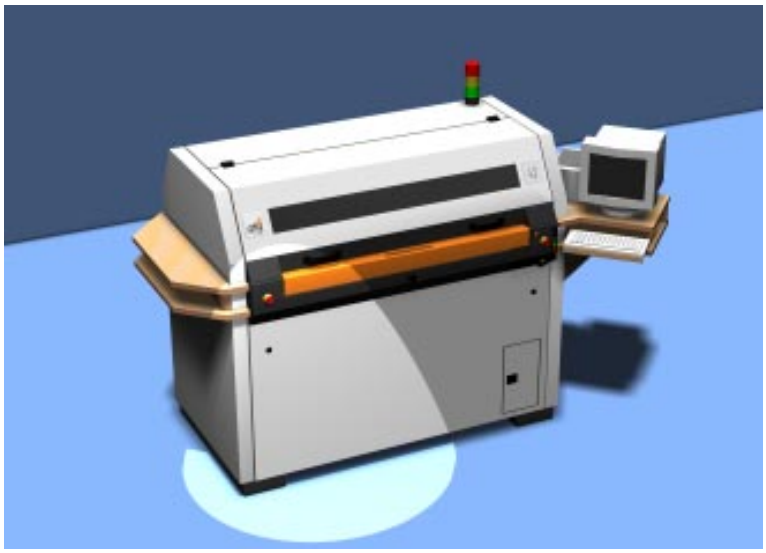
User Manual for
Flying Probe Test System

A3

V3.7

Click on a line in the table of contents to jump to the corresponding chapter.



atg test systems®

The test system may only be started, operated and turned off by a trained operator. A trained supervisor may only carry out the password-protected operations.

Before turning on the system, the operator must have read this quick reference manual especially observing the documented safety precautions.

As far as no appropriate training on part of the company atg has taken place the operator is not authorized to carry out the following activities:

- Transport
- Assembly
- Mounting
- Putting into operation
- Adjustment
- Repair
- Trouble shooting
- Putting out of operation
- Disassembly

The Reader should be familiar with the use of Windows.

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This manual can be corrected and adapted to the technical progress at any time without prior notice. 6/2001

Table of Contents

Click on a line in the table of contents to jump to the corresponding chapter.

Directions for avoiding personal injuries

In order to avoid personal injuries, the following directions should be paid attention to:

General Directions

Observe all safety and danger directions on the test system.

Only electrical specialists or trained personnel supervised and guided by an electrical specialist according to the electrical engineering regulations are authorized to carry out work on the electrical equipment of the test system.

Take measures to only operate the machine in safe and functional condition!

Only operate the machine if all safety precautions and safety required equipment e.g. detachable safety equipment, emergency off furnishings, etc. are installed and functional!

In case of operational malfunctions immediately turn off and secure the machine!

Malfunctions must be eliminated promptly!

Electrical Energy

Use only original fuses with the proper current intensity! Turn off the machine immediately in case of defects in the electrical power supply!

Only electrical specialists or trained personnel supervised and guided by an electrical specialist according to the electrical engineering regulations are authorized to carry out work on the electrical equipment of the test system.

Machine and system parts needing inspection, repair or maintenance must be voltage free - if required. First, check the powerless parts for residual voltage then ground and short-circuit them and isolate neighboring powered parts!

The electrical equipment is to be inspected/tested regularly. Defects as for example loose connections or burnt cables must be eliminated immediately.

If it is necessary to carry out work on powered parts call in a second person that in case of an emergency can push the emergency-off button which turns off the voltage. Secure the work area with a red-white security chain and an appropriate warning sign! Use only insulated tools!

In case of working on high voltage assembly racks connect the power cable to the ground after switching the power off. Then short-circuit the assembly components such as the capacitors with a grounding bus.

Safety Directions for Product Defects

In order to avoid product defects the following should be observed:
Do not carry out any program changes (software) to programmable control systems!

Organizational Directions

General Directions

This manual should be kept in reach of the test system at all times!

In addition to the operator's manual, universally valid and other obligatory regulations concerning the prevention of accidents and environmental protection should be observed and instructed!

Safety and danger consciousness among the personnel should be controlled regularly, in consideration of the operator's manual!

All safety and danger directions affixed to, at and on the test system must be visible and clearly readable!

Without prior permission of the manufacturer, do not carry out any exchange, add-on or reconstruction activities that could impair the machine's safety!

Spare parts must meet the manufacturer set technical requirements. This is always guaranteed with original spare parts!

Make sure to meet the deadlines stated in the operator's manual for recurrent tests/ inspections!

Assign only trained or instructed personnel. Clearly define the responsibilities of each staff member for either/and operation, preparation, maintenance or repair!

Make sure that only especially appointed personnel operate this machine!

Maintenance Directions

Make sure to meet the deadlines for adjustment, maintenance and inspection activities and appointments set in the operator's manual including the information for exchanging parts/partial equipment! Trained and qualified personnel may only do these activities.

Before carrying out extraordinary or reparation activities always make sure to inform the operator! Appoint a responsible supervisor!

Carry out all activities concerning operation, production adaptations, changes or adjustments to the test system and its safety required equipment, as well as inspection, maintenance, repair, and turning-on/off procedures according to the documentation in the operator's manual and in the repair directions!
Secure the repair area if required as spaciously as possible!

If the machine is completely turned off for maintenance and repair work it must be secured against unexpected reactivation:

- Lock up the main control equipment and withdraw the key and/or
- Set up a warning sign next to the main power switch.

If a disassembly of safety equipment is required for set-up, maintenance and repair activities, the reassembly and inspection of the safety equipment must immediately take place after the maintenance and repair work is completed.

Directions concerning Material and Environmental Damage

Ensure a safe and environmentally harmless disposal of all substances and material used for operation as well as of all exchanged parts.

atg test systems Software Certificate

You have purchased or leased a test system from atg test systems, Inc. (atg). This test system includes different software programs. All of these software programs are owned either by atg or its licensors. atg guarantees that these software programs are legally licensed from atg or its licensors.

You have the non-exclusive right to use the software in the course of operating the purchased or leased atg test system. You also have the right to make one copy of each program as backup and safety copy.

However, you do not have the right to use the software programs in applications exceeding the operation of the atg test system or to make copies thereof beyond the herein-defined scope. You further do not have the right to provide third parties with this software unless you sell or lease it together with the rest of the atg test system or to modify the software programs in any way.

If you sell or lease the atg test system, you are obligated to make sure that the buyer or lessee is aware of the above-described scope of his right to use the software programs. Your own right of using the software programs ceases when you sell or lease the test system.

Information for users

The test system meets the requirements of ISO 9001 only, if once a year a measurement calibration is carried out by the company atg test systems GmbH & Co. KG. This measurement calibration confirms the national standards of the German Calibration Service (DKD), the physical technical federal institution (PTB) or other national standards of representation of physical units in accordance with the international unit system (SI).
The test system gets a test badge and a confirmation certificate will be issued.
Please ask for a quotation from your atg-representation.

1. System Overview

1.1 Unloading and Transporting the Flying Probe Test System A3

<u>Attention</u>! Wear the appropriate safety gear for these activities! Pay attention to the generally applicable safety precautions!

The user is responsible for the company internal transport of the test system even in the presence of atg personnel. Furthermore, he must pay attention that all safety and accident prevention precautions are observed.

The appropriate safety gear is to be worn during these activities. The applied transport devices (crane and lifting devices, forklift, hand forklift etc.) must be sufficiently dimensioned for the load to be transported!

The transported object including its loose parts must be secured against moving, turning, tipping, tilting (consider center of gravity!).

Do not walk underneath lifted objects! Sufficiently secure the transported object! When turning/arranging the transported object in narrow areas pay attention towards keeping a sufficient safety distance (risk of bruising!)

<u>Attention</u>! The accident precaution instructions for transporting the test system must be compellingly observed!

Inspect the test system for transport damages!

Unloading and Transport:

With a forklift (min. fork length 1.80 m, lifting capacity of at least 1600 kg) drive underneath the thinner side of the palette and carefully lift the test system off the transport truck. Move the test system as close as possible to its final operating destination.

Loosen all 4 screws on the palette bottom side.
Insert the forklift fork (min. fork length 1.20 m, lifting capacity of at least 1600 kg) from the front side (shuttle side) underneath the test system and carefully lift it off the palette. The packing foil can be taken off in secured areas.
Store the accessory parts (monitor, spare parts) at the test system.

Size Test System A3		**Space requirements Test System A3**	
Width	2.60 m	Width	4.10 m
Depth	1.15 m	Depth	3.00 m excluding operator's working area
Height	1.90 m (opened)		

Set-up, installation and putting into operation only by atg test systems service personnel!

1.2 General View of the Test System

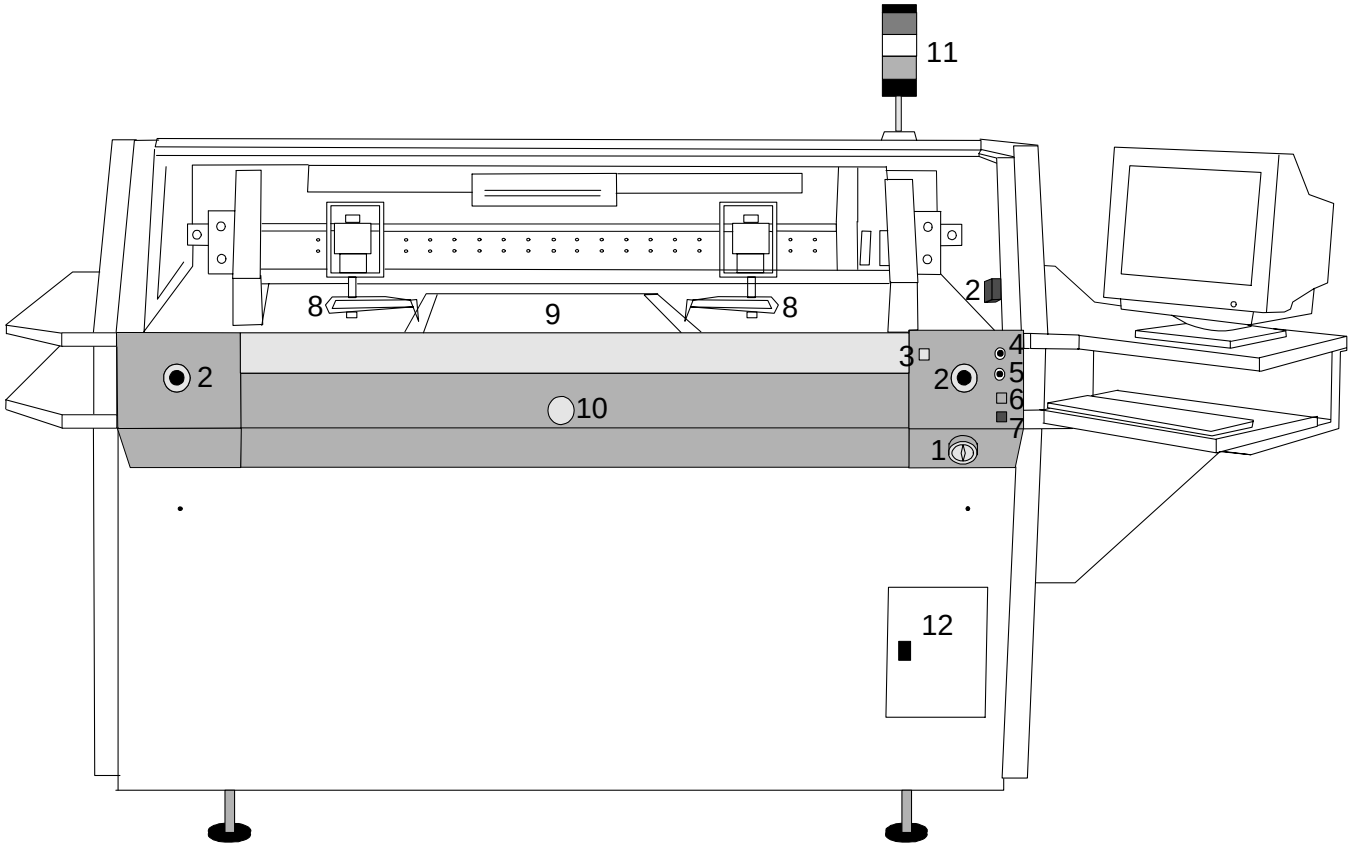


Fig. 1: General view of the A3 test system

Position	Description/Function
1	**Main Power Switch (gray rotary switch)** Machine On/Off
2	**Emergency Off** Machine Stop
3	**Release of shuttle clamp (yellow button)** Release fine adjust for turning knob no. 10
4	**Illumination controller top camera**
5	**Illumination controller bottom camera (option)**
6	**Control on (green button)** Machine control on
7	**Control off (red button)** Machine control off
8	**Flying probes with test needles**
9	**Shuttle** Ejectable board holding device
10	**Signal Light** Indicates the machine status
11	**Control Computer** The control PC is located behind this flap.

1.3 General View of the Shuttle

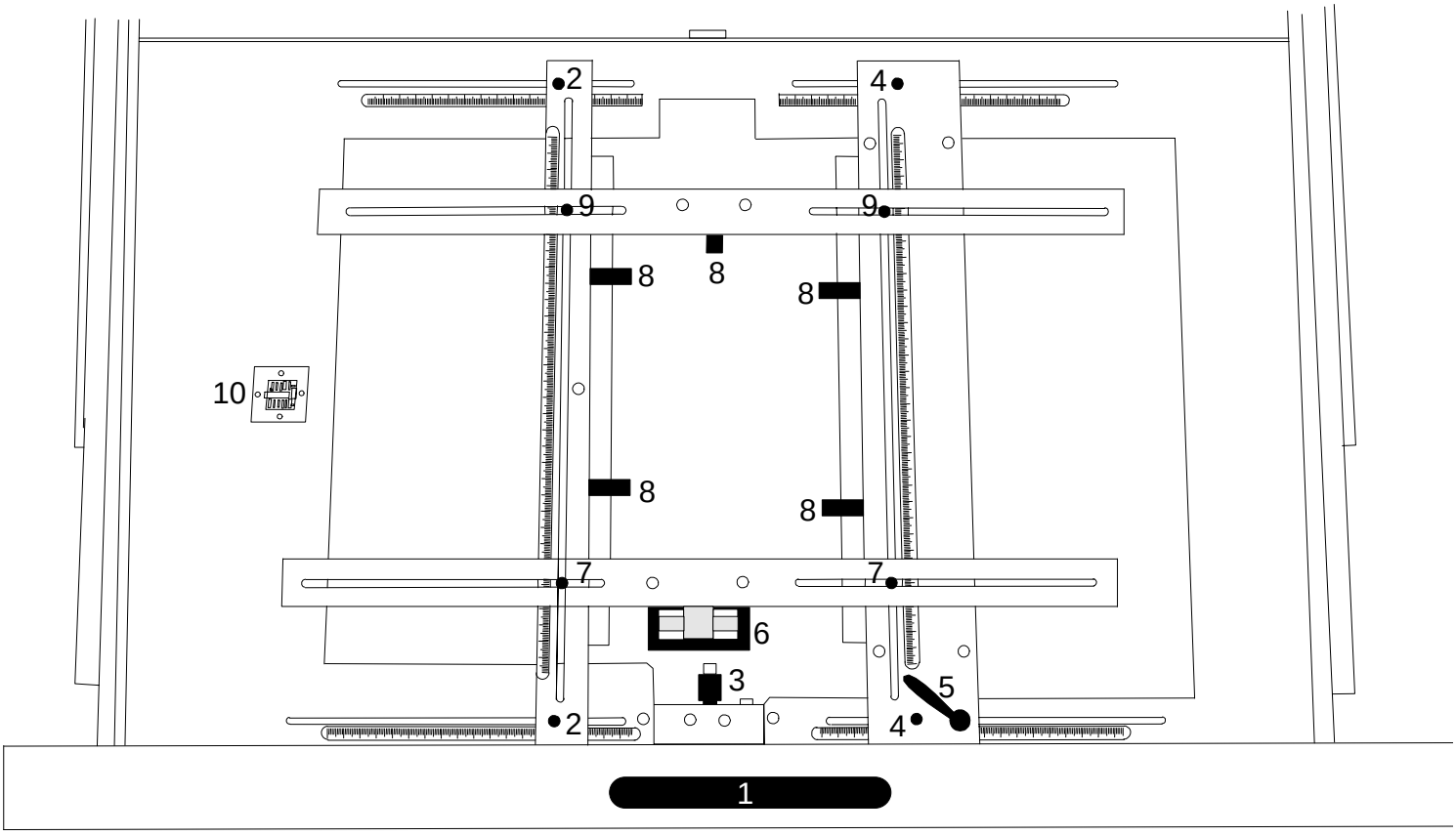


Fig. 2: General view of the A 3 shuttle

Position	Description/Function
1	Handle for shuttle
2	Fixing screws for left holder
3	Limit stop of shuttle
4	Fixing screws right Holder
5	Tension lever for lateral pressure
6	Spring loaded tense for head on pressure
7	Fixing screws for front holder
8	Clamp pieces
9	Fixing screws for rear holder
10	C-Adjust-Board

1.4 Assembly Rack

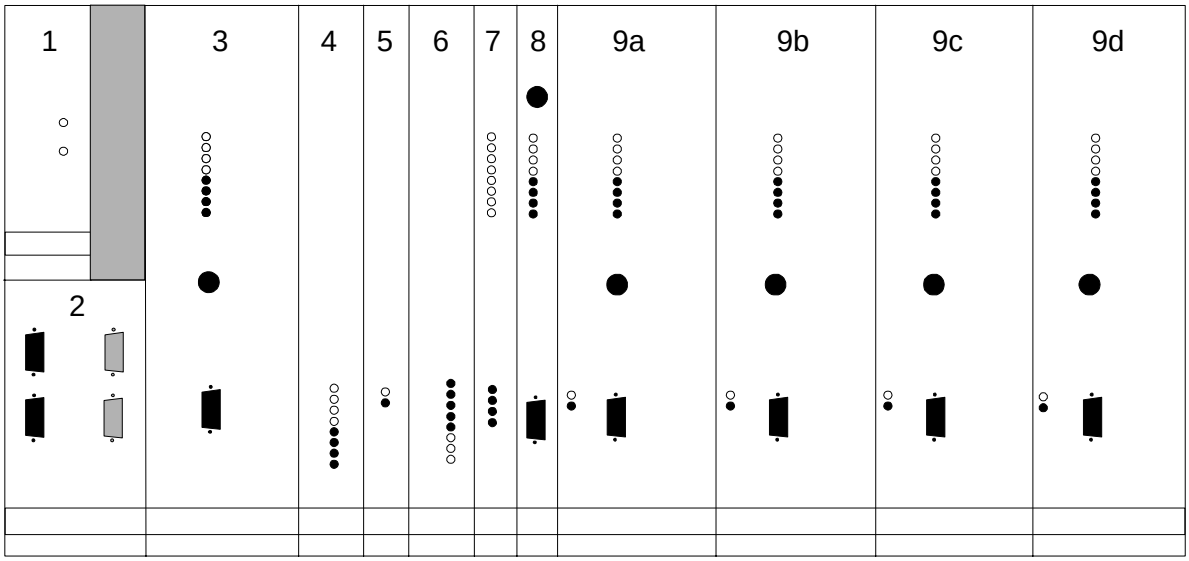
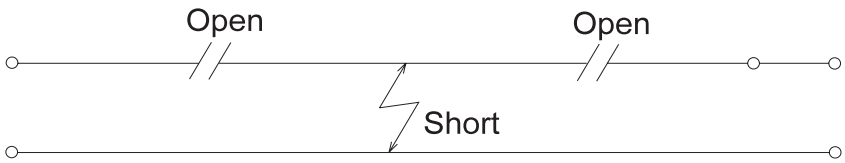


Fig. 3: Assembly racks

Position	Description/Function
1	**Netcard for measure power supply ±15 V / 5 V**
2	**Extender-I/O-card**
3	**Head Controller / Motor Driver, Camera(s)**
4	**Measurement Controller**
5	**A_MUX (analog-multiplexer)**
6	**High voltage measuring card (HV 500),** option
7	**I/O-Controller (control card)**
8	**Crate Controller (main control card)**
9a	**Head Unit / Motor Driver, Rail 0** (top, front)
9b	**Head Unit / Motor Driver, Rail 1** (top, rear)
9c	**Head Unit / Motor Driver, Rail 2** (bottom, front)
9d	**Head Unit / Motor Driver, Rail 3** (bottom, rear)

1.5 Test Requirement for Repaired Boards

Boards tested faulty are often repaired and reused. Repaired boards must be retested in a complete test.
Only a complete new test can give a correct good-result because there can be certain fault constellations which can prevent the finding of all other faults (see figure).
Besides this, not all faults can be fixed with the repair or new faults may have developed.
This does not depend on the applied test system or test method.



1.6 The Operating Modes of the A3 Test System

The **Test Player,** the control software of the test system, offers two different operating modes:

1. The **User Mode**
is active directly after starting the **Test Player**. The user mode provides all basic test functions, most parameters, however, cannot be modified in the user-mode.
The test runs are normally carried out in the user mode. During this, the possibilities of the user are reduced so far that the test software may be learned quickly and applied without having to experience great difficulties. The test parameters do not have to be changed for the user mode, provided that the test parameters were appropriately preset in the supervisor mode.

2. The **Supervisor Mode**
can be activated from the user mode by entering a password. In the supervisor mode, you can adjust the basic settings, interrupt the test in progress or carry out controls. Specially trained personnel must only activate the supervisor mode.

In this handbook, the user-mode and the supervisor-mode are extensively explained and described.

2. Turning on the Test System

1. Turn the Main Power Switch (Fig.1, No.1) to the On-position

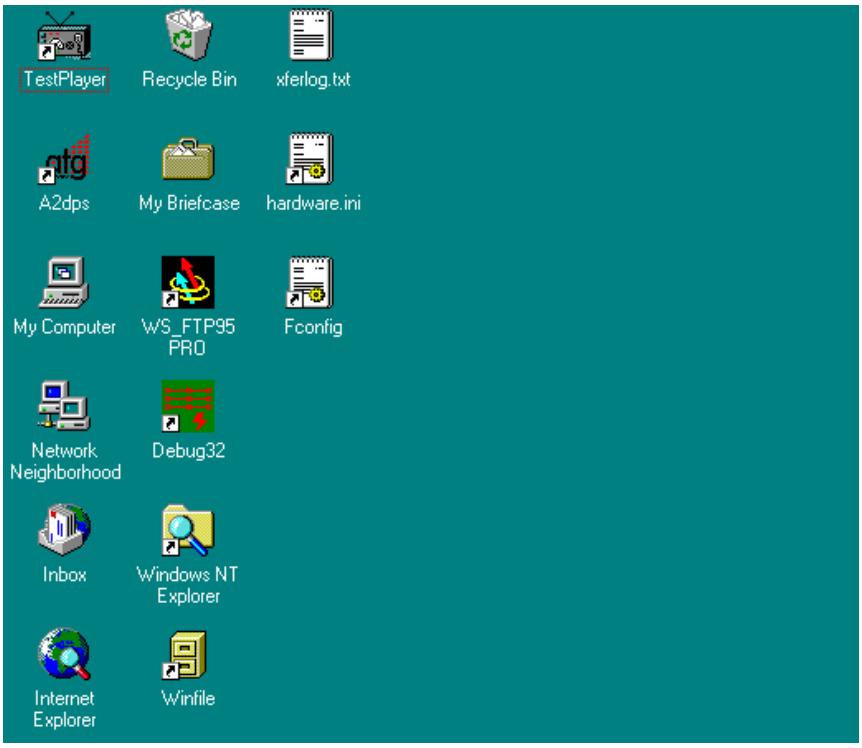
The Control Off lamp (red key) is illuminated
The control PC boots
The fan of the control unit starts to run

2. Push the Control On-Key (green key)

The Control starts
The signal light shines red
The test probes carry out a short movement

3. Start the *TestPlayer*-program

On the desktop, start the **TestPlayer** program by double-clicking its icon.
The operator program TestPlayer starts.

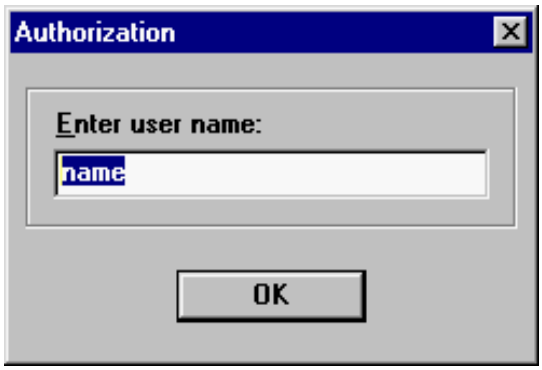


The icons on the desktop of the control PC

The test system now loads different files and scans the hardware settings in a self-diagnosis.

The signal light shines red.
The test system is initialized.
The test probes carry out a short movement.

After having started the **TestPlayer**-software the input window **Authorization** appears. Enter your name here. Your name is put out with the output of the test results.



Entry of the user name

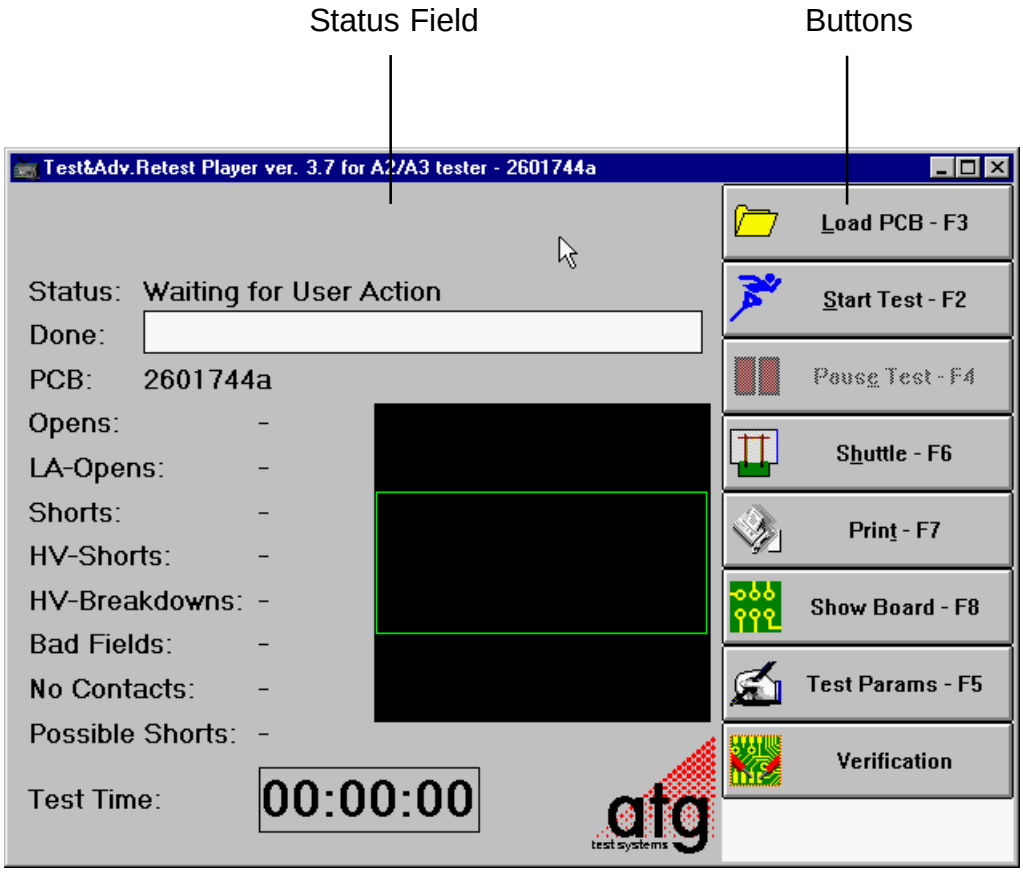
By pressing the **OK**-button after having entered at least one character you to enter the main operating window of the user-mode.

3. The User Mode

3.1 The User Interface of the User Mode

Hint: Screen displays in this handbook may not be equivalent to the displays on your monitor due to different software versions in use. However, this has no influence on the descriptions of the functions.

The user interface of the **TestPlayer** consists of two sections, the status field and the buttons.



The User Interface of the TestPlayer in the User-mode

3.1.1 Status Field

The left section of the **TestPlayer**-window shows the current test status.

The individual information lines in detail:

Status:	Display of the currently executed function.
Done:	Time bar indicating the test progress.
PCB:	Name of the tested board.
Opens:	Number of detected opens.
LA Opens:	Number of detected LA-errors (only with additional hardware)
Shorts:	Number of detected shorts
HV-Shorts:	Number of detected shorts in the high voltage test. Only with additional hardware and with special data preparation.
HV-Breakdowns:	Number of detected breakdowns in the high voltage test. Only with additional hardware and with special data preparation.
Bad Fields:	Unstable signals in the field measurement.
No Contacts:	Test points not correctly contacted in the field measurement.
Possible Shorts:	Number of detected possible shorts during the test run.
Test Time:	Test time indication.

System messages are displayed in the status window left bottom side. Pay attention to this messages. They give exact informations about the state of the test system.

3.1.2 Buttons

The buttons are located in the window's right section.
A button can be activated either by clicking it with the mouse or by pressing the appropriate function key (e.g. **F3** for **Load Board**) indicated on the button.
Depending on the current test status of the TestPlayer, only certain commands are available. An indistinct light gray font color indicates a currently unavailable command.

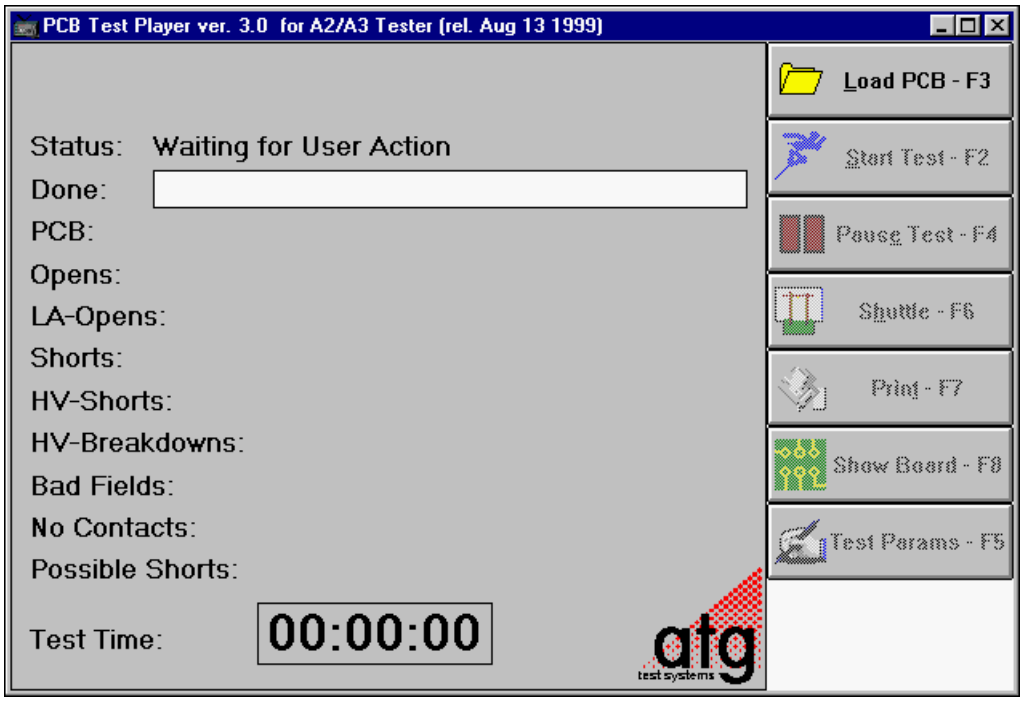
The functions of the individual buttons:

Button	Function key	Function
Load PCB	**F3**	Load a new job
Start/Stop Test	**F2**	Start/End the test
Pause Test	**F4**	Pause the test
Shuttle	**F6**	Lock/unlock the shuttle
Print	**F7**	Print the test results
Test Params	**F5**	Set test parameters
Find Pad	**F8**	Move with camera or needle towards test pad
Step by Step	**F8**	Execute testing in individual steps
Verification	**F9**	Option. Only with dongle. Start of additional programm "Verification" to verify faults found in e-test..

3.2 Load job

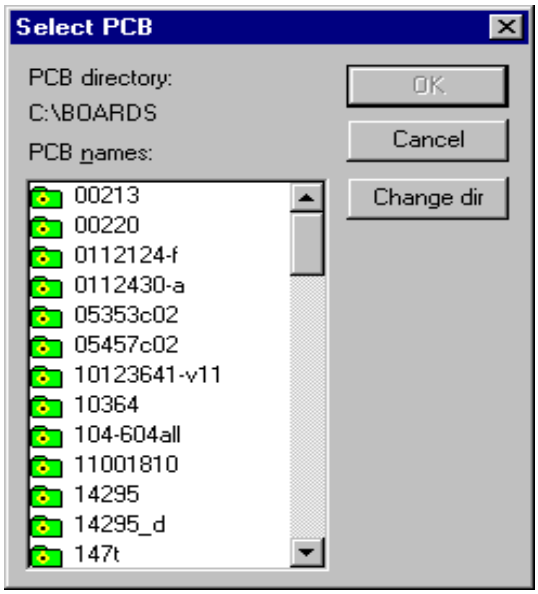
In order to a test a new PCB you need to load its job (work data). Therefore, either click the **Load PCB**-button or simply press the **F3**-key.

Hint: In order to execute a proper test run various prerequisites must be met described in the Chapter Supervisor Mode (e.g. calibration, C-Adjust, etc.)



PCB test player

The window **Select PCB** appears.



Selection-window Select PCB

From the given list load the desired job. In order to select a job you can either use the scrollbar on the right side of the window and click on the desired one or you can jump to the job's first letter by using the keyboard (e.g. Enter "**e**" for **E**L323 or enter "**3**" for **3**4abc). The selected job appears highlighted.
With the button **Change dir** you load test data from a different folder, hard drive or from a connected network. Therefore, a second path must be entered into the configuration file **fconfig.ini** of the **TestPlayer.**

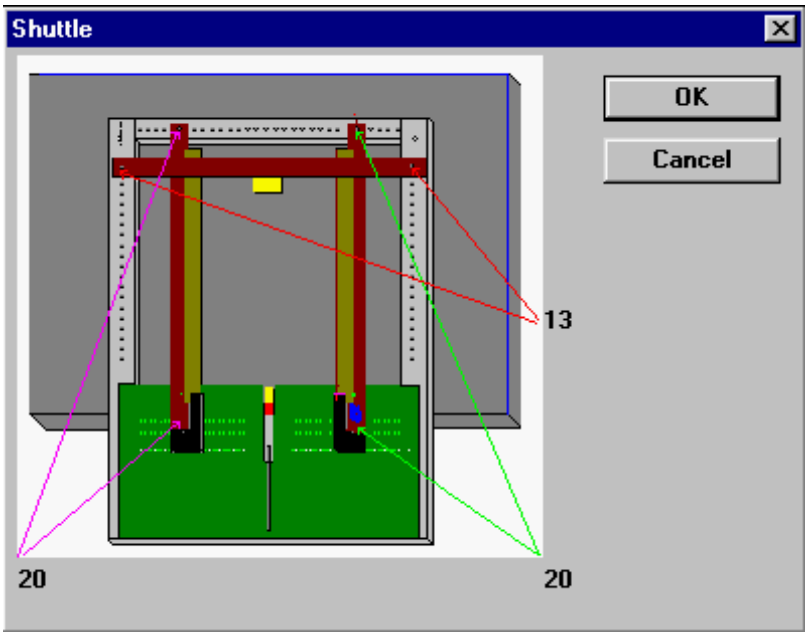
Annotation: Each job has its own folder containing the test-required files. For a successful test, the job folder must contain the 4 following files:
***.ant** antenna-file e.g. name.ant
This file contains information on the antennas.
***.les** net list-file e.g. name.les
This file contains the board's net list.
***.tsk** task-file e.g. name.tsk
This file contains the commands for the individual test probes.
***.vw** view-file e.g. name.vw
This file contains the info on the board's position in the test system as well as information about the scanmarks.
A job including these four files is displayed as a green folder. A brown folder indicates an unloadable job. (Reason: a file is missing, the name conventions are not met or the DPS did not completely process the job.)
The file ***.adj** (e.g. name.adj) is also included in the job if with the DPS-software created an adjacency-file.

The board's test data are loaded. Now you can set up the test system for the board.

4. Adjusting to a New Board

4.1 Ejecting the Shuttle

Now set the board into the shuttle. Therefore, open the shuttle locking-mechanism by clicking on the **Shuttle-**button (**F6)**. You will hear a clicking. Manually pull out the Shuttle out of the machine until the locking-mechanism automatically engages in the outer position. You will once more hear a clicking.
The window **Shuttle** appears. It shows the pre-defined placing of the product holders, which fasten the board.



Window **Shuttle** displaying the placement data for each holder

<u>Attention:</u> The shuttle must not be mechanically stressed in the open position, i.e. it is forbidden to lean on or place any other objects on it!

Annotation: The shuttle can be unlocked in two different ways:

1. If the **TestPlayer's** main-window is open, unlock the Shuttle by clicking the **Shuttle-**button (**F6**).
2. If the **Shuttle**-window is open, unlock the Shuttle by clicking **OK**. The Shuttle will not be unlocked if the **Cancel**-buttons clicked. Only the **Shuttle**-window is closed that way.

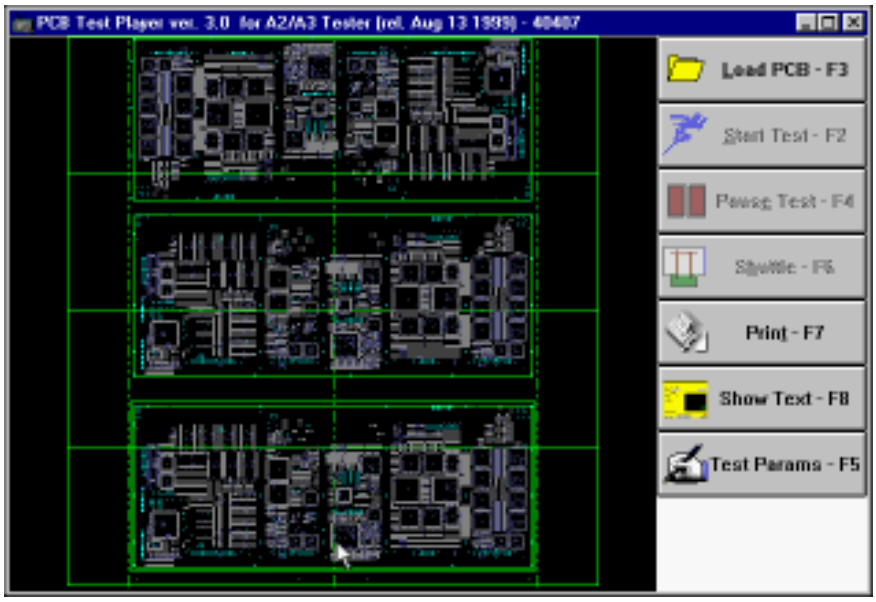
4.2 Adjusting the Product Holders

4.2.1 Selecting the proper Terminal Bar Sizes

Place at least two terminal pieces on each the left and the right product holder, and one terminal bar each on the front and rear product holder (Fig. 2, No. 8). The connecting surface must point downwards and the terminal bars must clamp in. The following applies to the terminal bar selection: As small as possible, however not smaller than the board thickness.

Observe that the contact pads located on the board's edge are not covered by the terminal bars (especially on the solder side) and that the terminal bars are not to close to them, since otherwise faulty measurements or damages to the test heads might result! In such a case, replace the terminal bars.

All holders must be set in a right angle.
If you would like to see how the board is to be set into the shuttle you can view its required position in the shuttle with the button **Show Board (F8)**.



Display of the board position in the shuttle with the button Show Board (F8)

Re-clicking the **Show Text (F8)**-button returns you to the working window.
In the window **Shuttle (F6)** the loaded board file displays the required positions of the product holders.
The example figure page B-6 indicates that the left product holder must be set to the scale position 29 and the rear holder to position 19.
Small arrows indicate the scale position.

4.2.1.1 Adjusting the left product holder

Open both clamp screws (Fig. 2 No. 2) of the left holder and adjust the product holder to the required position on the positioning scale. Re-tighten both clamp screws.

4.2.1.2 Adjusting the rear product holder

Open both clamp screws (Fig. 2 No. 9) of the rear holder and adjust the product holder to the required position on the positioning scale. Control the position of the rear terminal bar by holding the board against the adjusted position.
Re-tighten both clamp screws.

4.2.1.3 Adjusting the right product holder

Open both clamp screws (Fig. 2 No. 4) of the right holder and set the clamping lever (Fig. 2 No. 4) all the way to the right.

Lay the board on the surfaces of the terminal bars of the left and rear holder and push the right holder against the board until it is safely fixed. Pay attention towards proper board positioning!
Re-tighten both clamp screws of the right holder.

4.2.1.4 Adjusting the front product holder

Tighten the clamping device (Fig. 2 No. 6). Open both clamp screws (Fig. 2 No. 7) of the front product holder. Push the front product holder towards the board leaving approx. 1 mm distance between the clamping device and the board.
Re-tighten both clamp screws of the front holder.
Loosen the clamping device.
Pay attention towards a proper fit between all terminal bars and the board.
Loosely clamp the board laterally with the clamping lever (Fig. 2 No. 5).

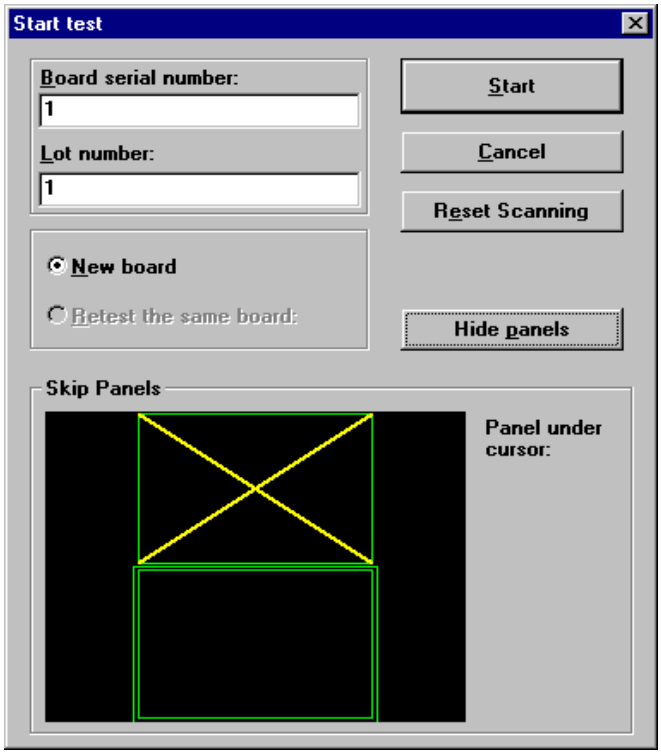
4.2.1.5 Inserting the Shuttle

After the board is properly fastened the shuttle can be driven into the test system. Release the locking mechanism by clicking on the **OK**-button in the **Shuttle**-window or by pressing the **Return**-key.
The **Shuttle**-window closes and the locking mechanism is released (you will hear a clicking). Click the **Cancel-**button if you do not want to release the shuttle locking mechanism. This way only the **Shuttle**-window is closed.
If the **Shuttle**-window is not open, push the **F6**-key or click on the **Shuttle**-button.
Push the Shuttle into the system until the locking mechanism engages again (you will hear a clicking).

5. Starting a Test in User Mode

You can begin testing after the board adjustment is complete and the shuttle is in the system.

With the mouse, click the **Start Test**-button (**F2**). The input window **Start test** appears.



Input window **Start test**

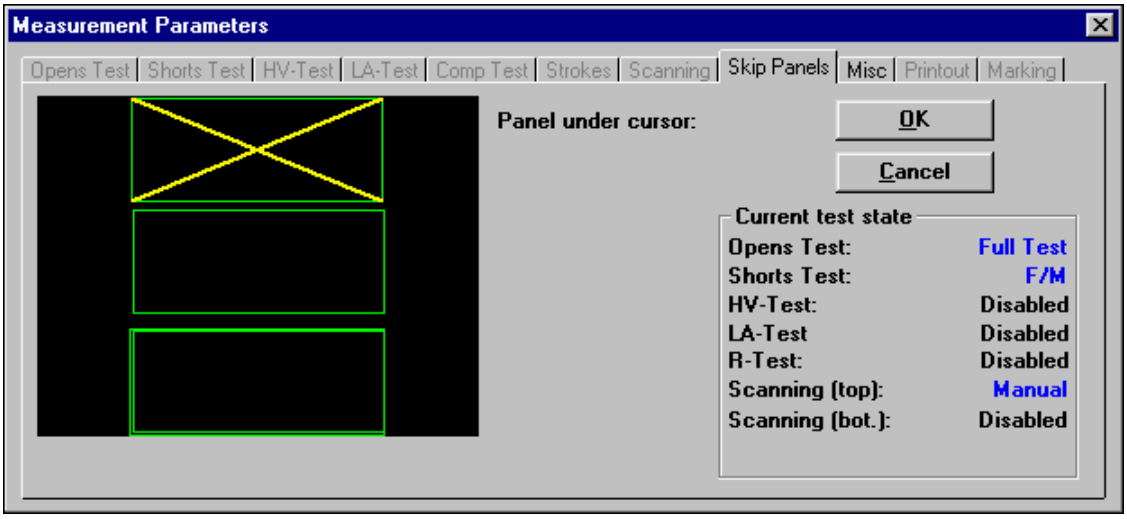
Enter the serial number of the board into the **Board serial number**-field. In the field **Lot number** the individual lots are automatically numbered. Confirm your entry with the **Start**-button.
With the button **Show panels** you can - for multi panels exclude - exclude individual panels from the test. The small graphic in the window schematically illustrates all panels. If the cursor is above a panel its number is displayed underneath the text line **Panel under cursor**. Click on the panels to be excluded. The excluded panels are displayed crossed out.
You can exclude a larger number of panels at once from testing by dragging the mouse with the left mouse-button being simultaneously pressed over the entire panels to be excluded. A white filed extends over these panels. All panels touched and covered by this white field are excluded from testing or reincluded for the test.

Annotation:
For testing a new lot its automatically pre-assigned lot number should not be changed. If you wish to assign a lot a specific number enter the desired number into the **lot number**-field.
The button **Retest the same board** is only activated if a board had already been tested. Use this button for testing the **same product** once more. The run-number will not change.

5.1 Button Test Params (F5) in the User Mode

In the User mode there are under button **Test Params (F5)** two tab-boxes available: **Skip Panel** and **Misc**.

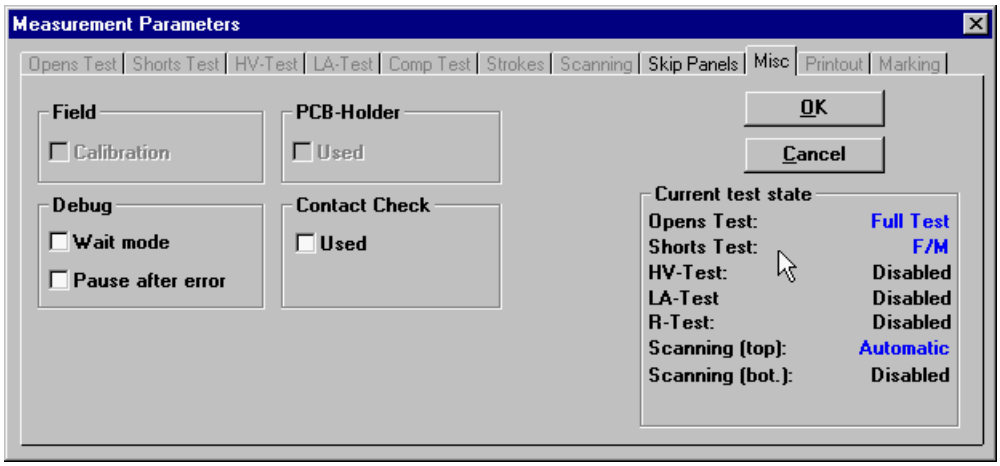
5.1.1 Tab-box: Skip panels



Panel selection window

For multi-panel testing, you can exclude individual panels from testing with the **Test Params (F5)**-button. For this purpose use the **Skip panels**-menu.
The small graphic in the window schematically illustrates all panels. If the cursor is above a panel its number is displayed underneath the text line **Panel under cursor**. Click on the panels to be excluded. The excluded panels are displayed crossed out. You can exclude a larger number of panels at once from testing by dragging the mouse with the left mouse-button being simultaneously pressed over the entire panels to be excluded. A white filed extends over these panels. All panels touched and covered by this white field are excluded from testing or reincluded for the test.

5.1.2 Tab-Box: Misc



Tab box: Misc

Field
Not functional with test system A3.

Debug / Wait mode
Perform testing step by step. Motions and measurements of the task file are sequentially executed. Consequently, the test speed is reduced facilitating the analysis of the detected faults.
The reduced test speed enables the reading the status window, giving information about the test run.

Example:
Resistance 2 <-> 3 [5 <-> 385 / 3]

Explanation:
A resistance measurement was executed with the probes 2 and 3 between the point Ids 5 and 385 of panel 3.

Wait mode is enabled if it is checked off in the pull down menu.

Hint:
Wait mode can be turned off during the test leading to its continuation at regular speed.

Debug / Pause after error
Interrupt testing (identical to **Pause Test (F4)**). **Pause after error,** only discontinues testing if a fault (open or short) is detected. The button **Pause Test (F4)** switches to **Resume Test (F4)**.
The message ”Test Paused” appears. **Resume Test (F4)** continues testing.
At normal test speed, the application of this function is senseless since the test system must first process its command buffer (up to 200 commands) before it can respond to the **Pause** command.

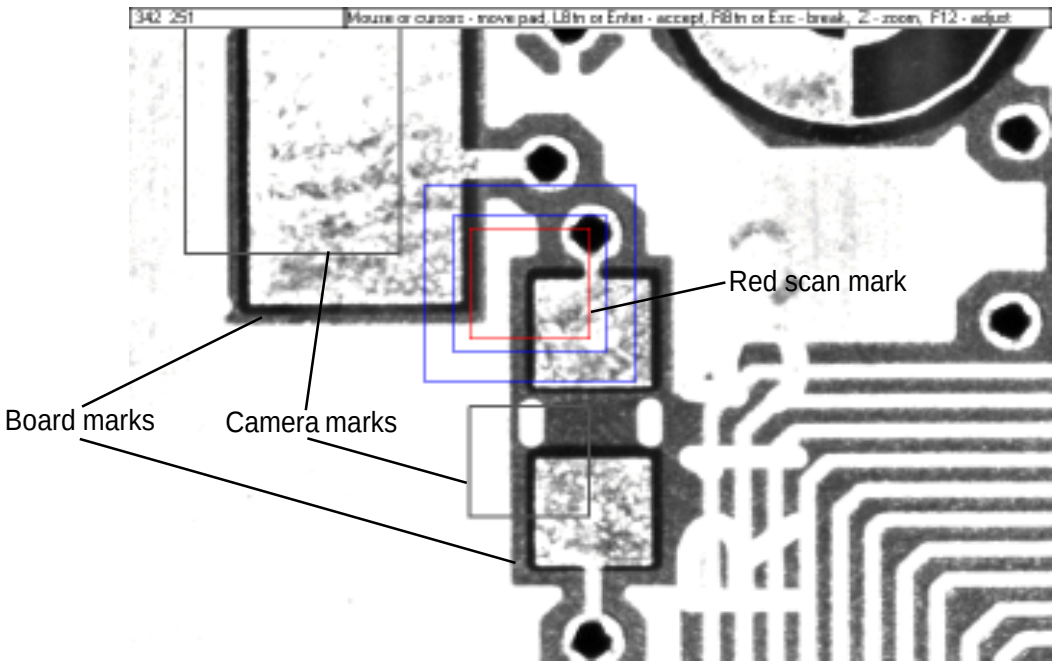
Hint:
In **Wait mode** (main menu **Debug** / menu item **Wait mode**), you can pause the test exactly at the desired position. Apply the combination of **Wait mode** and **Pause after error** for debugging. **Pause after error** is enabled if it is checked off in the pull down menu.

PCB-Holder / Used
Applies the maximum Z-axis stroke value. (The maximum value is specified in the tab box **Stroke,** function **Z-up**.)
The minimum Z-axis value, pre-set by the test system (see tab box **Strokes: min up** value), amounts to 1/3 of the defined Z-axis stroke. For increasing the test speed, the Z-axis stroke is reduced to the **min up** value if the board topography allows this. This option is disabled by checking off **PCB-Holder / Used**.
For multi-samples, the parameter **PCB-Holder / Used** should always be set to **Used** since the boards can be pushed to the bottom or top due to the holder pressure, possibly damaging the test probes or the board might result. Furthermore, select **Used** if specially built holding systems for flexible boards are applied. This excludes contacts between test probes and the holding system.

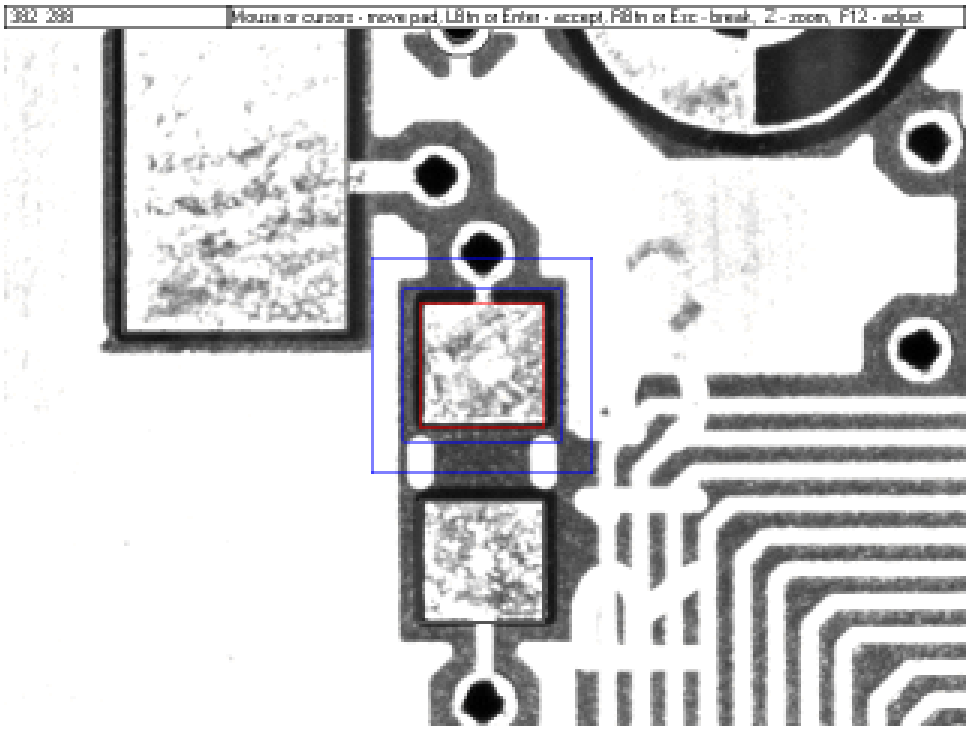
5.2 Scanning (Determining the board position with the camera)

The first step in the test procedure is the scanning. Due to the mechanical tolerances, the individual boards always show a slight difference between their actual position in the shuttle and their required position defined by the test data. This offset between actual and required board position must be determined through a measurement in order to be corrected by the test system.
For determining this offset, the board is scanned by one or two cameras. During this procedure, the camera scanmarks from the test data are brought to congruence with a section of the board.
If the camera picture is not exactly positioned on the scanmarks, they must be properly positioned to the correct camera picture with the mouse or with the cursor keys. Confirm this position with a left mouse-button click.
The red scanmark is decisive for the placement. The yellow scanmarks serve as an orientation. Compare the entire scanmark structure to find out whether the correct position was achieved.

The learned scanmark position is automatically considered and scanned for the following automatic test.



Example for incorrect placement of scanmarks:
red scanmark and black camera marks have not the position on the pads



Example for correct placement of scanmarks:
red scanmark and black camera marks have their position exactly on the pads

Attention: Position the red scanmark exactly on the corresponding pad of the camera picture!

Hint:
possible causes of board and camera scanmark incongruence:
- board improperly fixed
- wrong board fixed
- net list contains no or false board contours

The scanning procedure can be canceled with the right mouse-button or the Esc-key. A board without fine structures requires the scanning of only one side. A great offset between the top and bottom layer (frequently for multi-layered boards) requires the scanning of both sides.

5.2.1 Manual scanning

Every scanmark must be placed manually if manual scanning was set in the supervisor mode.

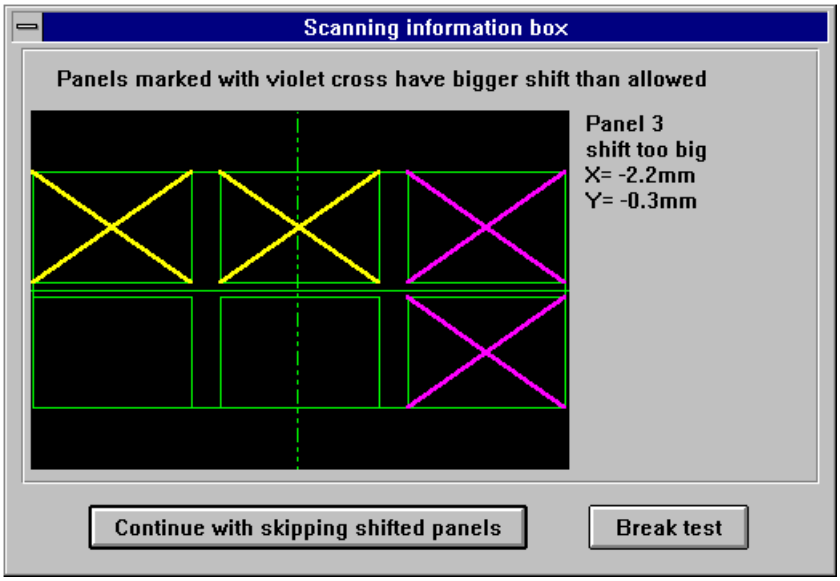
Attention: The decisive red scanmark of the camera must be exactly positioned on the concerned pad of the board.

Every time you move a scanmark with the mouse in order to place it, the scanmark is automatically moved to the screen center after the mouse click. A second mouse click confirms its new position.
The camera automatically moves on to the next scanmark if the scanmark position is not changed. Otherwise, the scanmark needs to be re-placed again.

Hint: A test is canceled after the scanning procedure, if the scanmark position expected by the test system differs more than 5 mm in x-direction or 3.5 mm in y-direction from the actual position. The following message appears:

The following errors might exist:
- Board improperly fastened
- Wrong board inserted
- Net list contains no or false board contours

After a successful scanning testing is started automatically.
For multi-panel testing, it may occur that one section of the multi-panel is located within the shift tolerance while the other one is not. In this case, the panels located outside of the shift tolerance are automatically excluded from the test. The window **Scanning information box** appears:



The skipped panels are crossed-out. Panels marked with a violet cross show a bigger shift than allowed. The purple crossed-out panels show a too large offset. The shift of an individual panel is shown in the right if the mouse positioned on it.
Inspect the possible reasons for a big shift.
You can continue testing the remaining panels (with the button **Continue with skipping shifted panels**) or cancel the test (**Break test**-button).

5.2.2 Automatic scanning

For automatic scanning enabled in the supervisor mode, only the scanmark of the first board of a series must be placed with the mouse. The test system learns this position and automatically sets this scanmark position on the following boards of this series. Testing is started automatically after the scanning process was successfully completed. The following window is displayed, if the automatic scanning happens to fail:

Close this window with the right mouse-button. The scanning procedure must then be continued manually. The scanning is only automatically continued if the test system recognizes the position of the next scanmark.
Every time the board data is newly input, the scanmarks must be relearned.

5.2.3 Wrong Board Position

The scanning procedure is canceled if the test system detects a too big offset between the actual scanmark position and the one given in the test data. The following warning is displayed:

In this case, check the following:

- Product holders properly adjusted?
- Board properly inserted?
- Step&Repeat incorrectly applied? (first panel scanned correctly, the following faulty)
- Wrong pad considered as scanmark?
- Do the test data differ from the original board?

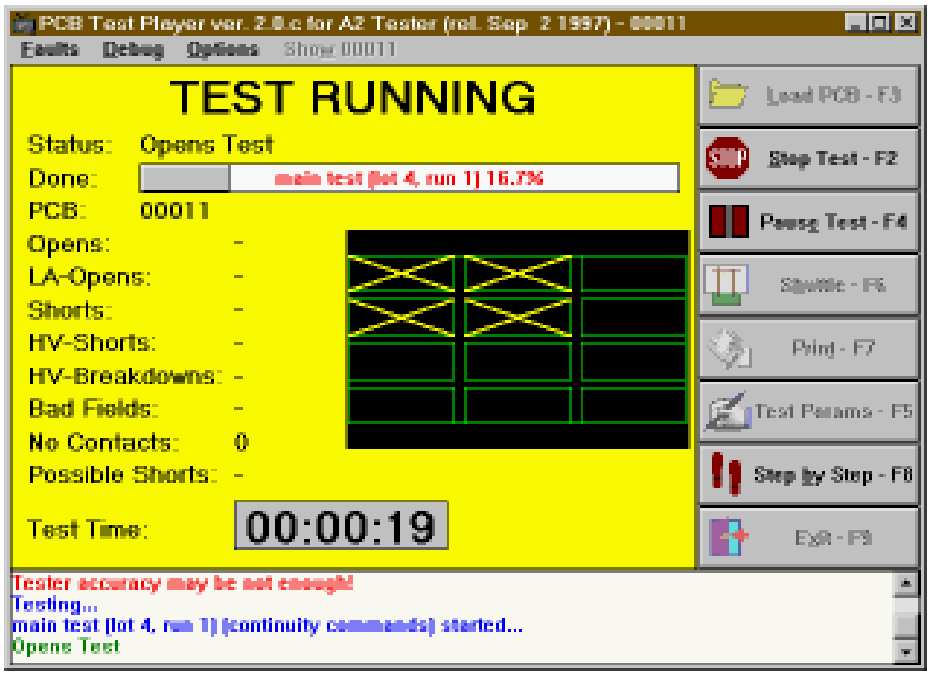
Restart the test after these corrective measures.

5.2.4 Canceling the scanning process

Scanning can be canceled at any time by clicking the right mouse-button or by pressing the **Esc**-key. In this case, the board is not tested.

5.2.5 The Beginning of the Test

The test system automatically starts the test run after the scanning. The line **TEST RUNNING** flashes and the board faults and the test time are displayed.



Test running

5.2.6 Pausing and Resuming a Test

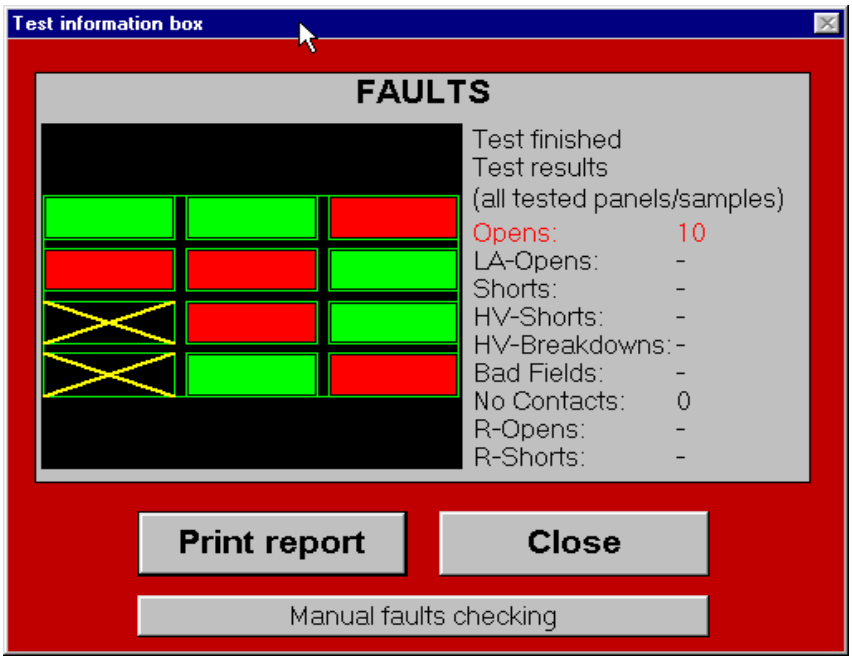
Click the **Pause**-button (**F4)** to pause testing. The test system comes to a stop in approx. 3 seconds after the command buffer is fully processed.
Testing is continued from the point where it was halted by clicking the **Resume test**-button (**F4)**.

5.2.7 Canceling the test

Click the button **Stop** (**F2**) to cancel testing. In this case, no test results are recorded.

5.3 Test Result Output

After a test run is completed, the test results are put out in the **Test information box**.

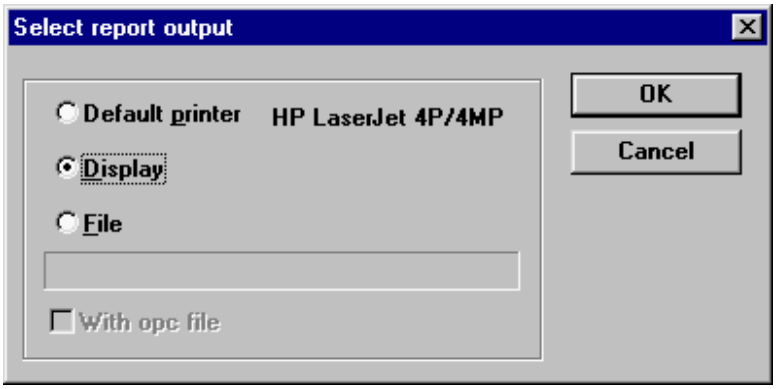


Test results

In the shown board view, faultless panels are displayed green and faulty panels red. Panels excluded from testing are crossed out yellow.
Panels automatically excluded after scanning by the test system are displayed violet. This for example occurs if the Step&Repeat-command is incorrect or if the board presents a too great offset.
In the fault list, all faults are listed in red.
Placing the cursor on a tested panel displays only its individual faults in the faults list.
Push the button **Print report** to activate the output option selected in the supervisor mode with the button **Test Params (F5).** The button **Close** exits the **Test information box.**
The test results can be printed at any time by pressing the button **Print (F7)**. However, if the test data was modified, a test result output with the button **Print (F7)** is no longer possible (Error message: **Wrong Timestamp**)
Depending on which output option was selected in the supervisor mode, the test results are put out on screen, printed or saved as a file.

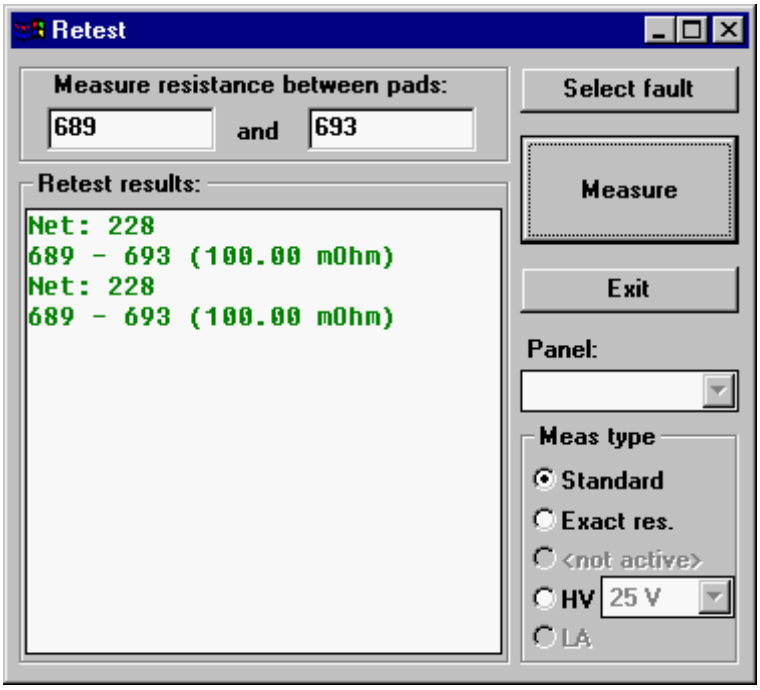
Hint: The printer driver is installed under Windows.

The setting **Ask before printing** of the supervisor mode allows the user to select the kind of output. Therefore, the window **Select report output** is displayed. Here, the test results can also be put out in several variants after each other.



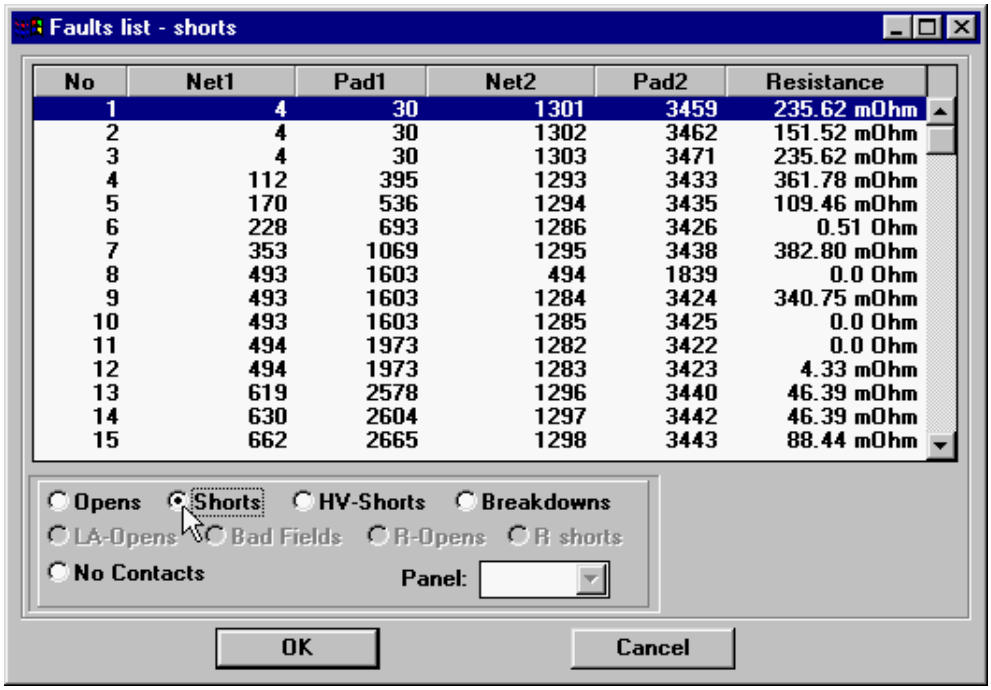
Output selection via ”Ask before printing”

The button **Manual faults checking** offers the option of selectively retesting individual faults. The window **Retest** is opened after this button is activated. This function only supports sequential single measurements. With it, you can carry out a retest of the ohmic resistance between faulty test pads.



Select retest pads

With the button Select fault of the **Retest** window, you can select and retest both pads of a single fault from the loaded faults list. The **Faults list** window is opened for selecting a fault retesting with a double-click.



In the bottom section of the window, select the type of faults to be retested (Opens, Shorts etc.).
The contacting of both faulty pads is carried out in a „stand-by mode“, i.e. the test heads slowly approach the pads, contact them for 5 seconds and then remain above the contacted pads. This enables an exact analysis of the individual measurements via the contact position.
Unconfirmed retested faults are displayed green in both the **Faults list** and the **Retest** windows. Confirmed faults are again displayed red.
In the fields **Measure resistance between pads**, it is also possible to enter the ID-pads between which the resistance value is to be determined. The **Measure** button initiates the desired test. The measurement value is displayed in the **Retest results**-window.

Hint:
The option **Exact** has no function.

6. Removing the tested Board and inserting a new One

After a board was tested and its results were put out a new one can be inserted. For this purpose the shuttle can remain in its inserted position.

Open the shuttle locking and pull out the shuttle. Relax the board by opening the tighting lever (fig. 2, no. 59) and unlock the spring loaded tighting element (fig. 2, no 6). Now you can take out the board.

Put in a new board and close the shuttle by pressing the button **Shuttle (F6)**. Now you can test the new board.

6.1 Turning off the Test System

Hint:
To guarantee a flawless test, the test system should never be switched off. If you don't use the test system for a longer time, the monitor can be switched off.
The test system is cooling down after turning off and the accuracy is reduced until the working temperature is restored.

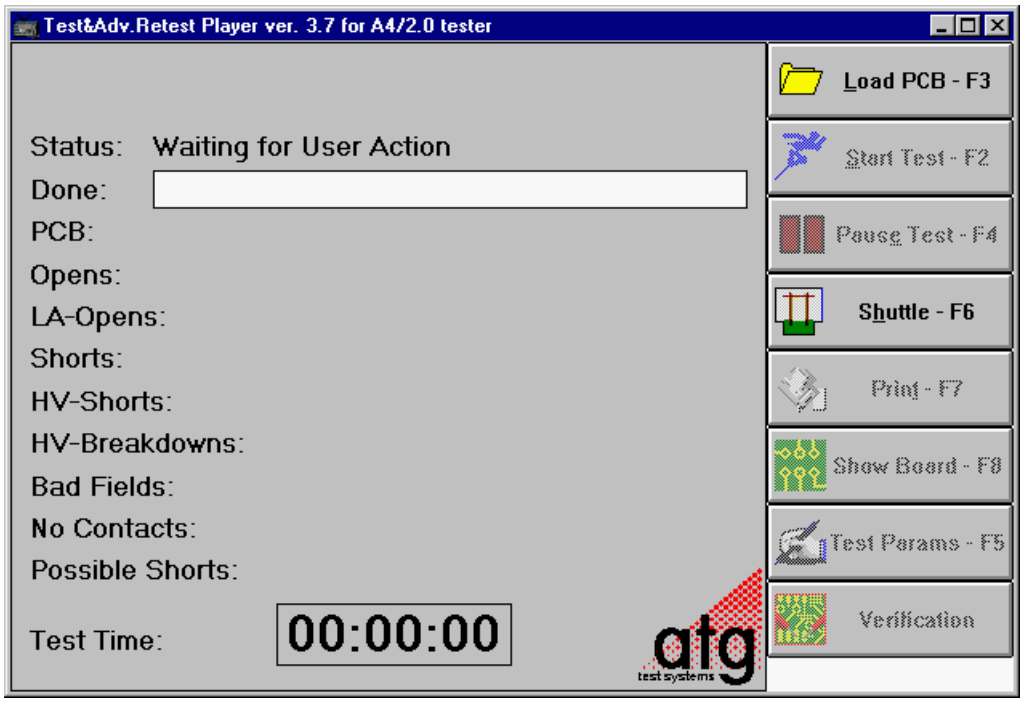
1. Press button **Control off** (p. A-12 no. 7, red Button)
   After 4 seconds all control rack LEDs switch off.

2. Turn main switch to **off** (p. A-12 no. 1).

7. The Supervisor Mode

7.1 Introduction

After starting the **Test Player**-program you are in the **user mode**. The user mode provides you with all necessary basic functions for the circuit board test.

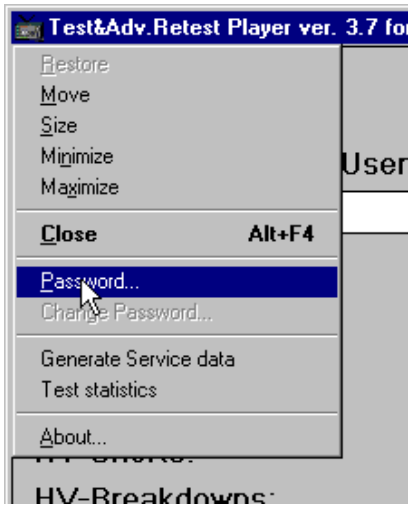


The **Test Player** in the user mode

From the user mode, you can activate the **Supervisor-mode** through a password. The supervisor mode provides additional functions enabling the adjustment of basic settings, test interference or the execution of inspections.
Appropriately trained operators must only activate the supervisor mode.

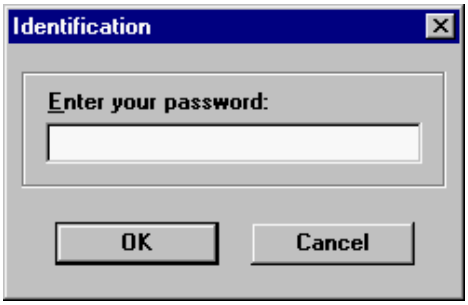
7.2 Switching to the Supervisor Mode

In the task window of the window **Test Player** once click on the control-menu-box in the upper left in order to open the menu for switching to the supervisor mode.



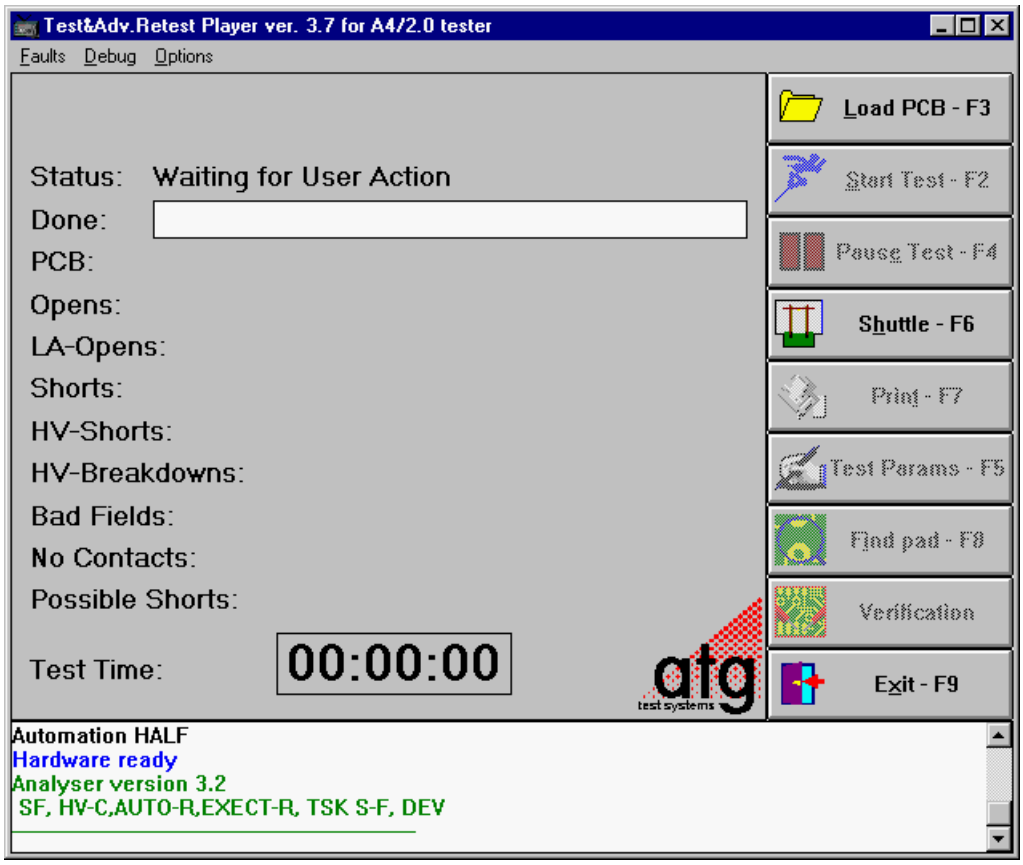
Menu Item Password

The pull down menu for changing the operator mode appears. After clicking on the menu item **Password,** the password input window **Identification** appears.



Password entry

Enter the password and confirm the entry with the **OK**-button. The test system now switches to the **Supervisor Mode** if the appropriate password was entered. The monitor display will change as shown in the following:

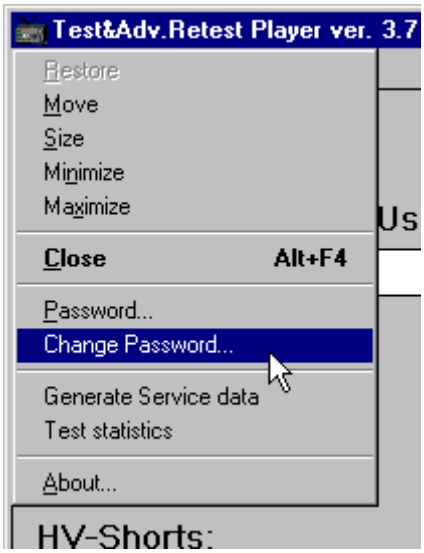


Opening screen supervisor mode

For returning to the **User Mode** just enter the password again in the same manner as described before.

7.3 Changing the Password

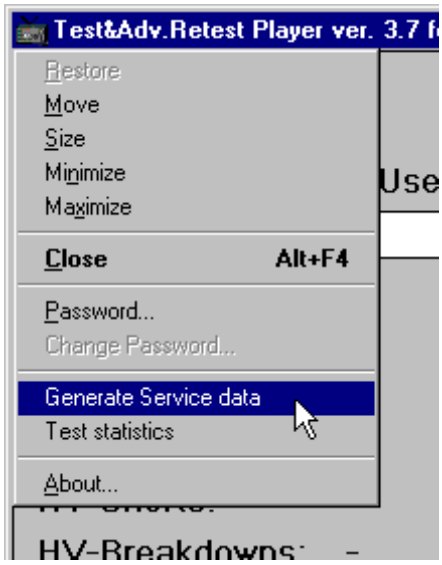
After the first installation of the A 3-software package no password is set. The supervisor functions are therefore freely accessible to anyone. The test system can be password protected and the password can be changed at any time.
In order to enter a password, switch to the supervisor mode and open the control menu box in the upper left of the **Test Player-**window. The menu item **Change Password** for entering a new password or changing an existing one is located here. You can only assign **one** password. Attention! Do not forget the password!



Menu Item Change Password

Attention! Do not forget the assigned password; otherwise, it is impossible to enter the supervisor mode!

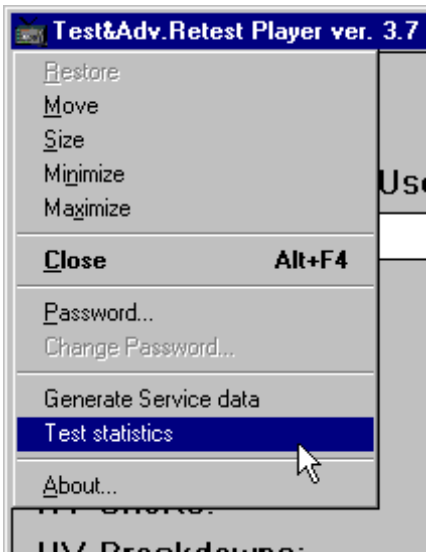
7.4 Generate Service Data

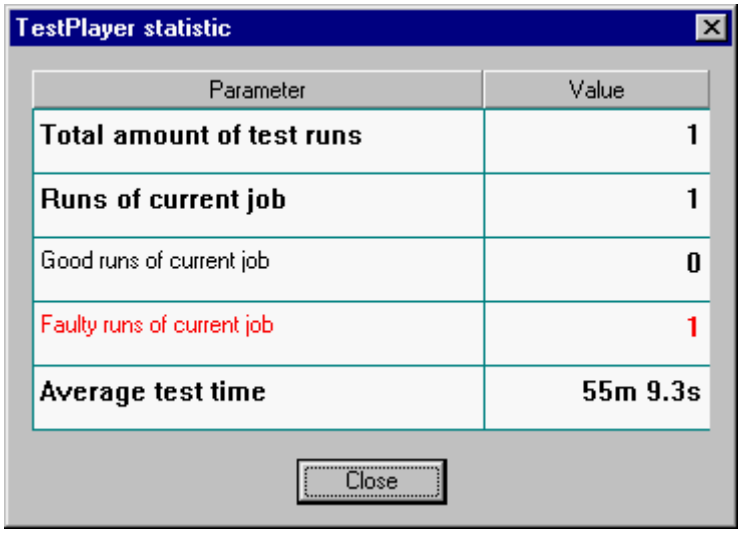


The item **Generate service data** creates a directory with different files, which will enable a service department employee of "atg test systems" to recognize the cause of a test problem. This service-file will be written to directory **C:\programms\atg\dump** as a compressed ZIP-file. Send this file to the service department of atg test systems.
E-mail adress: service@atg-test-systems.de

Hint:
This file is also created with every software crash. Sort the files in order of date to find the current one.

7.5 Test statistics





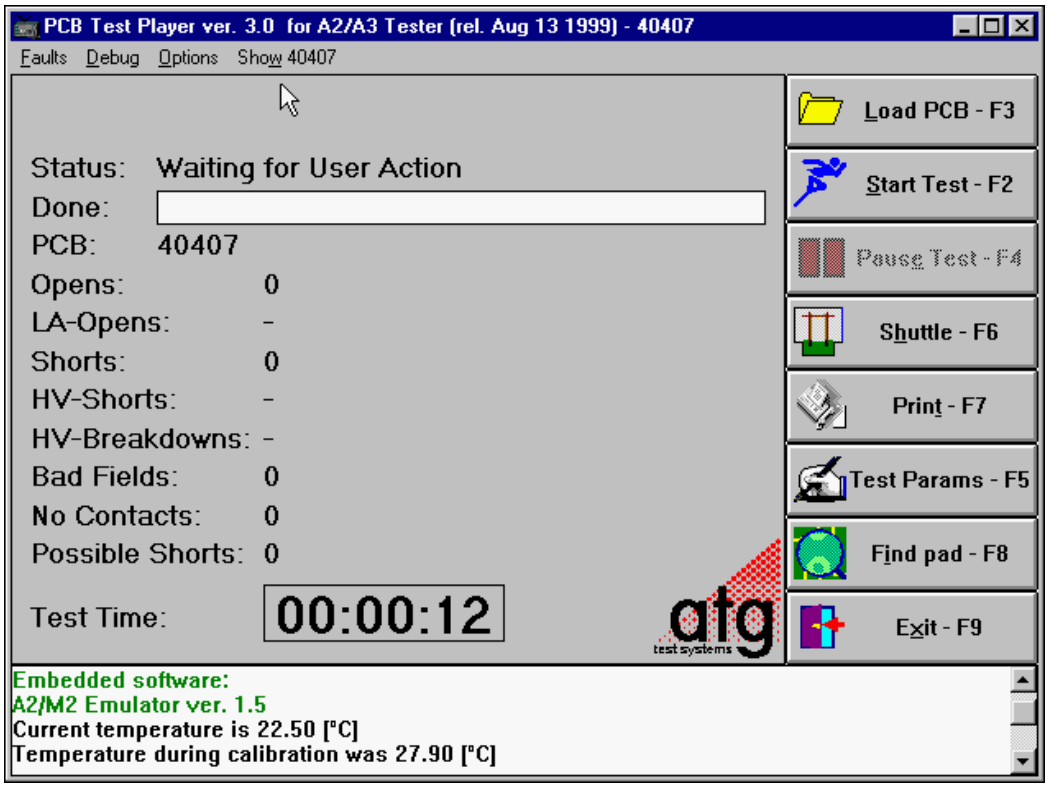
You can always open the wirndow **Testplayer statistic.** This window shows a summary of the done jobs sice turning on the test system.

Total amount of test runs
Runs of current job
Good runs of current job
Faulty runs of current job
Average test time

7.6 The operating window of the supervisor mode

The software buttons of the user mode are also functional in the supervisor mode. Modified or new are:

– for a job loaded, the function **Show <boardname>** is available in the top menu bar of the action window, providing an extensive sub-menu.
– the **F8**-key is now assigned the function **Find pad.**
– a new button is provided: **Exit F9**, for closing the Test Player.
– In the supervisor mode, system messages are displayed in a status window in the bottom section of the action window. Double-clicking this status window maximizes it, or vice versa.
– The **Test Params** button **(F5)** provides a lot more functions.



Opening screen supervisor mode

7.7 The Functions of the new Supervisor Mode Buttons

In the supervisor mode, the following new buttons are available in the right side of the window:

Button Find Pad (F8)

With the button **Find pad,** you can find individual pads on the board with the camera or contact them with a test probe. The board must have been scanned before; otherwise, this menu item cannot be started. For the opposite case, the board is first scanned automatically after the function **Find pad** is executed.

Button Exit (F9)

The **Exit (F9)** button closes the TestPlayer.

7.8 The Main Menus of the Supervisor Mode

7.8.1 The Main Menu Faults

In the **Faults** main menu, you can retest the entire or selected parts of the faults data of a loaded and fastened board and carry out ohmic measurements between two pads of your choice.

Main Menu Faults

These fault categories can be retested:
- *Opens*
- *Shorts*
- *Resistor-Opens* and
- *Resistor-Shorts*
- HV-Shorts
- Breakdowns

The following faults categories **cannot** be retested:
- *Bad Fields* and
- *No Contacts*

The requirements for the application of this retest function are:
- The board must already be scanned.
  A board is automatically scanned after starting the functions **Show Faults**, **Retest All** or **Retest Selected** provided the board had not been scanned before. The selected function only starts after the scanning is completed. The menu item **Scanning** of the test parameters (F5) should be enabled.
- The data set <**boardname**>**.les**, <**boardname**>**.vw**, <**boardname**>**.ant**, <**boardname**>**.tsk** must not have been modified in the fault file to be loaded.
  A fault file being loaded is displayed in gray with the addition `not valid`, if the current data set of the directory **\boards**<**boardname**> does not correspond to data set of the fault file at time of creation.

Hint:
An extensive verification mode is offered by atg test systems for all flying probe test systems. With this verification extension you can retest found faults (also from grid test systems).

7.8.2 The Menu Items of the Main Menu Faults

7.8.2.1 Load Faults

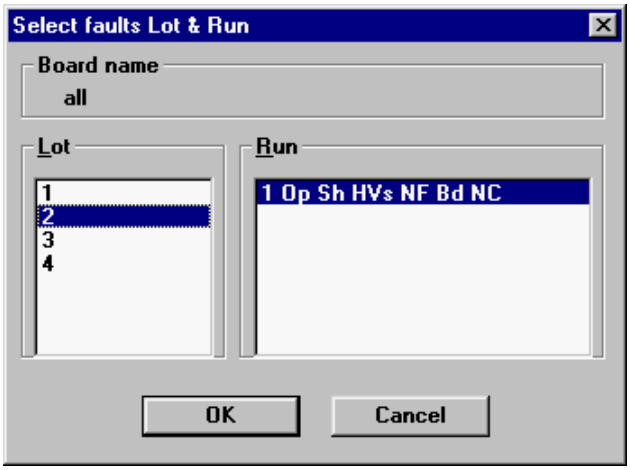
With menu item **Load Faults** you can select fault files of earlier tests for retesting.

The fault files <**boardname**>**.flt** are listed in lot-directories. These directories are located in your lot-directory and are named 001, 002... each number representing a lot.

Hint:
Lot = a working cycle of the test system, starts with the loading a new job. The lot contains all following test results of this board type. The lot is closed when exiting the **Test Player** or when loading a new board. The **Test Player** automatically creates a new directory if a lot is tested at a later point.
Run = a single test within a lot. The therefore created run-no. is assigned as ID-no. to the tested board.

Hint:
For the retest of multi-sample jobs it is necessary to fasten the panels in the exact same position in the shuttle as in the first test.

After selecting the menu item **Load Faults** a divided selection window is displayed. Select the desired lot and run for retest. This run is now available for the following menu items **Retest All**, **Retest Selected** and **Show Faults**.

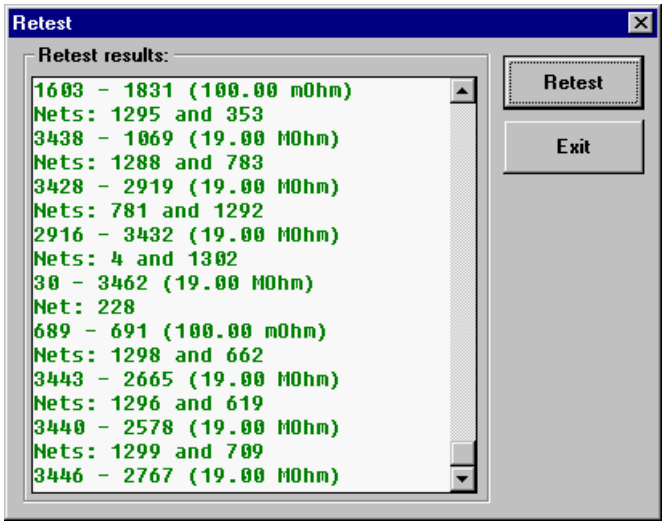


Lot- and Run Selection

Following the run number, the faults it includes are shown in abbreviations. For the case that the selected run contains no fault data the program will display: `No Faults in selected lot or run`

7.8.2.2 Retest all

The menu item **Retest all** can only be activated after you have loaded a fault file with at least one fault with the menu item **Load Faults.** All testable faults of the loaded fault file are retested and listed, if the **Retest**-button in the **Retest-**window is pressed.
If more faults than can be listed in the window are confirmed, you can view them by using the scrollbar on the right side of the window. The retested faults are displayed in green if they do not confirm as faults. Faults displayed in red were reconfirmed as faults in the retest.



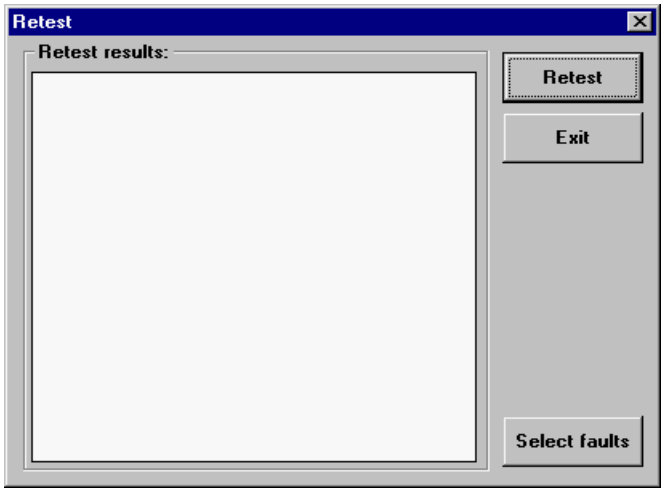
Retest all

Hint:
In the menu item **Retest all** you cannot refresh your fault file. Furthermore, it is impossible to printout the contents of this window.

You can apply the menu item *Retest all* for the inspection of repaired boards. However, this additional inspection cannot replace an entire retest of the board!

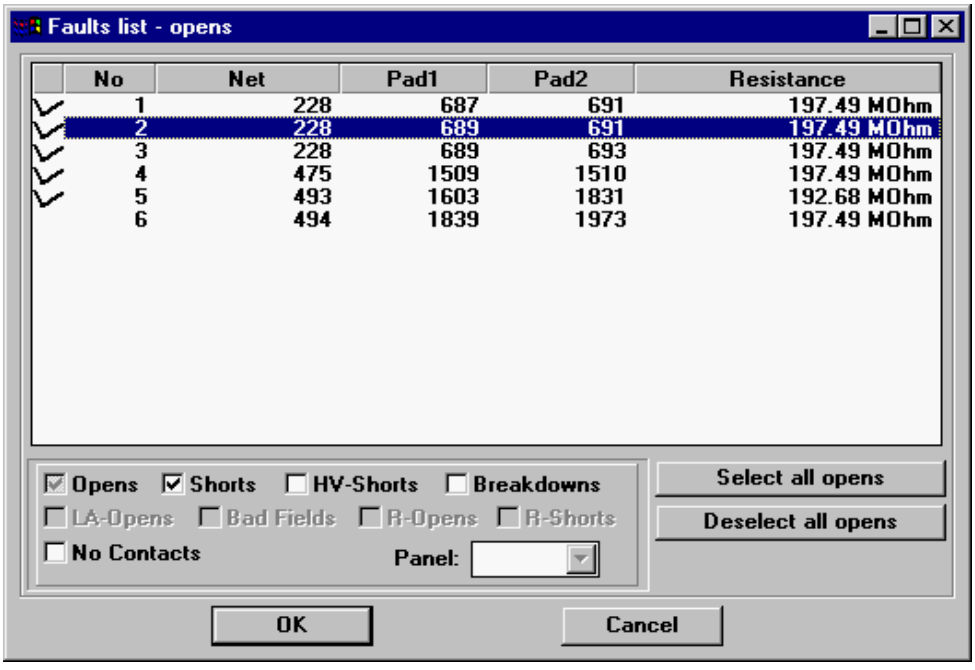
7.8.2.3 Retest Selected

The menu item **Retest selected** enables the retest of any desired parts of your fault file. As mentioned for the menu item **Retest all**, the menu item **Retest Selected** can only be activated after a fault file was loaded with **Load Faults.**
The handling is identical to the menu item **Retest All**.



Retest Selected

The menu item **Retest Selected** additionally contains the button **Select faults**, which opens the selection window **Faults list** in which you can make a selection of the faults to be retested.



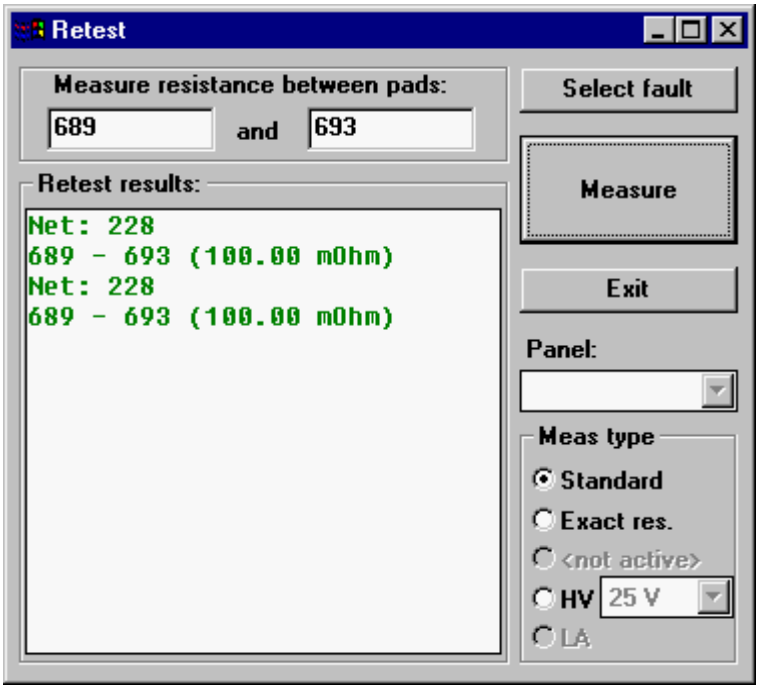
Fault Selection List

The bottom of the **Faults list**-window all possible fault types of the loaded run are listed. A fault type is displayed in gray if it is not included in the fault file. The selection box **Panel** lets you choose which panel you would like to retest or if you would like to retest all panels.

In the top of the selection window the individual faults of the activated fault type are displayed. Faults marked for retest are checked off. For (de) activating a fault, remove or add its marker with a mouse click or by pressing the space bar.
With the buttons **Select all** <**Fault type**> or **Deselect all** <**Fault type** > you can activate or deactivate all faults of the list.
In order to start the retest, confirm your selection with the **OK**-button. The **Faults list**-window is closed and the **Retest**-window is active again. Start testing with the **Retest**-button. All verified faults are shown in the scroll-list during the retest. The retested faults are displayed in green if they do not confirm as faults. Faults displayed in red were reconfirmed as faults in the retest.
As mentioned for the menu item **Retest all** there is no possibility of printing out the contents of the scroll-list or of actualizing the fault file.

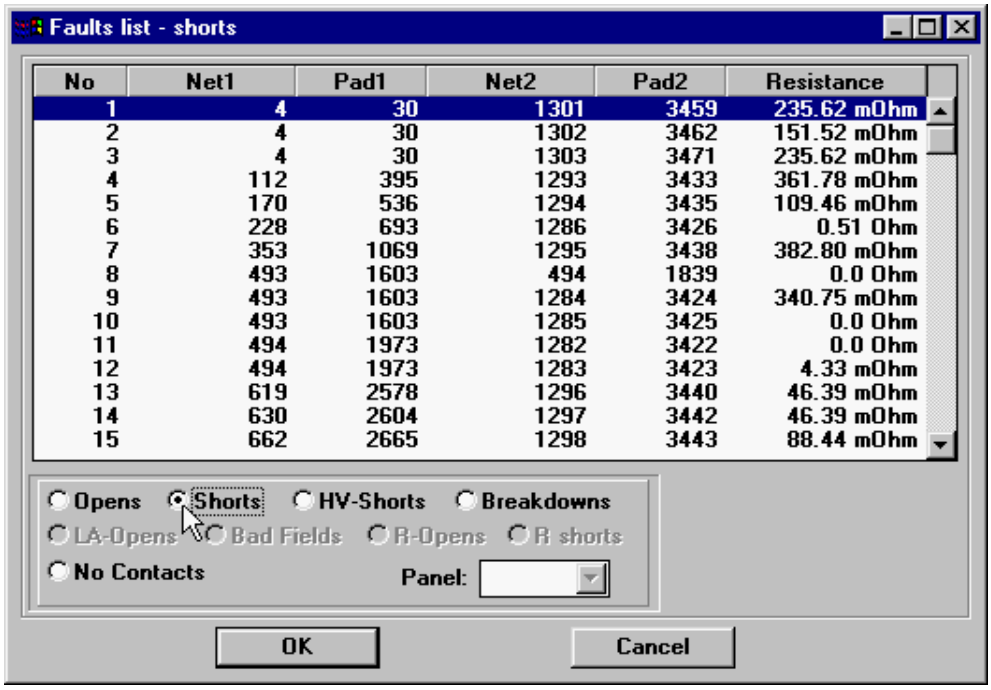
7.8.2.4 Show Faults

The menu item **Show Faults** serves the purpose of specifically inspecting individual faults. This menu item supports only sequential single measurements. The pads for measurement can be selected from the loaded fault file (see **Load Faults**) or directly entered.
During this the ohmic resistance between the test pads is measured. The contacting of the pads is carried out in a ”stand bye”-mode, i.e. the test heads are slowly directed to the pads, contact them for approximately 5 seconds and then remain above the contacted pads. This enables a closer analysis of the individual measurements in regards of the contacted pads.



Select Pads for Retest

With the **Select fault-**button you can select the pads of an individual fault from the loaded faults list. The **Faults list**-window is opened from which a fault can be selected.



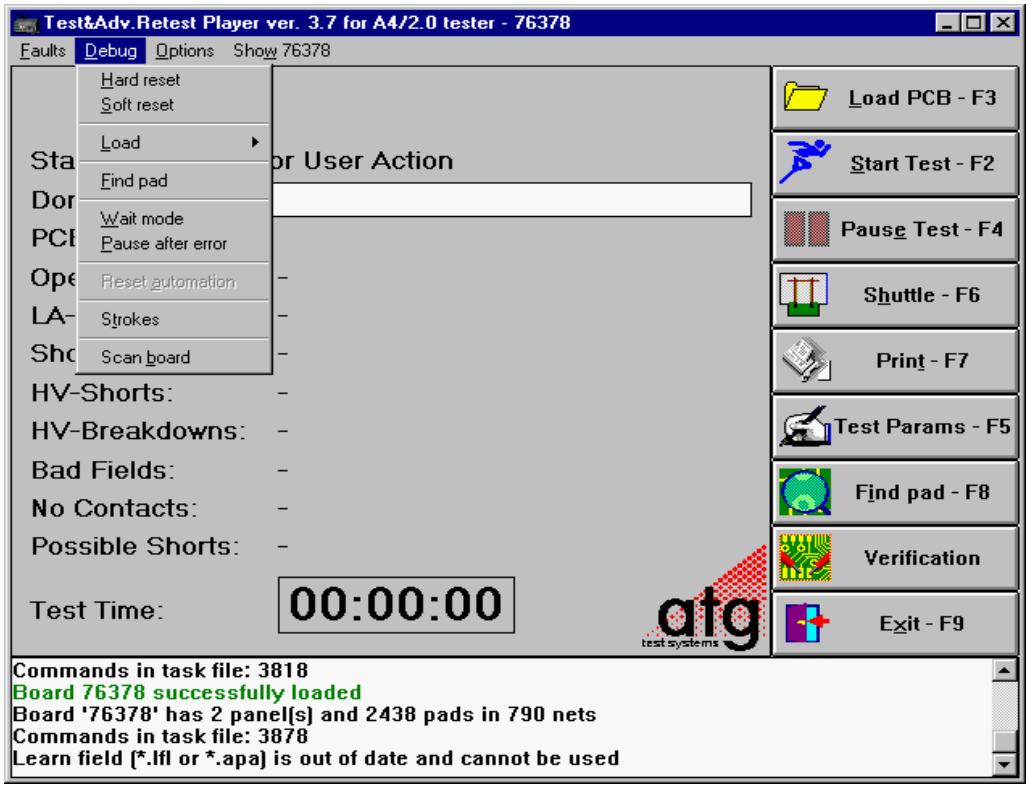
Select Faults for Retest

The functions of the **Fault list** window are described in the menu item **Retest Selected** (p. C-10).
Start the individual test with a double-click on the desired fault of the faults list. During this the faulty pads are transferred to the **Retest-**window and the test results are displayed. For a confirmed fault the measuring value is displayed in red and vice versa in green.

Hint:
Upon opening the **Fault list-**window entirely covers the display of the retest output-window. In order to prevent this from happening move the **Retest-**window for example upward ahead of opening the **Fault list-**window.

In order to carry out a measurement between to random pads enter the both pad ID's in the input window underneath **Measure resistance between pads**. In the selection window **Panel** you can select an individual panel.
The **Meas type** options enable the following settings for the measurement:
- **Standard:** Measurement at normal accuracy
- **Exact res.:** Measurement at increased accuracy. This measurement takes longer since an average value of several longer lasting measurements is determined.
- **HV:** Set the voltage for the measurement
- **LA:** Enables a LA-measurement if the required hardware exists.

7.8.3 Main Menu Debug



Main Menu Debug

7.8.3.1 Hard Reset

The menu item **Hard Reset** sets back all controller cards. During this, the power supply of the test system is not interrupted; however, all internal program activities are deactivated.
This function is comparable to the application of an emergency off switch. In order to put the test system back into operation you must reload all control programs (menu item **Load the entire** main menu **Debug / Load)**, or exit the **Test Player** and restart.

7.8.3.2 Soft Reset

With the menu item **Soft Reset** you can set the entire test system back to the ”zero position”. The test probes and the cameras are directed to their start position which they approach after the system is loaded. All incomplete command sequences are terminated and a short system check is carried out.

This command does not have a negative effect on the test system; it only produces a defined condition. Only execute a **Soft Reset** when the test system is inactive.

7.8.3.3 Load

With the sub-menus of the menu item **Load** you can reload necessary system programs and data required for the initialization of the test system, either individually or entirely (e.g. after a Hard-Reset).

All

Loads and starts the entire system programs in the following order:
1. Crate-program (control program) of the test system.
   This program is saved as **c_prog.bin** in the **\hardware-**directory.
2. Tester-layout (a hardware specific initialization file).
   This file is saved as **f_layout.bin** in the **\hardware-**directory.
3. Probe-program (control program for the test probes).
   This program is saved as **f_prog.bin** in the **\hardware-**directory
4. Correction-tables (for aligning the probes and camera on the test system matrix).

These tables are arranged corresponding to the numbering of the individual probes (e.g. rail0l.cor for probe 0, left). The individual programs are saved as **rail??.cor** in the **\hardware-**directory

The function **Load all** is nearly identical to the automatic loading procedure when starting the **Test Player**. Only the loading of the image capture software for the cameras is not implemented here.

Load & Run Crate

Loads and starts the Crate-control program (c_prog.bin).

Load Layout

Loads the test system-layout (f_layout.bin).

Load & Run Fingers

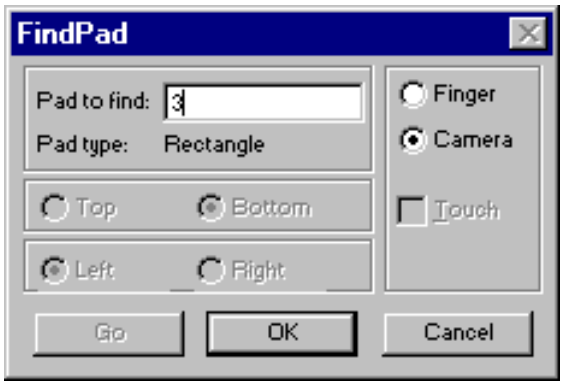
Loads and starts the probe-program for the individual probe controllers (f_prog.bin).

Load Correction Tables

Loads the correction tables (rail??.cor).

7.8.3.4 Find Pad

With the menu item **Find Pad** you can find individual pads on the board with the camera or contact them with a test probe. The board must have been scanned before; otherwise this menu item cannot be started. Is the opposite the case, the board is first scanned automatically after the function **Find Pad** was executed.



Find Pad

In the input box **Pad to find** of the **Find Pad**-window enter the pad-ID of the pad you wish to inspect. If the searched pad is not located on panel 1, the panel can be entered separated by a slash. Choose which device you would like to apply for finding the pad, either **Camera** or **Finger**, and click the **OK**-button.
A short information on the pad is displayed underneath **Pad type**. Press the **Go**-button to find the pad.
In the boxes Top/Bottom and Left/Right you can exactly specify the pad. If the camera was activated, the selected pad will be displayed in red in the screen's center. The **Find Pad**-window will be available again after clicking the left mouse-button. The right mouse-button closes the **Find Pad**-window.
If you activated **Finger,** one test head will move to the desired pad and remain there without making contact. Enable **Touch** for contacting the pad.
You can switch between **Finger** and **Camera.** In case of camera and test probe interference the software will direct either the test head or the camera back to its original position.
Close the action-window with the **Cancel**. This automatically executes a Soft-Reset of the test system.

Hint:
You cannot activate **Find Pad** if the optical scanning is disabled in the **Test Params (F5)**-menu.

7.8.3.5 Wait Mode

With the menu item **Wait Mode** you can run the test procedure step by step. Movements and measurements of the task file are executed sequentially. During this, the test speed is reduced and the analysis of the detected faults is therefore facilitated. Due to the reduced test speed it is now possible to online display information about the test procedure in the status window.
For that purpose an example line:

Resistance 2 <-> 3 [5 <-> 385 / 3]

Explanation:
A resistance measurement was carried out with the probes 2 and 3 between the pad-ID's 5 and 385 of panel 3.

The Wait-mode is selected, if it is checked-off in the pull-down-menu.

Hint:
During testing, the Wait-mode can be turned off/on. Afterwards, testing is executed in normal speed.

7.8.3.6 Pause after error

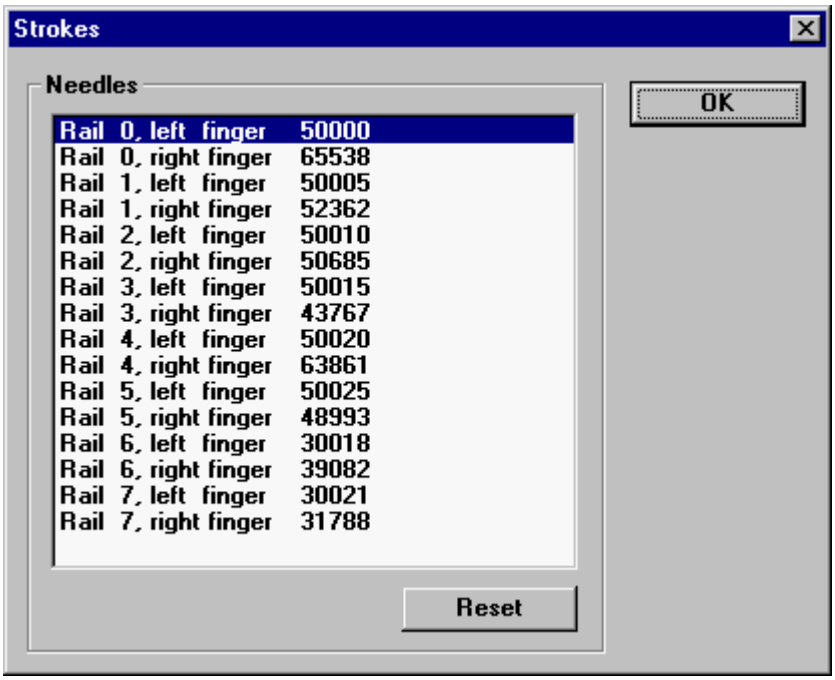
With the menu item **Pause after error** you can, similar to **Pause Test (F4)**, interrupt a test run. A **Pause after error** is only then carried out after a fault was detected (short, open). The button **Pause Test (F4)** changes to **Resume Test (F4)**. The message *Test Paused* is displayed. With the **Resume Test (F4)**-button you can continue testing.
However, in normal test speed this function becomes useless since the test system first processes the command buffer (up to 200 commands), before the **Pause**-command comes into effect.
In the Wait-mode (main menu **Debug** / menu item **Wait mode**), however, you can pause the test every time a fault is detected. Only apply the combination of **Wait mode** and **Pause after error** for debugging.
Pause after Error is selected, if it is checked off in the pull-down-menu.

7.8.3.7 Reset automation

The test system A 3 is also available as fully automatic system A 3-a. This feature does not work with A 3.

7.8.3.9 Strokes

The menu item **Strokes** tells you how often test probes have made contact during their operating life. This way you can keep track of their operating life. The statistics file **strokes.cnt** of the **\hardware-**directory is listed for this purpose. This file is actualized with each Soft-Reset.



Test Probe Contacts

After a test probe tip exchange you should reset this counter function. In order to do so, click on the line of the exchanged probe and press the **Reset-**button.

7.8.3.10 Scan Board

With menu item **Scan Board** you can start the scanning and this way determine the exact board position.
The scan result is displayed in the following format.

Example:
X = 0,999457x – 0,000014y – 44
Y = 0,000014x + 9,999457y + 1950

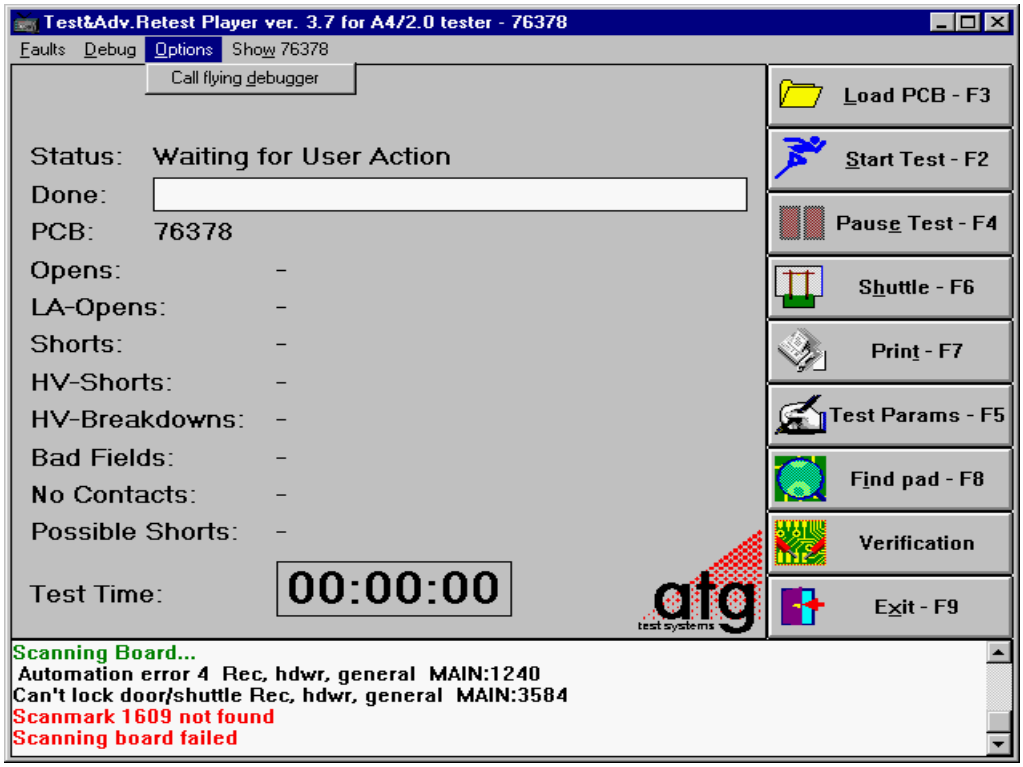
Of these lines only the X- and Y-offset of the board are of interest:
The X-offset is - 44 µm and the Y-offset + 1950 µm.

The remaining coefficients represent internal calculations results and are of no interest to the user.

Hint:
It is impossible to activate the menu item **Scan Board,** if scanning was disabled in the **Test Params (F5).**

The **Advanced-**button opens the **Advanced Video Setup-**window.
Attention! The settings in this window must not under any circumstances be changed.

7.8.4 Main Menu Options



Main Menu Options

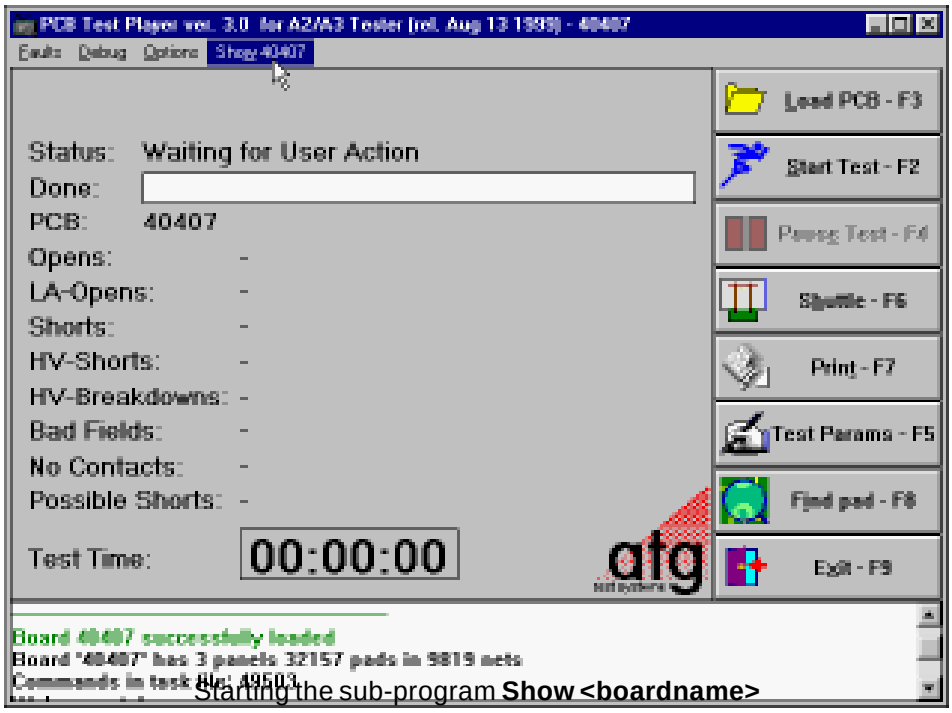
7.8.4.1 Call flying debugger

Do not use the menu item **Call flying debugger** for executing a C-Adjust or for calibrating the test system. Use the separate program icon **Debug32** on the Windows NT desktop. This menu item is only used for the atg service support.

Start Debugger

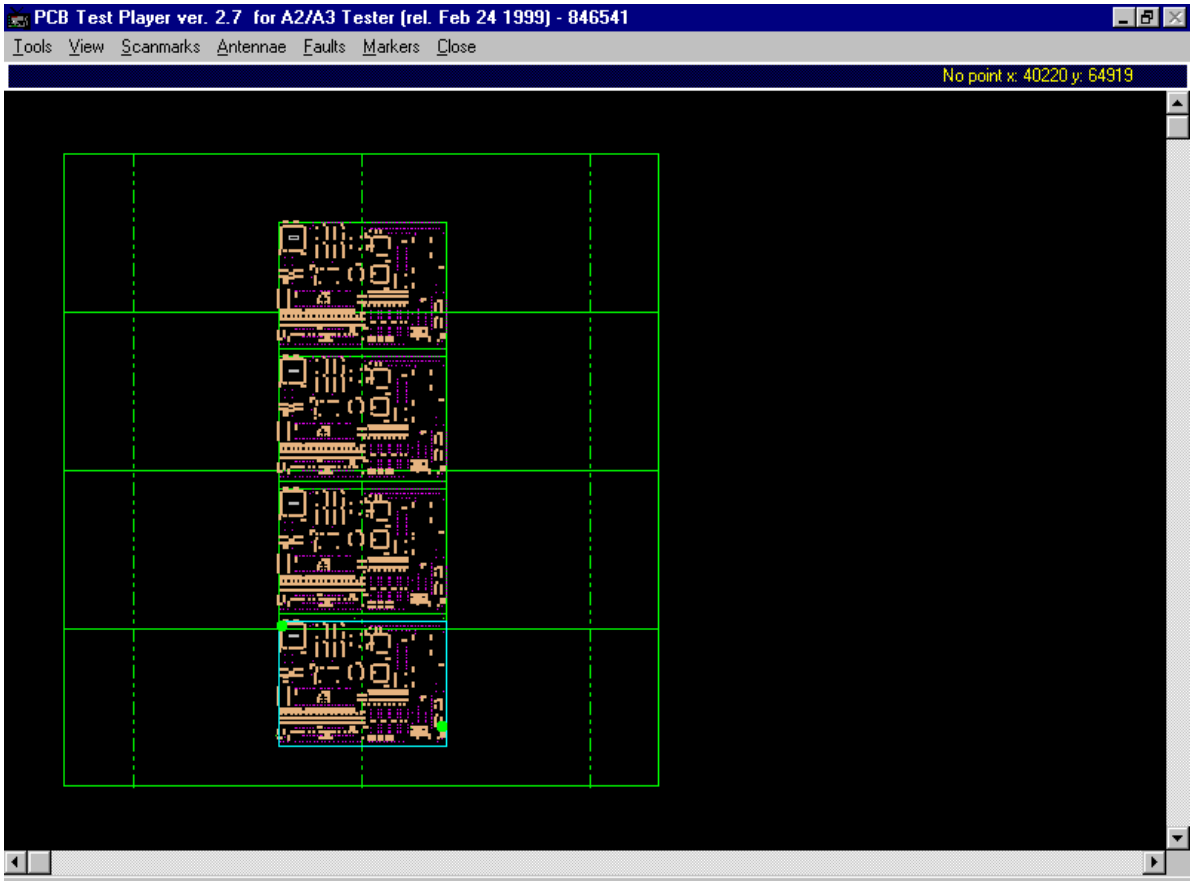
Attention! Only use the program module flying debugger if you are familiar with it!
Improper use may considerably alter the settings of the test system and may cause hardware damages!

7.8.5 Main Menu Item Show <boardname>



Starting the sub-program **Show <boardname>**

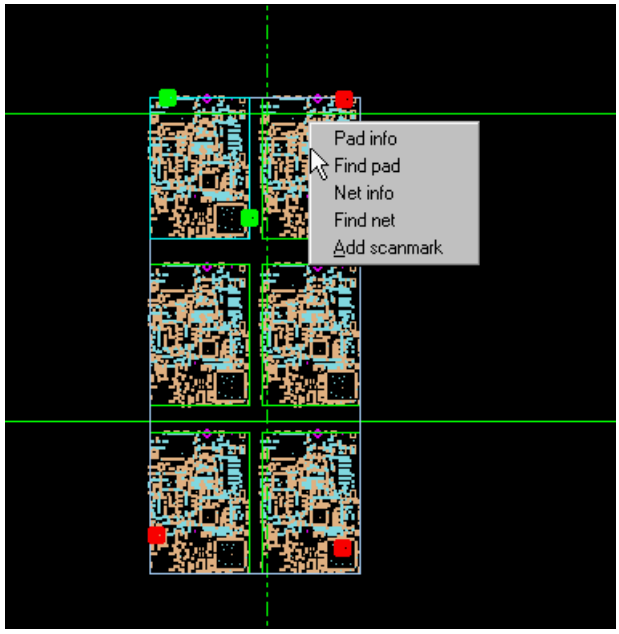
After having loaded a job, the main menu item **Show <boardname>** is available, via which you enter an extensive, graphically oriented sub-program. In this sub-program you can read back all relevant information on the tested board.
The sub-program **Show <boardname>** is not available during a test run.



Sub-program **Show <boardname>**

The main menu item **Show** <**boardname**> displays the board in a green line graphics representing the operating areas of the individual rails. Additionally, three vertical striped lines are shown. The outer lines represent the margins of the camera operating range in X-direction while the middle line shows the test field center and serves as orientation.
The sub-program **Show** <**boardname**> does not provide the edit functions known from the **DPS**.
In the information bar above the graphic window information about the current position and the cursor status is displayed in yellow. Here, the pad ID with pad coordinates is shown if the cursor is directly positioned on a test pad. The text No Point, followed by the cursor coordinates is shown if the cursor is not located on a test pad.
In the left of the info bar additional information is displayed in blue provided that the corresponding functions of the menus were selected.
Positions are stated in 1/100 mm units and correspond to the coordinates of the test field (shuttle coordinates).
For more comfort, the most important action and query commands are available in a pop up menu via a right mouse-button click.
The following functions are available if the cursor is located on a test pad (recognizable in the info bar) when the right mouse-button is pressed:

- *Pad info*
- *Find pad*
- *Net info*
- *Find Net*
- *Add Scanmark* (only available if not all scanmarks are placed*)*
- *Delete Scanmark* (only available if a scanmark is placed on the test pad)



Pop up menu: Commands for pads and nets

The following functions are available if the cursor is **not** located on a test pad (recognizable in the info bar) when the right mouse-button is pressed:

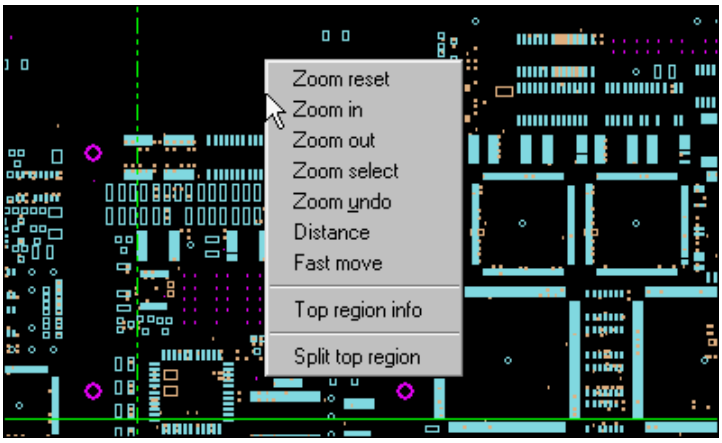
- *Zoom reset*
- *Zoom in*
- *Zoom out*
- *Zoom select*
- *Zoom undo*
- *Distance*
- *Fast Move*

The following functions are available vi the cursor is not located on a test pad but located on sample 1:

– *Divide top region*
– *Divide bottom region*

and if the cursor is located on a region divide line:

– *Connect top/bottom regions*



Pop up menu for graphic commands

7.8.5.1 The Functions of the pop up menu on a Test Pad

Pad Info

With this function you can call up information on a test pad. When this function is active the cursor has the shape of an arrow with a question mark. Place the arrow's tip on a test pad (whether or not you are located on a test pad is indicated in the info bar) and click the left mouse-button. The selected pad is marked with a big reticule. The pad info is displayed in the left of the info bar.

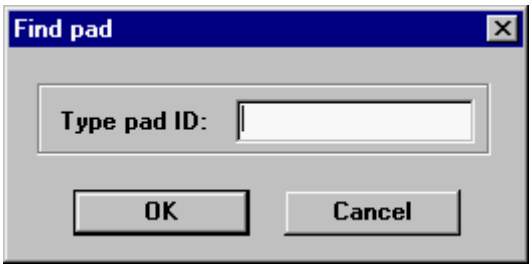
Example:
Pad 1488 (x=4416,y=4678 <-> x=35175,y=17293), net 3040: side:comp, tool 27, panel 6

Explanation:
Pad-ID 1488
Pad Coordinates in the ATF-net list x 14416, y 4678
Coordinates of the test pad in correspondence to the zero-position of the test area x 35175, y 17293
Pad is located on net 3040
Pad is located on component side
(comp = component side; sold = solder side; both = double-sided)
Pad is defined as number 27 in the ATF-header
Pad is located on panel 6

For a pad not located on panel 1, the stated pad-ID is not present in the ATF-file. This is caused by the application of the function **Step&Repeat** for multi-panels with which the pad information of panel 1 is multiplied.

Example for Pad-IDs on multi-panels:
A net list consists of 10 nets (net number 1-10) and 50 pads. With one Step&Repeat-line you have created a double-panel.
Consequently, in the first panel you will only receive pad-IDs between 1 and 50 and net numbers between 1 and 10.
In the second panel the pad-Ids are numbered consecutively so that pad-IDs between 51 and 100 result. Pad-ID 51 is therefore the first pad of the net list of the second panel. The XY-coordinates and tool sizes of pad-ID 51 and pad-ID 1 differ by the step width of the Step&Repeat-shift.

Find Pad



Input Window Find Pad

For finding a pad on the board enter the wanted pad-ID in the displayed input window. A big reticule indicates the found pad. The pad information is displayed in the info bar.

Net Info

For calling up net information about a certain pad. After activating this function, the cursor adopts the shape of an arrow with a question mark. The net is illustrated symbolically, if the pad is located in a net with more than one pad. The net information is displayed in the info bar in the following format.

Example:
Net 2142 (pads 12, first pad 1229): panel 1

Explanation:
The pad is located in net 2142.
Net consists of 12 test pads.
The first pad in the net has the pad-ID 1229.
The net is located on panel 1.

Hint:
Pads are connected with lines for nets consisting of several pads. However, these lines do not represent the real net course, they only serve as an orientation.

Find Net

Input window Find Net

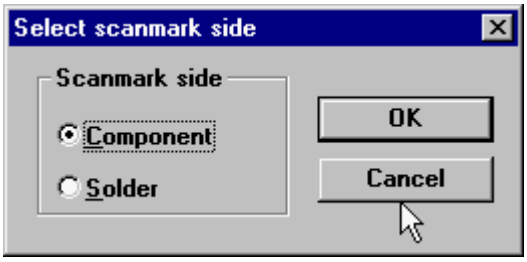
For finding a certain net on the board. In the displayed input window enter the wanted net number. In the graphic, auxiliary lines connect all pads of the net and the net information appears in the info bar.

Hint:
In the fault printout of a multi-panel the net numbers of panel 2 fol. are given with their ATF-net number. These nets are displayed in the first panel, if you would like to display them. You can then select the desired panel via the pad-ID of the fault printout.

Add Scanmark

For placing scanmarks. This function is only visible if not all scanmarks are set.
Position the cursor on the test pad, which you would like to define as a scanmark.

Press the left mouse-button and select **Add Scanmark**.
For through hole pads the window **Select scanmark side** appears if a scanmark can be placed on either side:



Select scanmark type

Select the board side and confirm with **OK**. The scanmark appears as colored symbol on the test pad.

Hint:
When placing scanmarks observe that they are positioned within the camera range, otherwise the scanning process is not started.

Delete Scanmarks

With the menu item **Delete Scanmarks** you can erase set marks. Position the cursor on the scanmark to be erased, click the left mouse-button and select **Delete Scanmark**. The scanmark symbol on the test pad is deleted.

7.8.5.2 The Functions of the Pop up menu outside of Test Pads

Zoom Reset

Image filling view of the test area; the test area is centered.

Zoom In

Magnifies the current view by the factor 2. The center remains center of the current window.

Zoom Out

Reduces the view by the factor 2.

Zoom Select

Enables a user defined image section. After selecting this function the cursor appears as a reticule. With the left mouse-button place this reticule at a random position and keep the mouse-button pressed. Pull a frame around the section to be enlarged.

Zoom Undo

Undoes the last zoom action.

Distance

Distance enables the measurement certain stretches.
The cursor adopts the shape of an arrow-symbol. Place the tip of the arrow on the origin of your measurement. Click and keep the left mouse-button pressed and move the cursor to the second measuring point. The measurement value is continuously displayed online, in the right of the info bar.
The measurement is displayed in 1/100 mm units. The measuring result displays the distance between the original and the final position in XY-coordinates.

Example:
dx: 114 dy: 465

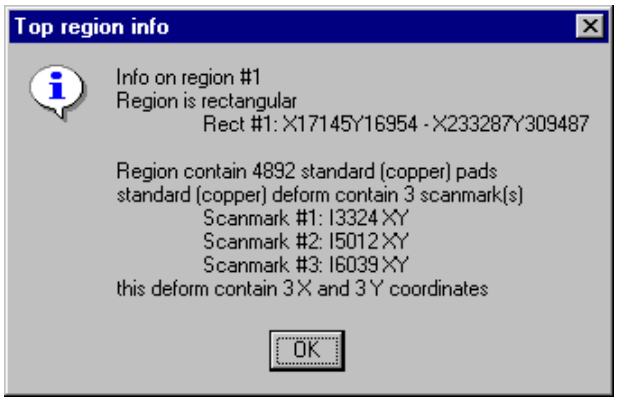
The measured pads show a distance of 1.14 mm in X-direction and 4.65 mm in Y-direction between each other.
The next mouse click deletes the measuring result in the info bar.

Fast Move

Fast Move (or the **M**-key) enables you to move the zoomed section without changing the zoom-factor (helpful for placing/deleting scanmarks).
For this purpose, a view of the entire test area is displayed. The zoomed section is surrounded by a white rectangle and can be moved across the entire display. Click the left mouse-button when the desired section is reached.

Top (bottom) region info

Opens the window **Top region info** or **Bottom region info** with informations about the choosen region.

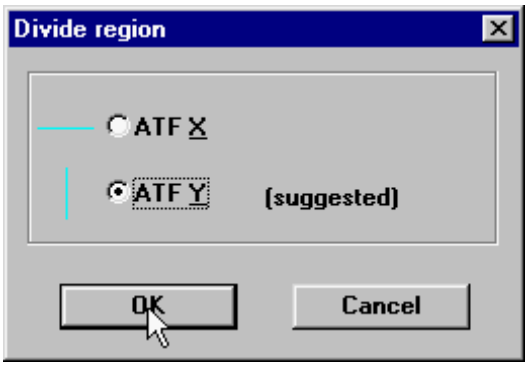


Info on region #1:	Informations refer to region1
Region is rectangular Rect #1 X17145Y16954 · X122187Y309487:	Corner coordinates of region
Region contains 4892 standard pads:	Region has 4892 pads
Standard deform contain 3 scanmarks:	Region has 3 scan marks
Scanmark #1: I3324XY:	Scan mark pad 1
Scanmark #2: I5012XY:	Scan mark pad 2
Scanmark #3: I6039XY:	Scan mark pad 3
This deform contains 3 X and 3 Y coordinates:	Number of used coordinates

Divide top region

For placing more than 4 scanmarks on a board's component side. This function works only if the cursor is located on panel 1.
The sections in which the scanmarks are to be placed can be randomly defined. After calling up the function **Divide top region** the window **Divide Region** appears:

This function is especially helpful if several boards are fastened in the shuttle and scanmarks are to be placed individually on each board, or for the separate scanning of high pitch areas, or also for trapezoid distortions on multi-samples.



Set dividing line

Here, you must select whether the scanmark area is to be divided vertically or horizontally. The test system suggests dividing the longer side. Consequently, 2-4 scanmarks must be placed in the defined regions.

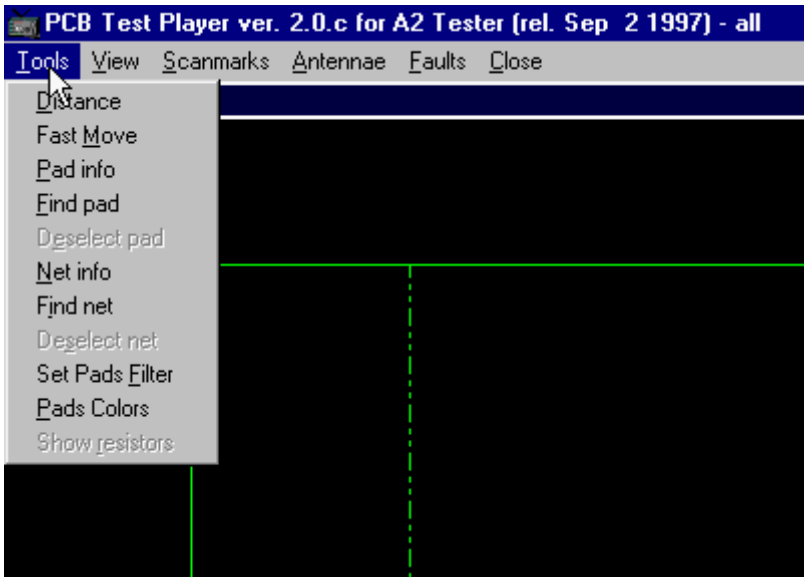
Divide bottom region

For placing more than 4 scanmarks on a board's solder side.
The function operates similar to the above-described function **Divide top region**.

Connect (top/bottom) Region

The regional division can be undone by clicking on one region dividing line with the right mouse-button. The function **Connect (top/bottom) Region** appears with which the dividing line is removed. Placed surplus scanmarks are automatically removed.

7.8.6 The Main Menu Tools



Main menu tools of the sub-program Show <boardname>

The following functions are available in the main menu **Tools**

- **Distance** (also included in the pop up menu of the right mouse button)
- **Fast Move** (also included in the pop up menu of the right mouse button)
- **Pad Info** (also included in the pop up menu of the right mouse button)
- **Find Pad** (also included in the pop up menu of the right mouse button)
- **Deselect Pad**
- **Net Info** (also included in the pop up menu of the right mouse button)
- **Find Net** (also included in the pop up menu of the right mouse button)
- **Deselect Net**
- **Set Pads Filter**
- **Pad Colors** and
- **Show Resistors**

Most functions are also available via the pop up menu of the right mouse-button. Zoom functions are only available via the right mouse-button. They are described in the previous chapter **The Functions of the Pop up Menu**.

Additional functions of the main menu **DPS** are:

7.8.6.1 Deselect Pad

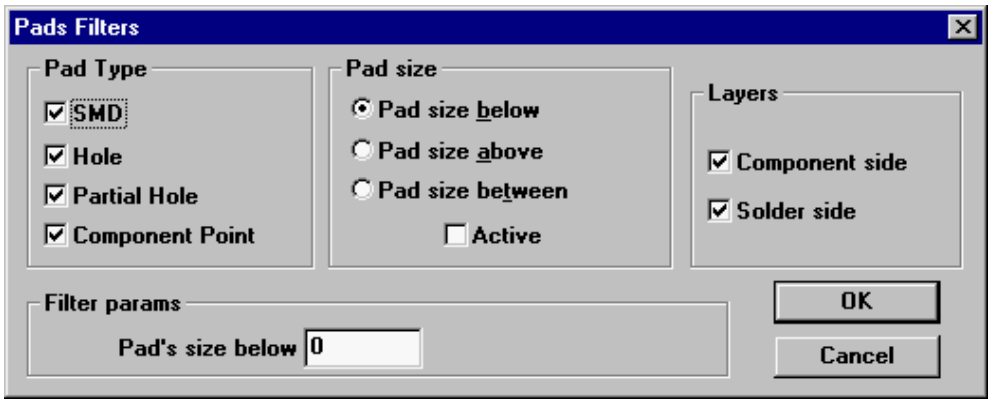
The menu item **Deselect Pad** is only active if a test pad was selected with **Find Pad**. With it you can remove the reticule from the selected pad.

7.8.6.2 Deselect Net

The menu item **Deselect Net** is only active if a test pad was selected with **Net Info.** You can now delete the symbolic net connection from the graphic.

7.8.6.3 Set Pads Filter

The settings of the menu item **Set Pads Filter** enable you to define the displayed pads.



Pad Selection with Pad Filters

The **Pads Filter**-window provides the following functions:

Pad Type

With the filter function Pad Type you can display the following pad types in the graphic:

- **SMD** Show or hide SMD-pads
- **Hole** Show or hide through holes
- **Partial Hole** Show or hide partial through holes
- **Component Point** Show or hide component points

Pad Size

Filter function for selecting pad types of a certain size (Unit: 1/100mm).
This function uses the value of the input line **Filter Params** (Pad size below) as reference value, displayed in the bottom of this window. The following filters are available:

- **Pad size below** Show all pads that are smaller than the entered value.
- **Pad size above** Show all pads that are greater than the entered value.
- **Pad size between** Show all pads which located in-between the entered values. A second input box is displayed for entering the filter parameters.

Hint:
The set **Pad size-**functions only come into effect after option **Active** is checked-off.

Layers

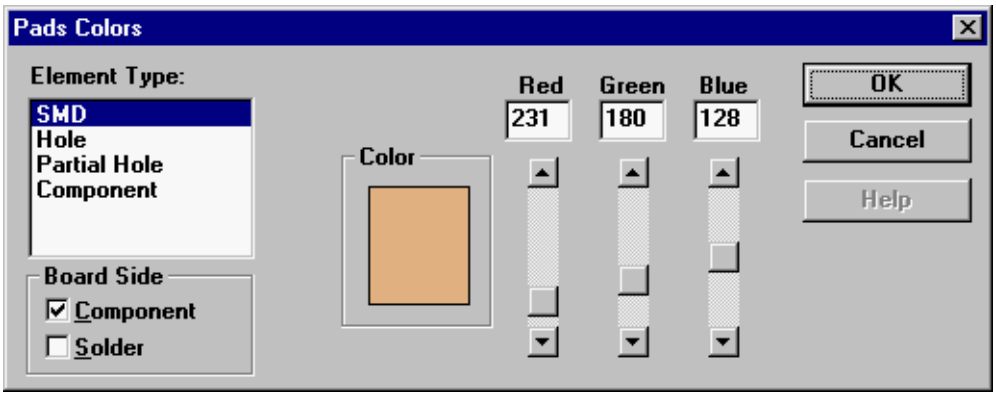
Filter for showing and hiding entire layers in the graphic.

- **Component side** Show or Hide the component side.
- **Solder side** Show or Hide the solder side.

Hint:
You can also use this filter when placing the scanmarks. This filter may also be useful in connection with the functions **Pad Info** and **Net Info.**
For selecting a pad of the solder side, which is covered, by a component side pad, only the pad of the component side is displayed. In this case, hide the component side.

7.8.6.4 Pad Color

The menu item **Pad Colors** lets you assign colors for the display of the different pad types.



Pad Color Assignments

In the function **Element Type** select the pad type to which you would like to assign a different color and then select the board side for the color assignment (component- or solder side).
For adjusting the color, three sliding controllers are available. Every color has 255 brightness levels, which may be combined with each other as desired. The color box displays the currently adjusted color combination.

The individual adjustment options of the **Pad Colors**-window:

Element Type:
- **SMD** Color selection for the display of SMDs
- **Hole** Color selection for the display of through holes
- **Partial Hole** Color selection for the display of partial through holes
- **Component Pad** Color selection for the display of component pads

Board Side:
- **Component** Color setting for the selected pad type for the component side
- **Solder** Color setting for the selected pad type for the solder side

Hint:
For **Hole**-pads select the same color for component and solder side, since you are dealing with one and the same pad. For this purpose, activate both layers (**Component** and **Solder**) during the color assignment.

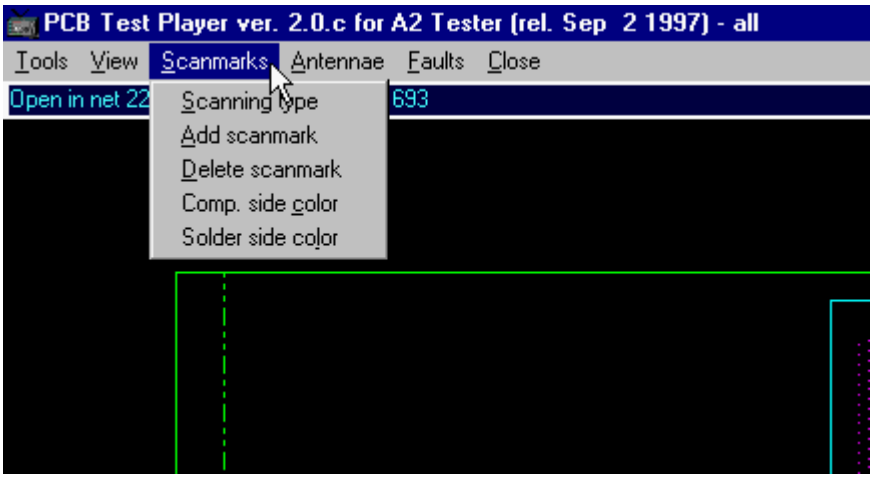
7.8.6.5 Show Resistors

Resistors defined between individual nets in the net list are displayed as red connection lines between the origins of the corresponding net. With the menu item **Show Resistors** you can either show or hide the resistor display.

7.8.7 Main Menu View

In the main menu **View** you can either show or hide the display of the outer layers. The menu item **Both sides** shows both layers. The menu item **Top only** shows only the component side and the menu item **Bottom only** exclusively the solder side.

7.8.8 Main Menu Scanmarks



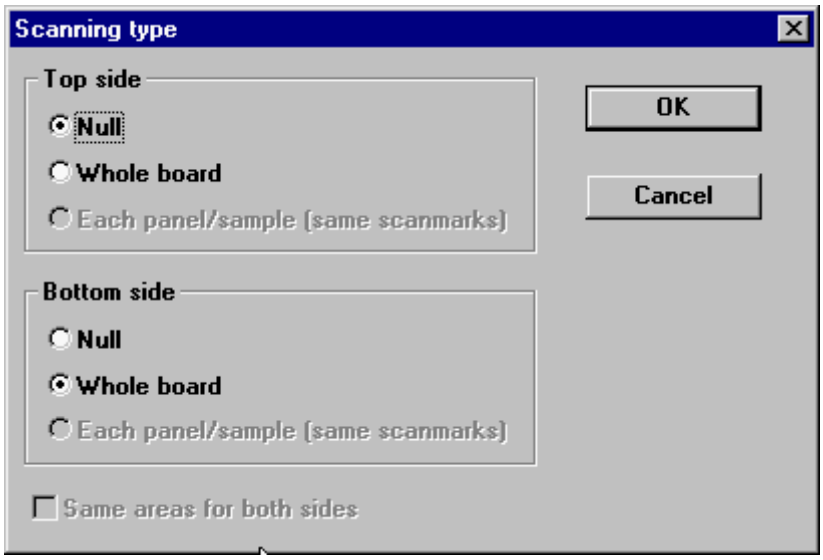
Main Menu Scanmarks

In the **Scanmarks**-main menu you can define, delete and edit scanmarks.

7.8.8.1 Scanning Type

With the menu item **Scanning Type** you can open the selection window **Scanning type**. With the available options you define how the board is to be scanned.
Usually, the definition of the scanmarks is already carried out in the **DPS**-station. Provided that the board is not available at the **DPS**, the defined scanmarks may be unfavorable (e.g. the real pad size does not correspond to the data or the board offset requires scanmarks in other sections).
A combination of different variants is possible.

The following scanning types are available per test layer:



Main Menu Scanmarks

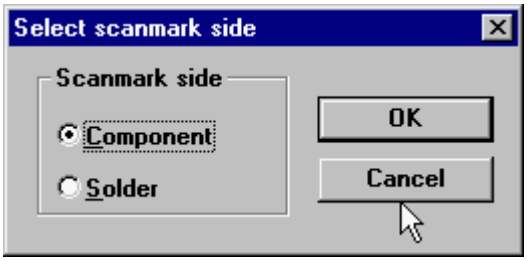
- **Null** No scanning
- **Whole board** You can place 2,3 or 4 scanmarks on a single panel or a multi sample. The number of scanmarks is calculated per section. (Division in sections see Chapter “Pop up Menu outside of pads”)
- **Each panel/sample** For multi samples you can place 2,3 or 4 scanmarks on every single panel. It is sufficient to place the scanmarks on one panel. A blue frame surrounds this panel.

The scanmarks must be:
1. as far outside as possible
2. as far apart from each other as possible
3. on small pads
4. on unmistakably pads

Fiducial-pads for pick and place machines are suitable.

7.8.8.2 Add Scanmark

With the menu item **Add scanmark**, you can set additional scanmarks. The cursor adopts the shape of the scanmark symbol with a plus sign and the scanmarks can be placed. Two to four scanmarks can be placed per region.
Place the scanmark symbol on the test pad to be defined as scanmark. For a through hole selected, the window Select scanmark type appears for selecting the side of the scanmark.



Select scanmark side

The set scanmark appears as colored symbol on the test pad.

Hint:
In the graphic sub-program you at all times have access to the **Add Scanmark**-command via the right mouse-button if the cursor is positioned on a test pad. However, this is only possible if not all 4 scanmarks (per section) are placed.

One of the 4 following reasons might explain why it is impossible to place a scanmark on a test pad:
1. **Scanning Type** for this layer is set to Null
2. All scanmarks for this layer are already placed.
3. The selected test pad is located on the solder side and is covered in the graphic by a component side test pad.
4. The selected test pad is located on the wrong panel (for **Scan each Panel**)

The following warning is displayed when leaving the graphic, if less than 2 scanmarks (per section) are set:
`Numbers of scanmarks are invalid!`

Hint:
When placing scanmarks observe that the scanmarks are set within the camera range, otherwise the scanning process is not started.

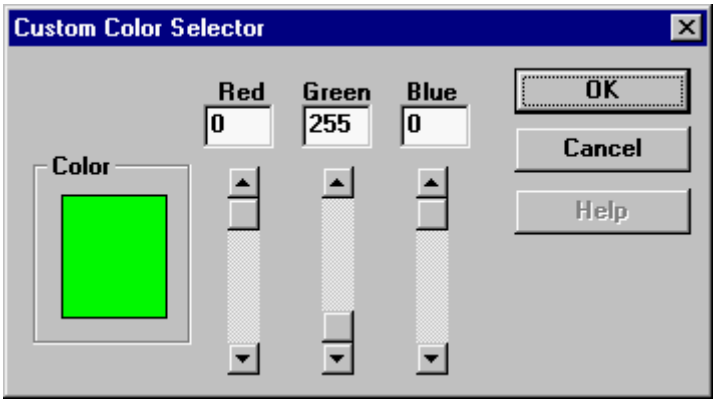
7.8.8.3 Delete Scanmarks

With the menu item **Delete Scanmarks** you can erase scanmarks. After the function is activated, the cursor adopts the shape of a scanmark symbol with a minus sign. Position the cursor on the scanmark to be deleted and click the left mouse-button. The scanmark symbol on the test pad is erased.

Hint*:*
At all times, you have access to the **Delete Scanmarks**-command via the right mouse-button, if the cursor is positioned on a scanmark.

7.8.8.4 Comp. Side Color

With the menu item **Comp. Side Color** you can define the color in which the scanmarks of the component side are to be displayed.

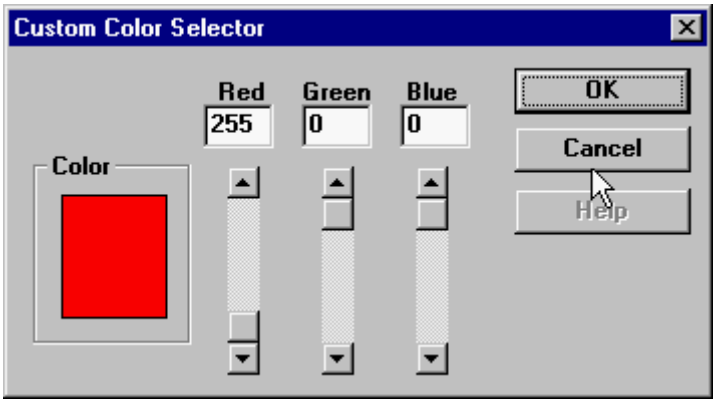


Color Selection for component side pads

For adjusting the color three slide controllers are available. Every color has 255 brightness levels, which can be combined with each other as desired. The Color-box displays the currently adjusted color.

7.8.8.5 Solder Side Color

The menu item **Solder Side Color** lets you define the color in which the scanmarks of the solder side are to be displayed in.

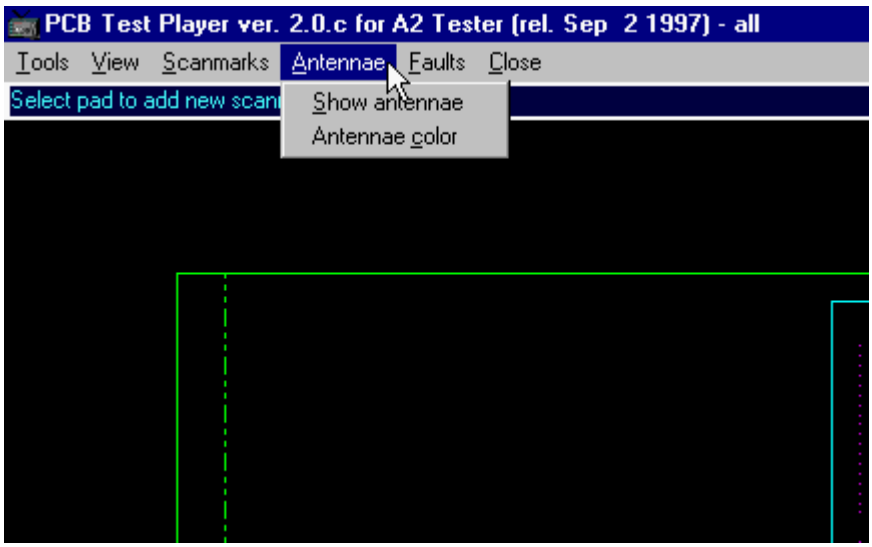


Color Selection for solder side pads

For adjusting the color three slide controllers are available. Every color has 255 brightness levels, which can be combined with each other as desired. The Color-box displays the currently adjusted color.

7.8.9 Main Menu Antennae

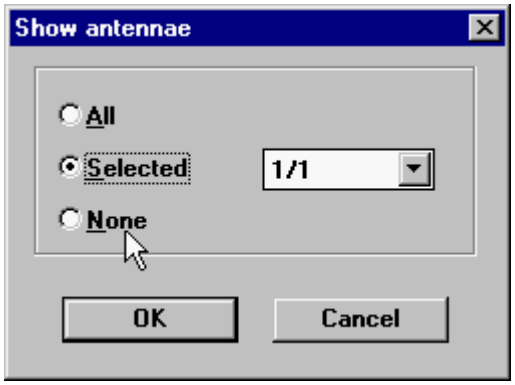
In the main menu **Antennae** you can both display antennae and adjust their color.



Main Menu Antennae

7.8.9.1 Show antennae

With the menu item **Show antennae** you can display the **DPS** generated antennae nets.



Show Antennae

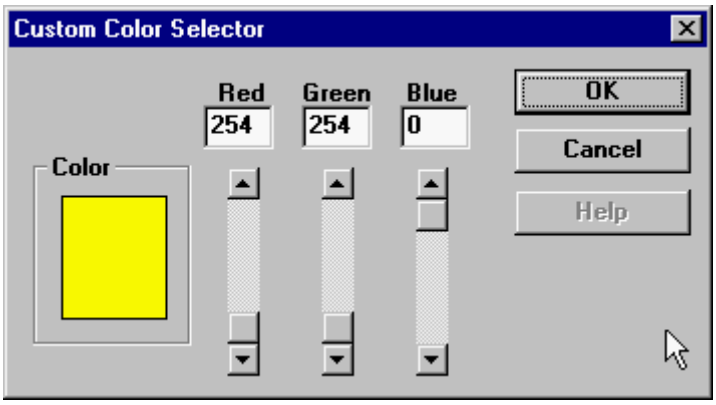
With the option **All** you can show all antennae. With the option **Selected** you can show a certain antennae. For this purpose, use the scroll-bar at the right.

Example:
2/1 = 2. Antennae net for panel **1**

The option **None** hides the antennae.

7.8.9.2 Antennae Color

With the menu item **Antennae Color** you can define the color in which the antennae are to be displayed in.

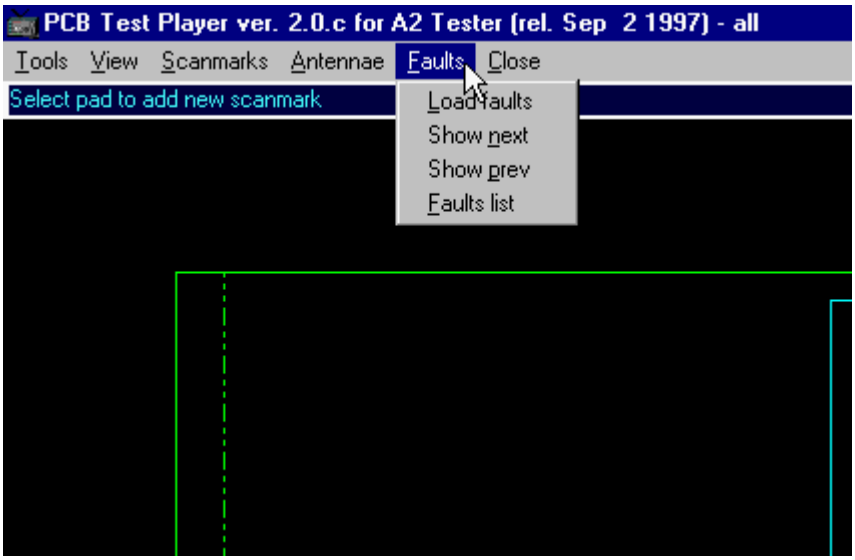


Color Selection for the Antennae Display

For adjusting the color three slide controllers are available. Every color has 255 brightness levels, which can be combined with each other as desired. The Color-box displays the currently adjusted color.

7.8.10 Main Menu Faults

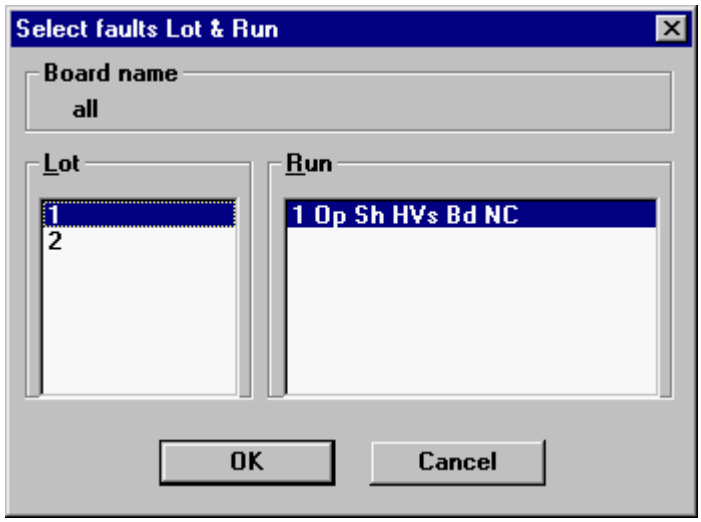
In the main menu **Faults** you can graphically display faults.



Main Menu Faults of the sub-program Show <boardname>

7.8.10.1 Load Faults

With the menu item **Load Faults** you can load faults for graphically displaying them. In the appearing selection window **Select faults Lot & Run** select the test run to be displayed. The faults included in the faults file are shown abbreviated in the list.



Load Fault File

The first fault of the test run is immediately shown in the screen and the corresponding fault information is displayed in the info line in the left. A yellow line for an existing open or a short connects both fault pads. The pads are highlighted in green for faults like No contact or Bad Field.

Hint:
The program displays the following text if no fault could be detected in the file of the selected test run:
`No Faults in selected lot or run`

7.8.10.2 Show next

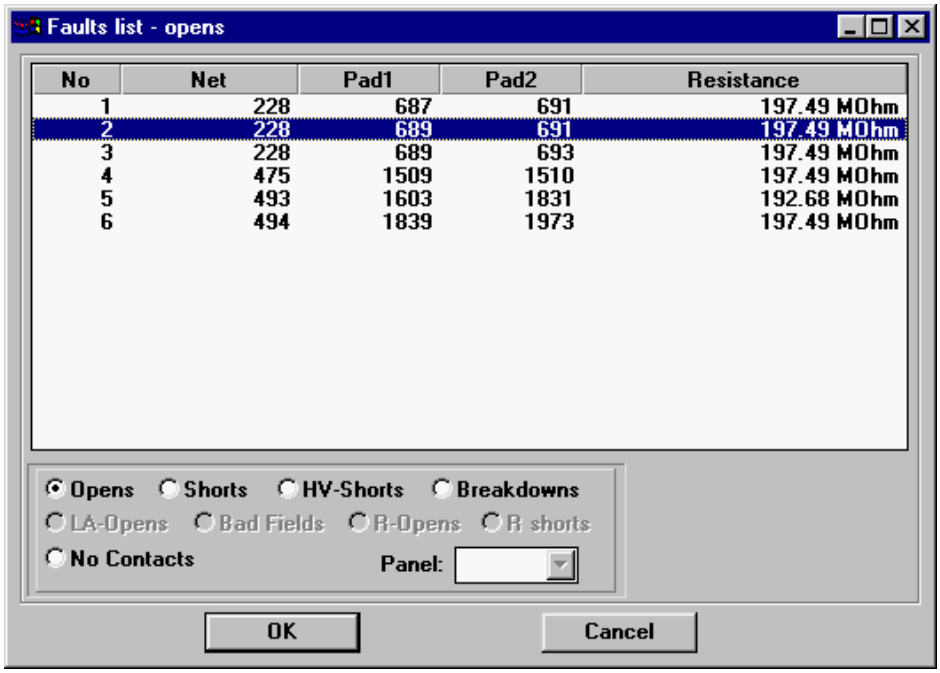
With the menu item **Show next** you can view the next fault of the faults list. The plus sign (+) serves as hot key for the same purpose.
If the end of the list is reached, the following message appears:
No more faults in fault-file*.*
After confirming this message, the program returns to viewing the first fault.

7.8.10.3 Show Prev

With the menu item **Show prev** you can return to viewing the previous fault of the faults list. The minus sign (–) serves as hot key for the same purpose.
If the end of the list is reached, the following message appears:
No more faults in fault-file*.*
After confirming this message the program returns to viewing the last fault.

7.8.10.4 Faults List

With the menu item **Faults List** you can view the faults list loaded with **Load Faults** and display individual faults.
In the bottom of the **Faults list**-window all possible fault types of the loaded run are displayed. A fault type not present in the fault file is displayed in gray. In the selection box **Panel** you can choose for multi samples which panel's faults you would like to show.
The upper part of the selection window shows the individual faults of the activated fault types. By clicking on the appropriate line of the faults list you can display any desired fault. The fault is immediately shown in the window. Move the **Faults list**-window to the side in order to view the board display.
It is impossible to print out the contents of the faults list or to actualize them.

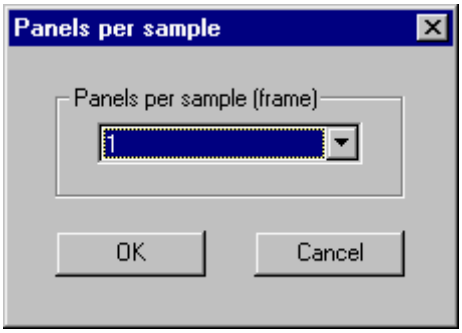


Selects Faults for Display

Hint:
atg test systems offers the option "verification mode". This expansion of the TestPlayer has extensive possibilities to verify faults from flying probe and grid test systems.

7.8.11 Main menu Markers

With the menu **Markers** you can define the number of printer marks. Not available for manual test system.



7.8.11 The Main Menu Item Close

With a mouse click on the menu item **Close** you switch back to the supervisor mode work window.

7.9 Action Buttons of the Supervisor Mode

The supervisor mode provides 8 buttons associated with the function keys **F2** through **F9**. The buttons **F2** through **F7** have the same functions as in the user mode. Additionally, the buttons **Step by Step (F8)** and **Exit (F9)** are available.
The functions of the **Test Params (F5)** button are greatly expanded in the supervisor mode. In the user mode, only the tab box **Skip Panels** is available for multi-panels.
In the supervisor mode, you can change the Z-axis parameters during the test run. For this purpose, first press the button **Pause Test (F4)**. With the button **Test Params (F5),** you can then edit the **Strokes** parameter settings. After the desired settings were made, press the **OK**-button to confirm the modifications. Testing is continued with **Resume Test (F4)**.

Button *Find Pad (F8)*

With the button **Find pad,** you can find individual pads on the board with the camera or contact them with a test probe. The board must have been scanned before; otherwise, this menu item cannot be started. For the opposite case, the board is first scanned automatically after the function **Find pad** is executed.

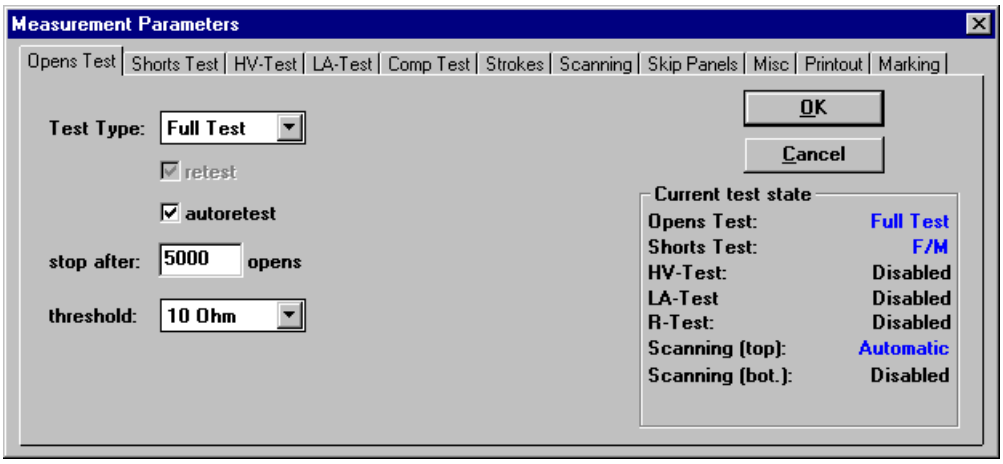
Exit (F9)

The **Exit (F9)** button closes the **TestPlayer**.

Hint:
The option button **verification** is only availably if the erscheint nur, wenn der dafür benötigte Dongle aufgesteckt ist.

7.9.1 Button Test Params (F5)

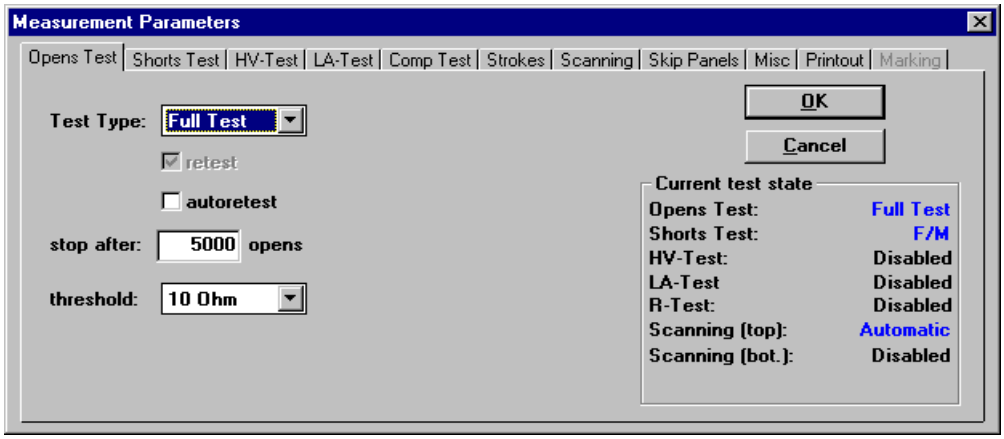
The settings of the **Test Params**-button define the conditions for the test procedure.



Opening window Test Params

The **Current test state**, a summary of all important parameters in their current status, is displayed in the bottom right for all menu items of the **Measurement Parameters**-window.

7.9.1.1 The Parameter-Menu Opens Test



Parameter-Menu Opens Test

The tab box **Opens Test** specifies the settings for the **Opens Test**.

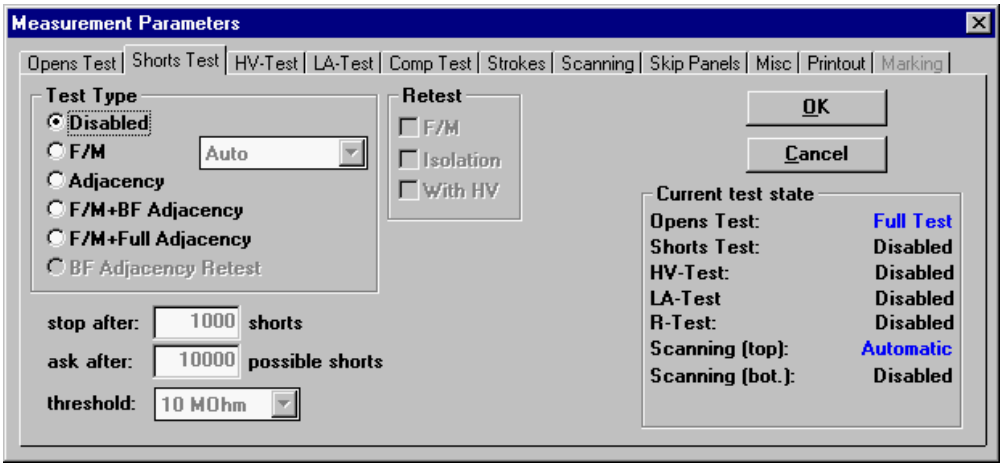
– Test type

Full test	Opens test enabled
Disable	Opens test disabled
Auto Retest	Opens test, retesting only detected opens. The only requirement is an existing faults file of the board including the opens data.
Combined	Enables the combined test method, prepared in DPS. Option for test system A3. Opens and shortstest in 1 test run. Approx. 10% faster test.

Hint:
Disabling the opens test simultaneously disables the shorts test. The opens test must be enabled for being able to select further test types.

Retest	Opens detected during the test are retested after test completion and are minimized if necessary. This function cannot be turned off.
Auto retest	Do not use this feature!
– Stop after....opens	Testing is automatically canceled if the here entered value of opens is obtained. For multi-panel testing, the panel is automatically excluded from testing while testing continues with the remaining panels.
– Threshold	Here you can define the resistance value (in Ohms) for an open to be detected. Default value 10 Ohm. (adjustable range 1 Ohm - 1 kOhm)

7.9.1.2 The Parameter-Menu Shorts Test



Parameter-Menu Shorts Test

The tab box **Shorts Test** defines the settings for the shorts test.

Test type

– **Disabled** Shorts test disabled

– **F/M** Field Measurement
Shorts are determined via field-measurement. The retest is a resistance test.

- **Adjacency** Only functional with an existing adjacency-file. Shorts are exclusively determined with the adjacency method.

- **F/M + B/F Adjacency** Field Measurement + Bad Field Adjacency
Only functional with an existing adjacency-file. Shorts are determined with the field measuring method. Determined unclear measuring results of the types “Bad Field” and “No Contact” are retested with help of the adjacency-file. “Possible Shorts” are retested with the resistance method.
The retest results of the field measurement and the comparisons with the adjacency-file are added.

- **F/M + Full Adjacency** Field Measurement + Full Adjacency
Only functional with an existing adjacency-file. Shorts are determined with the field measuring method. Determined unclear measuring results of the types “Bad Field” and “No Contact”, as well as “Possible Shorts” from the field measurement are compared with the possible shorts of the adjacency-file. They are retested if they exist in both lists.

Possible shorts found with the field measurement are not retested if they are not included in the adjacency-file.
Shorts clearly detected with the field measurement (Short to antennae) are put out even if they are not included in the adjacency-file.

– **BF Adjacency Retest** In an open auto retest all bad fields are retested.

Auto

The test systems chooses automatically from following test methods:
Double F/M, Single F/M, Parallel F/M or **One antennae parallel F/M**.

Measur-ment	All antennae	1 antenna	2 points per net	1 point per net	Parallel contacting
Double F/M	X		X		
Single F/M	X			X	
Parallel F/M	X			X	X
One ant. (par.) F/M		X		X	X

This menu can be limited because of limited DPS preparation. The items **Parallel F/M** and **One antennae parallel F/M** is only available with existing EPS-data.
The setting to Auto is normally recommended. During the first run of a job the test system calculates the best test method for the following tests of this board type and switches to this method.

– **Stop after....shorts** Testing is automatically canceled after the here entered value of shorts per panel is passed.

– **Ask after....possible shorts** Testing is automatically paused after the here entered value of shorts per panel is passed. The user then has the option of canceling the test.

– **Threshold** Here, you can define up to which resistor value (in Ohms) a short is detected. Standard value 10 MOhm.
(Adjustable range 0.5 MOhm - 10 MOhm)

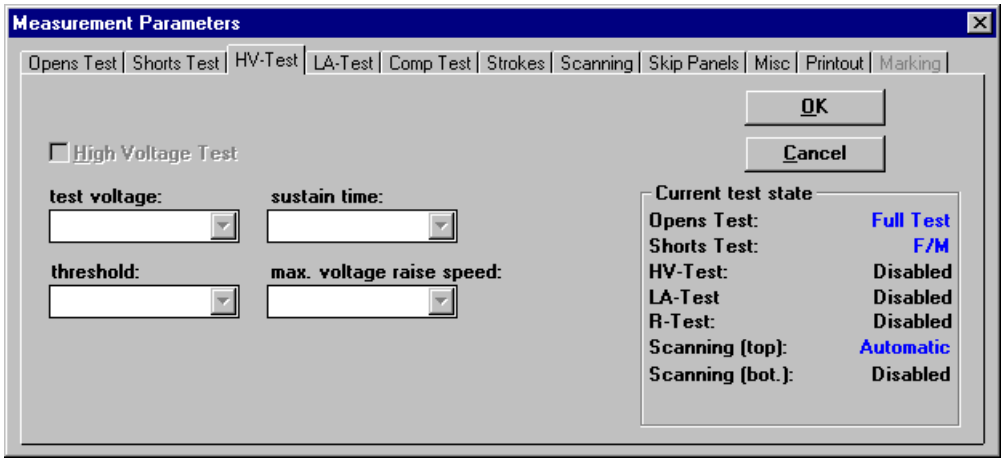
Retest

– **F/M** This option cannot be disabled.
If the test system receives insufficient measuring results from the field measurement, nets with contradictory measuring results are automatically retested (Field-Retest).

– **Isolation** This option cannot be disabled
Ohmic retest between the possible shorts detected in the field measurement.

–
With HV This option cannot be disabled
Retest is carried out with high voltage.

7.9.1.3 The Parameter-Menu HV-Test



Parameter-menu HV-Test

The tab box **HV-Test** (High-Voltage-test) defines the settings for the high voltage test.
These options are only available if the **DPS** generated an HV-test.

– High-Voltage HV test en/disabled

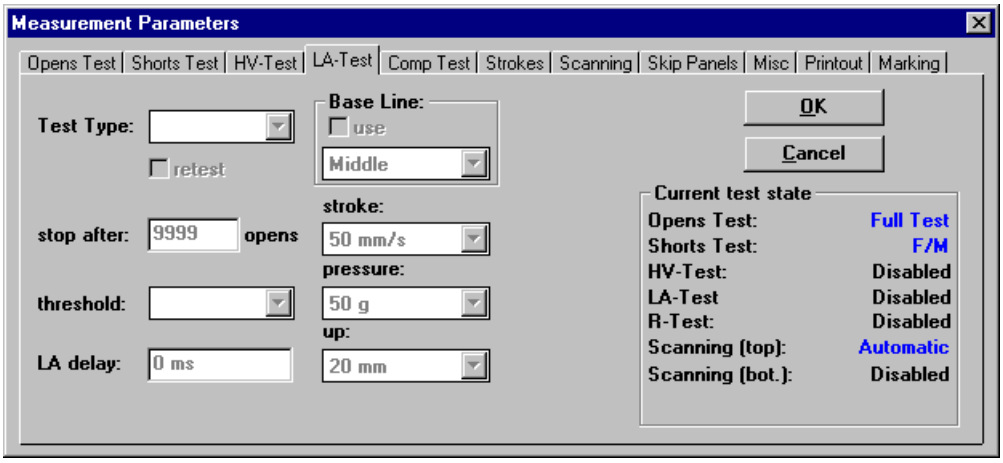
– Test voltage Test voltage of the HV-Test. Default value 250 V (adjustable range 25V - 250V / 500V, depending measuring card).

– Sustain time Voltage application time

– Threshold Here, you can define below which resistor value (in Ohms) a connection is detected as an HV short. Default value 100 MOhm. (adjustable range 5 MOhm - 100 MOhm)

– Max voltage raise speed Increase of the voltage

7.9.1.4 Parameter-Menu LA-Test



Parameter-Menu LA-Test

– Test Type LA-default test only with additional hardware.

– Stop after...opens Testing is automatically canceled if the here entered value of LA-opens per panel is obtained.

– Threshold Here, you define below which LA-value a connection is intact.

– LA delay Time in milliseconds of LA-voltage application before testing is started.

– Base line

Use Select this function for calibrating with the base line.

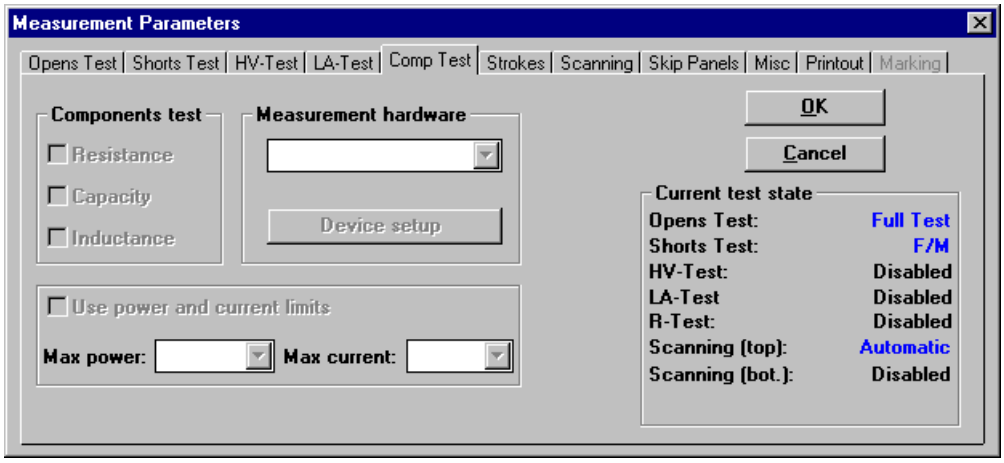
Middle Base line selection.

– Stroke Test needle motion speed for the LA-test.

– Pressure Pressure applied by the probes on the contacted pad for the LA-test. Default value: 30g. (adjustable range 10 g - 50 g in 5 g-steps)

– Up Maximum stroke of the needles above the board during the LA-test. Default value: 20 mm. (adjustable range 0.75 mm – 20 mm) The minimum stroke in a test run can be reduced to 1/3 of the set value. This value is shown underneath **Min up**. The test system reduces the Z-axis stroke to the Min-up value for increasing the test speed, only if the board topography allows this. This option can be disabled with the setting **PCB-Holder / Used** of the parameter window **Misc**.

7.9.1.5 The Parameter-Menu Comp Test



Parameter-Menu Comp Test

The menu item **Comp Test** (component test) provides optional board testing methods. They can be obtained as add-ons to the software package and are not included in the standard version.

Components test

– Resistance Enables the testing of buried resistors. **Resistor Short** is put out if the obtained test value of a resistor is too low, and Resistor Open vice versa.

– Capacity Not available

– Inductance Not available

Measurement hardware

Selection of an additional measuring device

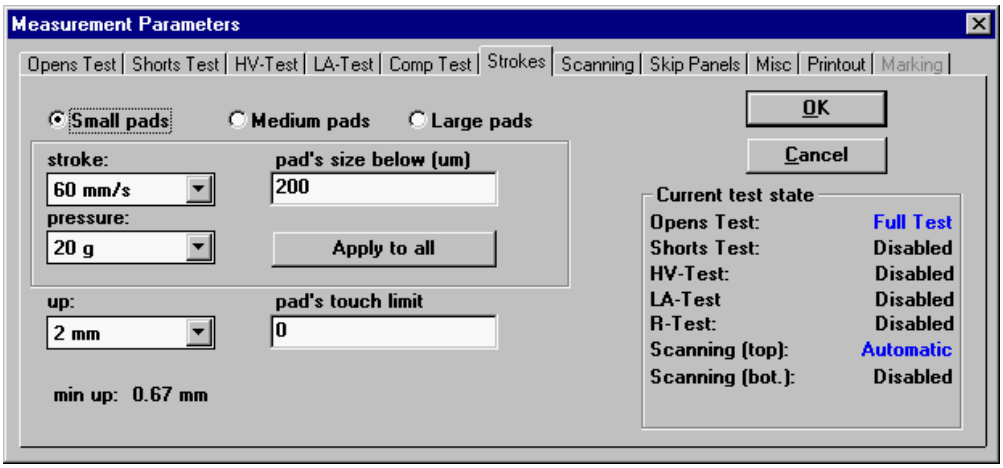
– Device setup Defines setup of the additional measuring device

– Use power end current limits Activates the settings of **Max power** and **Max current**

– **Max power**

– **Max current**

7.9.1.6 The Parameter-Menu Strokes



Parameter-Menu Strokes

In the **Strokes**-menu you define the conditions for the test pad contacting.
In the supervisor-mode, you can change the Z-axis parameters during a test in progress. To do so, first press the **Pause Test (F4)**-button. After pressing the **Test Params (F5)**-button you can edit the **Strokes**-menu. Testing is continued with **Resume Test (F4)**.

Attention! Observe to always modify the settings of the tab box Strokes individually for each board! Inappropriate settings cause test errors or damage the test probes or the board!

– **small, medium and large pads** — You can define individual z-axis stroke, pressure etc. for small, medium and large pad size. The pad size can also be defined.

– **Stroke** — Motion speed of the test probe approaching the test pad. Standard value 40 mm/s. (Adjustable ranges 10 - 100 mm/s).

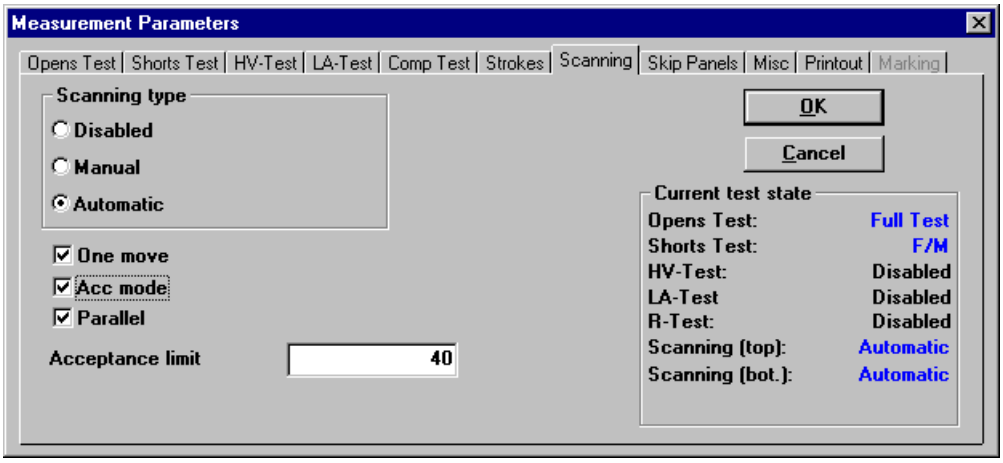
– **Pressure** — Press force of the probe on the contacted pad. Standard value 40 g. (Adjustable ranges 10 g - 100 g in 5 g-steps). Due to specifications pressure range on test system A3 is 30-300 g.

– **Z-up** — Maximum hight of the needles above the board. Standard value 20 mm (Adjustable ranges 0,75 mm - 20 mm). The minimum hight in a test run can be reduced to 1/3 of the set value. This value is shown underneath **Min up**.

The test system reduces the Z-axis stroke to the Min-up-value for increasing the test speed, only if the board topography allows this. This option can be disabled with the setting **PCB-Holder / Used** of the parameter window **Misc**.

– **pad's touch limit** Testing is stopped if a test pad is contacted as often as specified here. The message " Touch limit reached" is displayed. This prevents damaging of the test pads due to excessive contacting.

7.9.1.7 The Parameter-Menu Scanning



Parameter-Menu Scanning

In the **Scanning**-menu you define the conditions for the scanning process.

- **Disabled** — Disables the optical scanning. This option is always enabled if no scanmarks are placed.

Attention! The board offset and shift are not considered if testing is started without prior scanning! Consequently, the test probes only move according to the internal correction file (correction tables of the main menu *Debug*, sub-menu *Load*) and cannot properly contact. The test probes and the product may be damaged!

- **Manual** — The scanmarks are automatically approached by the camera and must be manually aligned with the mouse as described in Chapter User Mode.

- **Automatic** — Automatic scanning.
  Every newly loaded board image must be once manually aligned before. Afterwards, all identical boards and panels are automatically approached and optically captured.
  If this scan variant is unsuccessful a message is displayed and the following scan process must be continued in the manual mode.

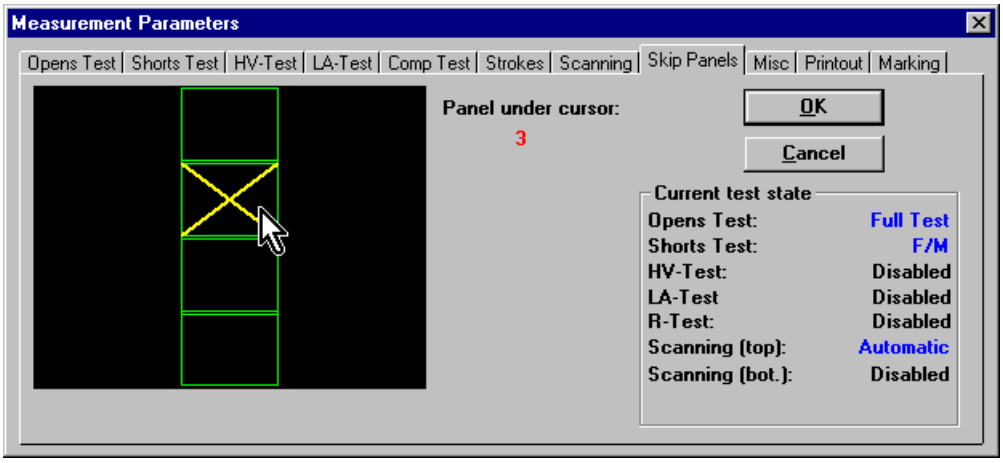
– **One move** Reduces the accuracy of camera evaluation and reduces the duration of scanning. Suitable for large, simple pads.

– **Acc mode** Increases the accurady of camera evaluation and prolongs the duration of scanning. Improves the recognition in fine pitch areas and areas with much details.

– **Parallel** Top and bottom cameras scan simultaneously. Reduces the duration of scanning.

– **Acceptance limit** View area of camera. Do not change this value, otherwise scanning can break off!

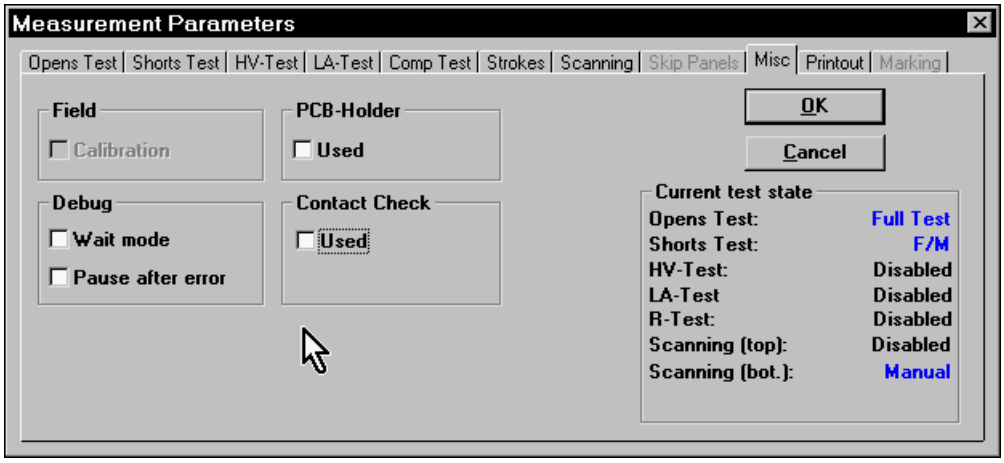
7.9.1.8 The Parameter-Menu Skip Panels



Parameter-Menu Skip Panels

In the **Skip Panels**-menu you define, for multi-sample testing, which panel is excluded from testing.
This menu is also available in the user mode. Additionally, this function is provided in the **Start test**-window via the **Show panels**-button when starting a test.
The small graphic window schematically displays all panels. A panel's number is shown underneath **Panel under Cursor**, if the cursor is positioned on the display of a panel. Click on the panels to be excluded from testing. They are then crossed out in the display.
You can exclude a larger number of panels at once from testing by dragging the mouse with the left mouse-button being simultaneously pressed over the entire panels to be excluded. A white filed extends over these panels. All panels touched and covered by this white field are excluded from testing or re-included for the test.

7.9.1.9 The Parameter-Menu Misc



Parameter-menu Misc

Field
Not functional with docked loading/unloading unit!

Execute a capacity check of the used test probes.
For **Calibration** enabled, the camera is additionally directed to the brass pads of the left product holder after scanning the board. On them, align the camera with the mouse. Afterwards, the test probes contact the brass pads at the beginning of a test run. (Only the test probes active in this test run are directed to the brass pads.) Testing is not started if the test probe deviates too much from its set data (see chapter ”Executing field calibration and C-adjust”). The test probes return to their start position and the following message is displayed in the status window:
Analyzer stopped. Please adjust heads capacity. Test cannot be continued.
In this case, you must start a **C-Adjust** and re-align the test probes.

In order to guarantee a faultless test, the option *Field calibration* must be activated at least once a day!

Debug / Wait mode
Perform testing step by step. Motions and measurements of the task file are sequentially executed. Consequently, the test speed is reduced facilitating the analysis of the detected faults.
The reduced test speed enables the reading the status window, giving information about the test run.

Example:

Resistance 2 <-> 3 [5 <-> 385 / 3]
Explanation:
A resistance measurement was executed with the probes 2 and 3 between the point Ids 5 and 385 of panel 3.

Wait mode is enabled if it is checked off in the pull down menu.

Hint:
Wait mode can be turned off during the test leading to its continuation at regular speed.

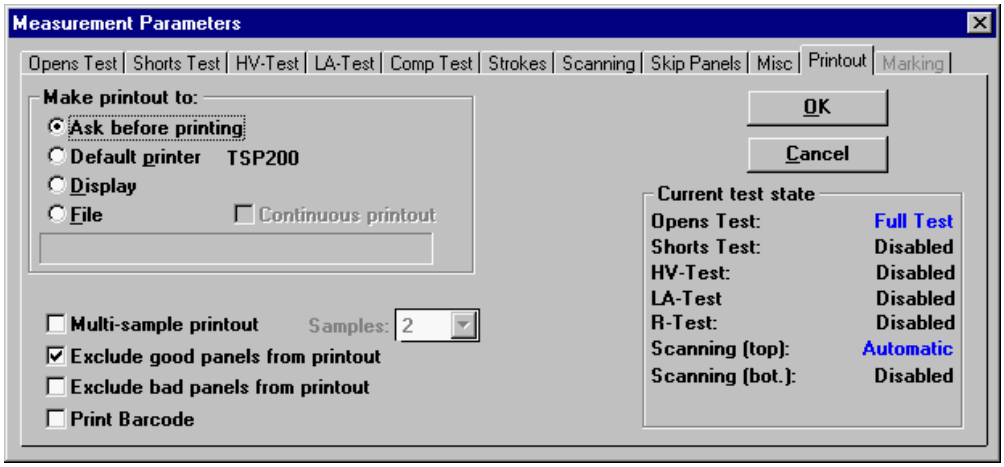
Debug / Pause after error
Interrupt testing (identical to **Pause Test (F4)**). **Pause after error,** only discontinues testing if a fault (open or short) is detected. The button **Pause Test (F4)** switches to **Resume Test (F4)**.
The message ”Test Paused” appears. **Resume Test (F4)** continues testing.
At normal test speed, the application of this function is senseless since the test system must first process its command buffer (up to 200 commands) before it can respond to the **Pause** command.

Hint:
In **Wait mode** (main menu **Debug** / menu item **Wait mode**), you can pause the test exactly at the desired position. Apply the combination of **Wait mode** and **Pause after error** for debugging. **Pause after error** is enabled if it is checked off in the pull down menu.

PCB-Holder / Used
Applies the maximum Z-axis stroke value. (The maximum value is specified in the tab box **Stroke,** function **Z-up**.)
The minimum Z-axis value, pre-set by the test system (see tab box **Strokes: min up** value), amounts to 1/3 of the defined Z-axis stroke. For increasing the test speed, the Z-axis stroke is reduced to the **min up** value if the board topography allows this. This option is disabled by checking off **PCB-Holder / Used**.
For multi-samples, the parameter **PCB-Holder / Used** should always be set to **Used** since the boards can be pushed to the bottom or top due to the holder pressure, possibly damaging the test probes or the board might result. Furthermore, select **Used** if specially built holding systems for flexible boards are applied. This excludes contacts between test probes and the holding system.

Contact Check
Check for pad contact during retest. Makes test time longer. Suitable for fine pitch. Some boards cannot use Contact Check.

7.9.1.10 The Parameter-Menu Printout



Parameter-Menu Printout

In the **Printout**-menu you define the settings for the printout of the test results.

- **Ask before printing** — After a test the window **Test information box** is displayed. After pushing the **Print report**-button the selection window **Select report output** appears. In it you can select several options consecutively or just one for printing out the test results. The handling of this **Test information box** is described in the Chapter User Mode.

- **Default printer** — After testing, the window **Test information box** is displayed. After pushing the **Print report-**button the test results are printed out with the Windows default printer.

- **Display** — After testing, the window **Test information box** is displayed. After pressing the **Print report-**button the test results are only printed to the screen.

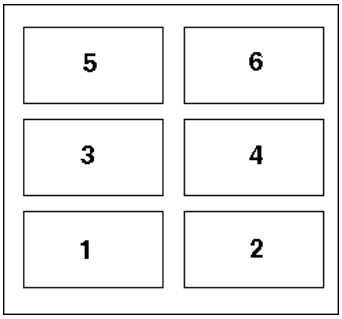
- **File** — In the appearing file selection-window select the directory for saving the results as a text document.
After testing, the window **Test information box** is displayed. After pressing the **Print report-**button the test results file is saved.

Hint:
The file is always assigned the name output.txt. If you do not change this name, an earlier fill will be overwritten.

Continuous printout Only functional for fully automatic version of test system (A3-a).

Multi-sample printout In the selection window **Samples** every single panel or panel group is printed out with its own header information, depending on the number of entered panels

Samples Enter the number of desired headers.
Example:



Samples 1: All panels are combined in one header. (One header)
Samples 2: The panels 1+2+3, as well as the panels 4+5+6 are each combined in one header. (Two headers)
Samples 3: The panels 1+2, 3+4 and 5+6 are each combined in one header. (Three headers)
Samples 6: All six panels receive their own header. (Six headers)

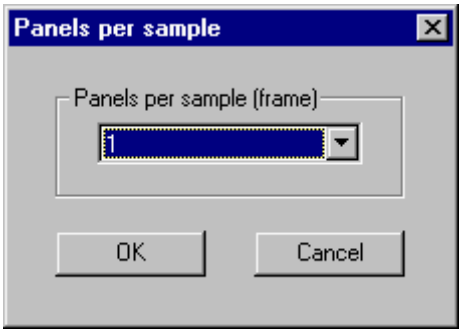
Exclude good panels from printout
The faults protocol only includes bad tested panels.

Exclude bad panels from printout
The faults protocol only includes good tested panels

Print Bardoce Barcode print (Code 39. Encoding 2:6)

7.9.1.11 The Parameter-Menu Marking

In the **Printout** menu you set the number of samples which are marked in automatic test. Not available for manual test system.



8. Appendix

8.1 Starting the Debugger

The parameters for maintenance and calibration activities are located in the Debugger. In order to start the Debugger you must first exit the TestPlayer. Start the Debugger by clicking on the **Debug32**-icon on the Windows NT desktop.

Working with the functions of the Debugger may lead to great maladjustments of the test system and possibly damage it! Only change parameters you are familiar with!

There are two possibilities depending if the test system is already booted or not:

Provided that the test system is booted, the necessary software is already loaded into the controllers of the plug-in cards (c_prog.bin in the crate-controller, f_prog.bin in the controller of each head-controller as well as the correction data).
In this case you only need to transfer the layout to the debugger. For doing so, open the **Load**-menu and select the menu item **Get layout**. The test system is now operable and you can execute the C-Adjust, the Onhead-self-test or the calibration.

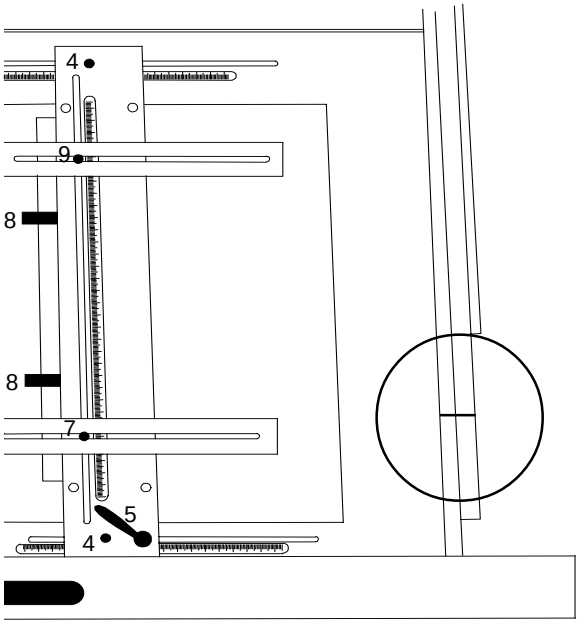
Provided that the test system is not booted, you must load the appropriate software into the controllers of the plug-in cards as well as the layout of the test system and the correction data. For doing so, open the **Commands**-menu and select the menu item **Hard Reset**. Wait until both green LED's of the crate-controller are lit (after approx. 10 sec.). Now click on the **Load all-**command of the **Load**-menu.
The test system boots now and the necessary software is loaded. During this, the test system carries out a couple of reference runs (this procedure takes about 45 sec.). After the boot procedure was successfully completed the Debugger displays the message **Tester loaded**.
The test system is now operable and you may carry out the C-Adjust, the Onhead-self-test or the calibration.

8.2 How to Calibrate the A 3 Test System

Please follow this description to calibrate:

1. Cancel program **Testplayer** if running.
   Start program **Debugger** by double clicking the Icon **Debug32** on the Windows desktop.
   Open pull down menue **Commands**, select the command **Hard reset**.
   Open pull down menue **Load**, choose command **Load all**.
   Wait until tester is booted and the message Tester loaded appears.

2. Check if the two black lines on the right shuttle sliding rail are lined up perfectly (see figure).



   If the lines don't fit, open pull down menue **Commands**, select command **Unlock door** to unlock shuttle without pulling out the shuttle!
   Correct the position by turning the knurled screw at the front side of the shuttle. Turn clockwise - out direction, turn counter clockwise - in direction. Hold position and wait 5 seconds, the shuttle locks automatically (you hear a click).
   Check position and correct again if necessary.

3. Now put in calibration board. Open pull down menue **Commands,** choose **Unlock door** and pull out shuttle.

Attention! When adjusting the clamps, observe that the calibration board is held by hand until the lateral holders are positioned! Improper holder adjustment may cause the calibration board to fall down and damage it!

For the calibration board use the 4 mm product holders.
Fix **left** holder in scale position **3.5 cm** and **rear** holder to scale position **46 cm**.
Fix the calibration board in the shuttle. The writing Top on the calibration board must be located at the top front side (operator side). Unlock shuttle and push in.
Close cover. Don't open cover during calibration, otherwise the calibration stops.

4. To make a rough check of calibration board position press down carefully the left and right probe of Rail 0 (top front rail).
   Check if the distance of the neddles to the left and right contact stripe on the calibration board are the same. Besides the distance of the needles to the horizonal lines should be the same.
   If not, you have to correct the position and to do following:

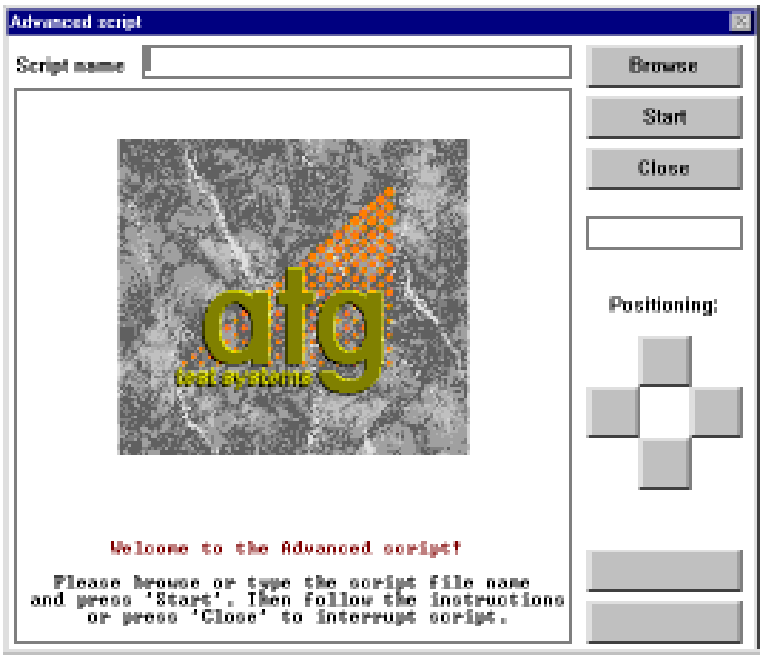
   Correct the x-direction:
   Unlock the shuttle and pull out.
   Untight the fastening screws of the left and right holders and adjust position.
   Tighten screws again. Push in shuttle.

   Correct the y-direction:
   Unlock the shuttle without pulling out and adjust y-position by turning the knurled screw at the front side of the shuttle.
   Turn clockwise - out direction, turn counter clockwise - in direction. Hold position and wait 5 seconds, the shuttle locks automatically (you hear a click).

   Check position again.

5. Turn the light of the top and bottom camera to maximum (turn buttons clockwise)

6. Open pull down menue **Hardware**, choose **Advanced Script.**
   The calibration windows appears.



Click button **Browse.**
Load calibration-file **ta3_1cal.das** which you find in folder **Debug32** on hard disc.
Click button **Start.**

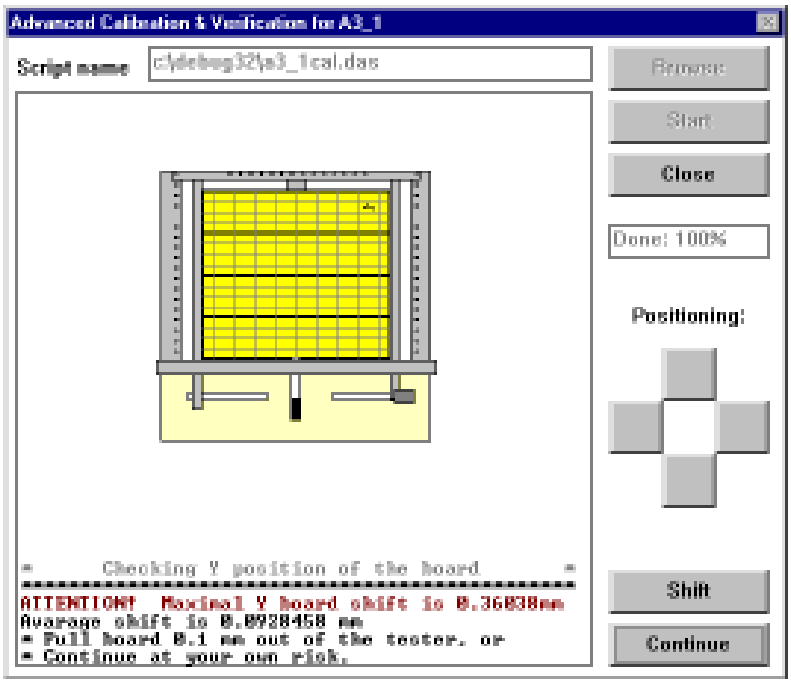
Perhalps a temperatur-information appears. Pay attention to the info and click button **Continue**.

Tip: The calibration window shows permanently information lines at the bottom of the window. Pay attention to this to be informed about calibration possibilities!

7. Select the button **Standard** for standard calibration.

8. Select the button **Normal** for the calibration.
   (If you have a camea lighting with 4 LEDs and a rectangular lighting system please select the button **Shinethrough.**)
   Some information appears about correct calibration board, camera and so on. Accept with button **Continue**.

9. Click button **Ready**.
   Now the calibration routine checks the correct y-position of the calibration board. This takes approx. 1 1/2 minutes.
   The incorrect possition value is shown in millimeter and direction in the information lines.



The value of the difference should not be bigger than ±0.3 mm.
If the position of the shuttle has to be changed, select the button **Shift** and unlock shuttle without pulling it out. Then adjust y-position by turning the knurled screw at the front side of the shuttle.
Information **in** means: move board in the tester
Information **out** means: move out of the tester
Turn clockwise - out direction, turn counter clockwise - in direction. Hold position and wait 5 seconds, the shuttle locks automatically (you hear a click).
Repeat correcting and clicking button **Shift** until the difference value is smaller than ±0.3 mm.

10. Then press button **Continue**.
    The calibration starts and works automatically. The information lines report the current status. The calibration takes approx . 45 minutes.

11. If calibration is done, open pull down menue **Commands** and choose command **Soft reset**.

Now the test system is calibrated.

Attention! Handle the calibration board properly: avoid scratches, store up-end, avoid great temperature fluctuations and maintain the correct humidity!

8.3 Executing Field Calibration and the C-Adjust (Capacity-Adjust)

The C-adjust must be executed regularly for guaranteeing proper testing. Without this adjustments, atg test systems cannot guarantee a 100% test.

Attention! Never turn off the test system, except for service activities!

For all calibration and adjustment activities, the test system must be in stable temperature condition. This requirement is met if the room temperature is kept constant between 19°C to 25°C (66°F-77°F). Furthermore, the test system must not be turned off at any time, except for service and special maintenance activities, since, otherwise, the temperature conditions are changed.

For extended test recesses, the computer monitor can be turned off.

8.3.1 Executing the C-Adjust

The maintenance schedule recommends calibration every two weeks.
Besides this, calibration becomes necessary if:
– fault message after field calibration
– exchange of Meas-Head or test needle
– a cable on the test head is changed
– after manipulations to the mechanics (e.g. test probes, axis, camera, etc.)
– after improper test probe contacts (also check for bent needles)

8.3.1.1 Loading the System and Adjusting the Product Holders

Exit the TestPlayer and start the Debugger. In the **Load**-menu, select the command **Get Layout**.
In the **Commands**-menu, select the command **Unlock door** for unlocking the shuttle. Pull out the shuttle and fix the left holder on position 27 cm and the rear holder on position 46 cm (these holderpositions are written on the C-Adjust board. Clamp the C-adjust board (BEL 337) with the front and right holder, so that you can read the imprinted text ("atg-test-systems....") from front side.

In the **Commands**-menu, select the command **Unlock door** to unlock the shuttle again and push it into the system.

8.3.1.2 Controlling the C-Adjust

In the **Hardware**-menu, select the command **Advanced Script**. Open the loading menu with the **Browse**-button and select the program file **a3xxx337.das** in the folder **Debug32**. Start the program with the **Start**-button.
The camera moves to the first cross on the C-adjust board and scans it. Then klick the button **Next cross.** The systems now scans the rear cross. Click button Ready. The C-Adjust begins.
The screen shows the capacity values. Here, an example of the determined measuring values:

Rails	Left			Right		
	Flying probe	Sine	Co-sine	Sine	Co-sine	Flying probe
Rear bottom	3L	**–3/**	–2	**2/**	–3	3R
Front bottom	2L	**2/**	2	**–8/**	–1	2R
Rear top	1L	**–5/**	0	**5/**	–2	1R
Front top	0L	**11/**	1	**0/**	–5	0R

After executing the C-Adjust the test system displays a message about the successful C-Adjust and you can start with the bare board test.

8.4 Exchanging a Test Needle

The test needles require substitution mainly due to wear, but also because of damage due to faulty test data (Stroke, Debugger...).

Carefully handle the parallelogram when disassembling the test tip! Excessive mechanical stress may lead to breakage of the parallelogram!

8.4.1 Checklist for the Test Needle Exchange

– Start the **TestPlayer** in the supervisor mode

– Set the stroke counter of the concerned test head to 0 in the sub-menu **Strokes** of the **Debug**-main menu

– Exit the **TestPlayer**

– Push the Emergency-Off switch

– Adjust the concerned test head to the desired exchange position. When doing so, avoid pulling on the parallelogram or the test needle in order to prevent damaging. Also pay attention towards not touching the other needles e.g. through body contact.

– Carry out the exchange of the test needle as described below

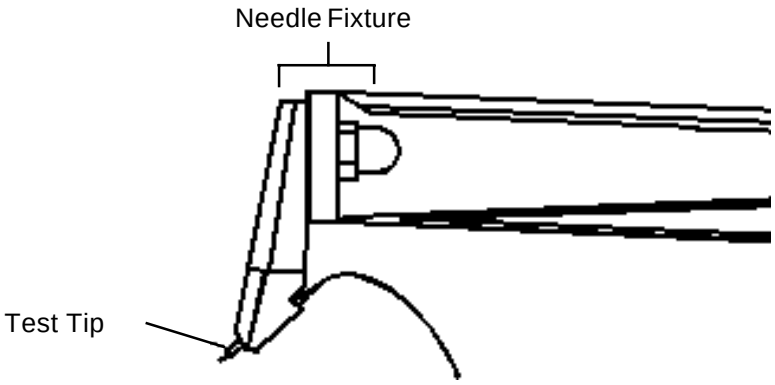
– Switch to the **Debugger** and select the command **Hard Reset** of the **Commands**-menu.

– Select the command **Load all** in the **Load**-menu.

– Calibrate the test system

– Exit the **Debugger**

– In the **TestPlaye**r, carry out a **Field calibration** for a board in which test area an exchanged needle is located.



8.4.2 Exchanging the Test Tip

With a flat nose pliers pull the test tip out of the needle fixturing of the parallelogram. For this purpose, tightly hold on to the parallelogram and pull out the rounded off part of the golden fixturing including the needle. The new needle is simply plugged into the fixturing with the pliers.

Attention! When plugging in the new needle tip pay attention towards not bending or breaking the tip with the pliers!

8.4.3 Removal of the entire Needle Fixture

First, release the plug contact of the blue measure line. Release the clamp on the base plate and the clamp on the Z-axis block with which the blue measure line is guided. Memorize the cable guide for the reconstruction during re-assembly. Cut the tie wrap on the parallelogram. Unscrew the plastic hat nut of the needle fixturing and pull the entire needle fixturing off the parallelogram.
Plug the new needle fixturing onto the parallelogram and re-tighten the hat nut. Reinsert the plug contact into the socket of the parallelogram's measure line.
After the needle exchange the test system must be newly calibrated.

Attention! When working on the parallelogram observe that all joints of the parallelogram remain stress relieved! In order to do so, always hold the parallelogram steadily in its position!

During the calibration routine the new needle is inspected for its contact with the test system. The following message is displayed if the needle fails to contact:

```
ATTENTION! Board test gives high resistance.
Calibration board is placed incorrectly, or
Wrong calibration board, or
Completely wrong layout, or
Some needle is broken.
```

8.5 Z-Axis Removal

Preparation:

– Pull out shuttle until it is locked.
– Push lateral product holders out as far as possible.
– Push rear product holders as far back as possible.
– Turn off the power of the test system by pushing the **Control Off**-key.

Required Tools:

– Allan-keys 4 mm and 2 mm

Procedure:

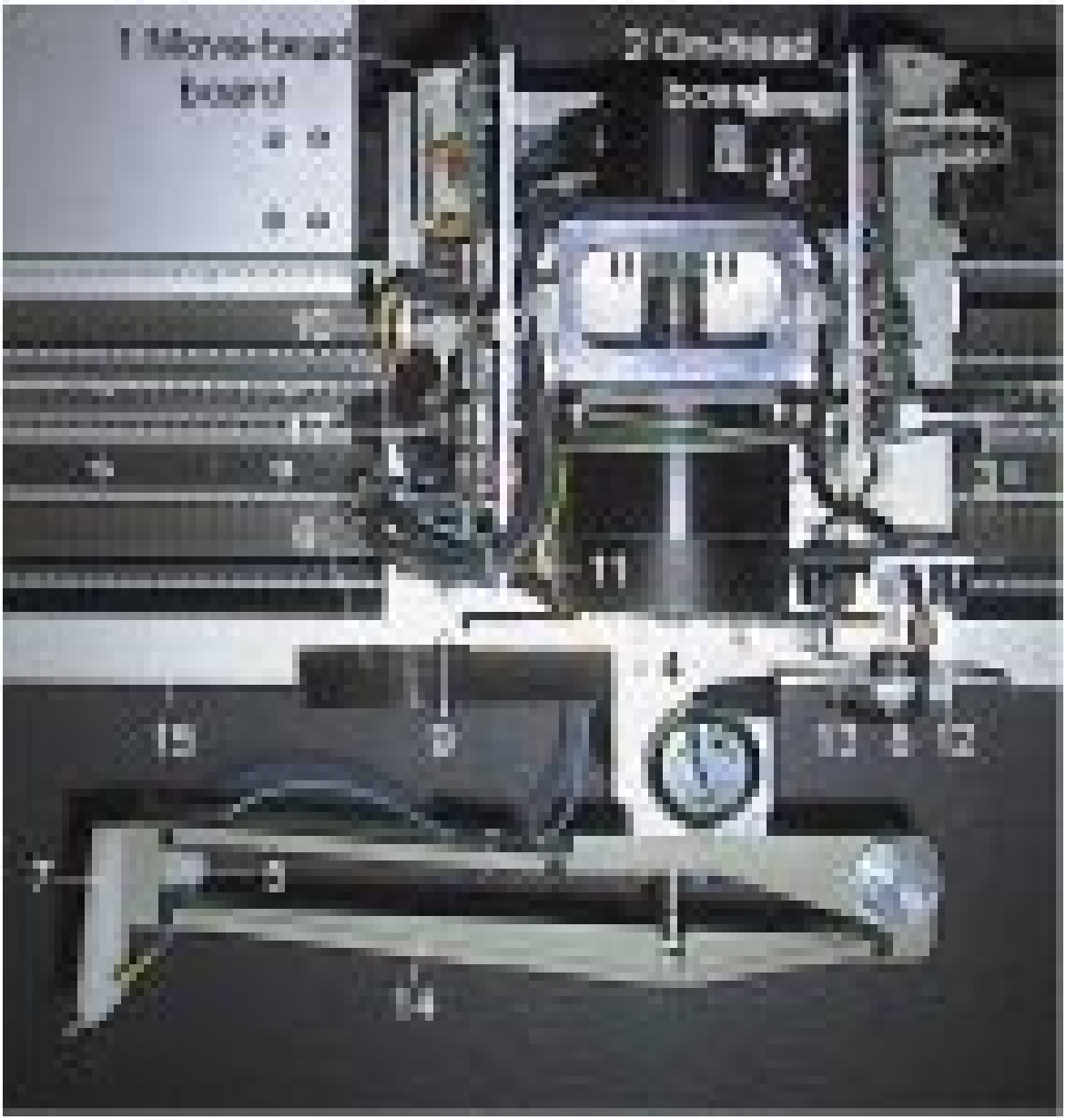
For the removal, place yourself in the open area of the shuttle (between the holders).

Safety precaution: Pull of needle tip
– With flat nose pliers, pull the test tip out of the needle fixture of the parallelogram.

Loosen connecting cable of OnHead-Board (No.2)**:**
– Pull the coax plug JP5 out of the measure line (No.3) on the OnHead-Board.
– Loosen the cable clamp on the motor plate (No.9), so that the measure line can easily be pulled out from underneath. Attention: Do not completely unscrew the clamp!
– Feed the measure line through in-between the rotation motor and motor plate.

Loosen connecting cable of Move-Head-Board (No.1)**:**
– Pull off Pfosten plugs (No.10) of the Z-axis-control.
– Remove fixing screw of the U-clamp (No.9).
– Pull the flat cable (No.6) out of the U-clamp. Attention: Memorize the cable guide in order to be able to properly redo it!
– Feed the flat cable (No.6) towards the Z-axis and lay it open.

Hint: A steel pin located underneath the Move-Head-Board fixes the motor plate (No.11). It is impossible to pull out the flat cable, if this needle is not evenly aligned with the motor plate. In order to solve this problem carefully sink the needle with a hammer.



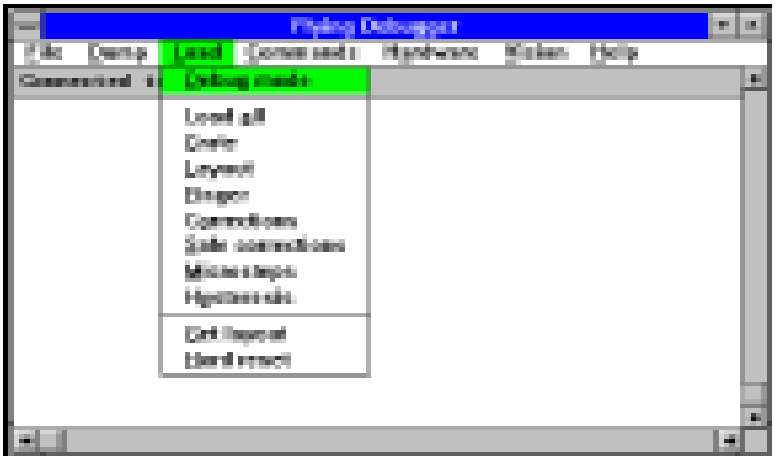
Loosen the clamp screw of the Z-axis (No.4, big allan screw) **and pull the Z-axis off the rotation shaft:**

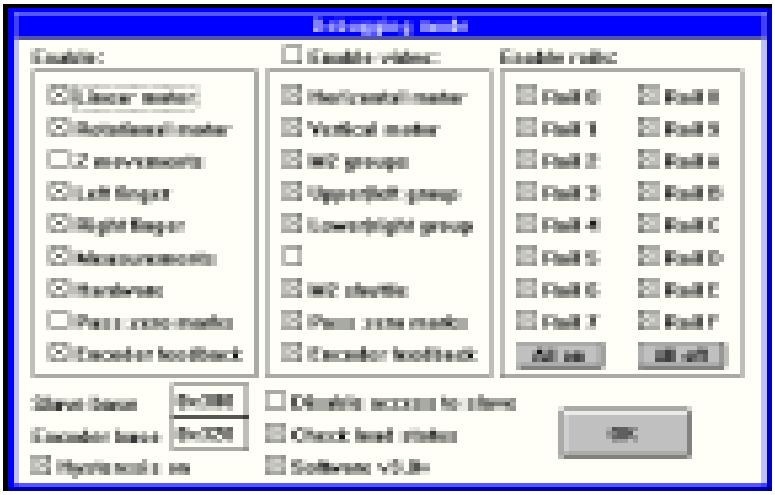
– A topside Z-axis must be held during its removal to prevent it from falling down. For the case that the axis is difficult to pull off, try to loosen the axis by lightly shaking it. Do not apply any force since this may cause damages to the rotation motor.

8.6 Z-Axis Installation

8.6.1 Preparation

– Push all test heads into their mechanical X-end positions left or right, so that the fork light barriers (No.12) are active when test system is powered.
– Turn all mounted Z-axes in rotation direction (Y-direction) into their mechanical end position, so that the aluminum stoppers (No.13) activate the rotation light barriers of the test heads:
– Turn all Z-axes so that all heads face outside and the parallelograms of the Z-axes point forwards in a 45° angle.
– The test heads without Z-axes only need to be set to the X-end position.
– Press the **Control On**-key to turn on the test system electronics.
– Start the **Debugger**-program under Windows. You need to close the **TestPlayer** if it is still active!
– With the menu item **Load / Debug mode** open the window **Debugging mode**

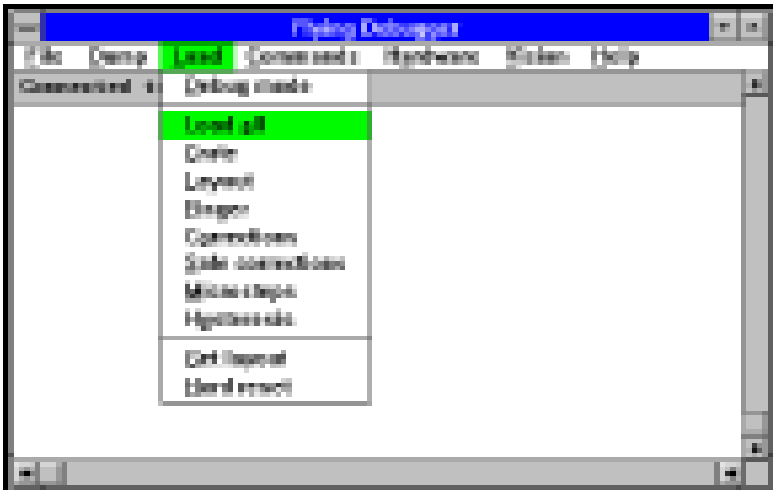




– In the **Enable**-column deactivate the functions **Z-Movement** and **Pass Zero Marks**. For doing so, click on the concerned lines with the mouse.
– Save the changes with **OK**

In the status window of the debugger the following error message is possibly displayed: `ROM, Crate not loaded`
You need not pay attention to this.

– Load all system programs with **Commands / Hard reset** and **Load / Load all**



– The system programs are now being loaded. After the camera initialization is completed and test heads are directed inwards, please make sure that none of the Z-axes undergo a rotation movement. This only happens if the Z-axes were not properly set into the rotation light barriers. For solving this problem carefully push the parallelograms (No.14) into the rotation sensor by applying light pressure.

– After the heads have reached their zero-positions on the glass scale (No.16) and on the rotation encoders (No.16), the red LED No.6 of the head controllers on the assembly rack carrier will blink. For unmounted heads it may take up to two minutes for the red LED to blink. The system will remain in this position.

8.6.2 Assembly

– Push the Z-axis onto the rotation shaft and turn the axis into its mechanical end position so that the aluminum stopper (No.13) activates the fork light barrier. Make sure that the axis is completely pushed onto the shaft and that the stopper is directed into the light barrier. The aluminum stopper can be manually readjusted if it is slightly bent.

– Tighten the allan screw (No.4) firmly and make sure that the shaft of the rotation motor does not move during this activity. For better accessing the allan screw it is

advisable to move the head in X-direction (this might not be easy since you need to work against the running voltage of the motor).

– Push the **Control Off**-key to turn off the test electronics.

– Remount the measuring cable and the flat cable of the Z-axis in reversed order (See instructions for the Z-axis Removal procedure). Make sure that the Z-axes do not hit any of the cables in their entire operating range and that the rotation light barrier is not covered. After the coax-plug is reinserted make sure that both the red mark of the plug and the red mark on the socket on the OnHead-Board (No.3) are aligned.

8.6.3 Final Test

– Turn on the test electronics by pushing the **Control On**-key.

– Confirm displayed error messages **OK**. These error messages only relate to old command sequences, which are still located in the program buffer. If no reset is carried out the software will be unable to make a connection with the hardware, because no answering signal is delivered to the software after the test electronics are shut off. In this case, the program will still concern the test system as ”loaded”.

– In the menu item **Load / Debug mode** activate the functions **Z-Movement** and **Pass Zero Masks** in the **Enable**-column (left column). For doing so, click on the concerned lines with the mouse.

– Save the changes with **OK**

– Re-initialize the **Debugger**-program with **Commands / Hard reset**

– Load all system programs with **Load / Load all**

– The system programs are now being loaded. No error messages are to be displayed. The test system is now ready for calibration.

8.6.4 Error Messages after Z-axis Installation and their Probable Causes

“Needle or cable shortened to shield, Unrec, hrdw, rail n, right/left, MEAS:XXX”
possibly in combination with the message:
“On-head amplifier shift XXXX bits, Unrec, hdwr, rail n, right/left, MEAS:XXX”

Probable Causes:
- The plug of the measure line (No.6) is improperly inserted or possesses a contact resistance between measure line and shielding.
- Needle is defective
- Needle holder (No.8) is defective

“Endsensor not found, value XXXXX, Unrec, hdwr, rail n, right/left, X, MAIN:XXX”
Head n cannot find the X-end sensor (No.12). Head is permanently directed to the mechanical end position.

Probable Causes:
- End stopper of the light barrier is bent and does not trigger anymore.
- Light barrier cable of the Move-Head Board is loose
- Light barrier is defective
- Stated test head is too far away from sensor. System was assigned a time-out. This error may be ignored. (REC = recovered)

“Endsensor not found, value XXXXX, Unrec, hdwr, rail n, right/left, Y, MAIN:XXX”
Head n cannot find the rotation sensor of the Z-axis (Y). Axis is permanently directed to the mechanical end position

Probable Causes:
- Z-axis was not properly tightened during assembly and therefore glides on the shaft
- Stopper of the rotation sensor (No.13) is bent and does not trigger the sensor

“Broken cable, Unrec, rail n, right/left, MEAS:XXX”
Interruption of the measure stretch between measurement-card and socket of the needle holder (No.7)

Probable Causes:
- Coax-plug (No.3) is not inserted on the On-Head Board
- On-Head Board is defective

“Z-movement up timeout, Unrec, hdwr, rail n, right/left, MAIN:XXX”
- Z-axis does not move

Probable Causes:
- Pfosten plug (No.10) of the Z-axis cable is properly inserted.
- Line breakage between Z-axis motor and Pfosten plug
- Z-axis motor defective
- Fork linkage of the Z-axis coupling is jammed
- Move-Head Board is defective

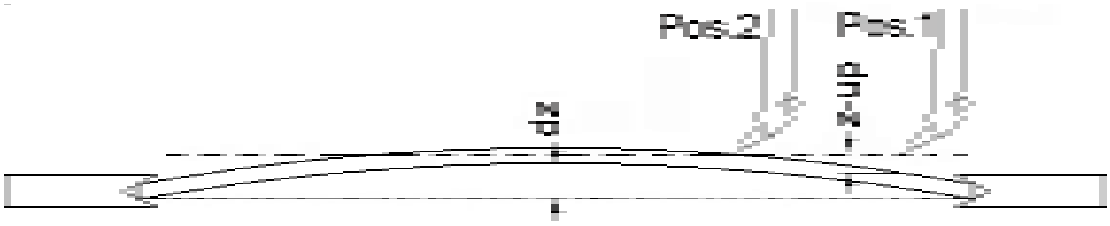
“Zero phases wrong, Unrec, hdwr, rail n, right/left, X, MAIN:XXX”
Zero-position of the probes differs greatly from the given position in the layout. This deviation is readjusted during calibration. The error and the message disappear after calibration.

8.7 Avoiding Test Head Damages

There are two basic situations in which A 3 test heads can be damaged:

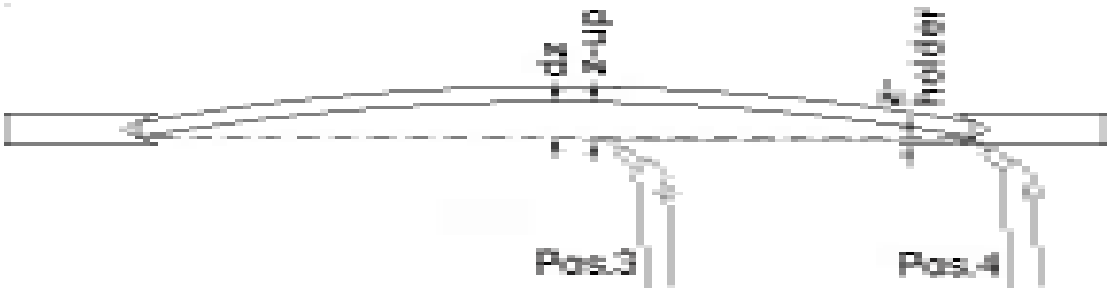
1. Z-up is less than the board deformation dZ

The flying probe starts the test in the area of position 1 area and learns Z-axis position of the area of position 1. If the board is deformed and the test probe receives a command to move a long distance in X-direction to position 2 (for example a jump from panel to panel), the test head will be damaged if the Z-up definition is too small.



2. Z-up is smaller than the board deformation dz + z-holder

The flying probe starts testing and learning in the position 3 area. Now the flying probe gets a command for a long movement in X-direction to position 4 (for example a command at the end of the continuity test which moves the flying probe to the edge of the board). If the flying probe moves back in position 3 area, the test head will be damaged if the z-up definition is too small.



Attention! Always define z-up larger than dz + z-holder! Always define z-up large enough to be higher than the bent board!

8.8 Testing Flexible PCBs

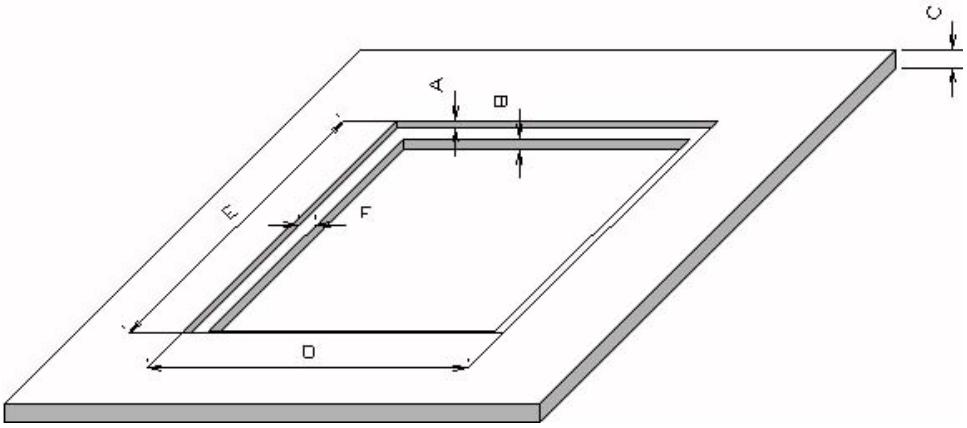
Project description

The shuttle of the A 3 flying probe test system can only fix boards laterally. This is ideal for boards of a thickness of 1 mm and more and for board measurements of at least 100 x 200 mm.
For testing boards
– thinner than 1 mm,
– partially milled or
– flexible boards testing is possible with special holders or frames.

The following variants are available:

8.8.1 The Simple frame

This frame should be used for the FR4 and ceramic boards with a thickness between 0.4 and 1.5 mm.
The frame takes up the fastening pressure of the product holders. The board fixed in the frame with scotch tape which both taped on the frame and the board surface.

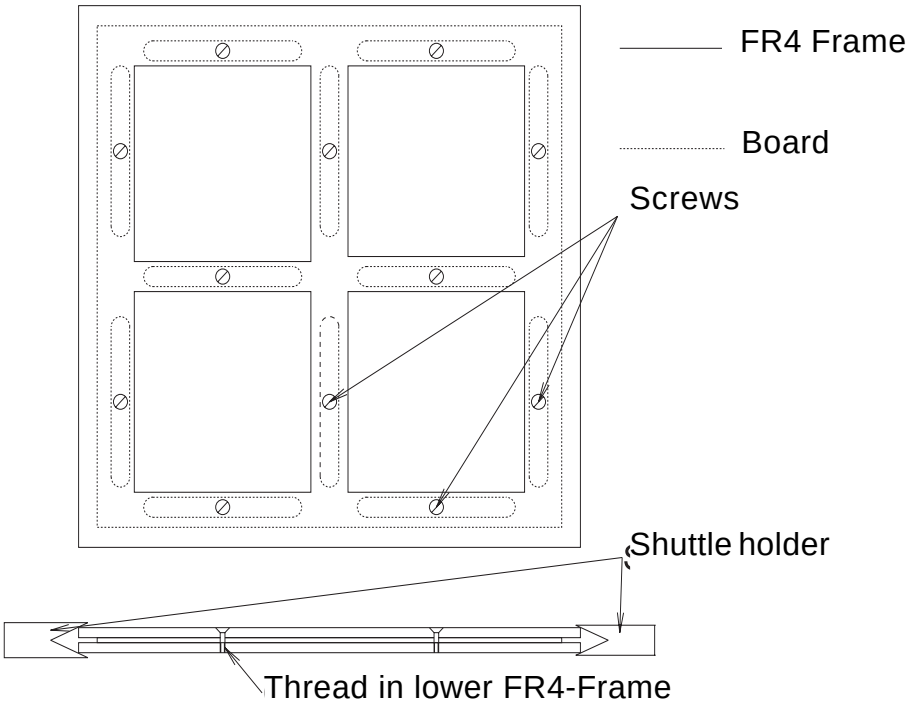


The dimensions **D** and **E** must be approximately 0.2 - 0.3 mm bigger than the size of the board. Dimension **A** must be 0.0 - 0.2 mm higher than the thickness of the board. Dimension **B** must be approximately 2 mm or more and depending on the board's size and the required stability. Furthermore, the measurement **C = A + B** must be guaranteed. The dimension **F** can be 1 - 5 mm and depends on the board layout of the solder side. The **F**-surface may be partially removed in order to avoid the covering of test pads.
A frame of this kind can also be built for multi-samples. The size of the whole frame must be defined in the **DPS** as **Contour Data**.
It is recommended to build 2 frames to be able to equip one while the other one is used at the same time for testing.

8.8.2 The Sandwich frame

This type of frame is recommended to be used for multi-panels, which are milled (serving the purpose of easier separating the panels after production).
Two similar frames are screwed together to form a ”sandwich” with windows for the panels. The screws are set into mill holes of the boards. The thickness of the frame halves is to be 1.0 - 2.0 mm. The bottom half of the frame must provide threads for fastening the screws. In the tightened state, the screws must be evenly aligned with the frames both surfaces.

In the menu **Stroke,** the **Z up**-value must be increased to 3.5 times the thickness of the frame. With sandwich-frames it is also advisable to produce two identicals for reducing the set-up time.



8.9 The Application of a Test tray for Testing Flexible Boards

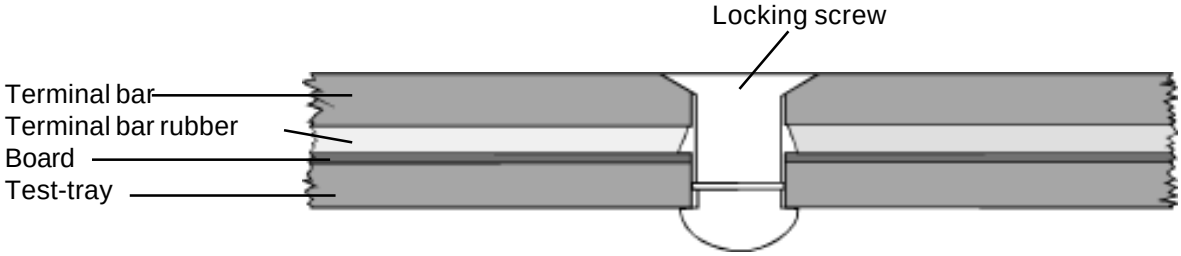
With the test-tray flexible boards can be tested on one side with the flying probe test system. The test-tray is used for inner layers with a thickness of at least 0.2 mm and for flexible boards with a thickness of up to 1.2 mm.

Fastening the test-tray

Move the lateral holders to position 7 and the rear holder to position 40. Insert the terminal bars of the size 5 mm or 6 mm. Tighten the test-tray in the shuttle.
Change to supervisor mode. Load the board file and select the graphic view of the board in the pull down menu **Show boardname**.
Place the board on the test-tray exactly as shown in the graphic window and move the board to the closest drill hole on the test-tray so that the terminal bars get a hold of the board.
Lay the terminal bars over the edges of the board and press the locking screws into the drill holes of the product holders and the test tray. The locking screws are available in the length of 12.8 mm and 13 mm.

Caution! Use only locking screws of the correct length and press them completely into the holes! If the locking screws are too short or not pressed in far enough, the tightening of the screws will damage the drill holes in the test-tray!

Turn the locking screws now ¼-turn to the right or to the left for locking them.



Check the board for proper fixing.

Caution! Test pads must not be located close to the terminal bar or be even covered by it! Otherwise, the test heads could collide with the bar and possibly be damaged!

Push the shuttle into the test system. Start the scanning of the board position with the function **Scan board** of the main menu **Debug**. During this procedure position the mouse on the scanmarks and confirm them. After scanning is finished testing can started.

8.10 The A 3-Test Protocol

Applies to all A 3 test systems.

After a test run you can print a test protocol. Therefore choose in button **Test Params (F5)** in parameter menu **Printout** the printer or **Ask before printing.**

```
====== atg, A3 ======
PCB 10602183
Serial no: 1234
Lot 1 No.1
_____________________
10.05.96 13:52:08
operator: atg
Test time: 43m 10.5s
Test temperature: 27.0 C
.......................
BOARD NOT COMPLETLY
TESTED!!!
.......................
Continuity test
Opens: 7
threshold: 10.0 Ohm
measurements: 6966
retests: 761
Isolation test
Test without adjacency
Shorts: 7
Bad fields: 5
threshold: 10.0 MOhm
measurements: 7875
retests: 1786
High Voltage test
Not done
_____________________
>>> Panel   1 <<<
Continuity test
Opens: 3
Isolation test
Test without adjacency
Shorts: 3
Bad fields: 4
Open in net 20
(197.1 MOhm)
X  1880 Y  2474 (   101)
X  3259 Y  4178 (   102)
Open in net 25
(197.1 MOhm)
X  1834 Y  6114 (   106)
X  3190 Y  2390 (   107)
Open in net 30
```

Header: Test system
PCB (board) name, serial number (if available), and lot and run number

Test end date and time
Name of operator
Test time (without scanning)
Temperature when test started

This information appears, if No contacts or Bad fields exist at the end of a test.

Information about continuity test (if executed):
Number of opens, threshold, and number of measurements and retests.

Information about isolation test (if executed):
Test with (or without) adjacency function, number of shorts, threshold, number of measurements and retests.

Information about High Voltage test (if executed):
Number of HV shorts, threshold, number of measurements and retests.

Faults list is divided into individual panels for multi-panel (multi-sample) boards. For multi-panel boards each panel has a short header informing about number of faults for this panel and whether the adjacency function was applied n the isolation test).

Open in net “net name”.
Open value: First point: coordinates (from *.les file) and pad number.
Second point: coordinates (from *.les file) and pad number.
For multi-panels coordinates and pad numbers were recalculated using Step and Repeat.

```
(197.1 MOhm)
X  1633 Y  1626 (   121)
X  1969 Y  5545 (   131)
Short between nets
1 and 115 (412.2 mOhm)
X  1633 Y  1930 (     3)
X  2410 Y  4699 (   337)
Short between nets
30 and 53 (391.0 mOhm)
X  1633 Y  1626 (   121)
X  1760 Y  3787 (   219)
Short between nets
110 and 117 (0.6 Ohm)
X  2446 Y  1554 (   326)
X  2606 Y  4699 (   340)
Bad field in net 3 (NC)
X  3907 Y  5222 (    69)
Bad field in net 5 (NC)
X  1760 Y  4567 (    75)
Bad field in net 8 (NC)
X  3932 Y  5004 (    90)
Bad field in net 25 (NC)
X  1834 Y  6114 (   106)

 >>> Panel   2 <<<
Continuity test
Opens: 3
Isolation test
Test without adjacency
Shorts: 2
Bad fields: 1
Open in net 87 (NC)
(197.1 MOhm)
X  1935 Y 11645 (   803)
X  3132 Y 12209 (   809)
Open in net 87
(197.1 MOhm)
X  2408 Y 12209 (   804)
(No Contact)
X  2776 Y 11345 (   806)
Open in net 87
(197.1 MOhm)
X  2408 Y 12209 (   804)
X  3132 Y 12209 (   809)
(No Contact)
Short between nets
1 and 62 (391.0 mOhm)
X  1633 Y  8030 (   538)
X  2931 Y 10799 (   768)
Short between nets
1 and 115 (412.2 mOhm)
X  1633 Y  8030 (   538)
X  2410 Y 10799 (   872)
Bad field in net 39
```

Shorts data:
Net names and shorts values.
First point: coordinate (from *.les file) and pad number.
Second point: coordinates (from *.les file) and pad number.
For multi-panel-coordinates the coordinates and pad numbers are recalculated using Step and Repeat.

Bad fields and No contacts
Point: coordinates (from *.les file) and pad number.

Open with “No contact” indication (No contact-pads are detected)

Open with “No contact” indication (only the first pad has No contact)

Open with “No contact” indication (only the second pad has No contact)

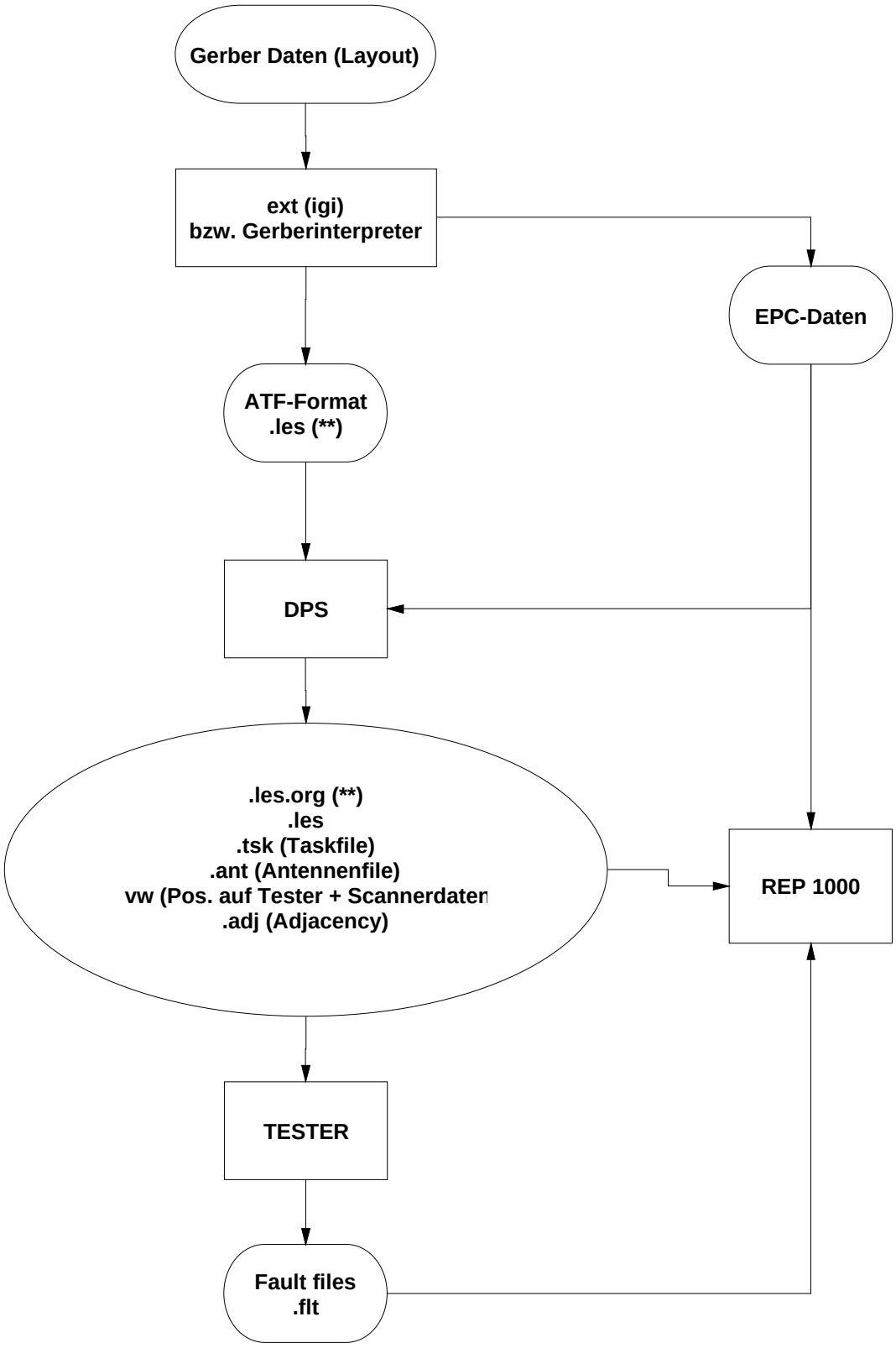
```
X  1880 Y  8289 (   725)
 >>> Panel   3 <<<
skipped

>>> Panel   4 <<<
Continuity test
Opens: 1
Isolation test
Test without adjacency
Shorts: 2
Bad fields: 0
Open in net 25
(197.1 MOhm)
X  5934 Y  6114 (  1711)
X  7290 Y  2390 (  1712)
Short between nets
1 and 50 (443.9 mOhm)
X  6305 Y  1557 (  1625)
X  7628 Y  3454 (  1820)
Short between nets
37 and 55 (0.5 Ohm)
X  5860 Y  3332 (  1791)
X  7791 Y  3066 (  1829)
=======================
```

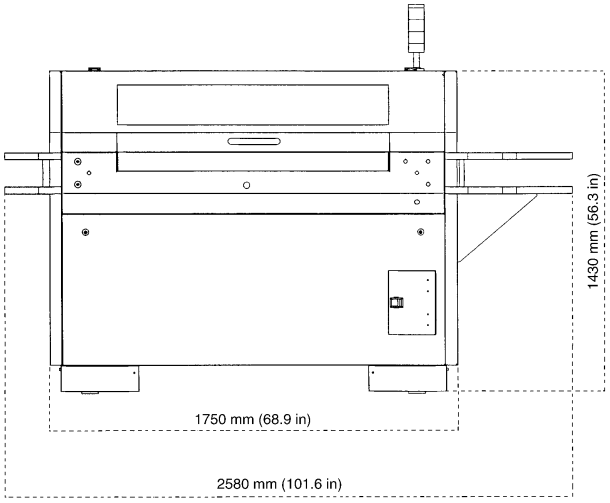
Panel 3 was skipped due to different reasons (user setting, scanning resulted too large offset, too many opens, shorts or possible shorts detected).

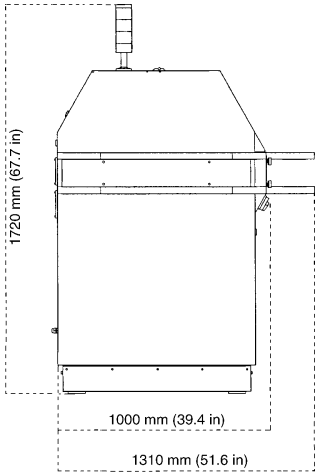
End of printout

8.11 Brief Flow Chart of Data Preparation



8.12 Technical Specifications A 3





Mechanics
Basic unit with 8 test probes (4 probes per side)
Pentium Hardware with WinNT operating system
Variable board fixing system
Multi board test
Active test area: 520 mm x 400 mm (20.4 in x 15.7 in)
Max. board size: 610 mm x 457 mm (24.0 in x 18.0 in)
Boards up to 6 mm (0.24 in) thickness

Optical registration
2 cameras for optical scanning of top and bottom side with shrinkage compensation
Optical image approx. 8 mm x 6.5 mm (0.31 x 0.25 in) with
10 µm/pixel (0.0004 in) resolution

Electrical parameters
Continuity test between 2 points from 1 Ω (±2 %)
100 % isolation test with 10 MΩ with field measurement (without adjacency)

Mechanical parameters
Positioning accuracy in X- and Y-direction:
±35 µm (±0.0013 in)
Repeatability: ±10 µm (0.0004 in)
Smallest test pad: 100 µm (4 mil)

Programmable test pressure: 20 - 100 g (0.70 - 3.53 oz)
Programmable probe speed: 15 - 100 mm/s (0.6 in/s - 3.93 in/s)
Programmable Z-axis travel: 0.5 mm - 20 mm (0.05 - 0.79 in)

Options
Integrated field measurement (IFM)
High voltage test, 500 V/100 MΩ
Selective resistance test (test of buried resistors): 10 Ω - 50 MΩ, ±2 %
Fault verification and retest of atg- and ECT-grid tested boards
Tension frame for flexible boards
Repair station with camera support

Data formats
ATF and EPC
IPC-D-356/A

Supply and environment conditions
Power supply: 230 V, 50 Hz (115 V, 60 Hz)
Relative humidity: 40 % - 60 %
Temperature: 19 °C - 27 °C (66 - 81 °F)
Temperature stability: ±3 K

Necessary working space
Width: 2.85 m (112 in)
Depth: 1.53 m (60 in) without area for operator

Weight
approx. 1200 kg (2650 lbs.)

8.13 Maintenance Plan

The following maintenance tasks have to carried out regularly:

Daily:

check the needles optically:
if the needles are bent or damaged they have to be changed.

Weekly:

check the emergency-off circuit:
Therefore, activate all emergency-off buttons in succession. The test system must turn off after their application.

Every two weeks:

calibrate
Execute a mechanical calibration every 14 days. This has to be done too after every manipulation at the mechanics (e.g. probes, axis, needles etc.).
For fine pitch testing you have to do the calibration every week.

check the C-adjust and adjust it new if necessary
for that purpose, start the **Debugger**-program. The procedure is described in the chapter Execute the Field Calibration and the C-Adjust.

Every three months:

Clean the shuttle
clean all movable parts of the shuttle with a fluff-free cloth.

Check the hard drive capacity:
Depending on the number of different boards and fault files the available hard drive space is reduced. Since the free capacity is not considered by the software data might be lost if there is not enough space to save it. Delete jobs (data) which is not used any more in the directory **C:\BOARDS\...**

Execute Onhead-Selftest
Start the program **Debugger**. In the main menu **Hardware** start the sub-menu

Onhead-Selftest. In the appearing window check off the item **Repeat Measurement**. After clicking the **Start**-button, the current values of the probes are permanently shown in the table. A value within in the tolerance is displayed in blue, while values beyond the tolerance are displayed in red. The error must be eliminated for parameters displayed in red.
Hint: The most important parameters of the **Onhead-Selftest** are also shown after a **Soft-Reset**.

Clean the fan-unit

1. Shut down the test system according to the regulations and with the button **Control Off** switch it off.
2. Loosen four at a time of the fixing screws of all 3 head-unit/motor-driver plug-in cards at the front side of the electronics-rack. Pull out the cards. Only the 2 head-unit cards can be pulled out, the motor-driver card remains in the rack. Handle the sensitive electronics cards very carefully!

<u>Attention</u>! Discharge yourself by touching a naked metal part on the test system (i.e. wall of rails) or another grounded object, before you touch the rack cards to avoid a damage by electrostatic charge!

3. Clean the fan unit, which is under the electronics-rack, by blowing with pressure air from top side through the gaps in the electronics-rack. If cards are dirty, blow them off, too.
If there is much dust, clean the fan unit more often.
4. Screw on the head-unit cards again.

After repairing a probe or exchanging a needle: Calibrate the test system and make a C-Adjust!