

A. P. E.

Automated Production Equipment



EX—700

DIGITAL DESOLDERING/SOLDERING STATION

EX—750

DIGITAL DESOLDERING/SOLDERING REWORK SYSTEM

EX—755

DIGITAL SOLDERING/DESOLDERING STATION

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SECTION I : THE EX-700/EX-750/EX-755

INTRODUCTION

The **EX-700** system is the most advanced Desolder/Solder Station available from A.P.E. Two programmable, digital controllers separately govern the temperature application of the solder extractor and solder iron, providing continuous display of operation temperature in clear, LED fashion.

Like the **EX-700**, the **EX-750** also has the capabilities to solder and desolder. However the **EX-750** incorporates a JETFLOW handpiece for precise temperature solder reflow applications and a SMD Thermal Quad-Pack Tweezer which is designed for solder reflow of PLCC surface mount devices. A variety of interchangeable tips are available.

In addition, the controllers monitor the temperature at the heat tools tip. A temperature tolerance of $\pm 2^{\circ} \text{F}$ is maintained between the actual temperature of the tool and the desired temperature programmed into the controller ("Set point" temperature).

Contained within the scope of this manual are comprehensive directions for the set-up, programming and maintenance of the **EX-700/EX-750/EX-755** and associated parts. Also provided are illustrated instructions of the most up-to-date desoldering techniques used in the electronics industry today.

EQUIPMENT SPECIFICATIONS

The **EX-700/EX-750/EX-755** Digital Desolder/Solder system meets or exceeds EOS/ESD requirements of the DOD-STD-2000-IB (per section 4.11.3 and using Appendix A procedure for measuring 2mV potential at the soldering iron tip).

1. Input Voltage -

MODEL EX-700 110/120vac, 50/60Hz, 0700-0002 220/240vac, 50Hz, 0700-2000

MODEL EX-750 110/120vac, 50/60Hz, 0750-0002, 220/240vac, 50Hz, 0750-2002

MODEL EX-755 110/120vac, 50/60Hz, 0755-0002, 220/240vac, 50Hz, 0755-2002

Output Voltage - 24 Volt AC

2. Separate temperature control and display for extractor and solder iron.

3. Less than 2mV leakage with the solder iron/ extractor between 50 Hz to 500 Hz.

4. Less than 2 ohms impedance to ground with the solder iron/extractor tips.

5. Tip temperature stabilization within input voltage range of 95-130 volts AC.

6. Zero Voltage thyristor minimizes transient spikes.

7. **EX-700** is furnished with an anti-static extractor handpiece, a solder iron, foot pedal, power cord, mtd. dual holder assy., and operational maintenance manual.

EX-755 is furnished with a soldering iron, Thermal Quad-Pack Tweezer, Quad-Pack Tweezer Holder, mtd. Single holder assy., operations maintenance manual, and power cord.

EX-750 is furnished with an anti-static extractor handpiece, a solder iron, foot pedal, power cord, mtd. dual holder assy., JETFLOW handpiece, SMD Thermal Quad-Pack Tweezer, Thermal Quad-Pack Tweezer holder, and an operational maintenance manual.

8. All aluminum, non-static power supply with chassis ground.

9. Mechanical parameters:

Weight 14.5 Pounds

Length..... 11.5 Inches

Width 8.5 Inches

Height 6.75 Inches (10.5" w/holder assy.)

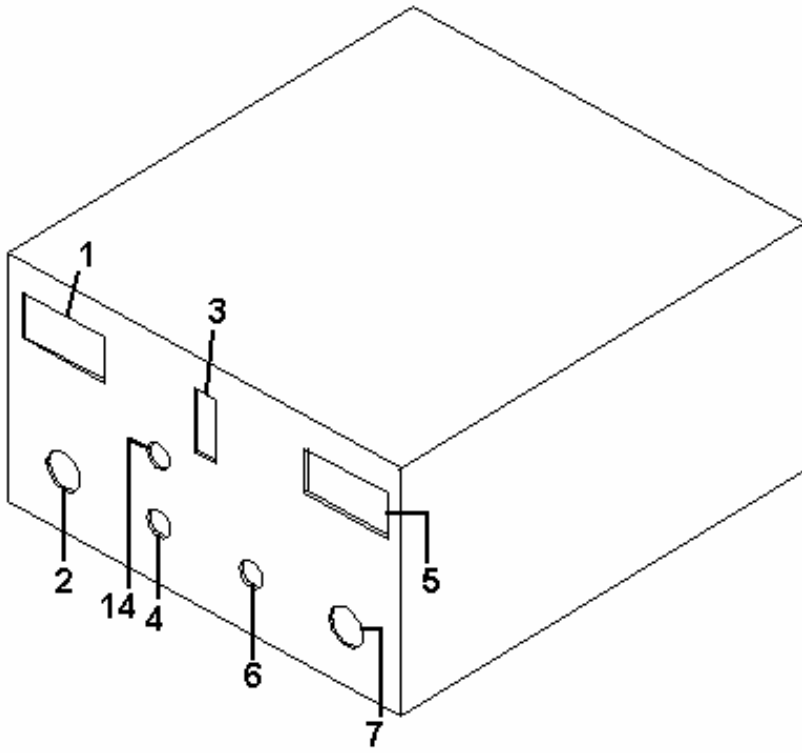
10. Designed to meet or exceed electrical construction requirements of UL, CSA, GS, CEE and other International codes.

All measurements represent nominal maximum figures.

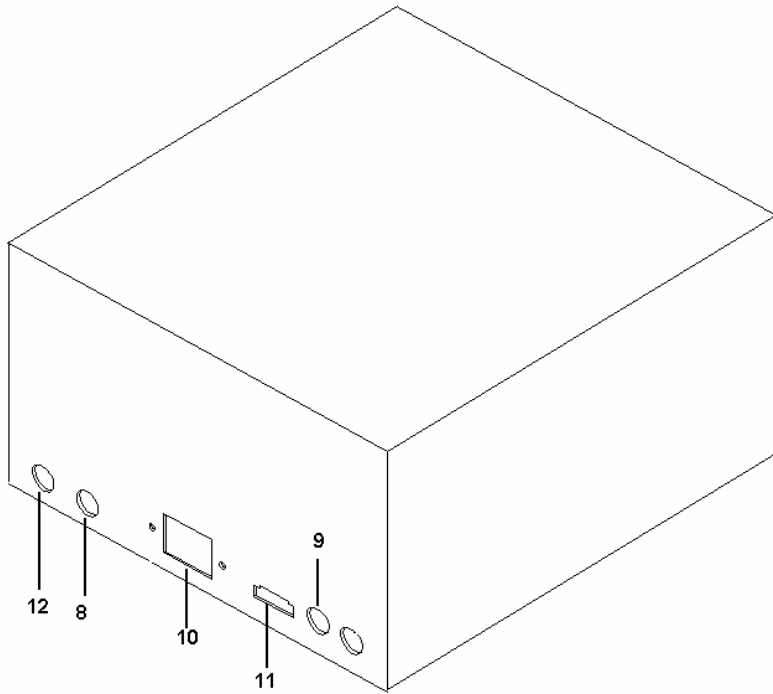
GLOSSARY OF TERMS

AC Out put Receptacle -	Alternate current output that provides 24 volts to heat tools.
Cleaning Unit -	Cleaning/Holder assembly for heat tools.
Desolder -	Remove solder from printed circuit board.
Desolder Handpiece -	See EX-1700.
Extractor -	Same as Desolder Tool.
Desolder Tip -	Tip for EX-1700 to extract solder from PCB.
Digital Display -	Window of controller which displays temperature in numeric fashion.
Heat Tool -	Extractor, Solder Iron Jetflow and Tweezer, Jetflow and Tweezer (Model EX-750 only).
JETFLOW Control -	Controls which regulate air pressure when the Jetflow is used. (MODEL EX-750 only)
Pressure Control -	Controls which regulate air pressure when the pressure is used.
LED -	Light Emitting Diode. EX-700/EX-750/EX-755 provides four, seven segment LED's on each controller to display.
Main Fuse -	Protects all circuits and components from electrical overload.
Main Power Switch -	Provides power to all system components.
Operating Temperature -	Actual temperature at the heat tool's tip.
Set Point Temperature -	Temperature programmed in controller as desired operating temperature.
Secondary Fuse -	Additional fuse protection for the heat tool's and the digital controllers.
Solder Extractor -	See EX-1700.
Stop Clog Filter -	Filter in extractor's vacuum line which prevents solder particles from entering EX-700/EX-750 and damaging the internal pump.
Vacuum Flow Control -	Fitting which regulates vacuum strength when the extractor is used in the vacuum mode.
Vacuum Pump -	Internal pump of EX-700/EX-750 which provides vacuum and pressure needed for desoldering operations.

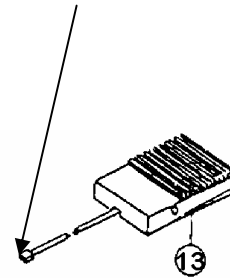
FRONT PANEL



REAR PANEL



PLUGS INTO
NOMENCLATURE # 11



NOMENCLATURE	PART #	EX-700	EX-750	EX-755
1. DIGITAL TEMP CONTROLLER (SOLDER/JETFLOW)	4020-9025	X	X	X
2. DIN PLUG RECEPTACLE, AC 6 PIN (SOLDER/JETFLOW)	4000-8407	X	X	X
3. LIGHTED ON/OFF SWITCH (MAIN POWER)	8000-0010	X	X	X
4. FLOW CONTROL, PRESSURE (JETFLOW)	7001-8799	X	X	⊗
5. DIGITAL TEMPERATURE CONTROLLER (DESOLDER/TWEEZER)	4020-9025	X	X	X
6. FLOW CONTROL, VACUUM (DESOLDER)	7001-8799	X	X	⊗
7. DIN PLUG RECEPTACLE, AC 6 PIN (DESOLDER/TWEEZER)	4000-8407	X	X	X
8. FUSE, 5 AMP, SLOW (F1) (MAIN POWER)	8000-0046	X	X	X
9. FUSE, 5 AMP, SLOW (F2) (TOOLS)	8000-0046	X	X	X
10. MAIN POWER RECEPTACLE	8000-0090	X	X	X
11. ELECTRIC FOOT PEDAL RECEPTACLE	5000-8404	X	X	X
12. GROUND POST	3006-0133	X	X	X
13. ELECTRIC FOOT PEDAL (PLUG IN)	5000-8404	X	X	X
14. JETFLOW AIR CONTROL	9000-0060	⊗	X	⊗

X- INCLUDED IN THE MACHINE ⊗ NOT INCLUDED IN MACHINE

SECTION II : PREPARATION FOR USE

INITIAL SET-UP

1. Arrange suitable space on the work surface for the power supply.
2. Turn the Main Power Switch to the “OFF” position (NOMENCLATURE #3).
3. Plug Power Cord into an outlet receptacle providing the appropriate voltage input (110v or 220v) (NOMENCLATURE #10).
4. Position the foot pedal (NOMENCLATURE #13) in a comfortable position beneath work bench, routing the wire from rear of system to the floor, behind work bench is suggested.
5. Assemble desoldering handpiece by attaching hose from end cap assembly to stop clog filter and quick disconnect. Install desoldering tip in heater, leaving ½” of the tip protruding. Tighten set screw only enough to secure tip in place.
6. Attach holder assembly plate to cleaning unit on top of system. Insert both heat tools into the holder.
7. Plug desolder handpiece into AC output on system (NOMENCLATURE #7). Plug Solder Iron into AC receptacle on System (NOMENCLATURE #6).
8. Attach air hose on desoldering handpiece to the vacuum flow control by means of the quick disconnect as outlined in NOMENCLATURE #6.
9. Set the vacuum flow control (NOMENCLATURE #6) to the maximum setting.

POWER SOURCE CHECKOUT

Follow the instructions in the “Initial Set-Up” portion of this manual prior to checking the power source.

The power source of your **EX-700/EX-750/EX-755** Desoldering System is to be checked in the following manner:

1. **Main Power** - Turn on the power switch (NOMENCLATURE #3). The switch will light, indicating power to the system.
2. **Vacuum**- With the desoldering handpiece attached as outlined in steps 5 & 8 of the “Initial Set-up” instructions, remove the internal glass tube of the handpiece, leaving the air hose still connected and the glass tube seated on the rear rubber seal, step on the floor pedal to activate the vacuum. Place a finger over the exposed end of the tube to evaluate suction.
3. **Pressure** -To evaluate pressure, with the foot pedal (NOMENCLATURE #13) depressed, place a finger over the Pressure Control (NOMENCLATURE #4). The air pressure should be felt.
4. **Temperature Controllers** - The **EX-700/ EX-750/EX-755** provides two separate temperature controllers for independent operation and monitoring of the solder extractor and the solder iron.

***USE AND PROGRAMMING OF THE DIGITAL CONTROLLERS IS OUTLINED IN MORE DETAIL LATER IN THE MANUAL.**

OPERATION OF CONTROLS/ OUTPUTS

A. Vacuum Flow Control (NOMENCLATURE #6)

The Vacuum produced at the desoldering tip is controlled by the twist valve on the Vacuum Flow Control (NOMENCLATURE #6). Adjustments in the strength of the vacuum is accomplished by twisting the fitting. Extreme left provides maximum vacuum, extreme right provides minimum vacuum.

A majority of desoldering applications require or can use maximum vacuum. On circuit boards, with heat sinks, large solder masses, or multi-layer construction, a reduction in vacuum may be desirable. The vacuum should be adequate to extract the solder from the joint before the air flow cools the solder.

The temperature on the desolder tip is programmed in the digital controller (NOMENCLATURE #5) as a set point. The desolder tool is plugged into the power receptacle, (NOMENCLATURE #7) to receive electrical power.

The Vacuum is obtained by depressing the electrical foot pedal (NOMENCLATURE #13). Releasing the pedal stops the vacuum.

B. Pressure Flow Control (NOMENCLATURE #4)

When the desoldering handpiece is connected to the Pressure Flow Control, the air passing through the heater element and desoldering tip is heated. Solder melt temperature can be attained in the pressure mode. A minimum pressure is recommended, in conjunction with a desoldering tip of small diameter, installed in the heater element.

A twist valve regulates pressure strength in the same manner as the vacuum fitting outlined above.

C. Vacuum Pump

The vacuum pump in the **EX-700/EX-750** is especially designed for desoldering applications. The pump provides 18" Hg of vacuum with a flow rate of .75 cfm. This pump supplies adequate vacuum/pressure for desoldering circuit boards. Activation of the pump is achieved via the foot pedal.

D. Temperature Controllers (NOMENCLATURE #1 AND #5)

The incorporation of two highly sensitive thermal controllers, to regulate the extractor tool and solder iron, has made the **EX-700/EX-750/EX-755** the most advanced desoldering system in the A.P.E. product line. The controllers perform the following services:

OPERATION OF CONTROLS/ OUTPUTS (CONT'D)

- * Digital display of actual temperature of the heat tool in LED fashion.
- * Quick and simple programming of desired working temperature.
- * Temperature stabilization of ± 2 °F between the programmed temperature and actual working temperature.

E. Solder Control (NOMENCLATURE #1 AND #2)

The set point for soldering is entered in the digital controller (NOMENCLATURE #1). A recommended setting of 500° F is the norm in most applications. However, set points of up to 900° F are obtainable, but not recommended to use without using extreme caution. Set points as low as 100° F are also obtainable. Plug the power cord in the power receptacle (NOMENCLATURE #10) . The digital controller will automatically raise to the set point and retain the temperature within ($\pm 2^\circ$)

F. Tweezer Control (Model EX-750) (NOMENCLATURE #5 AND #7)

Using the tweezer is similar to using the solder iron. However a different digital controller and power receptacle is used. The recommended set point range is between 100° and 900 ° F.

G. Jetflow Control (Model EX-750) (NOMENCLATURE #1, #2, #14 , AND #15)

Open #14 one turn from closed position. Select the jetflow hot air tool, which has “Jetflow” on the handle. Insert the air fitting of the tool into the “Jetflow” air fitting, and the electric power plug into the 24vac receptacle. Open the “Jetflow Air Control” valve for maximum air output: step on the foot switch to retain the air flow. Turn the needle valve clockwise until a zephyr of the air flow is emitted. This air check is made with ambient temperature. Release the foot switch, the air will stop flowing. Increase the set point of the Controller to 900° F. When the Controller reaches 900° F, aim the air tool on a piece of waste paper that has paste on it. Step on the foot switch to melt the paste. Adjust the Jetflow Air Control and the distance between the tool and the paste until the proper melting occurs. Release the foot switch to stop the flow of air. Never aim this tool at your finger. Always practice on a trial board before trying SMD Removal or Installation work.

H. Thermovac (NOMENCLATURE #3, #5, #6, #7(OPTIONAL))

Operating the Thermovac tool is detailed in this manual under “Using the Thermovac”

USE OF THE DIGITAL TEMPERATURE CONTROLLERS

The **EX-700/ EX-750/EX-755** has two, independent controllers. The digital controller on the left side of the system has been designed for the solder iron, while the controller on the right side of the system governs the desolder handpiece.

TEMPERATURE SELECTION / STABILITY

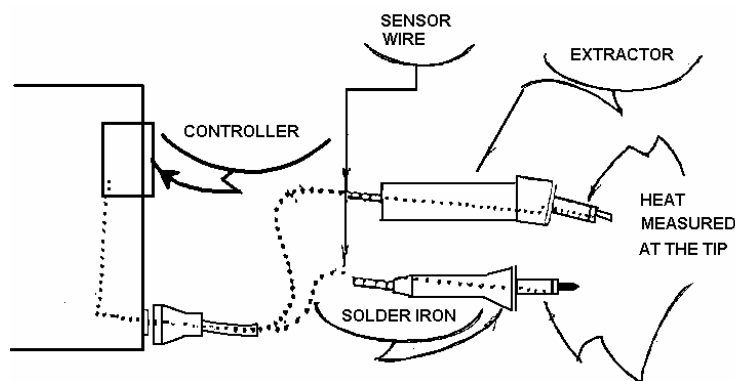
The controllers on the **EX-700/ EX-750/EX-755** allow the system technician to select and program a desired working temperature, which the controller will automatically maintain (+/- 2° F). The temperature programmed into the controller's memory is referred to as the "Set point" temperature.

Once programmed, the controller monitors the temperature at the heat tool's tip, continually comparing and adjusting the actual temperature to match the "Set point". This is accomplished by a metallic sensor which connects the heat tool's tip directly to the controller.

CONTROLLER ACTIVATION

Attach the tools to the proper AC output as described in the "Initial Set-up" portion of this manual. Place the heat tools in the holder assembly atop the **EX-700/EX-750/EX-755**.

Turn the Main Power Switch, located in the center of the system, to the "On" position. The switch will light, indicating power to the system. (NOMENCLATURE #3).



DIGITAL CONTROLLERS OPERATING INSTRUCTIONS

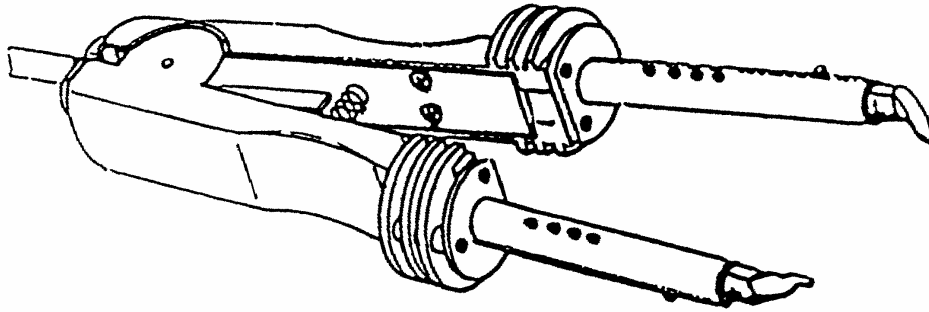
1. Plug in the tool containing the “K” sensor.
2. Turn the power ON. The indicator will show four number eights, darken, then show a LOW TEMPERATURE which will quickly start rising to the set point temperature. When the set point is reached, the display will remain constant.
3. To check for an unknown set point temperature, press the star (*) button continuously. The indicator will show “F°” (Fahrenheit degree) then blink to the number that the temperature is set.
4. To increase the set point temperature, press the star (*) button continuously and press the “UP” (Δ) button until a new number is displayed. Release the buttons. The temperature is set.
5. To decrease the set point temperature, press the star (*) button continuously and press the “DOWN” (∇) button until the new number is displayed. Release the buttons. The temperature is set.
6. The set point temperature remains in the digital controllers memory. Turning the machine off does not change the set point temperature.
7. The controllers have been “LOCKED” electronically at the AUTOMATED PRODUCTION EQUIPMENT CORPORATION manufacturing plant. This precaution is taken to assure continuance of extremely accurate calibration of the machine.
8. Recommended set point temperature for using the tools are :

TOOL	TEMPERATURE (°F)	RANGES (°C)
Solder Iron	100 to 900	38 to 482
Desolder	100 to 900	38 to 482
Tweezer	100 to 900	38 to 482
Jet Flow	100 to 900	38 to 482

9. The machine can be operated using Fahrenheit or Centigrade.
10. The digital controllers can be set from ambient temperature to 900°F.

** Note: The Tweezer, and JETFLOW are included in **MODEL EX-750**.*

USING THE TWEEZERS (Model EX-750)
(NOMENCLATURE #5 AND #7)

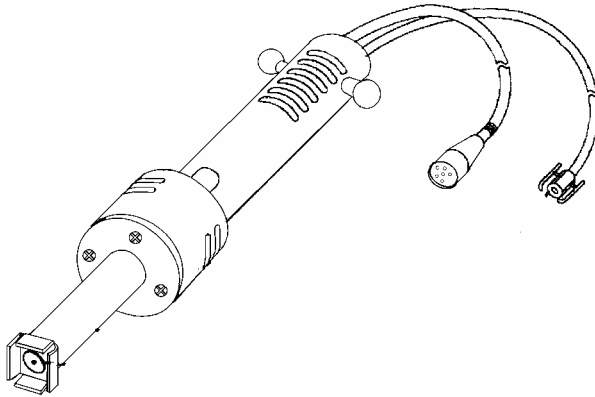


Plug the tool into the power receptacle (NOMENCLATURE #7). The set point recommended for the tips in the illustration is 700°F. When the digital controller (NOMENCLATURE #5) indicates 700° F, position the tool at an angle of 45° with the tips on the ship's leads. Remove the chip when the solder melts.

Using larger tips require a higher set point. The larger the tip, the higher the set point to a maximum setting of 900°F. Use the tool when the set point is reached.

Use similar temperatures to replace the chip.

USING THE THERMOVAC (OPTIONAL)
(NOMENCLATURE #3, #5, #6, #7)



1. Plug tool into (NOMENCLATURE # 7) to desolder.
2. Connect the quick disconnect air fitting of the tool to the vacuum air valve (NOMENCLATURE # 6). Turn the air valve counterclockwise to the maximum position.
3. Insert plug of the tool into the receptacle(NOMENCLATURE #7)
4. Turn on the Power switch (NOMENCLATURE #3) to energize the digital controller(NOMENCLATURE # 5)
5. Set the temperature in the digital controller to 500° F.
6. When the heat rises to 500°F, place the tip of the tool around the chip to be removed. The suction cup of the tool will seat on top of the chip, allowing the tool to melt the chip's terminals (about 30 seconds). Step on the foot pedal (NOMENCLATURE #13) the vacuum will suck the chip into the tip's chamber.
7. Remove the chip from the printed circuit board. Move the tool to a safe area to drop the chip. Step off the foot switch and the chip will drop.
8. To install a replacement chip, apply solder paste to the cleaned printed circuit board terminals. Allow the heat to rise to set point 500°F; step on the foot switch for the vacuum to hold the chip in the tip; target the chip to its proper position on the surface mounted board. Allow an additional 30 seconds of heat for the chip contacts to solder. Step off the foot switch. Do not remove the tool until the solder has cooled and the chip will not move when the tool is lifted from the printed circuit board.

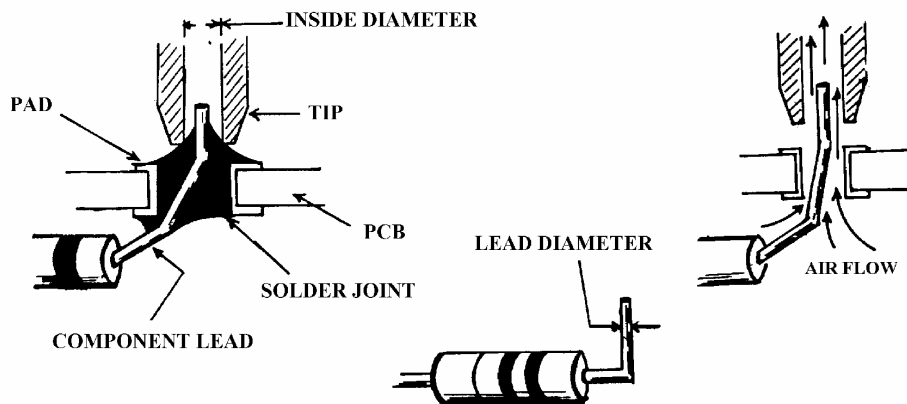
SECTION III : APPLICATIONS

This section will outline the proper use of the **EX-700/ EX-750** desoldering handpiece in the vacuum mode for varying applications.

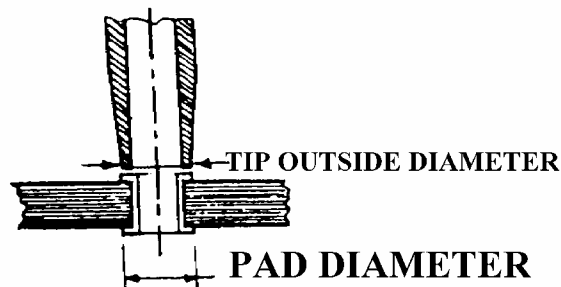
DESOLDER TIP SELECTION

Proper selection of the tip is key to successful desoldering.

1. Inside Diameter - The tip should be large enough to fit over the lead to be desoldered. A slight clearance is necessary to allow the solder to flow through the tip. Although several tip diameters will work, ideally a tip inside diameter of $1\frac{1}{2}$ to 2 times that of the lead diameter is best.



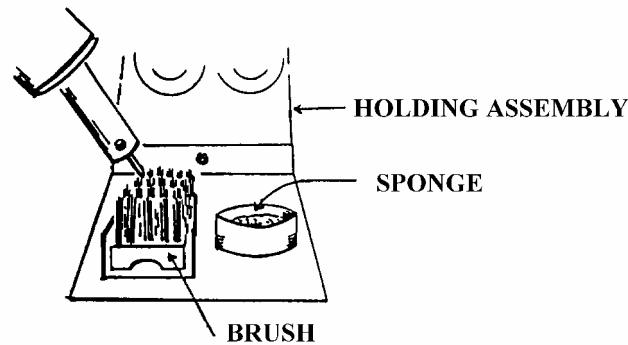
2. Outside Diameter - The O.D. of the tip should be less than the diameter of the circuit board pad. This is to avoid burning or marking the board material. The tip wall thickness provides the path of heat into the solder joint. Thicker walls are preferable for large solder joints and bigger heat sinks to conduct the heat to the solder joint as quickly as possible.



DESOLDER TIP SELECTION (cont'd.)

3. Tip Care - After each period of use, the tip should be cleaned off with the stand brush and inspected for signs of wear. The tip end may get frayed or spread out causing rough edges that can scratch a board. Tips should be removed from heater several times a day to clean heater and remove oxidation from outside the tip.

** NOTE: Failure to remove tip for long period of time may result in tip seizing in heater due to expansion from oxidation.*

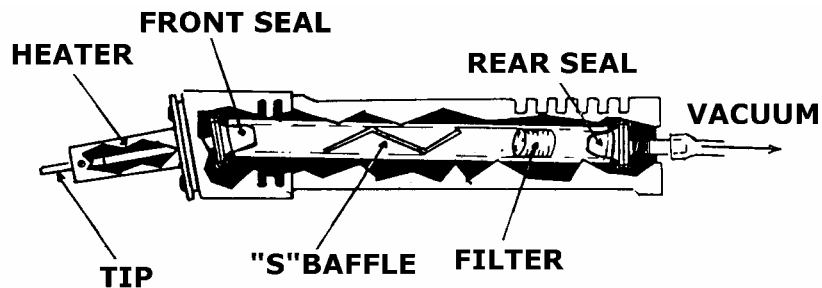


4. Tip Wear - Desoldering tips tend to wear out faster than soldering iron tips for many reasons such as:
 - A. Increased surface area exposed to oxidation.
 - B. Cycling of temperature from hot to cold.
 - C. Wearing out of inner surface from molten solder and flux passing through
 - D. Mechanical wear from bending leads and stirring action.
 - E. High temperature causes oxidation.
5. Set Screw - An anti-seizing lubricating compound is impregnated into the set screw to prolong useful life. The set screw should be loosened every few hours to prolong life. When holding tip in place, the set screw should be tightened to just make contact with tip and then turned only $\frac{1}{4}$ turn additional to avoid crushing tip wall and making tip removal difficult.
6. Tip - Tips should be positioned so they protrude about $\frac{1}{2}$ " from heater. Personal preference for variations will affect the temperature and thermal recovery time of tip. The adjustment of the temperature control in conjunction with position of tip as well as type of tip when used can give infinite variations.

SOLDER JOINT REMOVAL

The desoldering handpiece is a simple but critical tool. Understanding its functions will make its use and maintenance easier.

1. Through the tip, the solder joints is heated to make the solder molten. The vacuum is energized to extract the molten solder up through the tip and heater assembly and into the glass collection tube. A metal baffle is positioned in the glass tube to provide a surface for the molten solder to adhere. The felt filter at the rear end of the glass tube will trap fine particles and vapors that are drawn in preventing these particles from reaching the vacuum pump.
2. A seal on both ends of the glass tube preserves the vacuum from the power supply through the hose to the heater and tip. The seals permit quick disconnection of the glass collection tube for removal of the solder and changing of the filter.
3. The tip is heated by the heater which also carries the vacuum. A tight seal at the tip is essential to both transfer the heat and the vacuum to the solder joint. The tip must be blocked or have "blow holes" in its sides.



Plated Through And Reinforced Hole Joint Removal

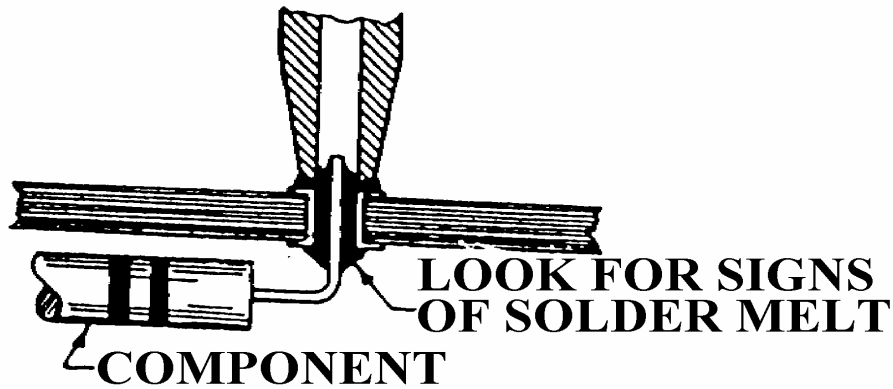
These joints have solder in holes that are plated through. Complete evacuation of solder must be achieved before the component can be removed. Using four basic steps, the joint can be removed. The first step is to make the solder molten. This can be verified by glancing at the component side of the joint and watching for the first sign of bubbling or movement of the solder at the joint. Continuation of the basic steps will assure good joint removal. These steps are as follows:

A. Heating the Solder Joint

Lay the tip over the lead against the pad-lead junction. This will ensure there is adequate melting of the solder. The time needed should be only a few seconds. It is helpful to watch the component side of the PCB for full melt of solder.

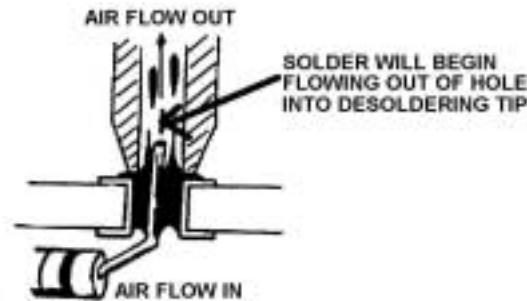
SOLDER JOINT REMOVAL (cont'd)

Desolder Tip
cross section



B. Start Vacuum

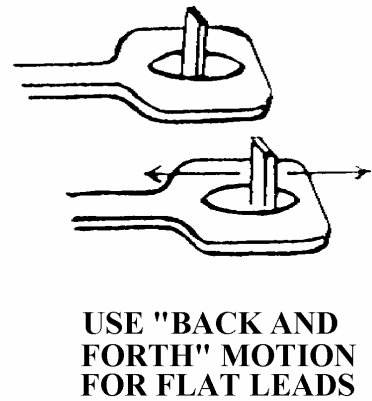
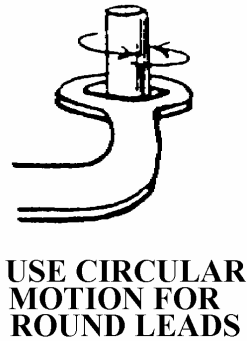
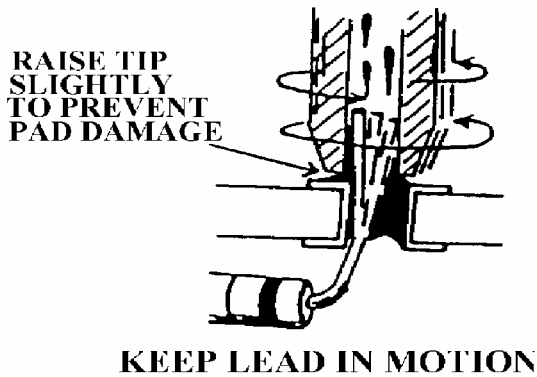
Once solder melt is observed, step on the foot pedal to suck solder from joint. Hold tip in a perpendicular position to board and let tip gently lay on pad. This will seal the pad and tip and give maximum vacuum. Do this for several seconds.



C. Oscillation

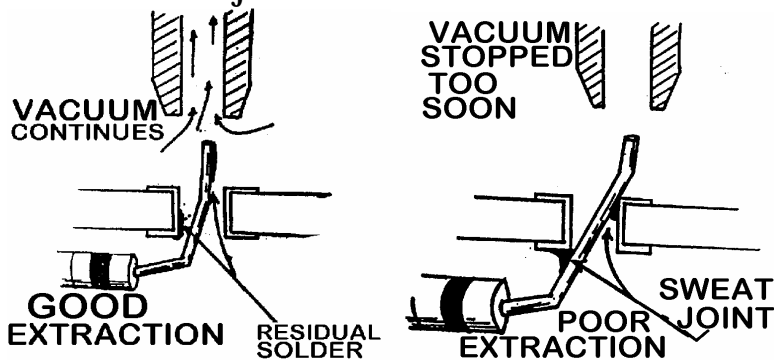
After stepping on the foot pedal to begin evacuating solder, almost instantaneously begin vigorously (but gently) oscillating the component lead. Usually the lead bends more easily in one direction than the other, such as IC's. This vigorous oscillating should be done only to the lead and the weight of the tip on the board **should be removed**. Care should be taken not to scratch the pad with the tip. Keep the vacuum on at all times. The purpose of oscillating the lead is to keep the joint from re-sweating until the temperature is lowered below the melting point of the solder. The temperature is lowered by the continuous flow of cool air through the joint by the vacuum at the tip.

SOLDER JOINT REMOVAL (cont'd)



D. Remove tip From Lead

While still holding the foot pedal and sucking air into tip, lift the tip off component lead and away from circuit board. Maintain the vacuum for a count of three to ensure solder has had time to run into a glass tube and will not stop and solidify in heater riser tube. Be sure that vacuum is continued after the tip is raised from component lead. When vacuum flow is stopped, heat is instantly driven into the tip and can cause a sweat joint of residue particles if not removed from joint.



SOLDER JOINT REMOVAL (cont'd)

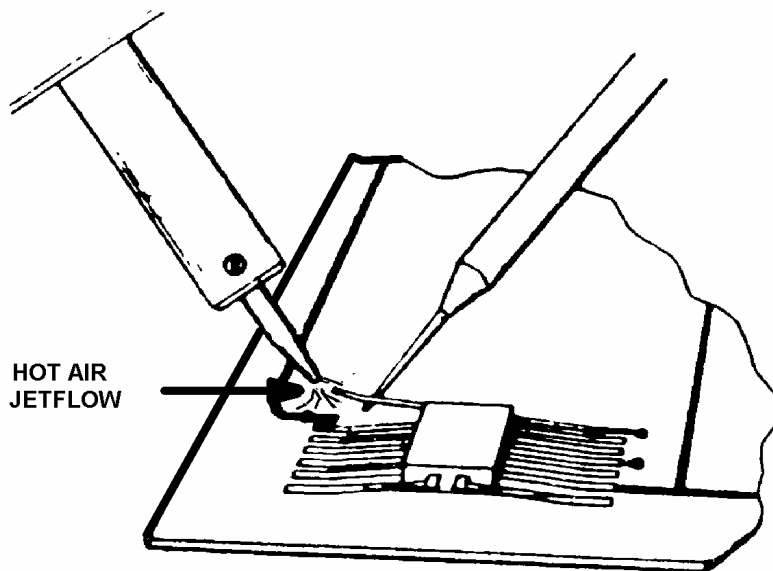
Blind Side Solder Joint Removal

This is when the component is flat against the board so there is no air path possible through the board along the protruding leads. This is due to conformal coating, or the component is designed to lie flat against the board.

In these cases, first remove as much of the solder by the vacuum mode. Then, the hose is changed to the pressure mode and the protruding lead is heated enough to conduct the heat to the blindsided solder joint. After sufficient time is allowed to melt the solder, the blast of hot air is blown into the hole. Stir the lead vigorously, until the joint is cooled down below the melting point of solder and the lead is free to remove.

Removal Of Flat Packs

Use the jetflow hand tool when the component leads are mounted on a flat surface and do not protrude through holes in the boards. These "lap joints" are heated by the hot air from the Jetflow tip directed on them from ¼" away. When the solder is molten, the flat lead is tilted up with a tweezer or a pick. Each lead is removed in this manner without harm to the component or the board.



A fine stream of temperature controlled air can be used to direct hot air on a component that failed, or to the heat-shrink tubing in hard to reach locations. The hot air can be used to soften conformal coating and facilitate removal from around the components. **For removal methods and specialized equipment for removal of all types of conformal coating, contact your distributor at the factory.**

SOLDER JOINT REMOVAL (cont'd)

Single Sided Board Joint Removal

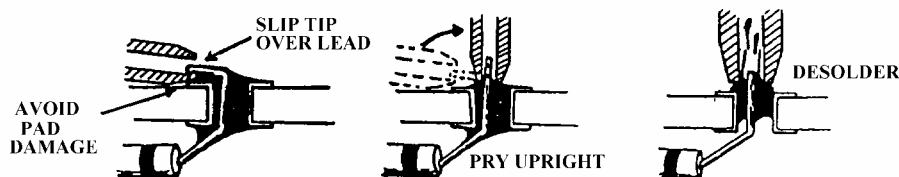
When removing the joint, the four previous steps must be observed. These solder joints are easiest to remove but care must still be taken to prevent lifting of pads which are weakest when heat is applied. The bonding strength of the circuit pad recovers when the vacuum air cools down the joint.

Double Sided Board And Multi-Layer Board Joint Removal

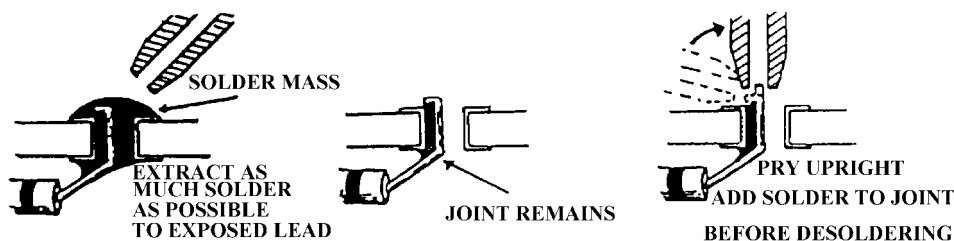
Since there is really two single sided solder joints at each location, these joints will be treated like the above joints except that additional heat and time may be required as thermal properties increase. On leads that go through pads with no circuitry attached, be careful to oscillate the lead very gently to prevent the pad from being lifted.

Clinched Lead Solder Joint Removal

The first step is to straighten out the clinched lead. If the end of the lead is visible and it is laying on some form of circuitry, carefully slide the desoldering tip under the lead while melting the solder. After the tip is on the lead, slowly and carefully begin to straighten out the lead with the tip. When in a vertical position, proceed as in four basic steps.



When the end of the lead is not visible, it may be necessary to first lay the desoldering tip on top of the clinched lead to melt the solder. Then suck excess solder from joint thereby exposing end of component lead.

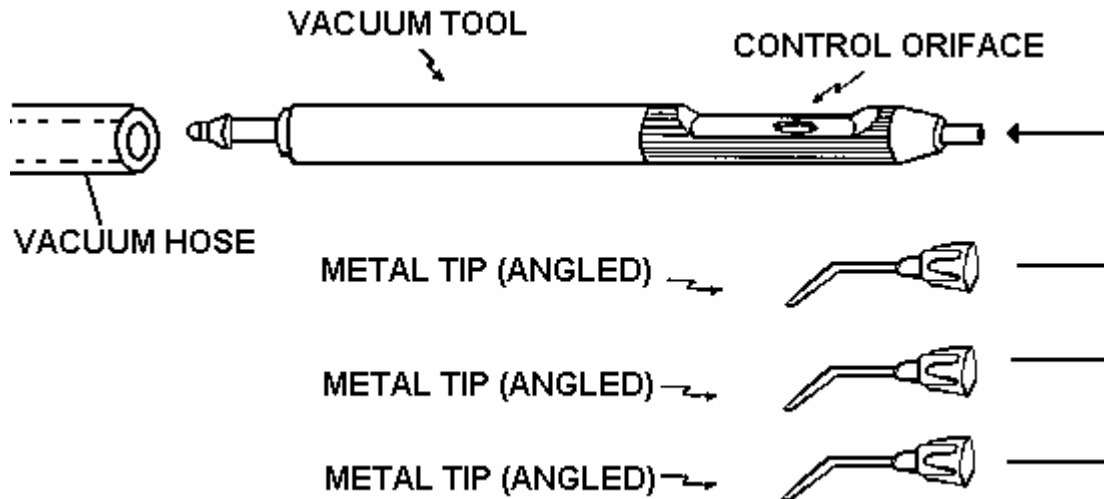


Now the lead can either be clipped off next to the hole and desoldered, or it can be straightened as shown. Resoldering and extracting of the lead yields the best results.

If the lead is laying on the Board without any circuitry under it, clipping the lead is safer to avoid scratching the board.

SMD VACUUM PICK AND PLACE TOOL(OPTIONAL)

The **SMD** Vacuum Handling Tool is ideal for the precision handling and placement of surface mounts. Included with the handling tool are three different tip sizes that can lift a wide range of components.



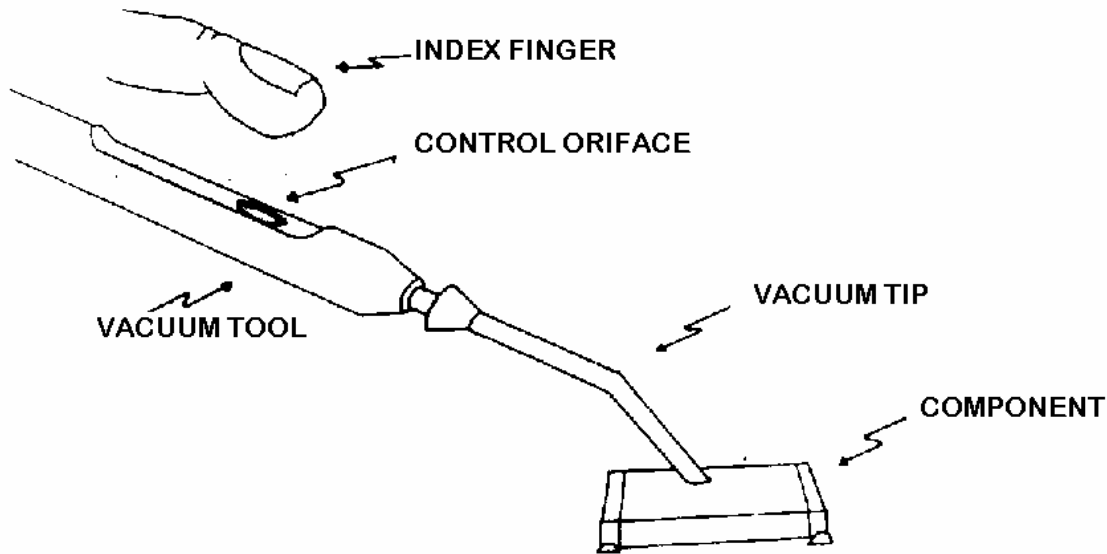
SET-UP

The three tips included in the Vacuum Tool Kit are rapidly interchangeable and slip easily over the head of the Vacuum Tool. To use the Vacuum Tool, select a tip size appropriate for the component to be removed. Place the tip on the Handpiece, connect the Air Hose to the Vacuum Valve. As with all the equipment on the **SMD** Machines, the Vacuum Tool is activated by the foot pedal.

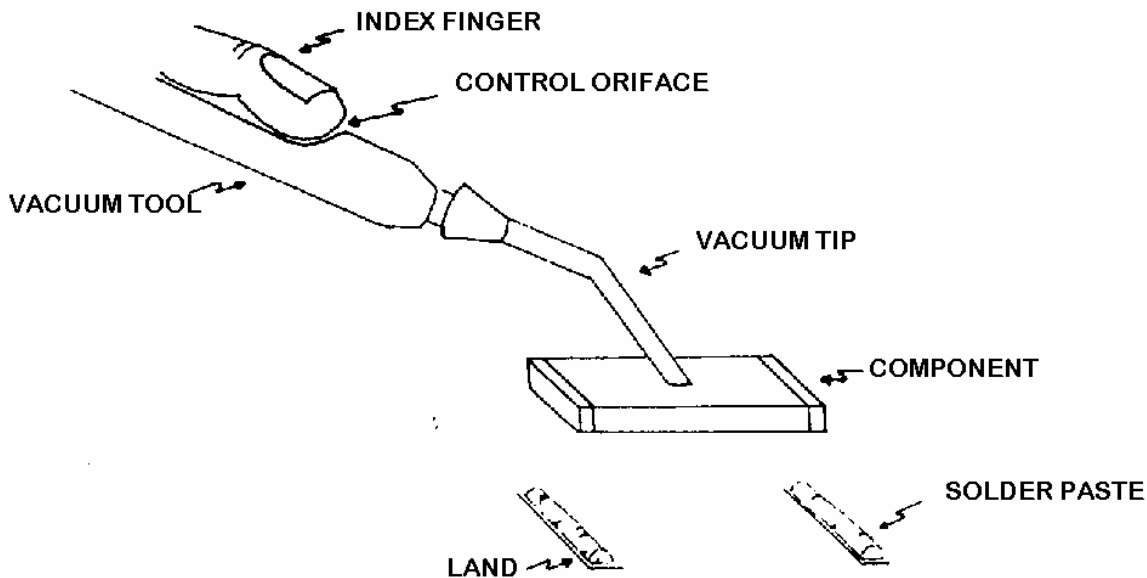
USING THE HANDLING TOOL

To use the tool, select the desired tip. While the vacuum is in operation, the suction force is drawn through the control orifice on top of the handpiece.

SMD VACUUM PICK AND PLACE TOOL (cont'd)



Only when the control orifice is covered by the operator's finger is the suction force diverted to the tip. Use the handling tool for either removal of components or the precision placement of a component by placing the tip directly atop of the desired component. The operator will then step on the foot pedal while simultaneously covering the control orifice with a finger. The suction force will secure the component for easy maneuverability.



** Note: The Vacuum Tool should never be used to remove molten solder from a board. Solder particles may become lodged in the tool, hindering the vacuum flow.*

SECTION IV : MAINTENANCE

MAINTENANCE /REPAIR OF THE EXTRACTOR

Although the handpiece is a low maintenance device, proper cleaning during use will ensure optimum performance and is critical in reducing system malfunctions.

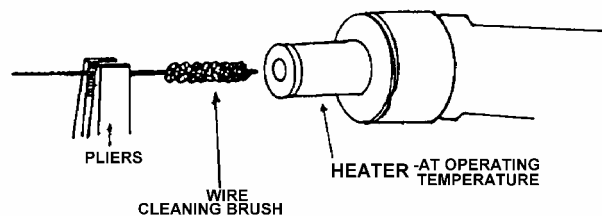
Poor or no vacuum at the desolder tip is the most common system failure on an extractor system. In most cases, this failure is the direct result of inadequate cleaning of the handpiece and heater element.

When excessive amounts of solder collect in the handpiece, the vacuum flow becomes obstructed or blocked. Continued use under poor vacuum conditions increases the likelihood of a solder clog in the heater element.

Use the following steps to clean your desolder handpiece.

REGULAR HEATING CLEANING

1. Use Caution! The heater element must remain hot during the cleaning process. Never raise the heating element above eye-level to examine interior of element.
2. Loosen the set screw which secures the desolder tip in the heater element.
3. Using pliers, remove the tip from heater. Caution - The tip will remain hot for a short period after removal from the heater.



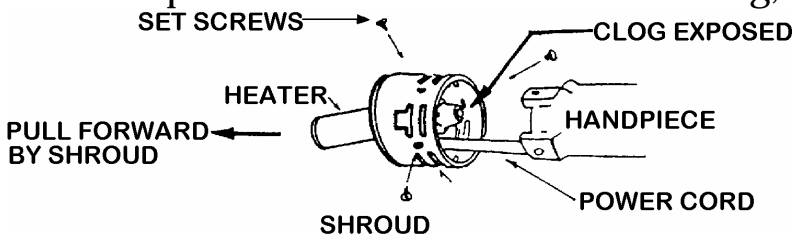
4. Using pliers, insert the small wire brush into the front of the heater element. Caution - The brush will begin to absorb heat. **DO NOT TOUCH WITH HANDS!!**
5. Run the brush up and down the heater, pushing the solder particles into the glass tube secured in the handpiece.
6. When the heater is clean of all obstructions, **SLOWLY** remove the brush from the front of the heater. This will avoid solder particles on the brush bristles from spattering.
7. Replace desolder tip in heater and secure with set screw.

MAINTENANCE /REPAIR OF THE EXTRACTOR (CONT'D)

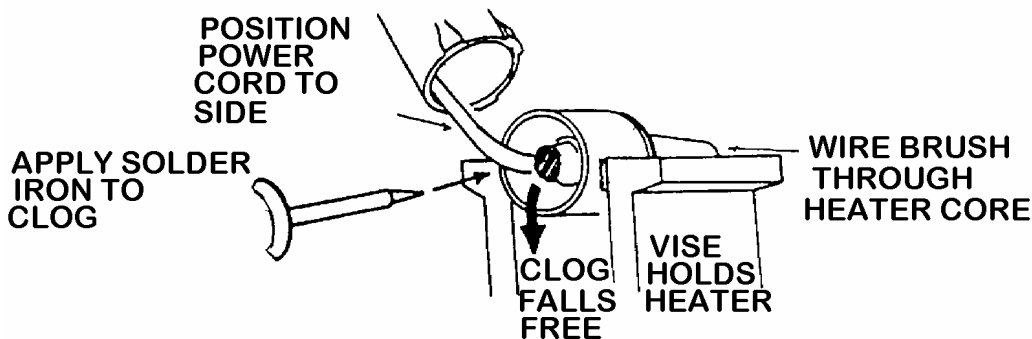
CLEANING A SEVERELY CLOGGED HEATER

When excessive amounts of solder are allowed to accumulate in the handpiece's glass tube, the possibility of a solder clog is greatly increased. Typically, the solder particles will mass around the front seal that connects the heater to the glass tube. If the clog is too massive, the wire brush may not be able to clear the vacuum path.

1. Let the handpiece remain hot, do not turn the power off. Removal of a solder clog is easier from a hot heating element.
2. Remove the three screws which secure the handpiece shroud to the handpiece body,
3. Separate the shroud from the body. Make certain the power cord moves forward with the shroud. For best results and safety, place the shroud and heater in a vise. Have the power cord on either side of the clog, not directly below the clog.



4. With the handpiece apart, direct access to the solder clog is permitted. Insert the wire cleaning brush in the front of the heater element. Use pliers to avoid getting burned.



5. Apply the tip of a hot solder iron directly to the mass of the solder clog at the front seal.
6. When the solder melts, push the wire brush completely through the heater. Caution - The solder will fall freely. Do not allow the solder to land on the power cord.
7. With the clog removed, reassemble the handpiece.
8. The Jetflow Heater operates on a gentle air flow (pressure) and will not clog.

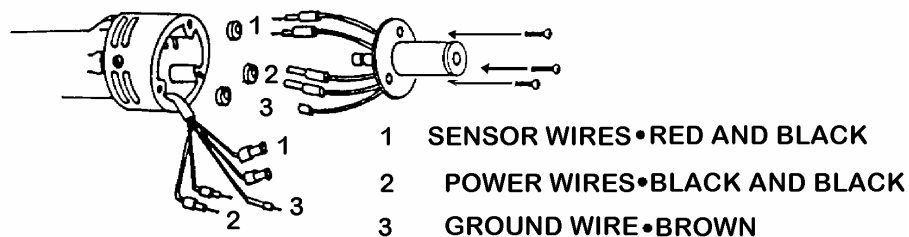
Note: This is available with the **EX-750 unit.*

MAINTENANCE /REPAIR OF THE EXTRACTOR (cont'd)

HEATER REPLACEMENT

To replace the heater element on the handpiece, unplug the handpiece from the power source. Replace the heater in the following manner:

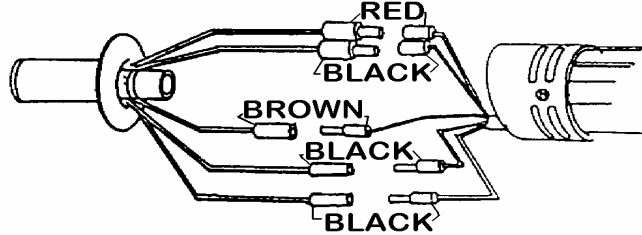
1. Make certain the heater to be removed from the handpiece is cool to the touch.
2. Remove the three heater retaining screws which secure the heater to the shroud of the handpiece.
3. When the screws are removed, the insulating spacer can also be removed. On standard handpieces, one screw will also secure the heater ground wire.
4. Separate the heater element from the handpiece. Carefully pull the power cord forward with the heater element.
5. A desoldering handpiece equipped with a thermal sensor utilizes five wires to connect the heater to the power source. All five wires have push fittings that require separation for heater replacement. The two black wires carry power to the heater element. The red wire and black wire control the temperature sensor. The brown wire is the ground wire for the heater element. The wires are color-coded to ensure proper attachment. Alternating the female and male push fittings prevents the improper connection of the three black wires.



6. The extractor heater element is 35 watts. The JETFLOW Heater Element is 60 Watts.

HEATER REPLACEMENT ELEMENT (cont'd)

7. Install the new heater following the color-coding.



8. Return the heater to the shroud of the handpiece. Pull power cord from the rear of the handpiece to remove any slack in the cord.
9. Secure the heater in place with the retaining screws. Make certain the insulating spacers are secured by screws between the heater and the shroud.
10. On handpiece, the ground lug is secured by one of the retaining screws. The ground lug is positioned between the heater and the insulating spacer.

GLASS TUBE

1. Remove the glass tube from the desolder handpiece via the twist – lock fitting at the rear of the handpiece. If the glass tube remains seated on the front seal and does not exit the handpiece, insert a small bladed screwdriver through the access window on the handpiece shroud. The glass tube can be separated from the front seal with a light push.



2. With the glass tube out of the handpiece, remove the tube from the rear seal on the end-cap assembly (Twist lock fitting).
3. Use the large bristle brush to push the aluminum "S" Baffle and felt filter out of the glass tube.



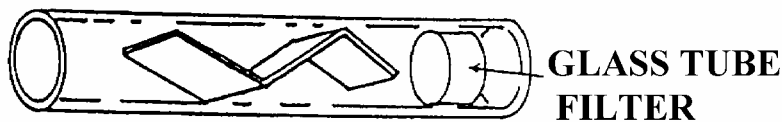
GLASS TUBE (cont'd)

4. Brush the interior of the glass tube to remove solder particles.
5. With the bristle brush, remove the solder particles from the "S" baffle. The poor bond strength between solder and aluminum will allow easy cleaning of the "S" baffle.
6. Return the "S" baffle to the glass tube. Center the baffle with the brush.
7. Inspect the felt filter. Determine if a new filter is required. Place the filter in the glass tube. The filter must rest between the "S" baffle and the REAR seal.
8. Place the glass tube on the rear seal (End-cap Assembly) and return tube to handpiece.
9. Make certain the glass tube seats properly on the front seal. Secure in place with the twist – lock fitting.

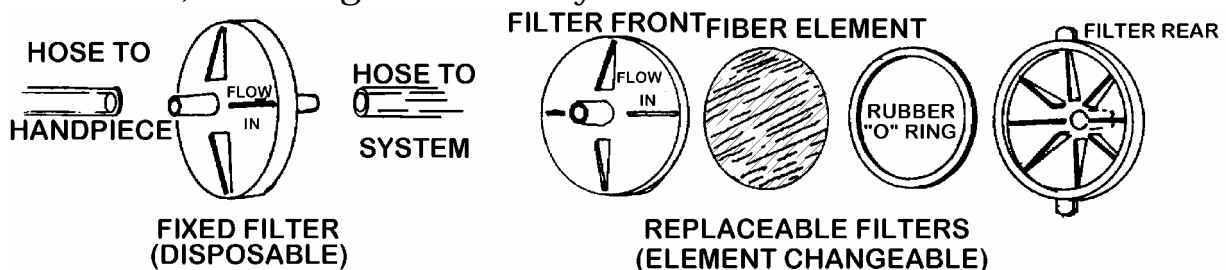
FILTERS

The Desolder handpiece has two filter elements to prevent flux and solder particles from entering the Power source and damaging the vacuum pump.

1. The glass tube filter should be replaced on a regular basis. The need to change the filter is determined by visual inspection. A suggested rate of a new filter every two days of normal use is recommended.



2. The stop clog filter, in the air line of desolder handpiece, adds some additional protection to the vacuum pump by trapping any particles that may have passed the glass tube filter. A visual inspection indicates the need for a new filter (or new filter element). A change rate of every two weeks of normal use is recommended.

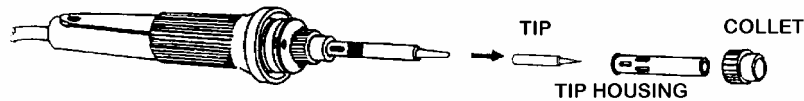


MAINTENANCE /REPAIR OF THE SOLDER IRON

TIP REPLACEMENT

When changing the tip or heater on the solder iron, make certain that the iron is unplugged from the power source and is cool to the touch.

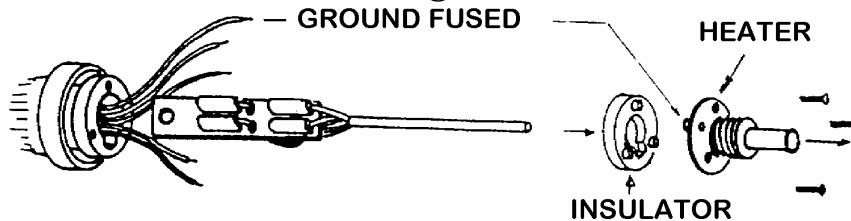
1. Unscrew the collet that secures the tip housing to the heater flange.
2. Slide the tip housing forward, exposing the tip.



3. The tip rests on the heater/sensor core rod. When the tip housing is removed the tip will slide off the rod.
4. Install new tip by sliding heater/sensor rod into hollow center of tip.
5. Replace tip housing and secure with the collet.

HEATER / SENSOR REPLACEMENT

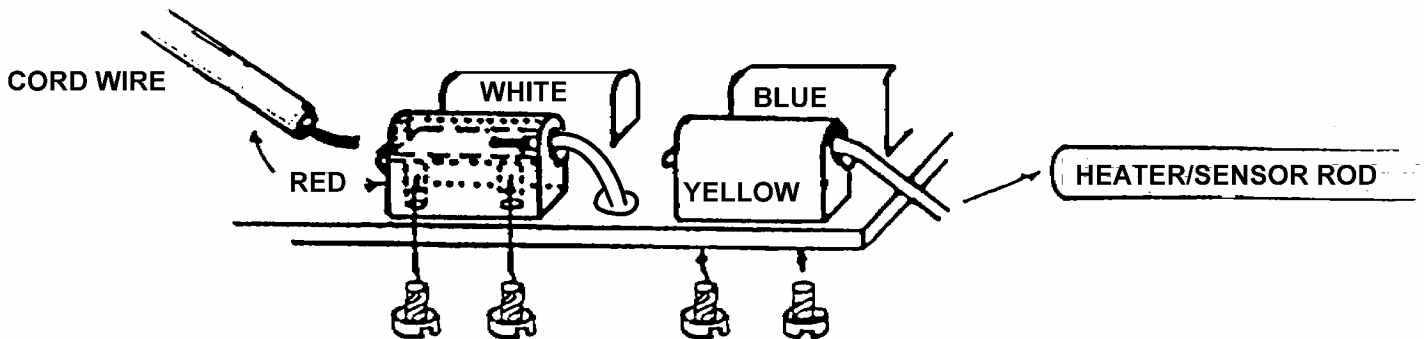
1. Remove the tip from the heater assembly as outlined above.
2. Remove the three heater retaining screws located on the heater flange.



3. With the screws removed, the heater flange and insulator can be separated from the handpiece.
4. The ground wire for the heater element is fused to the heater flange. It is not necessary to disconnect the ground wire from the flange for heater replacement.
5. Loosen the screw at the rear of the solder iron handpiece. This will free the power cord. Push the cord forward from the rear of the handpiece. As the cord moves forward, the heater/sensor rod and control board will emerge from the front of the handpiece.

HEATER/SENSOR REPLACEMENT (cont'd)

6. On the control board are four (4) metal housings. These housings provide the electrical connections for the power cord to the control board. Each housing has two screws on the underside of the control board. The front screw (nearest the heater/sensor rod) of each housing connects the control board to the power cord.
7. Loosen the REAR SCREW of each housing. Pull the color-coded wire out of each housing.



8. Position the control board and heater rod with the metal housings face up, and the screws down. Attach the control board to the color-coded wires in the following fashion:

FRONT	(Housings nearest rod)		
LEFT	Yellow	RIGHT	Blue
REAR	(Housings away from rod)		
LEFT	Yellow	RIGHT	Blue

9. Tighten all screws on the control board.
10. Pull power cord back into handpiece from the rear. Guide the control board into the handpiece. Tighten the screw at back of handpiece to secure power cord.
11. Slip heater insulator and heater flange over rod. Secure in place with heater retaining screws.
12. Place tip on exposed end of heater/ sensor rod.
13. Replace tip housing and secure with collet.

VACUUM PUMP MAINTENANCE

Vacuum pumps are designed to yield maximum, trouble free performance under all conditions. To assure safe and proper operation

and maximize the life of the unit, the following guidelines should be observed.

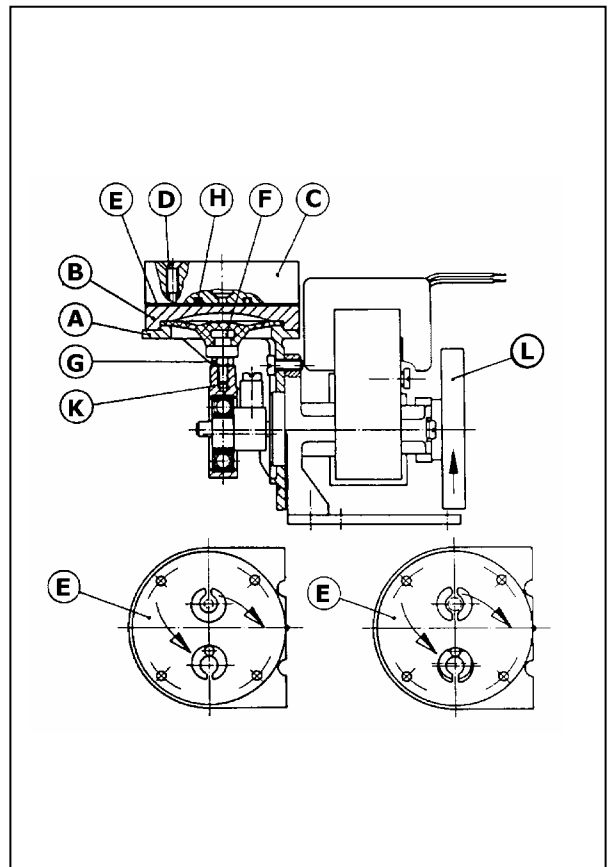
- 1). Be sure that the available electric power matches the specifications of the electric motor.
- 2). Care should be taken to ensure that the temperature of the compressor or vacuum pump environment remains between 40° and 100°F. This is particularly important when unit is installed in a confined space.
- 3). Unit should be started against atmospheric pressure only, not under load (pressure or vacuum). Care must be taken to eliminate load when pump is turned off for any reason.
- 4). Be sure that the pump is installed at the highest point within the system to prevent possible condensation from entering in the unit.

Exchanging diaphragm and valveplate

Diaphragm and valveplate, the only parts which may wear out, are easily and quickly replaced.

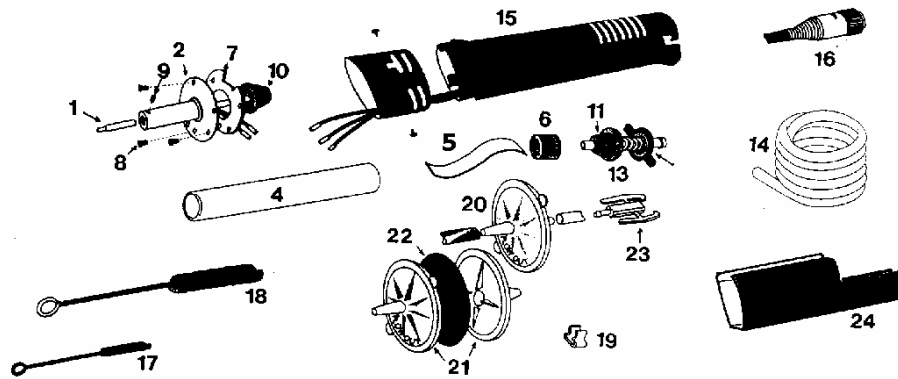
- A). Mark with a pencil the position between the housing A, the intermediate plate B and the headplate C
- B). Loosen the 4 countersunk screws D and remove the headplate C, the valveplate E and the intermediate plate B. Remove O-ring H from the headplate C.
- C). Loosen the diaphragm F by turning it counterclockwise! (Caution: If a spacer nut is present, it must be screwed back on top of plug bolt of the diaphragm when reassembling unit).
- D). Screw on new diaphragm F and tighten by hand.
- E). Turn the fan L until connecting rod K is in mid-position and replace intermediate plate B according to the pencil markings on the housing A.
- F). Now place new valveplate E (as shown on the drawing) on top of the intermediate plate B and headplate C (with new O-ring H) on top of the valveplate. Tighten with countersunk screws D uniformly in a criss-cross fashion. Check easy run by slightly turning the fan L.

- 5). Use only to pump air or gas, not liquids. In the event that corrosive gasses are to be pumped, be certain that a corrosive resistant model is used.
- 6). Always install pump in such a location that it is protected from direct (or indirect) moisture contact.
- 7). Avoid operating the unit in very dusty conditions if this cannot be prevented then be sure to install an inlet filter and inspect and change it frequently.
- 8). If flow is throttled for any reason care must be taken to not exceed the maximum continuous operating design pressure of the unit.



REPLACEMENT PARTS

EX-1700 DESOLDER HANDPIECE



Item	Description	Part No.
A	Handpiece Complete (24v w/ Sensor)	1700-6700
1	Tip	See tip section
2	Heater & Seal Assy. (24v w/ Sensor)	6700-1760
4	Glass Tube	6700-3200
5	"S" Baffle	6700-4100
6	Extractor Glass Tube Filter	6700-0100
		Package of 25
		Package of 50
7	Heater Insulator	6700-3813
8	Heater Retaining Screws	6700-7017
9	Set Screws	6700-7700
10	Seal, Forward	6700-7201
11	Seal, Rear	6700-7200
12	End -cap Retaining Clip	6700-7302
13	End -cap Assembly (Standard)	6700-7300
14	Tubing: 6' Length	7000-8790
	Tubing: 12' Length	7000-8701
15	Handpiece Assembly (Standard)	6700-0287
16	Power Cord for handpiece w/ Sensor	4000-8417
17	Wire Brush	6700-0112
18	Bristle Brush	6700-0010
19	Hose Clamps	6700-2002
20	Stop- Clog Filter (Fixed)	3000-5002
21	Stop-Clog Filter w/ Replaceable Element	3000-5003
22	Replaceable Stop-Clog Element	3000-5001
	Package of 10	3000-5001-P10
	Package of 25	3000-5001-P25
	Package of 50	3000-5001-P50
23	Quick Disconnect	6700-8799
24	Handpiece Insulator	6700-0286

REPLACEMENT PARTS (Cont'd)

SOLDERING AND DESOLDERING TIPS

Tips Desoldering/Soldering

Description:	Part No.:	Description:	Part No.:
Tip 3/64"	1212-1764	Tip 1/64"	1212-1717
Tip 3/16"	1212-1736	Tip 1/16"	1212-1716
Tip 1/8"	1212-1725	Tip 1/32"	1212-1701



Tips Desoldering

(I.D. to fit Pace & Plug Tips)

I.D.	Part No.
.018	1212-0018
.025	1212-0225
.040	1212-0440
.050	1212-0550
.060	1212-0660
.080	1212-0080
Assorted Tips	1212-1212

Long Tips

(Fits Pace MP-also for wire wrap pins)

I.D.	Part No.
.060	1212-2060
.040	1212-2040
.025	1212-2025

Curved Tips

(30° bend)

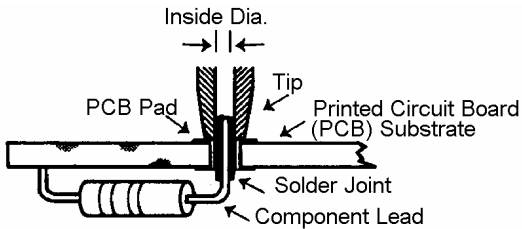
I.D.	Part No.
.025	1212-2125
.040	1212-2140
.060	1212-2160

DESIGNED FOR MAXIMUM HEAT CONDUCTIVITY
AND OPTIMUM OPERATING LIFE.

DESOLDER TIP SELECTION

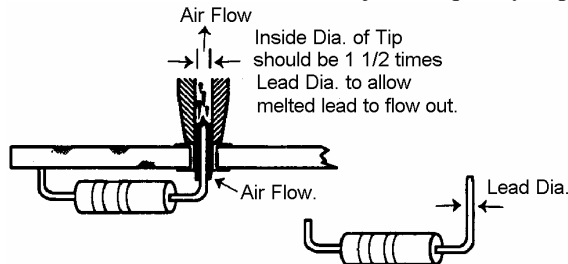
INSIDE DIAMETER

The tip should be large enough to fit over the lead to be desoldered. A slight clearance is necessary to allow the solder to flow through the tip. Although several tip diameters will work ideally, a tip diameter 1 1/3 the lead diameter is best.

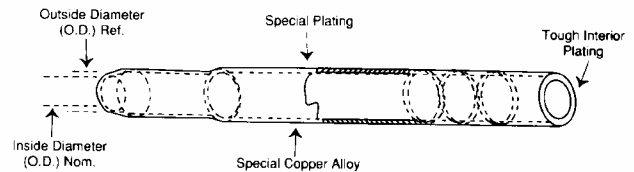


OUTSIDE DIAMETER

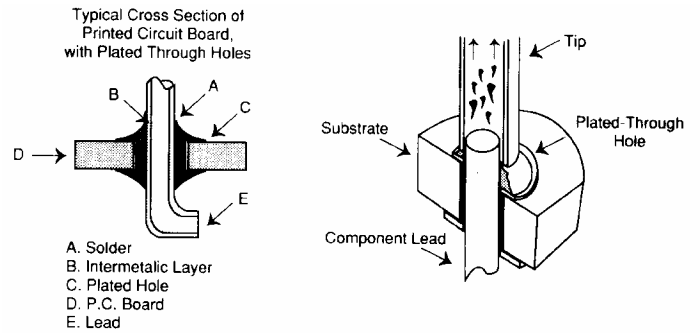
The O.D of the tip should be less than the diameter of the circuit board pad. This is to avoid burning or marking the board material. The tip wall thickness provides the path of heat into solder joint. Thick walls are preferable for large solder joint and bigger heat sinks to conduct the heat into the solder joint as quickly as possible.



DESOLDER CROSS SECTION



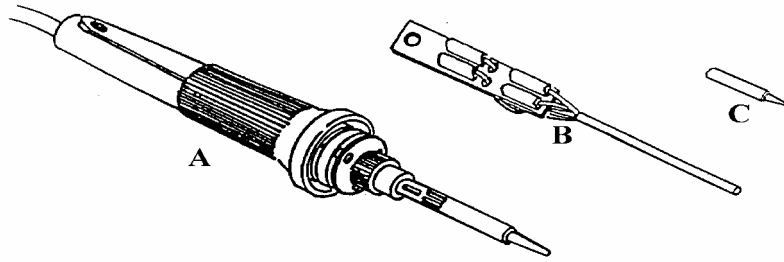
MEASUREMENT OF REPLACEMENT



A.P.E. Tips are manufactured to outlast any competitive tip on the market today. Three years of research and development and specialized tooling allow us to introduce this tip with plating high conductivity copper with corrosive-resistant inner-lining for longer life and instant heat recovery.

REPLACEMENT PARTS

Solder Iron



Item	Description	Part No.	Optional Tips Available	Part No.
A	Complete 24v w/Sensor	6910-1700	Fork Small Chip	6910-2311
B	Control Board & Rod	6910-1724	Fork SOT 23/143	6910-2310
C	Tip		Funnel SOIC-14	6910-2314
	1/8" chisel	1212-1725	Fork Large Chip	6910-2312
	1/16" chisel	1212-1716	Funnel SOIC -8	6910-2308
	1/32" pointed	1212-1701	Flat Blade	6910-2395
	1/64" pointed	1212-1717	Funnel SOIC -16	6910-2316
	3/16" chisel	1212-1736	PQFP .389" x .389"	6910-2401
	3/64" chisel	1212-1764	PQFP .512" x .512"	6910-2402
			PQFP .545" x .545"	6910-2403
			PQFP .574" x .574"	6910-2404
			PQFP .697" x .697"	6910-2405
			PQFP .820" x .820"	6910-2406

Desolder Tips

I. D Part No



STANDARD TIPS

.025	1212-0225
.040	1212-0440
.060	1212-0660
.080	1212-0080



30° CURVED TIPS

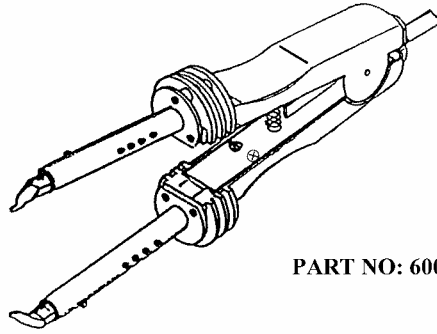
.025	1212-2125
.040	1212-2140
.060	1212-2160



LONG TIPS

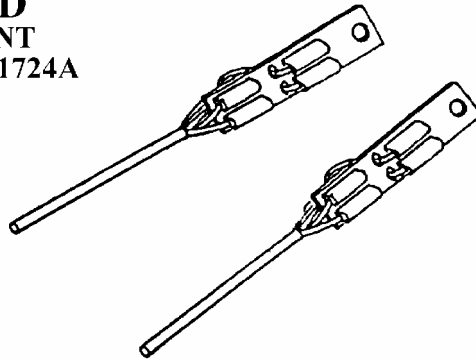
.025	1212-2025
.040	1212-2040
.060	1212-2060

THERMAL QUAD-PACK TWEEZER
SMD THERMAL QUAD-PACK TWEEZERS
PART NUMBER: 6000-2400A



PART NO: 6000-2400A

HEATER ELEMENT
WITH BOARD
HEATER ELEMENT
PART NO: 6000-1724A



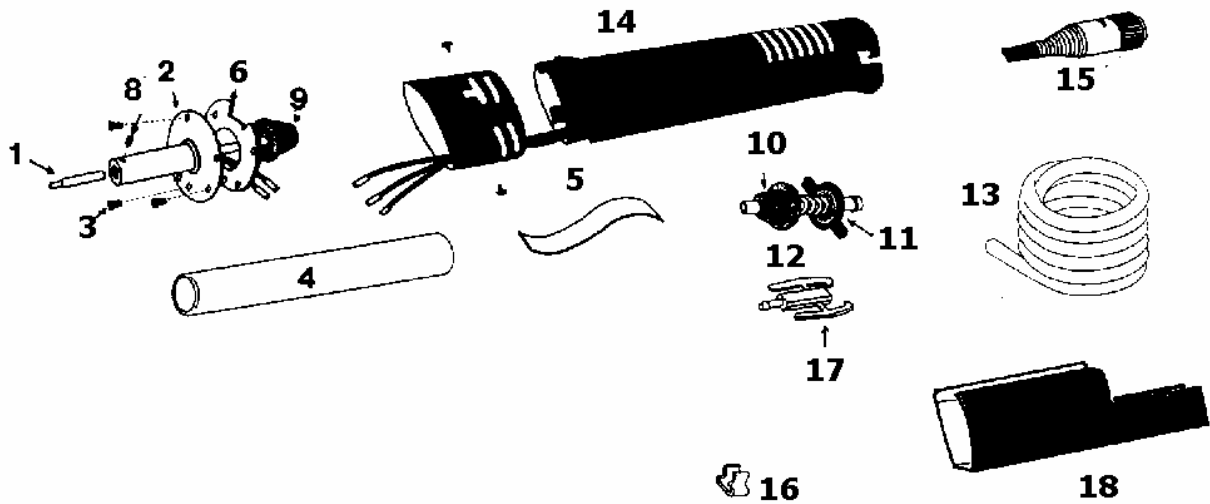
Quad-pack Tweezer Handpiece Tips

TIP	PART NO.
Chip Component	1212-2311A
SOT 23/143	1212-2310A
SOIC-8	1212-2308A
SOIC -14	1212-2314A
SOIC - 16	1212-2316A
SOIC -20	1212-2320A
SOIC -24	1212-2324A
PLCC/Quads - 18	1212-2318A
PLCC/Quads - 20	1212-2326A
PLCC/Quads - 28	1212-2328A
PLCC/Quads - 44	1212-2344A
Handpiece Insulator	6000-0286
<i>*NOTE: THE TWEEZER ASSEMBLY REQUIRES QUAD-PACK TWEEZER HOLDER ASSEMBLY (PartNo. 3550-6000)</i>	

REPLACEMENT PARTS(continued)-(optional)

JETFLOW HANDPIECE REPLACEMENT PARTS

Part Number 1700-0060

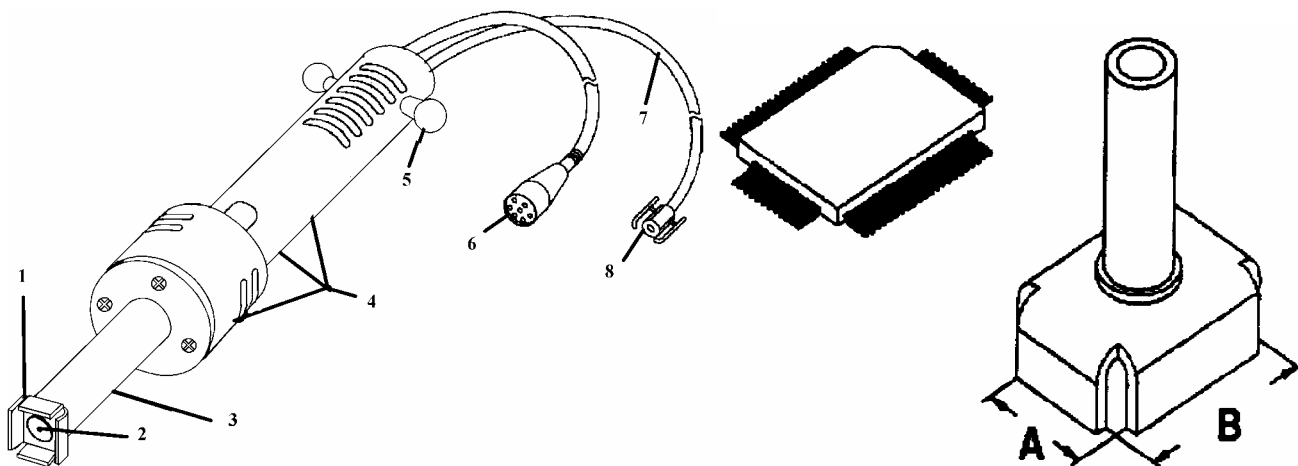


Item	Description	Part No.
A	JETFLOW Handpiece Complete (24v w/ Sensor)	1700-0060
1	Tip	See tip section
2	Heater & Seal Assy. (24v 60 WATTS)	6700-1760
4	Glass Tube	6700-3200
5	"S" Baffle	6700-4100
6	Heater Insulator	6700-3813
7	Heater Retaining Screws	6700-7017
8	Set Screws	6700-7700
9	Seal, Forward	6700-7201
10	Seal, Rear	6700-7200
11	End -cap Retaining Clip	6700-7302
12	End -cap Assembly (Standard)	6700-7300
13	Tubing: 6' Length	7000-8790
	Tubing: 12' Length	7000-8701
14	Handpiece Assembly (Standard)	6700-0287
15	Power Cord for handpiece w/ Sensor	4000-8417
16	Hose Clamps	6700-2002
17	Quick Disconnect	6700-8799
18	Handpiece Insulator	6700-0286

REPLACEMENT PARTS (CONTINUED)
THERMOVAC REPLACEMENT PARTS (OPTIONAL)
THERMOVAC

PART NUMBER
6000-2600

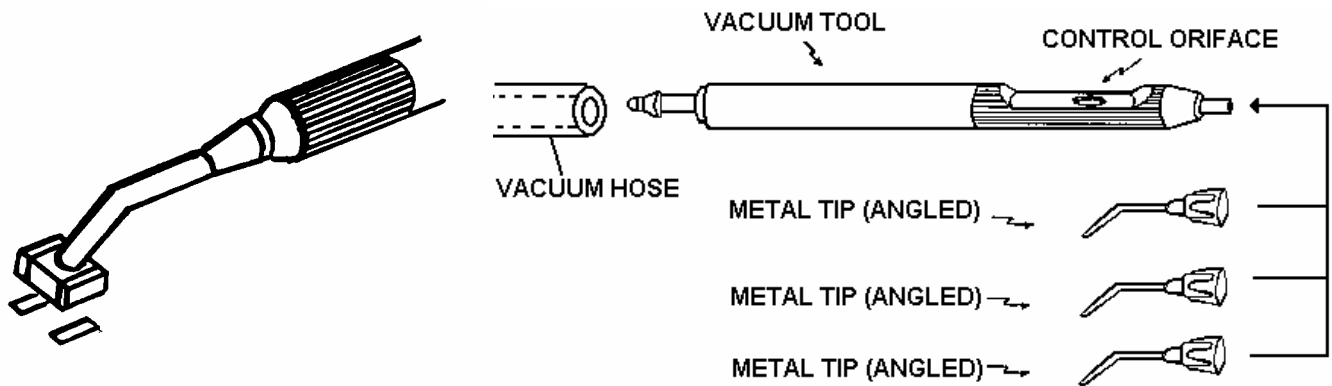
TIP REPLACEABLE
 see below



NUMBER	DESCRIPTION	PART NUMBER
1	TIPS (SEE SIZES LISTED BELOW)	SEE LISTING BELOW
2	VACUUM CUP	8100-0003
3	HEATER ASSY 24V-60W	6700-1765
4	REPLACEMENT HANDLE ASSY	6700-0288
5	END CAP ASSY	6700-7300
6	POWER CORD - SENSOR	4000-8417
7	TUBING 6 FEET LENGTH	7000-8790
8	QUICK DISCONNECT FITTING	6700-8799
INTERNAL	SPRING	6000-3204
INTERNAL	VACUUM TUBE	6000-3203
INTERNAL	BUSHING	6000-3201
INTERNAL	WASHER	6000-3202
INTERNAL	VACUUM PICK-UP TUBE	6000-3200
INTERNAL	SET SCREWS	6000-7706P2

DESCRIPTION	TIP SIZE A X B	PART NUMBER
FLATPACK TIP	.63" X .87"	1212-2423
FLATPACK TIP	.68" X .92"	1212-2425
PQFP-68 TIP	.64" X .64"	1212-2426
PQFP-84 TIP	.74" X .74"	1212-2427
PQFP-100 TIP	.84" X .84"	1212-2428
PQFP-132 TIP	1.04" X 1.04"	1212-2429
PQFP-144 TIP	1.17" X 1.17"	1212-2430
PQFP-160 TIP	1.24" X 1.24"	1212-2431
PQFP-208 TIP	1.24" X 1.24"	1212-2431

**REPLACEMENT PARTS
SMD PICK AND PLACE /VACUUM HANDLING TOOL
PART NUMBER: 6000-2500(OPTIONAL)**



SMD Vacuum Pick-up/Placement Handling Tool Kit

This kit is designed to handle all types of SMD components. A by-pass hole is covered with finger to allow vacuum flow through probe tip, causing a delicate suction force to remove and replace SMD's Components. Handpiece is contoured to minimize fatigue.

A.P.E. Stock No.	6000-2500
Kit Contains:	
Probe (Vacuum By-pass)	not sold separately
SMD Vacuum Probe Tip (.063" ID x .083" OD)	6000-2501
SMD Vacuum Probe Tip (.033" ID x .050" OD)	6000-2502
SMD Vacuum Probe Tip (.020" ID x .032" OD)	6000-2503
Quick Disconnect Fitting	6700-8799
6 ft Flexible Tubing	7000-8790
Vacuum Replacement Cups	
SMD Vacuum Cups (.140" dia)	6000-2504
SMD Vacuum Cups (.200" dia)	6000-2505
SMD Vacuum Cups (.250" dia)	6000-2506
SMD Vacuum Cups (.320" dia)	6000-2507
SMD Vacuum Cups (.400" dia)	6000-2508

TROUBLESHOOTING

The following chart provides a quick reference guide to assist in the recognition of minor problems that may occur with a desoldering system and the corrective action suggested.

Symptom	Probable Cause	Suggested Action
<i>No main power</i>	Defective Connection	Check main system power or cord connection.
	Main fuse blown (NOMENCLATURE #8)	Replace fuse; after repairing the short circuit
<i>No temperature display</i>	Secondary fuse blown (NOMENCLATURE #9)	Replace fuse; after checking the tool short circuit.
	Display defective	Contact A.P.E. factory.
<i>Digital Display Indicates 1700- Then Flashes "INPUT FAILURE"</i>	Tool is not plugged into the power receptacle beneath it.	Plug in the tool. If the flashing continues, replace the heater element of the tool.
<i>Digital displays a Constant temperature That is not the set point</i>	Blown secondary fuse (NOMENCLATURE #9)	Change fuse after checking heater element in tool for a short circuit
<i>No vacuum pump Activation</i>	Defective switch in foot pedal (NOMENCLATURE #13)	Clean or replace switch.
	Defective Wire in foot pedal	Replace foot pedal assembly (NOMENCLATURE #13)
<i>Pump activation – No vacuum at tip</i>	Heater clogged	Clean heater.
	Glass tube full	Clean tube.
	Filter(s) dirty	Replace filters.
	Pump bound	Disassemble and clean.
	Vacuum hose damaged	Replace hose.
<i>Tools do not get hot</i>	Defective heater	Replace heater.
	Defective connections	Check internal connections between heater and cord.
	Damaged power cord on heat tool	Replace power cord.



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