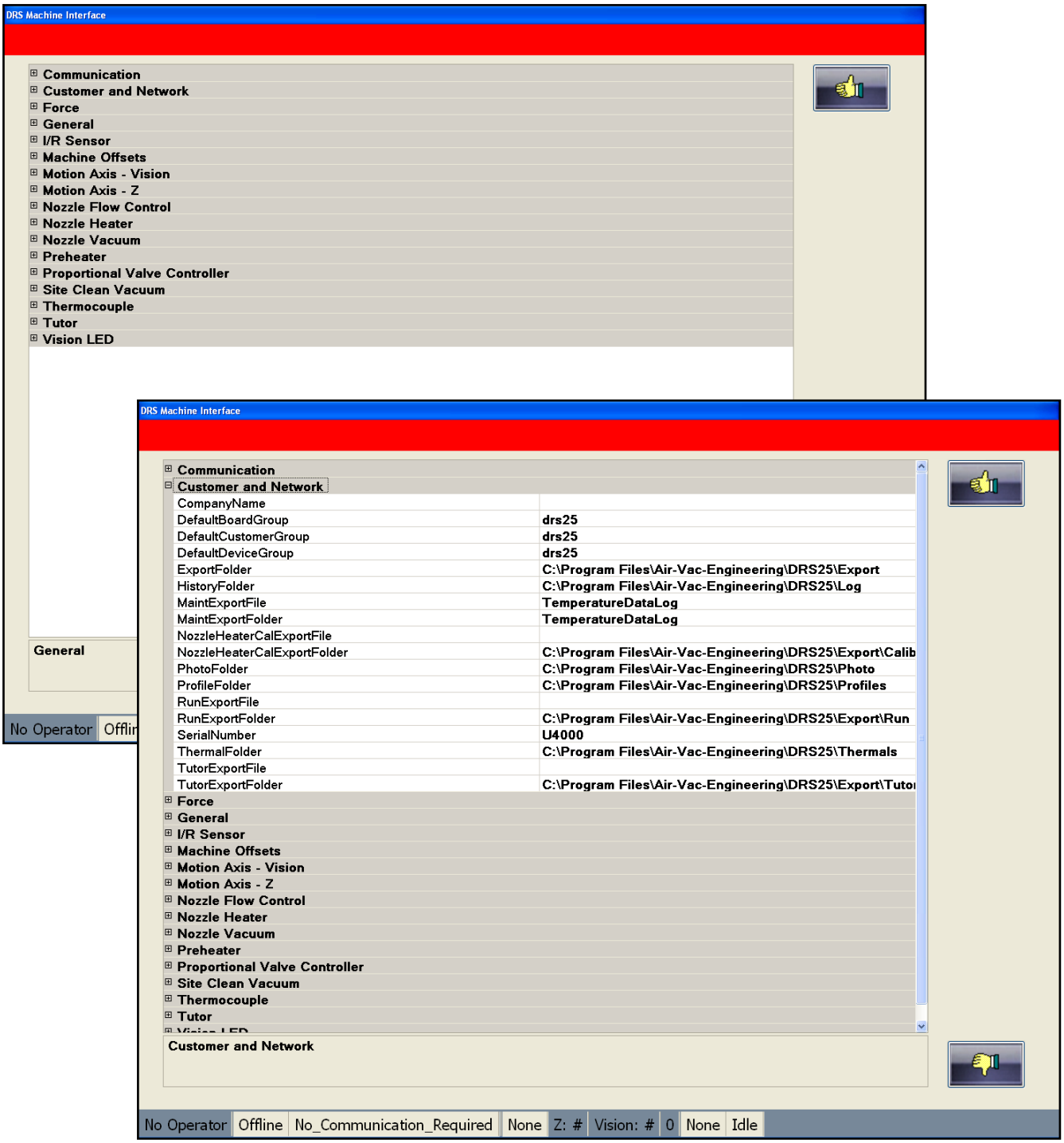
6.6.3.4 I/R Sensor

This screen is used to automatically map a non-contact I/R sensor to a typical contact thermocouple (attached to the surface of a board). This procedure allows a more precise temperature reading from the I/R sensor (across the entire range of the device).



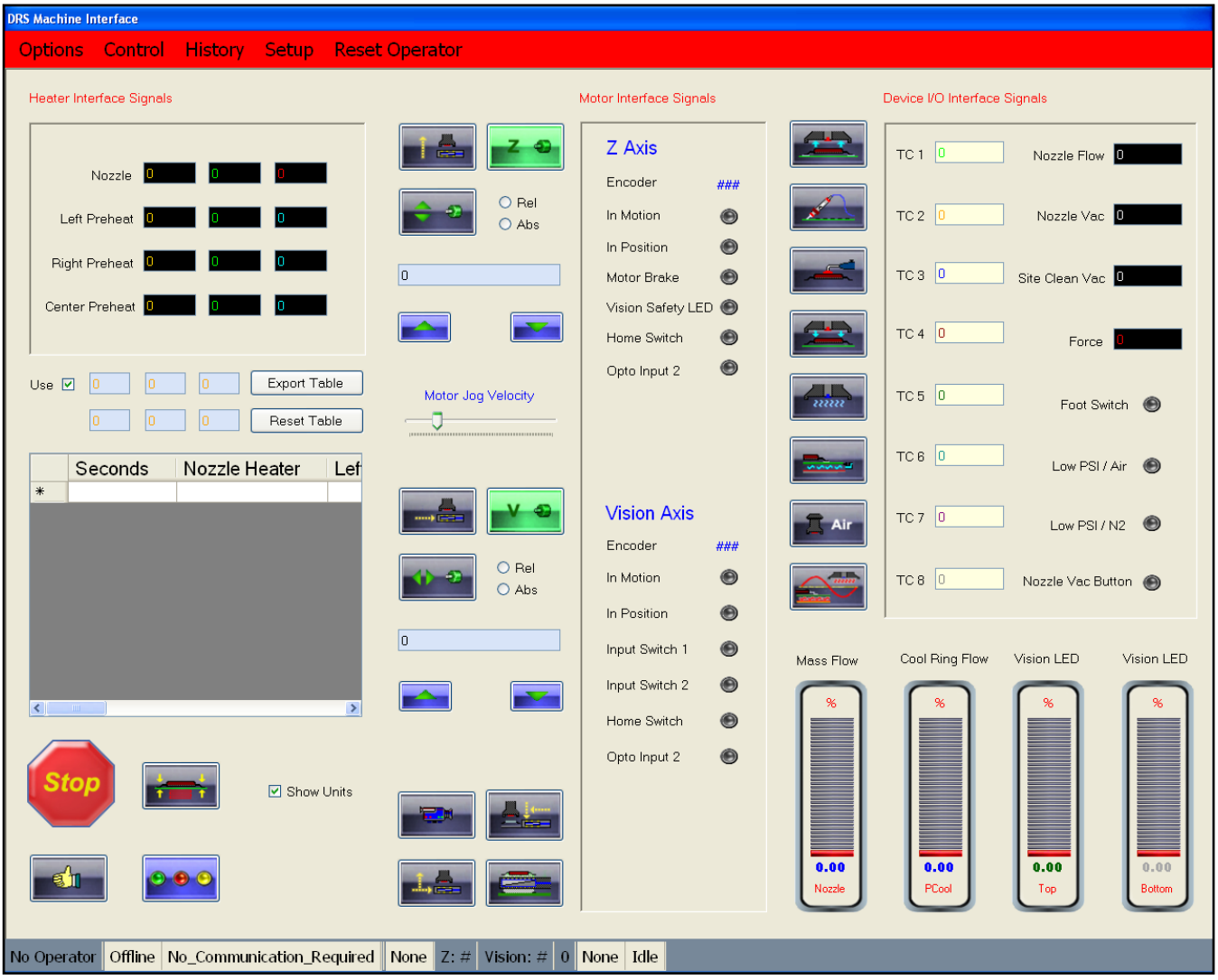
6.6.4 Machine Properties:

- All machine properties (control / setup parameters) are connected to this screen.
- Machine properties associated with different peripherals to be quickly adjusted.
- Click on the plus sign (+) to expand a category.
- Use caution before making any critical machine control properties.



6.6.5 Machine Maintenance:

This screen offers access to all machine the interface / control signals. This screen is normally used to test individual control signals diagnose a repeatable issue.



7: Troubleshooting

7 Troubleshooting

7.0 No Heat

7.0.1 Nozzle Heater

If the upper heater is not putting out any heat, run through some of the items on this list:

- Verify that the process profile has not been inadvertently saved with no heat in that event.
- Verify that the incoming air line is still connected. Look for problems with the lines.
- Verify that the incoming pressure is set for 80 PSI on both the Nitrogen and Air inputs to the machine.
- Measure both legs of the incoming 220V ac line to insure the voltage is within tolerance of the heating element. (210-232 VAC)
- Check fuse F3 and replace if blown.
- Measure the resistance of the upper heater element. It should be 52 ohms. See *section 10: Maintenance* for details on how to checkout the heating element. Replace the element if required.

7.0.2 Communications Problems

If the 'temp communications link' alarm is persistent:

- Insure that the communication cables relating to the temperature control are connected properly – see schematic or block diagram in the schematics section of this manual.
- Reboot computer to unlock COM port.
- Verify the setup parameters.

7.1 No or Low Flow Condition

- Verify that the incoming air line is still connected. Look for problems with the lines
- Verify that the incoming pressure is set for 80 PSI.
- Check fuse F6, should be O.S.A. Slo Blo fuse.

7.2 Nozzle Does Not Pick Up Component

- Check nozzle vacuum filter. Clean and replace element (F1AE).
- Check nozzle vacuum cup. Replace if worn or missing.

7.3 No Motion

- Reboot computer to unlock COM port.

7.4 Machine Alarm Conditions & Alarm Screen

When the system senses an undesirable condition, an alarm message will be displayed in the status bar at the bottom of the screen.

The following pages list all alarms and what causes them.

Machine Hardware Alarms

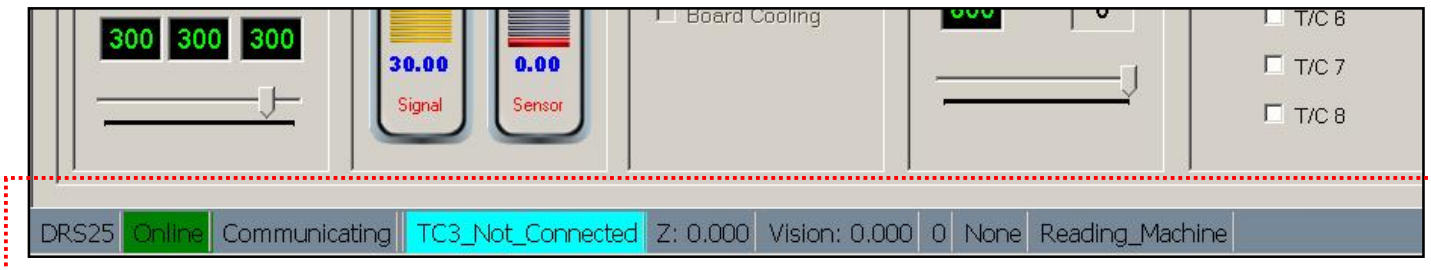
This alarm type occurs when one of the following conditions is detected:

```
SerialPort_Failure
Z_Axis_Motor_Comm_Restart
Vision_Axis_Motor_Comm_Restart
Nozzle_TempControl_Comm_Restart
Left_Preheat_TempControl_Comm_Restart
Right_Preheat_TempControl_Comm_Restart
Center_Preheat_TempControl_Comm_Restart
DeviceIO_Communication_Restart
Low_Pressure_Air_Regulator
Low_Pressure_N2_Regulator
```

Process Alarms

This alarm type occurs when one of the following conditions is detected:

```
Nozzle_Temperature_Limit,
Nozzle_TC_Error,
Left_Preheater_Temperature_Limit,
Left_Preheater_TC_Error,
Right_Preheater_Temperature_Limit,
Right_Preheater_TC_Error,
Center_Preheater_Temperature_Limit,
Center_Preheater_TC_Error,
Below_Minimum_Nozzle_Flow_Rate,
Nozzle_Flow_Sensor_In_Position_Failed,
Exceeded_Max_FootSwitch_Delay,
Exceeded_Max_TC_Control_Delay,
TC1_Not_Connected,
TC2_Not_Connected,
TC3_Not_Connected,
TC4_Not_Connected,
TC5_Not_Connected,
TC6_Not_Connected,
TC7_Not_Connected,
TC8_Not_Connected,
Site_Clean_Tool_Clogged
```



7.4.1 Maximum Time Alarm

The maximum time allowed to complete a profile event has expired.
- Modify profile
- Work faster
- Call Air-Vac Process Support

7.4.2 Serial Port or Device Communication Alarm

The communications link between your computer and your motor drivers for your vision cube and your Z-axis is not functioning.
- Check that your DB25 cable is plugged into the COM3 port expander and that the ribbon cable that connects that port to the expander card is plugged in.
- Shut down Windows, re-boot and try motion again in "set-up/vision system" screen.
- Call Air-Vac Technical Support.

7.4.3 Process Thermocouple Alarm

The process you are running requires one or more thermocouples to continue.
- Install thermocouples in the appropriate channels.
- Verify that the thermocouple is good. Plug into a handheld meter to test. Make sure the thin wires on the end of the thermocouples are twisted or shorted together.
- Call Air-Vac Technical Support.

7.4.4 Site Cleaning Vacuum Alarm

Your site cleaning tool requires cleaning or is clogged.
- See instructions for cleaning the tool.
- Check vacuum filters – if clogged then replace.
- Check profile "Teach Screen" for "Clogged%" (track bar).
- Call Air-Vac Technical Support.

7.4.5 Temperature Limits Alarm

- Contact Air-Vac Technical Support.

7.4.6 Flow Sensor Alarm

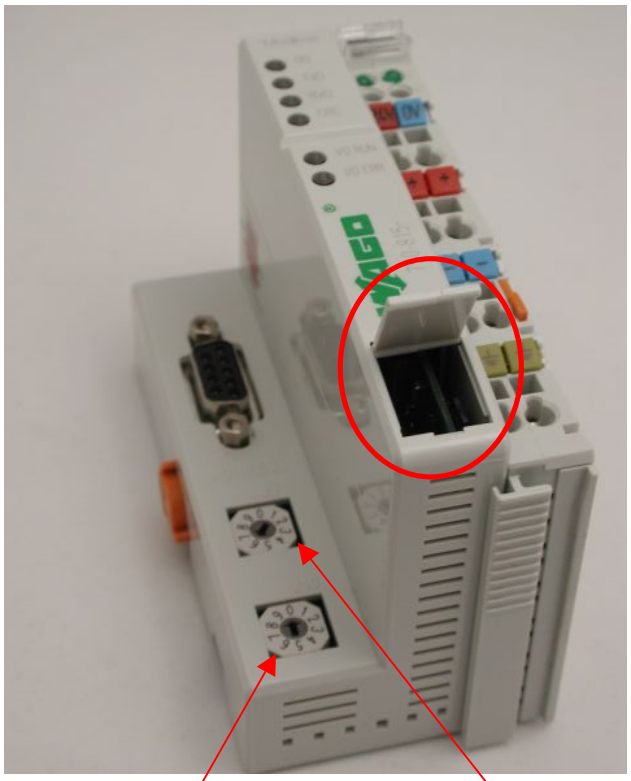
This alarm occurs when the DRS25 nozzle flows are out of the pre-set range of the set-point (default is 5%).
- Check air pressure.
- Calibrate nozzle flows.
- Call Air-Vac Technical Support.

7.4.7 Low Pressure Alarm

This alarm occurs when the DRS25 senses low pressure on either the air or N_2 inputs.
- Check pressure gauges on the rear of the DRS25. They must be set with no air flowing to the proper specs in your manual.
- Check to see if your air pressure drops significantly (below 65psi) when nozzle, diffuser and vacuums are all turned on high flow.
- Call Air-Vac Technical Support.

7.5 Wago Modbus Flash

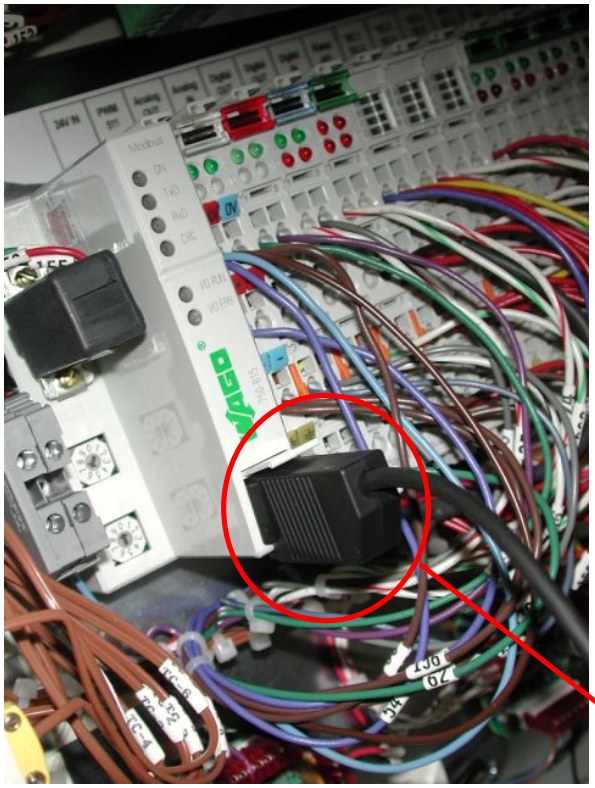
1. Open small access door on main Wago unit.
2. Set small dipswitch under access door to the downward position, as shown, for programming.
3. Set ID pots for 0

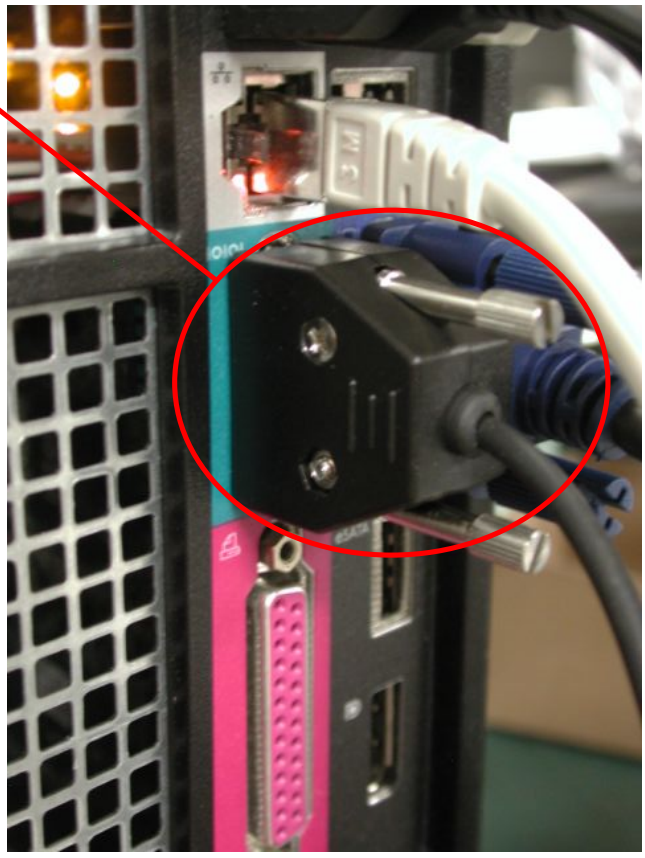


Lower ID pot

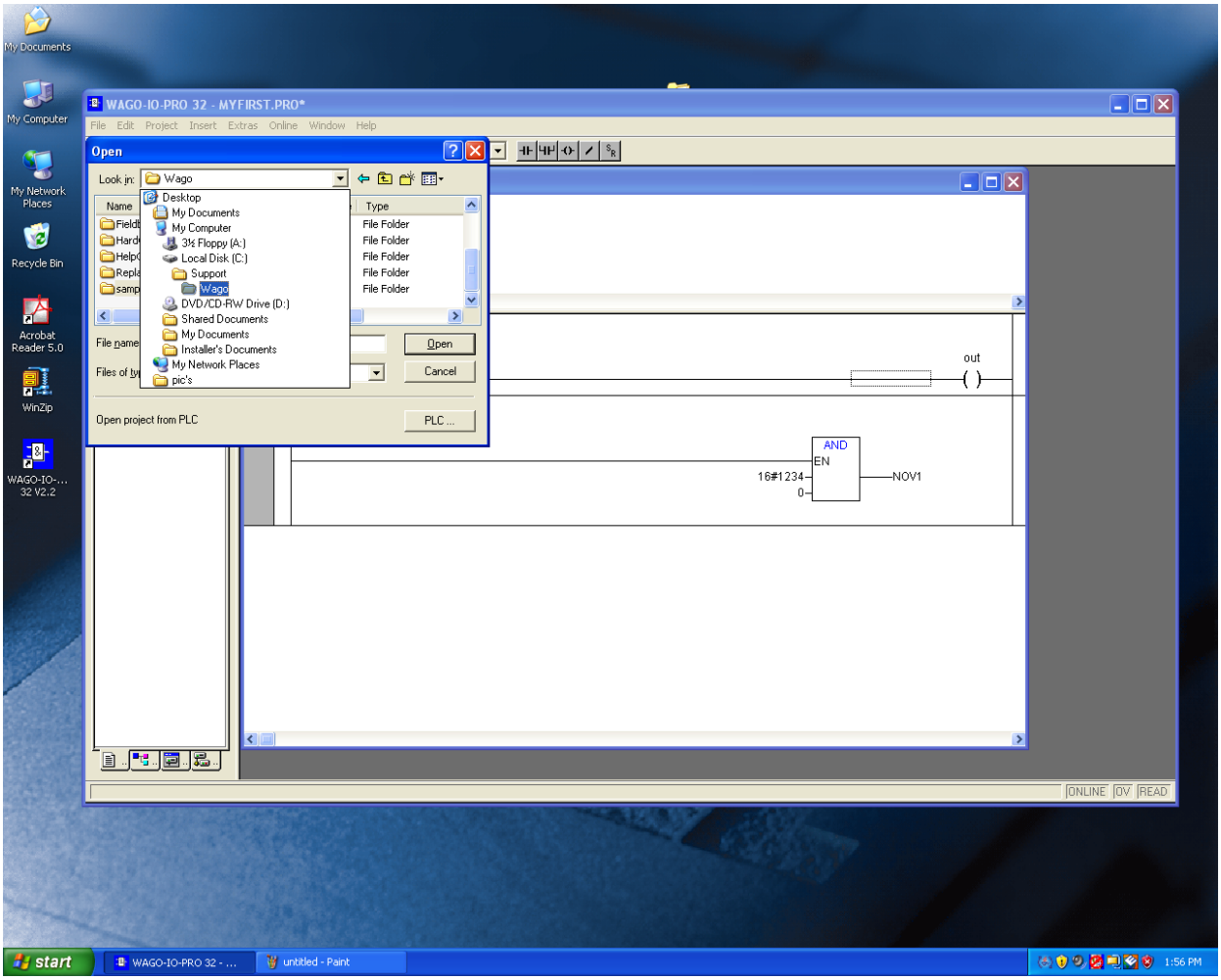
Upper ID pot

4. Install Wago I/O Cable between the main Wago unit and the serial port on the back of the computer.

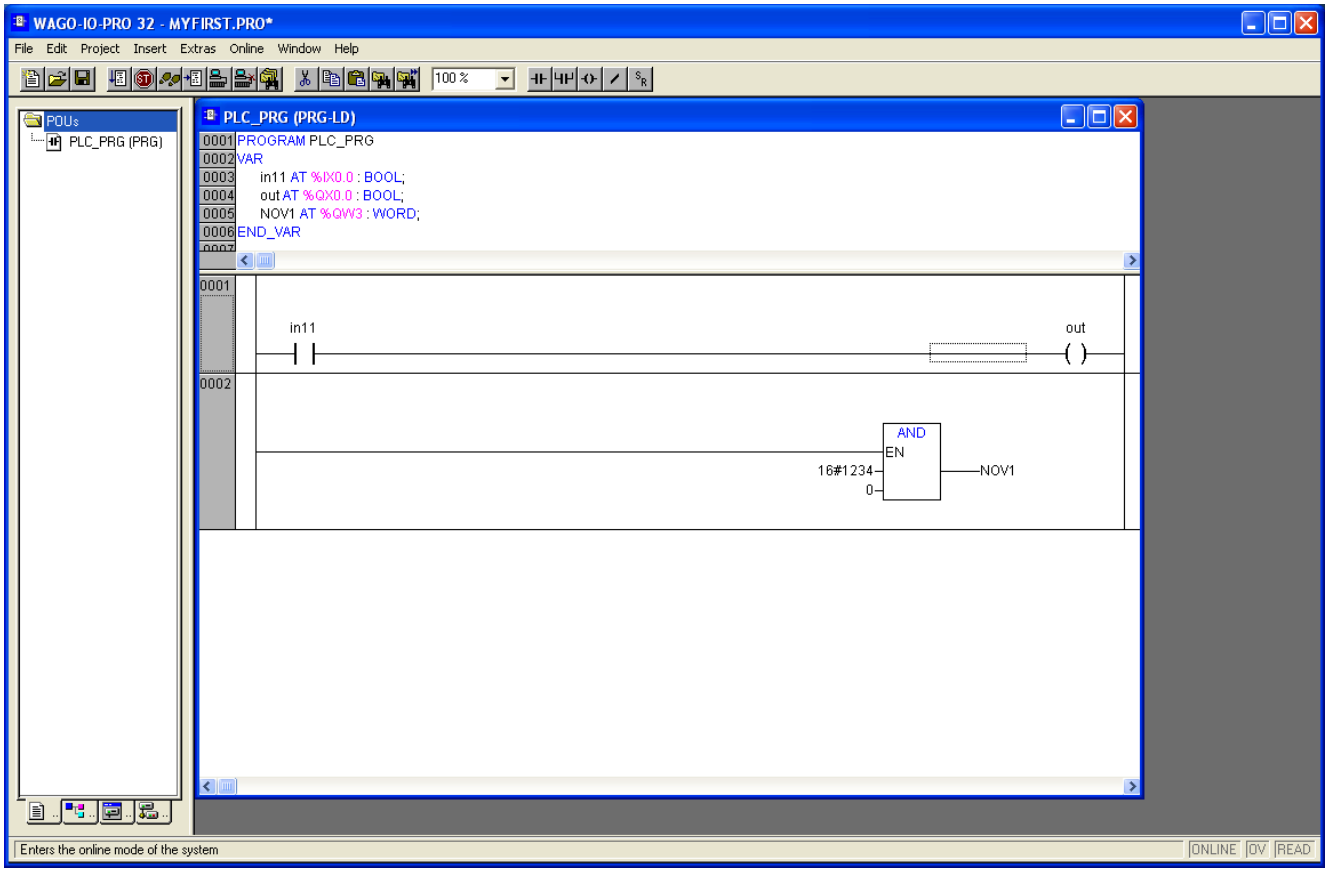




5. Power up DRS25.
6. Go to Start, Programs, Wago I/O Pro 32
7. Go to File, Open then Browse To Support, Wago, Sample Programs, Baud Rate Setup Pro if prompted to save changes select No
8. Open Wago-10-Pro32V2



9. Go to online in the tool bar select Log In – if a No Program notice appears, select Yes



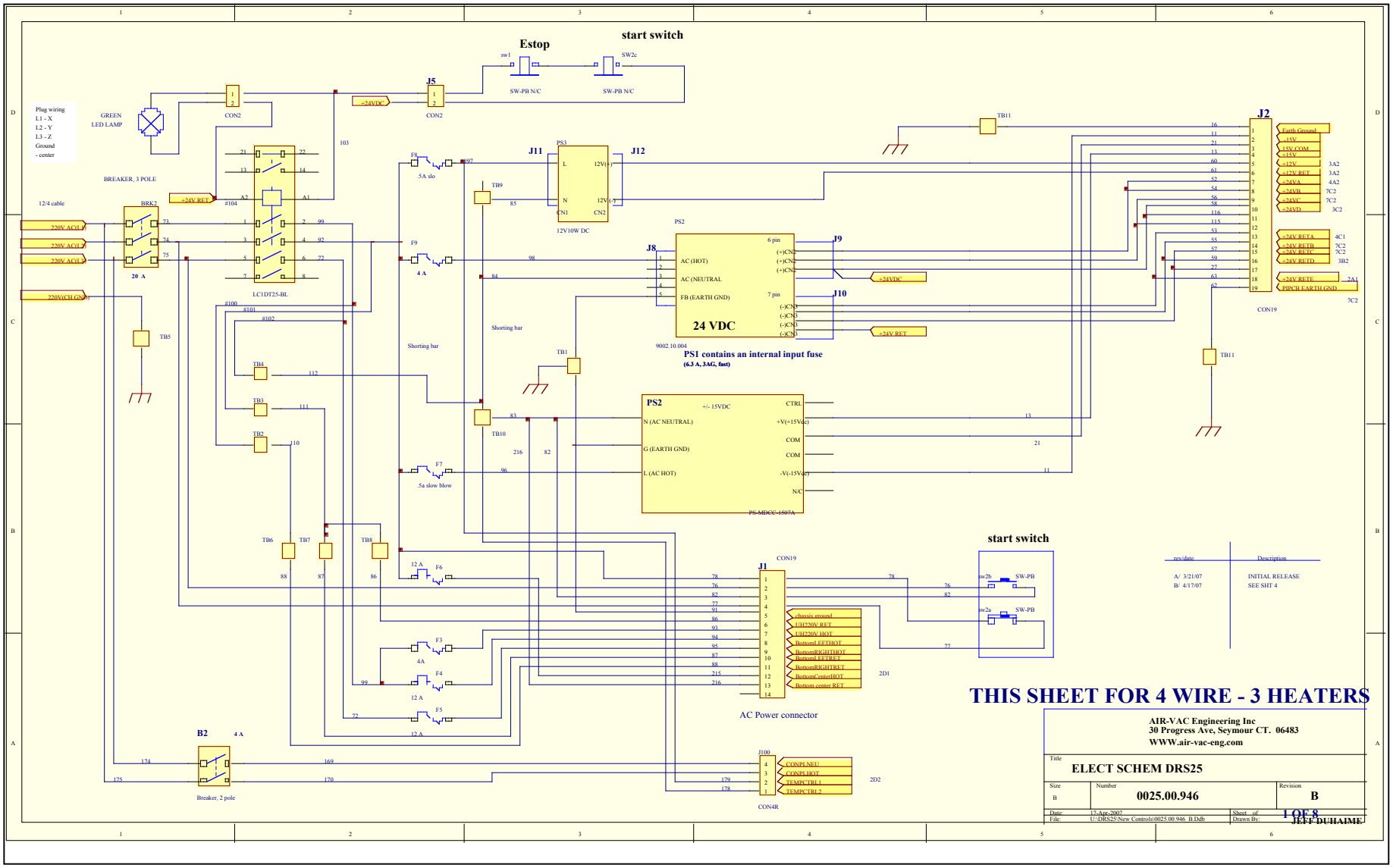
10. Go to online then run; go to online and flash. Observe brief flicker from red CRC LED on Wago Unit. Exit Wago Software.

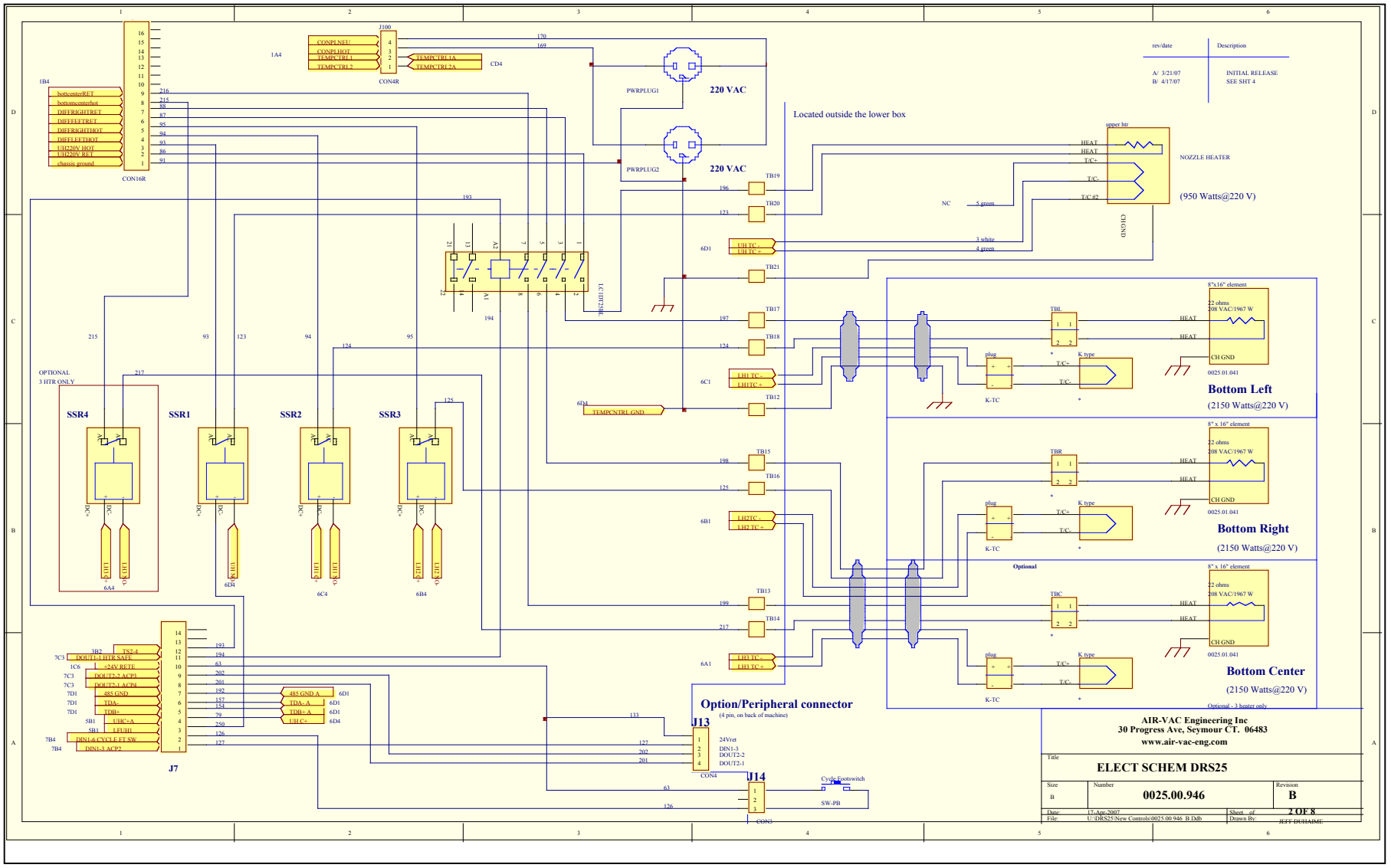
11. Power down, reset ID pots to 0 lower and 6 top.

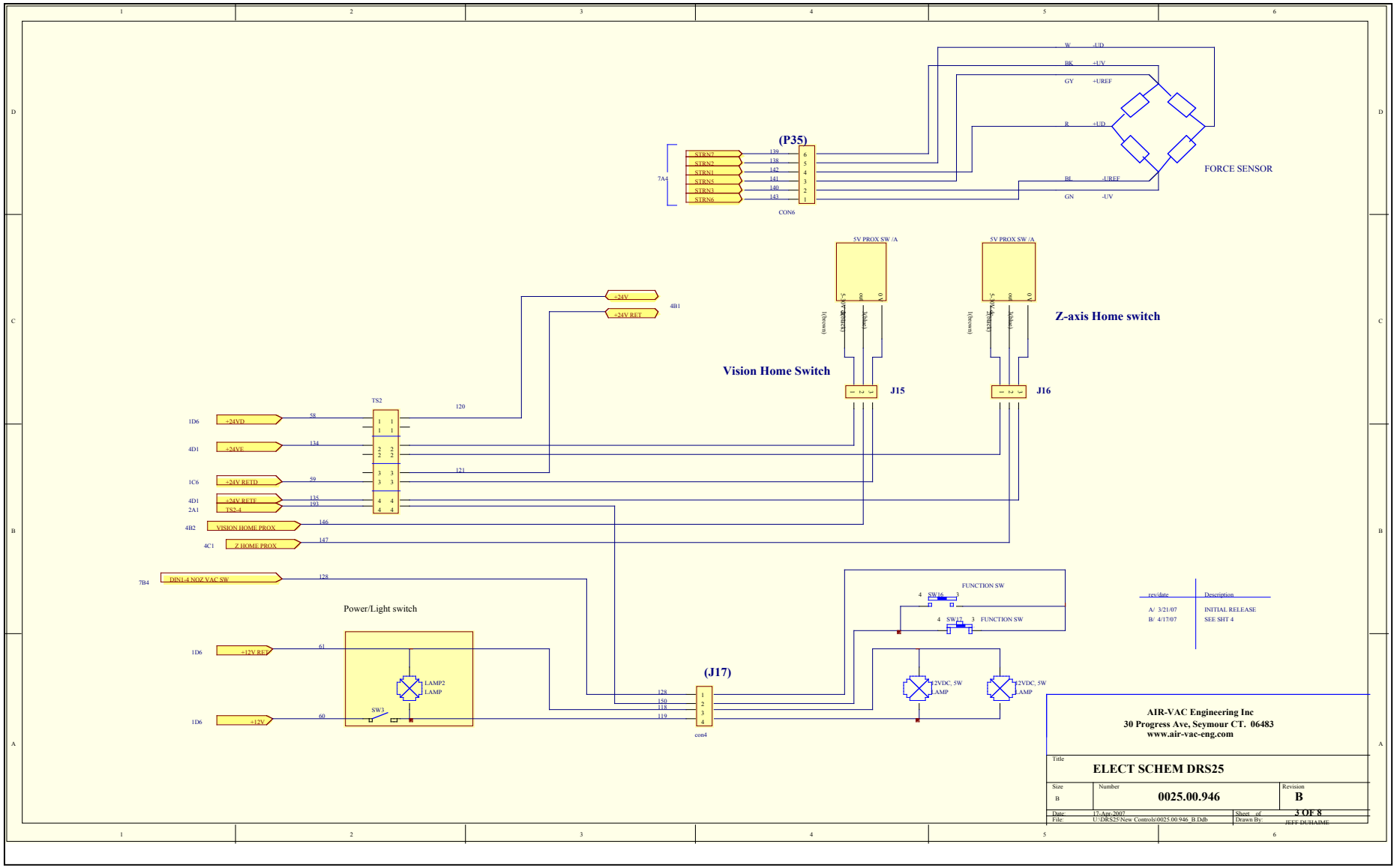
12. Remove Wago cable and store properly.

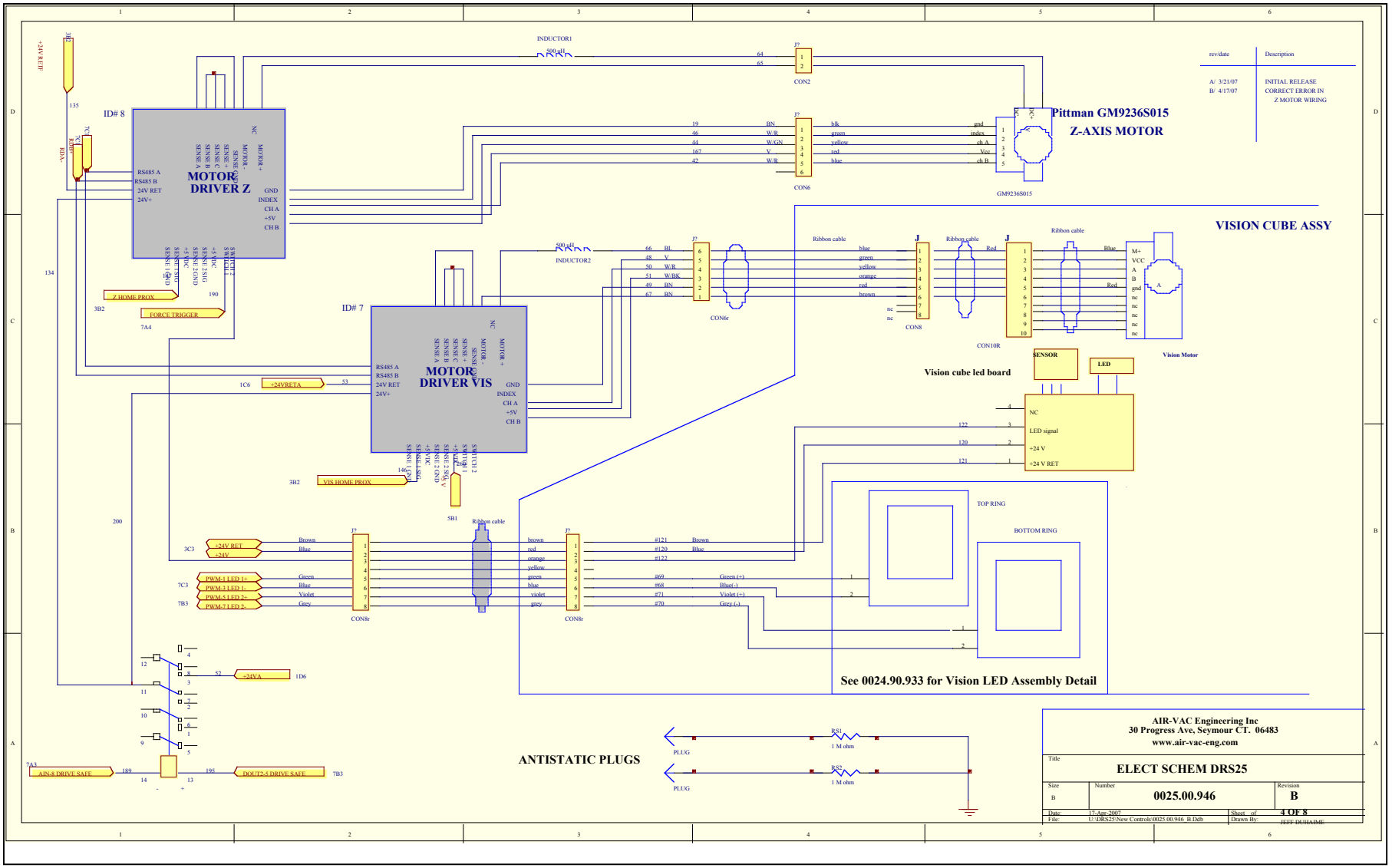
13. Re-set the dip switch on the Wago unit to the upper most position.

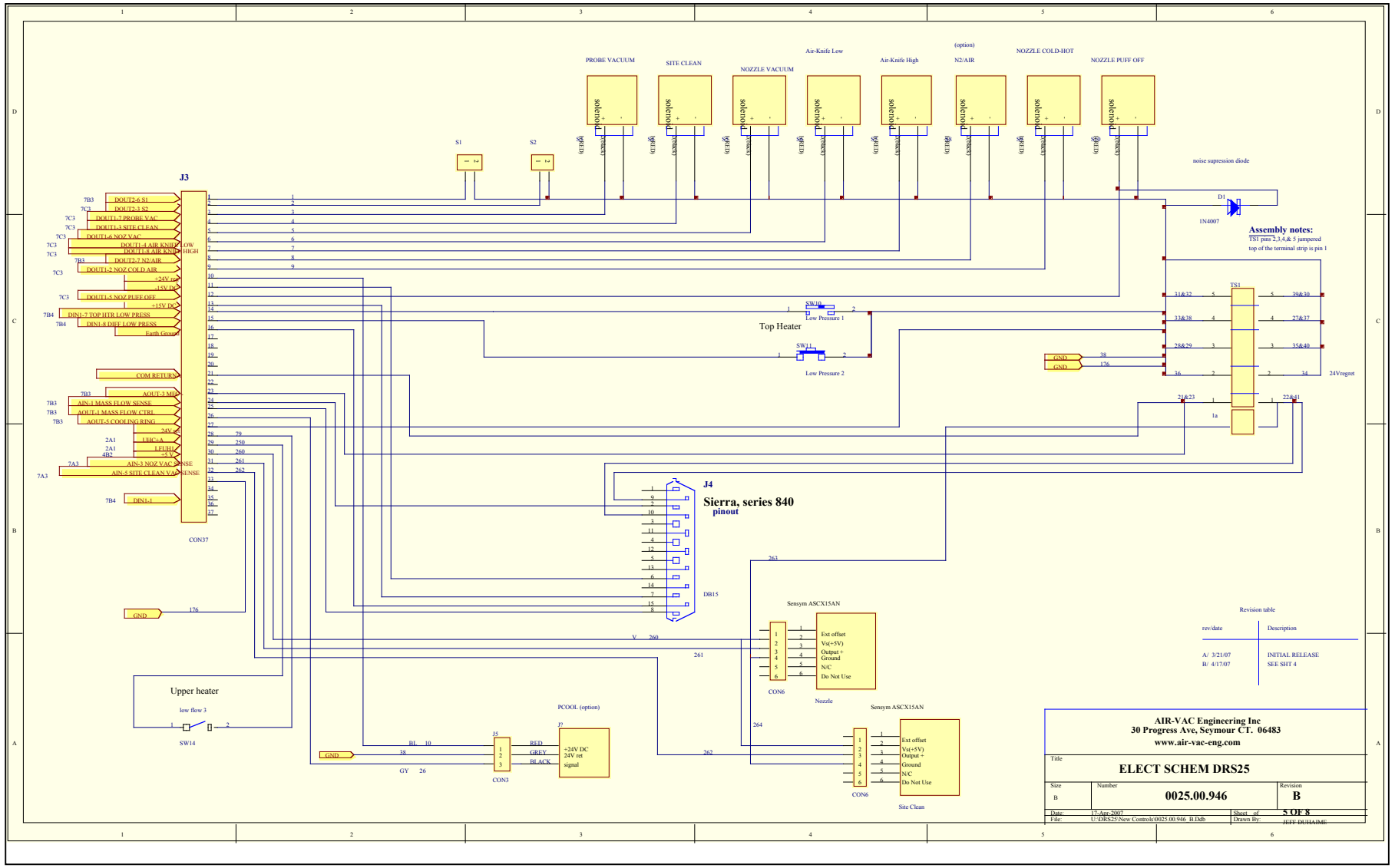
8: Schematics

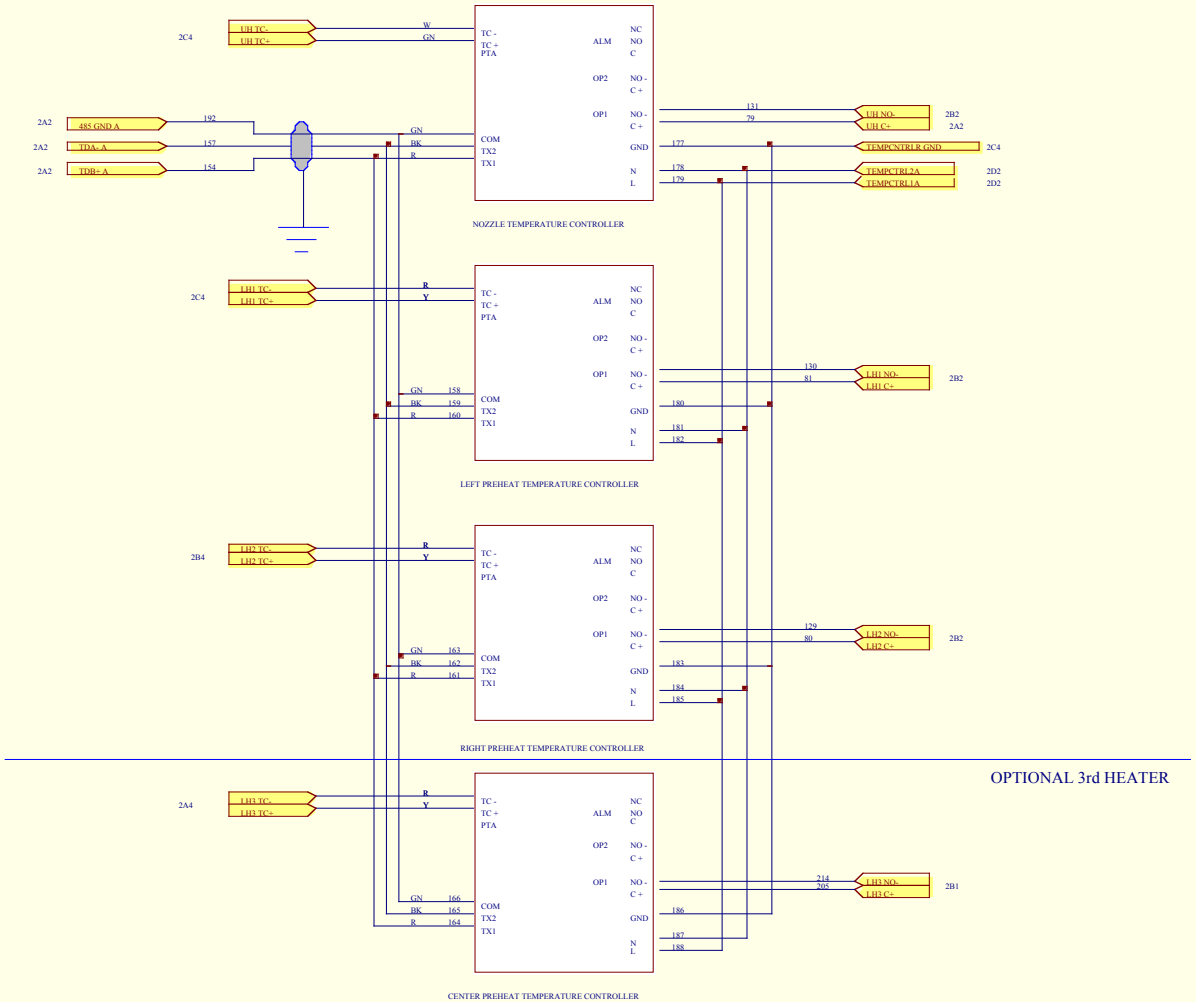

start switch
Estop
sw1
SW2c
SW-PB N/C
SW-PB N/C
J5
CON2
+24VDC
CON2
Plug wiring
L1 - X
L2 - Y
L3 - Z
Ground
- center
GREEN
LED LAMP
BREAKER, 3 POLE
12/4 cable
BRK2
20 A
220V ACL1
220V ACL2
220V ACL3
220V(CH GND)
+24V RET
#104
LC1DT25-BL
TB5
#100
#101
#102
TB4
TB3
TB2
Shorting bar
Shorting bar
F8
5A slo
F9
4 A
F7
.5a slow blow
TB9
J11
PS3
J12
12V10W DC
TB10
TB1
PS2
+/- 15VDC
N (AC NEUTRAL)
G (EARTH GND)
L (AC HOT)
CTRL
+V(+15Vdc)
COM
COM
-V(-15Vdc)
N/C
PS-MDCC-1507A
J8
PS2
AC (HOT)
AC (NEUTRAL
FB (EARTH GND)
24 VDC
6 pin
7 pin
J9
J10
+24VDC
+24V RET
9002.10.004
PS1 contains an internal input fuse
(6.3 A, 3AG, fast)
TB11
TB11
J2
CON19
Earth Ground
+15V
+15V COM
-15V
+12V
+12V RET
+24VA
+24VB
+24VC
+24VD
+24V RETA
+24V RETB
+24V RETC
+24V RETD
+24V RETE
PIPCB EARTH GND
3A2
3A2
4A2
7C2
7C2
3C2
4C1
7C2
7C2
3B2
2A1
7C2
TB6
TB7
TB8
12 A
F6
4A
F3
12 A
F4
12 A
F5
CON19
J1
chassis ground
LH220V RET
LH220V HOT
BottomLEFTHOT
BottomRIGHTHOT
BottomLEFTRET
BottomRIGHTRET
BottomCenterHOT
Bottom center RET
2D1
AC Power connector
start switch
sw2b
SW-PB
sw2a
SW-PB
B2
4 A
Breaker, 2 pole
J100
CONPI NEU
CONPI HOT
TEMPCTRL1
TEMPCTRL2
2D2
CON4R
THIS SHEET FOR 4 WIRE - 3 HEATERS
rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
WWW.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date: 17-Apr-2007
File: U:\DRS25\New Controls\0025.00.946 B.Ddb
Sheet of
Drawn By:
JEFF DUHAIME
1 OF 8


rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
Located outside the lower box
220 VAC
220 VAC
PWRPLUG1
PWRPLUG2
CON16R
CON4R
J100
CD4
1A4
1B4
bottcenterRET
bottomcenterhot
DIFFRIGHTRET
DIFFEFFTRET
DIFFRIGHTHOT
DIFFLEFTHOT
LH220V HOT
LH220V RET
chassis ground
CONPLNEU
CONPLHOT
TEMPCTRL1
TEMPCTRL2
TEMPCTRL1A
TEMPCTRL2A
upper htr
HEAT
HEAT
T/C+
T/C-
T/C #2
CH GND
NOZZLE HEATER
(950 Watts@220 V)
NC
5 green
3 white
4 green
TB19
TB20
TB21
TB17
TB18
TB15
TB16
TB13
TB14
TB12
6D1
6C1
6B1
6A1
LH1 TC -
LH1 TC +
LH2TC -
LH2 TC +
LH3 TC -
LH3 TC +
TEMPCNTRL GND
6D4
LC1D25K
8"x16" element
22 ohms
208 VAC/1967 W
0025.01.041
TBL
TBR
TBC
plug
K type
K-TC
Bottom Left
(2150 Watts@220 V)
Bottom Right
(2150 Watts@220 V)
Optional
Bottom Center
(2150 Watts@220 V)
Optional - 3 heater only
OPTIONAL
3 HTR ONLY
SSR4
SSR1
SSR2
SSR3
6A4
6D4
6C4
6B4
LH1 -
LH1 +
LH2 -
LH2 +
LH3 -
LH3 +
DC-
DC+
Option/Peripheral connector
(4 pin, on back of machine)
J13
CON4
24Vist
DIN1-3
DOUT2-2
DOUT2-1
J14
CON2
Cycle Footswitch
SW-PB
J7
TS2-4
DOUT1-1 HTR SAFE
+24V RETE
DOUT2-2 ACP3
DOUT2-1 ACP4
485 GND
TDA-
TDB+
UHC+A
LFUHI
DIN1-6 CYCLE FT SW
DIN1-3 ACP2
485 GND A
TDA- A
TDB+ A
UH C+
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date:
17-Apr-2007
Sheet of
2 OF 8
File:
U:\DRS25\New Controls\0025.00.946 B.Ddb
Drawn By:
JEFF DUHAIME


W +UD
BK +UV
GY +UREF
R +UD
BL -UREF
GN -UV
FORCE SENSOR
(P35)
7A4
STRN7
STRN2
STRN1
STRN5
STRN3
STRN6
139
138
142
141
140
143
CON6
5V PROX SW /A
Z-axis Home switch
Vision Home Switch
J15
J16
+24V
+24V RET
4B1
TS2
1D6 +24VD 58 120
4D1 +24VE 134
1C6 +24V RETD 59 121
4D1 +24V RETE 135
2A1 TS2-4 193
4B2 VISION HOME PROX 146
4C1 Z HOME PROX 147
7B4 DIN1-4 NOZ VAC SW 128
Power/Light switch
1D6 +12V REF 61
1D6 +12V 60
LAMP2
LAMP
SW3
(J17)
128
150
118
119
con4
FUNCTION SW
SW16
SW17
12VDC, 5W LAMP
12VDC, 5W LAMP
rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date: 17-Apr-2007
File: U:\DRS25\New Controls\0025.00.946_B.Ddb
Sheet of 3 OF 8
Drawn By: JEFF DUHAIME


rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
CORRECT ERROR IN Z MOTOR WIRING
Pittman GM9236S015
Z-AXIS MOTOR
GM9236S015
VISION CUBE ASSY
MOTOR DRIVER Z
MOTOR DRIVE VIS
ID# 8
ID# 7
INDUCTOR1
INDUCTOR2
500 uH
CON2
CON6
CON6r
CON8
CON10R
Ribbon cable
Vision Motor
Vision cube led board
SENSOR
LED
NC
LED signal
+24 V
+24 V RET
TOP RING
BOTTOM RING
See 0024.90.933 for Vision LED Assembly Detail
ANTISTATIC PLUGS
PLUG
RS1
RS2
1 M ohm
Z HOME PROX
FORCE TRIGGER
VIS HOME PROX
+24VRETA
+24VA
+24V RET
+24V
PWM-1 LED 1+
PWM-3 LED 3-
PWM-5 LED 5+
PWM-7 LED 7-
AIN-5 DRIVE SAFE
DOUT2-5 DRIVE SAFE
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date:
17-Apr-2007
Sheet of
4 OF 8
File:
U:\DRS25\New Controls\0025 00 946 B.Ddb
Drawn By:
JEFF DUHAIME


PROBE VACUUM
SITE CLEAN
NOZZLE VACUUM
Air-Knife Low
Air-Knife High
(option)
N2/AIR
NOZZLE COLD-HOT
NOZZLE PUFF OFF
solenoid
S1
S2
J3
DOUT2-6 S1
DOUT2-3 S2
DOUT1-7 PROBE VAC
DOUT1-3 SITE CLEAN
DOUT1-6 NOZ VAC
DOUT1-4 AIR KNIFE LOW
DOUT1-8 AIR KNIFE HIGH
DOUT2-7 N2/AIR
DOUT1-2 NOZ COLD AIR
+24V out
+15V DC
DOUT1-5 NOZ PUFF OFF
+15V DC
DIN1-7 TOP HTR LOW PRESS
DIN1-8 DIFF LOW PRESS
Earth Ground
COM RETURN
AOUT-3 MFC
AIN-1 MASS FLOW SENSE
AOUT-1 MASS FLOW CTRL
AOUT-5 COOLING RING
24V
UHC+A
LFUH1
+15V
AIN-3 NOZ VAC SENSE
AIN-5 SITE CLEAN VAC SENSE
DIN1-1
CON37
GND
176
Upper heater
low flow 3
SW14
noise supression diode
D1
1N4007
Assembly notes:
TS1 pins 2,3,4,& 5 jumpered
top of the terminal strip is pin 1
TS1
31&32
33&38
28&29
36
21&23
39&30
27&37
35&40
34
22&41
1a
24Vregret
SW10
Low Pressure 1
Top Heater
SW11
Low Pressure 2
GND
38
176
J4
Sierra, series 840
pinout
DB15
263
Sensym ASCX15AN
Ext offset
Vs(+5V)
Output +
Ground
N/C
Do Not Use
CON6
Nozzle
V
260
261
264
262
Site Clean
PCOOL (option)
J5
J7
CON3
RED
GREY
BLACK
+24V DC
24V ret
signal
BL 10
GY 26
Revision table
rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date:
17-Apr-2007
Sheet of
5 OF 8
File:
U:\DRS25\New Controls\0025.00.946 B.DdB
Drawn By:
JEFF DUHAIME



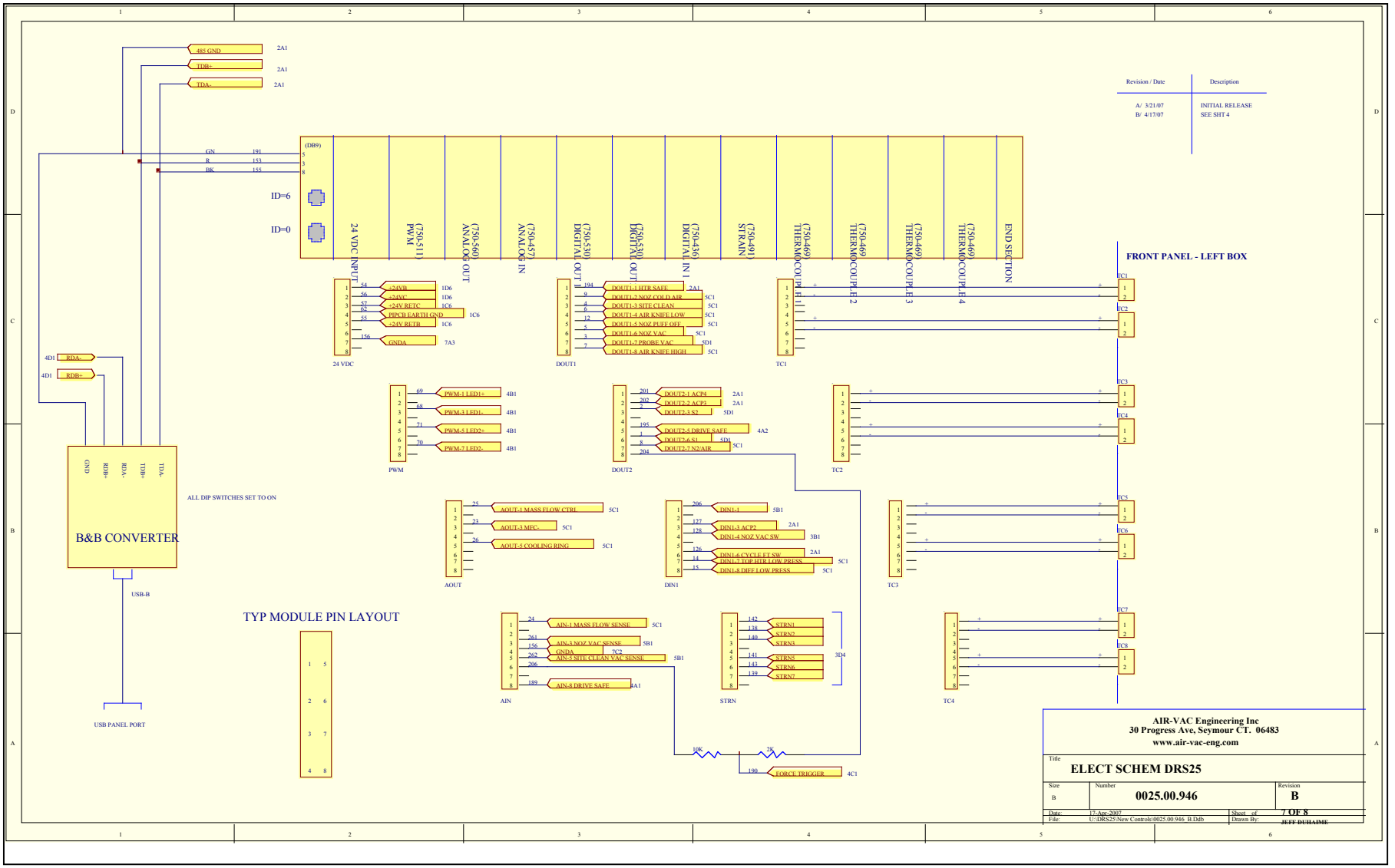
Revision / Date	Description
A/ 3/21/07	INITIAL RELEASE
B/ 4/17/07	SEE SHT 4

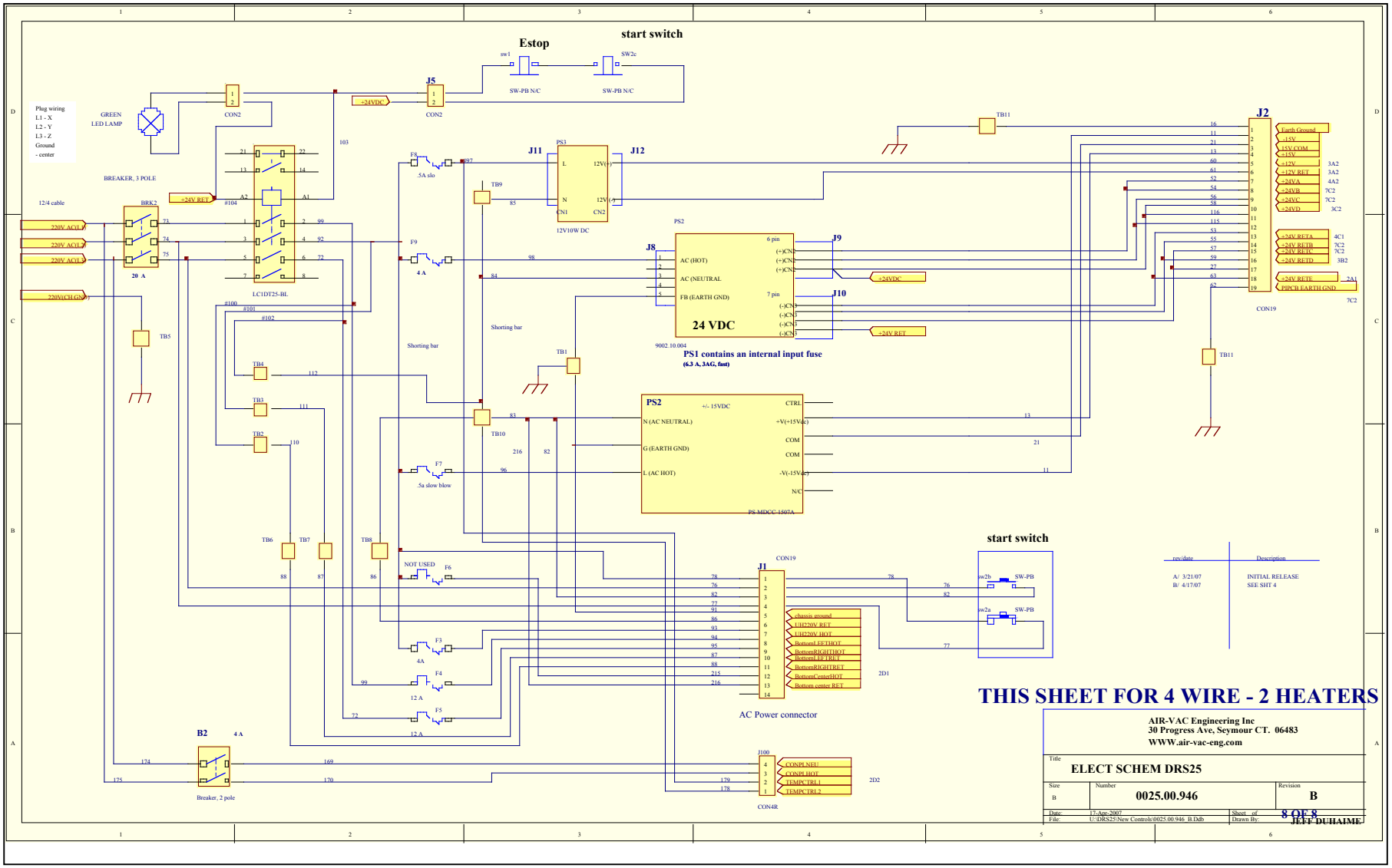
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com

Title: **ELECT SCHEM DRS25**

Size	Number	Revision
B	**0025.00.946**	**B**

Date:	17-Apr-2007	Sheet of	**6 OF 8**
File:	U:\DRS25\New Controls\0025.00.946_B.Ddb	Drawn By:	**JEFF DUHAIME**


485 GND
TDB+
TDA-
2A1
Revision / Date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
(DB9)
GN 191
R 153
BK 155
ID=6
ID=0
24 VDC INPUT
(750-511) PWM
(750-560) ANALOG OUT
(750-457) ANALOG IN
(750-530) DIGITAL OUT 1
(750-530) DIGITAL OUT 2
(750-436) DIGITAL IN 1
(750-491) STRAIN
(750-469) THERMOCOUPLE 1
(750-469) THERMOCOUPLE 2
(750-469) THERMOCOUPLE 3
(750-469) THERMOCOUPLE 4
END SECTION
FRONT PANEL - LEFT BOX
+24VB
+24VC
+24V RETC
PIPCB EARTH GND
+24V RETB
GNDA
24 VDC
DOUT1-1 HTR SAFE
DOUT1-2 NOZ COLD AIR
DOUT1-3 SITE CLEAN
DOUT1-4 AIR KNIFE LOW
DOUT1-5 NOZ PUFF OFF
DOUT1-6 NOZ VAC
DOUT1-7 PROBE VAC
DOUT1-8 AIR KNIFE HIGH
DOUT1
TC1
TC2
TC3
TC4
PWM-1 LED1+
PWM-3 LED1-
PWM-5 LED2+
PWM-7 LED2-
PWM
DOUT2-1 ACP4
DOUT2-2 ACP1
DOUT2-3 S2
DOUT2-5 DRIVE SAFE
DOUT2-6 S1
DOUT2-7 N2/AIR
DOUT2
RDA-
RDB+
GND
RDB+
RDA-
TDB+
TDA-
B&B CONVERTER
ALL DIP SWITCHES SET TO ON
USB-B
USB PANEL PORT
TYP MODULE PIN LAYOUT
AOUT-1 MASS FLOW CTRL
AOUT-3 MFC-
AOUT-5 COOLING RING
AOUT
DIN1-1
DIN1-3 ACP2
DIN1-4 NOZ VAC SW
DIN1-6 CYCLE FT SW
DIN1-7 TOP HTR LOW PRESS
DIN1-8 DIFF LOW PRESS
DIN1
AIN-1 MASS FLOW SENSE
AIN-3 NOZ VAC SENSE
GNDA
AIN-5 SITE CLEAN VAC SENSE
AIN-8 DRIVE SAFE
AIN
STRN1
STRN2
STRN3
STRN5
STRN6
STRN7
STRN
10K
2K
FORCE TRIGGER
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
www.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date: 17-Apr-2007
Sheet of 7 OF 8
File: U:\DRS25\New Controls\0025 00 946 B.Ddb
Drawn By: JEFF DUHAIME


start switch
Estop
sw1
SW2c
SW-PB N/C
SW-PB N/C
J5
CON2
+24VDC
GREEN
LED LAMP
Plug wiring
L1 - X
L2 - Y
L3 - Z
Ground
- center
BREAKER, 3 POLE
12/4 cable
BRK2
20 A
220V ACL1
220V ACL2
220V ACL3
220V(CH GND)
+24V RET
LC1DT25-BL
TB5
TB4
TB3
TB2
TB6
TB7
TB8
F8
.5A slo
F9
4 A
F7
.5a slow blow
NOT USED
F6
F3
4A
F4
12 A
F5
12 A
Shorting bar
Shorting bar
TB9
TB10
TB1
J11
J12
PS3
12V10W DC
PS2
24 VDC
9002.10.004
PS1 contains an internal input fuse
(6.3 A, 3AG, fast)
J8
J9
J10
AC (HOT)
AC (NEUTRAL
FB (EARTH GND)
+24VDC
+24V RET
PS2
+/- 15VDC
N (AC NEUTRAL)
G (EARTH GND)
L (AC HOT)
CTRL
+V(+15Vdc)
COM
COM
-V(-15Vdc)
N/C
PS-MDCC-1507A
TB11
J2
CON19
Earth Ground
-15V
-15V COM
+15V
+12V
+12V RET
+24VA
+24VB
+24VC
+24VD
+24V RETA
+24V RETB
+24V RETC
+24V RETD
+24V RETE
PIPCH EARTH GND
3A2
3A2
4A2
7C2
7C2
3C2
4C1
7C2
7C2
3B2
2A1
7C2
CON19
J1
chassis ground
UH220V RET
UH220V HOT
BottomLEFTHOT
BottomRIGHTHOT
BottomLEFTRET
BottomRIGHTRET
BottomCenterHOT
Bottom center RET
2D1
AC Power connector
start switch
sw2b
sw2a
SW-PB
SW-PB
B2
4 A
Breaker, 2 pole
J100
CONPI NEU
CONPI HOT
TEMPCTRL1
TEMPCTRL2
2D2
CON4R
THIS SHEET FOR 4 WIRE - 2 HEATERS
rev/date
Description
A/ 3/21/07
INITIAL RELEASE
B/ 4/17/07
SEE SHT 4
AIR-VAC Engineering Inc
30 Progress Ave, Seymour CT. 06483
WWW.air-vac-eng.com
Title
ELECT SCHEM DRS25
Size
B
Number
0025.00.946
Revision
B
Date:
17-Apr-2007
File:
U:\DRS25\New Controls\0025.00.946 B.DdB
Sheet of
8 OF 8
Drawn By:
JEFF DUHAIME

9: Maintenance

9 Maintenance

9.0 Preventative Maintenance Checklist & Schedule

Note: Please refer to the following pages for details.

Daily:

- Clean carrier area of fallen parts.
- Wipe painted surfaces with cleaner.
- Report any problem to supervisor or machine maintenance department.

Monthly:

- Clean microscope and vision system optics
- Wipe flux from table, arms, and rails.
- Apply a film of light oil to the X and Y rails (to avoid corrosion).

Three to Four times per year:

- Check air pressure.
- Check flow rate verification.
- Check Upper Heater temperature verification.
- Check vision alignment verification.

Yearly:

- Replace vacuum cup or o-ring, if required. Clean nozzles with flux remover and soft brush.
- Replace vacuum filter of Site Solder Removal System, if required.
- Replace nozzle vacuum filter.
- Clean the fan cover filters on the two back fans.
- Drain water and oil from air supply filters.
- Check for play in carrier Y-bearing.
- Check for play in carrier X-bearing.
- Check diffuser to carrier parallelism.
- Clean and lubricate vertical shafts.
- Check microscope lights.
- Check for wobble in nozzle cone.
- Check nozzle clamp: must open completely and hold, and snap closed. Rebuild, if necessary.
- Run wire brush through vacuum tube.
- Check for air-tube cracks at heater head cap and insulation on wires inside.
- Check for tie wraps: tube input, to hold vacuum hose; around hose and tube through vertical supports.
- Perform daily, weekly, and monthly preventative maintenance schedule.

Note:

- ***Maintenance is based on normal usage. Depending on environment and usage the maintenance schedule may need to be adjusted.***
- ***If machine is moved the installation and verification should be repeated.***
- ***Proper electrical input (208-240 VAC, 50-60 Hz) and air supply (90-130psi) MUST be provided.***

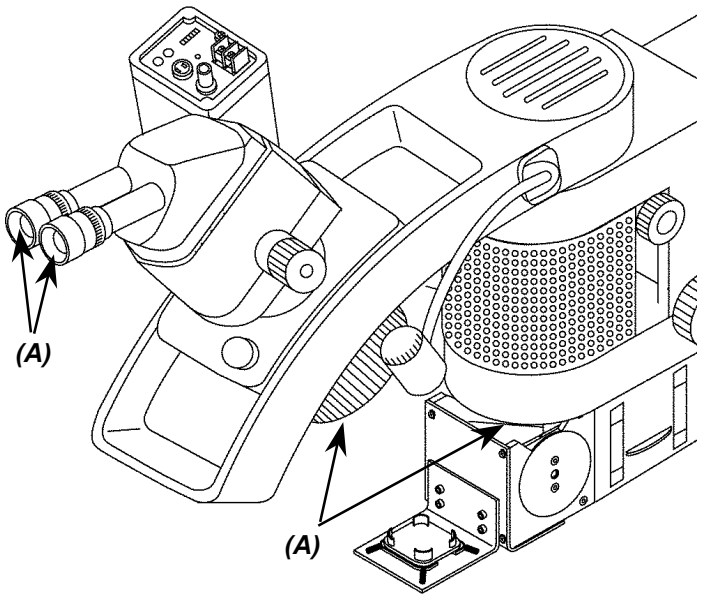
9.1.1 Preventative Maintenance Schedule Procedure

Daily:

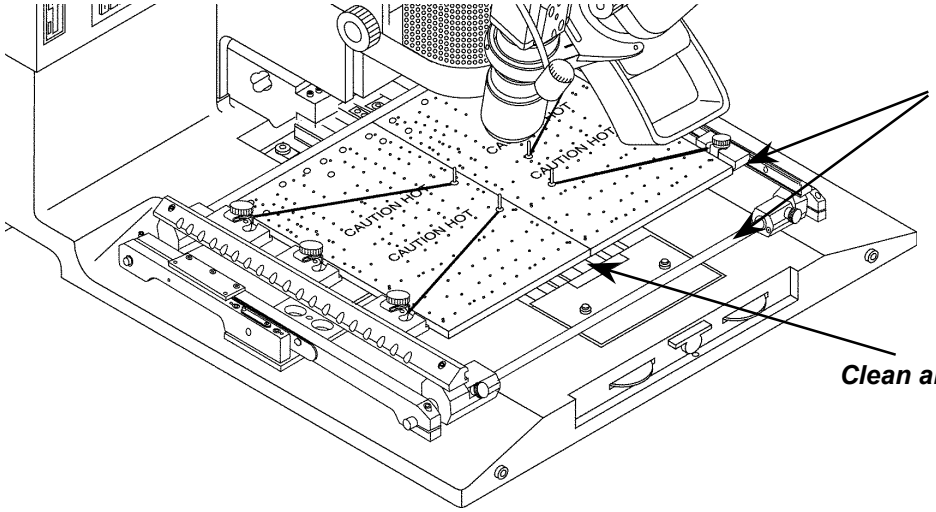
- Self explanatory

Monthly:

- Clean Microscope and Vision System Optics. Wipe ***eyepieces, mirror, and vision system prism (A)*** with alcohol.
- Clean bottom of vision prism.

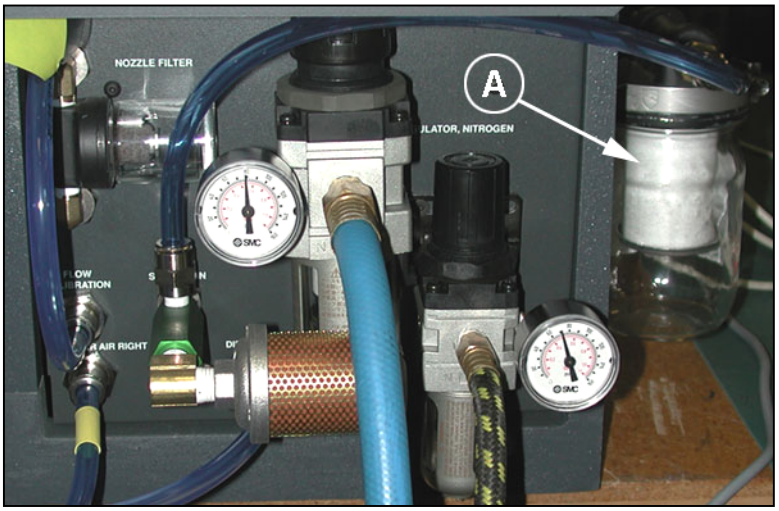


- Wipe flux from table, arms, and rails.
- Apply a film of light oil to the X and Y rails.

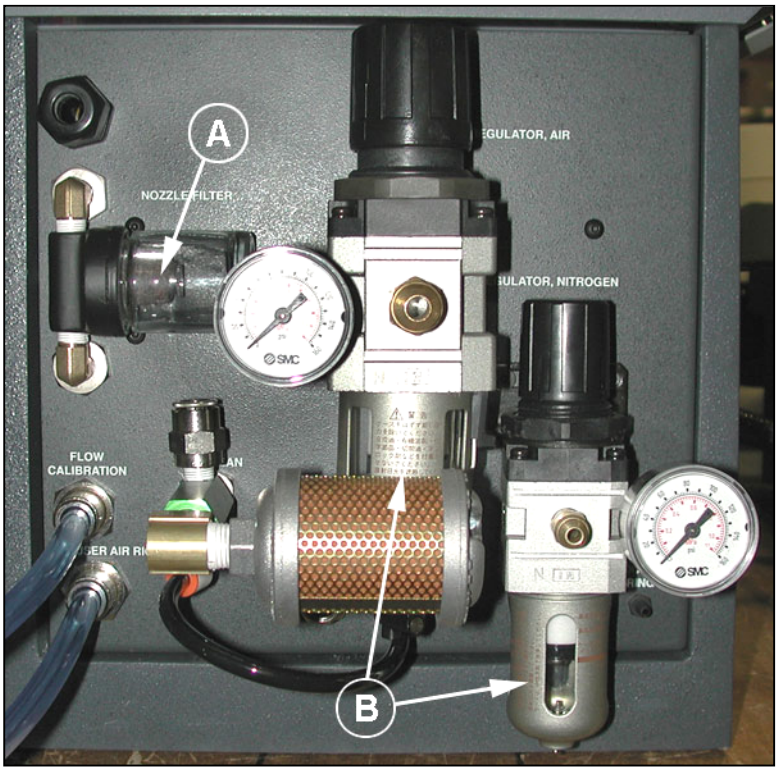


Yearly:

- Replace the ***vacuum filter elements (A)*** of Site Solder Removal System***.*** Flux vapors in the vacuum pump will result in insufficient vacuum operation. Unscrew glass jar.



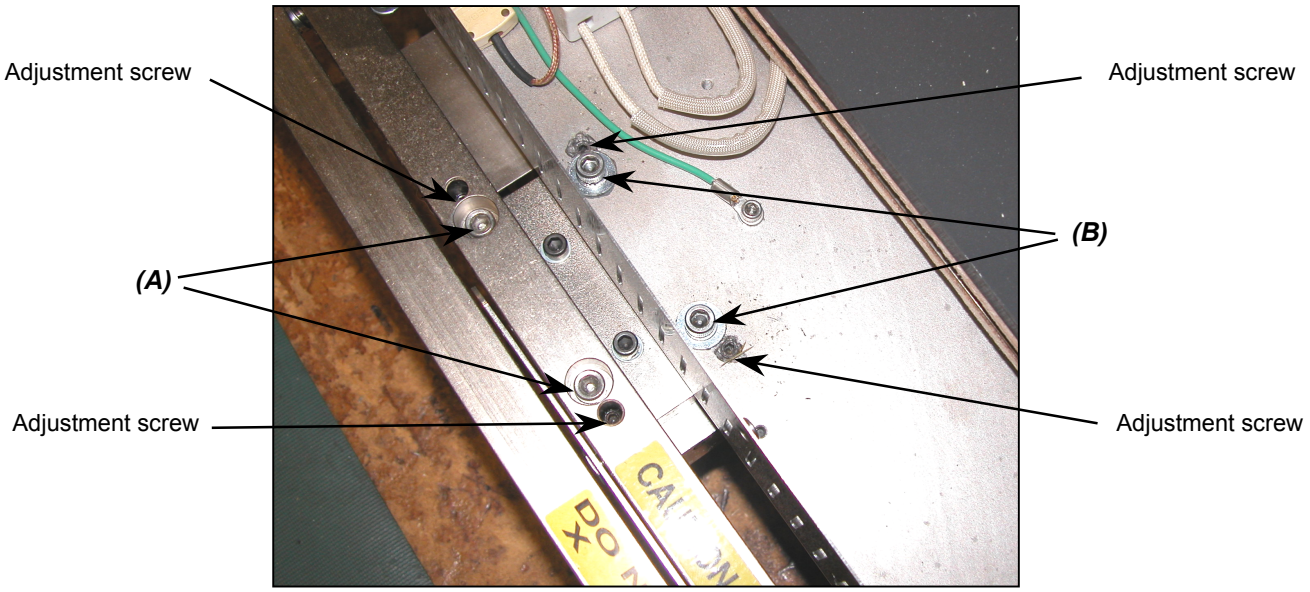
- Replace ***two nozzle vacuum filters (A).*** Unscrew glass jar. Unscrew stem to remove and install new filters. **Note: Filter must cover holes on stem.**
- Drain water and oil from ***air supply filters (B).***
- Clean the fan cover filters on the rear of the upper box.



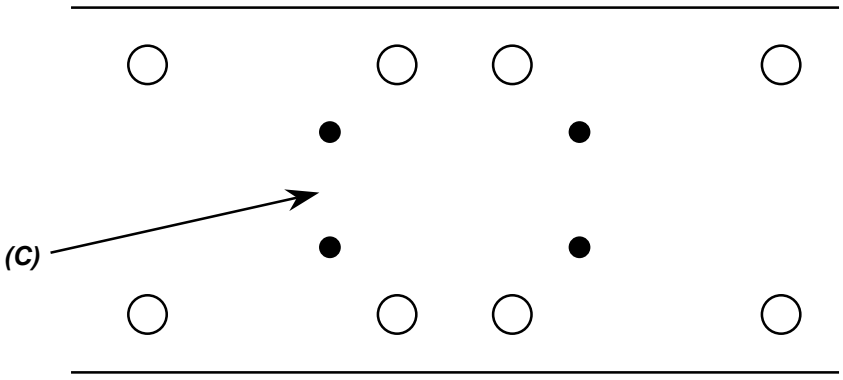
AS REQUIRED:

To correct for play in carrier Y-bearing:

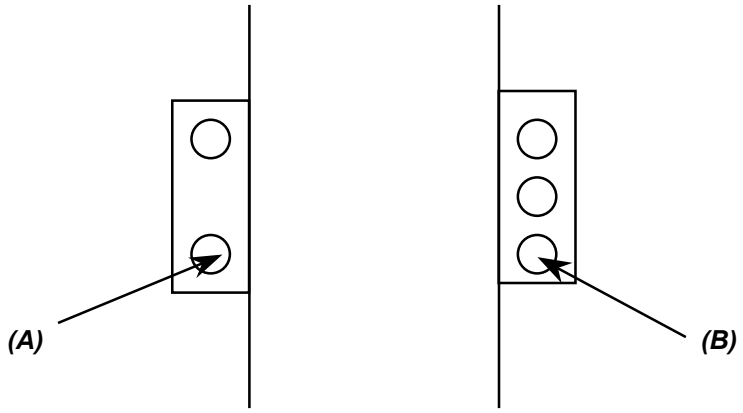
- Bring the carrier to the forward most position, center carrier, and lock in place.
- Remove the ***four screws (A – left & right sides)*** holding the board carrier, set carrier aside.
- Remove the ***four screws (B – left & right sides)*** holding the diffuser mounting plate (double diffuser) or dovetail (single).
- Lift straight up and slide to back. Lay on top of diffuser. Inspect cable. Make sure cable clamps are tight.
- Clean rail.



- Remove the ***four screws (C)*** holding the x-bearing rail.
- Lift and move the carrier assembly to the back of the machine.



- Remove ***left bearing (A).*** Be careful so that balls do not fall out.
- Remove ***right bearing (B).*** Do not loosen center screw (cam).
- Use 3-in-one oil or similar to lightly lubricate bearing.

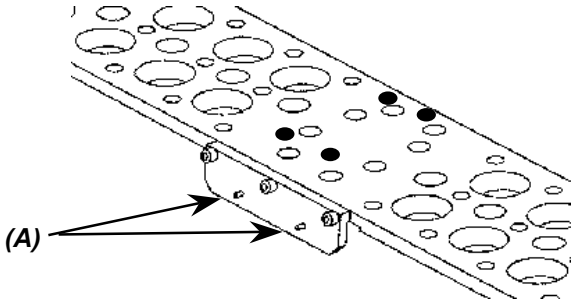


- Reinstall right bearing. Do not tighten completely.
- Slide back and forth.
- Reinstall left bearing from front of machine.
- Slide back and forth. Tighten.
- Press right bearing against rail.
- Set cam until almost tight. Tighten top and bottom screws.
- Check the y-bearing for excessive play by twisting the bearing plate left and right. There should be less than 1/16" play in the assembly. Do not over tighten. Table will not move with y-drive, or bearing will be damaged if it is too tight.
- Continue to X-bearing procedure.

AS REQUIRED:

To correct for play in carrier X-bearing:

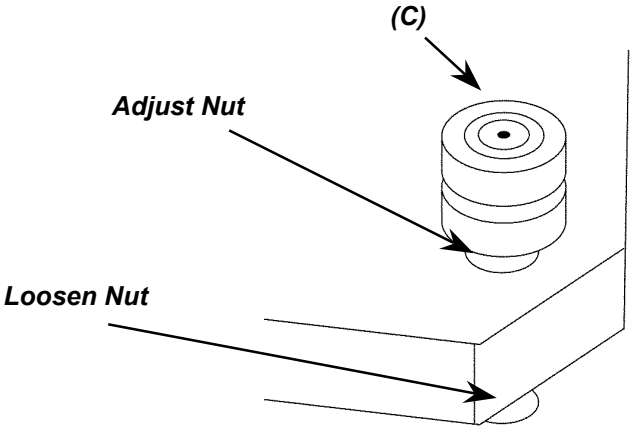
- Loosen rear bearing and remove. Lubricate bearings.
- Loosen ***set screws (small) (A)*** of front face of carrier bar.
- Loosen screws of front bearing and remove. Lubricate bearing.
- Re-install rear bearing and tighten. Install front bearing.
- Tighten set screws. Tighten screws of front bearing.
- Slide rail. Movement should be firm but not stiff. Check tension by twisting rail.
- Reattach the x-bearing rail. Reattach the diffuser and board carrier.
- Check perpendicularity of carrier.
- Check diffuser to carrier parallelism.

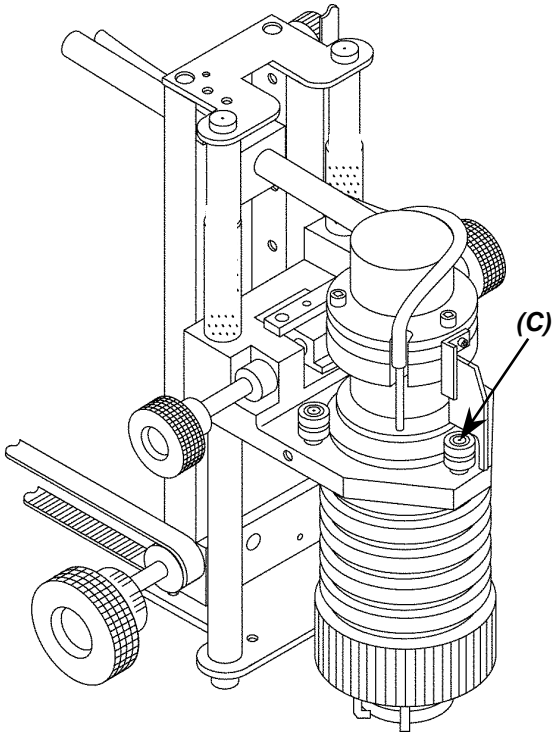


- Remove heater cover.
- Remove all grease from bearings and shafts (top and bottom) with alcohol. Brush on and wipe.
- Apply silicon/vacuum grease on shafts and bearings.

To correct wobble in nozzle cone:

- Remove heater shield.
- Loosen nut under plate of center ***front bearing (C).***
- Adjust nut under center bearing.
  Do not over tighten (bearings will separate).
- Retighten nut under plate.





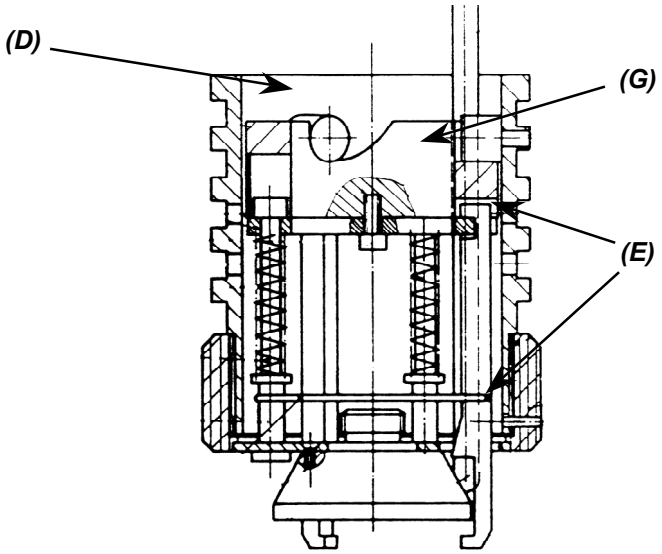
To correct nozzle clamping mechanism:

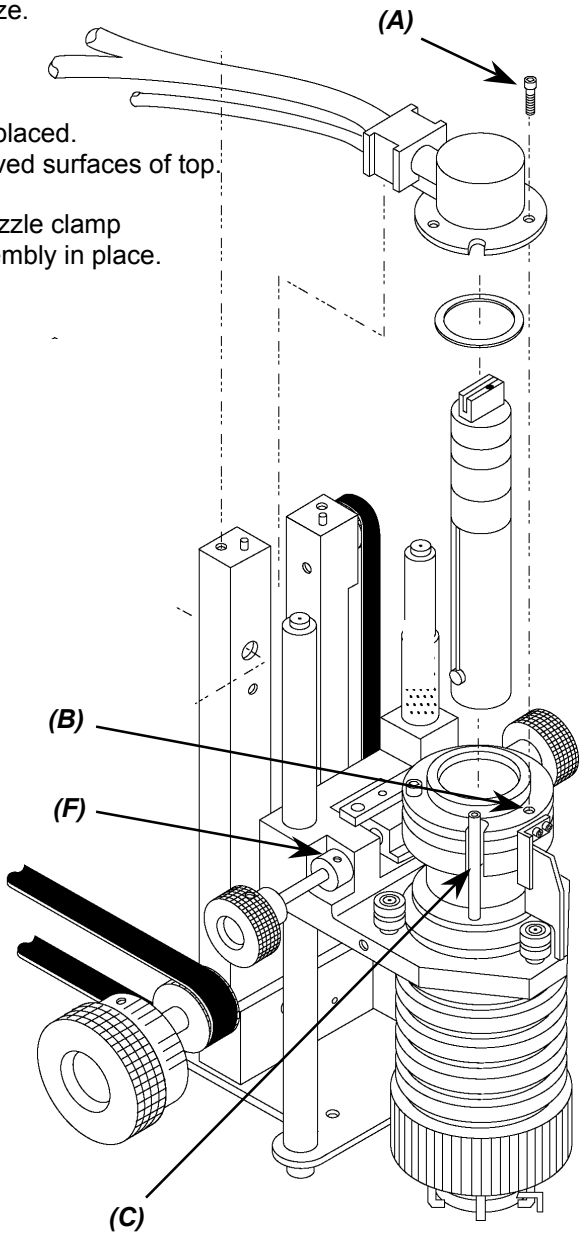
- Disconnect power.
- Remove heat shield.
- Spread carrier arms far apart.
- Remove the ***3 screws (A)*** of the heater head cap.

Note: all washer and spacers of the heating element must go back in the right order. Heating element is keyed. Remove heating element. (Check heating element for cold joints or burnt areas.)

- Use spanner wrench (turn counterclockwise) to loosen ***heater tube (B).***
- Lift tube to remove. Clean tube.
- Run a 2.5 mm allen wrench down the ***vacuum tube (C)*** and carefully straighten. Remove housing carefully- rotate tube.

- Remove ***nozzle ring (D).*** Clean all areas of anti-seize.
- Apply pressure (stand on it with your foot) on nozzle ring and housing to seat.
- Remove spring clip and fingers. Clean all areas of anti-sieze.
- Inspect for wear. File burrs at top of fingers, if necessary.
- Apply anti-seize at the two ***contact points (E),*** as shown.
- Reassemble. Move assembly up and down.
- Check if all pem nuts are in place. If not, plate must be replaced.
- Clean ***brass ring (G)*** of anti-seize. Apply anti-seize at curved surfaces of top. Apply a light bead around the outside.
- Reassemble in reverse order. Slide back into machine (nozzle clamp goes in front). Carefully bending vacuum tube to hold assembly in place.





Tighten theta mechanism:

- Loosen ***set screw (F)*** of ring.
- Press rod to left side. Retighten set screw.

Cleaning of nozzle vacuum tube (C).

- Use the stainless steel brush (STB7) to clean.

9.1.2 Process-Related Preventative Maintenance

- Supply clean compressed air or nitrogen. Do not allow the lines to be changed by unauthorized personnel.

WARNING: Unfiltered air can result in the following problems; premature heater failure, contaminated flow meter, vacuum pump, and moisture exhaust in electrical compartment.

Unregulated air will shut off solenoid (too high) pressure or will not allow heater to activate (too low).

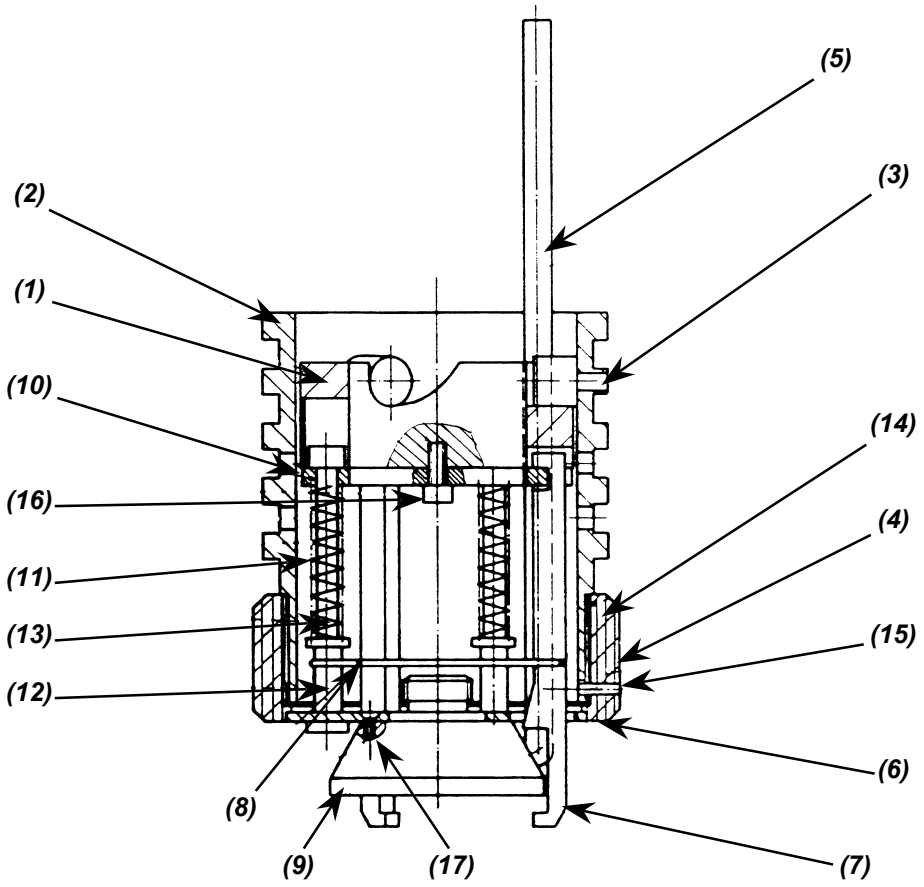
Air requirement: 85-120 psi, 20 scfm clean dry compressed air or inert gas.

- Change the nozzle with the GNT1 or GNT4 tools only. DO NOT GRAB at the bottom of the nozzle as it will damage the gas nozzle opening.
- Store nozzles in tray. Do not drop nozzles.
- Do not force the SMD into nozzle. Damage will occur to the nozzle nest, PCB or component.
- Do not apply excessive flux. Consider fume extraction system.
- Remove the arrows from repair components. They stick to the inside of the nozzle.
- Do not clean nozzle in cleaning solution or degreaser with vacuum cup still installed.
- Do not run the process without a vacuum cup. Change cups after long exposure to heat and flux.
- Transport the unit holding the base. Do not lift unit by the board carrier or microscope.

9.1 Nozzle Clamp Repair

- Disconnect power.
- Remove nozzle assembly heat shield and heater head cap. Check for keyway in heating element and heater cap gasket.
- Two spanner wrenches with 2.5mm pins are necessary to unscrew heater tube from nozzle cone (9). Hold one wrench in heater cap to keep from twisting, place second wrench in top of tube and unscrew (when reassembling do not overtighten, snug is best). Pull tube completely out and set aside.
- Run a 2mm allen wrench down the vacuum tube (5) and carefully straighten. Nozzle clamp assembly should slide down, do not use too much force, vacuum tube can be stripped out easily, rotate tube to help removal.
- Lift heat shield off (2), if hand ring (4) has slipped down (not seated at base) press together to seat.
- Remove spring clip (8) and fingers (7) and inspect for twisting or wear, replace if necessary.
- To lubricate, use Never-Seez or other high temperature grease. Lubrication points are:
    - Top of brass ring (1)
    - Inside brass ring on compression screws
    - Top of fingers, spring clip groove on fingers, sides of fingers above bottom plate.
    - Inside threads of heater tube.
- Reassemble in reverse order, carefully bending vacuum tube to clear heater tube.
- Clamp should now open fully and hold, and snap closed when released.

Nozzle Clamp Assembly:



9.2 Y-Axis Bearing Adjustment

- Bring the carrier to the forward most position, center carrier, and lock in place.
- Remove the four screws holding the board carrier, set aside.
- Remove preheater mounting plate.
- Locate the 4 access holes to the x-bearing plate. Use a 3mm allen wrench to completely loosen the screws holding the x-bearing rail to the y-bearing block.
- The x-bearing rail and assembly are now free of the y-bearing block. Lift and move the carrier assembly to the back of the DRS along the cables in order to access the y-bearing block.
- Tighten the two 3mm allen screws holding the left bearing to the y-bearing block.
- To adjust the y-bearings, loosen the two 3mm allen screws that hold the right side bearing to the y-bearing block.
- Tighten a small amount on the 3mm allen (an adjustment cam) in the center of the right side bearing. Retighten the two 3mm allen screws holding the right bearing.
- Check the y-bearing assembly for excessive play by twisting the bearing plate left and right. There should be less than 1\16" play in the assembly. **Do not over tighten. Table will not move with y-drive, or bearing will be damaged if it is too tight.**
- The bearing assembly is adjusted correctly when the left to right play is less than 1\16". Also check that the bearing assembly moves freely from front to back.
- Repeat steps 6-8 until no more adjustment is necessary.
- Reattach the carrier and x-bearing rail to the y-bearing block, make sure carrier is perpendicular to y-axis rail before tightening.
- Attach the preheater assembly and board carrier to the x-axis plate. Do not overtighten, preheater plate and carrier can be distorted.
- Check board carrier and preheater leveling.

9.3 Carrier Leveling

TOOLS

- NCal4 Nozzle
- Glass Plate (8" x 10" x 1/4")
- Allen wrench set
- Feeler Gauge

Warm-Up:

- From the Main DRS25 Screen, select Setup.
- Set both heaters to 200°C and high flow. Let heaters stay on until heater is heat soaked (5-10 minutes.)
- Change heater temp. to 200°C at low flow.

Carrier Leveling:

1 - Attach the NCAL4 nozzle knife blade to the DRS. De-power vertical motor if required.

2 - Place the glass plate in the carrier arms.

3 - Center the glass from front to back of the carrier arms. Lock the glass to the carrier.

4 - Center the glass under the nozzle from front to back and left to right. Lock the carrier. The blade of the nozzle should run from left to right as viewed from the front of the DRS.

5 - Lower the nozzle until the blade is just above the glass. Do not hit the glass with the blade of the nozzle.

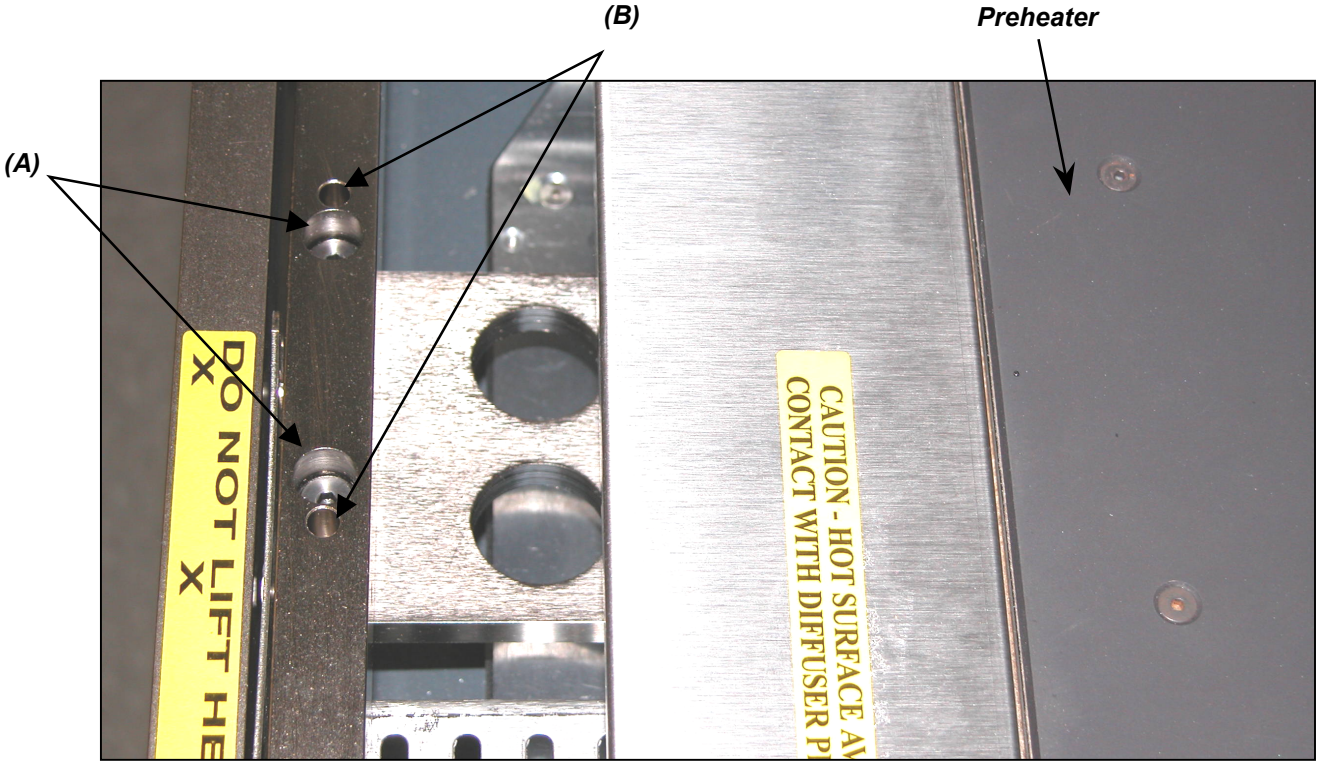
Note: If the nozzle hits the glass plate, raise the nozzle, release the nozzle clamp and then re-clamp the nozzle into place.

6 - Using the feeler gauge, check level of nozzle to glass plate. ***The left to right nozzle clearance to the glass plate must be .005" or less.***

7 – To adjust, raise the nozzle. Go to the outside edge of the carrier assembly to make adjustments. Loosen the ***four allen screws (A)*** that hold the carrier arms to the carrier rail. ***Adjust the 3/32" allen screws (B),*** 1/8 turn at a time (clockwise moves the carrier up).

8 - Snug the two allen screws (A) that hold the carrier arms. ***Do not overtighten.*** Repeat until the left to right nozzle clearance to the glass plate is .005" or less. Check at center, left and right sides. Adjust as necessary.

9 - Turn nozzle 90° and repeat steps 6-8 for adjustment of carrier front to back.



9.4 Preheater Leveling

TOOLS

- Free Standing Board Support
- 1\4 Inch Plate Glass 8x10 Inch Square
- 5/32 Inch Allen Wrench
- 3/32 Inch Allen Wrench
- Feeler Gauge

- Place 1/4" plate glass in carrier. Move glass over left side diffuser and lock in place.
- Place board support (one not installed) on the front left of the diffuser.

Note: If board supports have been installed, remove them so that there is no contact with the installed glass.

- Slide the board support under the glass. Slide glass over right side preheater, slide support under glass. The preheater plate should be adjusted so the support contacts the glass consistently at these four corners.
- Use feeler gauge as reference.

Note: The support should just touch the glass and still be free to move.

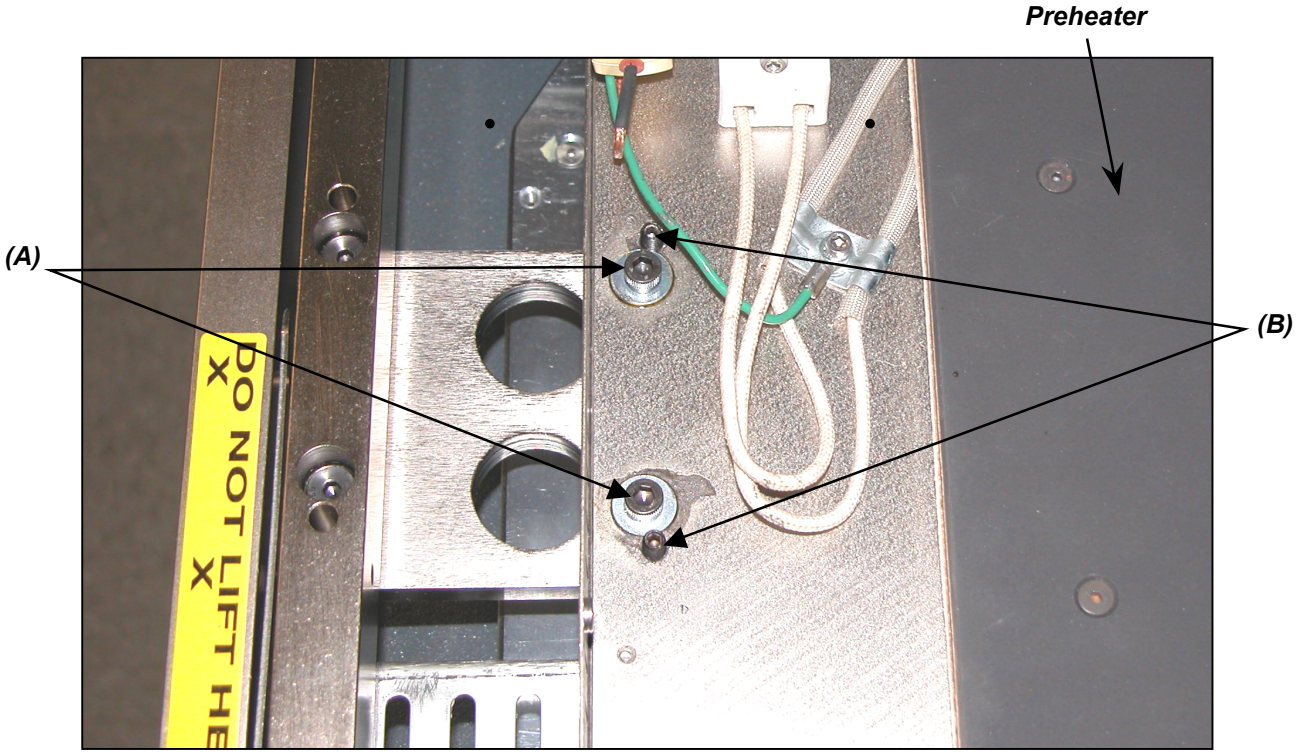
- Remove the board support.
- To adjust, loosen the ***four 5/32" allen screws (A)*** on both left and right side of preheater.
- Tighten or loosen the ***four 3/32" allen screws (B)*** to adjust height of the board support to the glass.

Note: Adjust up only until four corners are touching, then back off. Raising front, lowers back.

- Tighten the 2 1\8" allen screws.

Note: Do not over tighten screws. This will warp preheater mounting plate.

- Place the board support back on the preheater and slide under the glass. Check for contact with the glass in four corners.
- Repeat steps on all 4 corners of the preheater until no more adjustment is needed.



9.5 Vacuum Ports/System

Input Regulators (both nitrogen and air inputs),
Heater Condensation Chamber (A) and Nozzle Condensation Chamber (B):

- Bleed off any water built up in the condensation chamber.
- Inspect the chamber for excessive dirt. Take corrective action on the input air line if excessive dirt is found.

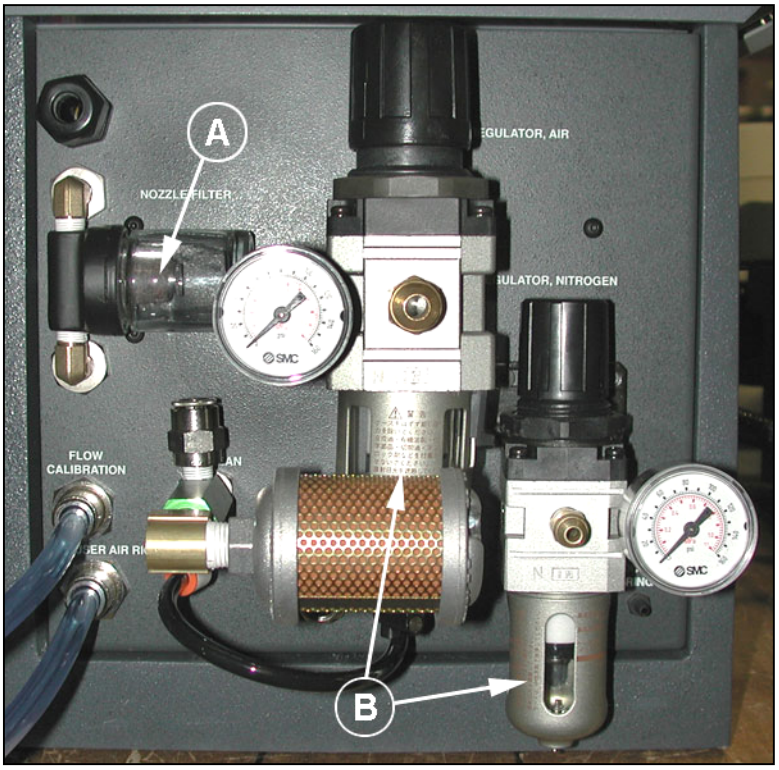
Nozzle Vacuum Filter (C):

- Keep the nozzle vacuum glass tube free of contaminants.
- Change felt filter (F1AE) as needed.

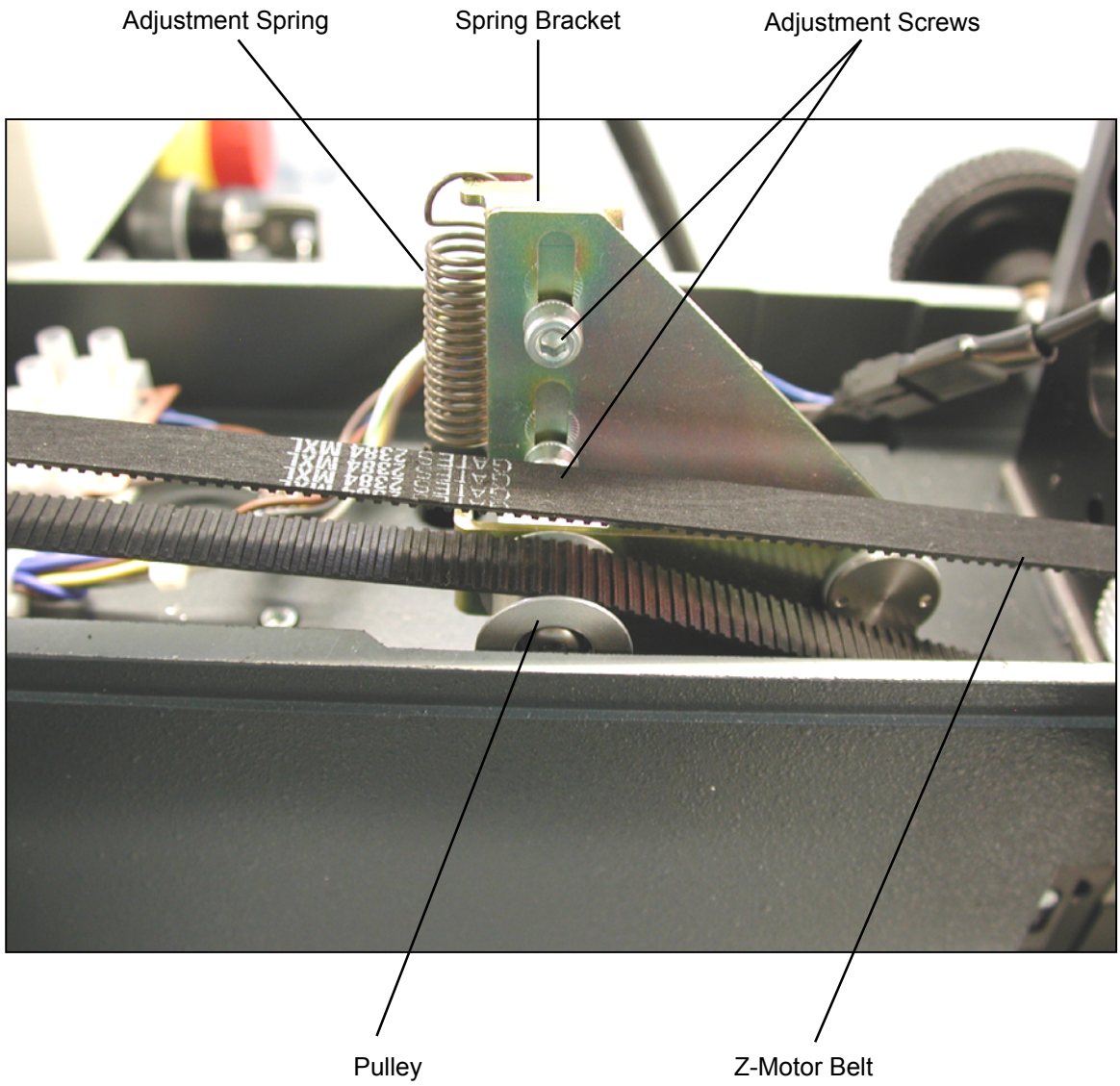
Site Clean Vacuum Filter (D):

- Keep the site clean glass tube free of contaminants.
- Change felt filter (F1AE) as needed.

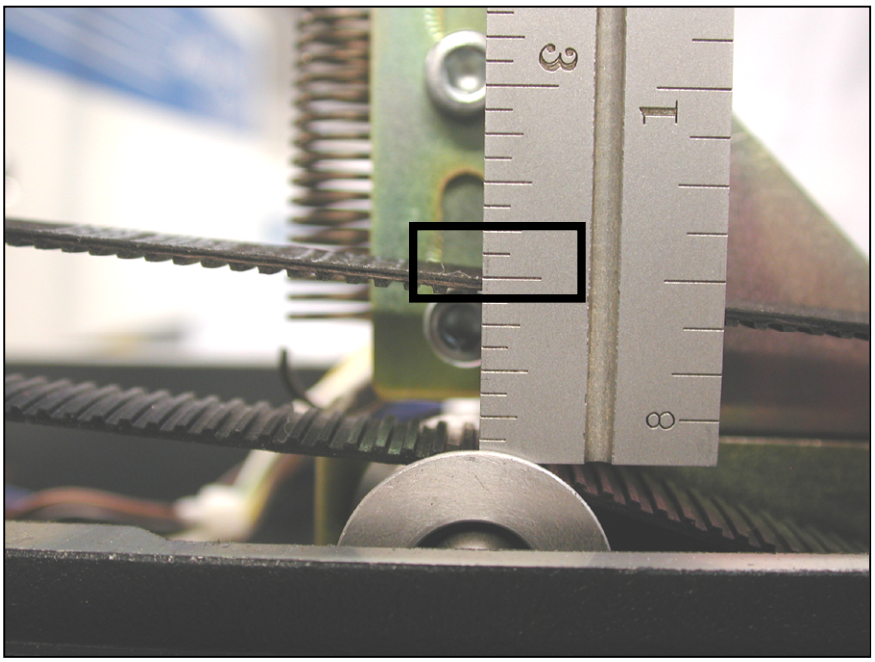
- For internal vacuum pump locations and part # see the manifold assembly section of the manual.



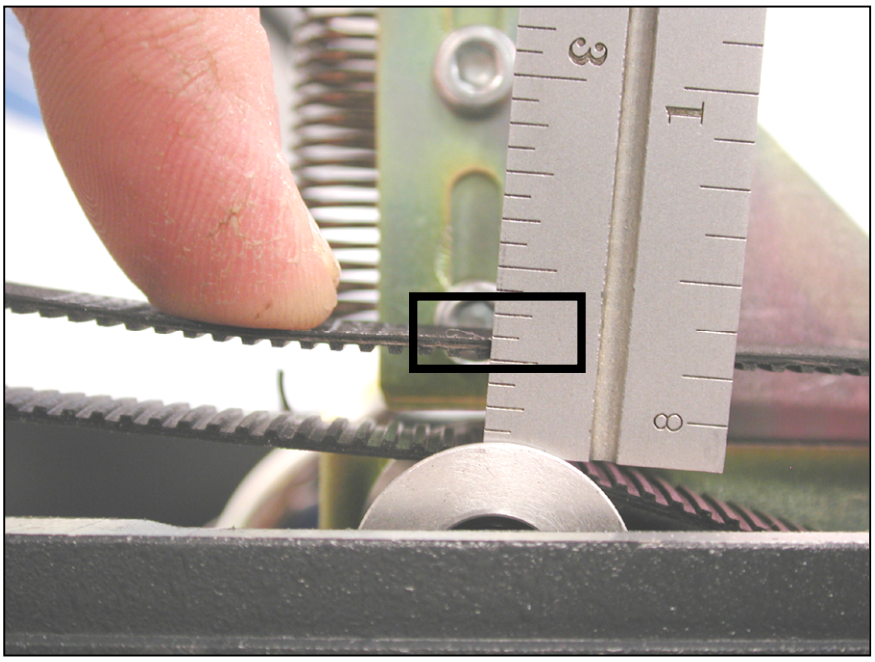
9.6 DRS Z-Axis Motor Belt Adjustment



1- Remove Upper Casting of unit.
2- Disconnect all power
3- Adjust belt by placing the edge of a scale on the centerline of the pulley. Note the measurement.



4- Belt tension is determined by pressing on belt as shown. Once the pulley starts to move from the force, take a reading. Deflection should be set at 3/16".
5- To adjust deflection, loosen adjustment screws and pull up on spring bracket. Retighten and check measurement.



9.7 Replacement of the Heating Element

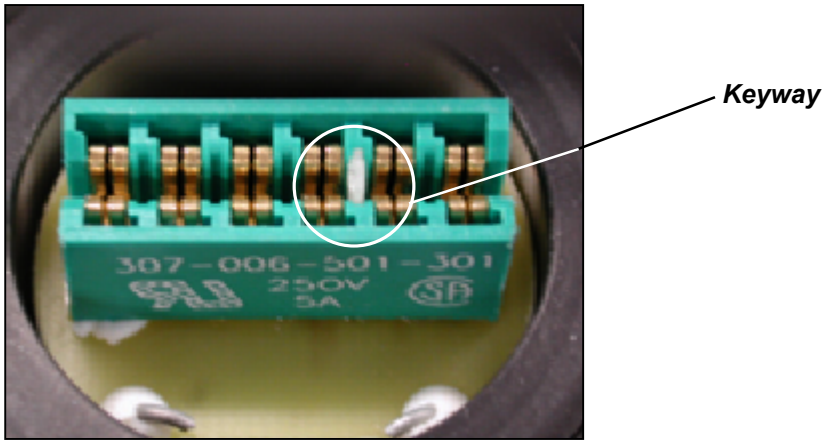
Nozzle Heater

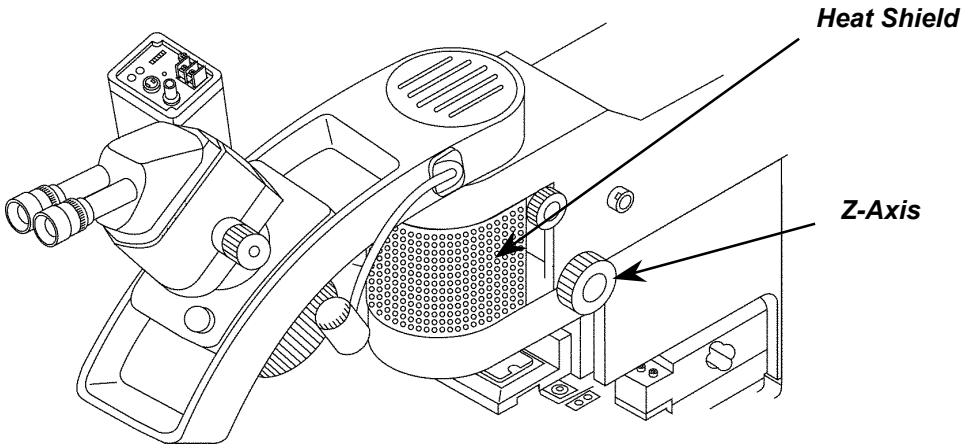
Tools Needed: Metric Allen Wrenches, Multi-Meter

Perform these quick steps to ensure the new heater will not fail prematurely.
Please note that a burned out heater could possibly cause other parts of the system to fail.

NOTE: To determine whether a heater is good or not, check with a multi-meter: Terminal 2 and 6 ⟶ 53.0 Ω +/– 5.0 (coil). Terminal 3 and 4 should have continuity (thermocouple).

1) Check heater for keyway and location of keyway at the connector

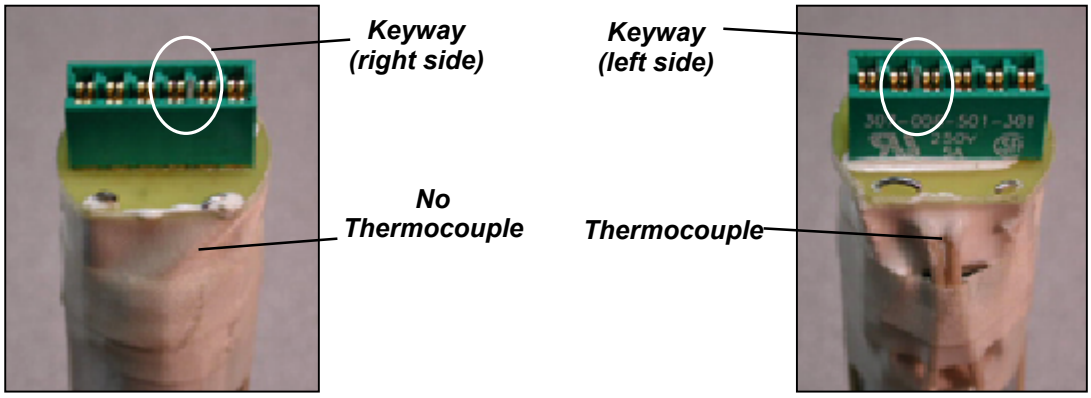




- Disconnect machine main power.
- Remove heat shield to expose the element.
- Using the z-axis adjustment knob, lower the assembly to the bottom most position.
- Remove the 3 allen head screws from the heater head cap. Carefully separate cap from heater.

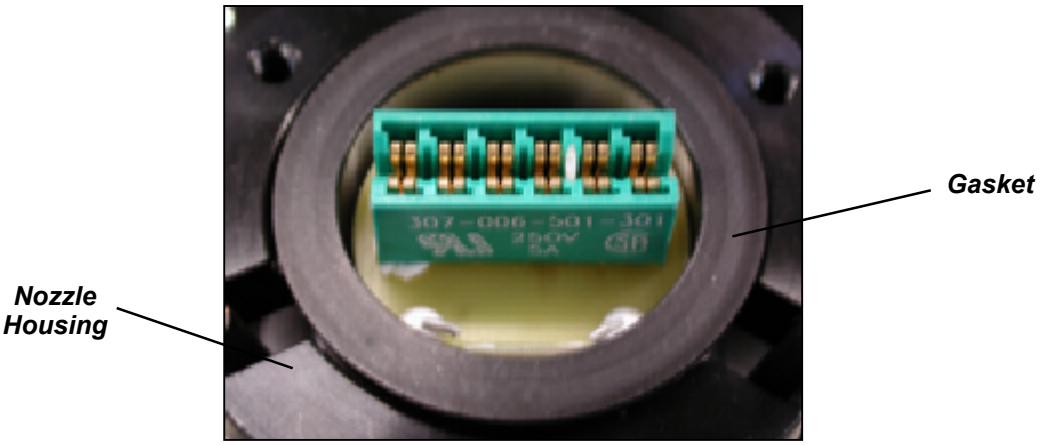
2) **Note orientation of heater before seating into nozzle housing.**

3) Place heater into nozzle housing with keyway to the right side (viewed from operator position), wiggle side to side to be certain heater is seated.



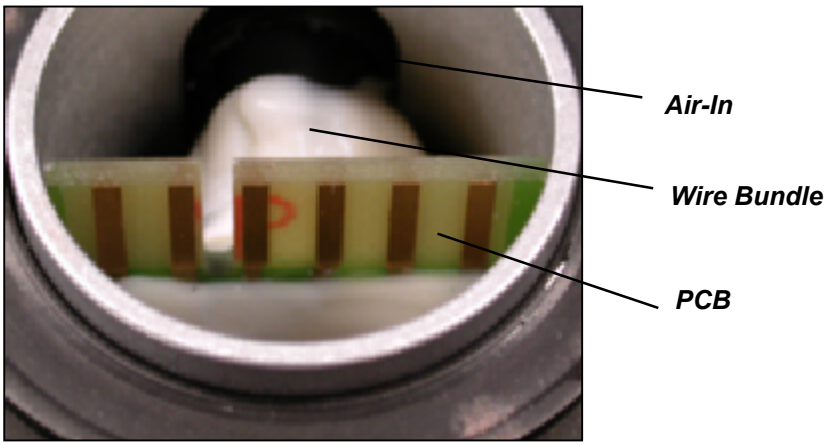
Correct Orientation *Incorrect Orientation*

4) Place gasket over heater.



5) Before attaching Heater Head Harness to heater, turn heater cap over and inspect heater wires for breaks, air lines for leaks and condition of the PCB that interfaces with heater.

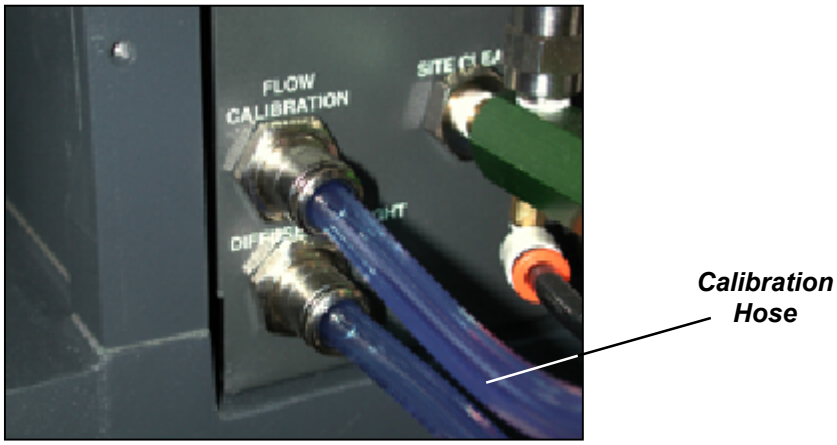
If damage is present, do not attempt to use. Call Air-Vac Technical Support.



6) Once harness passes inspection, attach to heater. Snug only screws in place, alternating bolt pattern. Over tightening the screws will damage cap.

NOTE: For CXX modules the stack up will be, gasket, spacer, gasket.

7) Be certain the calibration hose is securely attached in the rear of the machine before applying power to the heater. If hose is not in place or secure, the heater will burn out.



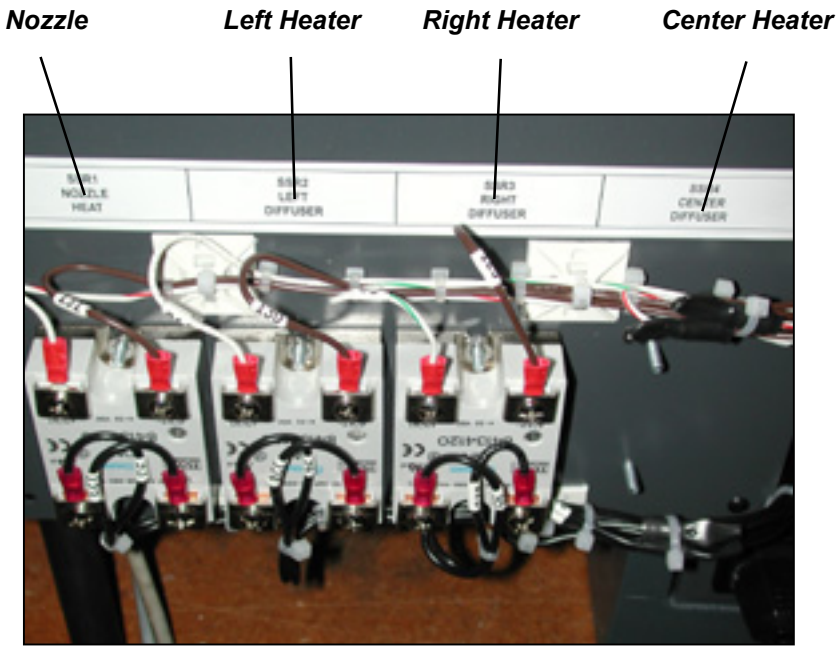
NOTE: Whenever heaters are changed, the machine will need to be recalibrated.

Relay Replacement for DRS Models

1. Solid State Relays are located in the right side of unit (Temperature Box Assembly).

   Rear left of machine.

2. Located inside are the relays. Replace the bad relay.
3. Remove the panel from the Temp. Box Assembly to expose the SS relays. Reverse panel and mount as shown to make it easier for checking.



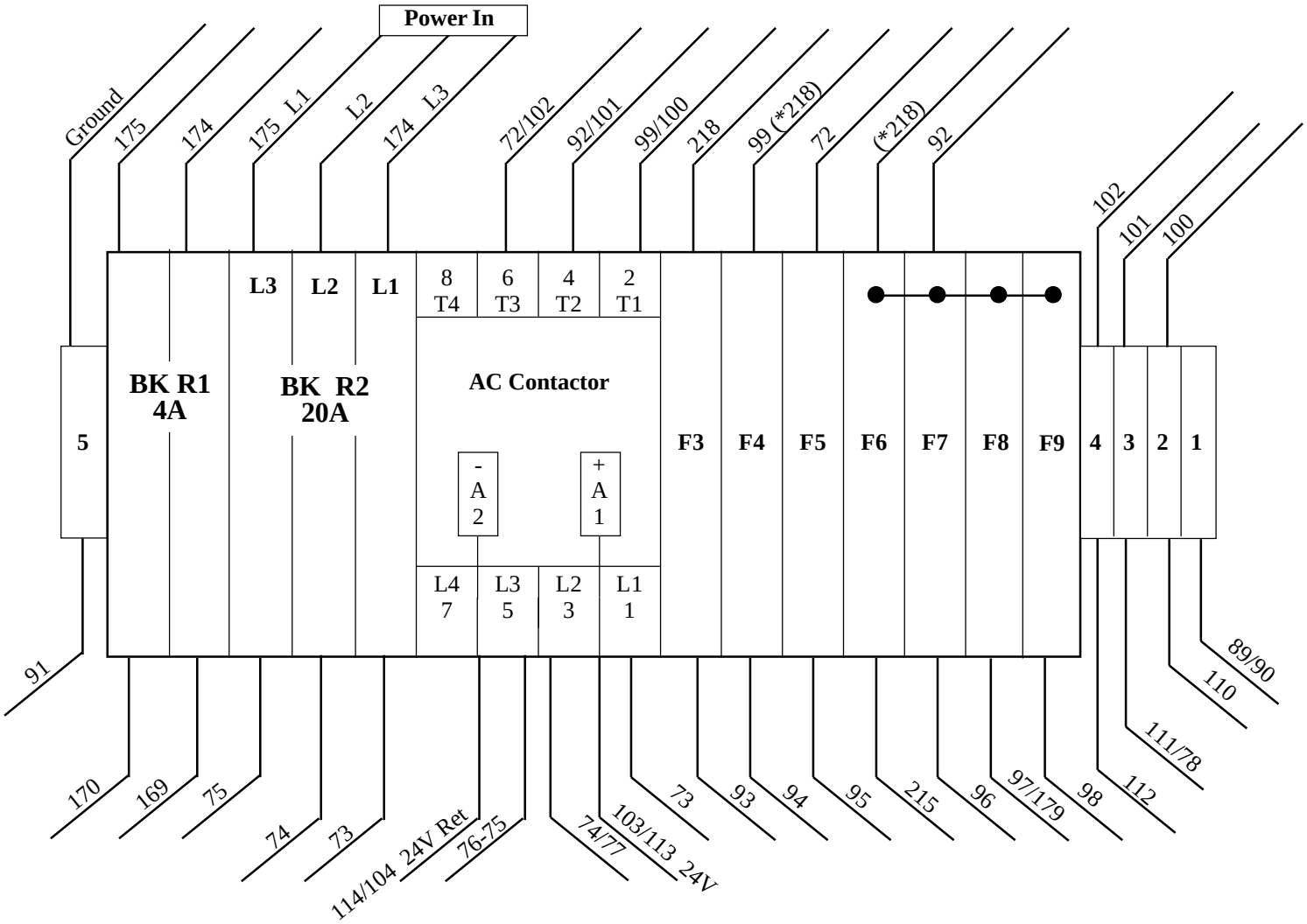
9.8 Wire Diagrams and Assembly Drawings

DRS25 (Air-Vac) - WAGO

AC Power Distribution - Diagram

3-Phase Power

Right Sub-Plate
#0025.77.075



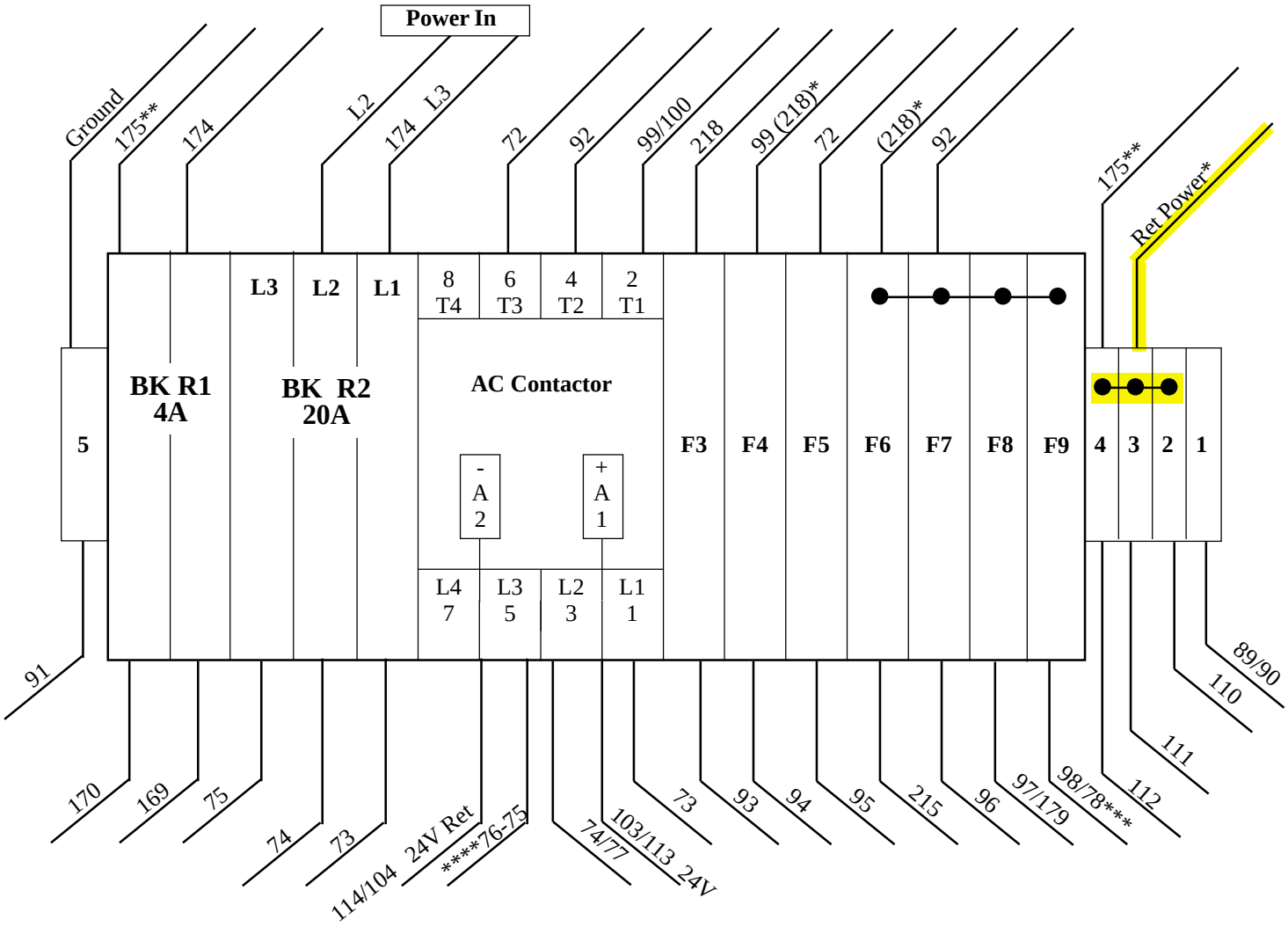
***218 connects to F3 & F4 for 3 heater configuration**
***218 connects to F3 & F6 for 2 heater configuration**

DRS25 (Zevac)* - WAGO

AC Power Distribution - Diagram

3-Phase Power

Right Sub-Plate
#0025.77.075



***218 Connects to F3 & F4 for 3 heater configuration**
***218 Connects to F3 & F6 for 2 heater configuration**
****175 Connects from 4 amp breaker to terminal 4, new longer wire #175 lt blue**
***** Move black wire #78 to fuse #9 from terminal 3**
****** Tie off lt blue wires to keyswitch #76 and #82, also tie off #76 lt blue at contactor**

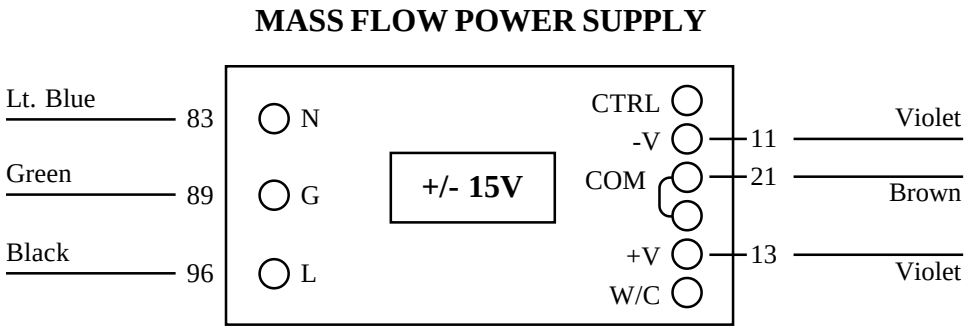
For Zevac units, remove wires 100, 101, 102 and short TB 2, 3, 4

DRS25 - WAGO

DC Power Distribution - Diagram

3-Phase Wiring

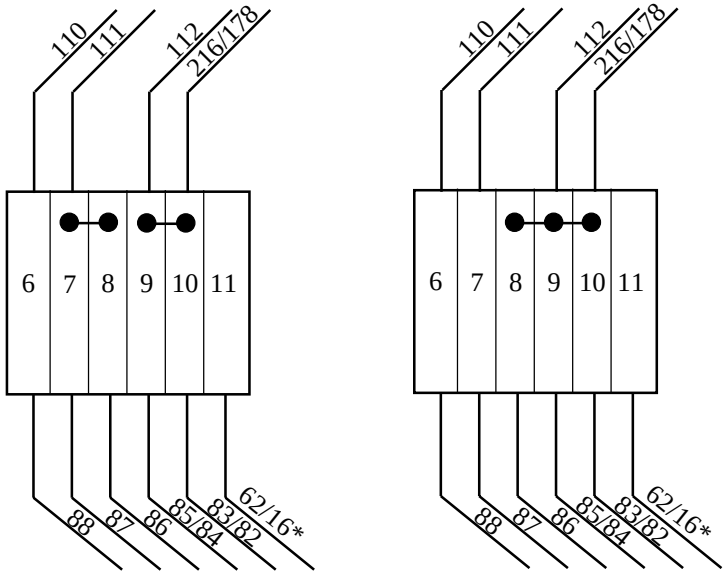
Right Sub-Plate
#0025.77.075



DRS25 (Air-Vac) - WAGO

Right Sub-Plate
#0025.77.075

AC Power Distribution - Diagram
3-Phase Wiring Terminal Blocks



3 Heater **2 Heater**

Jumper Settings

3 Heater **9-10/7-8**
2 Heater **8-9-10**

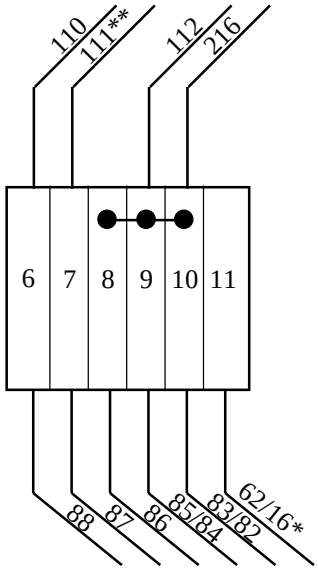
***Wires 62 and 16 are from the DC harness**

DRS25 (Zevac) - WAGO

AC Power Distribution - Diagram

Right Sub-Plate
#0025.77.075

3-Phase Wiring Terminal Blocks



2 and 3 Heater

Jumper Settings

3 Heater 8-9-10
2 Heater 8-9-10

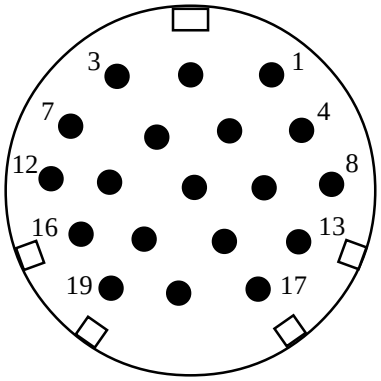
***Wires 62 and 16 are from the DC harness**

DRS25 - WAGO

J2 DC Power - Power Out Checks

Right Sub-Plate
#0025.77.075

PIN		WIRE#
1	Earth Ground	16
2	-15	11
3	15V Ground	21
4	+15	13
5	+12	60
6	12V Ground	61
7	+24V DC	52
8	+24V DC	54
9	+24V DC	56
10	+24V DC	58
11	+24V DC	116
12	+24V DC	115
13	24V Ground	53
14	24V Ground	55
15	24V Ground	57
16	24V Ground	59
17	24V Ground	27
18	24V Ground	63
19	Earth Ground	62

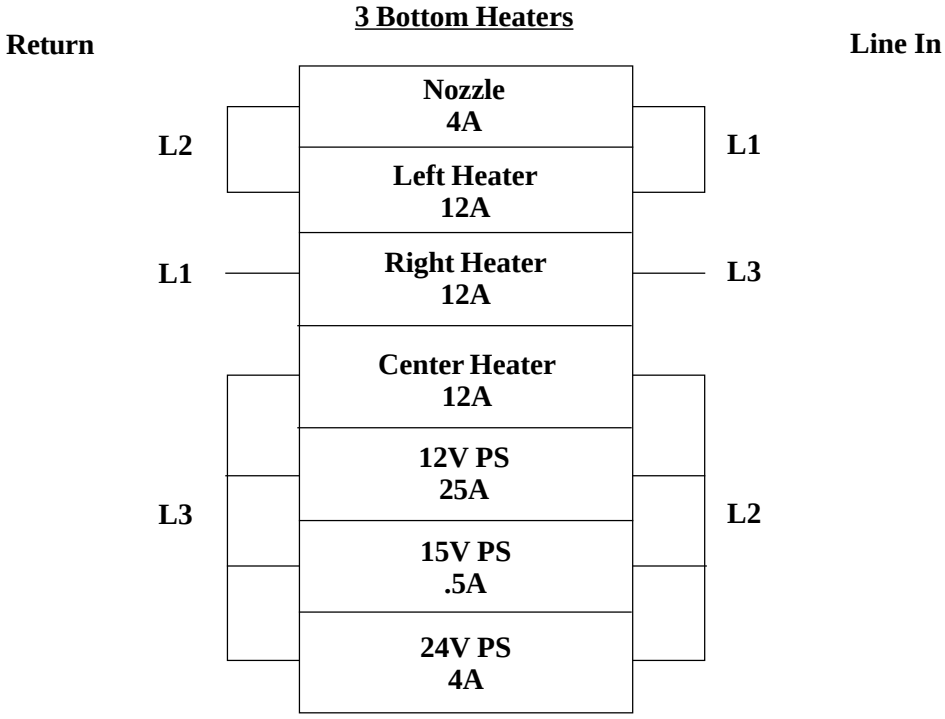


DRS25 - WAGO

3-Phase AC Loading

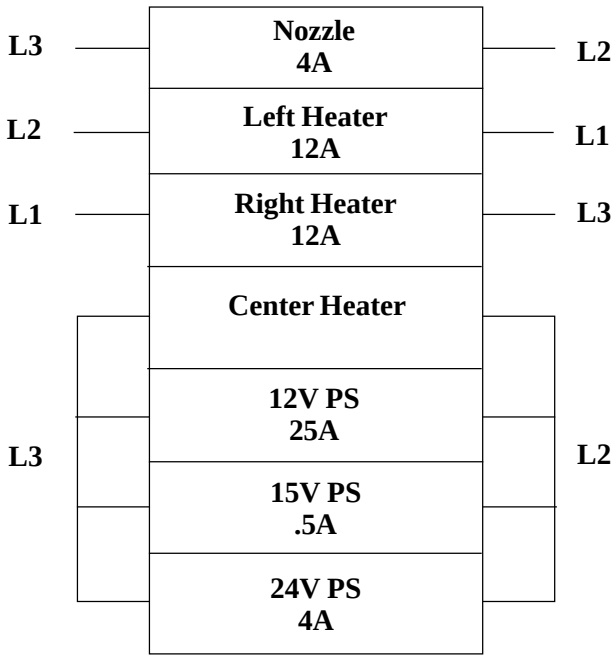
Right Sub-Plate
#0025.77.075

3 Bottom Heaters



---

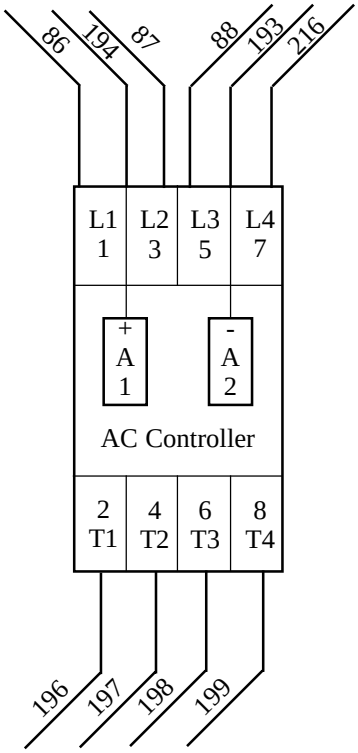
2 Bottom Heaters

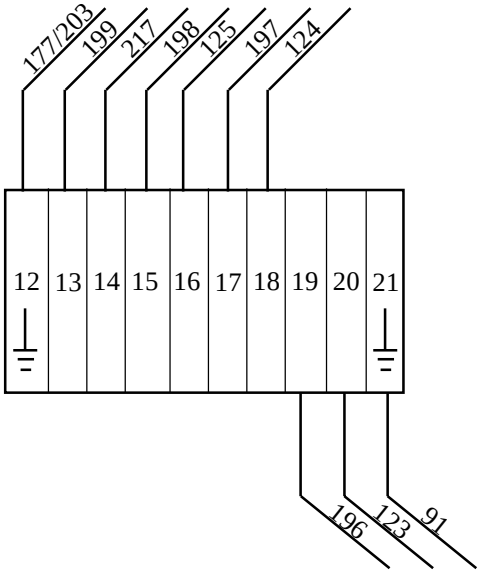


DRS25 - WAGO

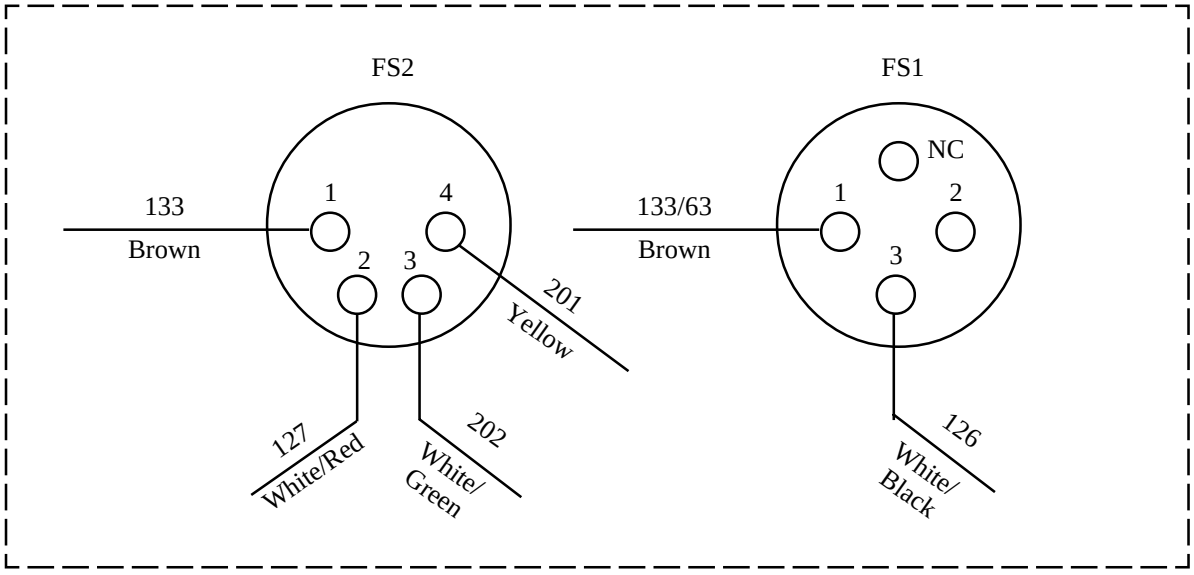
#0025.77.046 Temperature Box Assembly - Diagram
3-Phase Wiring

AC Controller #2





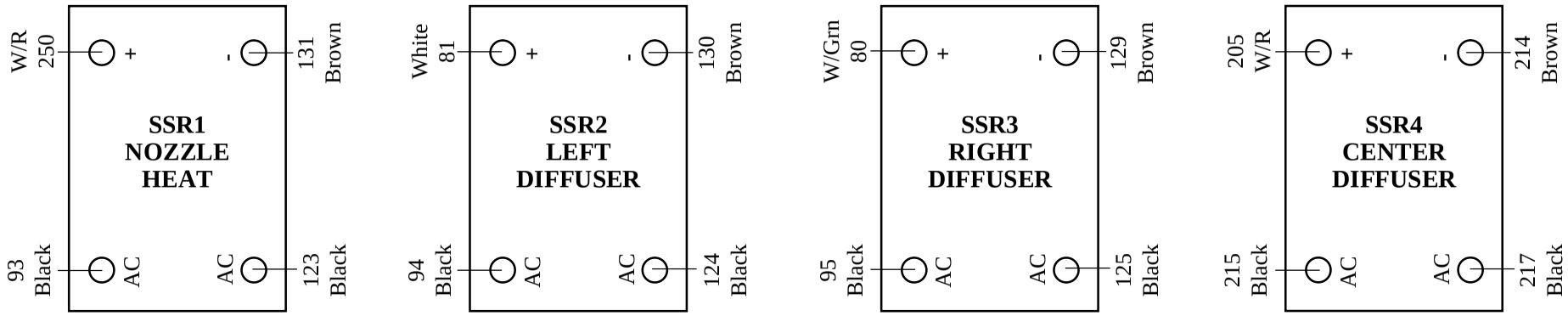
Back of Sockets



DRS25 - WAGO

Temperature Box Assembly - Diagram

#0025.77.046



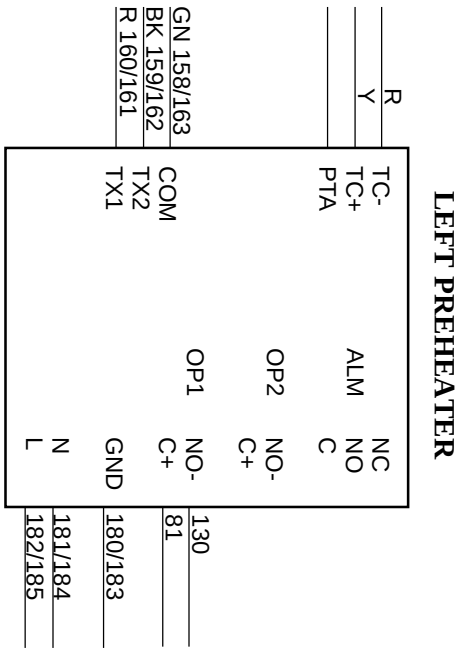
02-5-2007

MacFiles\DRS25ElectricalDiagrams/IOmap.p65

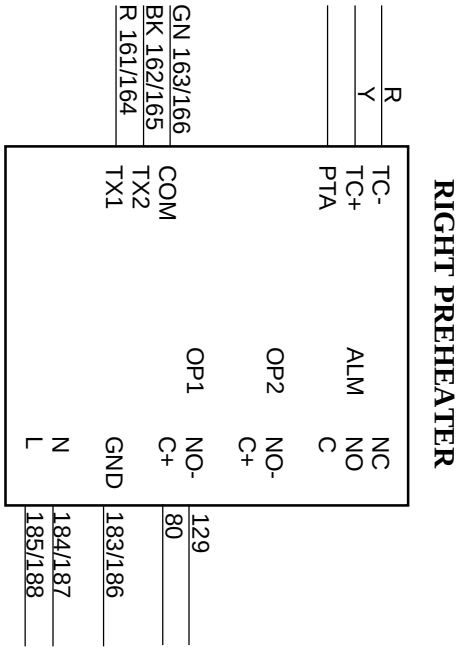
DRS25 - WAGO

Temperature Controllers
Left Sub Plate

Top of Plate



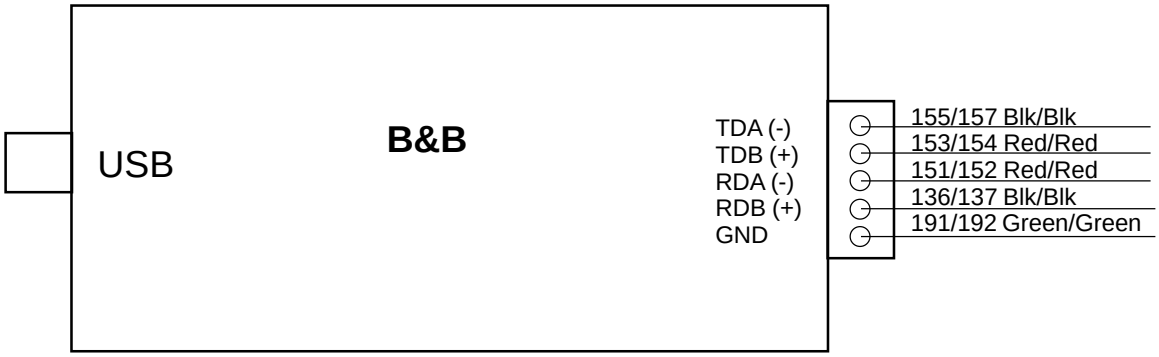
Bottom of Plate



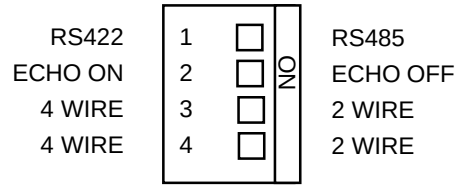
DRS25 - WAGO

B & B

Left Box Sub Plate #0025.77.043



Dip Switches



ALL SWITCHES SET TO ON

DRS25 - WAGO Controller

Part

●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	●● ○○	
□□ 24V 0V ○○ BL54 55BN	1□□5 DO1 DO2 ○○ GN69 71V	1□□5 AO1 AO2 ○○ W/R25 26GY	1□□5 AZ1 AZ2 ○○ W/GN W/R24 262	1□□5 DO1 DO2 ○○ BL194 12R	1□□5 DO1 DO2 ○○ Y201 195R	1□□5 DI1 DI2 ○○ W/R205	1□□5 +UD +UREF ○○ R142 141GY	1□□5 +TC1 +TC2 ○○ Y Y	1□□5 +TC1 +TC2 ○○ Y Y	1□□5 +TC1 +TC2 ○○ Y Y	1□□5 +TC1 +TC2 ○○ Y Y	
+□□+ - - ○○ BL56 -	2□□6 - - ○○ - -	2□□6 - - ○○ - -	2□□6 Common ○○ - 206BK	2□□6 DO3 DO4 ○○ R9 5R	2□□6 DO3 DO4 W/GN ○○ 202 1R	2□□6 DI3 DI4 ○○ - 126 W/BK	2□□6 -UD -UREF ○○ W138 143BL	2□□6 -TC1 -TC2 ○○ R R	2□□6 -TC1 -TC2 ○○ R R	2□□6 -TC1 -TC2 ○○ R R	2□□6 -TC1 -TC2 ○○ R R	
-□□- - - ○○ BN57 156BN	3□□7 OU OU ○○ BL68 70GY	3□□7 OU OU ○○ WB23 -	3□□7 AI3 AI4 W/GN ○○ 261 -	3□□7 DO5 DO6 ○○ R4 3R	3□□7 DO5 DO6 ○○ R2 8R	3□□7 DI5 DI6 ○○ W/R127 14Y	3□□7 -UU -UU ○○ GN140 139BK	3□□7 Common ○○ - -	3□□7 Common ○○ - -	3□□7 Common ○○ - -	3□□7 Common ○○ - -	
⏚□□⏚ ○○ GN62 -	4□□8 ⏚ ⏚ ○○ - -	4□□8 Shield ○○ - -	4□□8 Common ○○ BN156 189BN	4□□8 DO7 DO8 ○○ R6 7R	4□□8 DO7 DO8 ○○ - 204R	4□□8 DI7 DI8 W/GN ○○ 128 15Y	4□□8 Shield ○○ - -	4□□8 Shield ○○ - -	4□□8 Shield ○○ - -	4□□8 Shield ○○ - -	4□□8 Shield ○○ - -	
24V IN	PWM 511	A OUT 560	AIN 457	D OUT 530	D OUT 530	D IN 436	Force 491	TC 1 & 2 469	TC 3 & 4 469	TC 5 & 6 469	TC 7 & 8 469	END 600

I/O Call Outs – DRS25 WAGO

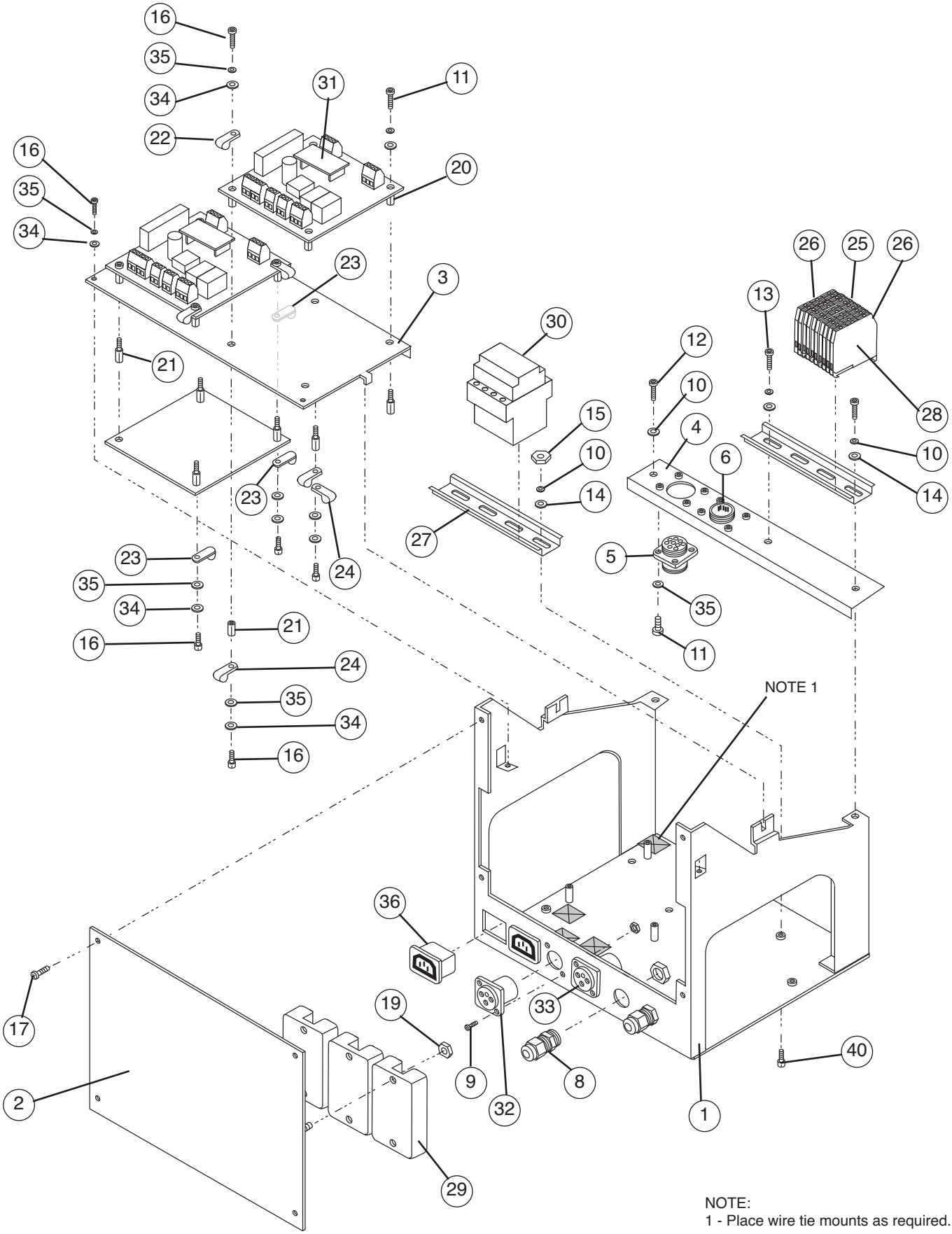
	Model Type & ID#	WAGO Model#		WAGO Pin#	Wire#
	PWM - O	750-511	Top Leads	1	69
	PWM - 1		Bottom Leads	5	71
	A out – O	750-560	MFC	1	25
	A out – 1		P-Cool	5	26
	A in – 0		MFC	1	24
	A in – 1	750-457	Site Clean Vacuum Sense	5	262
	A in – 2		Nozzle Sense	3	261
	A in – 3				
	D out – 0		AZ Contactor #2 (Heat)	1	194
	D out – 1		Puff Off Sol	5	12
	D out – 2		Nozzle cold/hot	2	9
	D out – 3		Nozzle Vac	6	5
	D out – 4	750-530	Site Clean	3	4
	D out – 5		Probe Vac	7	3
	D out – 6		Air Knife High	4	6
	D out – 7		Air Knife Low	8	7
	D out – 0-8		Accessory Plug 4	1	201
	D out – 1-9		Relay Motor Power	5	195
	D out – 2-10		Accessory Plug 3	2	202
2	D out – 3-11	750-530	Diff Left High	6	1
	D out – 4-12		Diff Left Low	3	2
	D out – 5-13		N2/Air	7	8
	D out – 6-14			4	
	D out – 7-15		Z Motor Stop Input	8	
	D in – 0		Future Use	1	200
	D in – 1			5	
	D in – 2			2	
	D in – 3		Footswitch	6	126
	D in – 4		Accessory Plug 2	3	127
	D in – 5	750-436	LP1 N2 Reg	7	14
	D in – 6		Vacuum Button	4	128
	D in – 7		LP2 Air Reg	8	15
	TC Mod 1	750-469	TC 1 & 2		
	TC Mod 2		TC 3 & 4		
	TC Mod 3		TC 5 & 6		
	TC Mod 4		TC 7 & 8		

Model Type & ID#	WAGO Model#		WAGO Pin#	Wire#
Force	750-491	Strain Gauge	1	142
Force		Strain Gauge	2	138
Force		Strain Gauge	3	140
Force		Strain Gauge	4	
Force		Strain Gauge	5	141
Force		Strain Gauge	6	143
Force		Strain Gauge	7	139
Force		Strain Gauge	8	

Address Map

ID#	
#2	Nozzle – Temp Controller
#3	Left – Temp Controller
#4	Right – Temp Controller
#5	Center – Temp Controller
#6	WAGO
#7	Vision Motor
#8	Z-Axis

DRS25 Temperature Control Module #0025.77.046 Assembly View



NOTE:
1 - Place wire tie mounts as required.

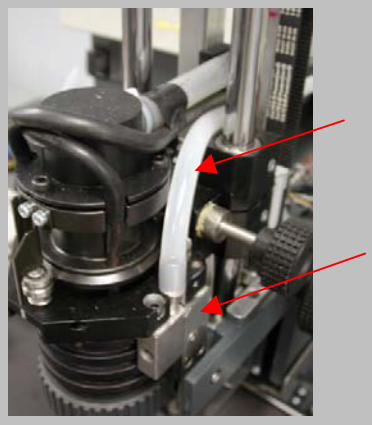
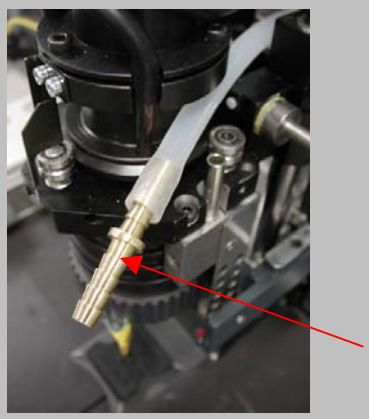
DRS25 Temperature Control Module #0025.77.046 Parts List

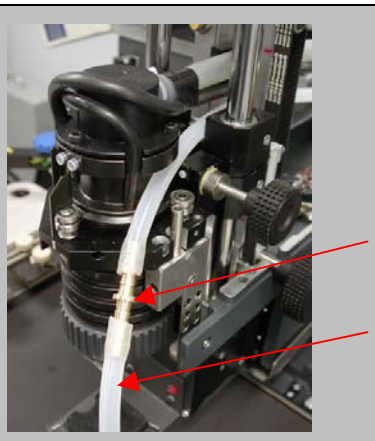
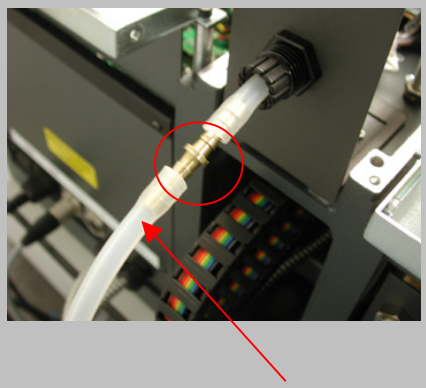
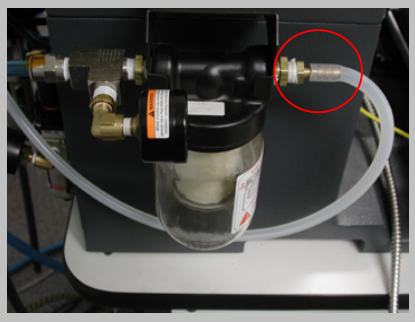
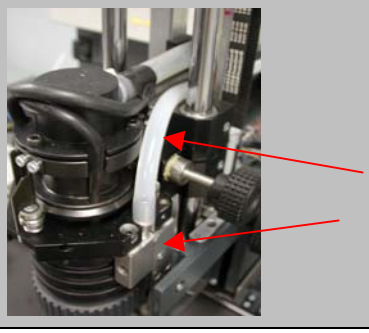
	Item	Description	P/M	Location	Qty Req	UM
	0025.77.046	TEMP. BOX ASSEM	M	25.C.006	1.00	
1	0025.02.100	FRAME, POWER	P	27.D.003	1.00	EA
2	0025.02.103	PLATE, MOUNTING	P	09.B.080	1.00	EA
3	0025.02.104	MOUNTING PLATE,	P	09.B.055	1.00	EA
4	0025.02.105	PLATE, MOUNTING	P	09.B.056	1.00	EA
5	0025.02.107	HARNESS, AC TEM	P	24.A.002	1.00	EA
6	0025.02.108	HARNESS, DC TEM	P	24.A.003	1.00	EA
8	0100.01.124	STRAIN RELIEF G	P	10.B.062	2.00	EA
9	117C	SCREW, M3x10mm,	P	65.C.117	4.00	EA
10	156B	WASHER, #8 MEDI	P	65.B.156	5.00	EA
11	1A	SCREW, 6-32x.25	P	65.A.001	15	EA
12	39A	SCREW, 8-32x1/4	P	65.A.039	1	EA
13	40A	SCREW, 8-32x3/8	P	65.A.040	2	EA
14	45A	WASHER, #8	P	65.A.045	4.00	EA
15	55A	NUT, 8-32 HEX	P	65.A.055	2.00	EA
16	67A	SCREW 6-32x3/8"	P	65.A.067	8.00	EA
17	70A	SCREW, 6-32x3/8	P	65.A.070	4.00	EA
18	76A	NUT, HEX M3	P	STOCK	4.00	EA
19	8B	NUT, HEX #6-32	P	65.B.008	6.00	EA
20	9000.29.112	STANDOFF, 6-32	P	09.C.075	8.00	EA
21	9000.29.136	STANDOFF, 6-32	P	09.C.076	8.00	EA
22	9002.02.052	CABLE CLAMP, .1	P	16.B.027	3.00	EA
23	9002.02.055	CLAMP, NYLON LO	P	17.B.042	2	EA
24	9002.02.210	CLAMP, CABLE, .	P	16.B.026	3.00	EA
25	9002.03.000	TERMINAL BLK	P	08.A.053	8.00	EA
26	9002.03.001	TERMINAL BLK-GN	P	08.A.054	2.00	EA
27	9002.03.003	DIN RAIL .71 SL	P	18.A.002	10.00	IN
28	9002.03.006	END SECTION - T	P	08.A.058	4.00	EA
29	9002.06.003	RELAY, SOLID ST	P	16.E.061	3.00	EA
30	9002.06.120	AC CONT, 4 POLE	P	08.A.066	1.00	EA
31	9002.11.044	TEMPERATURE CON	P	09.D.005	3.00	EA
32	9002.13.015	3 CIRCUIT FT PE	P	08.A.102	1.00	EA
33	9002.13.193	CONNECTOR, XLR	P	10.A.132	1.00	EA
34	9A	WASHER, #6 SAE	P	65.A.009	8.00	EA
35	9B	WASHER, INTERNA	P	65.B.009	17.00	EA
36	ST353	AC POWER LINE (	P	13.E.037	2.00	EA
38	236A	M3 Star Internal			4	
40	39B	8-32 Button			2	

AIR–VAC

Work Instruction

Product Line: DRS 25
Category: Site Solder Tube # 9001.15.048 Replacement

	• Remove the nozzle heat shield screw located on the left side of the shield. Do not remove the one on the right. • Remove the heat shield.
	• Locate the site solder tube and remove it from the bracket.
	• Install the double barb fitting into the existing site solder tube, as shown.

	• Attach the new length of site solder tube (7') to the other end of the double barb fitting.
	• Walk to the rear of the machine and locate the existing site solder tube. Gently pull the tube until the double barb comes through the fitting as shown. • Remove the old tube along with the double barb from the new tube.
	• Route the new site solder tube to the barb fitting on the filter jar as shown.
	• Attach the new tube to the bracket, Verify the tube routing and re-attach the nozzle heat shield.