

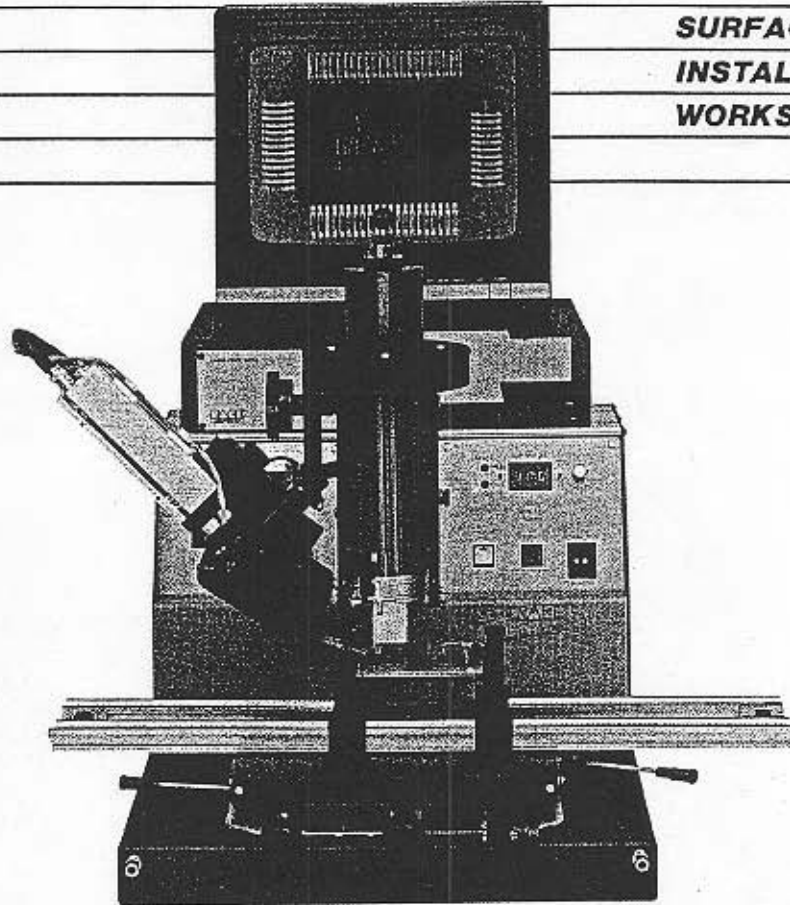
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**PAGE**<sup>®</sup>  
**INCORPORATED**

**CRAFT<sup>®</sup> 15/15E**

**SURFACE MOUNT  
INSTALLATION/REPAIR  
WORKSTATION**



**OPERATION &  
MAINTENANCE  
MANUAL**

**MANUAL NO. 5050-0230**

**REV. B**

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## SPECIFICATIONS

### POWER REQUIREMENTS:

CRAFT 15 (DOMESTIC VERSION)—115 VAC, 60 HZ, 12.8 AMPS, 1500 WATTS  
CRAFT 15E (EXPORT VERSION)—230 VAC, 50 HZ, 6.5 AMPS, 1500 WATTS

### PHYSICAL PARAMETERS:

23" H × 17" W × 22" D  
(58 cm. H × 43 cm. W × 56 cm. D)  
WEIGHT—49 lbs. (22.2 kg.)

### CIRCUIT BOARD CAPACITY:

STANDARD: 18" W × 18" L (46 cm. W × 46 cm. L)  
WITH EXTENDED RAIL OPTION: 24" × 18" (61 cm. W × 46 cm. L)

### COMPONENT CAPACITY:

1.5" × 1.5" maximum  
(3.8 cm. × 3.8 cm.)

## PRODUCT APPLICATION

The following sections of this manual will familiarize you with the parts and operation of the unit. This product is very versatile however, and may be used to satisfy a variety of application requirements. If you require assistance in the use of this product in your particular application, contact your local authorized PACE® dealer or call PACE Applications Engineering at (301) 490-9860.

## **NOZZLES**

**STANDARD NOZZLES**—A selection of standard nozzles are available for use on the CRAFT 15 system and may be ordered using the Standard Nozzle Replacement Parts List shown on pages 41 thru 43 of this manual.

**CUSTOM NOZZLES**—PACE can prepare special nozzle configurations to address any specific requirements not satisfied through the use of standard nozzles. Contact PACE directly at (301) 490-9860 (FAX # 301 498-3252) for assistance.

## **PCB CAPACITY ENHANCEMENT**

1. **EXTENDED RAIL KIT (P/N 6993-0126)**—The CRAFT 15 is equipped to allow for rework of PCB assemblies with physical dimensions of up to 12 inches by 18 inches (30.5 cm × 46 cm). Extra length rails may be ordered as options to allow for rework of PCB assemblies as large as 18 inches by 18 inches (46 cm × 46 cm).
2. **PCB TEMPLATE KIT (P/N 6018-0064)**—Allows the user to support large PCB assemblies on the CRAFT 15 unit. Kit contains two board edge support rails with PCB tooling hole mounting capability and an adjustable center support.

## **SERVICE/MAINTENANCE**

**Service/Maintenance Manual**—(P/N 5050-0261) Will assist the technician in performing preventive maintenance, corrective maintenance and temperature calibration on the CRAFT 15 system.

## **VIDEO**

PACE offers the following video mounting mechanisms as interfaces for attaching a video camera and monitor to the CRAFT 15 system.

1. **VIDEO MOUNT (P/N 6018-0072)**—Used to mount a video camera to the Reflow Station (at a 45° angle to the workpiece) for observation of the placement and reflow processes.
2. **MONITOR MOUNT (P/N 6018-0044)**—A universal type metal bracket which permits the selected video monitor to be directly mounted onto the top center of the CRAFT 15 chassis.

## VIDEO CAMERA REQUIREMENTS

The following guidelines must be followed if the user of a CRAFT 15 system wishes to purchase a video camera system other than those recommended by PACE. Use Figure 1 as a guide for each of the parameters.

1. The lens mount of the Video Camera body must be centered 1.08 inches (2.74 cm.) from the camera mounting point.
2. The width of the Video Camera body must not exceed 2.75 inches (6.99 cm.).
3. The length from the end of the lens to the center of the camera mounting point shall not exceed 5.27 inches (13.39 cm.).
4. The camera mounting point shall have a 1/4-20 tapped hole.
5. The total combined weight of the camera and all attachments (including lights) must not exceed 4 lbs. (1.81 kg.).

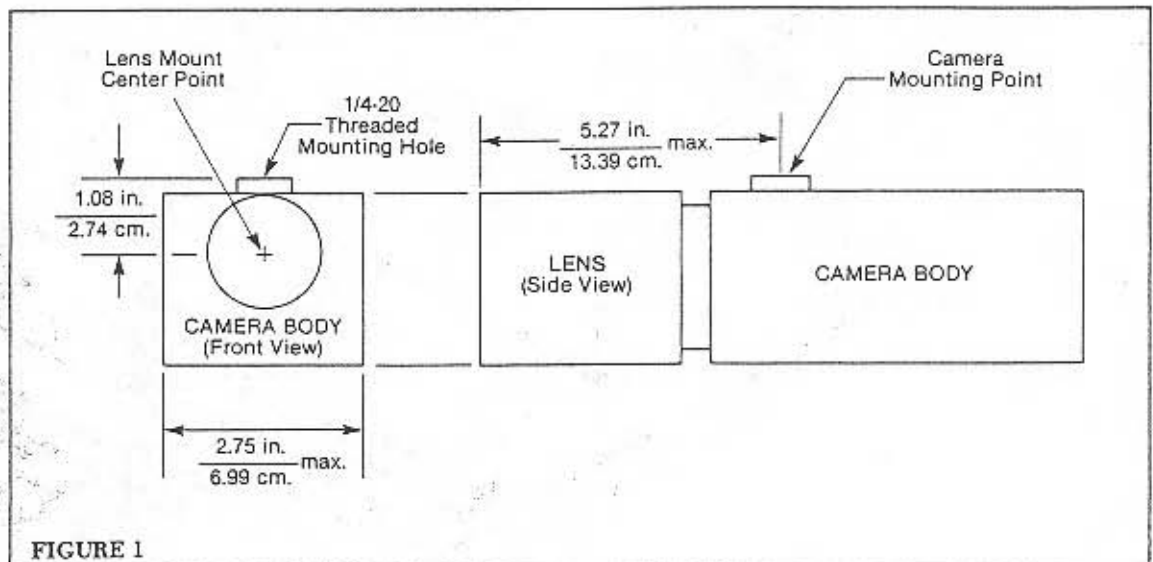


FIGURE 1

## CONTROL PANEL

1. MAIN POWER SWITCH—Provides input power to unit.
2. GAS/AIR PRESSURE GAUGE—Indicates air pressure level from compressed air or gas supply.
3. GAS/AIR PRESSURE CONTROL—Allows regulation of compressed air or gas pressure flow.
4. GAS/AIR BLOWER SWITCH—Allows selection of compressed air or internal blower supply to heater.
5. BLOWER SPEED CONTROL—Allows control of blower speed to regulate air flow to heater in blower mode.
6. READY LIGHT—Turns on when Heater achieves operating temperature and is ready for operation.
7. CYCLE LIGHT—Turns on when heater is in reflow cycle.
8. TEMPERATURE DISPLAY—Three segment display for heated air temperature readout. Temperature shown is air temperature at top of nozzle.
9. READ/SET SWITCH—Allows temperature display to show set temperature level in set mode or actual temperature in read mode.
10. °F/°C SWITCH—Provides either °F or °C readout on temperature display.
11. SET CONTROL—Allows user to set operating temperature of heater.
12. VACUUM PICK SWITCH—Push-push switch controls vacuum supply to pickup assembly.
13. CYCLE SWITCH—Push switch starts air flow through heater initiating reflow cycle. Deactivates air flow when pushed during a reflow cycle.
14. CYCLE TIMER—Manually resettable timer, controls duration of heat.

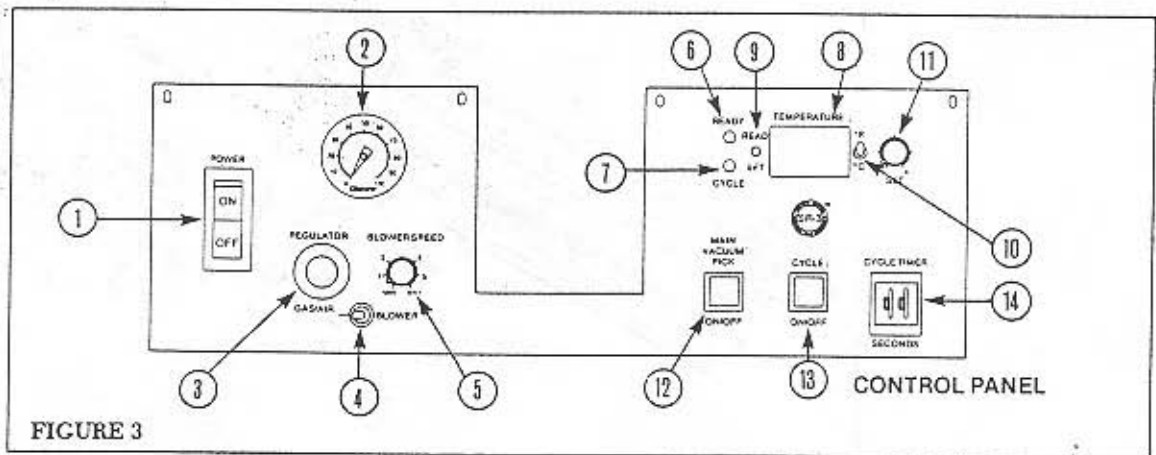


FIGURE 3

## REFLOW STATION

Station used for all repair functions including component removal, placement and reflow of all components.

21. HEATER ASSEMBLY—Supplies heated air or gas (directed through air nozzle) to simultaneously reflow all solder joints.
22. VACUUM PICKUP ASSEMBLY—Provides a means to lift or place components from or onto PCB.
23. NOZZLE ASSEMBLY—Directs heated air or inert gas from the heater assembly to the solder joint areas for either soldering or desoldering of components.
24. VACUUM PICKUP CUP—Provides positive holding of components for positioning during the replacement process and for lifting of the component during the removal process.
25. VACUUM PICK LOCKING LEVER—Locks the heater assembly and vacuum pickup assembly together for simultaneous movement and unlocks to allow independent movement.
26. Z-AXIS CONTROL—Controls z movement (2 inch max.) of heater and vacuum pickup assemblies.
27. NOZZLE CLEARANCE LIMITER—Limits downward movement of heater assy. Prevents nozzle from contacting PCB.
28. OPTICS ROTATION BEARING—Allows attached optic assemblies to be rotated in a 180° arc around the heater assembly for viewing of placement and reflow processes. Features position stops at 0° and ± 90°.
29. LIGHTING OUTPUT RECEPTACLE—Connects power from the CRAFT 15 system to the optional Dual Halogen Lighting system.
30. NOZZLE RETENTION LEVER—Provides lock, release and Theta-Shear for Nozzle assembly.

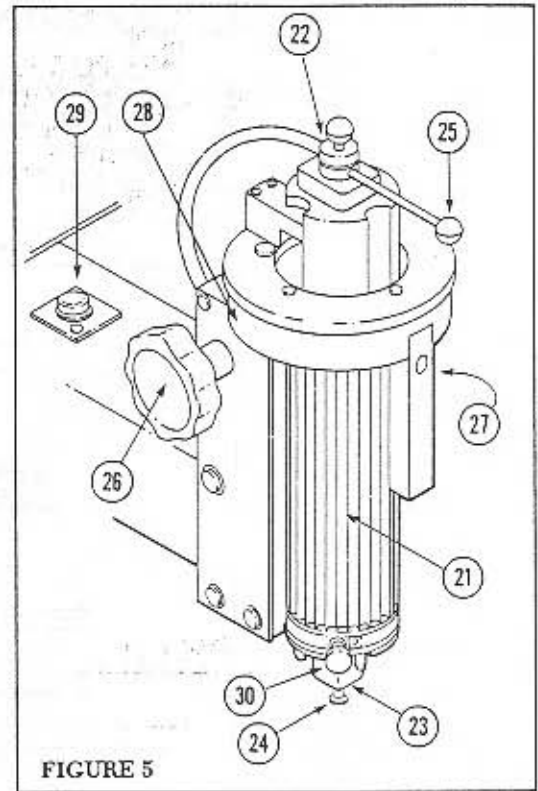


FIGURE 5



**BASE UNIT**

Perform the following procedure step by step, in order, to obtain proper results. Use figure 2, page 10 as a guide.

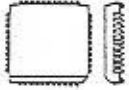

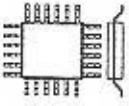
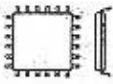
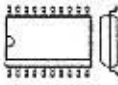
1. Remove the CRAFT 15 system from its shipping container(s), including all options such as lights and video monitor). **NOTE: DO NOT USE THE MOUNTING ARM TO LIFT UNIT OUT OF SHIPPING CONTAINER.**
2. Set the CRAFT 15 unit onto a level work surface. Insure that power switch is in the "off" position.
3. Install all purchased options (i.e. video camera and lights) at this time. Refer to "TABLE OF CONTENTS" for location of applicable instructions.
4. Check the Work Platform for freedom of movement. Check the Heater Assembly for freedom of travel. Check the Lock mechanism and Vacuum Pickup assembly.
5. If the CRAFT 15 system is to be used with compressed air or gas, connect the supply line to the back of the unit. **NOTE: INPUT AIR/GAS PRESSURE MUST BE REGULATED AT 60-90 P.S.I.**
6. Place the Read/Set switch in the set position and turn the Heater Temperature Control fully counterclockwise.
7. Plug power cable into AC supply.
8. Turn power switch on and test system see "OPERATION", page 20.

# CRAFT 15 PROCESS DEVELOPMENT

## PROCESS DEVELOPMENT CHART

CRAFT<sup>®</sup> by PACE

For Craft<sup>®</sup> Reflow Work Stations

COMPONENT					SUBSTRATE					REFLOW TIME (SEC.)	
					EPOXY GLASS (FR-4)		FLEX	CERAMIC	POLYIMIDE		PCB MATERIAL
					1-3 Layer	4+ Layer					
COMPONENT OUTLINE	COMPONENT TYPE	OVERALL SIZE	AIR PRESSURE	BLOWER SPEED	NONE	85*	NONE	120*	120*	PREHEAT AT TEMP (*C)	
					370*	370*	370*	430*	370*	REFLOW TEMP (*C)	
	P,OC (J Lead)	Less Than .5 x .5 inch (12 x 12mm)	35	Max.	18	10	14	12	10		
		Over .5 x .5 inch (12 x 12mm)	50	Max.	28	12	20	16	12		
	LCC (Leadless)	Less Than .5 x .5 inch (12 x 12mm)	35	Max.	20	14	16	20	12		
		Over .5 x .5 inch (12 x 12mm)	50	Max.	35	24	26	30	18		
	FLAT PACK	Less Than .4 x .4 inch (10 x 10mm)	20	3	14	12	12	10	10		
		Over .4 x .4 inch (10 x 10mm)	30	3	30	25	28	35	18		
	QUAD PACK	Less Than .5 x .5 inch (12 x 12mm)	20	2	12	10	12	10	8		
		Over .5 x .5 inch (12 x 12mm)	30	2	20	18	18	26	14		
	SOIC	.150 inch (3.8mm) Body	20	3	16	12	12	14	10		
		.50 L (Large Outline)	25	3	12	10	10	10	8		

Use this chart to determine a base starting point for development of your surface mount rework process. Select the Component Outline and Substrate which best matches your application. Enter the indicated settings onto a CRAFT<sup>®</sup> Process Work Sheet.

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FIGURE 7

# CRAFT 15 PROCESS DEVELOPMENT

## PROCESS CONTROL CHART

CRAFT<sup>®</sup> by PACE

SUBSTRATE		COMPONENT		HEATING				AIR FLOW		SPECIAL PROCEDURES
Designation	Material	Designation	Type	Preheat Temp °C	Preheat Time (min)	Reflow Temp °C	Reflow Time	Air Pressure	Blower Speed	
<b>PROCESS MATERIALS</b>		FLUX: Name _____ Type _____		Solder (or Paste) _____ Bonding Material _____		Other: _____ _____				

FIGURE 9

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## NOZZLE SELECTION

Selection of the proper nozzle assembly is essential to the performance of a quality repair. Each nozzle assembly is designed to insure that heated air or gas is focused directly onto the PCB land area. Listed on pages 41-43 are commonly used nozzles and the components for which they are normally used. Select the nozzle (part number stamped on the nozzle flange) configured for the component to be replaced. Contact your local PACE authorized dealer or call PACE Applications Engineering at (301) 490-9860 for assistance.

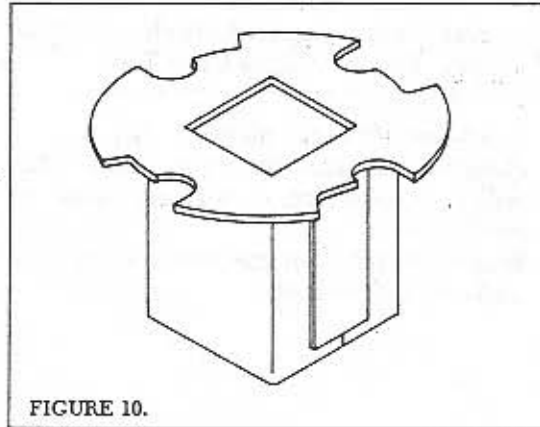


FIGURE 10.

## VACUUM CUP SELECTION

Selection of the proper size vacuum cup is important for achieving an adequate holding force for each component. The cup selected should be as large as can be used without exceeding the body size of the component. Vacuum cups are consummable items which deteriorate over a period of time and are available in four sizes which can be ordered using the part numbers listed on page 37.

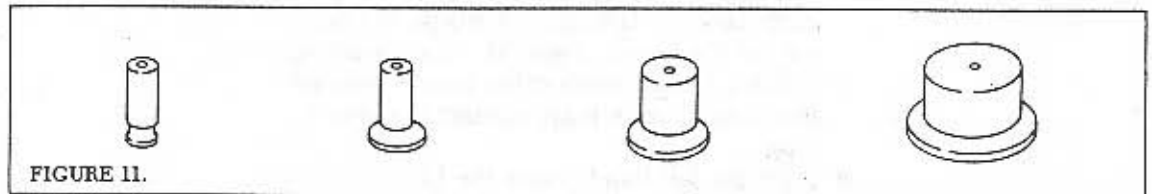


FIGURE 11.

## COMPONENT REMOVAL

1. Insert proper Nozzle Assembly and Vacuum Cup onto the reflow station.
2. Set controls listed below to optimize performance. If a written process has been developed, set controls as specified. If a process has not been developed, refer to PACE "Process Development" page 16.
  - a) air pressure (or blower speed)
  - b) temperature ( $^{\circ}\text{C}$  or  $^{\circ}\text{F}$ )
  - c) cycle time
3. Raise Heater assembly to the topmost position.
4. Place PCB assembly onto Work Platform.
5. Apply flux (i.e. RMA flux) to the solder joints of the component to be removed.
6. With the two coarse adjustment locks in the unlocked position, adjust Work Platform to align component beneath Nozzle. Lock Work Platform into place.

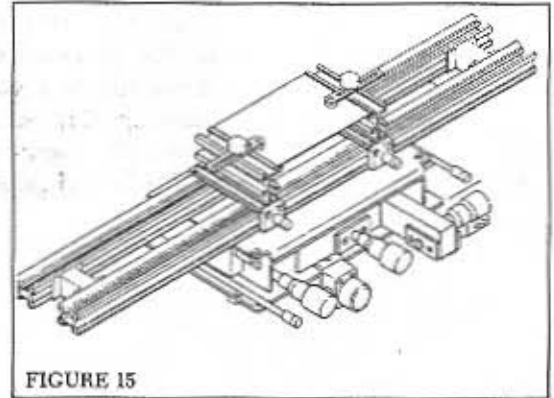


FIGURE 15

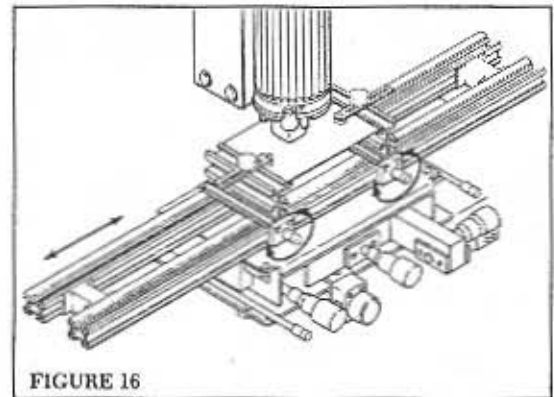


FIGURE 16

## COMPONENT REMOVAL (Cont'd)

10. Move the Vacuum Pickup Locking Lever to the unlocked position and lower the Heater Assembly (with Nozzle) over the component.

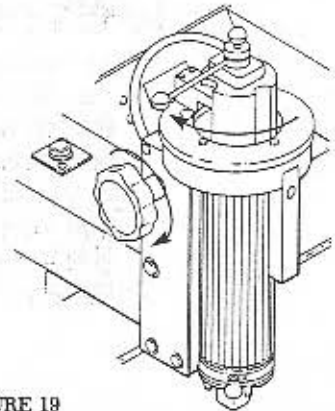


FIGURE 19

11. Readjust Work Platform using fine adjustment controls if Nozzle Assembly does not fit over the component. The component should be centered squarely in the Nozzle to insure uniform heating of the PCB land pattern during the reflow process.

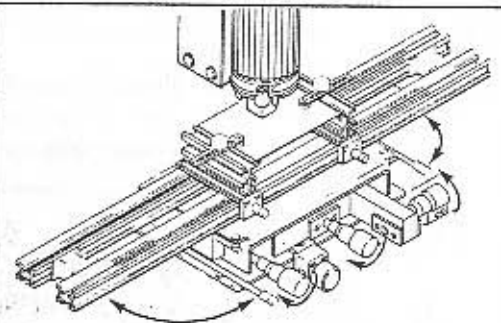


FIGURE 20

12. Adjust Nozzle Clearance Limiter if necessary, to provide repeatable Nozzle-to-PCB clearance. A clearance of .030-.050" is recommended.
13. Activate Main Vacuum Pickup Switch.
14. Push the Cycle Switch to start the heat cycle.
15. Move the Vacuum Pickup Locking Lever to the locked position.

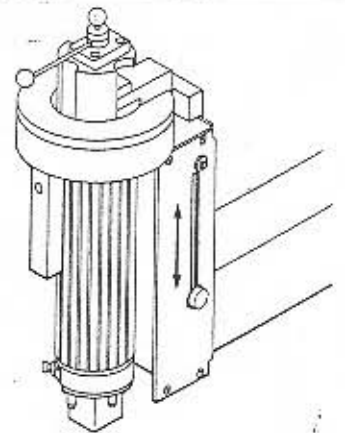


FIGURE 21

**BOARD/COMPONENT PREPARATION**

Proper preparation is the key to successful soldering. To obtain good solder joints, use the following.

1. All component leads should be freshly tinned to insure solderability.
2. Leadless ceramic chip carriers with gold plating should be pretinned. For quality work, check for correct solder deposition. The tinning process should not fill the castellations with solder.
3. Remove all flux applied during the component removal process.
4. Clean all component leads prior to soldering.
5. Remove all existing "old" solder from the PCB land pattern.
6. Do not touch component leads or PCB lands with bare fingers after cleaning.
7. Prepare the affected land pattern as per your specifications. For recommendations regarding processes which are best for your particular application, contact your local PACE dealer. The most widely used methods are as follows:
  - a) Pretinning—The PCB lands are pretinned using a soldering iron; taking precautions to insure that all lands are tinned with an equal deposition of solder. All lands must also be uniform in appearance.
  - b) Solder Paste—Apply an equal amount of paste to each land using a solder paste dispenser to control deposition. Take care to insure that the proper amount is dispensed. If too much paste is applied, bridging of lands will occur, whereas if a sufficient amount is not applied, solder joint formation will be unacceptable. The PCB assembly should also be preheated (in accordance with user's in-house requirements) after solder paste deposition to remove any solvents present in the paste. The PACE HotSpot (HS-150/150E) unit is highly recommended for this preheating application.
  - c) Solder Preforms—Any preforms must be designed specifically for each component used to insure proper solder deposition.

## COMPONENT REPLACEMENT

1. Move the Vacuum Pickup Locking Lever to the locked position and raise the Heater Assembly to its topmost position.
2. Move the Vacuum Pickup Locking Lever to the unlocked position and lower the Heater Assembly to a point at which the Nozzle Assembly extends below the Vacuum Cup.
3. Activate the Main Vacuum Pick Switch.
4. With the right hand and using the Nozzle Chip Tool, insert the replacement component (properly oriented) into the Nozzle. The Vacuum Cup will now hold the component in position. **NOTE:** You may find it necessary to raise the Heater Assembly slightly using the left hand, in order to place the component onto the Vacuum Cup.

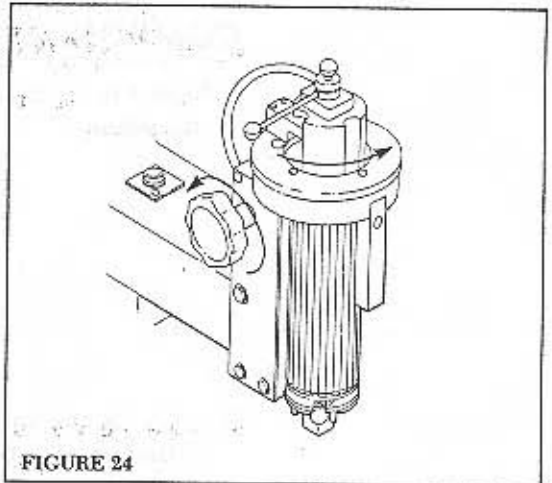


FIGURE 24

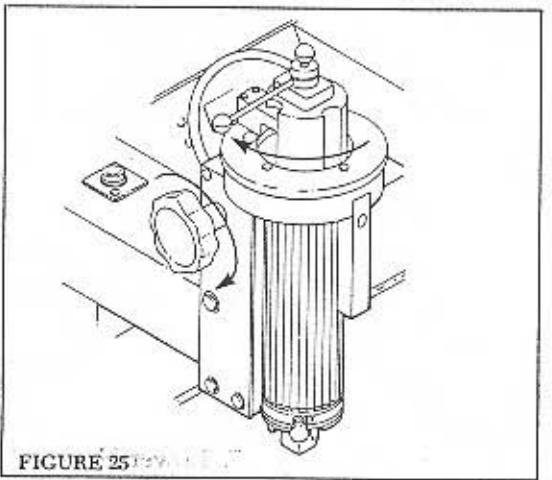


FIGURE 25

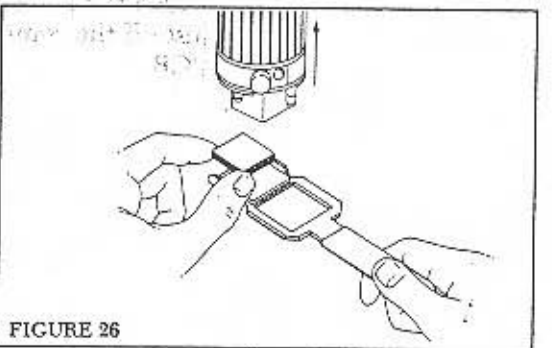


FIGURE 26



## COMPONENT REPLACEMENT (Cont'd)

- Adjust the fine controls on the Work Platform until the component leads (or pads) line up directly over the component land area on the PCB. Use of a video camera and monitor to view this is suggested. A camera mounted at a 45 degree angle to the PCB and swung in an arc of 180 degrees around the front of the component allows the operator to see three sides of the component to PCB alignment.

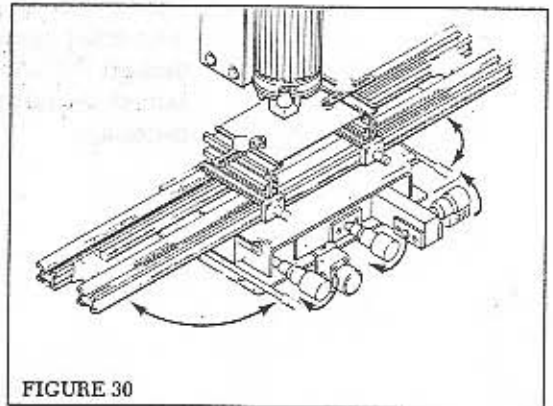


FIGURE 30

- Lower the Heat Assembly (with component) until the component leads rest lightly on the PCB land area.

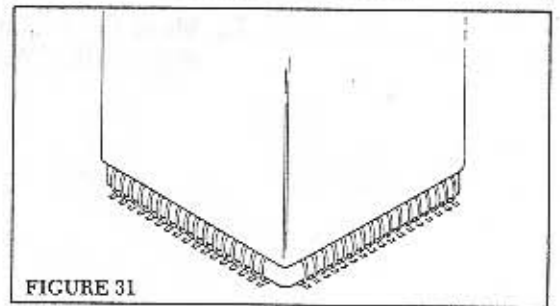


FIGURE 31

- Move the Vacuum Pickup Locking Lever to the unlocked position.

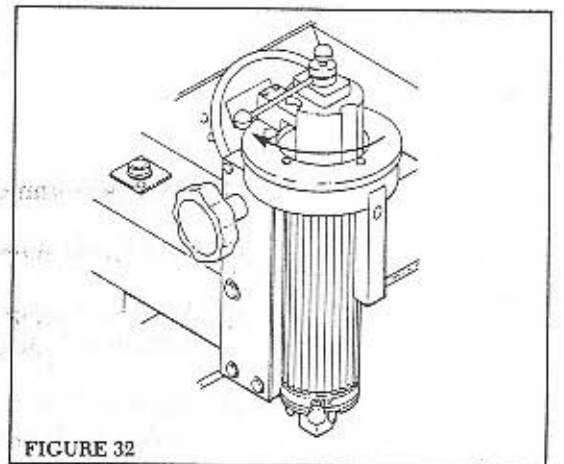


FIGURE 32

**CORRECTIVE MAINTENANCE**

When a problem in operation occurs, select the "Symptom" which applies and follow the steps given in the "Solution" column.

**TABLE 1**

<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>
<b>NO POWER—</b>	Circuit breaker tripped.	Reset Main Power Switch.
	Line cord unplugged.	Plug Line Cord into outlet.
	AC supply circuit breaker tripped.	Reduce # of other devices on circuit.
<b>NO TEMPERATURE DISPLAY—</b>	Blown fuse F2	Replace fuse.
<b>NO LIGHTS—</b>	Blown fuse F1	Replace fuse.
<b>NO VACUUM—</b>	Dirty filter	Replace VisiFilter.
	Kinked or broken vacuum line.	Repair or replace vacuum line.

# CRAFT 15 REPLACEMENT PARTS

## ACCESSORIES

TABLE 2

ITEM NO.	DESCRIPTION	PAGE PART NO.
1.	Color Video System	
	Domestic	6018-0055
	Export	6018-0057
	Export Less Monitor	6018-0062
2.	Reflow Station Video Mount	6018-0072
3.	Monitor Mount	6018-0044
4.	4X Microscope	6018-0048
5.	20X Eyepieces	1106-0033
6.	Reflow Station Microscope Mount	6018-0049
7.	Dual Halogen Lighting System	7007-0011
8.	Polarizer Kit	6018-0058
9.	Remote Control	6018-0047
10.	30" Work Holder Rail Kit	6993-0126
11.	PCB Template Kit	6018-0064

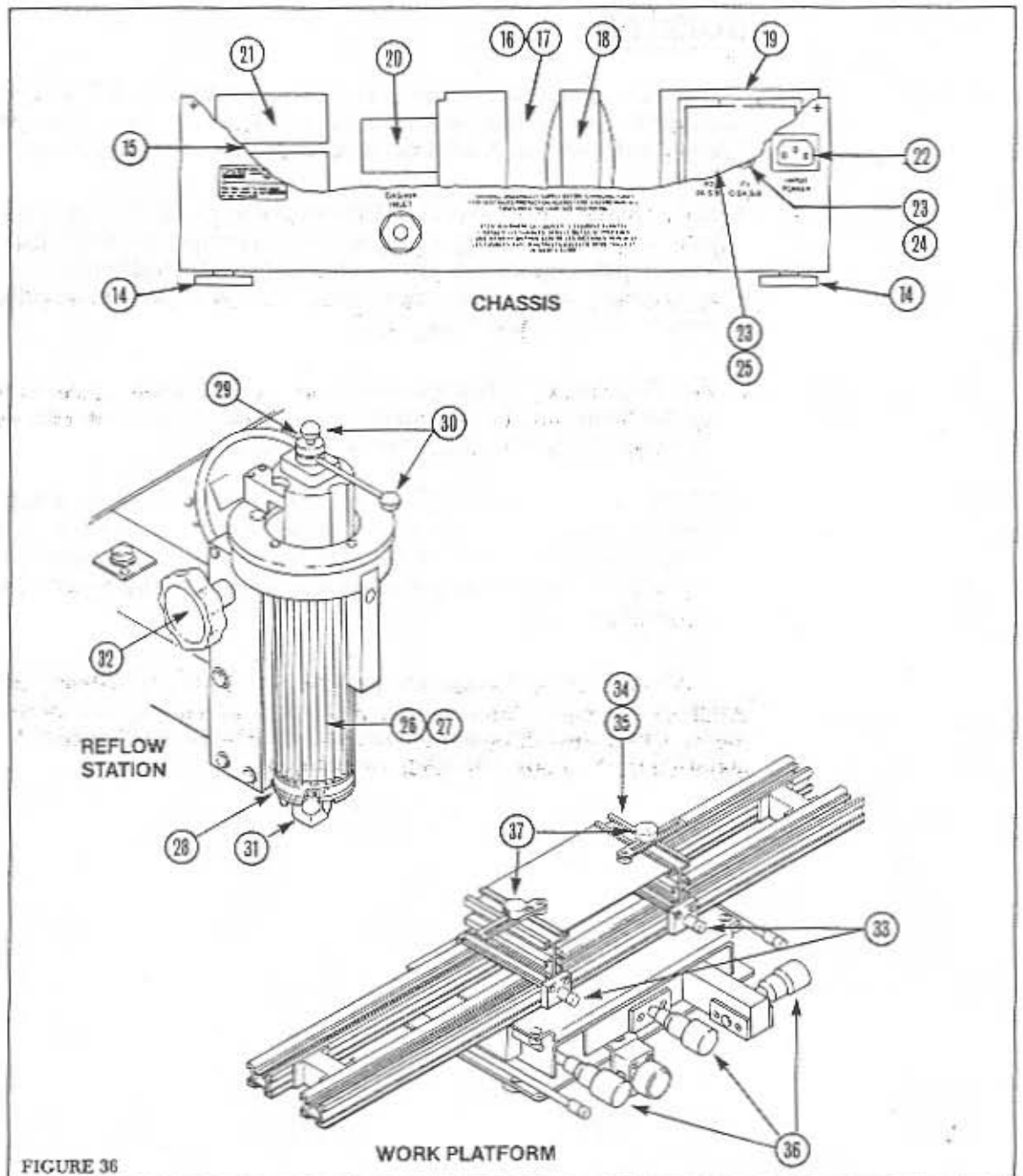
# CRAFT 15 REPLACEMENT PARTS

## CRAFT 15 UNIT

TABLE 3 (Cont'd)

ITEM #	QTY.	PART NO.	DESCRIPTION	SUBASSEMBLY AREA
26	1	4010-0091	Heater Core, CRAFT 15 (115 V)	Reflow Stn.
	1	4010-0092	Heater Core, CRAFT 15E (230 V)	
27	1	4010-0093	Heater Tube Assembly	
28	1	4010-0094	Reflow Sensor	
29	1	4010-0095	Vacuum Pick Assembly	
30	2	1222-0061	Vacuum Pick Control Knob	
31	1	1222-0084	Nozzle Locking Lever Knob	
32	1	1222-0053	Z Axis Control Knob	
33	4	1222-0074	Rail Locking Knob	Work Platform
34	2	1209-0030	PCB Holder Arm	
35	2	1274-0033	Bumper, PCB Holder Arm	
36	3	1222-0076	Fine Adjust Knob (X,Y, Theta)	
37	2	1222-0044	Clamp Locking Knob	
38	1	1332-0134	Power Cord, Domestic (115V)	Misc. Access.
39	1	1332-0135	Power Cord, Export (230V)	
40	1	1100-0231	Nozzle/Chip Tool	
41	2	1165-0023	Lamp, Lighting Assembly (12V, 20W)	
42	1	1309-0020	VisiFilter®	
43	1	1121-0280-P2	Vacuum Cup, .625 Dia.	Consummables
44	1	1121-0281-P2	Vacuum Cup, .400 Dia.	
45	1	1121-0282-P2	Vacuum Cup, .312 Dia.	
46	1	1121-0288-P2	Vacuum Cup, .200 Dia.	
47	1	5050-0230	Operation Manual	
48	1	5050-0261	Service Manual	

# CRAFT 15 REPLACEMENT PARTS



# CRAFT 15 REPLACEMENT PARTS

## STANDARD NOZZLES

TABLE 4

COMPONENT APPLICATION	COMPONENT SIZE (MAX.) INCHES	PACE PART NUMBER
PLCC-18	.467 x .327	4018-0033-001
20	.395 x .395	-002
28	.495 x .495	-003
32	.595 x .495	-004
44	.695 x .695	-005
52	.795 x .795	-006
68	.995 x .995	-007
84	1.195 x 1.195	-008
SO- 8	.244 x .197	4018-0034-001
14	.344 x .244	-002
16	.394 x .244	-003
SOL-16	.419 x .413	-004
20	.512 x .419	-005
24	.612 x .419	-006
28	.712 x .419	-007
FLAT PACK- 58 LEAD	.989 x .752	4018-0036-001

## STANDARD HV NOZZLES

TABLE 5

COMPONENT APPLICATION	COMPONENT SIZE (MAX.) INCHES	PACE PART NUMBER
PLCC-18	.467 x .327	4018-0037-001
20	.395 x .395	-002
28	.495 x .495	-003
32	.595 x .495	-004
44	.695 x .695	-005
52	.795 x .795	-006
68	.995 x .995	-007
84	1.195 x 1.195	-008

# CRAFT 15 REPLACEMENT PARTS

## SPECIAL HV NOZZLES

TABLE 8

COMPONENT APPLICATION	COMPONENT SIZE (MAX.) INCHES	PAGE PART NUMBER
PLCC-18	.467 x .327	4018-0053-001
20	.395 x .395	-002
28	.495 x .495	-003
32	.595 x .495	-004
44	.695 x .695	-005
52	.795 x .795	-006
68	.995 x .995	-007
84	1.195 x 1.195	-008
SO- 8	.244 x .197	4018-0054-001
14	.344 x .244	-002
16	.394 x .244	-003
SOL-16	.419 x .413	-004
20	.512 x .419	-005
24	.612 x .419	-006
28	.712 x .419	-007
LCC-16	.308 x .308	4018-0055-001
18	.435 x .300	-002
20	.358 x .358	-003
24	.410 x .410	-004
28	.458 x .458	-005
44	.660 x .660	-006
52	.761 x .761	-007
68	.962 x .962	-008
84	1.165 x 1.165	-009