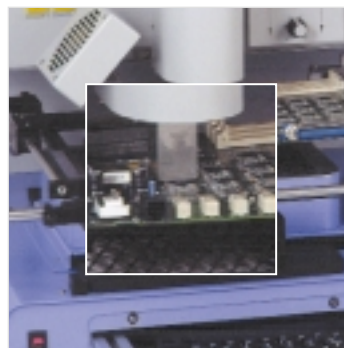




# AREA ARRAY REWORK

ALL THE PRODUCTS YOU'LL EVER NEED...

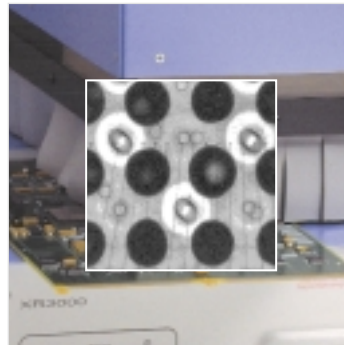
## PRECISE REFLOW



## XR 3000



## X-RAY INSPECTION



**TF 3000**

SOLUTIONS FOR THE ELECTRONICS INTERCONNECTION PROCESS

# FROM REWORK TO INSPECTION

TF 3000

XR 3000



# TOTAL SOLUTIONS

Ideal for post assembly rework, repair and low volume production operations.

## TF 3000 REWORK SYSTEM



Insert picture shows TF3000L

The TF 3000 is ideal for post assembly rework, repair, and low volume/short run production operations. The TF 3000 can remove and install PBGAs, CSPs, FCs, LGAs, LCC's and other SMDs.

Featuring unparalleled thermal performance, The TF 3000's flexibility and state of the art process software means no other system is easier to use. The TF 3000 is a PC based, semi-automated system that comes standard with a fully integrated Pentium® III PC featuring Windows XP® Professional OS and a software package that offers much more than just an operator interface. TF 3000's advanced vision and placement system is highly accurate and can quickly magnify even the smallest components for easy alignment. TF 3000 uses a combination of Convective top heating coupled with powerful IR bottom heating for the most effective, repeatable heating process available today.

For the most demanding applications such as very high mass and/or large PCBs the TF 3000 L is the product of choice with its wide area heating capability and large PCB holding capacity.

## XR 3000 INSPECTION SYSTEM



The XR 3000 is ideal for inspecting BGAs, CSPs, and other electronic components. The XR 3000 provides immediate feedback on your process using real time images. Images can be viewed through the ThermoFlo 3000 software or through an optional, flat screen, LCD monitor when used as a stand-alone unit.

The XR 3000 has been designed with rework in mind so it is able to fit easily on the benchtop and can be relocated quickly. Featuring patented camera technology and outstanding zoom capability, the XR 3000 is able to identify a wide range of anomalies, as small as .025mm (.001"). Using the ThermoFlo 3000 software, images can be viewed, stored electronically, and managed. Defect analysis reports with images can be easily created

# TF 3000/TF 3000L

For all your BGA/CSP requirements.

## REFLOW FUNCTION



- Unequaled programmability and process control ensures successful installation.
- The powerful and responsive 1600 Watt top heater, with closed loop temperature control, coupled with a unique nozzle design ensures uniform temperature distribution when heating.
- High power bottom heaters allow for successful and repeatable reflow at safe, low temperatures.
- Profiles are programmed through the PC software.
- Creating the perfect profile is easy with real time adjustment of profile parameters through the PC.
- Store and recall an infinite number of profiles.
- Three pre-defined profiles for use as baselines when developing custom profiles are included.
- Self contained, no external air supply or vacuum connections required. Can also be used with N<sup>2</sup> from external source.
- Semi-automated, motorized reflow head.
- 4 thermo-couple sensor inputs ensure successful profile development and monitoring.
- External fan to cool PCB and component to below solder melt temperatures after reflow.

## ALIGNMENT AND PLACEMENT FUNCTION

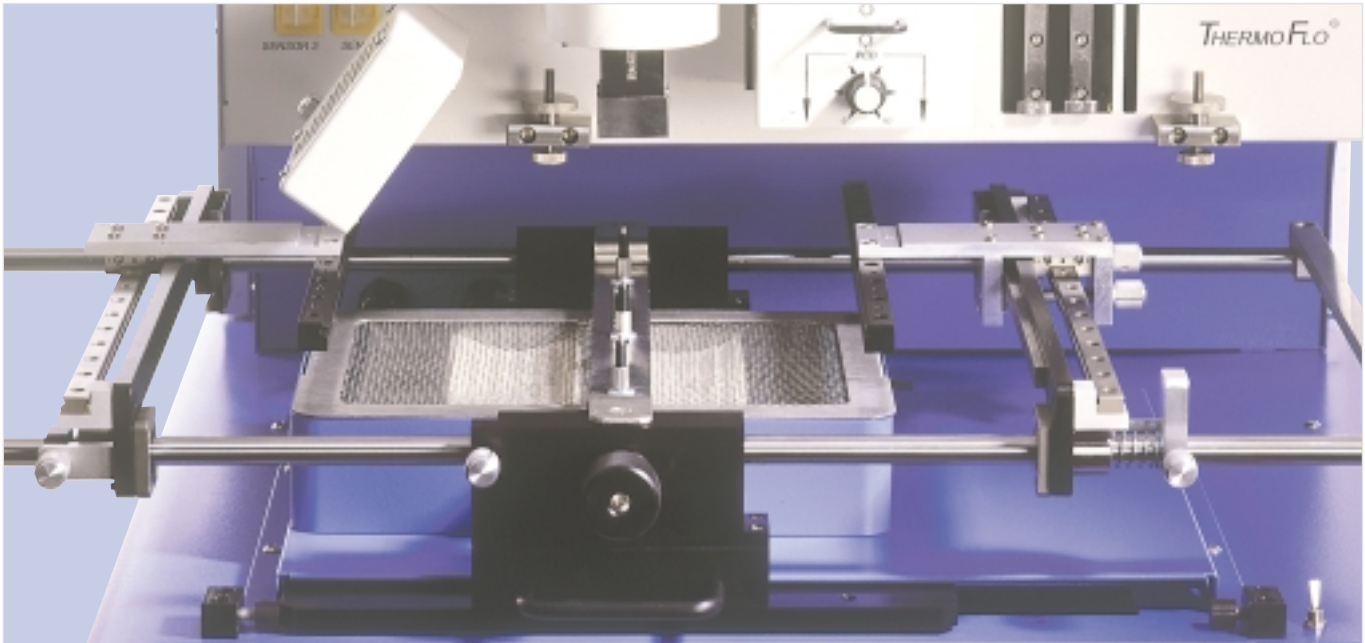
- High resolution Vision Overlay System (VOS) with color camera and dichroic prism. VOS does not require routine calibration, eliminating costly downtime and operator frustration.
- Color Camera with 300x zoom capability, featuring auto-focus zoom.
- Lighting system uses "Ultra Bright" Red and Blue LEDs for maximum contrast of lands and solder balls on component.
- Independent lighting controls for component and PCB to maximize overlay contrast.
- Retractable optics housing protects VOS from dirt and contamination.
- Accurately places any array package up to 65mm (2.6") square and as small as .5mm (.02") square.
- Precise micrometer adjustment for X, Y and Z axis with Theta adjustment ensures placement accuracy.
- High-flow vacuum pick holds component securely.
- Images are viewed through the PC in standard or full screen viewing options.



# TF 3000/TF 3000L

BGA/CSP Rework System

## PRE-HEAT FUNCTION AND BOARD HOLDER



TF 3000's Board Support System

- Fully adjustable, precision, spring loaded board holder with top PCB registration for repeatability.
- Rugged, stable board platform to hold and support the PCB.
- Unique board holding fixtures that are able to hold very small and odd shaped PCBs.
- Magnetic Table Locking Mechanism holds platform securely in either Reflow or Placement position.
- Board supports are standard with the system.
- Integrated, powerful, IR pre-heater with closed loop temperature control ensures process integrity by delivering heat evenly, time after time.

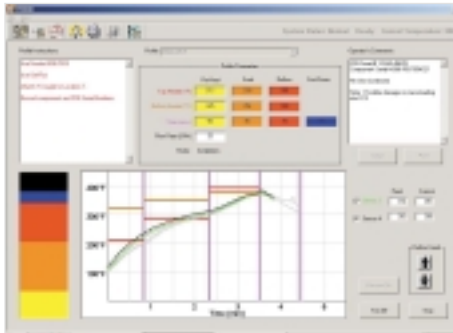


- The TF 3000L comes with a wide area pre-heater capable of heating large and very high mass PCBs, which eliminates warping and twisting. Fully adjustable, precision, spring loaded board holder with top PCB registration for repeatability.

# TF 3000 SYSTEM SOFTWARE

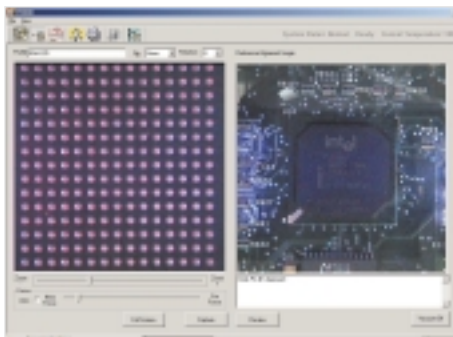
Advanced software protects the integrity of your process.

## OPERATION SCREEN



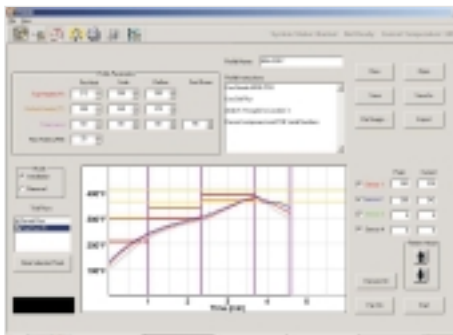
- Password Lockout ensures process control by restricting operator access to profile parameters.
- Profile process tracked by color-coded "Status Indicator" and Graphical User Interface (GUI).
- Allows for process verification using four thermo-couple inputs.
- Document operations for quality assurance, record PCB/component serial numbers for job tracking. Operators can record comments and observations such as additional defects.
- System control functions: Nozzle Up/Down, Vacuum On/Off, Fan On/Off, & Cycle Start/Stop.
- Print function allows for follow up documentation for component profile verification.

## ALIGNMENT SCREEN



- View images from Vision Overlay System.
- Control zoom, focus & Auto focus.
- Image Flip and Rotate functions.
- Store and manage images electronically.
- Full screen viewing mode.
- Reference image stored with Profile is displayed next to alignment image window to indicate which component is to be reworked preventing operator errors.

## PROFILE DEVELOPMENT SCREEN

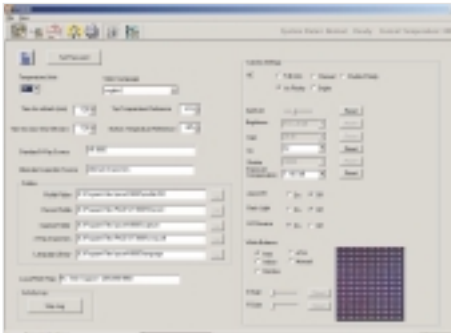


- Click and Drag Modification feature allows profiles to be created and modified in real time using PC mouse.
- Choose between installation or removal modes. Vacuum automatically activates in Removal Mode to lift component from PCB.
- Individual top heater & bottom heater settings for all 4 zones (Pre-heat, Soak, Ramp/Reflow, & Cool down).
- User can regulate the length of cool down phase and activity of cooling fan.
- System control functions; Nozzle Up/Down, Vacuum On/Off, Fan On/Off, & Cycle Start/Stop.
- Graphical interface of time and temperature parameters with upper and lower temperature limit reference guides.
- On-demand display of thermal ramp rate.
- 4 thermo-couple sensor inputs for profile development/monitoring.
- Incorporate work instructions into profiles for operator reference.
- Save thermal profile data for import into spreadsheet software (not included).
- Verify and compare profiles using "Trial Run Log". Up to four trials can be viewed.
- Link reference image to Profile so Operator can easily identify the part to be reworked.

# TF 3000 SYSTEM SOFTWARE

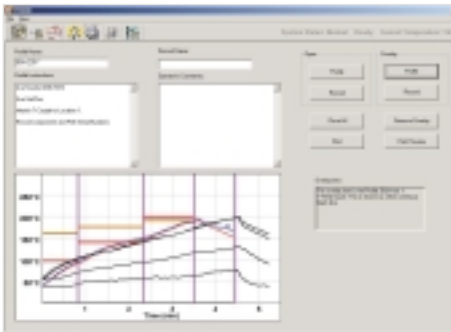
Operator friendly interface documents the procedure and eliminates operator mistakes.

## SETUP SCREEN



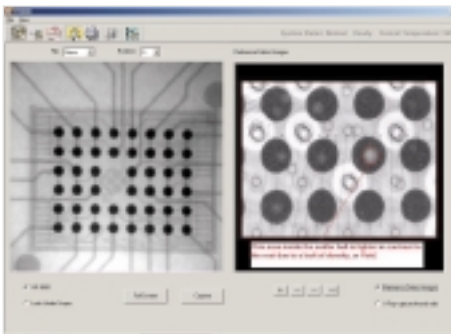
- Activate password lockout for Profile Development Screen.
- Set upper and lower temperature parameters for graphical interface.
- View software in choice of 6 different languages.
- Create your own language library or modify existing libraries.
- Set back mode and auto off function.
- Access Camera Controls

## PRINT/REVIEW SCREEN

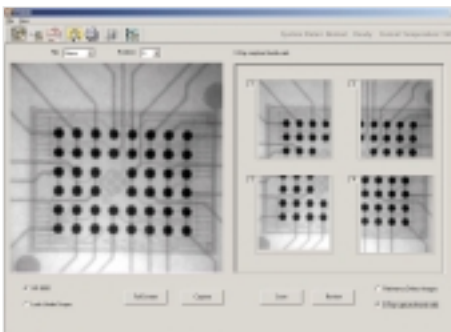


- Compare profiles or operations records using profile overlay display function.
- Profiles and records can be reviewed and printed in graphical display format with Print Preview.

## INSPECTION SCREEN



- View images from XR 3000 and/or other inspection device(s).
- Select thumbnail or reference image mode options.
- Full screen display capability.
- Library of reference defect images for easy inspection. Library can be added to/modified for specific application(s).



- Thumbnail mode allows up to 4 images to be captured and saved as a composite image. Composite images and text analysis are combined in a PDF format Defect Analysis Report that can be emailed, printed or saved on the PC.

# TF 3000 FEATURES AND SPECIFICATIONS

Flexibility and high performance to meet all your rework requirements.



SPECIFICATIONS	TF 3000	TF 3000L
PC SYSTEM	Pentium III, 850Mhz minimum 256Mb RAM, 10Gb Hard Drive, 8Mb Video RAM, High Resolution Video Capture Card, 3.5" Floppy Disk Drive, 2 USB Ports, 1 Serial Port, 1 Parallel Port, Keyboard and Mouse	Pentium III, 850Mhz minimum 256Mb RAM, 10Gb Hard Drive, 8Mb Video RAM, High Resolution Video Capture Card, 3.5" Floppy Disk Drive, 2 USB Ports, 1 Serial Port, 1 Parallel Port, Keyboard and Mouse
OPERATING SYSTEM	Windows XP Professional	Windows XP Professional
VIDEO DISPLAY	380mm (15") LCD Display	380mm (15") LCD Display
TOP HEATER	Convective (air or N <sup>2</sup> ), 1600 Watts	Convective (air or N <sup>2</sup> ), 1600 Watts
PRE-HEATER	IR, 400 Watts (200 Watts x 2), 220mm x 155mm (8.6" x 6.1")	Large Area Heater - 900 Watts, 305mm x 610 mm (12" x 24") Localized Heater - IR, 120 Watts, 65mm x 100mm (2.75" x 4")
COMPONENT SIZE	65mm x 65mm (2.6" x 2.6") maximum	65mm x 65mm (2.6" x 2.6") maximum
PCB SIZE	460mm x 500mm (18" x 20")	600mm x 500mm (24" x 20")
AIR FLOW	Self-contained, manual adjust, 25 SLPM maximum	Self-contained, manual adjust, 25 SLPM maximum
N <sup>2</sup> OPTION	Standard	Standard
RESOLUTION ON OPTICS ADJUSTMENT	25 μmeters (0.001")	25 μmeters (0.001")
POSITIONING ACCURACY (Z TRAVEL)	±25 μmeters (0.001")	±25 μmeters (0.001")
VACUUM	-800 mbar	-800 mbar
POWER REQUIREMENTS	115 VAC, 60 Hz or 230 VAC, 50 Hz 2.2 KW	115 VAC, 60 Hz or 230 VAC, 50 Hz 3KW
OPTICS	High resolution, Vision Overlay System	High resolution, Vision Overlay System
VIDEO INPUTS	2 Composite Video (external) 1 "S" Video (Internal for alignment optics)	2 Composite Video (external) 1 "S" Video (Internal for alignment optics)
TEMPERATURE SETTING RANGE	Top Heater: 100° to 500°C (212° to 932°F) Pre-Heater: 100° to 260°C (212° to 500°F)	Top Heater: 100° to 500°C (212° to 932°F) Pre-Heater: 100° to 260°C (212° to 500°F)
DIMENSIONS	635mm H x 641mm W x 660mm D (25" H x 25.25" W x 26" D)	635mm H x 641mm W x 660mm D (25" H x 25.25" W x 26" D)
WEIGHT	78Kg ( 170lbs.)	85Kg ( 185lbs.)
VIDEO MONITOR VIEWABLE AREA	(15") Integrated Color Flat Panel Monitor	(15") Integrated Color Flat Panel Monitor
BOARD SUPPORTS	Included	Included
PCB HOLDER FOR IRREGULAR SHAPED BOARDS	Included	Included
OPTICAL ALIGNMENT KIT	Included	Included

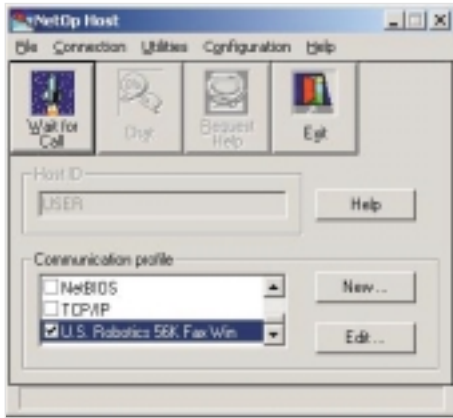
DESCRIPTION	PART NUMBER
TF 3000 120 VAC	8007-0391
TF 3000 230 VAC	8007-0396
TF 3000L 120 VAC	8007-0397
TF 3000L 230 VAC	8007-0398



# REMOTE ACCESS SUPPORT

Everything you need to install and inspect BGAs and CSPs in one benchtop package.

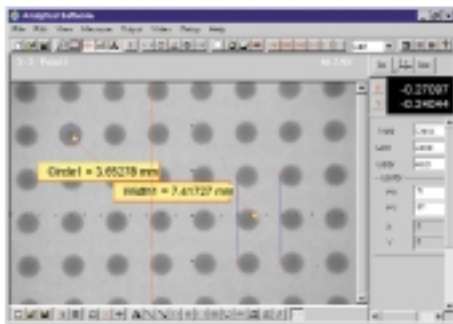
## REMOTE ACCESS CAPABILITY



The TF 3000 system comes standard with "Net Op Remote Control by CrossTec Corp" installed. Using remote access, the TF 3000 computer can be accessed via a modem. If you need assistance with your PC or if you need technical assistance, (i.e. creating a profile), PACE can provide support immediately. Simply connect the modem on the TF 3000 PC to a phone line that has a direct dial phone number, activate Net Op, and we'll take care of the rest!

The remote access feature can also be used to transfer profiles from one facility to another ensuring that your company's universal standards are met and that the process is always the same.

## IMAGE ANALYSIS SOFTWARE



The PC Video Inspection Package provides Live Video Interface to Computer for Inspection, Measurement, Documentation and Communication requirements. Live images at 30 frames per second displayed on your Computer Screen eliminate fatigue and eye strain for inspectors.

Dimensional Measurement capabilities include Edge Detection for Distance, angles, line width, area, radius and diameter measurement. Flexible Data format for SPC processing. Image overlay, split screen and comparison screens enhance inspection capabilities. Image annotation and report writing with images provide fast and accurate documentation and communications.

## MONITOR YOUR PROCESS WORLDWIDE



# REWORK WITHOUT THE GUESS WORK

Everything you need to install and inspect BGAs and CSPs in one benchtop package.

## TF 3000 AND XR 3000 BGA/CSP REWORK AND INSPECTION SYSTEMS



PACE is pleased to offer the industry's first total solution for rework and inspection by integrating the XR 3000 X-ray inspection system and the TF 3000 BGA/CSP rework system through PC based software.

The TF 3000 is BGA, CSP, and FC capable and features the industry's best optical alignment system. The TF 3000 is portable, highly reliable and easy to use. Process repeatability is a given with state of the art, closed loop, PC controlled heating.

The XR 3000 is ideal for inspecting BGA/CSP, multi-layer PCBs and other electronic components. The XR 3000 is completely portable, fits easily onto any benchtop and features outstanding zoom capability to identify defects as small as .025mm (.001"). Real time, high resolution images can be viewed/stored and defect reports can also be created using the TF 3000 software.

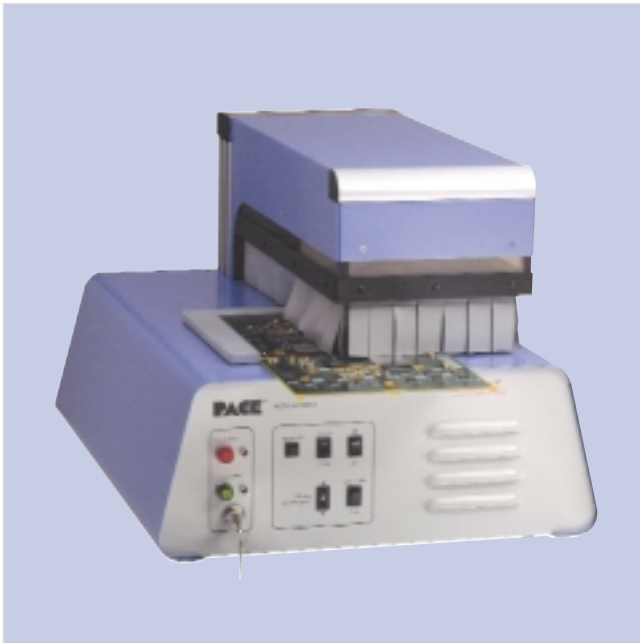
Finally! Everything you need for BGA/CSP rework in one benchtop package at an affordable price from PACE.

**Are your BGA/CSP rework needs short term?  
Contact PACE about our exciting rental programs!**

# XR 3000 BGA/CSP INSPECTION SYSTEM

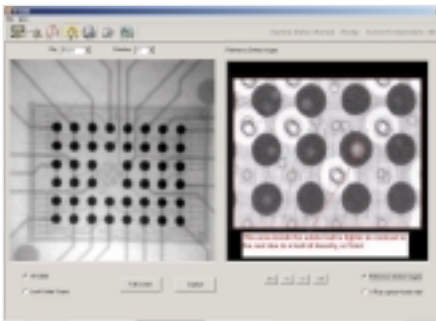
Real-time X-ray gives immediate feedback.

## XR 3000 INSPECTION SYSTEM



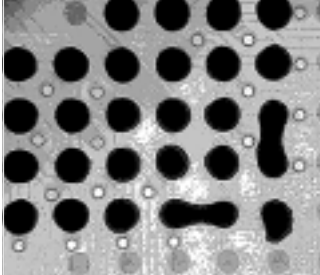
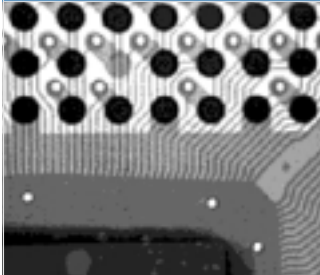
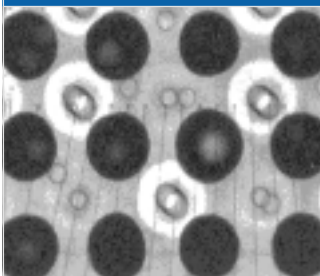
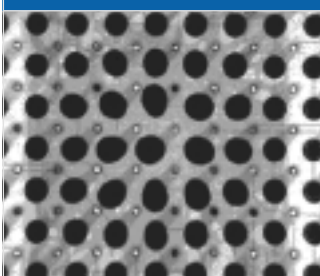
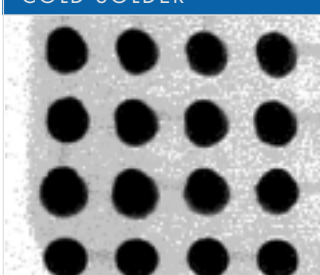
The XR 3000 X-ray inspection system has been designed as the first inspection system to meet the demands of rework operations, while maintaining the performance of more expensive production systems. The system is portable and can be moved easily from one location to another as needed, increasing operator convenience. The capabilities of the XR 3000 are maximized by integrating it with the TF 3000 software. However, it can also be used as a stand alone unit with the optional flat screen, LCD video monitor (P/N 7015-0010).

## SOFTWARE LIBRARY



When integrated with TF 3000 software, the XR 3000 system can actually teach operators how to identify defects using the defect image library. Examples of common defects are included with the software that operators can refer to compare the live image of their work with the reference image. The library can be added to and modified so you can provide images of the actual work to the operator for immediate comparison.

## AREA ARRAY INTERCONNECTION ANOMALIES IDENTIFIED BY THE XR 3000

<b>BRIDGING</b>		Bridging between solder joints is easily identified.
<b>MISSING SOLDER BALLS</b>		Missing solder balls can be identified easily.
<b>SOLDER VOIDS</b>		Solder voids
<b>SOLDER BALLS</b>		Solder balls in the center of the package are oversized due to delamination and compression under die area.
<b>COLD SOLDER</b>		Cold solder is signified by a jagged, irregular edge around the perimeter of the solder ball. Note that in this image only some of the balls show this signature.

# XR 3000 FEATURES AND SPECIFICATIONS

X-Ray inspection for the benchtop.



FEATURES/SPECIFICATIONS	XR 3000
POWER REQUIREMENTS	115 VAC, 60 Hz or 230 VAC, 50/60 Hz 1000 Watts maximum
X-RAY TUBE	50 kv
COLOR CAMERA	High resolution with 7-40x zoom
MAXIMUM PCB SIZE	760mm x unlimited (30" x unlimited)
FOCAL SPOT	0.2mm (0.008")
FOCAL SPOT TO IMAGE PLANE DISTANCE	124mm (4.875")
ADJUSTMENTS	Live or Capture video signal options. Video Gain adjustment
CONTRAST RESOLUTION	Can resolve a 0.25mm (.001") gold wire
SPATIAL RESOLUTION	20lp/mm
X-RAY ACTUATION	Foot Pedal
OPENING CLEARANCE	40mm (1.5") 120 VAC, 19mm (0.75") 230 VAC
PCB FIXTURE DEVICE	Standard
SMALL PCB CARRIER	Standard
DIMENSIONS	394mm H x 457mm W x 585mm D (15.5" H x 18" W x 23" D)
WEIGHT	39Kg (86 lbs.)

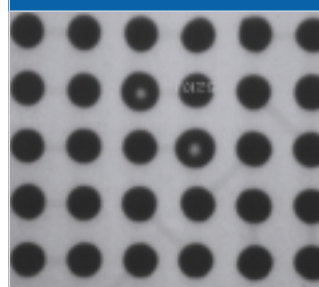
DESCRIPTION	PART NUMBER
XR 3000 120 VAC	8007-0385
XR 3000 230 VAC	8007-0386

## AVOID REJECTING GOOD BOARDS, WITH PACE'S PATENTED CAMERA TECHNOLOGY

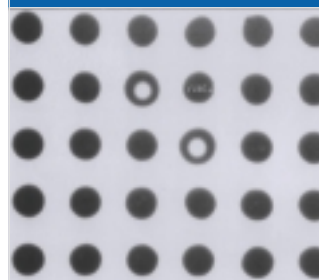
Voltage blooming is associated with the X-ray camera used in many X-ray inspection systems. The phenomenon occurs when voltage is increased, causing the white area of the X-ray image (the void) to expand (or bloom) and encroach on the black area.

This makes a void appear larger than it really is. A void that occupies 10% of a solder sphere at 50 kV may appear to consume up to 50% of the solder sphere at 70 kV. The patented camera technology found in PACE's XR 3000 is the only system of its type not subject to Voltage Blooming. The camera technology ensures that void sizes remain consistent.

X-RAY BLOOMING 50KV



X-RAY BLOOMING 70KV



# SUPPORT PRODUCTS FOR BGA REWORK

PACE's full line of BGA rework products covers all potential application requirements.

## REBALLING KITS

Removed components can be safely reballed and reused, reducing waste and costs.

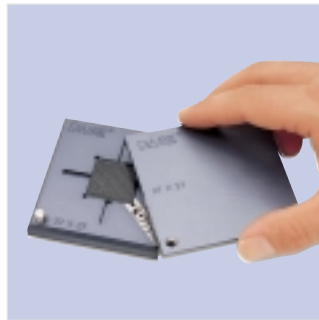
See page 17 for part numbers.



## COMPONENT STENCILING TOOLS AND STENCILS

Applies solder paste to component, reducing the difficulty and mess associated with PCB stenciling.

See page 15/16 for part numbers.



## FLUX APPLICATOR

Allows for precise and repeatable application of flux by dipping component.  
P/N 6993-0218



## TRAINING



PACE offers one of the most advanced operator training courses available, PCT-500 Advanced Surface Mount Rework and Repair. Heavy emphasis is placed on profiling, positioning, installation and removal of grid array style components such as BGAs and flip chips. Grid array component preparation including flux and/or solder paste stenciling, component reballing and advanced inspection methods using X-Ray are all covered. Finally, land replacement or repair is also practiced.

## APPLICATIONS SUPPORT



If you require assistance with an installation or removal, contact PACE for help! Customers can submit boards and components and we'll develop your profile for you or find a solution to your application. There may be a charge for applications support, contact PACE for more information.

# THERMOFLO TF 3000 NOZZLES

The widest variety of nozzles available for BGA rework.

			STANDARD	OPTIONAL *
	MAXIMUM COMPONENT SIZE	NOZZLE DIMENSIONS	NOZZLE P/N	NOZZLE P/N
	5mm x 5mm (0.19" x 0.19")	8mm x 8mm (0.31" x 0.31")	4038-7001	
	6mm x 6mm (0.24" x 0.24")	9mm x 9mm (0.35" x 0.35")	4038-7042	
	6mm x 8mm (0.24" x 0.31")	9mm x 11mm (0.35" x 0.43")	4038-7002	
	7.3mm x 7mm (0.29" x 0.28")	10.3mm x 10mm (0.40" x 0.40")	4038-7040	
	8mm x 8mm (0.31" x 0.31")	11mm x 11mm (0.43" x 0.43")	4038-7041	
	8.1mm x 8.1mm (0.31" x 0.31")	11.1mm x 11.1mm (0.43" x 0.43")	4038-7055	
	8.2mm x 12.7mm (0.32" x 0.50")	11.2mm x 15.7mm (0.44" x 0.62")	4038-7003	
	9mm x 9mm (0.35" x 0.35")	12mm x 12mm (0.47" x 0.47")	4038-7004	
	10mm x 10mm (0.39" x 0.39")	13mm x 13mm (0.51" x 0.51")	4038-7005	
	11.4mm x 5.1mm (0.49" x 0.20")	14.4mm x 8.1mm (0.56" x 0.31")	4038-7050	
	13mm x 10mm (0.51" x 0.40")	16mm x 13mm (0.63" x 0.51")	4038-7039	
	13mm x 13mm (0.51" x 0.51")	16mm x 16mm (0.63" x 0.63")	4038-7006	
	14mm x 22mm (0.55" x 0.87")	17mm x 25mm (0.67" x 0.99")	4038-7021	4038-8021
	15mm x 15mm (0.59" x 0.59")	18mm x 18mm (0.71" x 0.71")	4038-7007	4038-8007
	15.34mm x 12.7mm (0.60" x 0.50")	18.34mm x 15.7mm (0.72" x 0.61")	4038-7063	
	15.6mm x 5.1mm (0.61" x 0.20")	18.6mm x 8.1mm (0.73" x 0.31")	4038-7062	
	16.5mm x 8mm (0.65" x 0.31")	19.5mm x 11mm (0.77" x 0.43")	4038-7027	4038-8027
	17mm x 11mm (0.67" x 0.43")	20mm x 14mm (0.79" x 0.55")	4038-7052	
	17mm x 17mm (0.67" x 0.67")	20mm x 20mm (0.79" x 0.79")	4038-7008	4038-8008
	19mm x 19mm (0.75" x 0.75")	22mm x 22mm (0.87" x 0.87")	4038-7026	4038-8026
	20mm x 8mm (0.79" x 0.31")	23mm x 11mm (0.90" x 0.43")	4038-7058	
	20mm x 20mm (0.79" x 0.79")	23mm x 23mm (0.90" x 0.90")	4038-7061	
	21mm x 12.75mm (0.83" x 0.50")	24mm x 15.75mm (0.94" x 0.62")	4038-7060	
	21mm x 25mm (0.83" x 0.98")	23mm x 28mm (0.91" x 1.1")	4038-7029	4038-8029
	22mm x 22mm (0.86" x 0.86")	25mm x 25mm (0.98" x 0.98")	4038-7057	
	23mm x 23mm (0.90" x 0.90")	26mm x 26mm (1.02" x 1.02")	4038-7009	4038-8009
	25mm x 25mm (0.98" x 0.98")	28mm x 28mm (1.1" x 1.1")	4038-7025	4038-8025
	27mm x 27mm (1.06" x 1.06")	30mm x 30mm (1.18" x 1.18")	4038-7010	4038-8010
	28mm x 16mm (1.1" x 0.63")	31mm x 19mm (1.22" x 0.75")	4038-7038	4038-8038
	28mm x 28mm (1.1" x 1.1")	31mm x 31mm (1.22" x 1.22")	4038-7048	
28.5mm x 17mm (1.12" x 0.67")	31.5mm x 20mm (1.12" x 0.79")	4038-7059		
29mm x 29mm (1.14" x 1.14")	32mm x 32mm (1.26" x 1.26")	4038-7030	4038-8030	
30mm x 30mm (1.18" x 1.18")	33mm x 33mm (1.3" x 1.3")	4038-7044		

\* Optional nozzles feature a spring loaded vacuum pik for automatic component lift-off.

Custom nozzles available on request.

# THERMOFLO TF 3000 NOZZLES

Installation and removal nozzles are available.

	MAXIMUM COMPONENT SIZE	NOZZLE DIMENSIONS	STANDARD	OPTIONAL*
			NOZZLE P/N	NOZZLE P/N
	31mm x 31mm (1.22" x 1.22")	33mm x 33mm (1.3" x 1.3")	4038-7031	4038-8031
	32mm x 17mm (1.26" x 0.67")	35mm x 20mm (1.37" x 0.79")	4038-7053	
	32.5mm x 23mm (1.28" x 0.90")	35.5mm x 26mm (1.40" x 1.02")	4038-7051	
	32.5mm x 25mm (1.28" x 0.98")	35.5mm x 28mm (1.40" x 1.1")	4038-7056	
	33mm x 33mm (1.29" x 1.29")	36mm x 36mm (1.42" x 1.42")	4038-7028	4038-8028
	35mm x 35mm (1.37" x 1.37")	38mm x 38mm (1.5" x 1.5")	4038-7011	4038-8011
	38.1mm x 25.8mm (1.50" x 1.01")	41.1mm x 28.8mm (1.61" x 1.13")	4038-7066	
	40mm x 40mm (1.57" x 1.57")	43mm x 43mm (1.7" x 1.7")	4038-7024	4038-8024
	41mm x 41mm (1.61" x 1.61")	43mm x 43mm (1.7" x 1.7")	4038-7047	
	42mm x 42mm (1.65" x 1.65")	45mm x 45mm (1.77" x 1.77")	4038-7032	4038-8032
	42.5mm x 32.5mm (1.67" x 1.40")	45.5mm x 35.5mm (1.80" x 1.39")	4038-7054	
	43mm x 43mm (1.7" x 1.7")	46mm x 46mm (1.81" x 1.81")	4038-7045	
	44mm x 33mm (1.73" x 1.29")	47mm x 36mm (1.85" x 1.41")	4038-7064	
	44mm x 44mm (1.73" x 1.73")	47mm x 47mm (1.85" x 1.85")	4038-7043	
	44.5mm x 44.5mm (1.75" x 1.75")	47.5mm x 47.5mm (1.87" x 1.87")	4038-7012	4038-8012
	46mm x 46mm (1.81" x 1.81")	49mm x 49mm (1.93" x 1.93")	4038-7046	
	48mm x 48mm (1.89" x 1.89")	51mm x 51mm (2" x 2")	4038-7049	
	50mm x 50mm (1.97" x 1.97")	53mm x 53mm (2.1" x 2.1")	4038-7022	
	56mm x 17mm (2.2" x 0.67")	59mm x 20mm (2.32" x 0.79")	4038-7037	
	60mm x 60mm (2.36" x 2.36")	63mm x 63mm (2.5" x 2.5")	4038-7023	
	Connector, 16mm x 13mm (0.63" x .51")	19mm x 16mm (0.75" x 0.63")	4038-7033	4038-8033
	Connector, 19mm x 8mm (0.75" x 0.31")	22mm x 11mm (0.87" x 0.43")	4038-7036	4038-8036
	Connector, 27mm x 13mm (1.06" x 0.51")	30mm x 16mm (1.18" x 0.63")	4038-7034	4038-8034
	Connector, 30mm x 12mm (1.18" x 0.47")	33mm x 15mm (1.3" x 0.59")	4038-7035	4038-8035
	LQFP 9mm x 9mm (0.35" x 0.35")	12mm x 12mm (0.47" x 0.47")	4038-7016	
	LQFP 12mm x 12mm (0.47" x 0.47")	15mm x 15mm (0.59" x 0.59")	4038-7017	
	LQFP 14mm x 14mm (0.55" x 0.55")	17mm x 17mm (0.67" x 0.67")	4038-7020	4038-8020
	LQFP 16mm x 16mm (0.63" x 0.63")	19mm x 19mm (0.75" x 0.75")	4038-7014	4038-8014
	LQFP 16mm x 22mm (0.63" x 0.87")	19mm x 25mm (0.75" x 0.99")	4038-7019	4038-8019
	LQFP 22mm x 22mm (0.87" x 0.87")	25mm x 25mm (0.98" x 0.98")	4038-7013	4038-8013
LQFP 26mm x 26mm (1.02" x 1.02")	29mm x 29mm (1.14" x 1.14")	4038-7018	4038-8018	
LQFP 30mm x 30mm (1.18" x 1.18")	33mm x 33mm (1.29" x 1.29")	4038-7015	4038-8015	

# COMPONENT STENCILING

Avoid the mess associated with stenciling paste directly onto the PCB.

Component stenciling tools do not include stencils. Stencils are purchased separately as required by solder ball count geometry on component packages. Both the component stenciling tool and a stencil are required to apply solder paste to the component.



STENCILING TOOL/OPTIONAL STENCIL	PART NUMBER	STENCILING TOOL/OPTIONAL STENCIL	PART NUMBER
Component Stenciling Tool, 35mm x 35mm - 4	7016-0006	Component Stenciling Tool, 15mm x 15mm - 2	7016-0010
Component Stenciling Tool, 35mm x 35mm - 2	7016-0030	Component Stenciling Tool, 15mm x 15mm - 1	7016-0023
Stencil, 35mm x 35mm x 388	1035-0388-P1	Stencil, 15mm x 15mm x 156	1015-0156-P1
Stencil, 35mm x 35mm x 456	1035-0456-P1	Stencil, 15mm x 15mm x 160	1015-0160-P1
Stencil, 35mm x 35mm x 313	1035-0313-P1	Stencil, 15mm x 15mm x 196	1015-0196-P1
Stencil, 35mm x 35mm x 352	1035-0352-P1	Component Stenciling Tool, 13mm x 13mm - 2	7016-0011
Stencil, 35mm x 35mm x 480	1035-0480-P1	Stencil, 13mm x 13mm x 144	1013-0144-P1
Stencil, 35mm x 35mm x 580	1035-0580-P1	Component Stenciling Tool, 13mm x 10mm	7016-0027
Component Stenciling Tool, 27mm x 27mm - 4	7016-0007	Stencil, 13mm x 13mm x 64	1013-0064-P1
Component Stenciling Tool, 27mm x 27mm - 2	7016-0029	Component Stenciling Tool, 12mm x 12mm CSP	7016-0014
Stencil, 27mm x 27mm x 352	1027-0352-P1	Stencil, 12mm x 12mm x 144	1012-0144-P1
Stencil, 27mm x 27mm x 316	1027-0316-P1	Stencil, 12mm x 12mm x 160	1012-0160-P1
Stencil, 27mm x 27mm x 225	1027-0225-P1	Component Stenciling Tool, 11mm x 8mm CSP	7016-0015
Stencil, 27mm x 27mm x 256	1027-0256-P1	Stencil, 11mm x 8mm x 69	1011-0069-P1
Stencil, 27mm x 27mm x 272	1027-0272-P1	Stencil, 11mm x 8mm x 72	1011-0072-P1
Stencil, 27mm x 27mm x 292	1027-0292-P1	Stencil, 11mm x 8mm x 88	1011-0088-P1
Stencil, 27mm x 27mm x 324	1027-0324-P1	Component Stenciling Tool, 40mm x 40mm	7016-0016
Stencil, 27mm x 27mm x 328	1027-0328-P1	Component Stenciling Tool, 40mm x 40mm	7016-0025
Stencil, 27mm x 27mm x 336	1027-0336-P1	Stencil, 40mm x 40mm x 432	1040-0432-P1
Stencil, 27mm x 27mm x 676	1027-0676-P1	Stencil, 40mm x 40mm x 503	1040-0503-P1
Stencil, 27mm x 27mm x 672	1027-0672-P1	Stencil, 40mm x 40mm x 520	1040-0520-P1
Component Stenciling Tool, 23mm x 23mm - 2	7016-0008	Stencil, 40mm x 40mm x 596	1040-0596-P1
Component Stenciling Tool, 23mm x 23mm - 4	7016-0013	Stencil, 40mm x 40mm x 680	1040-0680-P1
Stencil, 23mm x 23mm x 169	1023-0169-P1	Component Stenciling Tool, 25mm x 25mm - 2	7016-0017
Stencil, 23mm x 23mm x 192	1023-0192-P1	Component Stenciling Tool, 25mm x 25mm - 4	7016-0020
Stencil, 23mm x 23mm x 288	1023-0288-P1	Stencil, 25mm x 25mm x 357	1025-0357-P1
Stencil, 23mm x 23mm x 324	1023-0324-P1	Stencil, 25mm x 25mm x 360	1025-0360-P1
Stencil, 23mm x 23mm x 208	1023-0208-P1	Stencil, 25mm x 25mm x 413	1025-0413-P1
Stencil, 23mm x 23mm x 256	1023-0256-P1	Component Stenciling Tool, 19mm x 19mm	7016-0018
Stencil, 23mm x 23mm x 484	1023-0484-P1	Component Stenciling Tool, 19mm x 19mm Socket	7016-0026
Component Stenciling Tool, 17mm x 17mm - 2	7016-0009	Stencil, 19mm x 19mm x 52	1023-0052-P1
Component Stenciling Tool, 17mm x 17mm - 4	7016-0012	Stencil, 19mm x 19mm x 163	1023-0163-P1
Stencil, 17mm x 17mm x 208	1017-0208-P1	Stencil, 19mm x 19mm x 225	1023-0256-P1
Stencil, 17mm x 17mm x 256	1017-0256-P1	Stencil, 19mm x 19mm x 289	1023-0289-P1



# COMPONENT STENCILING

For custom kits and stencils, contact PACE.

STENCILING TOOL/OPTIONAL STENCIL	PART NUMBER	STENCILING TOOL/OPTIONAL STENCIL	PART NUMBER
Component Stenciling Tool, 16.5mm x 8mm CSP	7016-0019	Component Stenciling Tool, 11.4mm x 5.1mm	7016-0039
Stencil, 16.5mm x 8mm x 52	1016-0052-P1	Stencil, 11.4mm x 5.1mm x 22	1011-0022-P1
Component Stenciling Tool, 33mm x 33mm - 4	7016-0021	Component Stenciling Tool, 16mm x 16mm	7016-0040
Stencil, 33mm x 33mm x 503	1033-0503-P1	Stencil, 16mm x 16mm x 209	1016-0209-P1
Component Stenciling Tool, 22mm x 14mm	7016-0022	Component Stenciling Tool, 42.5mm x 32.5mm	7016-0041
Stencil, 14mm x 22mm x 119	1014-0119-P1	Stencil, 42.5mm x 32.5mm x 824	1042-0824-P1
Component Stenciling Tool, 4mm x 4mm LCC		Component Stenciling Tool, 32.5mm x 25mm	7016-0042
w/ Pedestal Top	7016-0024	Stencil, 32.5mm x 25mm x 474	1032-0474-P1
Stencil, 4mm x 4mm x 16	1004-0016-P1	Component Stenciling Tool, 5mm x 4mm	7016-0043-P1
Stencil, 4mm x 4mm x 20	1004-0020-P1	Stencil, 5mm x 4mm x 24	1005-0024-P1
Stencil, 4mm x 4mm x 24	1004-0024-P1	Component Stenciling Tool, 32.5mm x 32.5mm - 4	7016-0044
Stencil, 4mm x 4mm x 28	1004-0028-P1	Stencil, 32.5mm x 32.5mm x 624	1032-0624-P1
Component Stenciling Tool, 31mm x 31mm - 2	7016-0028	Stencil, 32.5mm x 32.5mm x 937	1032-0937-P1
Component Stenciling Tool, 31mm x 31mm - 4	7016-0032	Component Stenciling Tool, 8mm x 8mm	7016-0045
Stencil, 31mm x 31mm x 304	1031-0304-P1	Stencil, 8mm x 8mm x 64	1008-0064-P1
Stencil, 31mm x 31mm x 316	1031-0316-P1	Component Stenciling Tool, 37.5mm x 37.5mm	7016-0046
Stencil, 31mm x 31mm x 329	1031-0329-P1	Component Stenciling Tool, 15mm x 13mm	7016-0049
Component Stenciling Tool, 8mm x 10mm	7016-0031	Stencil, 15mm x 13mm x 165	1015-0165-P1
Stencil, 8mm x 10mm x 48	1008-0048-P1	Component Stenciling Tool, 5mm x 5mm	7016-0050
Component Stenciling Tool, PLCC 28	7016-0033	Stencil, 5mm x 5mm x 32	1005-0032-P1
Stencil, PLCC 28	1012-0028	Component Stenciling Tool, 15mm x 15mm	7016-0051
Component Stenciling Tool, 9mm x 9mm	7016-0034	Stencil, 15mm x 15mm x 148	1015-0148-P1
Stencil, 9mm x 9mm x 56	1009-0056-P1	Component Stenciling Tool, 6mm x 5mm	7016-0052
Stencil, 9mm x 9mm x 64	1009-0064-P1	Stencil, 6mm x 5mm x 32	1006-0032-P1
Component Stenciling Tool, 24mm x 24mm - 4	7016-0035	Component Stenciling Tool, 10mm x 10mm	7016-0053
Stencil, 24mm x 24mm x 241	1024-0241-P1	Stencil, 10mm x 10mm x 64LCC	1010-0064-P1
Component Stenciling Tool, 6mm x 6mm	7016-0036	Stencil, 10mm x 10mm x 128	1010-0128-P1
Stencil, 6mm x 6mm x 40	1006-0040-P1	Stencil, 10mm x 10mm x 151	1010-0151-P1
Component Stenciling Tool, 7mm x 7mm	7016-0038	Component Stenciling Tool, 21mm x 21mm	7016-0055
Stencil, 7mm x 7mm x 32	1007-0032-P1	Stencil, 21mm x 21mm x 156	1021-0156-P1
Stencil, 7mm x 7mm x 48	1007-0048-P1	Component Stenciling Tool, 14mm x 8mm	7016-0056
Stencil, 7mm x 7mm x 49	1007-0049-P1	Stencil, 14mm x 8mm x 63	1014-0063-P1
Stencil, 7mm x 7mm x 113	1007-0113-P1	Component Stenciling Tool, 16mm x 8mm	7016-0057
Component Stenciling Tool, 45mm x 45mm	7016-0037	Stencil, 16mm x 8mm x 60	1016-0060-P1
Stencil, 45mm x 45mm x 600	1045-0600-P1	Component Stenciling Tool, 42.5mm x 42.5mm	7016-0058
Stencil, 45mm x 45mm x 731	1045-0731-P1	Stencil, 42.5mm x 42.5mm x 560	1042-0560-P1

Number after component dimension represents number of layers in components substrate. Number after dimension of stencil represents ball count.

# BGA REBALLING KITS

Don't throw away good components, reball and reuse them!

Reballing kits contain everything you need to reball components: flux, solder spheres, tweezer, brush, and reballing fixture with additional screen. Components can be reflowed using the TF 3000 or a reflow oven.



REBALLING KIT	PART NUMBER	REBALLING KIT	PART NUMBER	REBALLING KIT	PART NUMBER
Kit, Reballer BGA 36	4017-0001-P1	Kit, Reballer UBGA 256	4017-0038-P1	Kit, Reballer BGA 560	4017-0074-P1
Kit, Reballer BGA 40	4017-0002-P1	Kit, Reballer BGA 256	4017-0039-P1	Kit, Reballer SBGA 560	4017-0075-P1
Kit, Reballer FPBGA 44	4017-0003-P1	Kit, Reballer BGA 257	4017-0040-P1	Kit, Reballer BGA 564	4017-0076-P1
Kit, Reballer UBGA 46-33MB	4017-0004-P1	Kit, Reballer PBGA 272	4017-0041-P1	Kit, Reballer CBGA 575	4017-0077-P1
Kit, Reballer UBGA 46-16MB	4017-0005-P1	Kit, Reballer BGA 272	4017-0042-P1	Kit, Reballer PBGA 600	4017-0078-P1
Kit, Reballer BGA 48	4017-0008-P1	Kit, Reballer BGA 292	4017-0043-P1	Kit, Reballer SBGA 600	4017-0079-P1
Kit, Reballer UBGA 62	4017-0009-P1	Kit, Reballer BGA 304	4017-0044-P1	Kit, Reballer TBGA 696	4017-0080-P1
Kit, Reballer FPBGA 64	4017-0010-P1	Kit, Reballer BGA 313	4017-0046-P1	Kit, Reballer BGA 100	4017-0081-P1
Kit, Reballer FPBGA 69	4017-0011-P1	Kit, Reballer BGA 320	4017-0047-P1	Kit, Reballer LFBGA 100	4017-0082-P1
Kit, Reballer BGA 69	4017-0012-P1	Kit, Reballer TFBGA 324	4017-0048-P1	Kit, Reballer TFBGA 48	4017-0083-P1
Kit, Reballer FPBGA 72	4017-0013-P1	Kit, Reballer BGA 325	4017-0049-P1	Kit, Reballer BGA 233	4017-0084-P1
Kit, Reballer LFPBGA 84	4017-0014-P1	Kit, Reballer BGA 348	4017-0050-P1	Kit, Reballer TFBGA 64	4017-0085-P1
Kit, Reballer BGA 100	4017-0015-P1	Kit, Reballer BGA 352	4017-0051-P1	Kit, Reballer BGA 177	4017-0086-P1
Kit, Reballer BGA 108	4017-0016-P1	Kit, Reballer SPBGA 352	4017-0052-P1	Kit, Reballer BGA 169/2	4017-0087-P1
Kit, Reballer BGA 119	4017-0017-P1	Kit, Reballer SBGA 352	4017-0053-P1	Kit, Reballer LFBGA 80	4017-0088-P1
Kit, Reballer BGA 131	4017-0018-P1	Kit, Reballer TBGA 352	4017-0054-P1	Kit, Reballer TFBGA 48	4017-0089-P1
Kit, Reballer BGA 144	4017-0019-P1	Kit, Reballer BGA 356	4017-0055-P1	Kit, Reballer TFBGA 64	4017-0090-P1
Kit, Reballer UBGA 144	4017-0021-P1	Kit, Reballer PBGA 357	4017-0056-P1	Kit, Reballer LFBGA 64	4017-0091-P1
Kit, Reballer BGA 168	4017-0022-P1	Kit, Reballer CBGA 360	4017-0058-P1	Kit, Reballer LFBGA 144	4017-0092-P1
Kit, Reballer BGA 169	4017-0023-P1	Kit, Reballer BGA 388	4017-0059-P1	Kit, Reballer LFBGA 132	4017-0093-P1
Kit, Reballer BGA 180	4017-0024-P1	Kit, Reballer BGA 400	4017-0060-P1	Kit, Reballer TFBGA 168	4017-0094-P1
Kit, Reballer TBGA 192	4017-0025-P1	Kit, Reballer BGA 404	4017-0061-P1	Kit, Reballer TFBGA 100	4017-0095-P1
Kit, Reballer BGA 192	4017-0026-P1	Kit, Reballer BGA 421	4017-0062-P1	Kit, Reballer LFBGA 120	4017-0096-P1
Kit, Reballer CBGA 196	4017-0027-P1	Kit, Reballer BGA 428	4017-0063-P1	Kit, Reballer TFBGA 320	4017-0097-P1
Kit, Reballer UBGA 196	4017-0028-P1	Kit, Reballer PBGA 432	4017-0064-P1	Kit, Reballer BGA 241	4017-0098-P1
Kit, Reballer BGA 208	4017-0029-P1	Kit, Reballer BGA 452	4017-0066-P1	Kit, Reballer BGA 113	4017-0099-P1
Kit, Reballer BGA 216	4017-0030-P1	Kit, Reballer BGA 456	4017-0067-P1	Kit, Reballer BGA 153	4017-0100-P1
Kit, Reballer BGA 217	4017-0031-P1	Kit, Reballer TBGA 480	4017-0068-P1	Kit, Reballer SBGA 652	4017-0101-P1
Kit, Reballer BGA 225	4017-0033-P1	Kit, Reballer BGA 480	4017-0069-P1	Solder Spheres, 25,000 spheres, .020 diameter	6993-0231-P1
Kit, Reballer BGA 255	4017-0034-P1	Kit, Reballer BGA 492	4017-0070-P1	Solder Spheres, 10,000 spheres, .025 diameter	6993-0232-P1
Kit, Reballer SBGA 256	4017-0035-P1	Kit, Reballer TBGA 500	4017-0071-P1	Solder Spheres, 10,000 spheres, .030 diameter	6993-0233-P1
Kit, Reballer TBGA 256	4017-0036-P1	Kit, Reballer BGA 548	4017-0072-P1		
Kit, Reballer CBGA 256	4017-0037-P1	Kit, Reballer BGA 553	4017-0073-P1		

# PRODUCT PAGE

For a complete product listing contact PACE or visit [www.paceworldwide.com](http://www.paceworldwide.com)

PACE provides innovative solutions, products and training for the assembly, rework, repair and testing of printed circuit boards. PACE's unique capabilities and evolving vision have provided universal solutions to thru-hole and surface-mount assembly and rework problems for the most advanced electronics. Our strong commitment

and history of achievement has resulted in an unparalleled range of Assembly, Repair and Fume Extraction systems to meet your company's needs whether working to ISO-9000, industrial, military or your own internal specifications. Whatever the challenge, PACE stands ready to provide the best, cost-effective solution for you.

<p><b>HEATWISE/TEMPWISE</b></p> <p>HeatWise and TempWise systems feature a handpiece possessing the latest in ergonomic design and operator comfort and use replaceable tip/heater cartridge(s). The ability to change performance level without having to change tips results in significant cost savings and inventory reduction.</p>	<p><b>HW 100</b></p> 	<p><b>POWER MODULES</b></p> 	<p><b>TW 100</b></p> 	<p><b>INSTACAL™</b></p> 
<p><b>ST SYSTEMS</b></p> <p>This product line offers three basic configurations: production soldering, shop air desoldering and fully self-contained desoldering. Each of these basic configurations are available in either analog or digital versions.</p>	<p><b>ST 25</b></p> 	<p><b>ST 55</b></p> 	<p><b>ST 85</b></p> 	<p><b>ST 115</b></p> 
<p><b>MBT/PRC SYSTEMS</b></p> <p>PACE offers a broad range of rework and repair products to meet all your repair needs. Whether you are replacing a surface mount component, repairing a multi-layer printed circuit board, or making a plated thru-hole repair.</p>	<p><b>MBT 250</b></p> 		<p><b>PRC 2000</b></p> 	
<p><b>THERMOFLO SYSTEMS</b></p> <p>The PACE family of ThermoFlo hot air systems offers a complete solution for virtually all surface mount, BGA and CSP applications. From hand-held rework and repair to the production line.</p>	<p><b>TF 200</b></p> 	<p><b>TF 500</b></p> 	<p><b>TF 700</b></p> 	
<p><b>FUME EXTRACTION</b></p> <p>PACE offers Fume Extraction Systems that feature the latest advancements in filter condition monitoring and process control as well as cost effective solutions. A variety of collection accessories are available.</p>	<p><b>ARM-EVAC 105</b></p> 	<p><b>ARM-EVAC 50</b></p> 	<p><b>FUMEFLO WORKTABLE</b></p> 	<p><b>LAB-EVAC 150</b></p> 

## A WORLDWIDE COMMITMENT

With offices worldwide, PACE is a recognized world leader in the development of solutions for the assembly and repair of highly advanced electronics. Our expertise extends back to the dawn of the modern electronics industry. In 1958, PACE introduced training programs for the repair of printed wire assemblies, and soon after, revolutionized the industry by creating the first self-contained vacuum desoldering system.

Today, PACE continues to provide innovative solutions, products and training for the rework, repair and testing of printed circuit assemblies. Our unique capabilities and evolving vision have provided universal solutions for thru-hole and surface mount assembly and rework problems in the most advanced electronics.

Additionally, PACE manufactures Fume Extraction Systems to reduce exposure to harmful particulates and gases created from hand soldering operations. PACE Fume Extraction Systems effectively remove these contaminants from the worker's breathing zone thereby reducing or eliminating health risks and improving productivity.

Our strong commitment and history of achievement has resulted in an unparalleled range of Assembly, Repair and Fume Extraction solutions to meet your needs whether working to ISO-9000, industrial, military or your own internal specifications. Whatever the challenge, PACE stands ready to help you set a new standard.



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P/N 5400-0122 09/02

## A CUSTOMER COMMITMENT

In 2001 the distinguished Frost & Sullivan Award for the World Surface Mount Technology Rework and Repair Equipment Industry was bestowed upon PACE.

The Frost & Sullivan Market Engineering Customer Service Leadership Award is presented to companies that have demonstrated superior responsiveness to customer needs and value-added support in technology and services.

PACE was selected based upon independent research with customers, key market participants and even our competition. This award reiterates PACE's commitment to excellence from product concept to customer service in the field. Frost & Sullivan's research recognizes that the key to PACE's success in the industry is our interactive approach with customers to provide solutions and respond to end-user feedback when developing products.

In 2002 PACE was awarded World Class Status, signifying that PACE uses best practices in its design, development and manufacturing processes to provide the finest quality products to its customers at the lowest possible cost. The first Maryland based company to receive this coveted award, PACE stands alone in its market segment in achieving this highly regarded status.

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PACE products meet or exceed all applicable military and civilian EOS/ESD, temperature stability and other specifications, including MIL-STD-2000, ANSI/J-STD-001, IPC 7711, IPC 7721 and IPC-A-610.

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