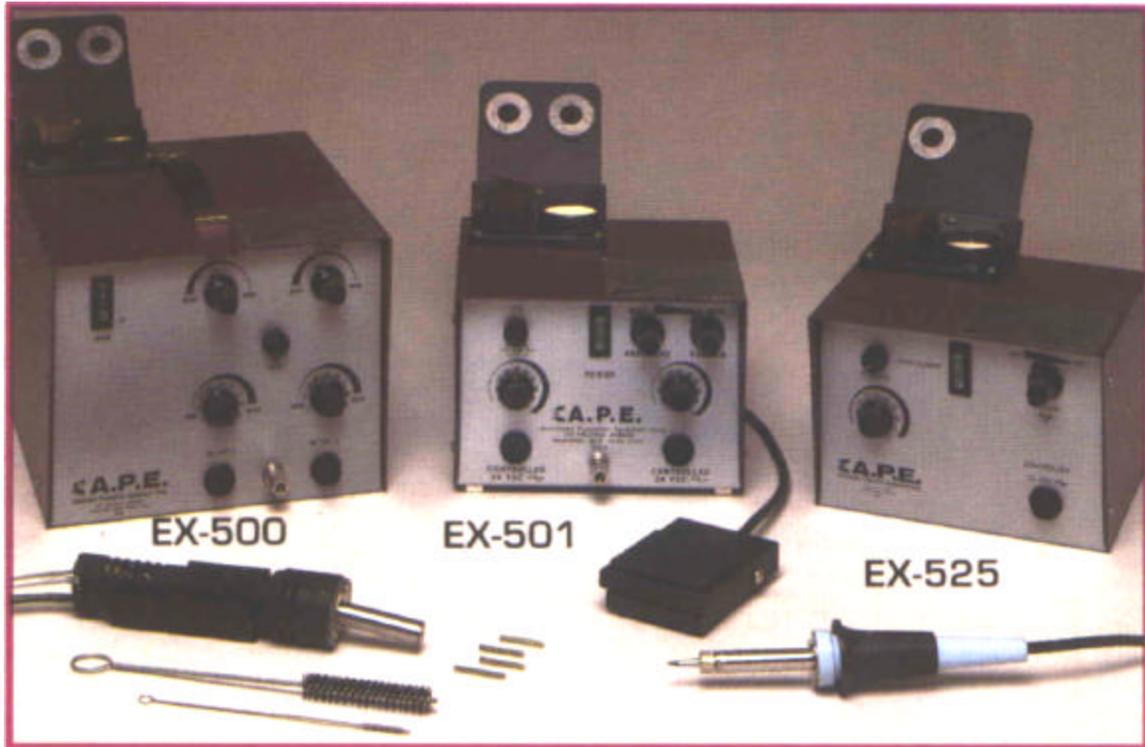


CA.P.E.

Automated Production Equipment



EX – 500/ EX-501

Soldering & Desoldering Systems

EX – 525

Desoldering System

EX – 550

Desoldering System

Operation & Maintenance Manual

Self-contained Production

Soldering/Desoldering Systems

EX-500 Series (Meets or Exceeds EOS/ESD Requirements MIL-STD-2000A)

Internal Vacuum Diaphragm Pump 18-20" Hg.



Temperature Controlled Soldering Desoldering Systems.

<u>Description</u>	<u>Part No.</u>	<u>EX-500</u>	<u>EX-501</u>	<u>EX-525</u>
Domestic Version Complete (110v)		0500-0002	0501-0002	0525-0002
“ “ “ Finger Actuation		0500-0004	0501-0004	0525-0004
Export Version Complete (220v)		0500-2002	0501-2002	0525-2002
“ “ “ Finger Actuation		0500-2004	0501-2004	0525-2004
Desolder Handpiece(24 Vac)	1505-6700	STD	STD	STD
Deluxe Solder Iron w/Tip	6910-0005	STD	STD	OPT
Dual Holder Assembly	3550-0602	STD	STD	x
Single Holder Assembly	3550-0600	x	x	STD
Tip Clean Unit Assembly. MTD	6730-3803	STD	STD	STD
Operation/Maintenance Manual	0550-5255	STD	STD	STD
Spare Parts Kit, One Year	6700-8724	OPT	OPT	OPT
Service Tech. Track Repair Kit	2570-0020	OPT	OPT	OPT
SMD Vacuum Pick/Place Wand	6000-2500	OPT	OPT	OPT
Hot Air Tool (60W 24V)	1005-6024	OPT	OPT	OPT

⚡ AUTOMATED PRODUCTION EQUIPMENT CORPORATION

PHONE # (631) 654-1197

FAX # (631) 289-4735

CALL TOLL FREE 1-888-DSOLDER

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INITIAL SET UP

- A. Arrange suitable space on the work surface for power supply and cleaning unit assembly.
- B. Plug power supply into AC receptacle. EX 550 Supply **shop air** 60-140 PSI 2CFM.
- C. Turn main power “on-off” switch to “on” position. The Indicator light will glow.
- D. Position foot pedal in comfortable position, routing wire behind work bench if possible.
- E. Depress foot pedal. This will start vacuum flow.
- F. Assemble desoldering handpiece by attaching hose to hose fitting on end. Install desoldering tip in heater end leaving about 1/2”(12.5 mm) of smaller end protruding and tighten set screw only enough to secure.
- G. Set up cleaning unit on work surface. Insert desoldering tool and soldering iron (EX 500/ EX-501 only) in holders.
- H. Plug desoldering handpiece and soldering iron power cords into either variable AC receptacle on power supply. Turn desoldering handpiece variable AC control on to position 6 to 8. After a few minutes warm up, heater will be ready for operation.
- I. Attach free end of hose from desoldering handpiece to vacuum hose fitting on power supply. Dress hose and power cord together with hose clips provided.
- J. The container on cleaning unit assy, can be used for storage of tips or for a wet sponge cleaning unit for soldering iron.
- K. The wire brush on cleaning unit is used to keep the desoldering tip clean and free from flux and solder.

SET-UP

The EX-550 requires the use of factory air pressure to perform the desoldering task. A minimum of sixty pounds per sq. inch (60 PSI) of factory air pressure is required, with a maximum of 110 pounds per sq. inch (110 PSI).

All air pressure lines should include a three, (3) micron filter to protect the foot pedal assembly and transducer from oil, dust, and water that can enter the system and effect performance. Contaminates lodged in the transducer will reduce vacuum power and result in clogging of the desoldering handpiece.

The following chart will provide a reference for the desired vacuum when using factory air pressure in the EX-550.

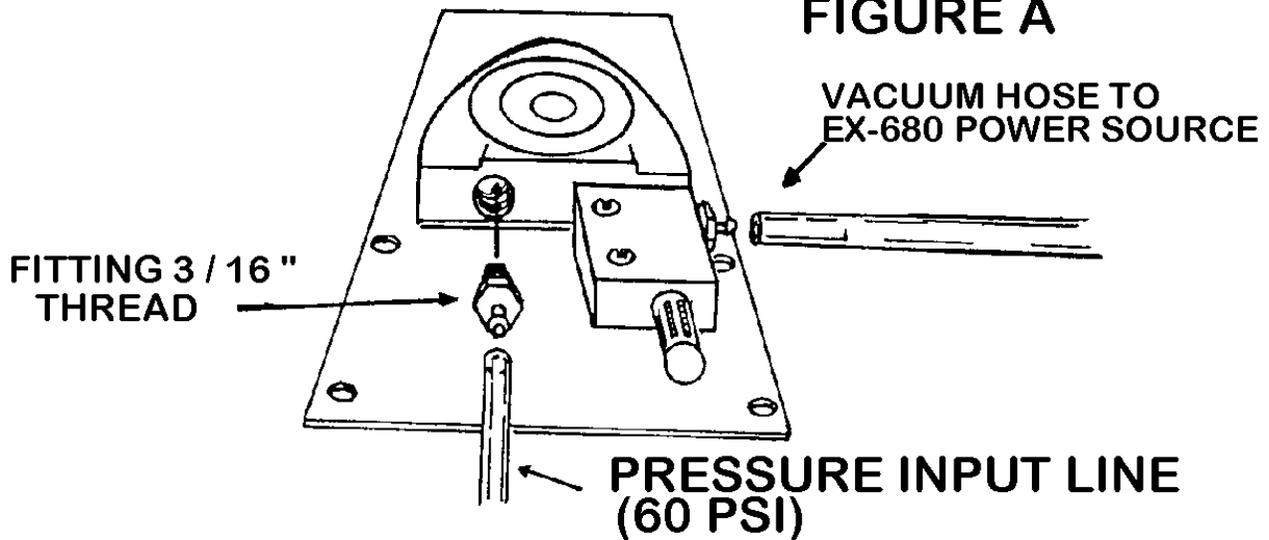
Vacuum Air Pressure in PSI	Vacuum Strength in Inches of Hg
60 (min)	18" to 20"
80	20" to 22"
110(max)	24" to 26"

To attach the factory air pressure line to the foot pedal assembly, first remove the transducer cover held in place with four screws secured to the base plate.

After the cover is removed, the air pressure input receptacle is exposed. A fitting with $\frac{3}{16}$ inch thread must be used to attach the factory air line, to the foot pedal assembly (see figure A).

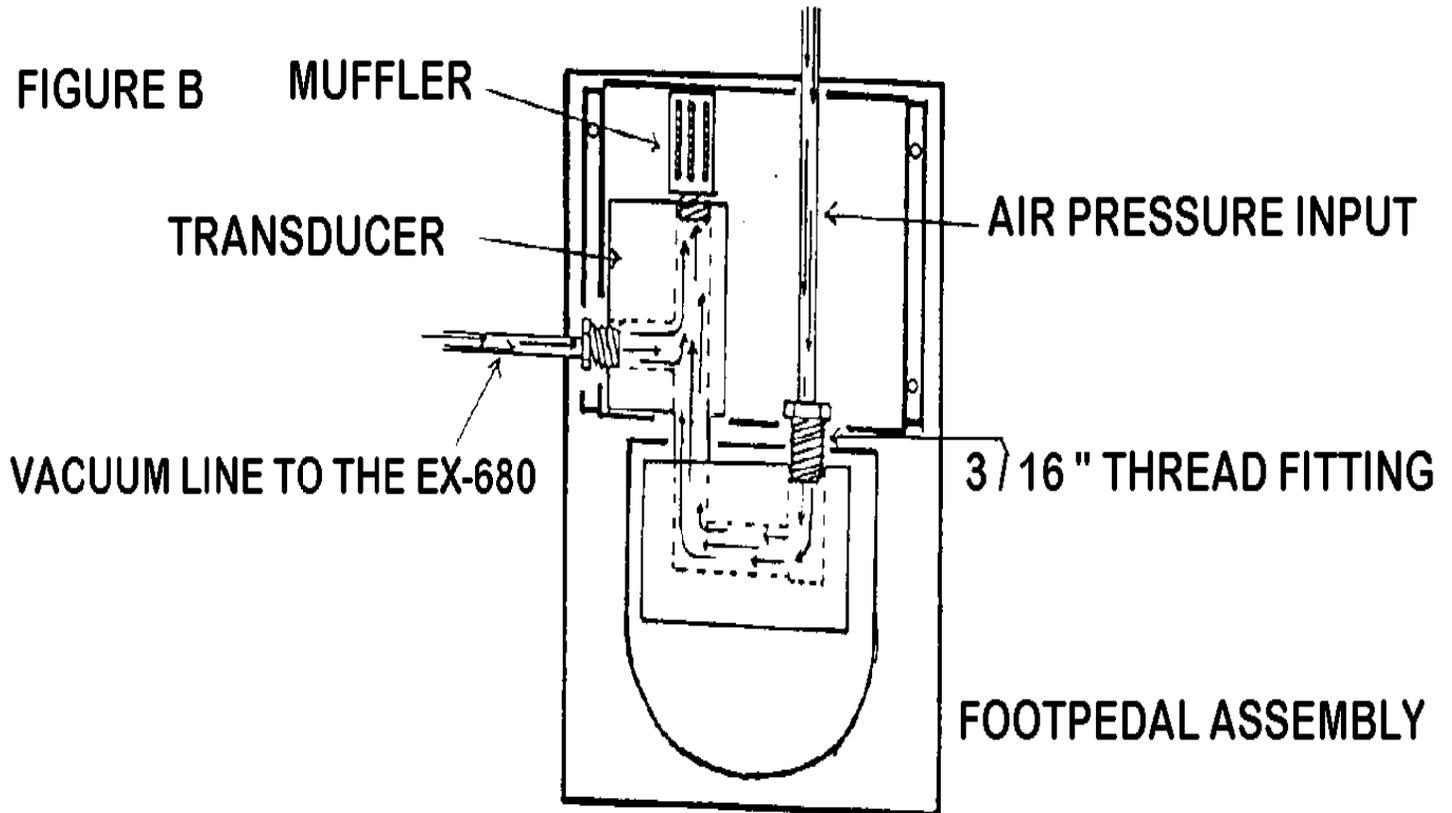
FOOTPEDAL ASSEMBLY

FIGURE A



Once the air line, has been attached, the transducer cover can be replaced and the vacuum hose of the desoldering handpiece can be fitted to the transducer assembly.

When the foot pedal is depressed, the air pressure will pass through the foot pedal and transducer, creating a vacuum from the venturi principal. The vacuum is the result of the large volume of air passing the vacuum hose opening at high speed (see figure B).



OPERATION

Controls

1. **Variable AC temperature control for desoldering handpiece.**

This control adjusts the temperature of the desoldering tip. Normal range for most work is in the 6 to 8 range (note: a rough approximation of tip temperatures is almost 1000°F per number. For example: a setting of 8 will be in the range of 700° to 800°F.) For best results, the solder joint should melt in under two seconds. The control should be set close to the highest setting possible to achieve the quickest solder joint melt. This way the heat does not have time to dissipate to the surrounding areas. Higher settings are required for large solder joints and multilayer boards. When not in constant use, note setting needed and reduce setting to idle at 4 or 5 to conserve energy and increase tip life.

2. **Variable AC temperature control for soldering iron, (EX-500/EX-501 only).**

Solder iron tip temperature is varied by this control. When not in constant use, reduce setting to conserve energy and tip life.

3. **Vacuum control**

The vacuum available at the desoldering tip is controlled by a flow valve on the vacuum hose fitting. Rotating the control clockwise reduces the vacuum. The majority of desoldering jobs require or could use the maximum vacuum. On printed circuit boards with multilayers ground planes, power planes, or where a large heat sink exists-vacuum level control is desirable. The vacuum should be reduced enough to keep the solder molten as it is being withdrawn from the solder joint. If the vacuum level is too high, the melted solder will “chill down” before it is out of the plated through hole due to massive heat absorption of the heat sink of the circuit board.

4. **Pressure control (EX-500/EX-501 only).**

Hot or cold air flow rate is varied by the flow valve on the pressure control. Rotating the control clockwise reduces the pressure (and flow rate). The hot air pressure mode is used by putting in a tip with a small diameter hole in the handpiece and setting the temperature control to a high setting.

Caution: Before using the pressure mode, be sure any solder or flux particles are cleared from the heater, so they will not be blown out when foot pedal is depressed. When pressure is initially used, point the desoldering tip away from personnel and the work piece to assure any remnant particles are harmlessly blown out.

The pressure mode has three principal uses:

a. **Removal of flat packs**

Where the components 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 desoldering tip directed on them from 1/4” away. When the solder is molten, the flat lead is tilted up with a tweezer or other tool. Each lead is removed in this manner without harm to component or board.

b. **Blind side solder joint removal**

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

In these cases, first- as much of the solder is removed 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 blind sided solder joint. After sufficient time is allowed to melt the solder, the blast of hot air is blown into the hole while stirring the lead vigorously to keep the joint free from forming a re-sweated solder joint until the joint is cooled down below the melting point of solder.

C. **Heat gun**

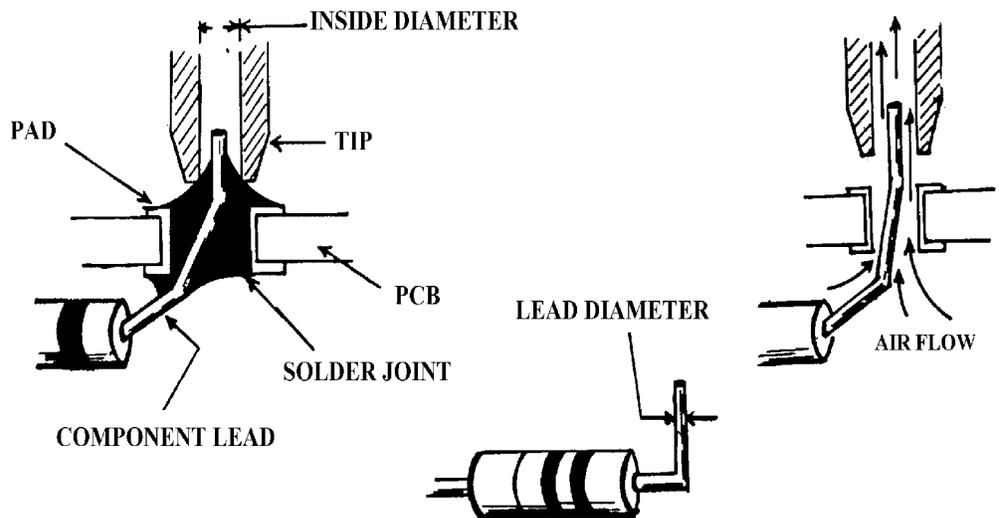
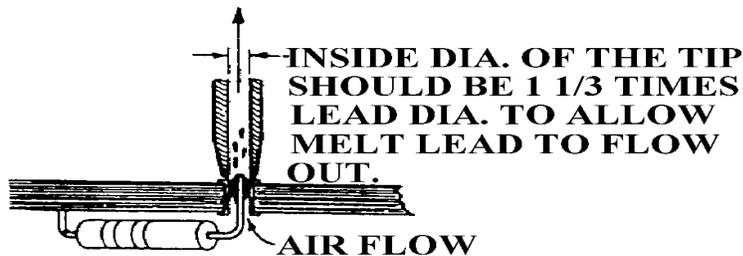
A fine stream of temperature controlled air can be used to direct hot air on a component under suspicion of failure or to heat shrink tubing in hard to reach locations.

The hot air can be used to soften conformal coating and facilitate removal from around components. For removal methods and specialized equipment for removal of all types of conformal coating, contact your distributor or the factory.

Desoldering Tip Selection

Proper selection of the tip is the 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 $1 \frac{1}{2}$ 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 quick as possible.



DESOLDER TIP SELECTION (CONTN'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 of 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:

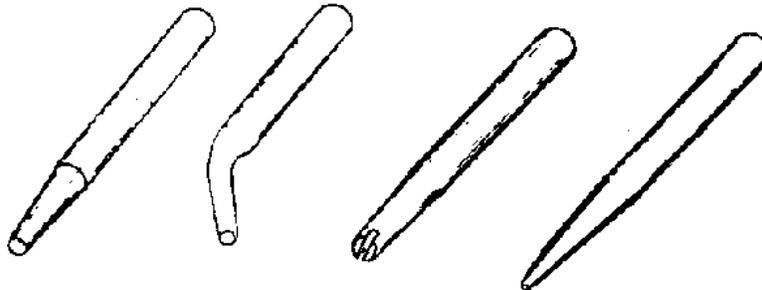
- a. Increased surface area exposed to oxidation.
- b. Cycling of temperature from hot to cold.
- c. Wearing out of inner surface from molten solder and flux passing through.
- d. Mechanical wear from bending leads and stirring action.
- e. High temperature causes oxidation.

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 extend life.**

When holding tip in place, the set screw should be tightened just to make contact with tip and then turned only 1/8 turn additional to avoid crushing tip wall and making tip removal difficult.

6. Tip- Tips should be positioned so they protrude about 1/2" (12.5 mm) from heater. Personal reference 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 used can give infinite variations.

7. Special Tips- Special tips are available from the distributors or factory. Tips can be bent, beveled, slotted and flattened to meet special requirements. Consult with distributor for special problems.



Solder Joint Removal

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

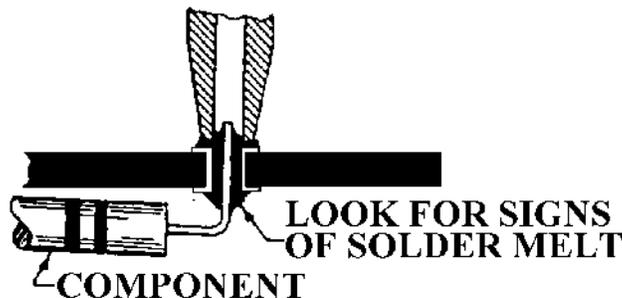
1. Through the tip the solder joint is heated to make the solder molten and then the vacuum is energized to remove the molten solder through the tip and heater and into the glass collection tube. A metal baffle is positioned in the glass to provide more surfaces for the molten solder to adhere to. The felt filter at the rear end of the glass tube will trap fine particles and vapors that are drawn in .
2. A seal on both ends of the glass tube serve to provide 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 joint. The tip must not be blocked or have “blow holes” in its sides.

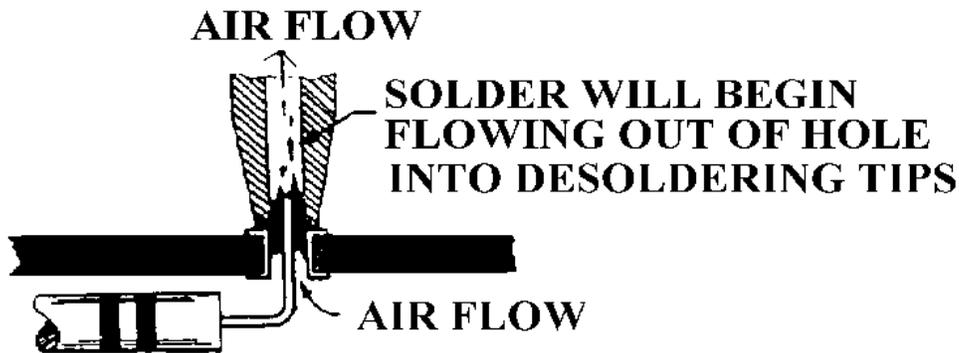
Plated Through and Reinforced Holes Joint Removal

These joints have solder in the plated through holes that must be completely removed before the component can be removed. Using the four basic steps, the joint can be removed. The first step to make the solder molten 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 solder joint

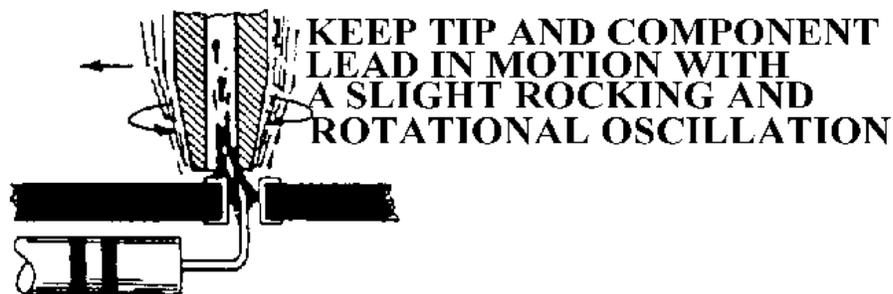
Lay the tip over the lead against the pad-lead junction. This will ensure there is adequate melting of the solder. The time needed should be only a few seconds. It is helpful to watch obverse side of PCB for full melt of solder.





b. **Start Vacuum**

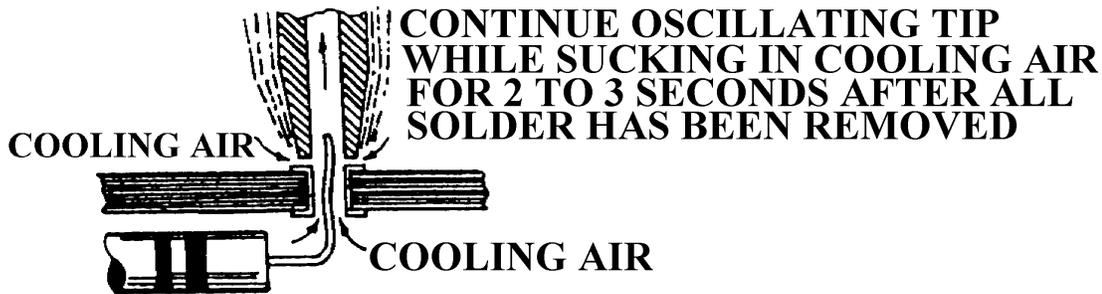
Step on the foot pedal to suck solder from joint while holding tip in a perpendicular position to board and letting tip gently lay on pad. This will seal the pad and tip and give maximum vacuum. **Do this for several seconds.**



c. **Oscillation**

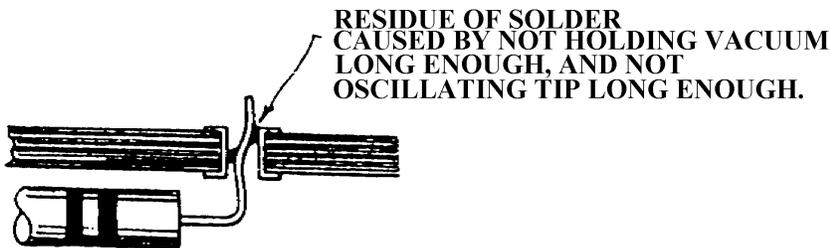
After stepping on the foot pedal to begin evacuating solder, almost instantaneously begin vigorous (but gentle) oscillation of the component lead. Usually the lead bends more easily in one direction than the other, such as IC's. This vigorous oscillating should be done only to the lead and the weight of the tip on the board **should have been** removed. Care should be taken not to scratch the pad with the tip. Keep 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.



D. Remove tip from lead

While still holding the foot on the pedal and sucking air into tip, lift the tip off the component lead and away from circuit board. Maintain the vacuum on for a count of three to ensure solder has had time to run into glass tube and will not stop and solidify in heater riser tube.



Single Sided Board Joint Removal

When removing the joint, those previous four 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. Their bonding strength recovers when the vacuum air cools down the joint.

Double Sided Board Joint Removal

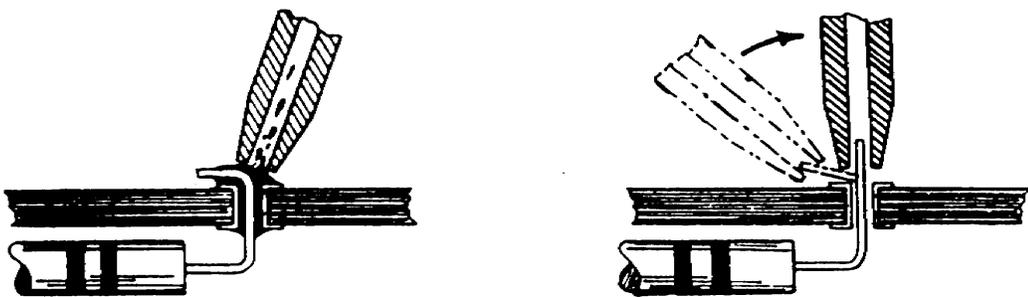
Since there is really two single sided solder joints at each location, these joints will be treated like the above joints except the component side joints should be removed first. On leads that go through pads with no circuitry attached be careful to oscillate the lead very gently or not at all to prevent 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 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 above.

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



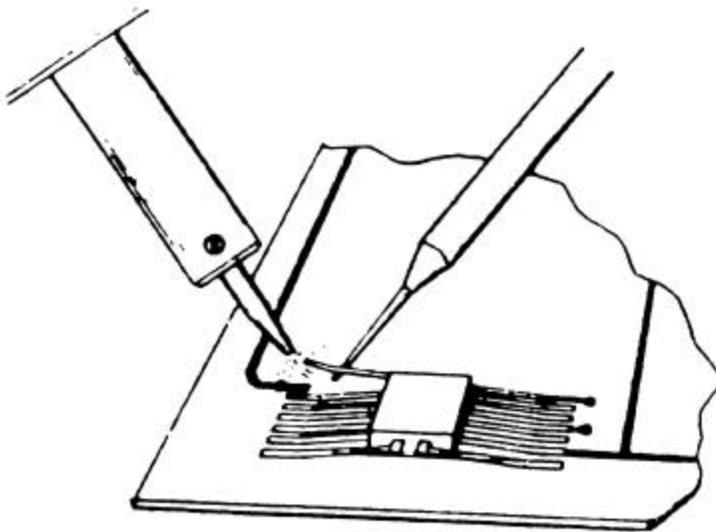
Blind Side Solder Joint Removal (EX 500/ EX-501 only)

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

In these cases, first- as much of the solder is removed 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 blind sided solder joint. After sufficient time is allowed to melt the solder, the blast of hot air is blown into the hole, while stirring the lead vigorously, to keep the joint free from forming a resweated joint until the joint is cooled down below the melting point of solder.

Removal of Flat Packs (EX 500/EX-501 only)

Where the component leads are mounted on a flat surface and do not protrude through the holes in the boards. These “lap joints” are heated by the hot air from the desoldering tip directed on them from 1/4” away. When the solder is molten, the flat lead is tilted up with a tweezer or other tool. Each lead is removed in this manner without harm to component or board.



Heat Gun (EX 500/EX-501 only)

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

TROUBLESHOOTING

POWER SUPPLY

TROUBLE	PROBABLE CAUSE	SOLUTION
Motor pump doesn't run Silent	No power to unit Fuse blown	Check plug & line Replace Fuse
Motor pump doesn't run humming	Pump binding	Check pump adjust
Motor pump runs but no vacuum at desolder tip	Hose not attached	Attach hose
	Flow control valve open	Set valve for max vacuum
	Tip hole too large in heater	Replace heater
	Seals on glass tube not sealed or worn	Examine seals put finger on glass end and test for vacuum
	Clog in tube of heater	Unclog heater
	Tip broken or clogged or has hole in side	Examine and replace tip
	Glass tube filter loaded	Change filter
	Pump line or fittings clogged	Run wire through line to dis lodge debris
	Pump inlet vacuum filter clogged	Replace filter

TROUBLESHOOTING

DESOLDERING HANDPIECE

TROUBLE	PROBABLE CAUSE	SOLUTION
Not Extracting Solder but has vacuum at the end of glass tube	Tip Clogged	Run wire up tip
	Tip has Blow Hole	Replace tip
	Tip is loose in the heater	Replace heater
Not Extracting Solder but has no vacuum at the end of the glass tube	Front seal is shrunk, worn or not sealed	Examine and replace front seal with new one
	Hose clogged or has a leak	Examine or replace hose
Desoldering action is erratic	Vacuum valve slide is open	Check valve for maximum vacuum
	Power cord on the handpiece is making poor contact or wire is frayed inside Temp control is Erratic	Replace power cord Try on other control and replace if control is defective

**EX-500 SERIES POWER SOURCE (After 2001)
SPARE PARTS LISTING**

Part No EX 500	Part No EX 501	Part No EX 525	Part No EX 550
110v- 0500-0002	110v- 0501-0002	110v- 0525-0002	110v- 0550-0002
220v- 0500-2002	220v- 0501-2002	220v- 0525-2002	220v- 0550-2002

ITEM NO.	DESCRIPTION	A.P.E. PART NO.
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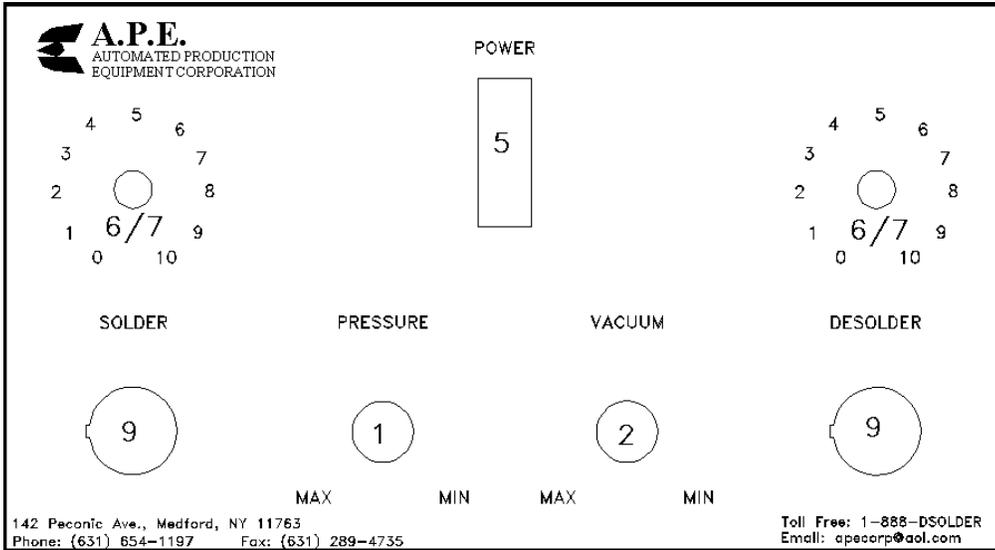
EX-500, EX-501, EX-525 & EX-550

- 1. Flow Control, Pressure 7001-8799
- 2. Flow Control, Vacuum 7001-8799
- 3. Fuse Holder 8000-0020
- 4. Fuse,5 Amp Slow 8000-0046
- 5. Lighted On/Off Switch 8000-0010
- 6. Temp. Control Board 8000-4440
- 7. Knob 3000-8004
- 8. Main Power Receptacle (rear) 8000-0090
- 9. AC Din Plug Receptacle 4000-8407
- 10. Dual Holder Assembly 3550-0602
- 10a. Single Holder Assembly 3550-0600
- 11. Tip Cleaning Unit Assembly 6730-3803
- 12. Sponge 6730-0118
- 13. Brush 6730-0116
- 14. Pump Overhaul; Kit 1525-0010
- 15. Pump, Vacuum (110V)(EX-501/525) 5000-0530
- 15a. Pump, Vacuum (110V)(EX-500) 5000-0531
- 16. Pump, Vacuum (220V)(EX-501/525) 5000-0630
- 16a. Pump, Vacuum (220V)(EX-500) 5000-0631
- 17. Ground Post 3006-0133
- 18. Electric Foot Pedal (EX-500/501/525) 5000-8404
- 18a. Air Foot Pedal (EX-550) 9000-0055
- 19. Transformer(EX-500/501) 4123-3846*
- 19a. Transformer(EX-525/550) 4123-7302*
- 20. Main Power Cord (110 Vac) 4000-8402*
- 21. Main Power Cord (220 Vac) 8000-0100*
- 22. Muffler(EX-550) 0550-5002*
- 23. Inlet Fitting (EX-550) 7000-8780*
- 24. Transducer (EX-550) 0550-5000*
- 25. Foot Pedal Receptacle (EX-500/501/525) 5000-8404
- 26. Iron Holder #####

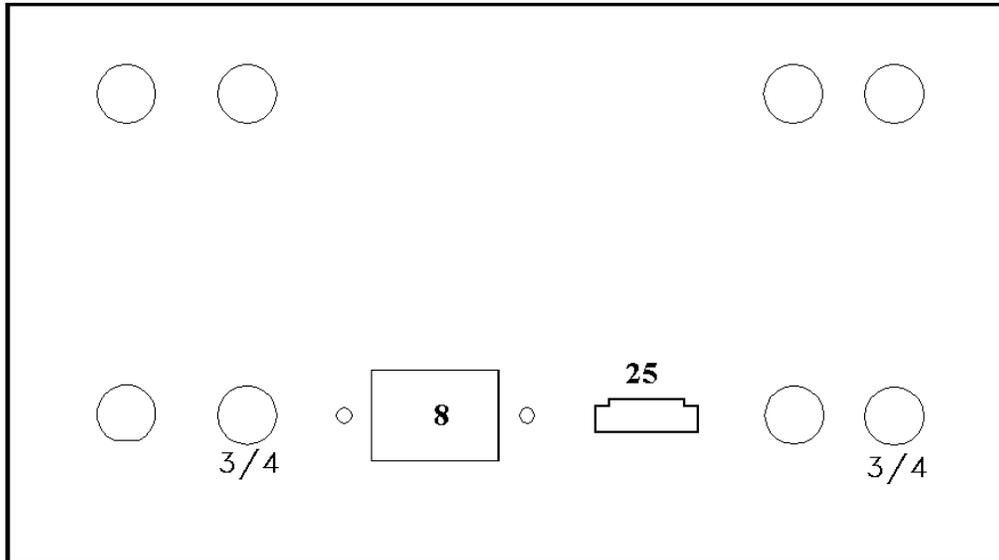
*Not Shown In Picture

Not sold separately

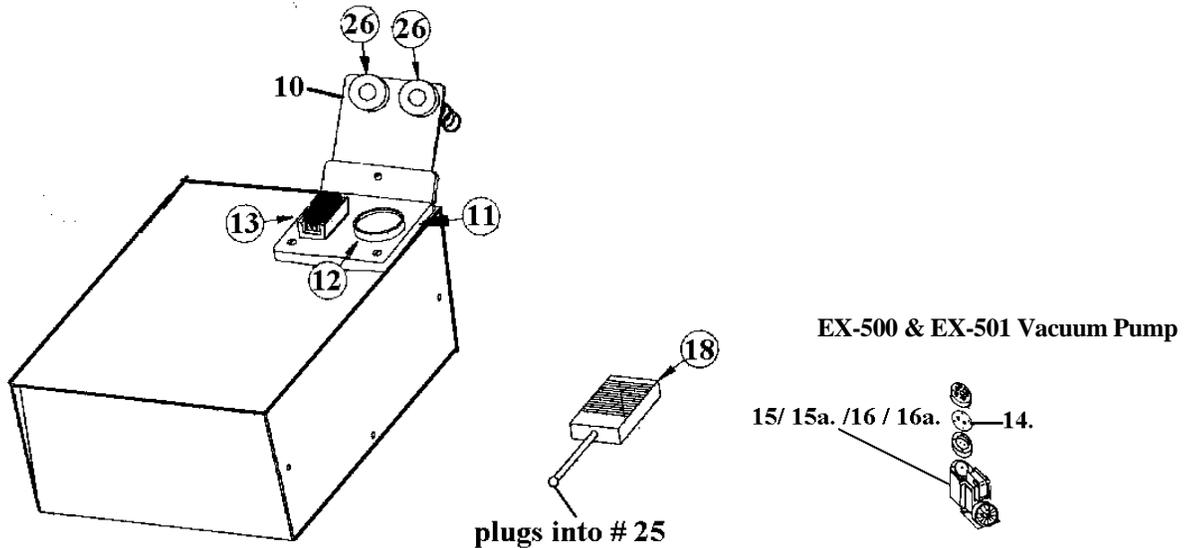
EX-500 & EX-501 Front Panel



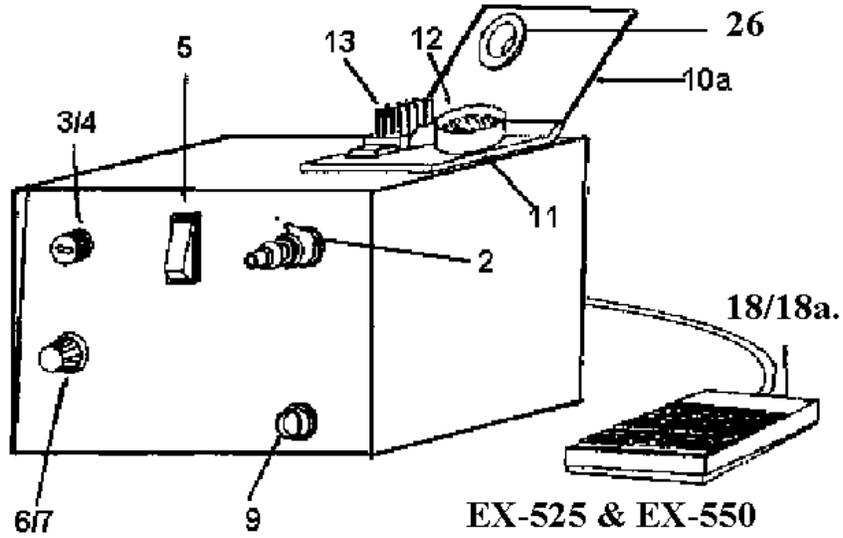
EX-500 & EX-501 Rear Panel



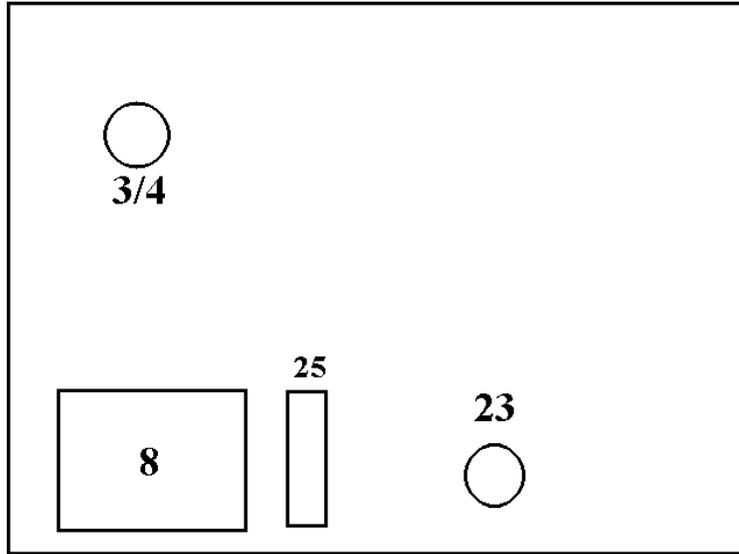
EX-500 & EX-501 Top View



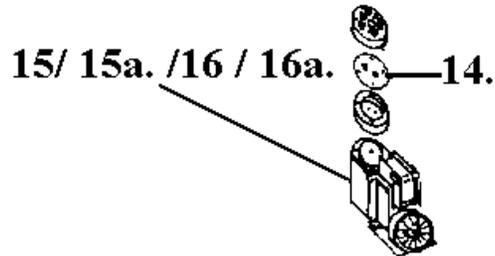
EX-525 & EX-550 Front and Top View



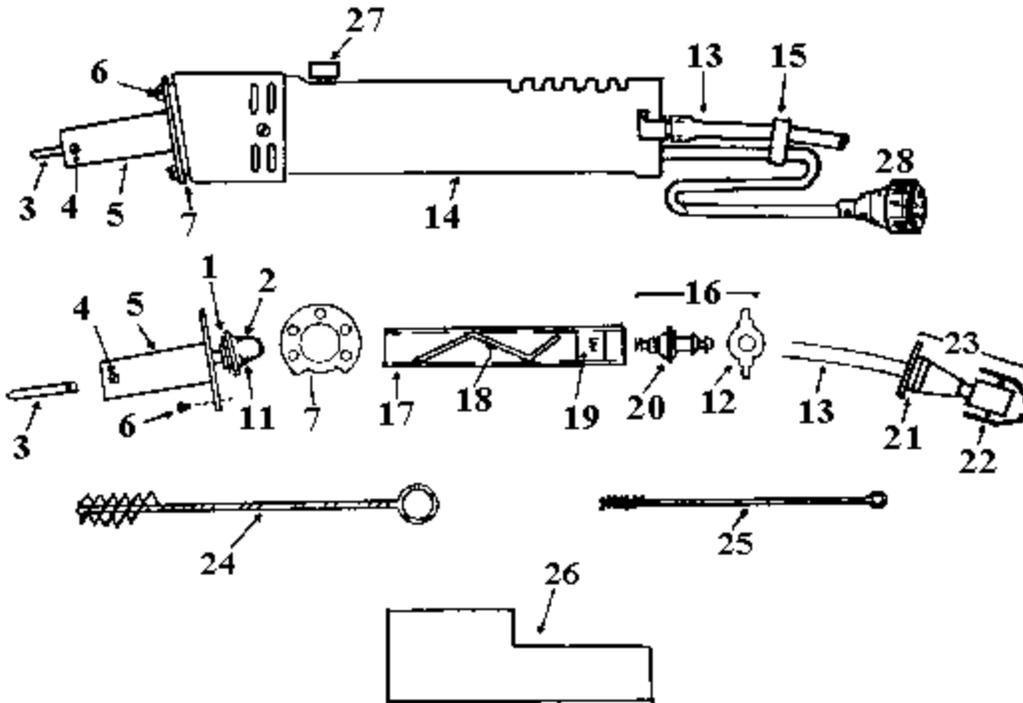
EX-525 & EX-550 Rear View



EX-525 Vacuum Pump

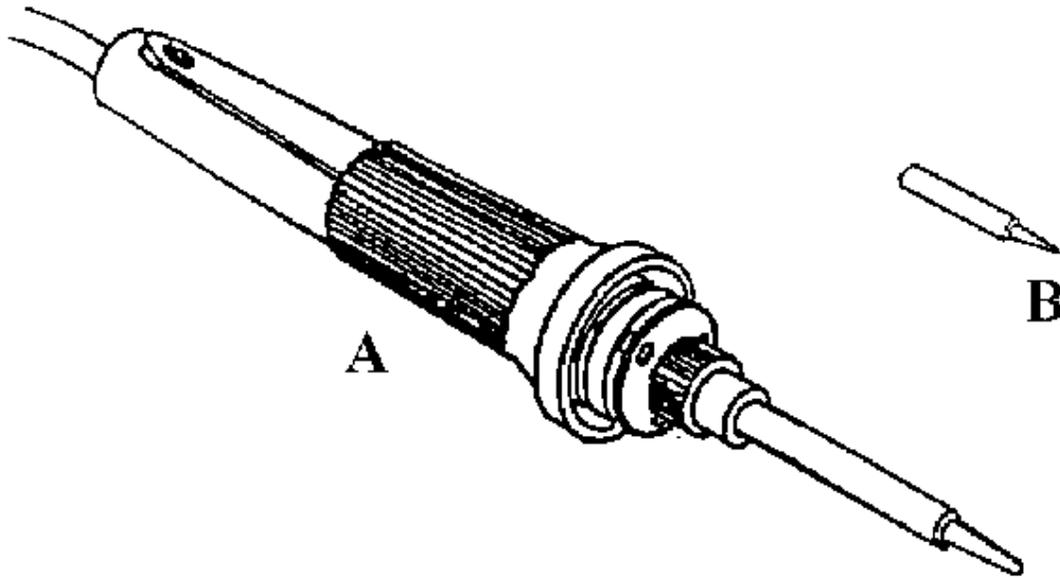


Replacement Parts
EX-1500 ANTI-STATIC DESOLDER HANDPIECE



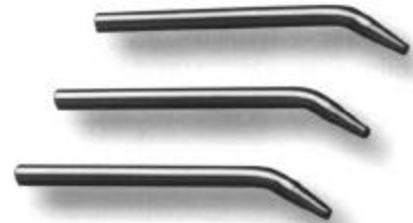
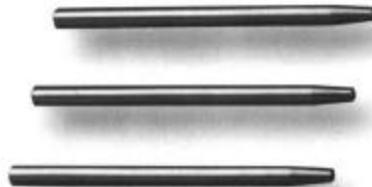
ITEM	DESCRIPTION	PART #	ITEM	DESCRIPTION	PART #
1.	Seal Support	6700-0028	17.	Glass Tube	6700-3200
2.	Forward Seal Assy.	6700-3700	18.	"S" Baffle	6700-4100
3.	Tip	See tip page	19.	Glass Tube Filter Felt	6700-0100
3A.	Tip Kit (not shown)	6700-4223	20.	Seal, Rear	6700-7200
4.	Set Screw	6700-7700	21.	Stop Clog Filter, Fixed	3000-5002
5.	24 Volt/35 Watt Heater	6700-0024	21A.	Stop Clog Filter, Replaceable	3000-5003
6.	Heater Retaining Screw	6700-7017	21B.	Replacement Elements, Stop Clog	3000-5001
7.	Heater Insulator	6700-3813	22.	Quick Disconnect	6700-8799
11.	Seal	6700-7201	23.	Stop Clog Filter Assy.	6700-5000
12.	End Retaining Clip	6700-7302	24.	Bristle Brush, Glass Tube	6700-0010
13.	Tube Assy. (6 Feet)	7000-8790	25.	Wire Brush, Heater Assy.	6700-0112
14.	Handpiece Replacement Assy.	6700-0287	26.	Handpiece Insulator	6700-0286
15.	Hose Clamps, Round	6700-2002-05	27.	Finger Actuation Switch	6700-0150
16.	End Cap Assy.	6700-7300	28.	5-Wire(Din)Power Cord 24V	4000-8415
			29.	Spare Parts Kit (24V)	6700-8724

REPLACEMENT PARTS
(EX-500 & EX-501 only)
 Deluxe Solder Iron
 Part Number 6910-0005



Item Number	Description	A.P.E.	Part
A	Deluxe Solder Iron Non-Sensor w/ tip		6910-0005
B	Tips		
	1/8" chisel tip		1212-0125
	1/16" chisel tip		1212-0016
	1/32" pointed tip		1212-0001

Tips Desoldering



Tips Desoldering

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

<u>I.D.</u>	<u>Part No.</u>
.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)

<u>I.D.</u>	<u>Part No.</u>
.060	1212-2060
.040	1212-2040
.025	1212-2025

Curved Tips

(30° bend)

<u>I.D.</u>	<u>Part No.</u>
.025	1212-2125
.040	1212-2140
.060	1212-2160

DESOLDERING TIPS

DESIGNED FOR MAXIMUM HEAT CONDUCTIVITY AND OPTIMUM OPERATING LIFE.

DESOLDER TIP SELECTION

INSIDE DIAMETER

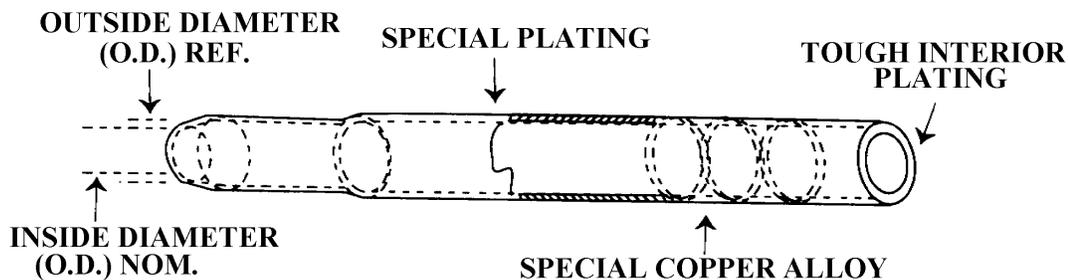
The tip should be large enough to fit over the lead to be desoldered. A slight clearance is necessary to allow the solder to flow through the tip. Although several tip diameters will work ideally a tip diameter $1 \frac{1}{3}$ the lead diameter is best.

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.

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-resistive- inner-lining for longer life and instant heat recovery

DESOLDER CROSS SECTION



MEASUREMENT OF REPLACEMENT

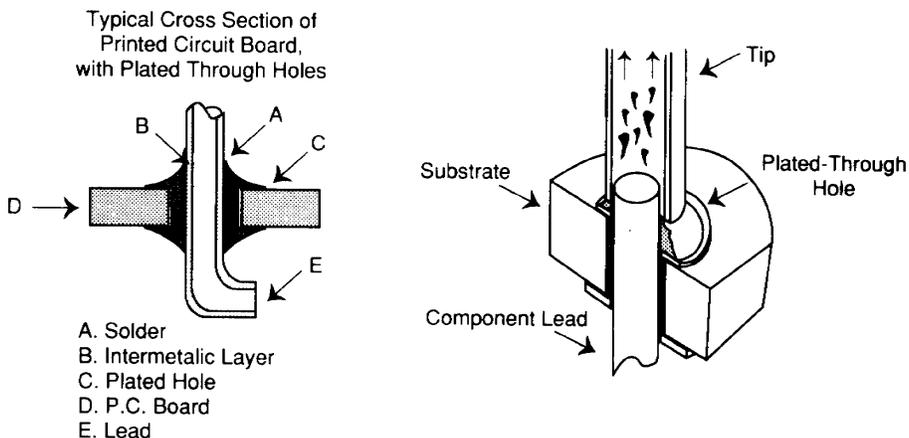


FIGURE ONE
Descriptions

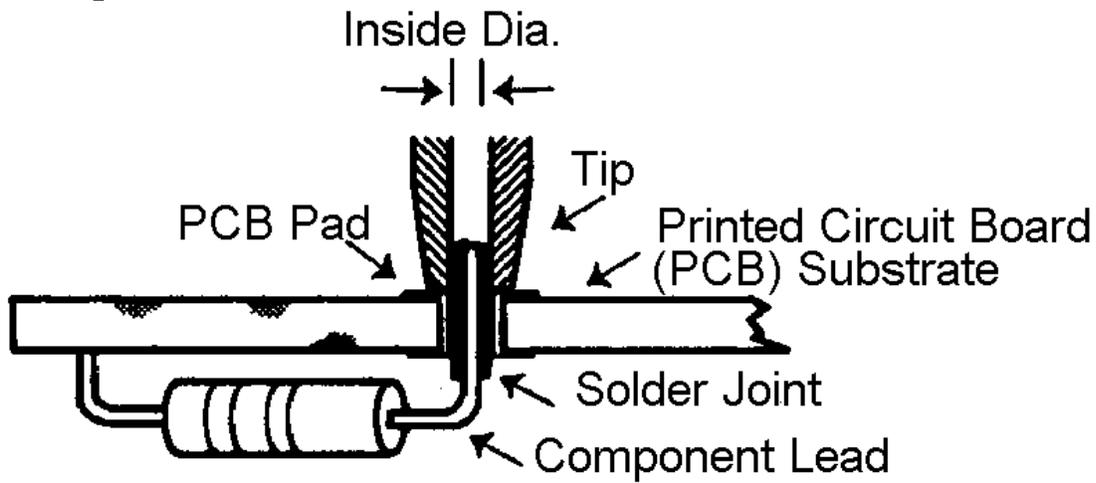
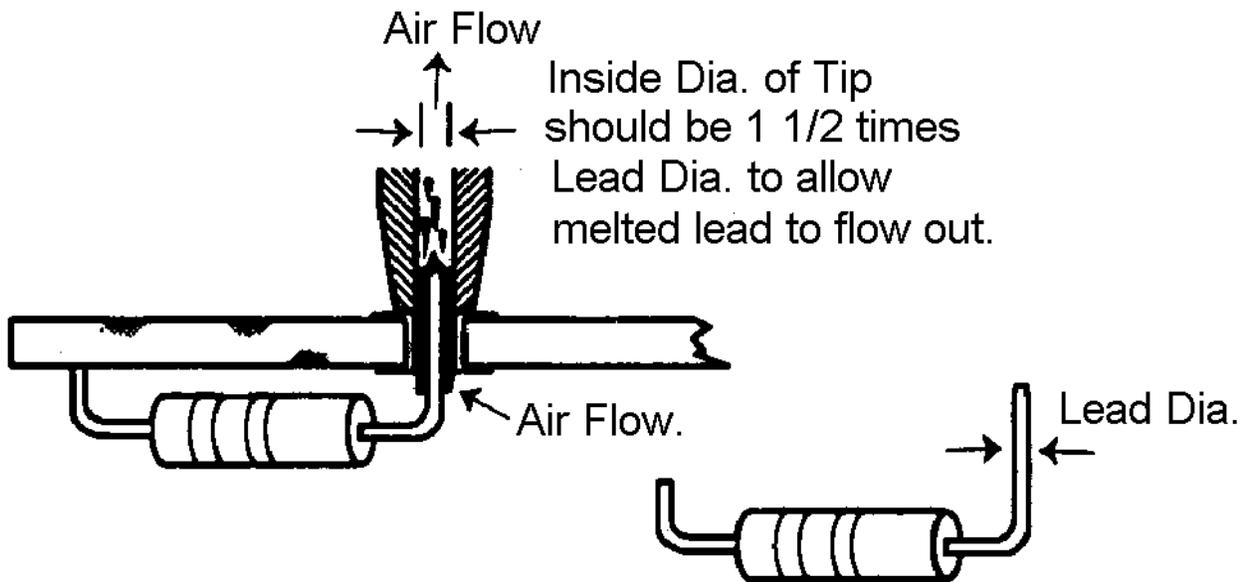


FIGURE TWO
COMPONENT REMOVAL



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