Fine Pitch SMD/ Flip Chip
Placement and Bonding Equipment System

FINEPLACER

THE FINEPLACER TECHNICAL MANUAL

Part A: Basic Machine "PICO"

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1. Hints For Using This Manual

Please read the safety instructions first before operating the FINEPLACER

- Have a look at the pictures before reading the operating instructions to familiarize yourself with the FINEPLACER. Start with the basic machine and do the same with each module belonging to your special system configuration.
- Read the operating instructions.
- Read the maintenance instructions. On the next pages you will find the most important points for avoiding problems.
- In case of defects, and before dismantling anything, contact your dealer or the manufacturer.

Perform the same procedure for all other optional module-concerned parts attached after part A.

2. General Information About FINEPLACER Systems and this Manual

This manual will be updated regularly. However, it is possible that it does not cover all the details of your equipment accurately. Further, it may be subject to errors and technical changes, especially those made on a customer's request. For optional modules, see also specific manual sections.

Assured properties must be agreed upon by contract expressly and in writing.

The trade name 'FINEPLACER' is now registered with Systems 2000 GmbH within the United States of America.

2.1 Application of the FINEPLACER A4 "PICO"

The "PICO" is designed to position fine pitch devices e.g. BGA, CSP, Flip Chips and Flip Chip assemblies, optoelectronic components, microelectromechanic systems (MEMS), (MOEMS), sensors, micro optics, TAB, bare chips and other high-count surface mounted devices (SMD). The FINEPLACER® System is based on a unique placement principle integrated into five machine models according to the type and sizes of the various components and substrate dimensions.

Using the highly accurate Vision Alignment System (**VAS**), the FINEPLACER® "PICO" is designed to accurately place the component on the first attempt. As its accuracy is 5 µm, it is possible to position new technology components with very fine pitch uniformly and accurately.

Optional accessories include special optics for positioning large fine pitch devices on their substrates and high magnification systems for observing chip bonding. All state of the art bonding technologies can be performed, such as thermocompression, ultrasonic/thermosonic bonding, ACF bonding using transparent or opaque films as well as liquid conductive pastes, UV cure and bonding of C4 chips is also possible. Due to the

modular system, the necessary configuration may easily be optimized, corresponding to your individual requirements. As with every FINEPLACER®, the "PICO" allows cost effective and safe manual component placement and bonding at one work station and in the same operation.

Additionally it is possible to use the PICO for rework purposes with the optional available FINETECH modules e.g. Soldering Arm, COMISS Reflow Module Top and Bottom Heating.

2.2 Operating Principle, System Features

The patented advanced Vision Alignment System of the "PICO" is based on the principle of imaging two orthogonal images simultaneously into one common image plane, using a stationary beam splitter (30) and a single beam deflection (see fig. 1):

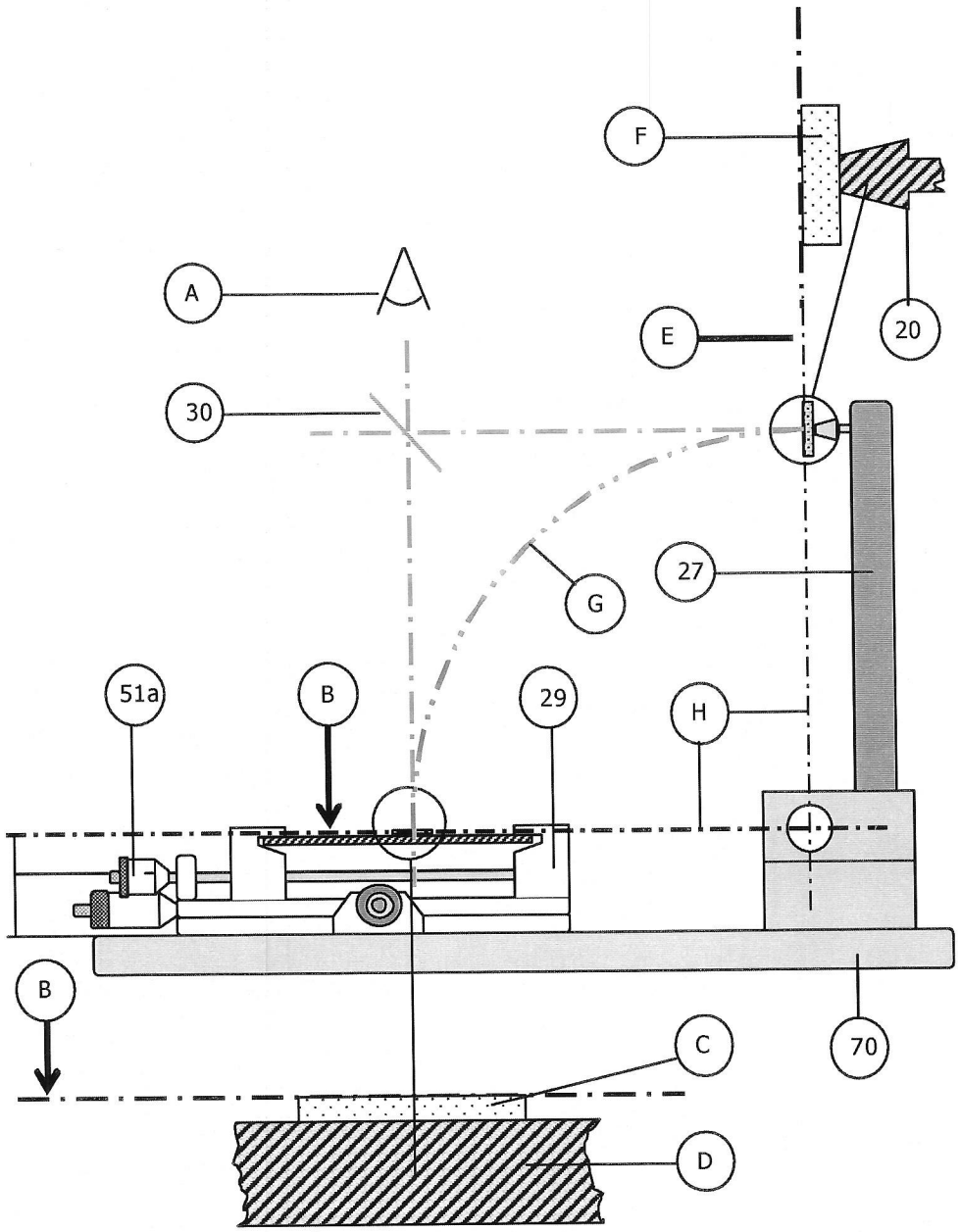


Fig. 1: Operating principle of the A4 with height adjustable table (sketch of the lateral view, right hand side)

A	Observation point (microscope or camera)	B	Working level
C	Bottom glass scale or substrate	D	Surface of the heating
E	UAP Upper Arm Position	F	Top glass scale or component
H	Working level and UAP must form angle of 90°		

The configuration shown in fig. 1 allows orthogonal view of the objects component (F) and substrate (C), so both are seen to be observed "vertically from above" (A). The overlay image allows a comparison of all connectors on each component lead with each substrate pad at a glance.

2.3 Method of Working, Positioning and Placement

To adjust the positioning table (29) manually, observe the dual image overlay through the microscope or with an optional video system. Coarse align using the air cushion, fine align by means of the micrometer screws. Angular deviations are eliminated by turning the positioning table around an electromagnet mounted in the optical axis.

After alignment place the component (F) held at the positioning head (20) on the substrate (C) by simply swinging down the pivot arm (27) following the curve (G). To release the component, switch off the placement head's vacuum by pressing the vacuum foot switch.

FOR AN ACCURATE PLACING IT IS AN ESSENTIAL PRECONDITION, THAT

- THE TABLE HEIGHT HAS BEEN BROUGHT INTO THE WORKING LEVEL (B) WITH THE HELP OF THE MICROMETER SCREW (51A) AND THAT THE **U**PPER **A**RM **P**OSITION (UAP) HAS BEEN ADJUSTED AS DESCRIBED IN 4.2.2, SO THAT LEVEL (B) AND (E) FORM AN RIGHT ANGLE.
- IN CASE OF RFLOW APPLICATION A POSITIONING TABLE WITHOUT Z-ADJUSTMENT HAS TO BE USED. IN THIS CASE THE CORRECT WORKING HEIGHT OF THE BOARD IS ACHIEVED BY THE SHAPE OF THE TABLE'S CLAMPING TRACKS.
- THE BEAM SPLITTER (30) HAS BEEN ADJUSTED CORRECTLY AS DESCRIBED IN 4.2.3. IT IS NOT NECESSARY TO PERFORM THE ADJUSTMENT PROCEDURE BEFORE EACH WORKING PROCESS BUT TO CHECK IT OCCASIONALLY.

2.4 Purpose Of The Equipment; Warning Against Misuse; Warranty Conditions

The FINEPLACER® equipment is intended only for industrial and skilled trade use and must be run and serviced by qualified personnel only. Everyone must observe the caution, circumspection, and responsibility required to run this equipment, consisting of mechanical, optical, mains powered, electromechanical and electrical heating appliances, and possibly using compressed air or an inert gas. Operators must not be under the influence of alcohol or other drugs and must not allow their attention to be distracted.

FINEPLACER® equipment is designed to be used solely for work on components and substrates in the way intended in a configuration agreed with FINETECH and together with FINETECH approved equipment. In other cases it must be expressly agreed in writing with FINETECH GmbH, Berlin, Germany, under the conditions stated in the manual. Any other use, changes, use of foreign controls or procedures not laid down in this manual may cause risks. Any single, complete FINEPLACER® Base Module in proper working condition, with or without additional optional FINETECH modules, is considered

3. The FINEPLACER® System

3.1 Introduction

Like each FINEPLACER®, the "PICO" has been designed for versatile use and ease of operation and maintenance, and is designed to be run with functional modules. The operator should thoroughly understand the function and control of each module and tool in the system before using it.

The numbers of machine parts given in brackets correspond to the numbers in table 2 of this text.

The 'PICO' consists of the following parts:

- Base Module with base plate (70), support arm (71), stationary beam splitter optics (30), lighting, microscope (18) and positioning table (29), further Placer Control Box (39), table foot switch connector (9) and vacuum foot switch connector (65), as well as cables and hoses.
- In the configuration as Flip Chip Bonder
  - Placer arm (27.1) with and without Theta fine rotation, to hold optional tools during alignment, placement and process
  - Auxiliaries, e.g. optional pipette (24) or laser target finder (1)
  - Optional height adjustable positioning table (29)
  - Vision modules, e.g. HU, HH, MIRAGE 96 or side camera with common video monitor
  - Heat generating process modules, e.g. chip contact heating module, ultrasonic module, ACF module and heating plates
  - Various placement heads (20.1), as well as unheated and heated pick&place tools in standard or customized versions
  - Bonding force modules, manual and automatic
- In the configuration as Reflow/Rework Machine
  - Reflow arm to hold optional tools during alignment, placement and process
  - Auxiliaries, e.g. optional pipette (24) or laser Target finder (1)
  - Vision modules, e.g. MIRAGE, as well as observing and inspection video module with common video monitor
  - Optional standard or customized soldering heads
  - Various top and bottom heating modules, e.g. COMISS reflow module and hot gas bottom heatings

FINEPLACER®s may additionally be equipped with further optional modules supplied by FINETECH, most of them to be retrofitted easily to adapt to customer's changed or increasing requirements.

3.2 Major Assemblies of the Base Module

3.2.1 **Base Plate (70)**

The base plate carries the support arm (71) and the pivot bearing with the pivot arm (27.1 or 27.2). It is possible to mount pivot arms for placement/bonding or for reflow/rework requirements.

The base plate serves as a highly precise finished gliding plane for the positioning table (29), and also contains an electromagnet which locks the table in the FINEPLACER®'s optical axis as soon as the air cushion is deactivated. This allows θ fine rotation without lateral movement.

The base plate rests on three foot screws to level it. Please check the horizontalism using the level glass (14) to adjust the screws until the base plate is horizontal in the x and y axis. This will avoid unintentional movement of the positioning table when the foot switch is pressed.

3.2.2 **Height Adjustable Positioning Table**

The height adjustable positioning table (29) has the following properties:

- Rests on the base plate (70). Carries clamping tracks (optionally height adjustable), to hold in a substrate, a substrate support plate or a FINEPLACER® heating plate to hold the substrate.
- Secures the substrate position by its mass and friction against the base plate (70), supported by an electromagnet buried in the base plate.
- Can be moved easily for coarse positioning on an air cushion so that it may float above the base plate (70), using the micrometer screws (50) and (51) as temporary handles. Once coarse positioning is achieved, releasing the foot switch will lock the table in the optical axis.
- The substrate's or PCB's position can be fine aligned using the x and y micrometer screws.
- Substrate or PCB can be rotated around the optical axis to achieve Theta correction, while electromagnetical locking prevents them against accidental x or y shifting.

A fundamental rule is that the height of the placement surface of the substrate or PCB must be equal to that of the pivot arm's axis. To achieve this with substrates to be laid onto heating plates or support plates, the continuously height adjustable tracks of the positioning table should be used. If z adjustment is not available at the existing positioning table, please use spacers or multi step carriers to maintain the correct working height. FINETECH will be pleased to give advise and offer you the necessary parts.

3.2.3 **Support Arm**

The support arm (71) holds the following parts:

- Vision/observation devices, basically consisting of the stationary mounted beam splitter optics (30), providing the dual image overlay, a microscope (18) and/or a video option. These are used to view the super-imposed image of the substrate's pads and the corresponding component leads.

- The microscope can be used for adjusting the FINEPLACER® itself and for aligning devices with the substrate. In many cases alignment is also possible by video, using MIRAGE-96 (type code FV4) or any other video tube (e.g. FV2, FV3), mounted to the microscope. Some video systems (RW1, FW1) can be used simultaneously, independent from the microscope.
- Lighting, where halogen lamps on goosenecks are standard, but fiber optic lighting (AC2) is recommended. Coaxial lighting (AC3) is useful in special cases, e.g. in case of ITO substrates.
- The laser target finder (AC1) is optionally available in two versions: "Single point" just for finding the target on the substrate and "dual point" also to adjust the two focus planes of the FINEPLACER® in order to avoid parallax errors.
- Pivot bearing for the pivot arm (27). Zero play of the bearing and stiffness of the arm are fundamental for the PICO's outstanding placement accuracy.
- Electrical connector for the placer control (26), containing the power supply for the base plate's electro magnet, the goose neck lights (if existing) and the laser target finder (if existing), as well as the air connector (4) for the positioning table's air supply.
- Holder (30) and adjustment means for beam splitter (33)
- Adjustment screw for the upper position (UAP) of the pivot arm (72)
- Adjustment screw for the lower position (LAP) of the pivot arm (89)

3.2.4 **Pivot Arm**

The pivot arm may be e.g. a placement arm (27.1), a reflow arm (27.2) or an ultrasonic arm. Further special arms may become available in the future. Pivot arms have their own cables and hoses for energy transfer and control. Each arm is equipped with a hose for the vacuum holding the component to be placed in the tool. Further it contains signal cabling for the tilt switch used to sense if the arm is in vertical or horizontal position. The tilt switch influences many equipment functions, e.g. which one of the FINEPLACER®'s video cameras is active.

The arm is mounted to the pivot log by only 2 screws (148) so it may be changed easily if required.

Placement arms with theta fine adjustment are available.

3.2.5 **Placer Control Box**

The Placer Control Box is an essential part of any FINEPLACER® base module. It generates and reacts to all signals needed for operating the machine's mechanical part, as well as supplying it with compressed air and vacuum.

The Placer Control Box contains the following basic functional groups:

1. Mains connection
2. Displays and operating elements
3. Generation of vacuum for fixing devices
4. Generation of compressed air for the positioning table's air cushion

5. Placer support, consisting of
   - Lighting control
   - Supervision of pivot arm
   - Control of the locking electromagnet
   - Control of the laser target finder
6. Supply and control of the video cameras
7. Power supply for options
8. RS 232 interface for communication with the PC
9. Finetech Module Interface (FMI) for connecting FINETECH process modules

3.3 Short Description of Basic Functions and Directions for Installation

3.3.1 **Mains Connection**

The Placer Control Box has to be connected to the mains via the POWER IN plug in the rear panel of the box using the supplied cable.

As soon as the Placer Control Box is switched on, the rear mains outlet AUX POWER OUT is energized. Please connect all additional control boxes via the supplied multiple box plugged into AUX POWER OUT. This way all FINEPLACER®-modules are switched on at the same time.

⚠ **CHECK YOUR MAINS VOLTAGE! THE BOX MUST NOT BE CONNECTED TO MAINS VOLTAGES DIFFERENT TO THOSE INDICATED ON THE REAR PANEL'S TYPE PLATE.**

The socket 'POWER IN' contains a fuse which exclusively serves to protect the Placer Control Box but not all the other control boxes connected to the multiple socket.

⚠ **PLEASE TAKE CARE NEVER TO EXCEED THE MAXIMUM OUTPUT CURRENT OF 10 A AT 230 V OR 15 A AT 115 V (RESISTIVE LOAD) RESPECTIVELY DELIVERED BY THE AUX POWER OUT SOCKET.**

There are two different green LED's. The LED 'LINE' indicates the presence of the mains voltage whereas the LED 'ON' is lit as soon as the equipment is switched on.

3.3.2 **Displays and Operating Elements**

The LED **'VACUUM STATUS'** and the interior red lit switch **'VACS OFF'** are used for indication and control of the vacuum. More detailed information about the meaning and function of these elements is given in the following operating instructions of the Placer Control Box (see below).

Pushing the selector switch **'PIPETTE MODE'** changes the working method of the pipette.

3.3.3 **Generation and Connection Of Vacuum And Compressed Air**

The built in vacuum pump operates permanently as soon as the Placer Control Box is switched on. It supplies the placer and the pipette alternately.

In the case of using a placement arm for e.g. thermo compression or ultrasonic bonding, the hose connector of the placement arm is directly connected to the socket HEAD VACUUM OUT of the Placer Control Box. In case of using a reflow arm, the socket HEAD VACUUM OUT is connected to the COMISS control box using the supplied hose. The pipette is always connected to the plug PIPETTE on the front panel.

The compressed air, necessary for the positioning table, is provided at the TABLE AIR OUT connector.

3.3.4 **Placer Support**

The locking electromagnet, the gooseneck lamps (if existing) and the optional laser target finder are connected via the supplied 25 pole cable from the SUB-D socket on the back of the support arm to the SUB-D socket (38) of the Placer Control Box. The Laser Target Finder is switched on as long as the foot switch is pressed to move the positioning table while the pivot arm is in its upright position.

In the case of using a placement arm for e.g. thermo compression or ultrasonic bonding, the electrical cable of the pivot arm is directly connected to the socket PIVOT ARM (66) of the Placer Control Box. In case of using a reflow arm, it is connected to the socket PIVOT ARM of the COMISS control box.

The foot switch for coarse positioning is connected to the socket TABLE FOOT SWITCH (9). An additional foot switch, used for controlling the vacuum, may be connected to the socket PIPETTE FOOT SWITCH (65). For further information, refer to the operating instructions (see below).

3.3.5 **Camera Control And Power Supply For Options**

The 12 V camera power supplies of two video modules (if existing), must be connected to the output sockets CAMERA I (68), color code "yellow" and CAMERA II (69), color code "blue". They are switched on alternately depending on the position of the pivot arm: CAMERA I is on when the arm is in the upright position, CAMERA II is on when the arm is horizontal.

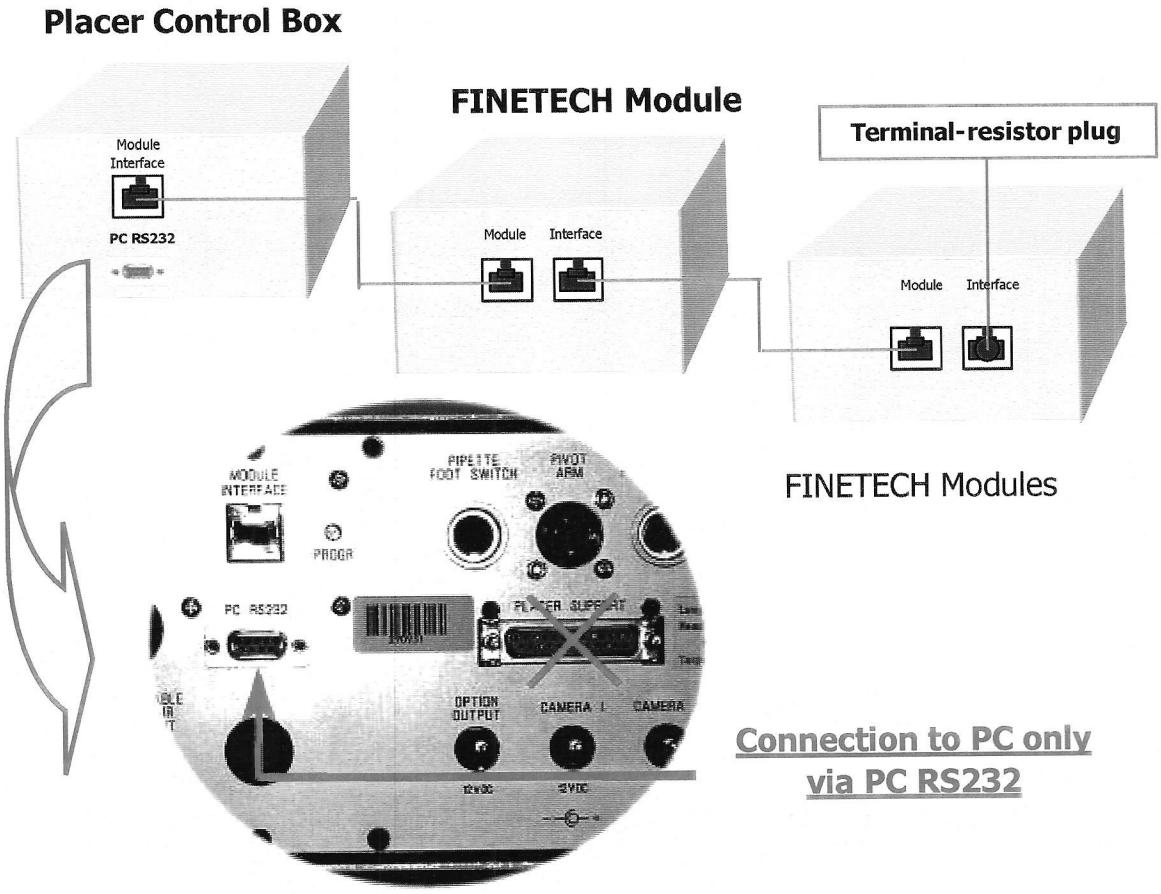
At the socket OPTION OUTPUT (69a), 12 V DC is provided continuously for driving optional devices with a max. current of 600 mA. This output is short protected by an automatic recovery circuit breaker.

3.3.6 **RS-232 Interface**

The Placer Control Box possesses an RS 232 interface. Its connector PC RS-232 (170) is in the back panel. It can be used for linking the PC to the Placer Control Box, allowing communication with the PC. This connector can also be used to change the firmware of the Placer Control Box using FINETECH's firmware update program on the PC.

3.3.7 **FINETECH Module Interface**

All current and future FINETECH® modules will communicate via a common interface bus. Therefore, all FINETECH® boxes must be connected in a chain as shown in the picture above. Begin with the Placer Control Box and connect all further module boxes us-



Connecting PC and Interface Module

ing the delivered interface patch cables (Western Plug) in any order. Please note that the last box in the chain should be terminated with the terminal resistor plug.

3.4 Operating Instructions for the Placer Control Box

3.4.1 Switching on

Press the **POWER** switch to activate the Placer Control Box, together with all connected modules. After each push, the **POWER** switch is disabled for three seconds to avoid unintentional actuation.

⚠ **PLEASE BE AWARE THAT THE PLACER CONTROL BOX CANNOT BE SWITCHED OFF AS LONG AS A COMPONENT IS IN EITHER THE PIVOT ARM OR THE PIPETTE. THIS "COMPONENT RECOGNIZED" STATUS MAY ALSO EXIST IF ANY OBJECT INHIBITS FREE AIR FLOW TO THE ARM VACUUM TUBE OR TO THE PIPETTE.**

3.4.2 Controlling the Brightness of the Lighting

Use the revolution transmitters HEAD (12) and TARGET (41) to control the illumination. They have no mechanical stops at their end positions. Turning the knob clockwise will increase the brightness, turning counter clockwise will decrease it. As soon as the brightness is at its maximum or minimum, a signal is heard.

3.4.3 Understanding the Vacuum Control

The vacuum is used for holding components with the pipette or with the placement head alternately. It can therefore be changed over back and forth between the arm and the pipette. This is necessary for transferring devices e.g. from a tray to a Placement Head, using the vacuum pipette.

THE VACUUM PUMP CANNOT BE SWITCHED OFF SEPARATELY. IF THE FINEPLACER® IS NOT IN USE FOR A LONGER PERIOD OF TIME, TO SAVE THE PUMP, SWITCH THE MACHINE OFF AT THE MAIN SWITCH.

The vacuum status is shown by three LEDs:

- LED in the handle of the arm — color: green
- LED in the vacuum pipette — color: yellow
- Duo LED in the front panel of the Placer Control Box — color: green/yellow

Table 1 gives further explanations:

TABLE 1

Vacuum	Arm LED	Pipette LED	LED "VACUUM STATUS"
at the arm, no component recognized	flashing	off	flashing green
at the arm, component recognized	flashing	off, if arm horizontal on, if arm vertical	on green
at the pipette, no component recognized	off	flashing	flashing yellow
at the pipette, component recognized	off	flashing	on yellow

A permanently shining pipette LED signals a "disabled" pipette. This status occurs in the following cases:

- Arm vertical, component recognized at the head.
- Arm horizontal and vacuum foot switch actuated for longer than 3 seconds, vacuum changed over from the arm to the pipette permanently.

If the vacuum is at the pipette, and no component is recognized, the vacuum can be switched back to the arm by lowering it to the horizontal position and lifting it up again to vertical. This status is equivalent to that after switching on the machine.

If the vacuum is at the pipette and a component is detected on it, changing the arm position will not initiate a switch-back of the vacuum to the arm and the component will remain at the pipette.

When the arm is in the horizontal position, it is possible to switch the vacuum to the pipette permanently. To do this, the vacuum foot switch has to be pressed for longer then three seconds.

3.4.4 Vacuum Control Safety System

The Vacuum Control Safety System minimizes the possibility of component loss caused by faulty operation. For visualization and handling of the Vacuum Control Safety System status, the red lit switch **VACS OFF** is used.

After switching on the Placer Control Box, the safety system is permanently active. The lamp in the **VACS OFF** switch is off. To deactivate the safety system permanently, press the **VACS OFF** switch for longer than three seconds. After three seconds, the deactivation of the safety system is indicated by the **VACS OFF** switch, which shines red permanently, independent of the arm position.

To re-activate the safety system, press the **VACS OFF** switch for longer than three seconds again. After this, the light in the switch goes out indicating the safety system is active again.

It is also possible to deactivate the safety system temporarily. For this, the arm has to be in the vertical position, and a component has to be recognized either in the head (**VACUUM STATUS** shines green permanently) or in the pipette (**VACUUM STATUS** shines yellow permanently). To unlock the safety system temporarily, the **VACS OFF** switch needs to be pressed for a short time only (< 3 s). This unlocked status is indicated by a red flashing of the switch. After the pipette switch or the vacuum foot switch is actuated once, the safety system is re-activated (**VACUUM STATUS** LED off again).

PLEASE TAKE INTO ACCOUNT THAT THE VACUUM FOOT SWITCH IS DISABLED AS LONG AS THE ARM IS IN ITS UPRIGHT POSITION.

3.5 Parts, Controls and Indicators

TABLE 2		
REF #	**NAME**	**FUNCTION**
1	Laser Target Finder	Laser pointer positioning device
4	Table air bearing connector I	Air hose coupling to connect the hose to the Control Box (39), fitting (7)
4a	Table air bearing connector II	Air hose coupling between support arm (71) and positioning table (29)
4b	Air outlet socket	At the left side of the support arm (71), to be connected with the table air bearing connector (4a)
7	Table air outlet	Hose fitting at the Placer Control Box (39) for the positioning table (29) air cushion, supplies compressed air to (4) by hose (87) when foot switch is pressed
8	Locking screw	Locks bearing screw in place NEVER TURN THIS SCREW!
9	Socket TABLE FOOT SWITCH	Socket for the foot switch. Pressing switch deactivates electromagnetical locking of positioning table. Activates table's air cushion for movement during coarse alignment
11	Arm handle	Handle to operate the Positioning or Reflow Arm with LED for vacuum status and release button to switch the vacuum on or off
12	Head lamp intensity knob	Used to control the brightness of the head lighting
14	Level glass	Use to control the inclination of the base plate with the leveling screws (15)
15	Leveling screws	Must be adjusted if base plate (70) is out of level
18	Zoom microscope	Used to view alignment of component and substrate and to adjust FINEPLACER® placement accuracy
19	Parallelism fine adjustment screw	Rotates the tool around the x-axis to compensate an angular deviation between tool and working plane
19a	Locking screws	Locking screws for parallelism adjustment (19)
20.1	Placement head	Fits into head receiver (25) and is locked with screw (21), holds component to mount The figure shows a Heated Pick and Place Tool with cooling option
20.2	Reflow Head	Fits into Reflow Arm and is locked with lever (21.2), holds components
20a	Cooling for the Heated Pick and Place Tool	Outlet for compressed cooling air
20b	Plug for the Heated Pick and Place Tool	Connector plug to the socket of the corresponding Control Box
21.1	Placement head screw of the Placer Arm	Locks the placement head (20) in the head receiver (25)
21.2	Clamping lever	Locks placement Reflow Head (20.2) Reflow Arm (27.2)
24	Pipette (with automatic vacuum switch-over)	Vacuum pickup device for moving component to and from a tray and vice versa
25	Placement head receiver	Holds the placement head (20) at the placer arm.
26	25-pin Sub D electrical connector (mounted plug)	Provides electrical power to the lighting devices and to the magnet of the base plate.
27.1	Placement Arm	Holds component in position during alignment and placement

27.2	Reflow Arm	Holds Reflow Heads during alignment and reflow process
28	Arm plug	Connection between placer arm and Placer Control Box (39), socket (66)
29	Positioning table	Holds a substrate, a substrate support plate or a heating plate. Floats on air cushion above the base plate (70) for coarse positioning. Available with or without z adjustment
30	Beam splitter optics holder see 4.2.3	Hold the beam splitter
33	Beam splitter	Beam splitter optics assembly
34	Release button for front track	Locks or releases front track (23) of positioning table
38	25-pin Sub D Placer Control Box panel socket	Electrically connects control box (39) to support arm (71) via connector (26)
39	Placer Control Box	Controls all electronic, lighting, vacuum and air cushion/magnet requirements of the FINEPLACER® Base Module's placement and control functions. Features mains power switching for optional modules
41	Target lamp intensity knob	Used to control the brightness of the target lighting
44	Head vacuum male connector (Vacuum filter at vacuum hose, #006)	Connects vacuum hose to head vacuum female connector (46) at the rear of the Placer Control Box (39) to provide vacuum to head receiver (25)
45	Vacuum status LED	Indicates vacuum status see 3.4.3
46	Head vacuum socket	To accept arm vacuum filter (44)
46a	Vacuum fine adjusting valve	Vacuum fine regulation for the recognition of components at the used placement head
47	Vacuum mode switch	See operating instructions of chapter 3.4.3
	"AUTO"	Vacuum can be switched over from the placement head (20.1) or Reflow Head (20.2) to the pipette (24) by pressing the pipette slightly on the body of the component to catch it
	"EXT"	Vacuum can be switched by an additional switch, e.g. a foot switch, connected to socket (65)
48	Observing and Inspection Camera	Camera assembly, option RW1, RW2 ...
50	x micrometer screw	Acts as a handle to position x-y positioning table (29) during x-y coarse- and Θ fine alignment; used for fine positioning in x axis during final alignment
51	y micrometer screw	Acts as a handle to position x-y positioning table (29) during x-y coarse- and Θ fine alignment; used for fine positioning in y axis during final alignment
51a	Z micrometer screw see 2.2	Height adjust for the positioning table; used for fine adapting the working level
54	Vacuum status	Indicates the vacuum status of the head and pipette. See 3.4.3
55	VACS off	Switch to turn on/off the Vacuum Control Safety System, see 3.4.4
57	Mains Power pushbutton	Applies primary AC power to Placer Control Box (39) and optional modules connected to (62 e), by power relay (max. 10 A at 230V, 15 A at 115 V). Can't be switched OFF if the pivot arm (27) is upright and a component is in the placement head
58	Power ON indicator	When 'ON', indicates that the DC supply for the electronics in the Placer Control Box (39) is active

59	Magnification changer	Switches/zooms magnification of the microscope (18).
61	Vacuum pipette socket	Connects vacuum and pipette switch signal from Placer Control Box (39) to vacuum pipette (24).
62 e	Aux. power female connector	Supplies mains voltage to video monitor and other optional modules via switch (57) and power relay
62 f	Mains male connector	Connects Placer Control Box (39) to power inlet cord
65	Socket VACUUM FOOT SWITCH	Connects foot switch to Placer Control Box
66	Socket PIVOT ARM	For plug (28) from pivot arm (27) or from COMISS control box
68	Camera connector socket: CAMERA I, yellow	Supplies 12 V DC to optional video module, e.g. FV2, switched on when the arm is raised, connect with the yellow marked plug
69	Camera connector socket: CAMERA II, blue	Supplies 12 V DC to optional video module, e.g. FW1, switched on when the arm is lowered, connect with the blue marked plug
69a	Option output	Permanent 12 V DC outlet for optional devices, e.g. additional camera
70	Base plate	Supports major assemblies
71	Support arm	Supports microscope (18), beam splitter, lighting and other vision options
72	Upper arm position (UAP) adjustment, see 4.2.2	Adjusts upper arm position, important for positioning accuracy of pivot arm (27)
75	Supply lines	Cables, hoses etc. must be connected to the corresponding Control Box(es)
89	Lower Arm Position (LAP) lever	Allows the pivot arm (27) to be moved carefully for exact placement
90	Harting Plug	Connection between Reflow Arm and COMISS Control Box, put together all necessary supply lines
148	Arm fastening screws	2 pcs. of 4 mm hexagon socket screws, M5 thread, included in the pivot arm assembly, for fixing the pivot arm (27)
151	Power LED "LINE"	In the front panel of the Placer Control Box (39), ON means that the mains is connected and live
152	Earth terminal	At the back panel of the Placer Control Box (39) connected to GND internally, for connecting antistatic leads from other modules
159	Fine rotation micrometer screw	Optional device, fine rotates the head together with the component to correct the angle deviation Θ (Theta)
160.1	Height adjustable tracks with V-shaped slots	To hold the clamped in substrate support or Heating Plate in place, which can be height adjusted with the z-micrometer screw (51a) to find the correct working level see 2.2
160.2	Fixed height tracks with clamping screws	To hold the clamped in substrate, heating plate, support plate, PCB or any other device in place
161	Lamp holder	In this configuration retrofitted for cold light illumination
167	Fitting for compressed air	Supplies the cooling (20a) with compressed air via corresponding Control Box
170	RS 232 connector	Serial connection to a free COM-port of the PC, see 3.3.6
171	Programming switch	Turns the programming mode on/off (only for firmware updates). If activated, it shines red. **IT MUST BE SWITCHED OFF FOR THE COMMON WORKING PROCESS!**

172	Module Interface	Connection for the Module Interface Bus (special cable supplied), which provides the communication between all Control Boxes of further modules and the PC within a FINETECH System. The last Control Box at the end of this bus must be terminated with a terminal resistor plug.
173	Illumination Control	Connection for the optional Cold Light Illumination

4. Instructions For Set-up

4.1 Initial Set-up of the FINEPLACER®

4.1.1 Preparation of the basic Components and Subassemblies

1. See safety instructions, chapters 2.5 to 2.9. !
2. Set-up should take place in a low-dust room. The base plate (70) on which the positioning table (29) floats, and the underside of the positioning table should be cleaned thoroughly with a clean, dry, soft clothe before use. Put the positioning table onto the base plate. Keep the base plate clean at all times!
3. When the equipment is set up, level the ground plate by adjusting the leveling screws (15) below the base plate. After interconnecting cables and hoses to the Placer Control Box (39), verify that the level has a minimum lateral descent so that the positioning table will not float uncontrolled in any direction.
4. The alignment of the superimposed image of the component as well as the subject may be impaired by any light from the background. A dark wall or screen behind the erected pivot arm (27) will improve this. Take care not to blind operators in adjacent work stations.

Installation of microscope (18) and Vision Modules:

- Ensure that you installed the correct type of microscope belonging to this FINEPLACER® PICO version. Because of their different working distances, different objective lenses are used in our individual machines. In case of blurred image, first compare the S/N of the microscope you are using with the delivery note entry.
- Choose a suitable set of eyepieces, referring to the required magnification and viewing area. If in doubt, consult table 3.
- Mount the microscope (18) on the upper part of the support arm (71). A suitable adaptor ring is usually fitted to the microscope.
- Fasten the microscope with the provided screw.
- Set the interpupillary distance for your eyes. If wearing glasses adjust the eyecups of the eyepieces (see LEICA User Manual).
- In case the PICO is equipped as a die bonder, zoom the microscope to maximum magnification. Look through the eyepieces and adjust the substrate's height until its surface comes into focus. If existing, use the height adjustable tracks of the positioning table for this, otherwise use spacers or multi step carriers.

type	FPL-145 (MZ6)	
magnification of eyepiece	total magnification	field diameter
10x/21B	4.0x	52.9mm
	6.3x	33.3mm
	10.1x	20.8mm
	15.8x	13.3mm
	25.2x	8.3mm
16x/14B	6.4x	35.3mm
	10.1x	22.2mm
	16.1x	13.9mm
	25.2x	8.9mm
	40.3x	5.6mm
25x/9.5B	9.9x	23.9mm
	15.8x	15.1mm
	25.2x	9.4mm
	39.4x	6.0mm
	63.0x	3.8mm
40x/6B not recommended, no additional image information	15.9x	15.1mm
	25.2x	9.5mm
	40.3x	6.0mm
	63.0x	3.8mm
	100.8x	2.4mm

- If the PICO is equipped as a rework station, you probably will not use a height adjustable positioning table. In this case the correct z position of your PCB will be adjusted by the fixed height tracks automatically.
- Zoom out to lowest magnification. Rotate the eyepieces anticlockwise in the "+" direction as far as the stop position.
- Slowly rotate each eyepiece individually in the "-" direction until each eye sees the object sharply imaged.
- If necessary, repeat focusing the substrate.
- If positioning will be performed by video later, you can use the Split Field Optics MIRAGE 96, or the video adapters HU or HH (see catalogue).

4.1.2 Preparation of the positioning table's height adjustable tracks

A fundamental rule is that the height of the substrate's placement surface must be the same as that of the pivot arm axis, so please take care for the following:

- The Tracks (160.1) of the positioning table (29) are parallel and contain V-shaped slots for receiving substrates, substrate support plates or heating plates.
- Whatever you clamp into the tracks, its upper side's edges must be pressed against the upper edge of the V-slots.
- To meet the working plane with substrates placed on a heating plate or on a substrate support plate, the adjustable height positioning table has tracks that are continuously z adjustable for substrate thickness from 0 to 10 mm. If the table should not be equipped with height adjustable tracks, spacers or multi step carriers have to be used to reduce the height of the clamped in supporting device. E.g. if you use a 1.5 mm substrate on a support plate clamped into the tracks, the z position of the table has to be screwed down for 1.5 mm, or spacers of 1.5 mm thickness can be used.
- In case the PICO is equipped as a rework station, the positioning table's clamping tracks (160.2) don't have V-shaped slots but clamping screws. These ensure the correct height of the PCB automatically. If parts on the PCB should impair its clampability, the clamping screws' positions can be changed by screwing them into different thread holes. In any case, please take care that the screws have to be tightened to their stop.
- When the release button (34) is pressed (by your thumb), the front track (23) can be moved in and out. To do this, hold it between your thumb and first and middle fingers.
- To position something correctly between the tracks, open them as described before, move the object first into the V-grooves of the rear track. After that close the tracks slowly and let the object slip into the front track. Now press the front track to the back firmly. As soon as the object is secured between the grooves, release the button (34), locking front track and board in place.
- If a heating or support plate is used, this should be equipped with an integrated vacuum holder to fix the substrate.

4.1.3 Providing suitable tools for the pivot arm

- Make sure that each tool is suitable for the shape and thickness of your component. Custom specified placement heads, heated pick&place tools and die collets are available, please ask your dealer.
- Using the screw (21), the tool, e.g. a pick&place tool (20), must be fixed so that its shaft is inserted fully to meet the correct working height (z-position). For die collets used with an ultrasonic arm, a special height adjustment procedure is necessary.
- In case of using the PICO with a COMISS reflow module, please choose adequate soldering heads. Shape and length of the tool have to fit to the component you want to mount or rework. Please consult your dealer, he will advise you which tool will lead to best results.
- In any case, samples of the components or at least drawings with dimensions are needed to manufacture a suitable tool. Samples or at least high quality digital photos of the substrate or PCB, sent by E-mail, are also essential. Photos should show not only the nearer area where the component has to be placed but also the boarders of the substrate or PCB, together with all additional components that are already on it. Heat sinks, covers, shieldings, sockets, frames and similar objects must be visible, because they might affect the accessibility and thus influence the construction of the tool and even the pivot arm.

4.1.4 Interconnection of the PICO

- Ensure the voltage adjustment of the Placer Control Box (see label at the back) corresponds to the mains voltage.
- Connect and fasten the 25-pin cable from the Placer Control Box, connector (38), to connector (26) on the back of the support arm (71).

TAKE CARE NOT TO CONFUSE THIS CABLE WITH THE RS232 COMPUTER CABLE!

- Connect the table foot switch to connector (9) of the Placer Control Box.
- If existing, connect the vacuum foot switch to connector (65) of the Placer Control Box.
- In case of die bonding, connect the pivot arm's (27.1) signal cable plug (28) to socket (66) of the Placer Control Box.
- In case of die bonding, connect the pivot arm's vacuum connection hose filter (44) to socket (46) of the Placer Control Box.
- In case of reflow, connect the large HARTING plug (90) of the reflow arm (27.2) to the corresponding socket on the rear panel of the COMISS control box. From this control box, make the pivot arm's signal and vacuum connection to the sockets (66) and (46) of the Placer Control Box like described below, but using the cable and hose coming with the COMISS reflow module.
- Connect the table air outlet (7) of the Placer Control Box to the table air coupling (4) at the rear of the support arm (71), using the supplied 3 mm vinyl hose. Push in the fitting firmly until it clicks. To loosen it, push back the knurled nut of the socket and pull out the fitting.

- Connect the air bearing connector (4a) of the positioning table to the air outlet (4b) on the left side of the support arm. Push in the fitting firmly until it clicks. To loosen it, push back the knurled nut of the socket and pull out the fitting.
- If available, connect the vacuum pipette (24) to the VACUUM PICKUP socket (61) at the front of the Placer Control Box (39).
- First connect the power cord with the Placer Control Box's male socket (62f) and then into the appropriate AC power source. Make sure that LED LINE (151) is 'ON'. Switch the Placer Control Box to "I", pressing the POWER switch (57). LED (58) should now be lit.
- If the PICO is equipped with fiber optic lighting, connect the light control boxes to the Placer Control Box's rear 3-pole output socket Illumination Control (173) using the blue cable supplied. Further custom specified lighting methods are possible.

4.1.5 **Preliminary Settings and Checkout**

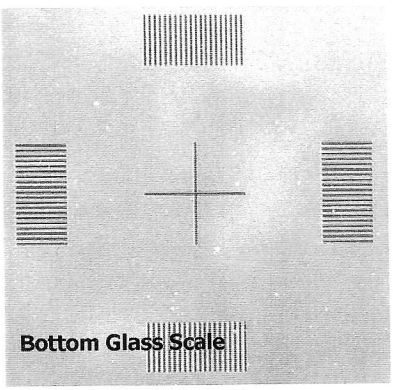
- Using the arm handle (11), rotate the pivot arm (27) into the vertical position (Upper Arm Position, UAP).
- Set the Placer Control Box (39) to "I" by pressing the POWER switch (57).
- Hold the positioning table by its x and y micrometer screws (50 and 51) and use them as handles. Press and release the foot switch (64) alternately to check if the air cushion of the positioning table (39) can be activated or deactivated, making the table movable freely on the base plate (70) or fixing it in its momentary position.
- When the foot switch is released, the positioning table lies directly on the base plate without air cushion and is fixed in the machine's optical axis by an electro magnet. It should be turnable a few degrees without affecting the tables actual x and y position. Use the micrometer screws as handles to achieve Theta correction. During this procedure, the positioning table must be movable smoothly, not scraping on the base plate.
- In case a fine rotation placement arm is existing, use the fine rotation micrometer screw on the right side of the placement arm to rotate the clamped in tool and thus achieve a highly accurate Theta alignment.
- An optional laser target finder (1) should project a red spot on the surface of the substrate or PCB as long as the foot switch is pressed.
- Check that the vacuum at the tool is strong enough to hold all your components safely.
- Check at the control box (39) that the relevant lighting control is able to dim head and target light from maximum brightness to dark.
- For general adjustment purposes refer to Chapter 4.2.

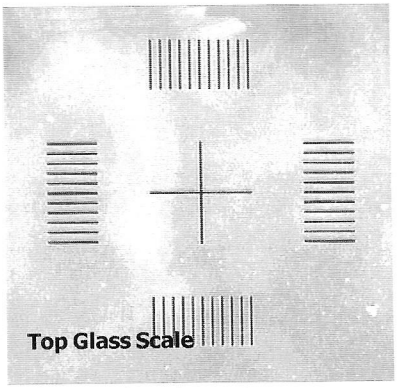
4.2 Adjusting the Placement Accuracy of a FINEPLACER® "PICO"

Before beginning, you should read and understand the whole of part 3 and 2.2 of this handbook. We recommend you get familiar with the logic of the vacuum control (see 3.43). After this, please print out or make a copy of the instructions below and take them to the machine. Follow each instruction thoroughly.

4.2.1 Required Tools

- FINETECH Adjustment Set for the pivot arm, resolution 5 µm, consisting of a support plate with integrated glass scale (bottom scale), an accuracy adjustment head and a second glass scales (top scale). See table 4 at the end of chapter 4.2.





- Allen key 4 mm
- If available, an independent digital photo camera

4.2.2 Distinguishing between PICO A4 and A4V

Depending on the customer's application, the configuration of the optical components can vary widely. During adjustment, you must take into consideration if you own a PICO A4 or a PICO A4V.

In case of using an A4, you can observe your working area through a microscope in binocular view and (optionally) at the same time on a video monitor. While working with a binocular microscope with three dimensional view you must pay attention to a possible parallax error and therefore follow all steps of adjustment 1 (chapter 4.2.3) and adjustment 2 (chapter 4.2.4.), see below.

In case of using an A4V, the working area is exclusively observed by a camera on a video monitor. As this configuration allows parallax free view, you can omit adjustment 1 (chapter 4.2.3), just focus to the sharpest image on the monitor, and proceed to adjustment 2 (chapter 4.2.4), see below.

In case of working with an A4, the whole procedure always consists of two adjustment steps, to be carried out in the correct order. Never try to do step 2 before or without first doing step 1!

Adjustment 1: UAP (Stop point of Upper Arm Position), A4 only, see chapter 4.2.3

Adjustment 2: Beam splitter adjustment in x and y direction, see chapter 4.2.4

4.2.3 Adjustment 1: UAP

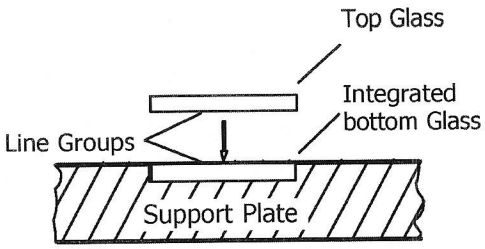
Before proceeding, remember the status indicated by the color of the vacuum control LED on the Control Box:

yellow	Ü	**vacuum off**
green	Ü	**vacuum on**

To adjust the UAP, please perform the following steps:

1. Move the pivot arm to its vertical position.
2. Clamp the adjustment set's support plate into the positioning table.

3. Clean the accuracy adjustment head and both glass scales using pure acetone, ethyl or isopropyl alcohol.
4. Remove any tool from the pivot arm and clamp in the accuracy adjustment head.
5. Clamp the adjustment set's support plate into the tracks of the positioning table so that the integrated bottom glass scale is on top. Adjust the microscope's magnification changer (59) to highest zoom factor. Turn the positioning table's height adjustment screw (if existing) to zero. Now you should get a sharp picture of the bottom glass scale's line groups, just as shown on the sketch on the right. If the picture should not be sharp in the z screw's zero position but somewhere else, consult your dealer for re-adjustment.

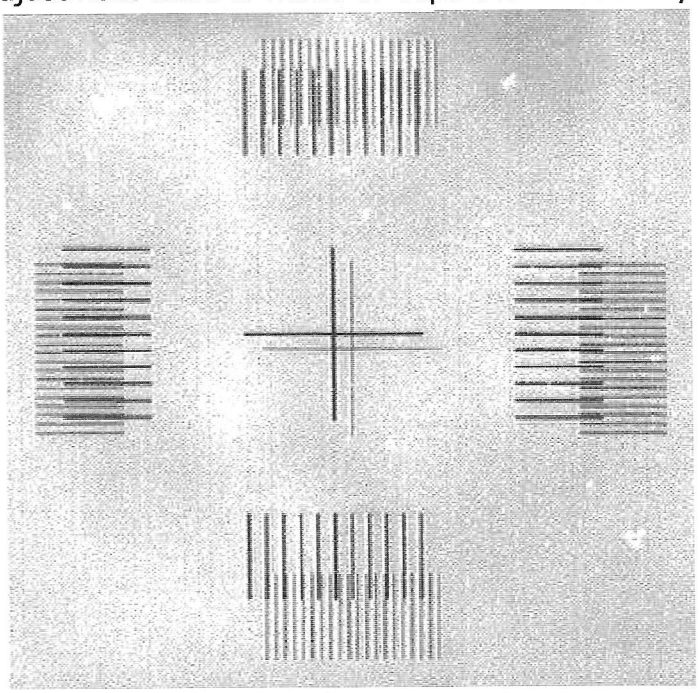


6. Put the upper glass scale on the bottom one, taking care that the printed side with line groups is face down.
7. Move the positioning table on its air cushion into the optical axis of the system. If available, use the laser target finder to adjust the coarse position.
8. Move the lower arm position (LAP) lever (89) on the left side of the machine's support arm (71) to the "up" position.
9. Hold the vacuum foot switch pressed and move the pivot arm to the horizontal position. Make sure that the above mentioned vacuum control LED has turned yellow.
10. After this, move the LAP lever (89) carefully to the "down" position. This will put the accuracy adjustment head into direct contact with the upper glass scale.
11. Release the vacuum switch and press it again briefly, this will switch on the vacuum, indicated by the green LED.
12. Carefully lift up the LAP lever to raise the pivot arm slightly, and then move the arm completely to the vertical position. The upper glass scale is now held by the accuracy adjustment head.
13. Please use the microscope for the following adjustment procedure - do not use any video equipment.
14. Look only through the left eyepiece of the microscope. Ignore the picture given by the right eyepiece by closing your right eye or blinding the right eyepiece with any kind of cover.
15. Use the light controller knobs at the Placer Control Box to adapt the brightness of the top and bottom glass' illumination, until you see an overlay image of both line groups with good contrast.
16. Using the micrometer screws, align the image of the bottom glass scale to that of the glass scale in the pivot arm.
17. Change to the right eyepiece of the microscope and blind the left one. Probably the image you see will not be identical to the image you saw through the left eyepiece. This shows you that there is a parallax error. Don't use the micrometer screws to correct this supposed "x misalignment". Instead, change alternately from the left to the right eyepiece to compare the images and turn the UAP adjustment screw (72) on the bottom left side of the support arm until you see exactly the same picture through both eyepieces.
18. Now you can turn the x micrometer screw until the misalignment is zero.
19. Repeat steps 17 and 18 to check and, if necessary, improve the UAP adjustment.

4.2.4 **Adjustment 2: Beam splitter**

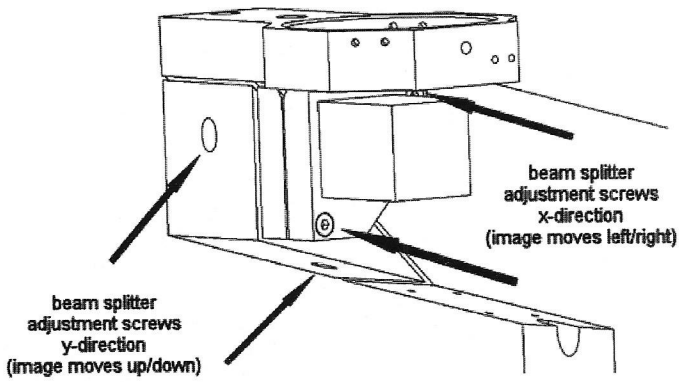
While the steps described in chapter 4.2.4 are obligatory for the PICO A4 only, the following procedure is essential for both PICO types, A4 and A4V.

1. Leave the pivot arm in the vertical position.
2. Leave the Adjustment Tool support plate in the positioning table.
3. Leave the Accuracy Adjustment Head on the pivot arm.
4. Leave the upper glass scale at the Accuracy Adjustment Head.
5. Look through the microscope in case of A4 or on the monitor in case of A4V.
6. Use the light controller knobs at the Placer Control Box to adapt the brightness of the top and bottom glass' illumination, until you see an overlay image of both line groups with good contrast.
7. Using the micrometer screws, align the image of the bottom glass scale to that of the glass scale in the pivot arm.
8. Carefully using the arm stop handle as described before, move the pivot arm to the horizontal position.
9. Always use the arm stop handle in all situations, in which contact between the upper glass scale and the accuracy adjustment head is made or separated. Never try to do this without using the arm stop handle, because this results in an inaccurate adjustment and involves the danger of destroying the glass scales!

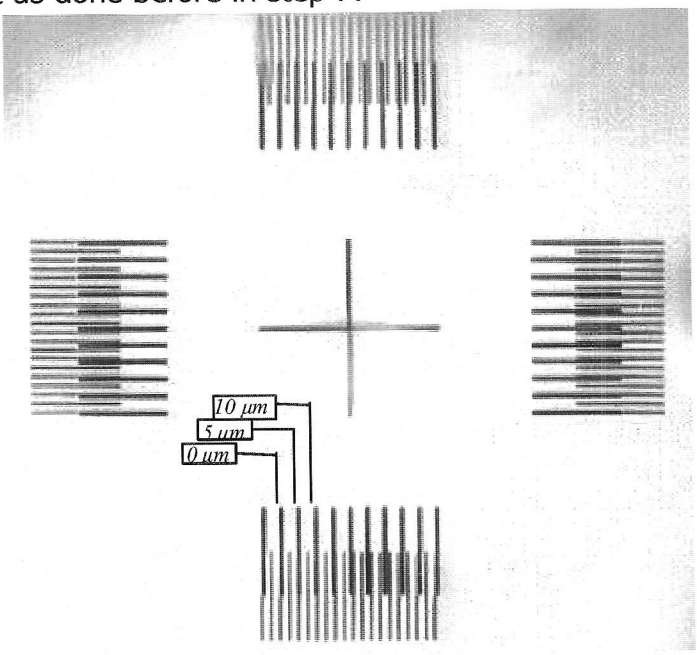


10. Briefly press the vacuum switch to switch off the vacuum, and move the pivot arm back to the vertical position. The upper glass scale should now lie on the bottom plate.
11. Looking through the top glass scale to the bottom one, you can see all the line groups at the same time. Set the magnification of the microscope (A4) or the video magnifier (A4V) to an appropriate value to let the inner group of lines fill the field of view completely.
12. What you will see is the misalignment due to wrong adjustment of the beam splitter. This may look as shown in the picture above. It shows a significant misalignment of more than 40 µm in –x and in +y direction. Take a digital photo of this overlay image by holding the lens of the camera directly on one eyepiece of the microscope. If you don't have a digital camera, make a sketch of what you see. If you are skilled, simply keep it in mind.
13. Hold the vacuum foot switch pressed and move the pivot arm to the horizontal position. Make sure that the above mentioned vacuum control LED has turned yellow.
14. Release the vacuum switch and press it again briefly to switch on the vacuum.
16. Move the pivot arm to the vertical position, the upper glass scale is in the accuracy adjustment head again.

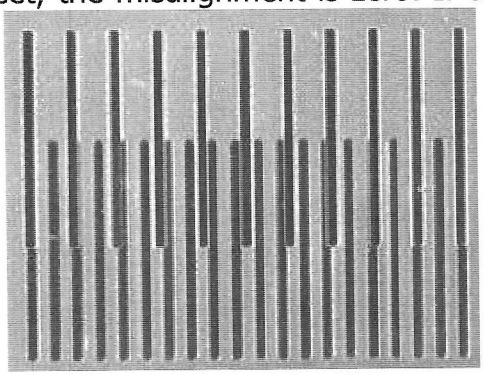
17. You should now see the same overlay image as directly after your alignment in step 7.
18. Using the Allen key 4 mm, turn the x and y beam splitter adjustment screws (see picture), until you have reproduced exactly the same misaligned picture you saw in step 12. The new image should look exactly like the digital photo or sketch you made before. Do NOT use the micrometer screws for this.



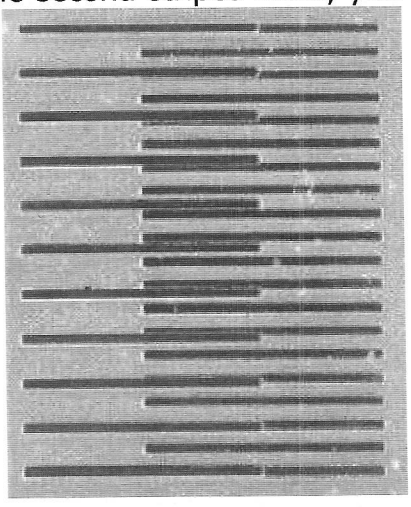
19. Only after step 18 is done, compensate for the misalignment you produced there by turning the micrometer screws, just as done before in step 7.
20. Move the pivot arm to the horizontal position.
21. Press the vacuum switch briefly and move the pivot arm back to the vertical position. This will place the upper glass scale on the bottom scale again.
22. You should now see an overlay image showing a much better alignment than the one you saw in step 12. The picture on the right shows an example: The residual misalignment is 10 µm in +x direction.



27. The alignment will probably not be perfect on the first attempt. You will therefore have to repeat steps 7 to 22 until it is 5 µm or better. Use the nonius principle of the glass scales: If the first stripes meet, the misalignment is zero. If the second stripes meet, you have 5 µm misalignment, if the third stripes meet, you have 10 µm, and so on. The resulting alignment error is less than 5 µm if you see patterns like those shown on the right.



Top: Optimal alignment in x direction



Right: Optimal alignment in y direction

Available Adjustment Sets

Type code	Reso-lution	Adjustment of		For which pivot arm?	For which machine?
		Placement ac-curacy	Parallelism		
AJ1.P	5 µm	◆		Placement	A4, A4V
AJ1.R	5 µm	◆		Reflow	A2, A3, A4, A4V
AJ2.P	5 µm	◆	◆	Placement	A4, A4V
AJ2.R	5 µm	◆	◆	Reflow	A2, A3, A4, A4V

5. Operating Instructions

The following instructions assume that you are informed and fully aware of the function of the equipment (see chapter 3) and of the safety instructions (see chapter 2) and that the FINEPLACER® has been calibrated and checked out (see chapter 4.2).

5.1 Microscope Use (A4 only)

For basic information of the LEICA Zoom Microscope and how to work with it, please refer the original attached LEICA manual. The PICO-used microscope (option) is mounted with a fix focus. Therefore the component and substrate details must be in focus all the time. To ensure this, not only the microscope's eyepieces have to be adjusted, but also you must make sure that the distance condition is fulfilled: the contacts of the component hold at the tool, and the pads of the substrate must get the suitable distance to the beam splitter (30). To achieve this, look through the microscope, (Leica eyepieces normally allow the operators to wear their glasses), and take the following steps:

- Adjust the microscope's (18) magnification changer (59) to lowest zoom factor.
- Set the adjustable eyepieces to adjustment scale value zero.
- Set the distance between the eyepieces for the distance between your eyes.
- Firmly fix your substrate to the height adjustable tracks, the support plate or the heating plate.
- Focus the eyepieces to your eyes, adjustment must be done with one eyepiece after the other. Close or cover the left eye when adjusting the right eyepiece, and vice versa. Do this adjustment with the lowest magnification of the zoom microscope.
- Use the dual image overlay to align the component and substrate when required: Clamp the substrate or PCB into the tracks or lay the substrate on a heating or support plate. Pick up the component with the tool and erect the pivot arm. Look at the **target pads** (the first image) and the **device's contacts** (second image). Both together are overlaid in the same microscope image. Observe the movement of the target pads caused by your positioning work. Coarse align using the positioning table's air cushion, fine align using the micrometer screws, and stop movement when target and component are aligned.

- Alignment is possible by video too; see the corresponding part of the manual: In case of using a microscope video adapter HU or HH, no instruction is needed, for MIRAGE-96 see the corresponding part of this manual.

5.2 Loading the component for Placement

Align the component, lying e.g. facedown in a tray, to the tool. Then switch off the vacuum, lay down the arm, switch on the vacuum again and pick up the component with the head. See chapter 3.2.5, for information on vacuum control.

5.3 Alignment

1. Look through the microscope (A4) or at the monitor screen (A4V). Look at the underside of the component. Through the microscope or on the monitor all pads should be seen simultaneously. This image will be superimposed by the image of the substrate. Observing both, you are able to compare the position of each pin of the component with that of its pad on the substrate.
2. Put your hands on the x and y micrometer screws (50) and (51) and use them as handles for the positioning table.
3. Press the table foot switch; the compressed air will be switched ON, enabling easy movement of the positioning table (29). Shift the table and compare the images of component pins and substrate's pads; a coarse overlapping can be quickly accomplished. The optional Laser Target Finder AC1, projecting a red spot on the substrate or PCB, helps to make this easier.
4. When overlapping has been achieved, release the foot switch and the positioning table will be locked in the optical axis.
5. Look at two opposite chip contacts and their corresponding pads on the substrate. At first, correct the angle deviation Theta, again using the micrometers as handles to rotate the positioning table slightly around the optical axis, without the air cushion. Ensure there is no dirt on the base plate, because this might impair its positioning action.
6. Align the images of chip contacts and pads completely by adjusting the x and y micrometer screws.
7. If necessary, repeat steps 6. and 7. until good alignment is achieved.

5.4 Placement

After successful alignment of both images, proceed as follows:

- Gently swing down the placer arm. Use the UAP lever for soft touch down.
- After placing, release the vacuum by actuating the foot switch, so that the component is released.

6. Maintenance

6.1 Preventive Maintenance

6.1.1 **Daily**

- Keep the base plate clean at all times. Do not allow dust or particles to collect on the underside of the positioning table. Wipe with a soft cloth, remove built-up flux deposits using the minimum amount of the proper solvent; (wiping with a bare hand may help you to decide about cleanliness). Dust the remaining subassemblies as required.
- Failure to keep the FINEPLACER® clean, or damage of the sliding planes may result in needless calibration, or difficulty in placing devices on the boards.
- Take care that the vacuum nozzles of the pipette and the tools do not suck in dirt, flux, or fumes. Do not operate the vacuum devices without the vacuum filter in the head vacuum socket (46) to avoid damage to the internal pump and magnet valves.
- Check whether the vacuum can safely hold your component. Change suction cups, gaskets, vacuum pump if required, protect hoses from being stepped on, driven over, crushed, cut , split etc. See spare part list for purchasing codes.
- Take care of the optical parts. Keep the optical surfaces clean at all times. Glass surfaces of the beam splitter (30), the microscope (18) and other optics may be cleaned with customary optics hair pencils or soft cleaning clothes, soaked with alcohol. Checking the lighting means: change blown bulbs, so as not to affect the positioning accuracy.

6.1.2 **Monthly**

Check the in-line vacuum filter which is plugged into the head vacuum socket (46) in the back plane of the Placer Control Box. The filter should be changed in case of a gray appearance, or if it diminishes the vacuum.

6.1.3 **Yearly**

Depending on the degree of accuracy needed for your task, check the possible accuracy of placement and re-adjust if required (see chapter 4.2). Checking the adjustment is also recommended after transportation

6.2 Corrective Maintenance

- All machine parts are manufactured using quality devices and are subjected to the most rigorous electrical and mechanical controls. Each FINEPLACER® product is tested as a unit before leaving the facility. Premature failure is therefore unlikely.
- In case of failure call, fax or mail your dealer or the manufacturer FINETECH. You will find the contact address on the bottom of each page of this manual.
- Corrective maintenance essentially consists of identifying a defective component, removing it from the machine and returning it to FINETECH for repair or replacement.

- FINETECH will also help you to identify the fault and give advice if you want to carry out repairs yourself.
- Before dismantling defective parts, please contact FINETECH or your representative!
- Before sending anything, please agree what, when and how to dismantle, and the best method of return.

7. Technical Data

Survey table for general information (changes without notice, e.g. customer specified, errors excepted):

FINEPLACER® Version (Model)	PICO A4
Dimensions	Length: 416 mm (1) Width: 416 mm (1) Height: A4: 520 mm (2) A4V:
Total weight (3)	About 100 kg
Max. panel size	234 mm x 410 mm
Microscope magnification/viewing area (4)	4x/52 mm.63x/3.8 mm (standard version)
Positioning accuracy	5 µm
Power requirements (base module only)	100/120/230/240 VAC 50/ 60 Hz 1 phase, about 100 VA

(1) Base plate dimension; Placer Control Box additional

(2) standard eye inspect height over work bench, may be higher or lower if choosing optional video modules or microscope tubes

(3) incl. cabling, foot switch, Placer Control Box (W x D x H = 290 x 310 x 143 mm; 10 kg) and Positioning Table

(4) incl. ranges that can be achieved by changing standard eyepieces against optional ones