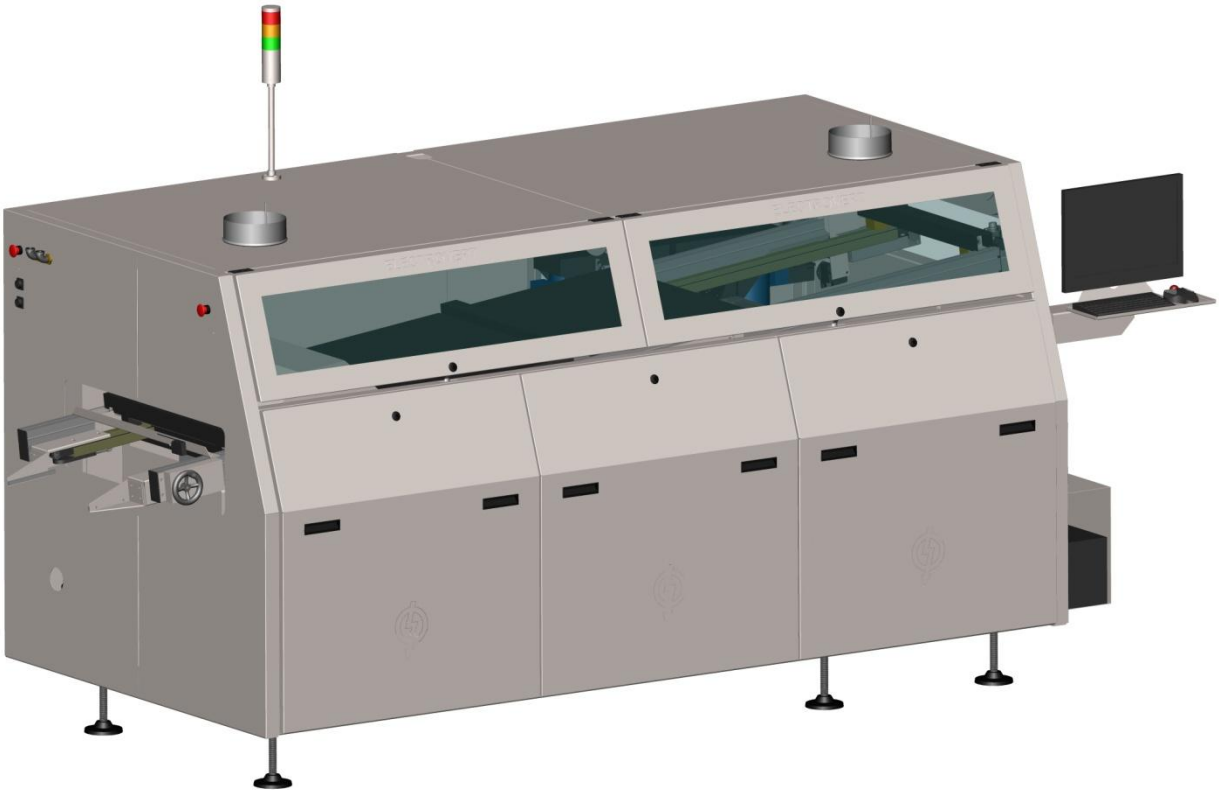
VectraES$_2$™

WAVE SOLDERING SYSTEM



INSTALLATION MANUAL

Manual Part #2-9317-970-00-0

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An ITW Company

TO OUR CUSTOMERS

The purpose of this manual is to help obtain the greatest possible return on your investment. It is suggested that new operators study the applicable sections of this manual thoroughly before operating the equipment. It is further suggested that the manual be used as a reference by maintenance personnel and as a text for training of new maintenance personnel.

This manual includes installation instructions for this equipment available at the time this manual was approved for printing. Speedline ELECTROVERT reserves the right to make changes in design and specifications and/or make improvements in the product without imposing any obligations upon itself to install them on previously manufactured products.

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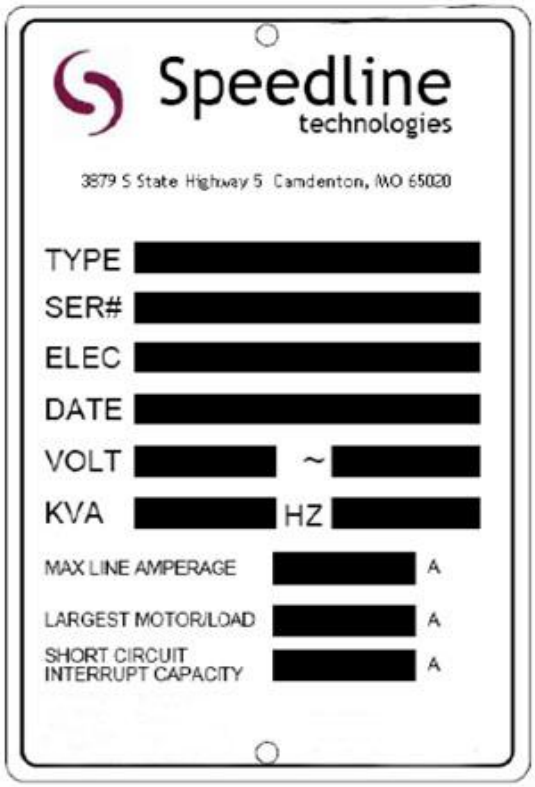
VectraES$_2$™ Installation Manual

SECTION 1: SAFETY INFORMATION

1.1 SERIAL NAMEPLATE

Below is an example of a machine serial nameplate containing important information. The nameplate is located at the rear, unload end of the machine.



The serial nameplate information is to be recorded by the user for technical support purposes. Please have the following information available when contacting Technical Support or when placing parts orders:

Machine Name

Model Number

Serial Number

Item/Kit Description

1.2 HAZARDS

Installation of this equipment exposes personnel to potential health and safety hazards. Listed below are warning tags installed on the system that warn of hazards that may be encountered during installation. Refer to the following information to ensure a safe operating environment for personnel.

Lead Hazard

Installation of this equipment may involve exposure to lead which may cause serious health hazards. Always wear protective clothing and an approved breathing apparatus when handling or working around products containing lead. Consult local authorities for acceptable lead limits in the air and in blood as these limits vary by region.

Burn Hazard

Installation of this equipment involves exposure to situations which may result in burn hazards if procedures are not properly followed. During normal operation, some components of this equipment operate at temperatures up to 301°C (575°F). The machine hoods, glass, conveyor, conveyor rails, fingers, rail guards, and boards moving through the system can reach temperatures in excess of 66°C (150°F) and can cause severe skin burns. The operator must use extreme caution and wear the recommended safety garments prior to coming in contact with hot surfaces or components.

Liquid Metal Eruption Hazard

Installation of this equipment involves exposure to molten metal which may erupt during the heat-up process. Also, any foreign liquids permitted to enter a molten metal solder pot will result in violent eruptions. Always wear appropriate safety glasses and high temperature gloves and garments when working around the solder pot.

Flammable

Installation of this equipment involves potential fire hazards due to excessive heat, as well as the normal sparks created by electric motors during operation. Flux and solvents used in the soldering process may contain flammable components. Keep all other flammable materials and solvents clear of the solder machine. Never stop the system with boards inside the machine.

Electrical Hazard

Installation of this equipment involves exposure to high voltage, which shock, burn, or cause death. Use extreme caution when performing voltage and amperage tests on live voltage. These procedures must be performed only by an authorized electrician, electrical engineer, or service technician familiar with testing live voltage. Prior to applying power for the first time, ensure that the system is properly grounded.

Mechanical Hazard

Installation of this equipment involves exposure to mechanical hazards. Stop all moving parts when making adjustments or performing maintenance. Use caution and avoid having hands or fingers caught in any moving mechanism. Long hair, jewelry, and other parts of loose attire could be caught in moving mechanisms and cause injury.

Weight Hazard

When attempting to move heavy equipment or components, it is imperative to use the proper rigging equipment. Do not attempt to move skids or large assemblies without the use of a fork lift or other rigging equipment. Hand lifting will cause serious personal injury. To avoid damage to the equipment, adjust the fork lift forks to their widest position. Use fork extensions on forks if the forks do not extend at least seven (7) feet.

Breathing Hazard

Noxious fumes are created during the soldering process. The gases and vapors emitted from the solder and flux are contained in the machine and should be avoided. Inhaling noxious vapors may cause headaches, eye redness, stomach aches, and breathing problems.

Compressed Gas Hazard

Compressed air and nitrogen can cause explosion of components inside the machine if not regulated below the maximum pressure as listed in the Engineering Data Sheet.

Foreign Material Hazard

Supply the machine nitrogen inlet only with nitrogen that has a purity of ≤4ppm. Use of other gases could interfere with the process and introduce additional safety hazards.

Skin Irritation Hazard

When using certain chemicals such as lubricants or solvents, it is important to follow the MSDS guidelines for proper handling and usage. Wear appropriate clothing and safety articles when using chemicals.

Inerting Hazard

Running the machine with nitrogen purges the oxygen from the space. This can lead to asphyxiation if the machine is not properly exhausted.

1.3 SAFETY PRECAUTIONS

Post electrical safety lock-out and tag-out procedures in the work place and ensure that all electrical, service, and maintenance personnel are familiar with the appropriate procedures. Mark and label all power supply sources used for the equipment to ensure that the lock-out and tag-out process is easily accomplished. Ensure an adequate exhaust system is installed that filters and monitors the system. Clean and monitor the exhaust ventilation system on a regular basis.

Post “No Smoking” signs in the work area and provide measures for enforcement.

Keep an approved fire extinguisher near the machine at all times. Familiarize all personnel with the operation and use of the fire extinguisher. When extinguishing a flux fire, first turn off the system’s input power. Do not point the extinguisher directly at the flux or solder.

Maintain a safety perimeter of at least 1219 mm (48 in.) around the machine for efficient operation and maintenance.

Exercise caution when using strong cleaning agents, solvents, lubricants and other chemicals. MSDS guidelines contain specific uses and safety precautions which must be thoroughly understood and strictly followed. If in doubt about any safety notices, contact the manufacturer for clarification.

Protective clothing is required for servicing hot machine components or areas of the machine which come in contact with chemical applications. Protective clothing includes the following approval agency and items:

ANSI (American National Standard Institute) approved:

- Safety goggles NIOSH (National Institute for Occupational Safety and Health) OR
- MSHA (Mine, Safety and Health Administration) approved:
- Respirator
- Steel toe safety shoes
- High temperature, acid, and water resistant gloves
- Apron
- Long-sleeved garment

Remove all protective clothing and wash thoroughly before eating, drinking, or smoking.

1.4 LOCK-OUT / TAG-OUT

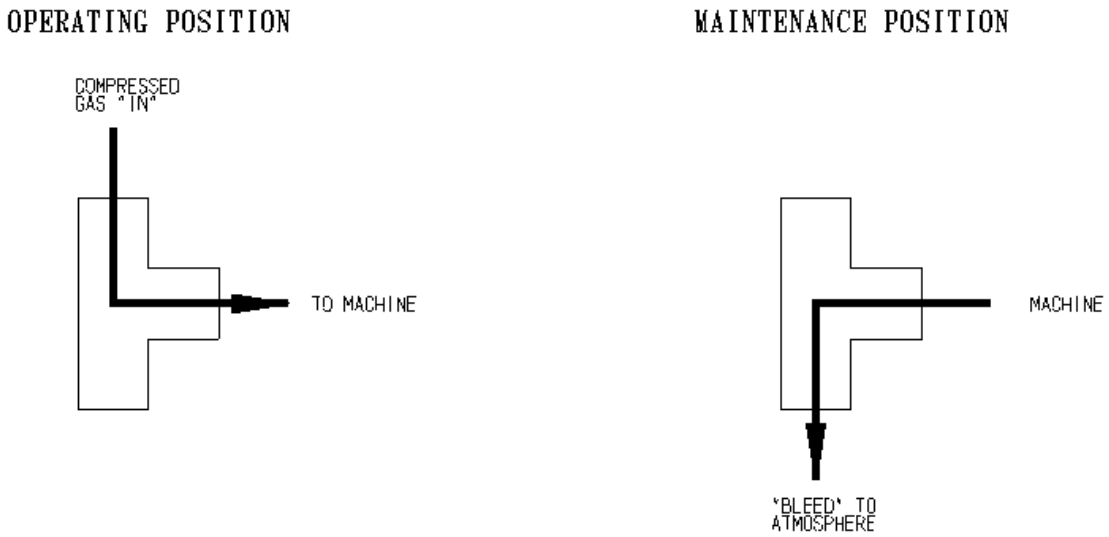
Be sure to perform Lock-out / Tag-out steps before beginning maintenance, installation, or upgrade procedures. Since lock-out/tag-out procedures and policies vary from company to company, the information here is provided as a recommended guideline. Each company must establish their own specific policies and procedures.

Attach Facility Lock-Out/Tag-Out Devices:

1. Ensure there are no boards or other product in the system.
2. Notify all affected employees.
3. Locate and identify all facility energy sources used, potential hazards, and all control devices.
4. Turn off all operating controls.
5. Locate the facility main power input to the system.
6. Turn the facility main power input device to the “OFF” or “STOP” position.
7. Secure the facility main power lock-out device in place.
8. Turn the facility compressed gas supplies to the “OFF” position.
9. Secure the facility compressed gas supply lock-out device in place.
10. Test operating controls. Put all controls in the “ON” position. Be sure no one can get hurt before testing.
11. Return all operating controls to the “OFF” position before proceeding.

Attach Machine Lock-Out/Tag-Out Devices:

1. Locate the main power disconnect switch at the rear of the system and turn to the “OFF” position.
2. Pull the tab and insert the lock-out device.
3. Secure the main power lock-out device in place.
4. Verify all manual compressed gas regulators and flow control valves for any fluxer/solder options are open to allow gas lines to be relieved of pressure.
5. Slowly turn the customer supplied 3-way manual diverting valves on the compressed gas inlets to the maintenance position to bleed the gas lines inside the machine. It is recommended that a rigid bleed line be installed along with the diverting valve to direct bleeding gas safely away from maintenance personnel.



6. Secure the compressed gas lock-out device in place.
7. The system is ready for maintenance, installation, upgrade, or repair procedures.

Remove Lock-Out/Tag-Out Devices:

1. Notify all affected employees.
2. Remove the lock-out device from the compressed gas diverting valve and return the valve to the operating position.
3. Remove the lock-out device from the facility compressed gas supplies.
4. Remove the lock-out device from the facility main power source.
5. Turn the facility main power source and compressed gas supplies to the “ON” position.
6. Remove the main power lock-out device from the rear of the machine.
7. Place the main power disconnect switch in the “ON” position.
8. Resume normal system operation.

SECTION 2: INSTALLATION PREPARATION

2.1 RECEIVING INSTRUCTIONS

Upon receipt, thoroughly inspect the system. If any damage or loss is detected, enter all details on the freight bill or receipt, and then have it signed by the carrier agent. Failure to follow this procedure may result in the carrier's refusal to honor the claim. The carrier is responsible to furnish the necessary forms for filing a claim.

When damage is not readily apparent until the equipment has been unpacked, file a claim for concealed damage. Make a written or telephone request to the carrier for inspection as soon as the damage is discovered. This type of claim must be completed within 48 hours of delivery.

Keep all cartons, packing materials and paperwork. The carrier will furnish an inspection report and the necessary forms for filing the concealed damage claim.

2.2 INSTALLATION PLANNING

Allocate sufficient floor space for efficient operation and accessibility from all sides. Refer to the Engineering Data Sheet and Installation Drawing for machine footprint, weight, and facility connections and requirements.

Clearance behind the system is especially important since service operations are performed from the rear of the machine. It is recommended that 2 m (6 ft) of space is allocated at the rear of the machine for safe access around the solder pot when rolled out.

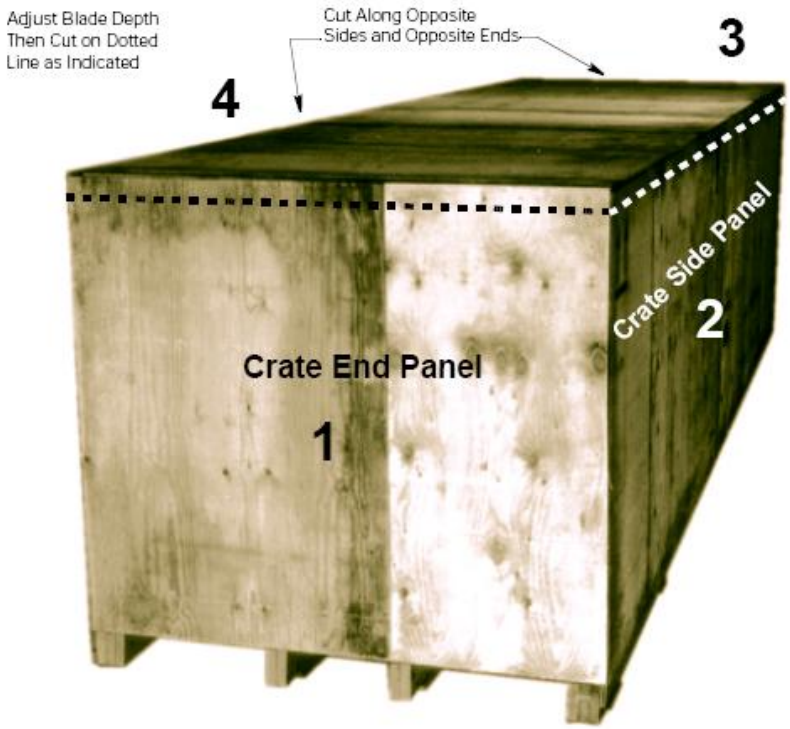
Install the system on a solid (anti-vibration), level floor capable of supporting the machine’s weight. Also keep in mind the flammability of the materials (i.e. fluxes and thinners) used during normal operation.

Allow additional space for storage of process materials such as flux, thinner, and solder. The storage containers for these should be remote and protected to minimize the risk of fire outside the machine.

2.3 CRATE REMOVAL (INTERNATIONAL SHIPMENT)

To minimize potential damage, move the machine to the installation site before uncrating. The following procedure describes the crate removal process.

1. Transport the system crate to the general area of the facility of installation using a fork lift that is specified to safely handle the system's shipping weight.
2. Carefully cut at a depth of 19 mm (3/4 in.) one end panel (#1) of the crate approximately 200 mm (8 in.) from the top of the crate as indicated by the dotted line in the figure below. An alternative method to cutting the top (steps 2-8) would be to use pry bars and claw hammers to remove the top panels and top braces.



3. Repeat step 2 on the other end panel (#3) of the crate.
4. Carefully cut at a depth of 51 mm (2 in.) one side panel (#2) of the crate approximately 200 mm (8 in.) from the top of the crate as indicated by the dotted line in the figure.
5. Repeat step 4 on the other side panel (#4) of the crate.
6. Ensure that all cuts are completely through the crate.
7. The top of the crate is now free from the crate. Carefully slide the top of the crate off using several personnel or with the aid of a fork lift. Ensure that the trailing edge of the crate top does not drop into the open crate and onto the system.

8. Carefully remove any additional bracing from the inside of the top of the crate.
9. Using pry bars and claw hammers, remove the end panels (#1 & 3) of the crate from the bottom pallet.
10. Repeat step 9 for the side panels (#2 & 4) of the crate.
11. The entire system is wrapped in moisture absorbent plastic to prevent damage to the equipment during transit. Remove the plastic from the system.

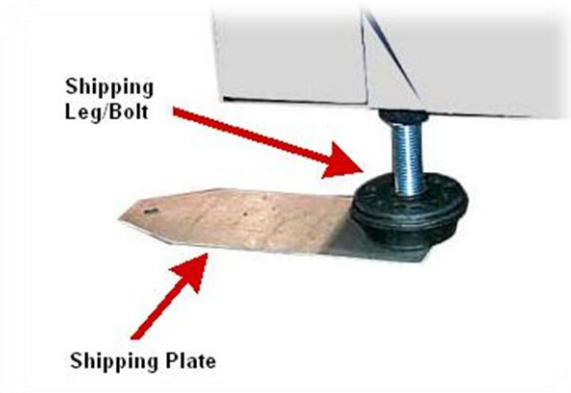
2.4 PACKING REMOVAL (INTERNATIONAL SHIPMENT)

The system arrives carefully padded and secured. Remove the packaging materials as outlined below. The following figure shows a typically packaged machine.

1. Remove the plastic wrapping from the perimeter of the system.
2. Remove the strapping securing all cardboard containers and any other components secured to the system skid.
3. Carefully place all separate components and document package in a safe place close to the site of installation for later use.
4. Remove packing materials from around keyboard/monitor assembly.
5. Remove packing materials around light tower.
6. Remove any desiccant packs placed inside the system's electrical cabinet.
7. Visually inspect machine for concealed damage. Check for damage to instruments, controls, and enclosures.
8. Inspect the shock meter located on the upper part of the unload end of the machine.

2.5 SKID REMOVAL (INTERNATIONAL SHIPMENT)

The machine is mounted on wooden planks and bolted to a wooden skid, or pallet. Bolts are installed in the existing leveling foot locations to secure the metal shipping plates to the underside of the system frame. Bolts are then inserted through the mounting holes in the skid, through the foam pads, through the planks, and finally through the mounting holes on the shipping plates. They are retained with jam nuts to secure the system in place on the skid.



Refer to the following procedure to remove the machine from the skid.

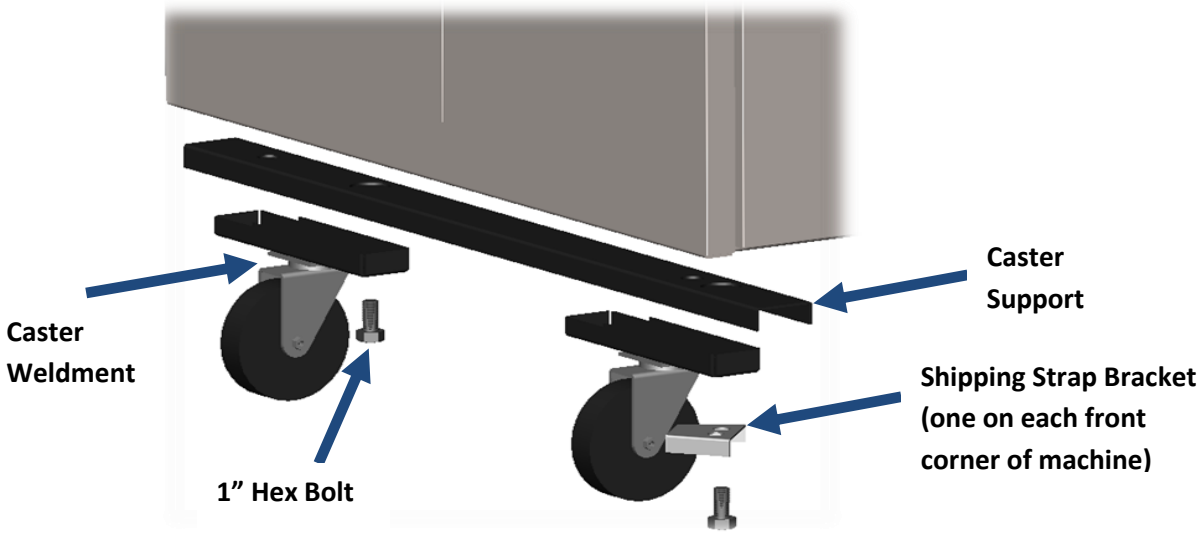
1. Use a ¾ in. socket wrench and ratchet to remove the two (2) jam nuts from each of the bolts from the top side of the wooden planks.

2. When all jam nuts are removed from the shipping plates, carefully position a fork lift, with the fork extensions at their widest setting, under the frame. Make sure that the forks make proper contact with the base beams to avoid damage to the wiring and metal panels underneath the machine.
3. With the fork lift in place, carefully raise the system off the skid high enough to remove the shipping plates and bolts from the system frame. Note that the center of gravity of the machine is slightly toward the unload end of the system (refer to the Appendix section for location).

4. Use a 1 ½ in. socket with ratchet to remove the shipping bolts from the machine frame.
5. Install the leveling legs by screwing them into the frame where the shipping bolts were removed. The legs should extend approximately 125 mm (5 in.) from the base of the system frame. Ensure the consistency of this distance with each leg.
6. Carefully position the system into place for installation.
7. Slowly lower the system onto the leveling legs at the site of installation and remove the fork lift.

2.6 CASTER REMOVAL (DOMESTIC SHIPMENT)

If equipped, the machine is mounted on six (6) caster weldments. Bolts are installed in the existing leveling foot locations to secure the casters to the underside of the system frame.



Refer to the following procedure to remove the casters from the machine.

1. Position pallet jacks at each end of the machine or carefully position a fork lift, with the fork extensions at their widest setting, under the frame. Make sure that the forks make proper contact with the base beams to avoid damage to the wiring and metal panels underneath the machine.
2. Carefully raise the system high enough to remove the casters and bolts from the system frame. Note that the center of gravity of the machine is slightly toward the unload end of the system (refer to the Appendix section for location).
3. Use a 1 ½ in. socket with ratchet to remove the six (6) bolts from the machine frame.
4. Install the leveling legs by screwing them into the frame where the bolts were removed. The legs should extend approximately 125 mm (5 in.) from the base of the system frame. Ensure the consistency of this distance with each leg.
5. Carefully position the system into place for installation.
6. Slowly lower the system onto the leveling legs at the site of installation.
7. Place the six (6) caster weldments and two (2) shipping strap brackets in the empty shipping box provided with the machine and ship them back to the factory.

2.7 COMPONENT CHECKLIST

Do not discard any boxes or packing material until an inspection is performed at the installation site. Use the following checklist to ensure that all components were received.

Component	**X**
Machine	
Tool Kit	
Leveling Legs	
Installation, Maintenance, & Software Manuals	
Bills of Materials (BOM)	
Mechanical Drawings	
Electrical Schematics	
Sales Drawing with facility requirements	
SMEMA Cable (if ordered)	
Spare parts (if ordered)	
ServoSpray™ or ServoJet™ Manual (if ordered)	
Flux/thinner tanks (if ordered)	
De-dross/maintenance tools (if ordered)	

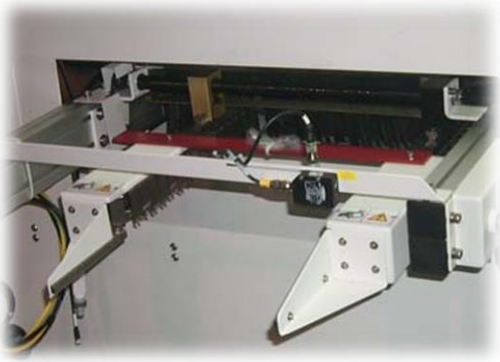
2.8 UNPACKING INTERNAL COMPONENTS

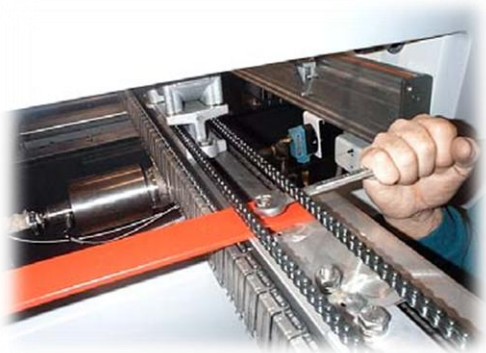
Carefully remove the machine packing materials according to the following procedures. Note that the straps/brackets used to secure the internal components during shipment are “red” in color for visual identification. Completely inspect the machine after following these procedures to insure all shipping components have been removed.

1. Remove all strapping and/or plastic wrap around the exterior of the machine.
2. Remove the foam padding between hoods/panels.
3. Unlock all ¼ turn door latches using the 5/16 in. allen wrench included in the tool kit.

4. The front access doors are “lift-off” panels. Once unlatched, they can be removed by tilting them slightly toward you and lifting them off of the supports. The rear electrical box access door is hinged and can be swung open once unlatched. Note that the electrical cabinet can only be opened if the main disconnect is in the “OFF” position.

5. Remove any tape/strapping securing the fluxer nozzle, if equipped.
6. Remove all strapping material securing the preheaters, tunnel covers, fluxer hood, width adjust covers, drip trays, finger cleaner tank, solder pot rollout stand, etc., as equipped.
7. Remove the two (2) shipping brackets on each end of the conveyor rails (re-install hardware in rails after removing brackets).

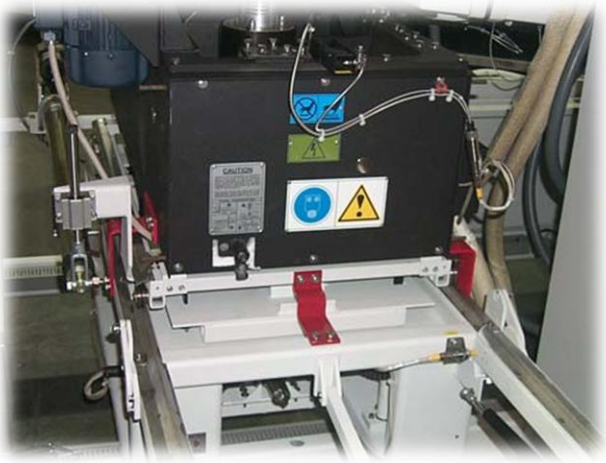




8. Remove the two (2) shipping brackets supporting the front and back conveyor tunnel supports.

9. Remove the shipping bracket on the front of the solder pot.

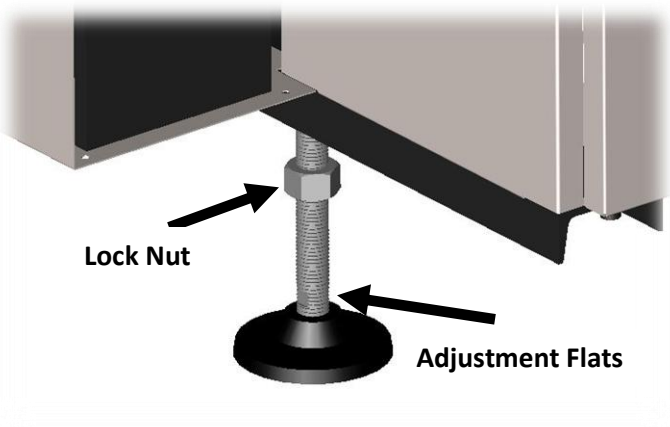
10. Remove the three (3) shipping brackets at the back of the solder pot.



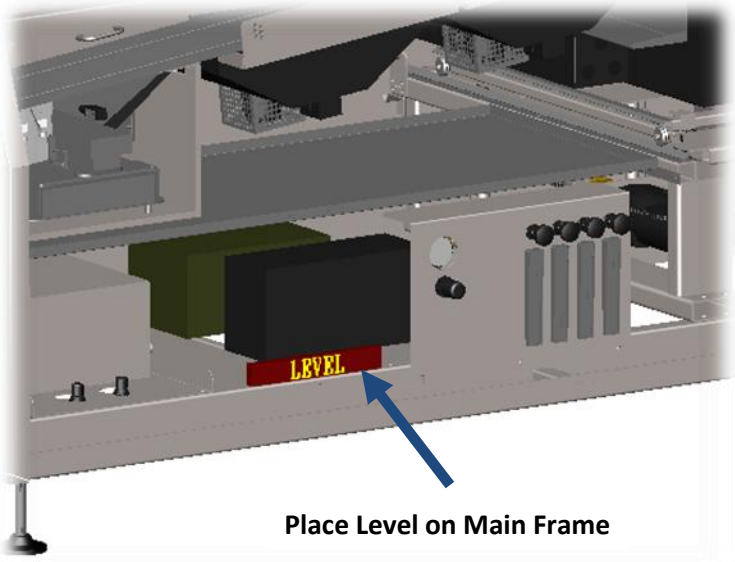
SECTION 3: INSTALLATION

3.1 LEVELING THE MACHINE

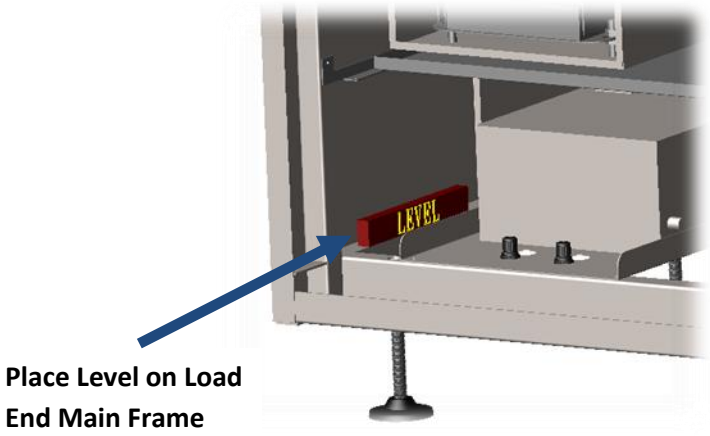
The machine is configured with leveling legs used for height adjustment and leveling. The leveling must be performed in both the front-to-rear direction and the load-to-unload direction. Use the following procedure to correctly level the machine.



1. Place machine to be aligned with upstream and downstream equipment with a 10mm gap between adjoining conveyors.
2. Remove the front access doors from the machine.
3. Use a crescent wrench and adjust the center leveling legs so they do not touch the floor. The machine will be supported by only the four (4) leveling legs located at each corner of the machine.
4. Alternately adjust the corner leveling legs until the conveyor reaches the required height.
5. Place a spirit (bubble) level approximately in the center of the front load-to-unload main frame beam.



6. Adjust the front load and unload leveling legs until the level indicates proper positioning.
7. Place a spirit level across the load end main frame member.



8. Adjust the rear load leveling leg until the level indicates proper positioning.
9. Repeat steps 7 and 8 on the unload end of the machine.
10. Verify the load-to-unload position is still level.
11. Adjust the center leveling legs until they just make contact with the floor. Turn them an additional ½ turn to support the weight of the center of the machine.
12. Visually inspect the load-to-unload main frame member to insure it is not “sagging” or “bowing”. (Correct such conditions by adjusting the center legs until frame is straight but making certain all legs are contacting the floor.)
13. Lower the solder pot rollout stand and place the level on top of the load end track.

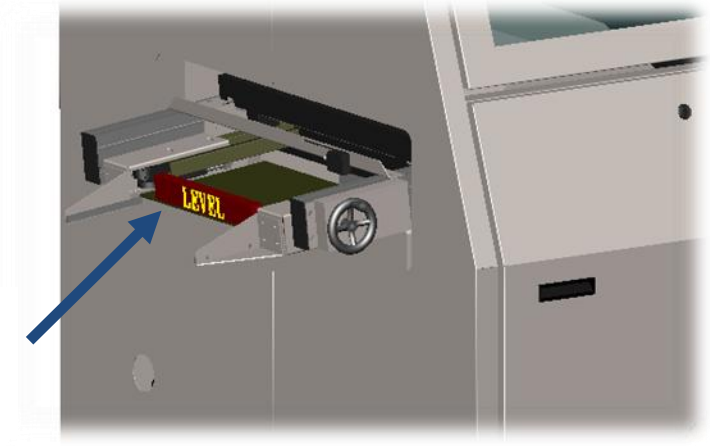
14. Adjust the load rollout stand leg until the level indicates proper positioning.
15. Repeat steps 13 and 14 on the unload rollout stand track.
16. Secure all leveling leg positions by tightening the lock nut on each leg.

3.2 CONVEYOR VERIFICATION

After the machine is leveled, continue the installation by performing the following procedures.

1. Use a tape measure to check the distance between the front and back conveyor rails at each width adjust screw shaft.

2. If the distances measured at all three (3) locations are within 1.5 mm (0.06 in.) the conveyor is within tolerance. If it is outside this tolerance contact the factory for instructions before making any adjustments.
3. Place a board or plate in the conveyor at the load end of the machine making certain it is completely seated and positioned in the fingers.
4. Place a spirit level across the plate perpendicular to board travel.

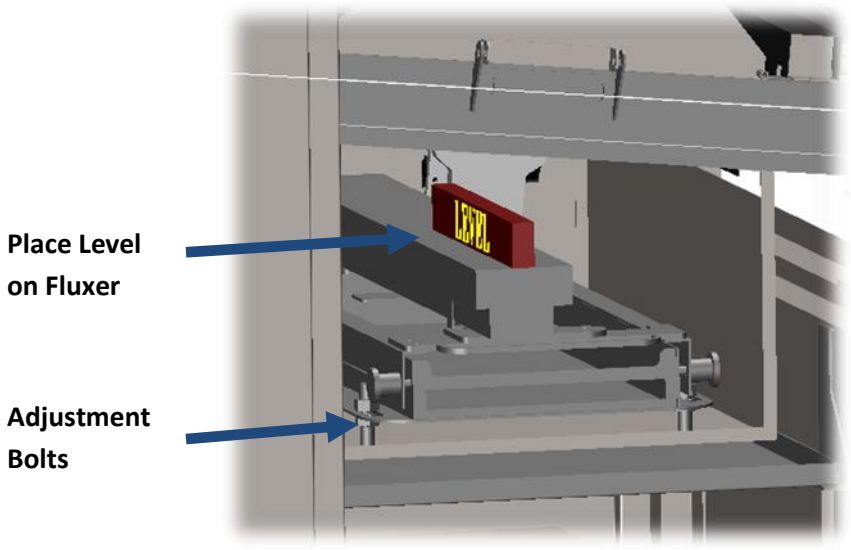


5. If conveyor is not level, verify that the machine frame is still level.
6. Contact the factory for instructions before making any adjustments if the conveyor cannot be leveled with the leveling of the machine frame.
7. Repeat steps 3 through 6 at the unload end of the conveyor.

3.3 MISCELLANEOUS INSTALLATION PROCEDURES

Continue the installation by performing the following procedures.

1. Place a spirit level on the fluxer and verify levelness in both X and Y directions. If adjustment is necessary, there are four (4) standoff bolts in each corner of the fluxer support.



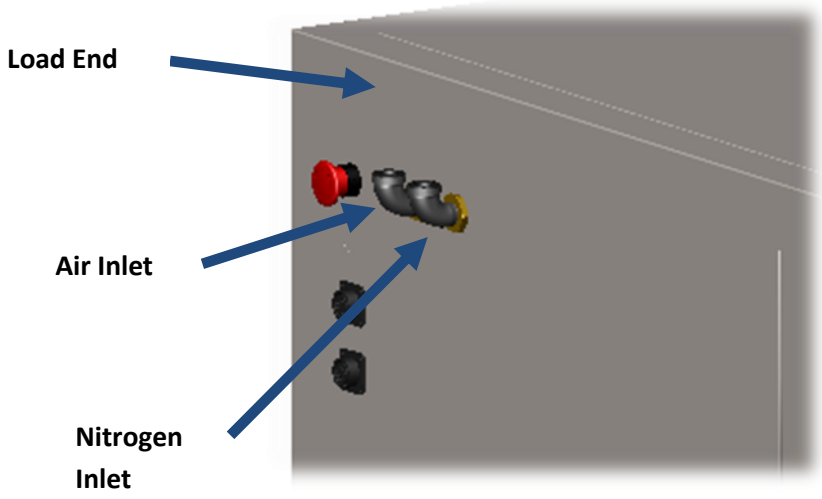
2. Place computer in lower unload end compartment and connect the following cables:
    - Power cord
    - Ground strap
    - Keyboard
    - Mouse
    - Monitor
    - Ethernet
3. Place UPS (if equipped) on the support frame beneath the preheaters and connect the following cables:
    - CA-85
    - CA-85B
    - CA-21
    - CA-24
4. Install the light tower on the top panel of the machine (if equipped).
5. Align all external panels, doors, and hoods on the machine.
6. Verify ease of operation of all panels and doors.
7. Verify conveyor finger chain, width adjust chain, and solder pot jacking stand chain are properly lubricated.
8. Verify width adjust shafts are properly lubricated.
9. Inspect all compressed air, nitrogen, fluxer, and finger cleaner hoses to ensure they are properly connected and not damaged or kinked.
10. Verify all preheater/solder pot conduit connectors are tightened securely using channel lock pliers.

11. Verify all preheater/solder pot electrical plugs are connected (if equipped).
12. Verify load guides are properly set up (if equipped).

SECTION 4: FACILITY CONNECTIONS

4.1 AIR CONNECTION

The machine requires a clean, dry compressed air (CDA) supply. The connection is made via a 1/2 in. NPT fitting on the load end panel. It is recommended that a 3-way manual diverting valve be installed at the compressed air inlet to shut off flow and relieve pressure in machine plumbing during Lock-out/Tag-out procedures. Please refer to the **Engineering Data Sheet** or **Sales Drawing** for supply line requirements.



4.2 NITROGEN CONNECTION (if equipped)

The machine requires a filtered, contamination-free nitrogen supply if any of the following options are installed on the machine:

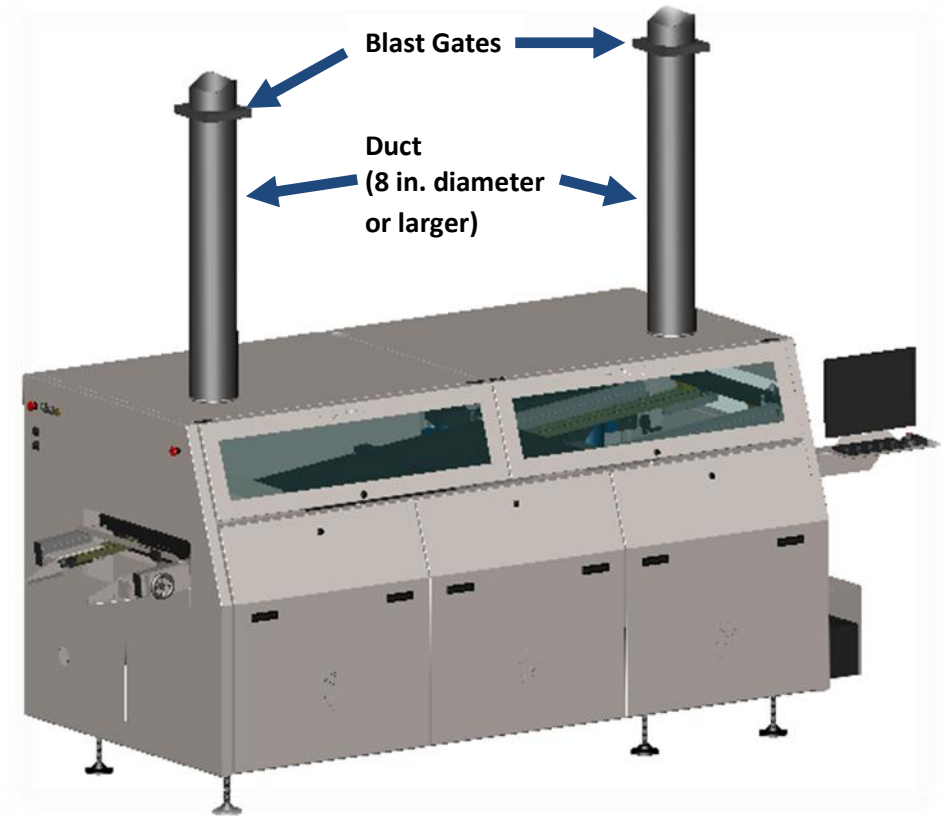
- Nitrogen Inert Soldering System
- ServoSpray™ or ServoJet™ Fluxer

The connection is made via a 1/2 in. NPT fitting on the load end panel. It is recommended that a 3-way manual diverting valve be installed at the nitrogen inlet to shut off flow and relieve pressure in machine plumbing during Lock-out/Tag-out procedures. Please refer to the **Engineering Data Sheet** or **Sales Drawing** for supply line requirements.

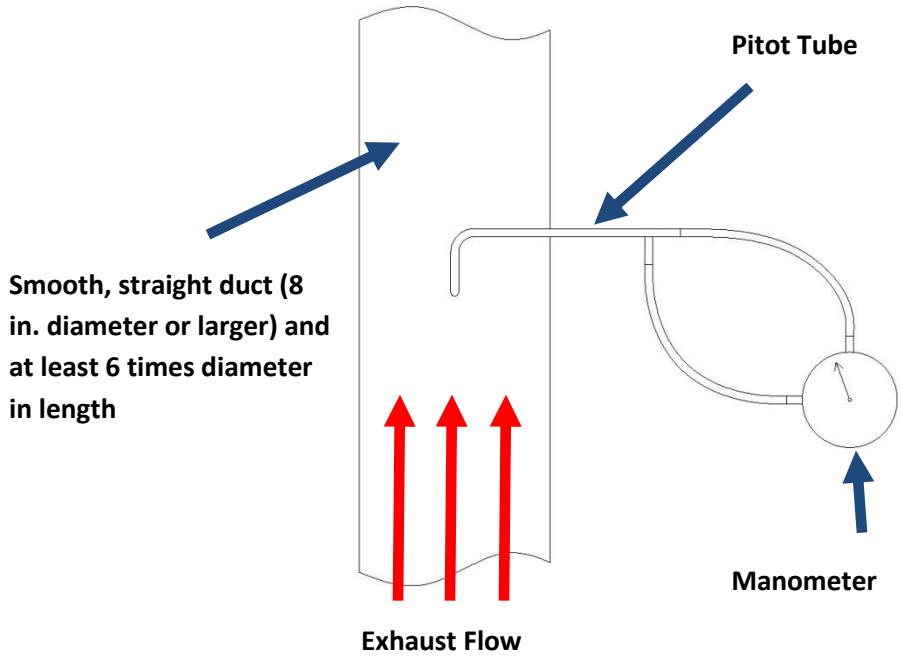
4.3 EXHAUST CONNECTIONS

The machine requires properly balanced exhaust for safe and efficient machine operation. The connection is made via 8 in. duct fittings. Please refer to the **Engineering Data Sheet** or **Sales Drawing** for proper requirements.

Recommended connection includes smooth, straight 8 in. diameter or larger sections of duct that are at least 6 times the duct diameter in length and a blast gate for each duct. Exhaust velocity pressure should be measured in the center of the straight section with a Pitot tube and manometer. This can then be converted to exhaust flow and balanced with the blast gates according to the EDS specifications.



It is important that the pressure measurement be taken in a long, straight section of duct with no restrictions or transitions (elbows, tees, etc.) near the point of measurement. Refer to the diagram below.



Refer to the following table to convert velocity pressure measurements to flowrate.

Flowrate (SCFM)	Velocity Pressure Measurement (inches of H_2O)		
	8 in. Duct	10 in. Duct	12 in. Duct
300	0.046	0.019	0.009
350	0.063	0.026	0.012
400	0.082	0.034	0.016
450	0.10	0.043	0.021
500	0.13	0.053	0.025
550	0.16	0.064	0.031
600	0.19	0.076	0.036
650	0.22	0.089	0.043
700	0.25	0.10	0.050
750	0.29	0.12	0.057

4.4 ELECTRICAL CONNECTIONS

Visually inspect all electrical connections to see if any are noticeably loose or damaged as a result of transit. There are electrical components in the electrical cabinet as well as on the convection preheaters where the blowers are wired. Check for any debris that may have fallen onto a connection during uncrating and clean out any dust or particulate matter.

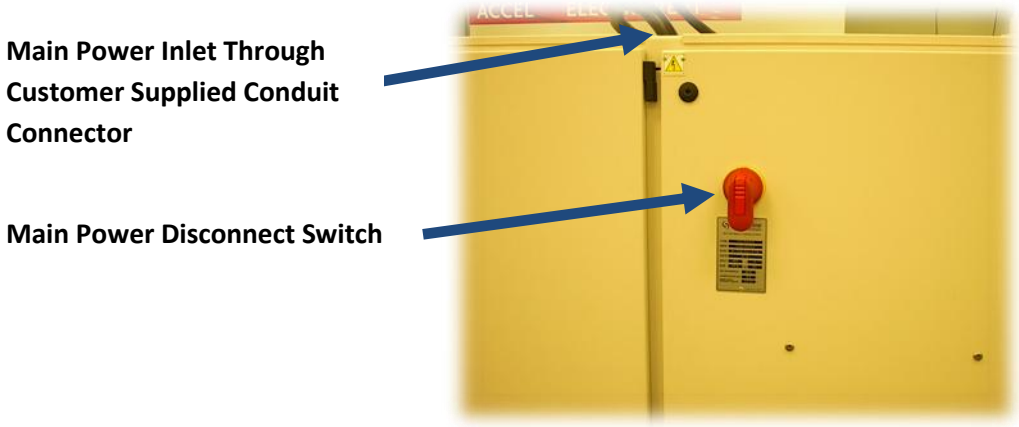
It is possible for the wire connections to the electrical components to become loose during the crating, transportation, and uncrating process. A potential fire hazard exists if the wires overheat, so all appropriate connections should be checked for proper torque according to the following table.

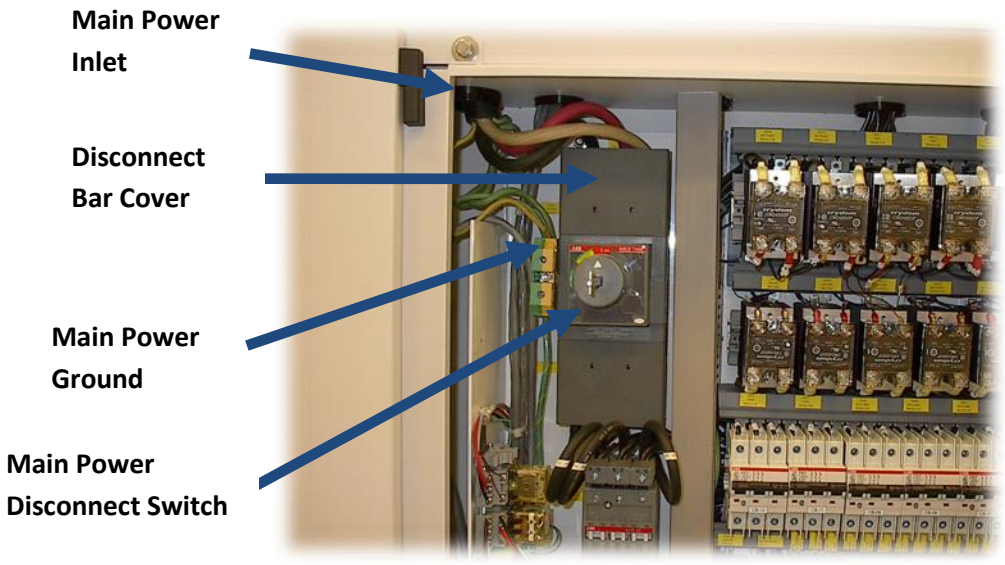
Device	Torque	
	N-m	in-lb
CB (Circuit Breakers)	2.0	17.5
SSR (Power Side-Larger Screw)	2.3	20.0
SSR (Control Side-Smaller Screw)	1.1	10.0
Main Contactor	4.0	35.0
Main Disconnect Switch	5.1	45.0
PE (Main Ground)	4.0	35.0

The operating voltage for the machine is listed on the machine serial name plate located at the rear, unload end of the machine. Before connecting power to the machine, it is necessary to verify that the facility voltage corresponds to the voltage on the serial name plate using the following procedure.

1. Using a digital voltmeter set to the expected range, measure the facility voltage across L1 and L2.
2. Measure the facility voltage across L2 and L3.
3. Measure the facility voltage across L1 and L3.
4. These three (3) voltage measurements should be approximately equal to each other and within ±10% of the voltage listed on the machine serial name plate.
5. If the power does not match, do not apply power. Contact Speedline Electrovert Technical Support.

Before connecting power to the machine, ensure the facility power is locked out. Also, connect the wiring to the machine before connecting the wiring to the facility power. The customer must provide a fuse or circuit breaker between the facility power and the machine and then complete the following procedures.





1. Open the rear electrical cabinet door that contains the connection to the Main Power Disconnect Switch.
2. Locate the Main Power Disconnect Switch (SW-01) in the electrical cabinet.
3. Remove the cover that houses the Main Power Disconnect bar.
4. Locate the main power inlet at the top of the machine above the electrical cabinet.
5. Route the house supplied power cords through the house supplied conduit connector at the power inlet.
6. Connect the ground line to the yellow and green ground connector.
7. Connect the power lines to SW-01. Connect the lines so that they enter the hex lug connector from the back of the switch. Refer to chart in Section 4.4 for torque specifications.
8. Connect the power lines to the facility power.
9. Verify electrical grounding (e.g. hi-pot tester) before applying power for the first time.

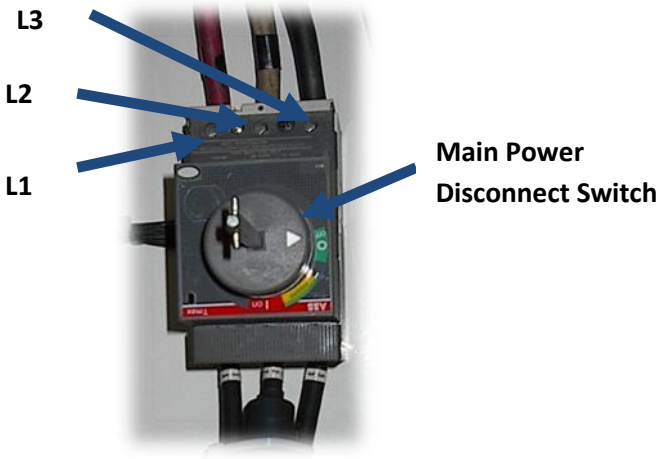
SECTION 5: SYSTEM VERIFICATION

5.1 ELECTRICAL VERIFICATION

The following voltage check exposes personnel to dangerous voltage levels. This procedure is only to be performed by adequately trained personnel.

Using a digital voltmeter set to the expected range, measure the voltage at the L connectors at the Main Power Disconnect Switch (SW-01) in the electrical cabinet. The voltage between any two (2) L connectors (i.e. L1-L2, L2-L3, or L1-L3) should be approximately the same as the previously measured facility voltage. Note that this is a phase-to-phase measurement (not phase-to-ground).

Replace the cover that houses the Main Power Disconnect bar before proceeding.



5.2 OPTION CONFIGURATION VERIFICATION

The software is configured at the factory according to the options present on the machine. Verify that this configuration is correct with the following procedure.

1. When power is supplied to the machine, the computer will turn on and the machine software will engage.
2. Click on “File” from the Menu Bar at the top of the screen and then click “Logon…”.
3. Enter “Supervisor” for the User Name and “Password” for the Password and click “Ok”.
4. Click on “Configuration” from the Menu Bar then click on “Modules”.
5. Obtain a list of installed options from the documentation package.
6. Click on the various machine module tabs in this screen and verify each option is checked.
7. If the configuration is not correct, consult the Software Manual for configuration instructions.

5.3 CONVEYOR SPEED VERIFICATION 

The machine conveyor speed is calibrated and tested at the factory before shipment. Verify the accuracy using the following procedure.

1. Place machine in Manual Mode by clicking on “Machine” from the Menu Bar and then clicking on “Manual”.
2. Access the Conveyor Module window by clicking on “Modules” from the Menu Bar and then clicking on “Conveyor”.
3. Engage the conveyor by clicking on the “Start” button on the “Operations” page.
4. Ensure the conveyor runs smoothly.
5. At the load end of the machine, mark a reference point with a pencil on a stationary part of the machine close to the conveyor fingers.
6. Using a standard tape measure, hook the end of the tape measure to one of the fingers upstream of the reference point.
7. When the end of the tape measures passes the reference point, start a stop watch and allow the conveyor to extend the tape measure.
8. At 30 seconds, note the measurement of the tape measure at the reference point in the same units the conveyor speed is measuring.

9. Multiply this measurement by a factor of two (2) and verify that this is the conveyor speed as displayed in the Conveyor Module window.
10. Stop conveyor by clicking on the “Stop” button on the “Operations” page.

5.4 CONVEYOR WIDTH VERIFICATION 

The machine conveyor width is calibrated and tested at the factory before shipment. Verify the accuracy using the following procedure.

1. In the Conveyor Module window, enter a Conveyor Width setpoint of a measured test board and click on the “Start” button.
2. Ensure the conveyor width runs smoothly.
3. Place the test board in the conveyor fingers and verify proper fit.
4. If the test board does not fit properly, consult the Software Manual for calibration instructions.

5.5 PHOTOCELL VERIFICATION 

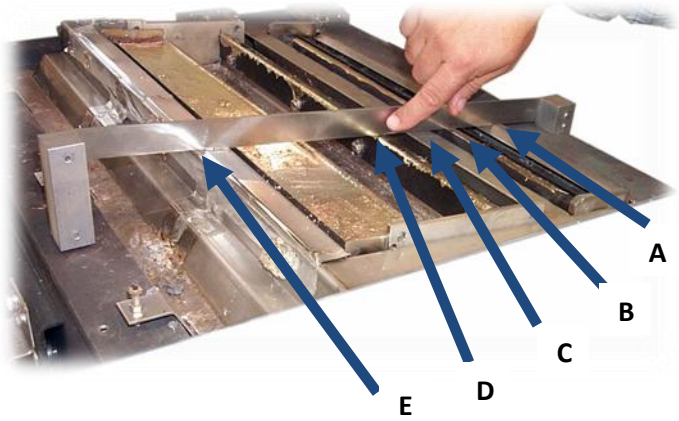
Verify the proper function of the input photocell using the following procedure.

1. With the conveyor running and the Conveyor Module window open, insert a test board in the conveyor.
2. As the plate is passing under the input photocell, the photocell icon on the screen should highlight.
3. The “Number of Boards” value in the Conveyor Module window should increment by one (1).

5.6 SOLDER MODULE VERIFICATION 

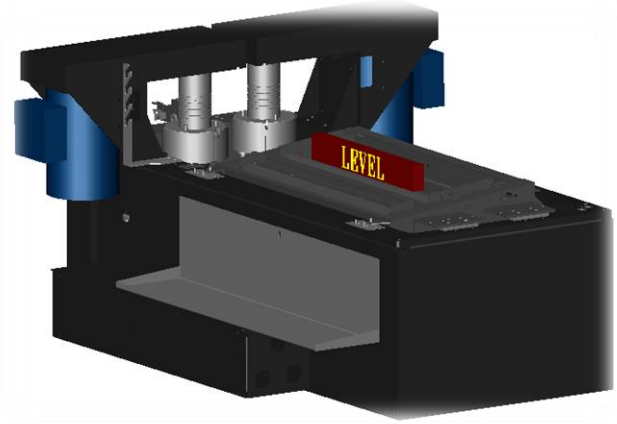
Verify the solder module components using the following procedure.

1. Verify solder nozzles and pumps are secured and seated on flowducts.
2. Click on “Modules” from the Menu Bar and then click on “Solder Pot”.
3. On the “Maintenance” page enter 0.500” for lead clearance and click “Start”.
4. Place a test board in the conveyor fingers above nozzles and measure from the bottom of the board to the nozzle curve plates to verify lead clearance calibration. Refer to the Software Manual if calibration is necessary.
5. Use the nozzle setup tool provided in the tool kit to verify the nozzles are properly set. If adjustment is necessary, consult the Maintenance Manual for detailed instruction.



Contact Points	Description
A	Chip Entrance Plate
B	Chip Baffle
C	Chip Exit Plate
D	Lambda Curve Plate
E	Lambda Exit Plate

6. Place a spirit level on the solder nozzles and verify levelness from front to back. If adjustment is necessary, consult the Maintenance Manual for detailed instruction.



5.7 BLOWER VERIFICATION (if equipped)

The preheater blowers are calibrated and tested at the factory before shipment. Verify the operation of the blowers using the following procedure.

1. Click on “Modules” from the Menu Bar and then click on a convection preheater in the list.
2. On the “Maintenance” page click on “Start” blower and verify the blower is running.
3. Repeat for each convection preheater installed.

SECTION 6: FILLING THE SYSTEM/FINAL CHECK

6.1 FILLING THE FINGER CLEANER

The finger cleaner reservoir is now ready to be filled with the customer supplied process materials using the following procedures.

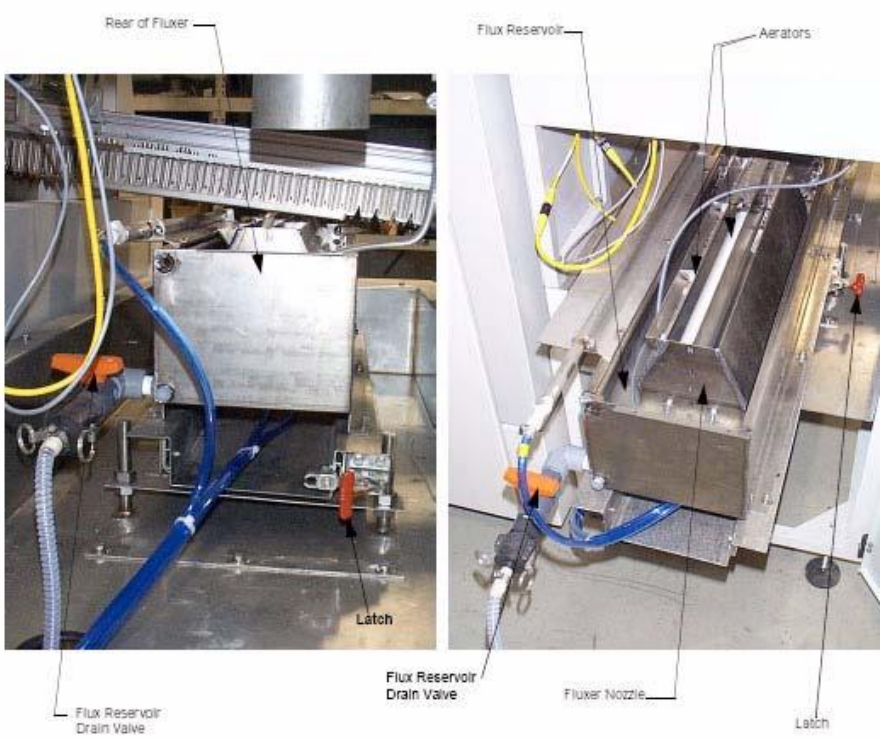
1. Access the finger cleaner tank through the rear, unload door.
2. Verify the drain valve located under the tank is completely closed.

3. Remove cover and fill the reservoir with solvent that is compatible with the machine and customer's process chemistry. Fill to about 25 mm (1 in.) below the top of the tank. Do not overfill. Re-install cover.

6.2 FILLING THE FLUXER

The foam fluxer is now ready to be filled with the customer supplied process materials using the following procedures. If equipped with a ServoSpray™ or ServoJet™ fluxer, refer to the corresponding manual for instructions.

1. Access the foam fluxer through the rear, load door and slide fluxer out for filling.
2. Verify the drain valve on the fluxer tank is completely closed.



3. Fill the reservoir with flux that is compatible with the machine and customer's process chemistry. Fill to 25 mm (1 in.) above the top of the aerators.

6.3 FILLING THE SOLDER MODULE

The solder module is now ready to be filled with the customer supplied process materials using the following procedures.

1. Open the rear solder module doors and lower the rollout stand.
2. Click on "Modules" from the Menu Bar and then click on "Solder Pot".
3. On the Maintenance page click on "Start" solder pot down.
4. Click on "Start" solder pot out.
5. Verify the solder pot drain valve is closed.
6. Load the solder pot with bar, pellet, or ingot virgin solder compatible with the machine and customer's process. Consult the **Engineering Data Sheet** for system capacity depending on type of solder and machine configuration. Note that not all of the solder will fit into the pot until it is melted.

7. If equipped, load the solder bar feeder with bars as shown.

8. It is recommended that the solder pot be covered with a high temperature blanket during heat-up to minimize the solder eruption hazard. Consult the factory to obtain a blanket if not purchased with the machine.

6.4 FINAL CHECK

Before beginning production, start the machine and all of its components to ensure proper operation by using the following procedure. Refer to the Software Manual for more detailed operating instructions.

1. Close and lock all doors and hoods before performing the final check.
2. Verify all required facilities are connected and exhaust is on.
3. Verify operation of the light tower (if equipped).
4. Verify operation of SMEMA (if equipped).
5. Verify that all Emergency Stops function properly.
6. Verify solder pumps operate properly once pot is heated.
7. Run all convection heaters at 100°C (212°F) and radiant heaters at 200°C (392°F) and verify setpoint stability.
8. Verify operation of the fluxer.
9. If equipped with UPS option, disconnect power at its source with conveyor running and test boards inside machine and verify the conveyor remains running until boards are evacuated.

APPENDIX

CENTER OF GRAVITY DRAWINGS