USER MANUAL

For Windows

TP 2101

Testpro

User manual for TP2101. Windows version

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Version V3.0.0 for TP2101 Windows software

Testpro as, 14. November 2002

General safety aspects.

TP2101, test equipment for testing of backplanes, racks and cable harnesses.

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Service should be done only by qualified personnel.
Disconnect the power cord before opening the covers.
Do not operate the system without covers.

Ground the equipment. The equipment is grounded through the grounding connector of the power cord.

Use proper fuse. Use only the fuse type and rating specified.

Do not operate in wet/damp conditions.
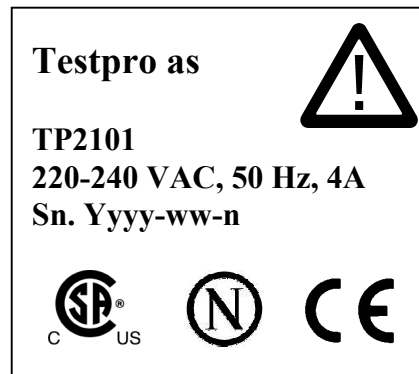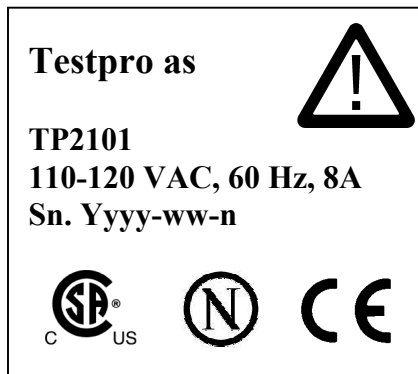**Do not operate in explosive atmosphere.**

Keep all surfaces clean and dry.
Provide proper ventilation.
Clean/replace filter in fan unit whenever necessary.

ESD: The scannercards are sensitive to electrostatic discharge.
The system shall be used only in ESD-controlled environment.

Marking:

Testpro as ⚠️ **TP2101** **110-120 VAC, 60 Hz, 8A** **Sn. Yyyy-ww-n** (CSA) (N) CE	**Testpro as** ⚠️ **TP2101** **220-240 VAC, 50 Hz, 4A** **Sn. Yyyy-ww-n** (CSA) (N) CE

Symbols and terms

Symbol	Description
(CSA)	Approved by Canadian
(N)	Approved by Nemko
CE	Conforms to European Union Directives
⚠️	Hazardous voltage is present inside the cabinet. Refer to manual.
⏚	Protective ground terminal.

INSTALLING THE TP2101 SYSTEM

This chapter includes information and details on:
- System requirements
- Starting the installation software
- Getting upgrades

SYSTEM REQUIREMENTS

Minimum Recommended Hardware
- Pentium 500 Mhz or better
- CD-ROM
- 17 inches colour monitor, SVGA at 800x600, 256 colours

Operating System Requirements
The TP2101 software runs on Windows 98, 2000, ME and XP.
The PCI software version will run on all windows versions.
The ISA version comes in two different versions, one for Windows 98 and one for Windows 2000.

Installation of the TP2101 PC interface cards.

There a two different interface cards available. The ISA bus version and the new PCI bus version which will replace the old ISA bus interface card.

ISA interface card

Turn off the computer and insert the ISA interface card into a free ISA slot. Be sure the connector is fully inserted into the socket. No further procedures has to be done. Proceed to the software installation.

PCI interface card

Turn off the computer and insert the PCI interface card into a free PCI slot. Be sure the connector is fully inserted into the socket.
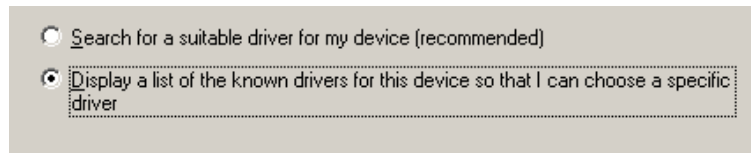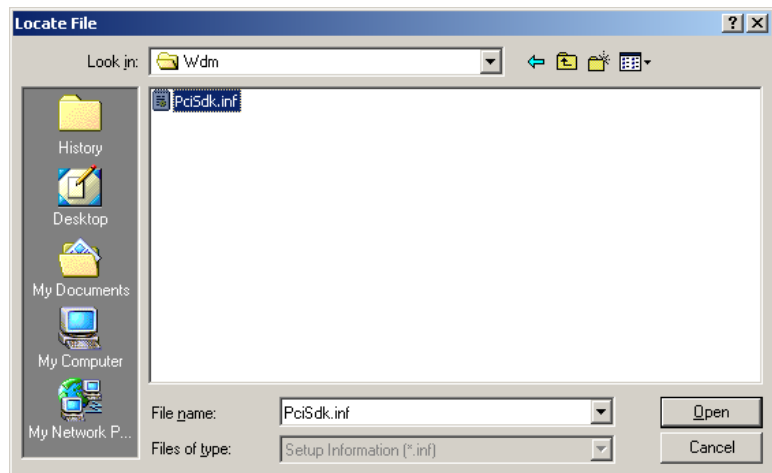Turn on the computer. The PC will detect the new PCI 9030 Board hardware and automatically

start the Found New Hardware Wizard program.

Just press next to continue.

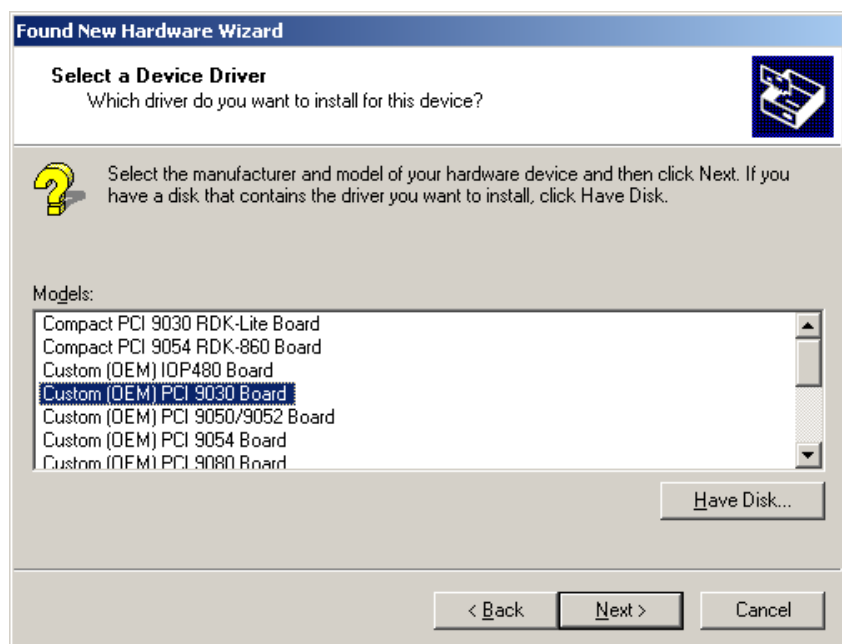Select the option allowing to choose a specific driver from a list.

○ Search for a suitable driver for my device (recommended)

● Display a list of the known drivers for this device so that I can choose a specific driver

Browse to the Driver directory on your installation CD and select the WDM directory. Select the *PciSdk.inf* file and press Open.

Locate File

Look in: 🗀 Wdm

📄 PciSdk.inf

History

Desktop

My Documents

My Computer

My Network P...

File name: PciSdk.inf   Open

Files of type: Setup Information (*.inf)   Cancel

Select a device driver to install for this device.

Select the *Custom (OEM) PCI 9030 Board* from the list and press next.

Found New Hardware Wizard

Select a Device Driver
Which driver do you want to install for this device?

Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.

Models:

Compact PCI 9030 RDK-Lite Board
Compact PCI 9054 RDK-860 Board
Custom (OEM) IOP480 Board
Custom (OEM) PCI 9030 Board
Custom (OEM) PCI 9050/9052 Board
Custom (OEM) PCI 9054 Board
Custom (OEM) PCI 9080 Board

Have Disk...

< Back   Next >   Cancel

The TP2101 PCI interface board should now be successfully installed and ready for use.

Installation of the TP2101 PC software

Before installing make sure your computer satisfies the system requirements.
Insert the TP2101 installation system CD into your CD-ROM drive and follow the steps below:

1. Click on the Windows Start menu and select **Run.** The run dialog appears.
2. Click Browse and navigate to the file named TPWinISA98install.EXE, TPWinISA2000install.EXE or TPWinPCIinstall.EXE located on the CD-rom drive. See table 1.1 for details.
3. Click Open.
4. In the Run dialog box click OK.

The TP2101 installation software starts. The installation software is a single EXE file that will automatically unpack and install all necessary files.

For the ISA version of the interface card, the TP2101 software is installed in directory C:\TPWIN\
For the PCI version, the software is installed in directory C:\TPWINX\

Note: In case of upgrading or reinstalling the software, there is an option not to install system files. A customer might for example want to keep the old User/Passwords settings.
Please deselect this checkbox to keep the old system settings.

Operating system	PC-interface card	TPWinISA98 install.exe	TPWinISA2000 install.exe	TPWinPCI install.exe
Windows 98	ISA	X		
Windows 2000	ISA		X	
Windows 98, 2000, Me, XP	PCI			X

Table 1.1 Type of testersoftware

UPGRADING AND GETTING TECHNICAL SUPPORT

To help you get the most out of the TP2101 test system we offer professional services and technical support, training and consulting.

Testpro as
Mail address: P.O.Box 284 Økern, N0511 Oslo, Norway
Delivery address: Risløkkveien 2, N-0580 Oslo, Norway

Homepage : http://www.testpro.no/
Software download : http://www.testpro.no/tpsoft.html

E-mail: testpro@testpro.no
Phone: +47 22 72 48 60. Telefax: +47 22 72 48 61.

GETTING STARTED

Always power up the TP2101system before starting the TP2101 software!

When you have finish the installation you can run the software immediately.
Enter username=TEST and password=PRO the first time. (see ch.3 System control & login)

You will see all the main TP2101 programs as shortcuts on the desktop. In addition you can find the same programs under the Programgroup TP2101 testsystem – WIN98, TP2101 testsystem - WIN2000 or TP2101 testsystem - WIN PCI under the windows programs menu.

Although the most commonly daily used software like the Test program usually are operated using shortcuts and function keys, many operations are more convenient and easy by using the mouse.

Using common toolbars, menu, and keyboard shortcuts

TP2101's toolbars, located at the top in the main window, provide quick access to frequently used operations and commands. They are duplicated in the drop down menus.


TP2101 program manager

Active test: Test1

Tp2101 system manager   Currently loaded testprogram
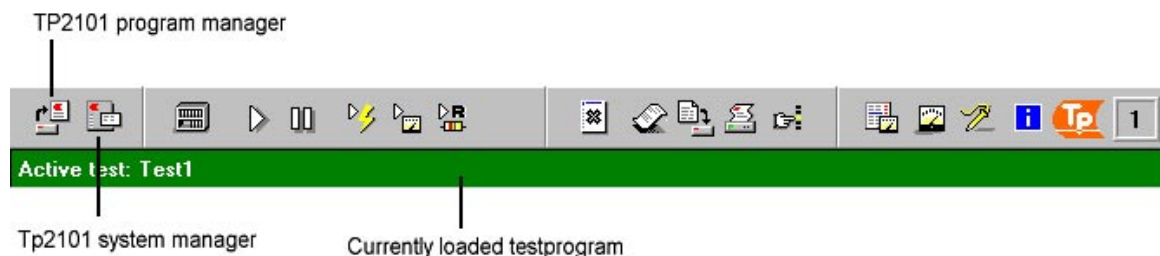
Open test program   Start TP210 program manager

Save test program

Open parameter window

Short detection test

Continuity and analog measurement test

Scanner card configuration check

Pen (short) detection program

Testprogram net list information window

These symbols are common throughout all TP2101 programs.

Hardware configuration parameters

If you try to start the software without the TP2101 hardware connected or powered on, you will get an error message. See Hardware manual - chapter 4 for more details on HW status.
Enable "Demo mode" option if no hardware is available or connected.
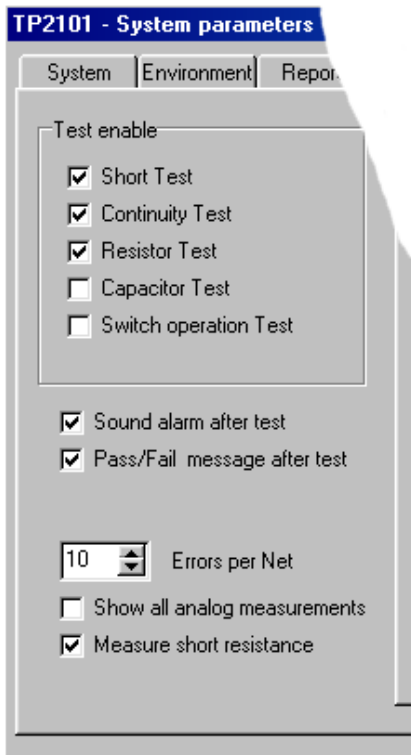
You will also have an error message if the software is not configured as the equipped hardware:

Click on the TP2101 System Parameter button at the left side of the Toolbar menu in f.ex. the Self learn program

Check that the number of controllers corresponds to the physical number of controller cards in your TP2101 control section.

Usually all other system parameter should be unchanged. For more details see chapter 15 – TP2101 Parameters dialog.

Using the Demo mode option

The software may be run for demonstration without any hardware connected. It is in fact possible to simulate all testprograms in selflearn and test The only requirement is that a textformat version of the testprogram files exists. To convert the testdata to text, start the TP2101 file handler, go to menu option [File], and select option [Export test program to text format]. Afterwards just select the testprogram in the normal way and start for example selflearn or test.

SYSTEM CONTROL AND LOGIN

The TP2101 system control program is supervising the userstatus and the teststation connection for all running TP2101 programs.
The TP2101 system controller is started by the first TP2101 program executed.
User must log in with a valid username and password. Users are defined as Operators or System operators.

 First time login after installation is done by **Username=test** and **Password=pro**.
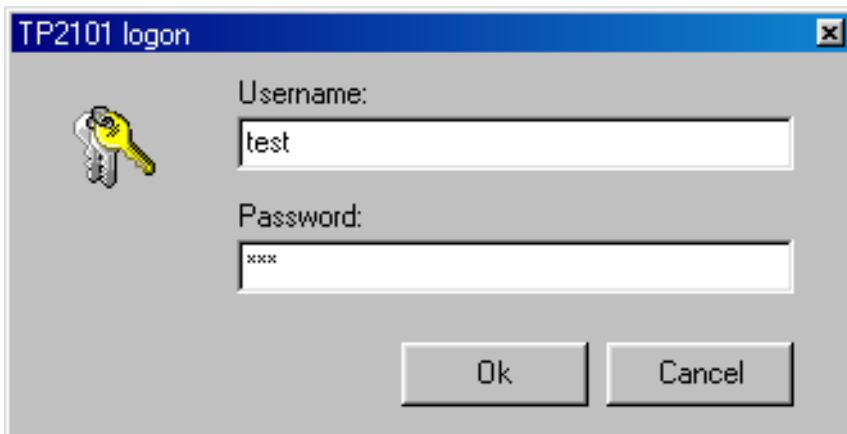
If Username and password are accepted, the TP2101 System control will appear as a windows tray icon and the tester software is starting.
Only System operators are allowed to change system and testprogram settings.
The system/user status may be checked any time by double clicking on the TP2101 tray icon.
Press the Hide button or X key to put the program back onto the systemtray.

To change user, press the change button or F2 key. Press Change password button to change password for the current user.
System operators can also add and delete users by pressing the Administration button.

Pressing Log Off (F1), will log off any user. Press Close button to terminate TP2101 system control program.

All currently running TP2101 software will also terminate.
NOTE: Windows will not be able to shut down as long as the TP2101 system control program is running. Log off TP2101 before shutting down Windows system.

Click the right mousebutton on the TP2101 tray icon to bring up a popup menu with the most used TP2101 programs.
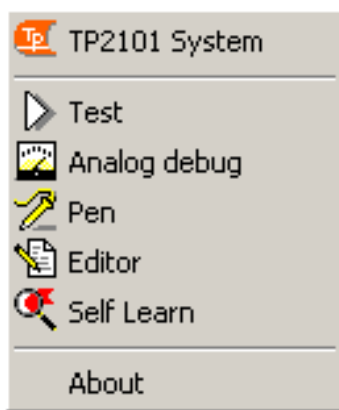
Test station selection

The TP2101 can be equipped with an optional switching card which enables the controller section to connect to up to three separate test stations.
The teststation page of the TP2101 system control displays the status of currently selected station.
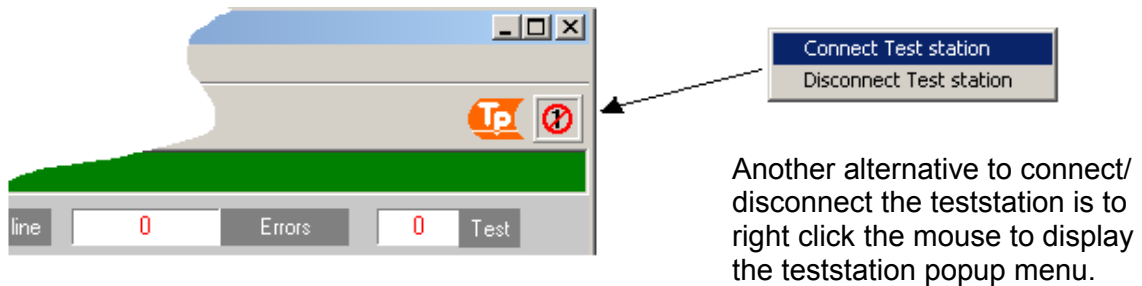The selected station may be connected/disconnected any time by the two appropriate buttons.
The green blinking light indicates when the teststation is connected/powered up.

The software usually selects and switches in the correct test station automatically when a testprogram is loaded . This station number is saved together with the testprogram parameter data.
However, the first time after operator login, the teststation is not powered up. In addition to the above window in the TP2101 system control, the status of the teststation can usually be seen in the upper right corner of the active TP2101 program window.

Another alternative to connect/ disconnect the teststation is to right click the mouse to display the teststation popup menu.

The third alternative to control the teststation selection is to enter the TP2101 system parameter window and go to the Test station page. In addition to connect/disconnecting the current test station, this is the only place where it is possible to select another teststation number. The new station number will automatically be connected the next time this testprogram is loaded.
(See TP2101 Parameters dialog – Test station)

TEST

This is the main test software, which runs and monitors all tests.
The test report window are continuously updated with easy to read test results during test-execution.

A normal automatic test consists of three standard tests:

1. A very fast **short detection test** which scans all pins in system against each other. Insulation between nets is selectable from test parameter window.
2. **Continuity test** which measures resistance between all pins in the nets and checks that the value are equal or below selected continuity limit.
3. **Resistor test** that measures that all Resistors/Diodes are within the set tolerance.

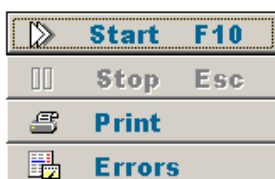In addition there are some optional tests which may be enabled:
Capacitor test that measures that all Capacitors are within the set tolerance.
Switch test usually measuring manually operated plugs and switches
**Capacitor check test** for checking large capacitors.
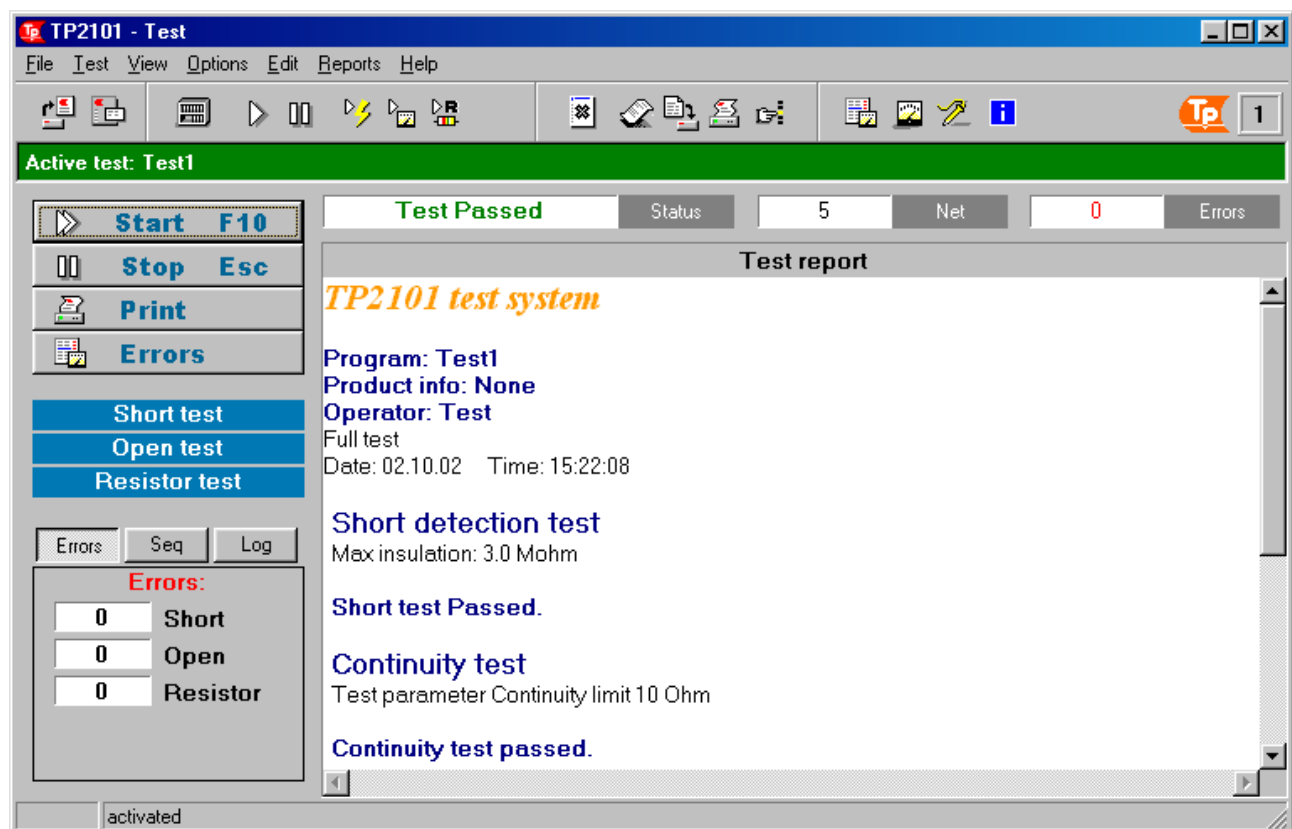
Main commands buttons

The main test command window includes the most often used operator commands such as start a full test, print test result and measure faults for diagnostics. Buttons are easy selected with up/down keys or function key. Test can be aborted at any time by pressing the ESC key. ESC key will also return focus to the main buttons.
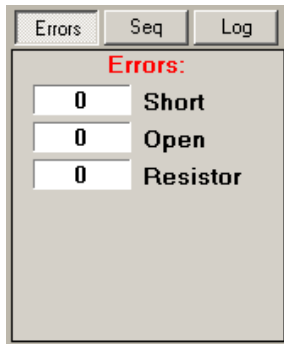Press Exit to close the Test.

Active test progression status

| Short test |
| Open test |
| Resistor test |
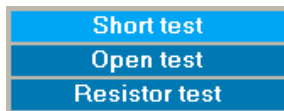
The active test status window shows which test are enabled and also which test is currently running.

Grey: test not enabled
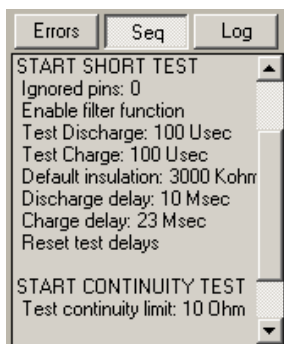Blue: test enabled but inactive
Bright blue: test running

Last test error counters

Errors	Seq	Log
Errors:		
0	Short	
0	Open	
0	Resistor	

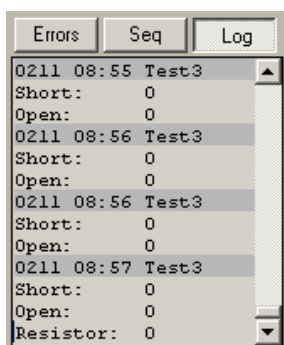The error counter shows the number of errors found during test.
A summary of the total errors from the last executed tests is also shown in the *"Total Error counter"* in the upper right corner of the main testscreen. (See picture on page 1)

Sequence

| Errors | Seq | Log |

START SHORT TEST
Ignored pins: 0
Enable filter function
Test Discharge: 100 Usec
Test Charge: 100 Usec
Default insulation: 3000 Kohm
Discharge delay: 10 Msec
Charge delay: 23 Msec
Reset test delays

START CONTINUITY TEST
Test continuity limit: 10 Ohm

The sequence window displays the hardware system commands executed during the last test execution.

Log

| Errors | Seq | Log |

0211 08:55 Test3
Short: 0
Open: 0
0211 08:56 Test3
Short: 0
Open: 0
0211 08:56 Test3
Short: 0
Open: 0
0211 08:57 Test3
Short: 0
Open: 0
Resistor: 0

The log window list a history with the date/time, testname and testresults. It stores the individual testround results with filedate, testname and serialnumber if enabled. For detailed testresults, open the report browser and look for the reportname with the same datetime stamp and testname or serialnumber dependant on the settings in the Systemparameter – reports page.

Menu   Commands   Shortcut

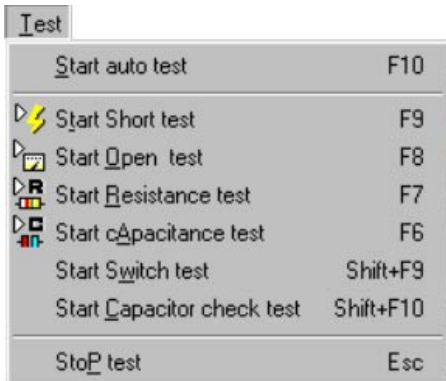| File |
| Open test F3 |
| Close test |
| Exit |
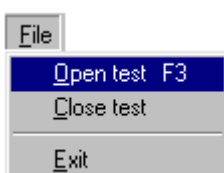
File

Open test
Starts the TP2101 test program file handler for loading a test program. The green status line at the top will always show loaded program name. See Chapter 8 - TP2101 filemanager.

Close test
Close currently loaded test.

Test

Start auto test
Runs all enabled tests (Go-no-go)

Start short test
Runs only the short detection test

Start open test
Runs only the analog open test

Start resistance test
Runs only the analog resistor test

Start capacitance test
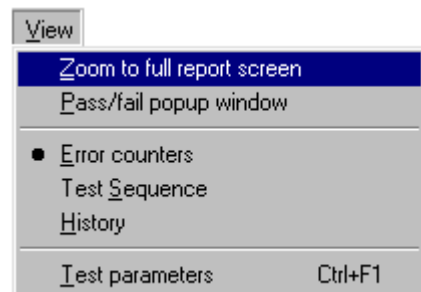Runs only the analog capacitance test

Start switch test
Runs only the switch test

Start capacitor check test
Runs only the capacitor check test. This test is a charging test for testing electrolytic capacitors.

Stop test
Aborts current test. Pressing the ESC key will do the same.

View

Zoom to full report screen
Zoom up the Test report window to fit the entire screen. Usable with small monitors.

Pass/fail popup window
Enable a Pass/fail popup window on screen after a full test.

Error counters
Display total error counters for each test

Test sequence
Display hardware system commands during last test run.

History log
Display testresult history with date/time, testname.

Test parameters
Enter the Test parameter setting page

Options

Check card configuration
Runs a check of on all connected Scannercards and reports if the card type and position is correct according to the test program. Test is not allowed if check is failing.

Analog debug measure
Starts the analog debug program. See Chapter 6.

Pen detection
Starts the pen detection program. See Chapter 10.

Error measuring utility
Starts the error measure utility program.
See Chapter 7.

Net capacitance utility program
For detecting capacitance between nets. Used for setting correct charge/discharge delays.

Net information summary
Displays a sorted summary of net numbers and net size from the loaded test program

Edit

Edit Net – Resistor – Capacitor test programs
Start the TP2101 editor.

Edit Switch test program
Open text editor for editing switch test.

Edit Capacitor check program
Open text editor for editing capacitor check test.

Capacitor check utility program
Start Capacitor check utility (See Chapter 22).

Edit Pin labels
Start pin name editor.

Reports

Save test report
Save current test result on screen to file. It will be named LAST.REP and saved under the TP2101 Report directory.

Save test report as
Save current testresult to file chosen by operator.

Load test report
Load report file named LAST.REP into the Test report window.

Printer report format setup
Setup printing format.

Print test report
Send content of test report window to printer.

Search and mark
Search and mark found text in test report.

Find next

Find next occurrence of text in test report.

Reset current test report text

Remove text marking after search.

Save test report as plain text
Content of test report window will be saved to file as plain text.

Save test report as rich text
Content of test report window will be saved to file as rich text.

Clear test results
Clear all error counters and test report window.
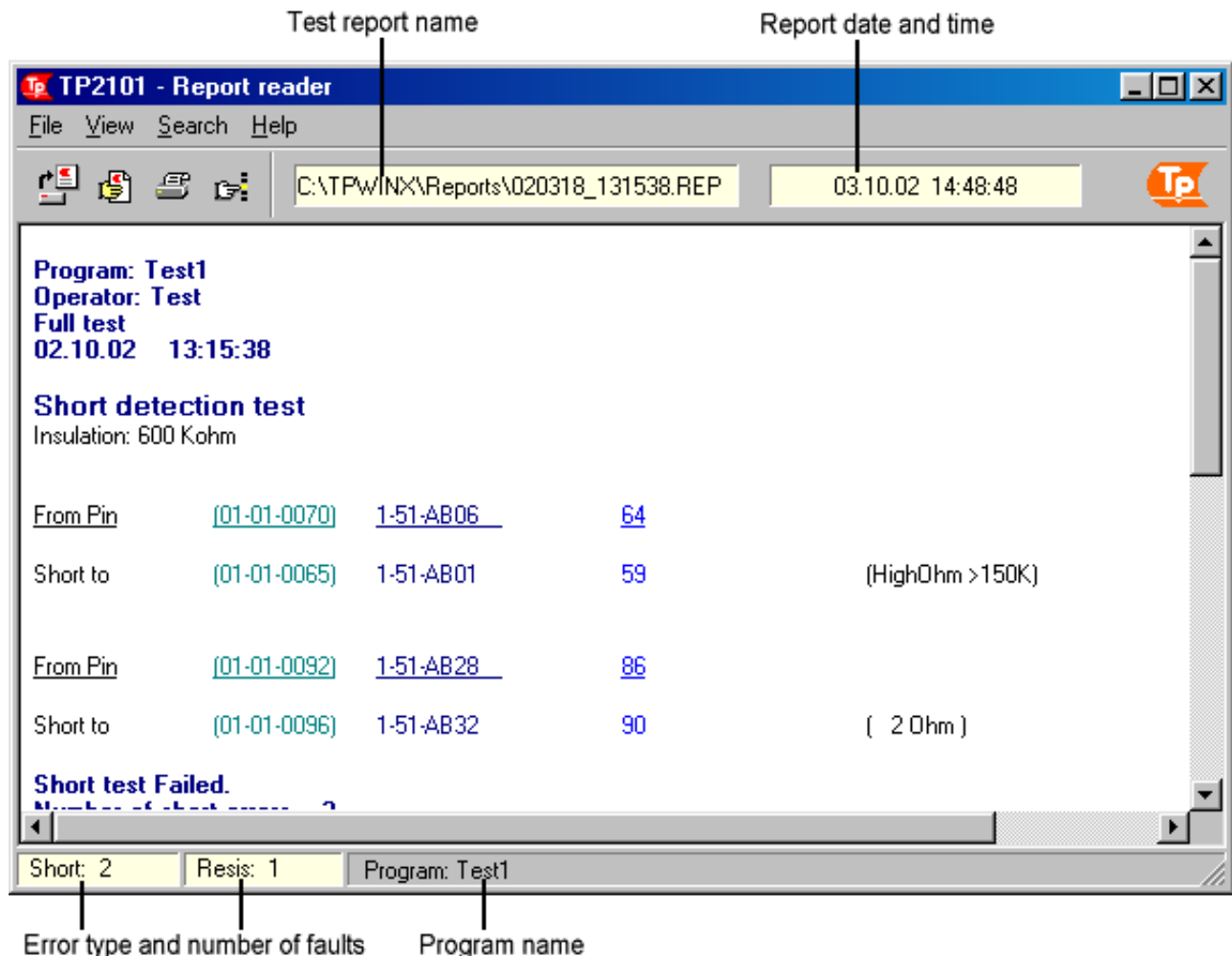
Clear test history
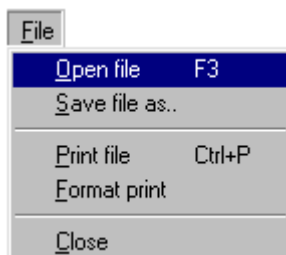Clear test history page.

TEST REPORT BROWSER

This browser is used for loading and viewing previous saved test reports and other TP2101 system text files.
It will display the text in the same format as the saved, usually as Rich text.
It displays test report filename and date and the bottom status line shows type of, and number of errors.

Test report name   Report date and time

Tp TP2101 - Report reader

File   View   Search   Help

C:\TPWINX\Reports\020318_131538.REP   03.10.02 14:48:48

```
Program: Test1
Operator: Test
Full test
02.10.02    13:15:38

Short detection test
Insulation: 600 Kohm


From Pin        (01-01-0070)    1-51-AB06        64

Short to        (01-01-0065)    1-51-AB01        59              (HighOhm >150K)


From Pin        (01-01-0092)    1-51-AB28        86

Short to        (01-01-0096)    1-51-AB32        90              (  2 Ohm )

Short test Failed.
```

Short: 2 | Resis: 1 | Program: Test1

Error type and number of faults   Program name

Menu	Commands	Shortcut

File

Open file
Open a text file from disk into the Test report browser for viewing

Save file as
Saves the current loaded file to a chosen filename/ directory.

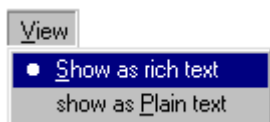*Print file*
Send loaded file to printer.

Format print
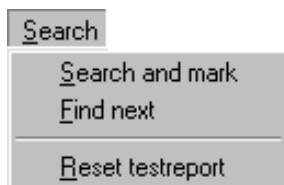Printer selection and setup.

Close
Exit test report browser

File
- Open file   F3
- Save file as..
- Print file   Ctrl+P
- Format print
- Close

View

Show a rich text
Display test report as Rich text. The report must exist as Rich text.

Show as plain text
Display the test report as plain text.

Search

Search and mark
Search for and highlight text.

Find again
Repeat search and mark.

Reset testreport
Remove highlighting.

ANALOG DEBUG

The Analog Debugger allows interactive testing in a very easy way. This is very useful for checking the individual errors found after test. Resistance and Capacitance can be measured between any two pins in the system. The measurement will run continuously like a multimeter. The debugger has a pull down list of all previous used measurements for easy access.
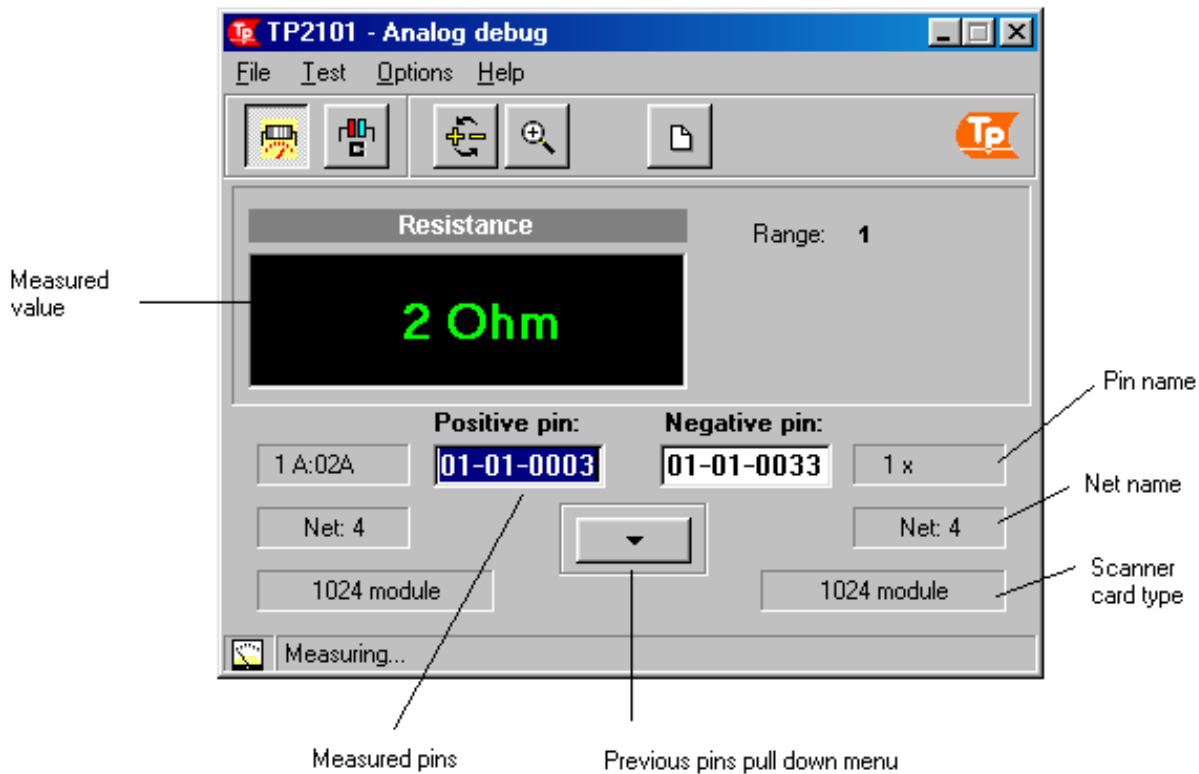
Just enter the two pins you want to measure between and press the resistance or capacitance button. Pressing the button a second time or ESC key stops the measurement

Menu	Commands	Shortcut
	Test	
	Resistance Start resistance measurements on selected pins	
	Capacitance Start capacitance measurements on selected pins	
	Reverse pins Turn positive and negative pins over	

Options

Options	
Zoom in/out measurement	F12
Show used pins	F3
Close used pins	F4
Clear Used Pins	Ctrl+F4
System parameters	Ctrl+F1
Close all Relays	
✔ Open all relays	
Close discharge resistor	

Options

Zoom in/out measurements
Displays the measured result in large figures. This is handy if the operator is fault finding on the test object from a distance

Show used pins
Pull down previous used measurements

Close used pins
Close previous used measurements

Clear used pins

Clear previous used measurements

System parameters
Enter system parameter pages

Close all relays
Closes all optional equipped scannercard relays:
testpins shorted.

Open all relays
Open all optional scannercard relays:
testpins open

Close discharge resistor
Closes all optional scannercard discharge relays:
testpins shorted with a discharge resistor (12 ohm)

ERROR MEASURE UTILITY

The Error measure utility program is used for finding and diagnoses errors after test. It presents all errors from a test report in a list format sorted on Short, Open, Resistor and Capacitor failures. Any previous existing test report can also be loaded into the Error utility. Any combination of single pins or group of pins from the lists can be set up by a single keystroke for measuring. The utility is started from the testpage.
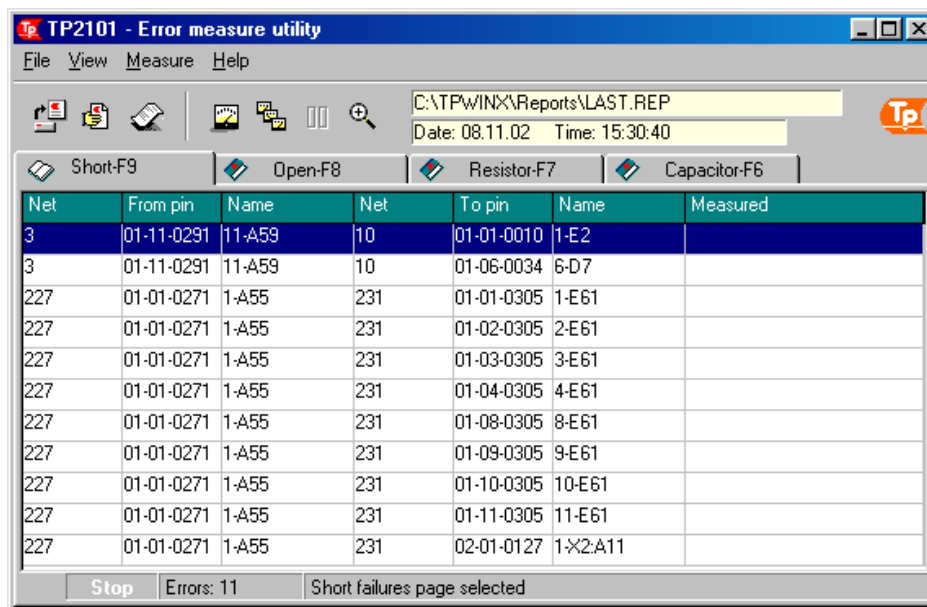
Select error type
Select error types by clicking on the Page Tab of respected error type or press the displayed function key.
The book icon on the Tab indicates if any error of this type is found in the current test report.
The error list consists of a Net number, a pin pair with its pin labels and two fields for the expected and the actual measured value in Ohm.
Short error measurements normally will be shown as 0 Ohm. The correct and expected value is open (----- Kohm).
Open error measurements normally will be shown as open (---- Kohm). The correct and expected value is 0 Ohm.
The Resistor and Capacitor error measurements is displayed according to the expected value defined in the test program

Select pins to measure
Select pins by clicking on the error list. Hold the mouse button down to select a range of pins.
Press button or F10 to start measuring or F9 to measure all pins visible on error page.
Changing Tabs will stop all measurements going on. Clicking on the error list will do the same.

The Pass/Fail window at the bottom status line displays at all time the status of the measurements going on: One failure or more will be shown as a red fail label. If all measurements are correct, a green Pass label will be shown.
The number of errors is presented also on this line.

File

Load last test report
Present error measurements from last test report

Load test report
Load any previous saved test report and present error measurements

View

Short error list
Select Short error measurement page

Open error list
Select Open error measurement page

Resistance error list
Select Resistor error measurement page

Capacitance error list
Select Capacitor error measurement page

Zoom up/down measurements result
Display result in big/small letters

Browse test report source
Look at the actual test report text using the Testreport browser.

Measure

Single select measurement
Start a measurement between selected pair of pins

Range select measurement
Start measurements between all pair of pins visible on selected error page.

Halt all measurements
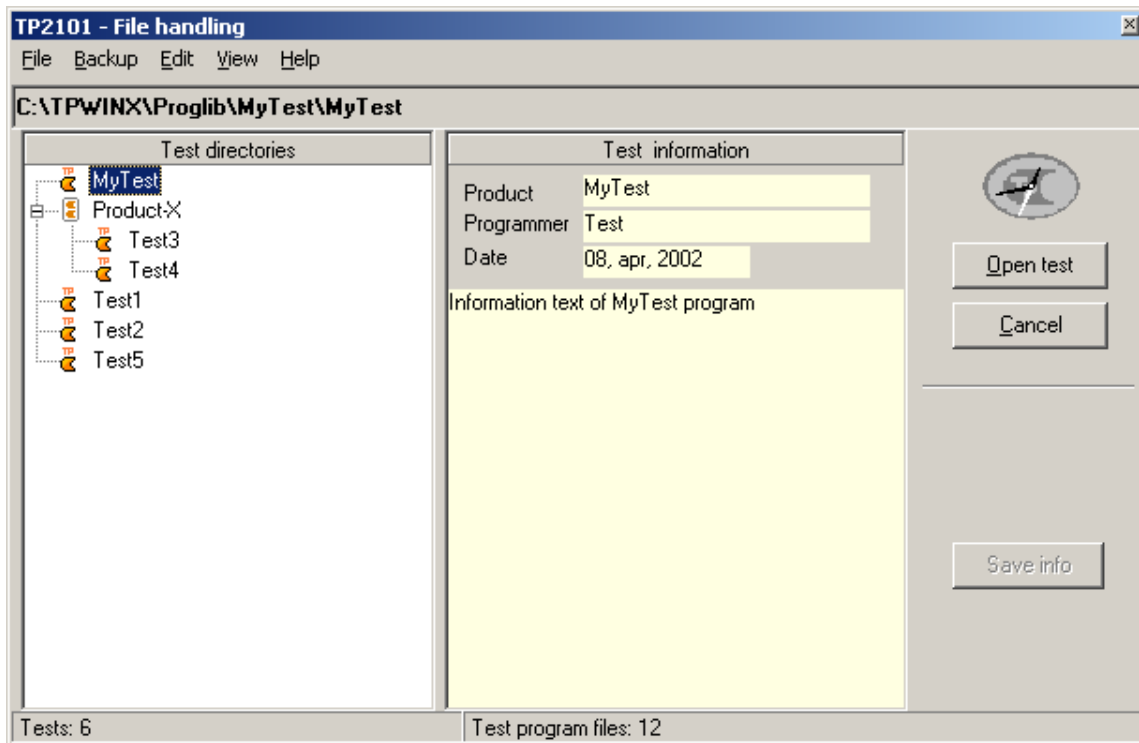Stop all measurements.

FILE MANAGER

The File Manager dialog is usually available from all main TP2101 programs. Its main tasks are loading test programs.
Deleting and creating new empty test programs or make new copies of old test programs are also done in this window.
The File Manager icon is always found at the left side of the topmost toolbar.

Test Directory window
The file manager always opens in the system defined TP2101 program library. It is based on the familiar Windows collapsable/expandable directory tree structure.
Principally every test is located in separate directories under the Program library directory.
The test directories are normally and by default named the same as the actual test files.
One or more test directories can also be organized under a product group. This is symbolized by the tree icons.
Select test directory and press the Open test button to load a new test.

Test file window
This optional window lists all test program files under the selected test directory. Usually one test exists. This window is normally hidden.

Test Information window
This window may store information about the selected test program and test object. There is a split bar between the Test file window and the test Information window for resizing the two windows.
Press the "Save Info" button to save all changes in the info window.

File

New empty directory and test program
Creates a new test directory with complete set of test program files.

New copy of test program
Copies all test files from currently loaded test program into a new directory/test name.

Open test program
Load test program. All TP2101 software started will use data from this test files.

Close test program
Close current test program (No test available)

Export testprogram to textfile format
Write card configuration, net,resistor and capacitor testprogram data to textfile format using the defined TP2101 textformat syntax.
(see appendix C)

Import testprogram from textfile format
Read card- net- resistor- and capacitor- testdata from textfile formats into TP2101 testprogram data structure. Textfile must conform to the TP2101 textformat structure and syntax.
(see appendix C)

Import TP2101 MS-dos testprogram
Transfers selected TP2101 MS-dos test program into TP2101 Windows test format.
This is an option for existing TP2101 users who have test programs made with the old TP2101 Dos software. The old selected test files will be copied into a new created test directory located under the TPWIN program library. Necessary recompilations of the old test files are done automatically.

Import TP210 msdos system setup
For users of TP2101 Msdos software converting to TP2101 windows versions.
Reads TP2101 Msdos system settings and updates the TP2101 windows version.
These system setup items are updated:
- Number of Controllers
- Number of Test station
- All cardtypes definitions
- All cardtype relayscards definitions

System scanner card definitions in windows must be identical to the DOS definitions for the imported testprogram to work properly: Pinsize/module number, identity and the position of the cardtypes in the cardtype list must be the same.

The File menu shown in the image contains:

File
- New empty Directory and test program
- New Copy of test program
- Open test program   F3
- Close test program
- Export testprogram to textfile format
- Import testprogram from textfile format
- Import TP2101 Msdos testprogram
- Import Msdos TP2101 system setup
- Exit   Esc

Backup

Save testprogram to backup archive
Compress all testfiles in selected testprogram and save to TP2101 backup directory. Backup file is named with the same testprogramname with extension *.TPZ

Restore testprogram from backup archive
Unpack selected backup file and restore all files to original testprogram directory.

Edit

Make new Test program group
Create a new product group (No testfiles created)

Delete program group directory
Removes product group. No test programs must exist.

Delete test program
Removes test program directory and testfiles

Edit test information
Edit testinformation window. Press Save button to accept changes.

View

Refresh
Update Test directory window tree
Display complete list of testprograms
Expand testprogram list. Test under Product groups shown.
Hide all testprograms under Product groups
Collapse testprogram list. Only Product groups shown.

Show all testprogram files
Display all test files for selected test directory

SELFLEARN

New test programs for the TP2101 can be made in Selflearn. Selflearn will scan the connected test object automatically and make all the necessary test files. After completion you will have one test file describing the nets and one file for all the Resistors/diodes. Capacitors must be programmed manually.
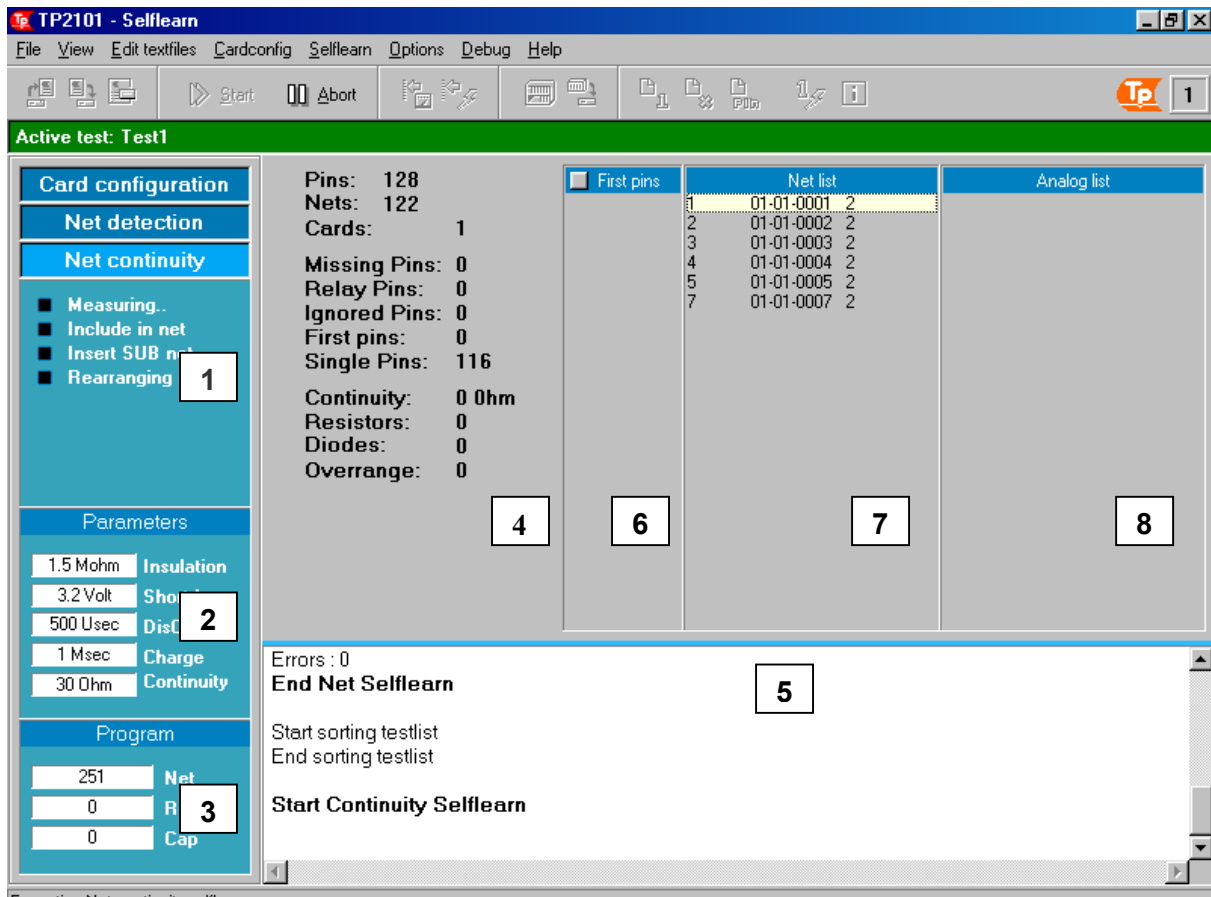
Selflearn progression window (1)
This window will show which sequence is enabled and running at the moment.
Greyed : Disabled
White : Enabled
Yellow : Running

Normal Selflearn sequence is first a very fast scan of all the test points in the system. System will learn how the test points are organised in nets.
The second sequence is investigating how the connections are internally in the nets by measuring all test points in the net against each other. Parameter settings by the operator will decide if a net connection is defined as a short connection or a resistor.
At last a resistance measurement will be run on all connections defined as Resistor.

Test parameter window (2)
This window shows the most important parameter settings when making a Selflearn. See chapter 15, System Parameters for more details.

Test program file size window (3)
During Selflearn and after a "load test program", the NET-field shows the program size of the Net list test file.
The RES-field shows program size of the Resistance test file.
Since it is not possible to Selflearn Capacitors, the CAP- field is only showing the size of the currently loaded Capacitance test file.

Selflearn status window (4)
This window shows details from the currently executing Selflearn.
Pins: Total number of test pins in system is calculated from the connected Scannercards.
Nets: Increments every time a new net is found.
Cards: Number of Scannercards connected.
Missing pins: Remaining system pins not detected in the Net detection scan sequence. This may indicate a problem that has to be investigated more closely.
Relay pins: Number of pins used for connecting shorting relays on the scannercards.
Ignored pins: Number of pins listed in the Ignore pin text file. A list of these pins are shown i the Ignore pin window.   See Menu commands for reading and editing the ignore pins
First pins: Number of pins listed in the First pin text file. A list of these pins are shown in the First pin window. See Menu commands for reading and editing the first pins
Single pins: Shows the number of single pins (net size =1) for the currently running net detection Selflearn.
Resistors: Shows the number of program defined and detected resistors for the currently running resistance Selflearn.
Diodes: Shows number of diodes found during resistance selflearn.
Overrange: Shows the number of resistance overrange measurements after Selflearn resistor Selflearn.
               Overrange normally indicates an unstable net detection status. This is often caused by inadequate charge/discharge delays when capacitance is involved in the nets.

Selflearn report window (5)
Text report file for the last executed Selflearn. May be stored or sent to a printer.

First pin window (6)
Displays the pins stored in the first pin text file belonging to the loaded test program. See Menu commands for editing the first pin file. Nets belonging to pins stored in the first pin file are scanned first.

Ignore list window
Displays the pins stored in the ignore pin text file belonging to the loaded test program. See Menu commands for editing the ignore pin file.

Net list window (7)
Shows information about the nets (larger than 1 pin) detected during the currently running net detection Selflearn:
Given net number, the main source pin (first detected pin in net) and net size.

Analog list window (8)
Shows information about detected resistors during currently running resistance Selflearn:
Net number, positive and negative pin and measured resistance value.

Menu	Commands	Shortcut
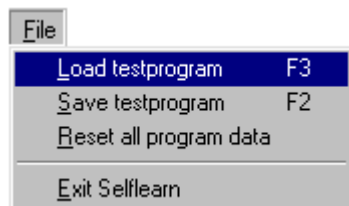
File

Load test program
Load a new empty or old test program into the
Selflearn software.

Save test program
Save current Selflearn data to file. Saves all test files to
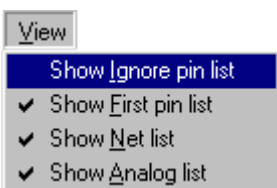the harddisc with identical filename and appropriate file
extensions.

Reset all program data
Resets all test data to the default empty program state.

Exit Selflearn
Exit and close Selflearn

View

Show ignore pin list
Toggle display of ignore pin list window on/off

Show first pin list
Toggle display of first pin list window on/off

Show net list
Toggle display of net list window on/off

Show analog list
Toggle display of analog list window on/off
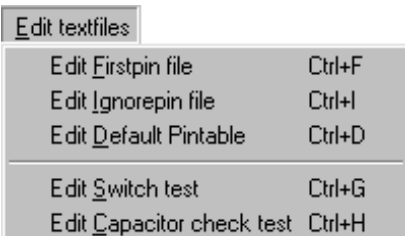
Edit textfiles

Edit firstpin file
Loads the first pin text file into the Windows Notepad
for editing.

Edit Ignorepin file
Loads the Ignore pin text file into the Windows
Notepad for editing.

Edit default pintable
Loads the Default pin table text file into the Windows
Notepad for editing.

Edit switch test
Edit the test for testing switches.

Edit capacitor check test
Edit the test for big capacitors (Charging test).
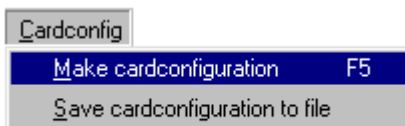
Card configuration

Make card configuration
Scan the Scannercard bus of all controllers for
connected Scannercards. See chapter 12

Save card configuration to file
Save detected scanner configuration to file. All
Scannercard communication will be checked against
these data when using this test program.

Menu	Commands	Shortcut

Selflearn

Start Automode selflearn
Start and run a complete selflearn sequence.

Start Short selflearn
Start a single net detection selflearn sequence

Start Continuity selflearn
Start a single net continuity selflearn sequence. Only possible after a successful Short net selflearn.

Options

Set Selflearn parameters
Enter the Selflearn page of the system parameters.

Set Continuity level
Set definition of highest allowed internal net continuity in Ohm. Used during Selflearn continuity sequence. If measured value is above set level, system will insert connection as a resistor. See page 5

Set short insulation level
Gives system hardware information of level of insulation between nets and necessary charge and discharge delays. See chapter 14 for details

Net information summary
Displays a general information window of net numbers and its net sizes of the current loaded program.

First pin wizard tool
May be used after an initial first Selflearn run to improve the net detection quality.

Net capacitance utility program
Program for detecting capacitance between different nets. Used for calculating necessary delays used in insulation test.

List undetected pins
Show systempins not detected after selflearn. Also lists pins in ignore text file.

Edit pin names editor
Start the TP2101 pin name editor utility program.

Debug

Analog Debug
Start the analog debug program

Pen
Start the Pen detection program

Set continuity level dialog

This dialog displays the current continuity threshold level. This parameter is stored with the test programs and defines the ohmic threshold when pins in a net are passed/failed as connected during the Continuity test.
Level can be set from 0 Ohm to 99 Ohm. Since the measure path include the test object, connectors, switching and cables, setting level too low will make the test result unstable. On the other hand, setting a too high level can result in failures like bad connection and soldering not being found in test.
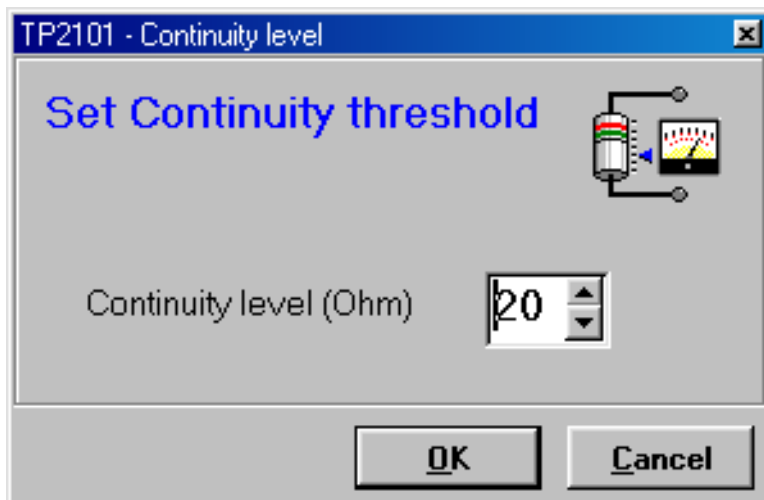
PEN DETECTION

The pen option program allows the operators to interactive identify nets or pins in the test object. It is operating on the same principal as the fast short detection test, continuously scanning all system pins.

The pin scanning will restart every time the pen probe is lifted and then connected to a pin. The last detected pins will then remain on screen until changes are detected in the list. The list may be printed or saved to a selectable filename.

The scanning can be toggled on off by button /menu commands.

In addition the Pen has some options for assisting the making of pin labels.
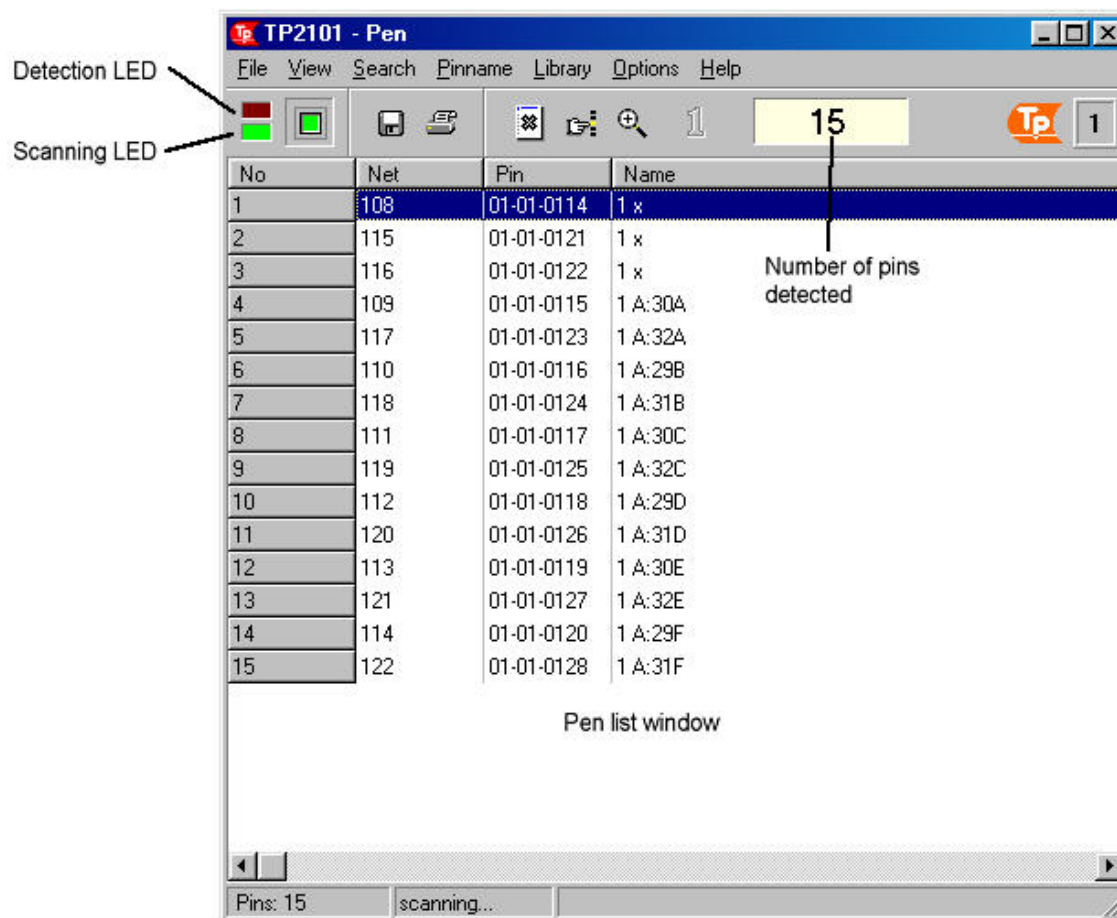
Pen list window

Detection LED
If hardware is detecting pins this light is red.

Scanning LED
If hardware is active scanning for pins this light is green. Pushing the scan button will toggle this on/off.

Pen list window
All pins detected will be listed here sorted on TP2101 system pin number with net numbers and pin names which are found from the program files.
All the three columns are sizeable.

Number of pins detected
This window shows the number of detected pins after the last probe connection.

Menu	Commands	Shortcut

File

Save pen list
Save last detected pins to default filename (LAST.PEN)

Save pen list as
Save last detected pins to textfile with a selected filename.

Open pen list
Open a previous pin detection textfile in WordPad.

Print pen list
Print the pen list.

Exit
Exit and close Pen.

View

Clear pen
Clear pen list window.

Load complete pen list
Load all detected pin into pen list scrolling down the list will have the same effect.

Sort on list number
Sort the pen list on the original list number

Sort on net number
Sort the pen list on the Net number

Sort on pin number
Sort the pen list on the pin number

Sort on pin name
Sort the pen list on the pin label

Search

Find net number
Search for net number in pen list.

Find pin number
Search for pin number in pen list.

Find pin name
Search for pin name in pen list.

Alarm on detection
Sound alarm then net number, pin number or pin name are detected.

Pinname

Show pin name generator

Display the pin name generator popup window. (see page 4)

Edit penlist names

Set the name column in edit mode. The user may edit single pin names manually.

Save penlist names

Writes current pin names in pen list to file.

Pin name editor program
Start the TP2101 pin name editor program
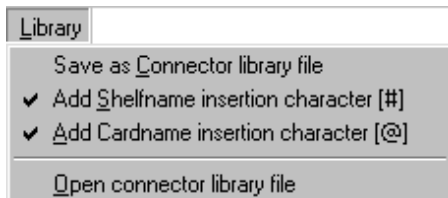
Library

Save as connector library file

Write current pen list to selected library textfile

Add shelfname insertion character [#]

When "saving as Connector library file", character [#] is added infront of all pinnames. This character may be used for automatic insertion of shelf names during pinname library import. See chapter 17.

Add cardname insertion character [@]

When "saving as Connector library file", character [@] is added infront of all pinnames. This character may be used for automatic insertion of card names during pinname library import. See chapter 17.

Open connector library file

Load selected library file into a texteditor
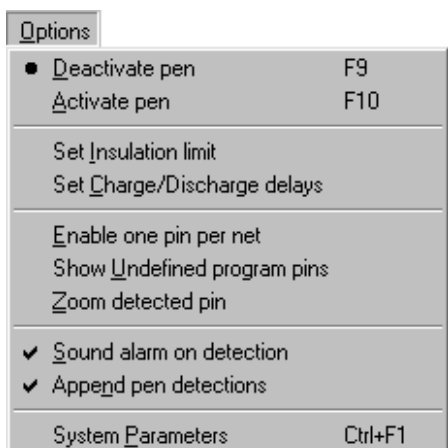
Options

Deactivate pen
Toggle off pen scanning mode.

Activate pen
Toggle on pen scanning mode

Set Insulation limit
Set level of insulation between nets. (See page 5)

Set charge/discharge delays

Set Charge/discharge delays (See page 6)

Enable one pin per net
Toggles one pin per net on/off. If enabled the hardware will return all nets represented by the first pin in the respective net.

Show undefined program pins
In cases when test program are made from CAD data, some system pins may not be used and are therefore not present in the test program. This function enables the user to see these undefined pins in the list.

Zoom detected pin
Zoom up to full screen for first pin in detection list.

Sound alarm on detection
Toggles sound alarm on/off when connecting the probe to a new pin or net.
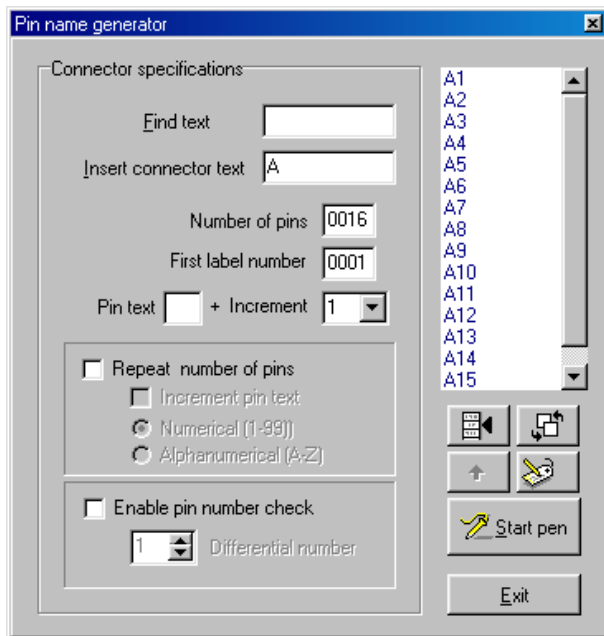
Append pen detections
Enable this function to store all detection to screen in the same sequence as probed. The Pen list window will not clear. This function is often used to map how the system is connected to a connector in the test

object.

System parameters
Enter the Pen parameter page in the system
parameters.

Pin name generator

Use this menu for changing pin names of the listed pins according to available editorial rules:

Insert
Automatically inserts new pin name text from selected list position and downwards.

Insert text	Connector name to be inserted .
Number of pins	Number of pins to be changed. Usually the size of the connector.
First label number	First connector number to be inserted
Increment	Number by which label number is multiplied. (2 =A-2, A-4, A-6, A-8….)
Repeat number number	Last valid label number. Connector number restarts from first label

Edit
Set the pin name column in editor mode. Change any pin name text manually by typing
 the new text.

Replace
Automatically searches and replaces pin names or part of pin names with selected text

Insert text	New connector text to be inserted .
Find text	Connector text to search and replace.

Start pen
Used to map and make pin names of a connector position on a testobject.

Set up the parameters below and press Start Pen button. Probe the connector pins in the correct sequence. (Usually 1,2,3,4,5…) Sequence is automatically ended when last pin number is detected: Number of pins.

Insert text   Connector name to be inserted .
Number of pins   Number of pins to be probe. Usually the size of the connector.
First label number   First connector number to be inserted
Increment   Number by which label number is multiplied.
                                    (2 =A-2, A-4, A-6, A-8….)

Repeat label number   Last valid label number. Connector number restarts from first label number
Increment connector text   Automatically change label connector name every time Number of pins is reached according to below setting.
Numerical   Update connector text from 0 and upwards.
Alphanumerical   Update connector text from A to Z.

Enable pin number check   Halts pin collection if last detected system pin number is not previous number + below number setting.
Differential number   Specify how connector layout is organized.

Note: see also chapter 19 Customizing pin names

Set insulation level

This dialog display the theoretical system insulation level used in the fast short detection test. This parameter is stored with the test programs and defines the maximum ohmic threshold when nets / test points are detected as shorted. The actual insulation level is determined by the Charge delay set in the Insulation Charge delay dialog . See chapter 14.
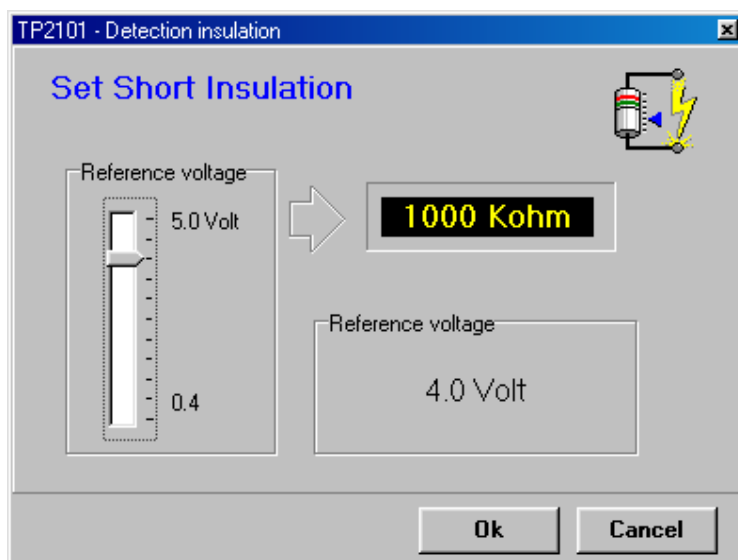

The reference voltage vertical slide bar adjusts the insulation level. As the name indicates it adjusts the voltage reference on the detection circuits on the scanner cards. The range is from 0.4 Volt to 5.0 Volt. The lower the voltage, the higher the insulation level. This results in a theoretical insulation range from approximately 600 Kohm to 19 Mohm.

Adjust the slide bar until desired insulation level is displayed in the black window. Press Ok button to write the new parameter to test parameter file.

It is important to understand that the real resulting insulation level is dependent on both the reference level voltage and the charge delay. Therefore the operator usually monitors and controls the actual test insulation through the Insulation charge delay dialog window. See chapter 14.

Set charge/discharge delays

This dialog displays the current charge and discharge delays used during pin detection.
If the pin detection is unstable due to capacitance in the UUT, increase the charge delay.
Discharge delay is not so important.
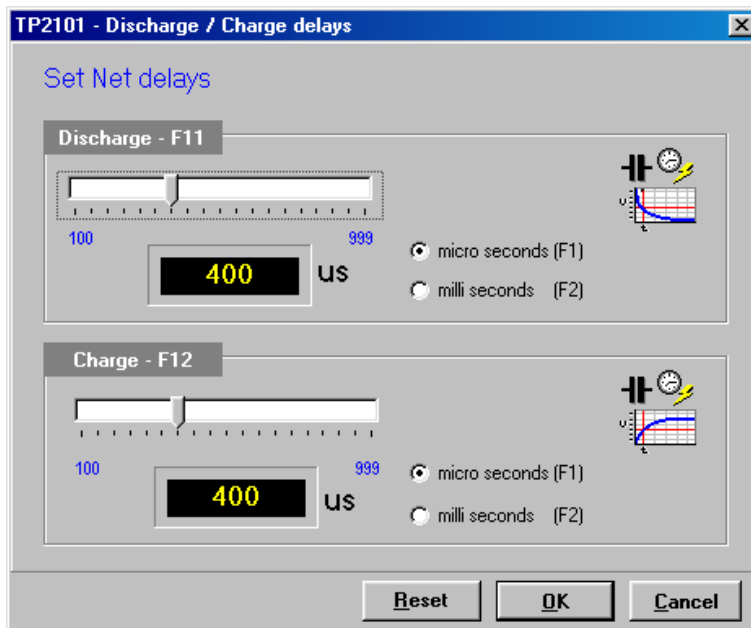
EDITOR

The editor makes it possible to look at and edit the test program. It consists of three separate editors:
1. Net editor
2. Resistor editor
3. Capacitor editor

Net Editor

In principal it is possible to create a test program by manually typing in all the Nets and pins in the Net editor. This is however a very time consuming method so the editor must be seen as a way to inspect and make changes and corrections to a test program made from Selflearn or CAD.
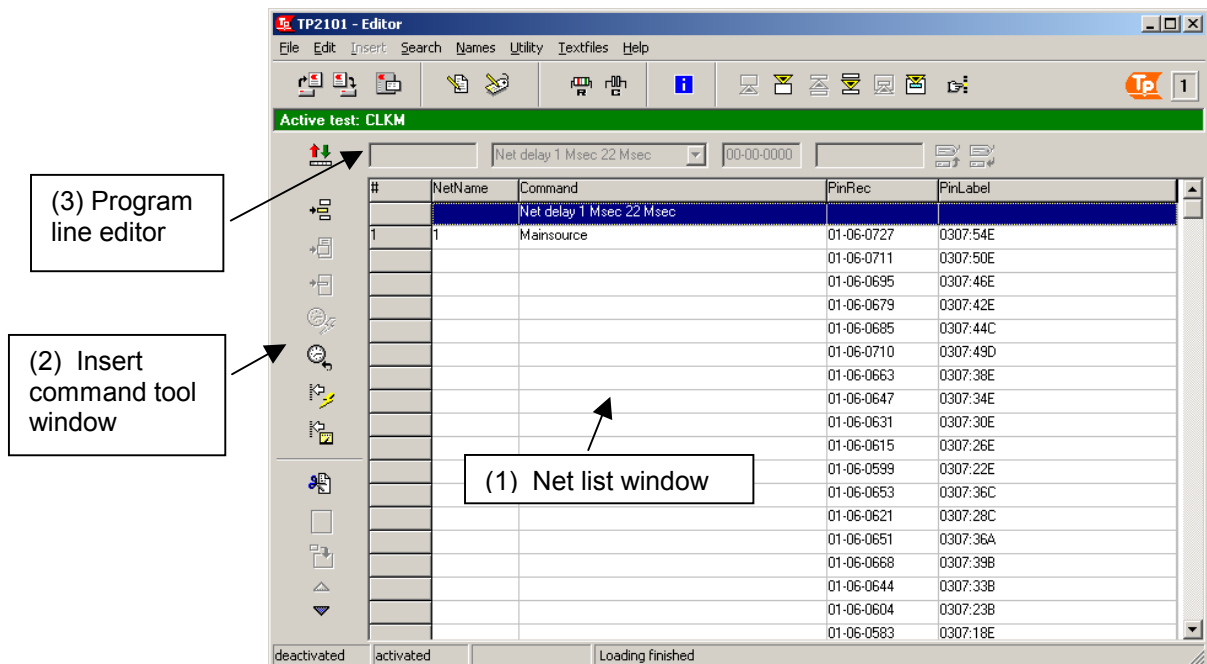
Net listing window (1)
This presents the Net data in 5 columns of a text. Changes are not allowed directly in the list, except when editing pin labels. Editing a program line are done in the edit fields just above the program listing window.
The numbers to the left are just program line numbers.
1. [#] column shows the net index number.
2. [NetName] column shows the actual Net name text stored in the net name file.(*.NNX)
3. [Command] column shows an optional net command. This can be a command definition of a pin or a command to the hardware system.
4. [PinRecord] column is the actual Tp2101 system pins in the different nets and with the user defined pin labels under the [Pinlabels] column.

Insert command tool window (2)
This vertical tool menu to the left has one button icon for each possible insert command. They are disabled as long as the editor is in read-only mode. If put in editor mode, the operator may insert nets, sub nets, pins or hardware commands into the program listing. (See commands/Edit for details)
A button icon command for deleting program lines is also available. All edit commands/icons are enabled/disabled automatically by the program software dependent on cursor position. Only the commands that are enabled in a specific position are allowed.

Program line editors (3)
These editor fields are editable when the Net Editor is in editor mode. Set cursor on the line you want to change and press the Change- button/command.
Dependant on the program line, the operator can edit/change these program line values.
- Netname editor: this net number can be from 1 to 999999.
- Command editor: use the pull down menu to select between possible commands
- Pin editor: edit pin within legal system pin limits (01-01-0001 to 10-32-2048)
- Pinlabel editor: write any text of up to 15 characters.

Bottom status line
The status line has four fields for information:
Line: Shows the current program line position of the cursor.
Net: Shows the net number position of the cursor.
Netsize: Shows the net size of the net.
Text: Shows current/last action of the editor.

Menu	Commands	Shortcut

File

Load complete test program F3
Save complete test program F2

load Resistance test editor F4
load Capacitance teste editor F5

reOpen complete test program

Save Testprogram to text file
Print test program Ctrl+P

Exit

Load complete test program
Load all test program files into the editor

Save complete test program
Compile and save all test program files to disc.

Load resistance test editor
Makes the Resistor editor visible.

Load capacitance test editor
Makes the Capacitor editor visible.

Reopen complete test program
Reload all test program files into the editor.

Save test program to text file
Send selected lines from net editor to a text format file

Print test program
Send selected lines from net list editor to printer

Edit

Editor mode enabled Ins

Change program line Ctrl+A
Delete program lines Del

Cut selected Pin number
Paste selected pin Number

Move net command Up one net
Move net command Down one net

Editor mode enabled
Toggle editor mode in/off. Button down makes the Net editor editable.

Change program line
Enables program column line editors for selected program line. Select a program line to update the net editor and disable the column editor. If possible, select from command editor pull down list appropriate command.

Delete program lines
Deletes selected net program lines.

Cut selected pin number
Cut selected pinnumber lines. See Paste command.

Paste selected pin number
Paste and insert above pinnumbers at selected program line position.

Move net command Up one net
Move net command up to previous net.

Move net command Down one net
Move net command down to net .

Insert

Insert mainsource pin and command
Inserts a new net and pin at cursor position. Default pin copied from cursor position.

Insert subsource pin and command
Inserts a new subnet and pin at cursor position. Default pin copied from cursor position.

Insert pin
Insert a new pin at cursor position. Default pin copied from cursor position.

Insert net delays
Insert new delay parameter command at cursor position. Starts the Insulation change delays dialog. See chapter 14.

Insert net normal delays

Insert delays according to testparameters.

Insert net reference level
Insert new insulation level command at cursor position. Starts the Short insulation dialog. See page 5.

Insert continuity threshold
Insert a new continuity threshold command at cursor position. Starts the Continuity level dialog. See page 6.

Search

Goto first net number
Set cursor on first mainsource pin in net editor.

Find previous net number
Move cursor upwards one netnumber.

Find previous sub net
Move cursor upwards one subnet.

Goto last net number
Set cursor on last mainsource pin in net editor.

Find next net number
Move cursor downwards one netnumber

Find next subnet
Move cursor downwards one subnet.

Find net number
Position cursor on searched netnumber.

Find pin record
Position cursor on searched pin.

Find pin Label
Position cursor on searched pinlabel.

Goto resistor measurement position
If cursor is set on a subnet command, the resistor editor

will start and the cursor positioned on the associated resistor measurement. If the measurement is not existing, the cursor is set to line 1.

Pin labels

Enable pin name editing
Toggles the pin label editor mode on/off. In pin label editor mode the operator can edit the pin labels directly in the pin label column.

Pin name editor program
Start the TP2101 pinname editor program

Save all changed pin labels
Write all changed pin labels to respective pin label card files.

Reload all pin labels from file
Reload all pin labels from pin label card files into the net editor.

Reload Pin label from file
Reload selected pin labels from pin label card files into the net editor.

Reload all pin labels from default pin table
Reload all pin labels from default pintable into the net editor.
Note: the actual pin labels stored in the pin label card files are not overwritten until a "save command" is executed.

Reload pin Label from default pintable
Reload selected pin labels from default pintable into the net editor.

Make all pinnames from default pintable
Overwrites all previous stored pin labels in the pin label card files with the default pintable name. Warning; All previous manually edited pin labels will be lost!

Utility

Insert net delays.
Starts the Short delays wizard dialog. Ensures that extended delay commands will be inserted before all nets larger or equal to selected net size throughout the net test program to stabilise test.

Change all net delays
Exchange net delay parameters for all delays to a value selected by operator.

Delete all net delays
Delete all net delay commands in net editor.

View net connection summary
Pops up sorted data on net and net sizes.

Analog debug measure
Start the Analog debug measure program. See chapter 6.

Pen detection
Start the Pen detection program See chapter 10.

Show card configuration
Display information about the scannercard configuration
stored with the loaded test.

Editor system parameters
Show the editor parameter page of the system
parameters.

Textfiles

First pin file editor
Load the First pin textfile into the windows Notepad for
editing.

Ignore pin file editor
Load the Ignore pin textfile into the windows Notepad for
editing.

Generic pin table editor
Load the default Pintable textfile into the windows
Notepad for editing.

Edit capacitor check test
Edit the test charging test for checking large capacitors

Insert insulation level

This dialog display the theoretical system insulation level used in the fast short detection test. This
parameter is stored with the test programs and defines the maximum ohmic threshold when nets /
test points are detected as shorted. The actual insulation level is determined by the Charge delay
set in the Insulation Charge delay dialog . See chapter 14.
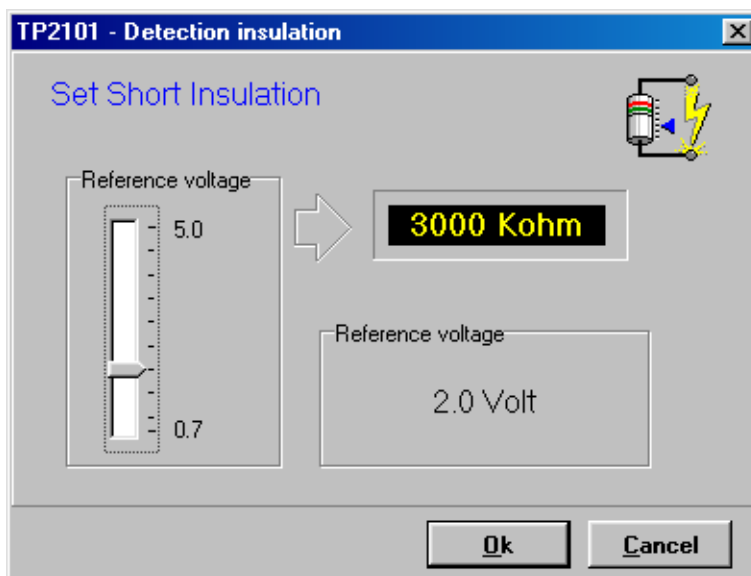
Insert continuity level

This dialog display the theoretical system insulation level used in the fast short detection test. This parameter is stored with the test programs and defines the maximum ohmic threshold when nets / test points are detected as shorted. The actual insulation level is determined by the Charge delay set in the Insulation Charge delay dialog . See chapter 14.
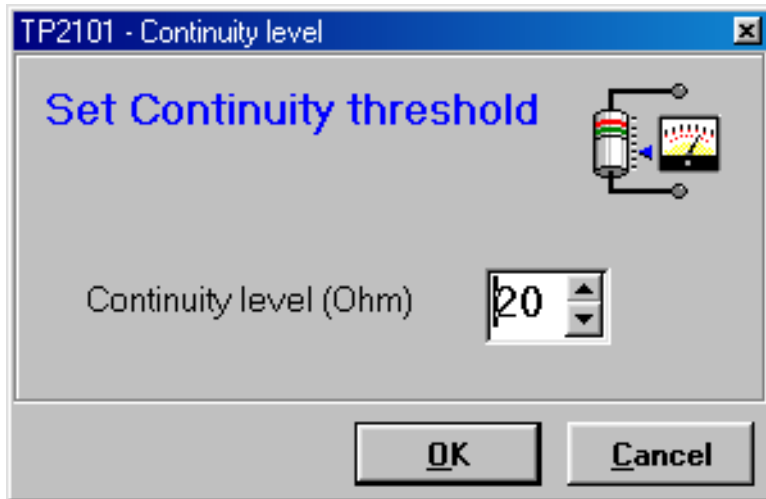
Resistor Editor

The resistor data of a test program is stored in a separate testfile. To read or edit this data use the Resistor editor.

New resistors can be added or deleted or changed. For debugging purposes selected resistors can be measured online directly in the editor.

Note that normally by definition all analog component measurements should have its subnet command in the Net editor list. There is no automatic function taking care of this when inserting or deleting resistors. This has to be programmed manually by the operator.
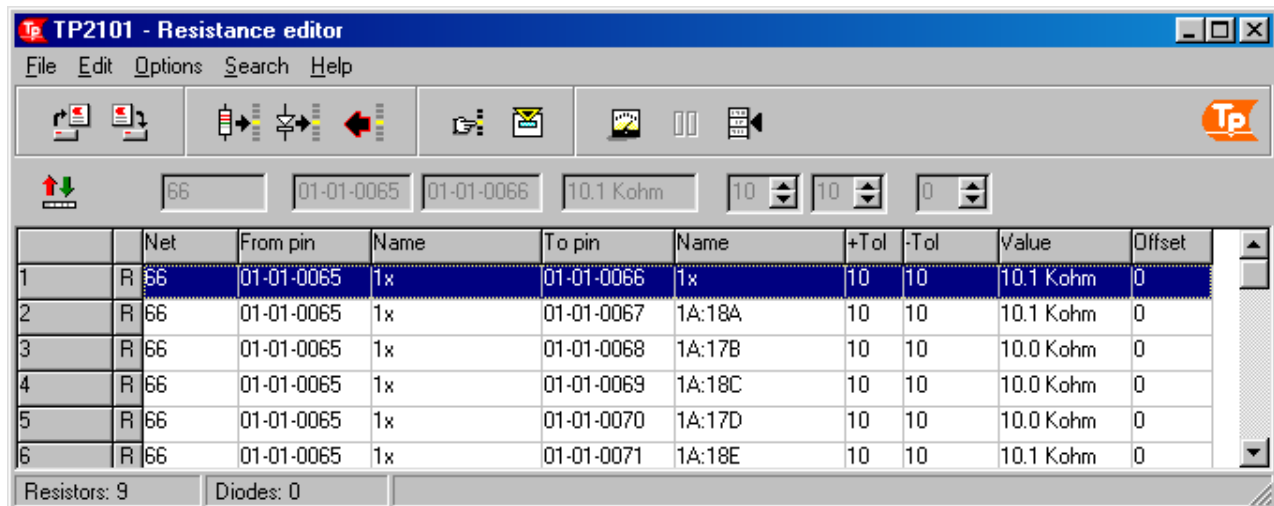
Resistor listing window

This presents the Resistor data in 9 columns of text. Changes are not allowed directly in the list.

Editing a program line are done in the edit fields just above the listing window.

The numbers to the left are program line numbers.

1. [Net] column shows the belonging net of the Net editor.
2. [From Pin] column shows the positive pin of the measurement.
3. [Name] is the pin label of the above pin.
4. [To Pin] column shows the negative pin of the measurement.
5. [Name] is the pinlabel of the above pin.
6. [+Tol] Positive tolerance in percentage of expected resistance value.
7. [-Tol] Negative tolerance in percentage of expected resistance value.
8. [Value] Expected resistor value in Ohm or Kohm.
9. [Offset] Positive resistor adjustment offset value in ohm added to the measured value.

Program line editors

Set cursor on the line you want to change and press the Change- button/command.

- Netname editor: this netnumber can be from 1 to 999999.
   Note that the operator must manually check the connection between Net
                    editor data and Resistor editor data!
- Pin editors   TP2101 system pin format editor
- Value editor   Resistance value can be written in ohm or Kohm. No letters means an ohmic value.
- Tolerance editor   Default is 10%. Range: 0-99
- Offset editor   Written in Ohm in just numbers. Range: 0-99

Menu	Commands	Shortcut
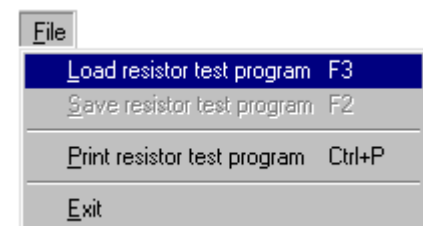
File

Load resistor test program
Load resistor test data file into the Resistor editor

Save resistor test program
Compile and save resistor editor content to resistance test file.

Print resistor test program
Send selected program lines to printer.

Exit
Close and exit resistor editor.

Edit

Change program line
Enables program column line editors for selected program line. Select a program line to update the net editor and disable the column editor.

Add resistor
Insert a new resistor measurement. Default values are copied from cursor position.

Add diode
Insert a new diode measurement. Default values are copied from cursor position.

Delete program line
Delete selected measurements.
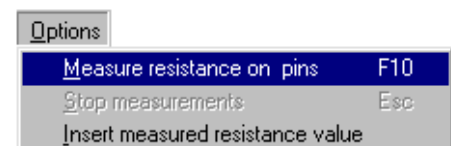
Options

Measure resistance on pins
Start measurements on selected lines. Measured values are displayed in the expected value column.

Stop measurements
Stops all measurements. Original values are restored.

Insert measured resistance value
Stops all measurements and replaces original expected values with measured.

Search

Find pin number
Position cursor on searched system pin.

Find pin label
Position cursor on searched pin label

Find net name
Position cursor on searched net number

Goto sub net position
Focus to the Net editor and position cursor on associated subnet command

Capacitor Editor

The capacitor data of a test program is stored in a separate test file. To read or edit this data use the Capacitor editor.
New capacitors can be added or deleted or changed. For debugging purposes selected capacitors can be measured online directly in the editor.
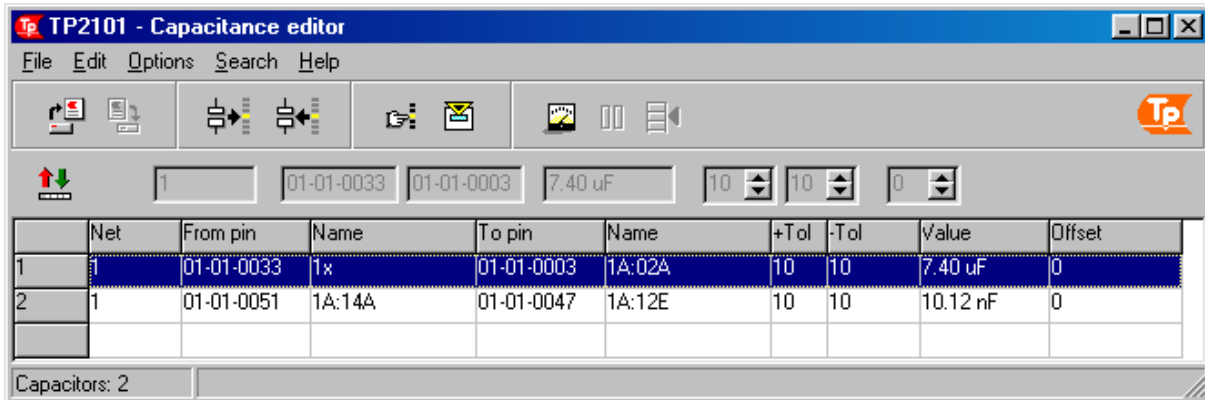
Capacitor listing window
This presents the Capacitor data in 9 columns of text. Changes are not allowed directly in the list. Editing a program line are done in the edit fields just above the listing window.
The numbers to the left are program line numbers.
1.   [Net] column shows the belonging net of the Net editor.
2.   [From Pin] column shows the positive pin of the measurement.
3.   [Name] is the pin label of the above pin.
4.   [To Pin] column shows the negative pin of the measurement.
5.   [Name] is the pin label of the above pin.
6.   [+Tol] Positive tolerance in percentage of expected capacitance value in picoFarad.
7.   [-Tol] Negative tolerance in percentage of expected capacitance value in picoFarad.
8.   [Value] Expected capacitor value in picoFarad, nanoFarad or microFarad.
9.   [Offset] Positive capacitor adjustment offset value in picoFarad added to the measured value.

Program line editors
Set cursor on the line you want to change and press the Change- button/command.
- Netname editor: This netnumber can be from 1 to 999999.
                              Note that the operator must manually check the connection between Net editor data and Capacitor editor data!
- Pin editors   TP2101system pin format editor
- Value editor   Capacitance value can be written in ohm or Kohm. No letters means an ohmic value.
- Tolerance editor   Default is 10%. Range: 0-99
- Offset editor   Written in Ohm in just numbers. Range: 0-99

Menu	Commands	Shortcut

File

Load capacitor test program
Load capacitor test data file into the Capacitor editor

Save capacitor test program
Compile and save capacitor editor content to capacitance test file.
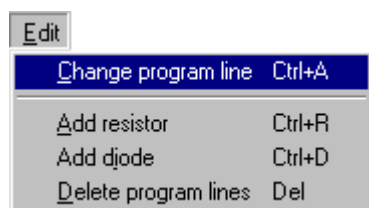
Print capacitor test program
Send selected program lines to printer.

Exit
Close and exit capacitor editor.

Edit

Change program line
Enables program column line editors for selected program line. Select a program line to update the net editor and disable the column editor.

Add program line
Insert a new capacitor measurement. Default values are copied from cursor position.

Delete program line
Delete selected measurements.

Options

Measure capacitance on pins
Start measurements on selected lines. Measured values are displayed in the expected value column.

Stop measurements
Stops all measurements. Original values are restored.

Insert measured capacitance value
Stops all measurements and replaces original expected values with measured.

Search

Find pin number
Position cursor on searched system pin.

Find pin label
Position cursor on searched pin label

*Find Net name*
Position cursor on searched net number

CARD CONFIGURATION DIALOG

This dialog displays the current detected scanner cards with information about position and card type. Card type is indicated by colour code. This is information about connector-type and size and is saved in the Card configuration file when making a new program. An unknown card type is displayed as a grey box in a red rectangle. See chapter 13, Card type Configuration Dialog for more details about setting card types.
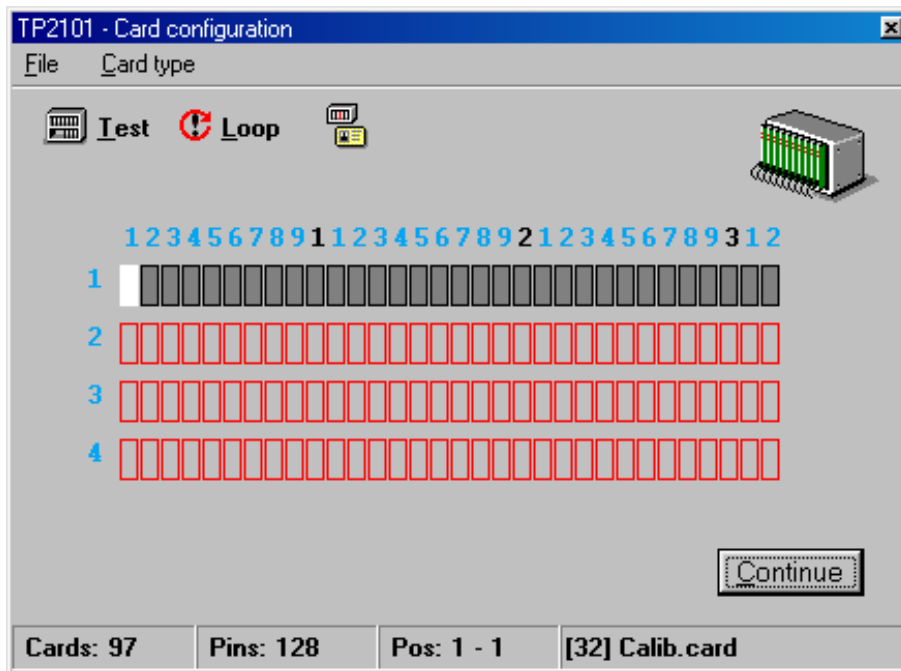
Card configuration window
The vertical numbers on the left are scanner bus/controller numbers (1-10).
The horizontal numbers on top are address on the bus. Available addresses are from 1 to 32.
Position the mouse over a card position to display the address and card type name on the bottom status line.

Card type details window
This window is normally not shown. For more details about a Scannercard, position the mouse over the card and right click the mouse. A status line is shown:

This is the data read from the selected Scannercard.
Identity is hardware setting on the Scannercard, set by a DIPswitch.
If the Scannercard are equipped with modules, all detected modules are indicated by a "1". A "1" in the first position means 1 module (pin 1 to 128) and so on. (Position 1 is to the right)
A total of 8 modules (1024 pins) can be equipped on a single card. If it is a double card the maximum is 16 (2048 pins).

Menu	Commands	Shortcut
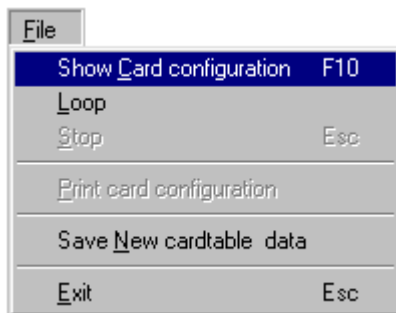
File

Show card configuration
Executes a single scan of the scanner busses and
displays the detected cards.

Loop
Executes the card detection in loop

Stop
Stop the card detection

Print card configuration
Send the card configuration to printer

Save new card table data
Save last card detection to current loaded test program
card configuration file.
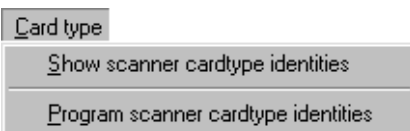
Card type

Show scanner cardtype identities
Displays the card type dialog window in a read only
mode. See chapter 13.

Program scanner cardtype identities
Starts the card type dialog window in edit mode. The
operator may change, delete or add data in the current
card type settings. See chapter 13.

CARD TYPE CONFIGURATION DIALOG

This dialog displays the current card type definitions available to the system. A total of 32 different card types may be programmed. A card type definition can consist of two parameters:

Identity: A unique hardware setting on the scanner card (DIP-switch or HW-strapping).
Modules: If the card type is based on the 128 pins modules, this parameter sets the number of modules.
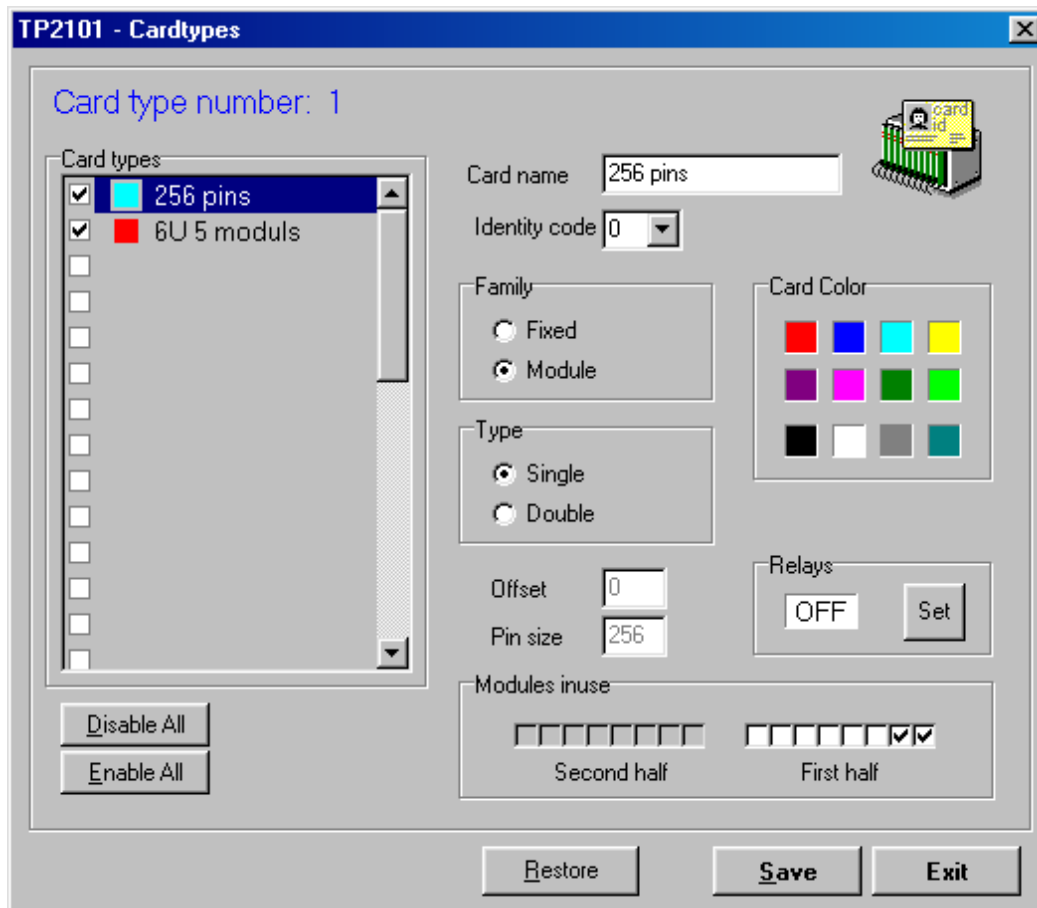
Card types window
All available card types are listed with colour code and name. Each card type can be disabled/enabled by the checkbox to the left. The Disable and Enable buttons right under the window enabled/disables all existing card types. To read or change the settings for a card type select card type by mouse or keyboard.

Press the **<Save>** button to write the new data to file. **<Exit>** cancels all the changes and closes the dialog. The **<Restore>** button will re-load card type data from the system file and reset the original parameters.

Card name
Write any text to name the card type. This is the name displayed to the operator in the TP2101 software.

Card colour
Click on a colour box to select c colour code to represent the card type.

Identity code
Select hardware wired identity code from pull-down list. (0-31) The identity on the scannerboard is binary programmed.

Family
Select the "Fixed" check button if the switching electronics are mounted directly on the scanner motherboard.
Select "Module" if the Scannercard uses the TP2101 switch modules.

Type
Select "Single" button when Scannercard have from 1 to 1024 pins or 1 to 8 modules.
Select "Double" if Scannercard uses pins above 1024 (maximum 2048 pins, 16 modules).

Offset
Only valid when double card is enabled. Defines the first system pin on the second half of the Scannercard.

Pin size
If Family is set to fixed, type in the number of pins that equip the card type.
If Module family is selected, this number is calculated automatically from the number of modules selected by the operator.

Module in-use
Valid only if Module Family is selected. If Type is single, only the first half (8 modules) is selectable. First module (pin 1-128) is the rightmost checkbox.
If Type is double card, select modules also equipped in the upper half. (The left section)

Relays
Scanner cards may be optionally equipped with up to 4 relays per card. The output I/O testpins connected to these relays may be used to short circuit large capacitors or active components on the testobject during test.

(Relays are automatically operated during selflearn and test
See also Chapter 09 Selflearn)

	Test pins		Resistor		Short		Sense	
	Pin A	Pin B	Close	Open	Close	Open	Res	Short
Relay 1	800	799	801	802	803	804	818	819
Relay 2	798	797	805	806	807	808	820	821
Relay 3	796	795	809	810	811	812	822	823
Relay 4	794	793	813	814	815	816	824	825

Card type: 1   Name: ATM-72
☑ Enable relay function   [0817] Com
Save   Cancel

PinA,PinB   = relay test terminals. Wired to scannercard output test pins
Resistor Close   = relay driver pin. Short testpins with a 12 ohm discharge resistor
          Open   = relay driver pin. Disconnect discharge resistor
Short   Close   = relay driver pin. Short circuit testpins
          Open   = relay driver pin. Open testpins

Sense Com,Res,Short   = only for internal use. Used for checking relay operation function.

Important:
If scannercard is equipped with optional relays, the "Enable relay function" checkbox must be selected to inform the system. This ensures that the TP2101 system always knows which pins should be processed as normal test output pins and relay operation pins.
Disabling the relay function on relay cards will usually give a failure status during test and selflearn because system will detect the relay driver circuits connected on the output testpins.

SHORT DELAY/INSULATION DIALOG

General:
This dialog window display the current delays used in the fast short detection test. These delays are stored with the test programs and take care of discharging and charging the test points during the short detection test. Large capacitance between pins in a test object usually requires longer delays during test to produce stable test results. The theoretical required delays are defined by common electrical laws and are dependant on the capacitance of the connected testpoints and the desired level of insulation between the testpoints.
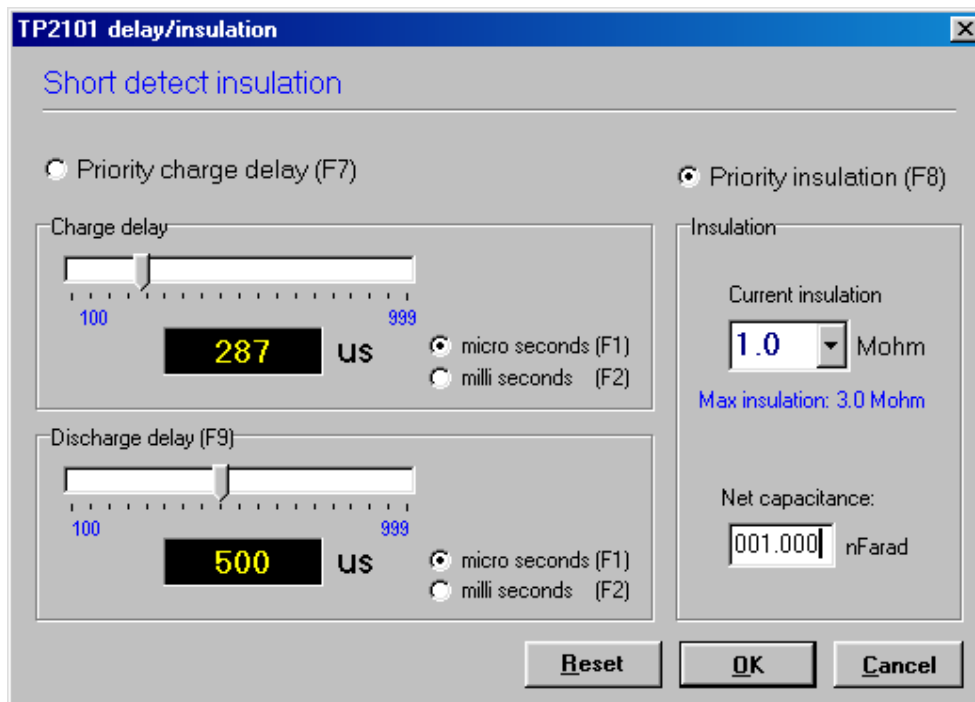
Automatic set of charge delay / insulation:

The Insulation dialog automatically calculates the charge delay necessary to detect a short connection up to a user defined resistance.

- Type in the typical capacitance value in nanoFarad in the Net Capacitance edit window. Default value is 1.0 nanoFarad which normally is beyond most net capacitance values, but which in any case produce charge delay with good margins.
- Then select a resistance level from the dropdown list in the Current Insulation edit window. The range of selectable insulations are dependent of the Maximum insulation level currently set for the test system. This level can be changed in the Test- or Selflearn- parameter window.
- The Charge slide bar should now be positioned at the required delay.
- Press Ok button to accept input and change the delays or Cancel to close an exit dialog.
- Finally press the main System Parameter Ok-button to write the new parameters to file.

If you on the other hand want to see the Insulation resistance as result of the Charge Time, :
- Click on the Priority charge delay radiobutton.
- Press Microseconds or Milliseconds button to select range and use the slide bar to set wanted delay. The resulting insulation level (max possible resistance detected between testpoints) will automatically show in the Insulation window.

Changing the maximum insulation level
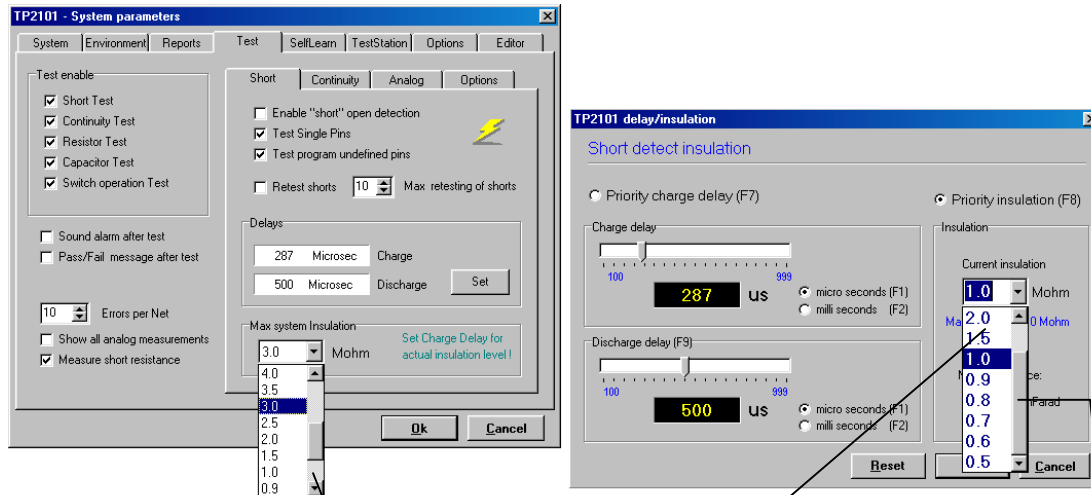
In the TP2101 system parameter windows, the [Max System Insulation] list shows all the available insulation levels (in this example for the Test parameters). Maximum detection level is 10 Mohm and minimum is 0.5 Mohm. In this example a 3.0 Mohm level is selected.

In the Insulation Dialog this level will then be the maximum selectable insulation during this specific loaded test. The actual insulation is then finally determined by the charge delay time. See text to the right

In this example 1.0 Mohm insulation level is selected which automatically results in a charge delay of 193 microseconds.
Keep in mind that the closer the selected value is to the Max system insulation, the longer the Charge time is needed.

Important:

Since the delays directly affects the total testtime, a delay in the millisecond range may result in an excessive testtime. To avoid this and keep testtime within practical limits, TP2101 programs basically treat high capacitance nets with special long charge delays.
Such nets are for example ground and power nets due to large number of pins. These nets are automatically inserted into the FirstPin file during Selflearn procedure for this purpose. When tested, the nets represented in the First Pin file uses very long Charge delays, typically above 100 milli seconds. Since the number of nets with 50 pins or more are usually few, this affect testtime marginally.

If You want to add or adjust charge delays to some nets in an existing program, this must be done in the TP2101 Editor. See Chapter 11. Editor.
Adding nets into the Firstpinfile does not take affect until making a new selflearn!

See also chapter 18. Making a new testprogram.

Parameters dialog

All TP2101 parameters can be read and changed in the general system parameter dialog. It consists of a multi-page window, which normally may be accessed from the common System Parameter command/button. The parameter window will always open on an appropriate page of the active TP2101 program.

Most of the parameter pages are general system parameters, but some pages are Testprogram parameters. That means they are loaded and saved with a specific test program name.

General system parameters

Defines hardware relative settings necessary for the system to be able to function.

PC interface

Interface address	Reserves computer memory address for interface to TP2101 hardware. when using the TP2101 ISA interface card. This is not relevant when communicating through the TP2101 PCI interface card.

Hardware

HW type	Internal information for operating hardware.
No of controllers	Define number of controller cards in the controller section.
Last card in bus	Define number of available scannercard addresses on one controller bus.
Peripherial controller	Enables or disables the use of a peripherial controller card. This card is mainly used for switching between different teststations.

Communication

Scanner bus clock rate: Defines the speed at which communication with the scannercards is operated.

Possible clock rates are:

(0	1.0 MB/S, not used)	6	80,0 KB/S
1	667 KB/S	7	51.3 KB/S
2	400 KB/S	8	33,9 KB/S
3	286 KB/S	9	22,0 KB/S
4	200 KB/S	10	14,3 KB/S
5	125 KB/S Default		

Retransmissions   If scanner bus communication failure is detected, this number sets the number of successive retransmission before controller abandons transmission and sends error to PC control.

Users
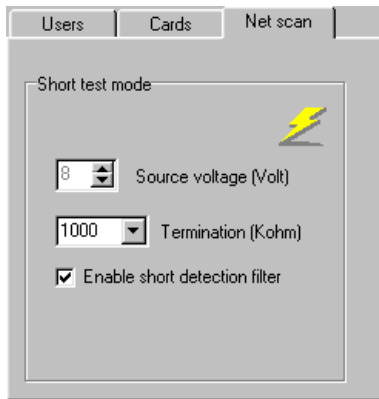
Log on   Displays the login window for changing the user operator.

Password   Displays the Password window for changing password for the current user.

Administrations Displays the administration window for adding or deleting users.

Log off   Log out current user from the testsystem.

Cards
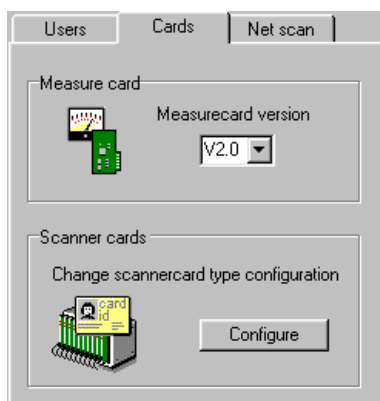
Check hardware for setting correct type of measurecard.

Press the **<Configure>** button to start the Scannercard type dialog window. See chapter 13: Card type configuration dialog.

Net scan

Source voltage   For future use.

Termination   Defines the internal termination resistor
                        equipped on the scannercards used by the
                        system.

Enable short det. filter Enable/disable the use of rush scan short
                        detection filtering. Should only be disabled in
                        special cases.

Environment - General system parameters

Initial System definition of directories on the computer used by the TP2101 system.

Directories

TP2101 Directory	Not editable. Information of the location of the installed TP2101 test software. This directory is decided during the installation procedure.
Test Directory	All customer test programs are by default stored in unique subdirectories under this directory.
Report Directory	All test reports are stored under this directory.

Startup status

Active testprogram	Information about the last used or current loaded test program.

Reports - General system parameters

User defined settings of test report behaviour and visual appearance. Are mostly related to the TP2101 Test software.
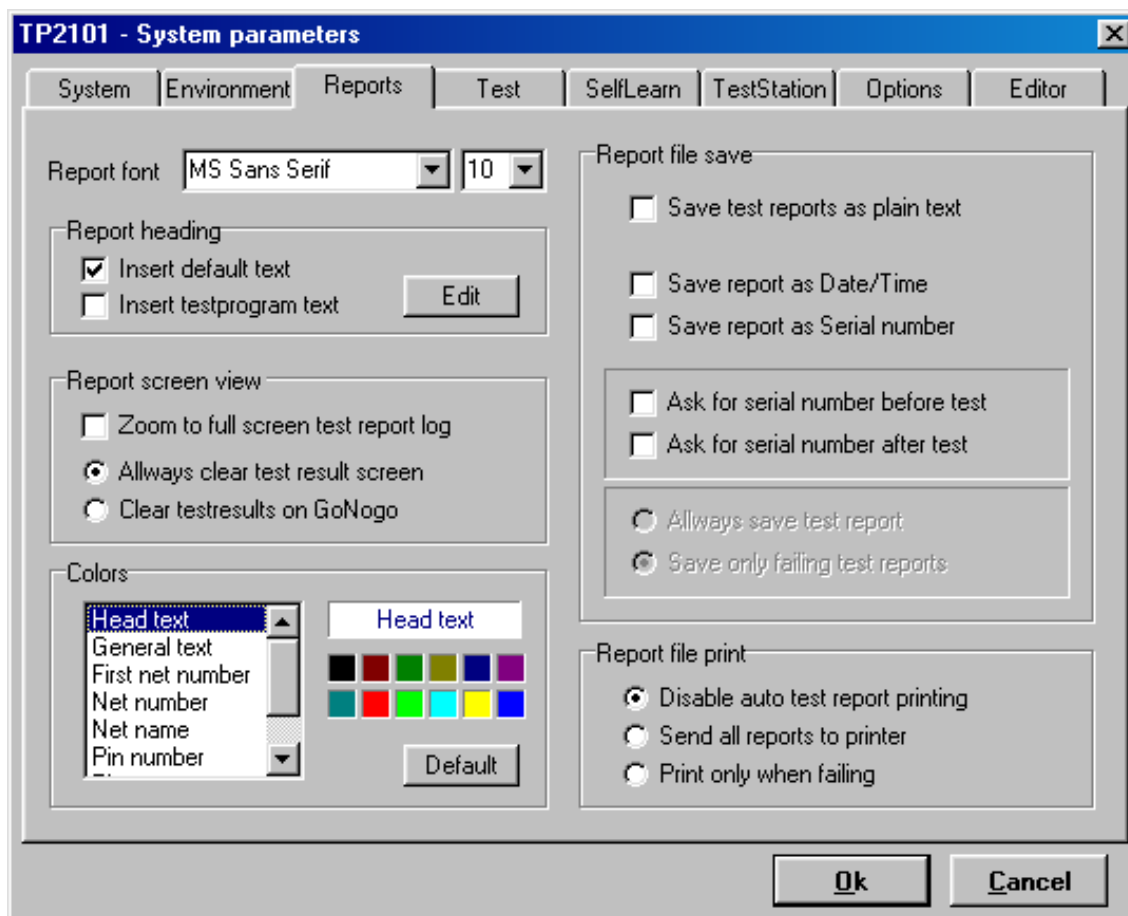
Report font
Set font type of the test report text.

Report font size
Set font size of the test report text.

Report heading
Insert default text   Inserts common heading text at the top of all reports
Insert testprogram text   Inserts test specified heading text at the top of the report.

Report screen view
Zoom to full screen report log   Zoom test report log window to fit complete screen size.
Always clear test result screen   Clear test report log window at all test commands
Clear test results on GoNogo   Clear test report log window only when starting a complete test.

Colors
User defined colours for the different parts of the test report log. Select text definition and then press colour. Result will always be shown in text window below colour grid.

(Hint: right click inside this frame to select a background colour for the main test window)

Report file save

Save test reports as plain text	Writes test report log text to file with standard black a white text. Default test reports are saved in rich text with colours and font sizes set in above items.
Save report as Date/Time	Saves reports using date/time format as filename: yymmdd_hhmmss.REP (yy=year,mm=month,dd=day,hh=hour,mm=minute,ss=second)
Save report as Serial number	Saves test reports using serial number input from operator.
	Note: A copy of the last test report is always saved under the default name LAST.REP. Hence if neither of the two options above is selected, this is the report name.
Ask for serial number before test	Raise a dialog box before test and ask the operator for the test objects serial number. This serial number will be inserted in test report heading.
Ask for serial number after test	Raise a dialog box after test completion and ask the operator for the test objects serial number. This serial number will be inserted in test report heading.
Always save test reports	Save all test reports using serial number or date/time file name.
Save only failing test reports	Save only testreports from failing tests.

Report file print

Disable auto test report printing	Enable/disable automatic printing of test reports after test.
Send all test reports to printer	Above item must be enabled. Send all reports to printer.
Print only when failing	Above item must be enabled. Send only failing reports to printer.

Test - Test program parameters

Test program parameter loaded and saved together with a test program name.
Defines all parameter options related to the TP2101 test execution and test report handling.

Test Enable
Short Test
Continuity Test
Resistor Test
Capacitor Test
Switch operation Test

Sound alarm after test
Enable/disable sound alarms after test. According to PASS or FAIL status.

Pass/Fail message after test
Disable/enable a popup screen after test showing PASS/ FAIL status.

Errors per net
User may select the number of errors written in the report associated with each net.

Show all analog measurements
Normally only failing measurements are written to the test report. If enabled all analog measurements in test will be listed in the test report log with a green PASS or a red FAIL -status. This only relates to the Continuity, Resistance and Capacitance tests.

Measure short resistance
Used by the Short test. Enable this option to automatically do an analog resistance measurement between shorted pins. Normally this should show as a Zero ohm measurement.

Short test parameter page
Parameter used by the short detection test.

Enable "short" open detection
Normally the short test only should report short failures, but the short test can also detect open or breaks in the nets.

Test single pins
Enable/disable short test of one pin nets. To optimise test quality this parameter should be enabled. Single pins may for example be shorted to each other, which again may destroy the functioning of the final product.

Test program undefined pins
In cases where test programs are made from CAD data, all system pins of the TP2101 may not be listed in the test program. This function enables/disables testing of these pins.

Retest shorts
Enable a retest of a shorted net. May be enabled to improve error reporting on unstable nets due to for example high capacitance and components in the test object

Max retesting of shorts
Defines max net size of nets to retest to prevent "infinite" test times.

Delays
Discharge   The time in microseconds or milliseconds for discharging nets/pins before starting a short-scan test.
Charge   The time in microseconds or milliseconds for charging nets/pins before sampling the result of a short-scan test.

Press the **\<Set\>** button to start the charge/discharge dialog for changing the current settings.

Max System Insulation
Select Max system Short-test insulation (range: 500Kohm – 10 Mohm).

Continuity parameter page
Parameters used by the Continuity test
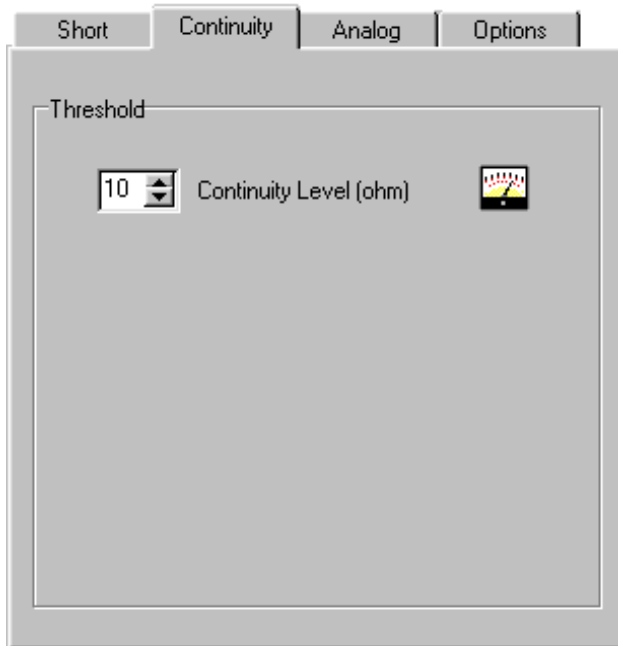
Continuity level
Set maximum allowed resistance for internal net connections. If the measured result is larger than this limit, an open failure is reported.

Analog parameter page
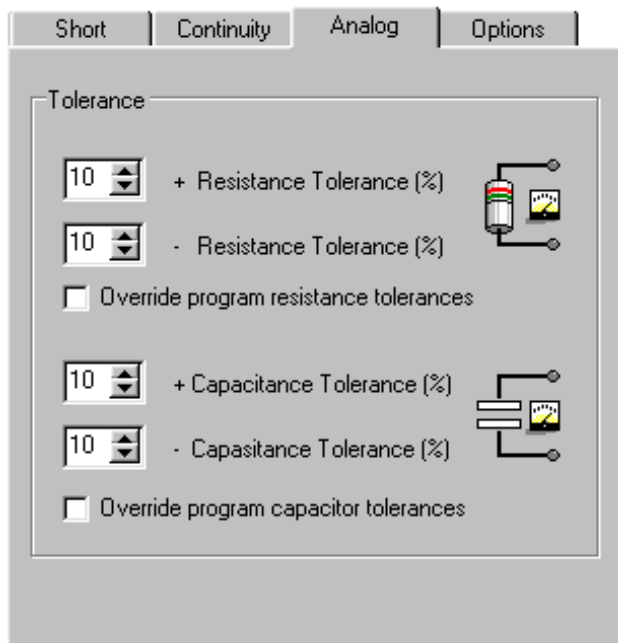
Parameters used by the Resistance and Capacitance test.
+ Resistance Tolerance
Set maximum accepted resistor measurement in percent of expected value.

- Resistance Tolerance
Set minimum accepted resistor measurement in percent of expected value

Override program resistance tolerances
Disables all program tolerance commands. All measurements uses above tolerances.

+ Capacitance Tolerance
Set maximum accepted capacitor measurement in percent of expected value

- Capacitance Tolerance
Set minimum accepted capacitor measurement in percent of expected value

Override program capacitance tolerances
Disables all program tolerance commands. All measurements uses above tolerances.

Optional parameter page

This page is prepared for enabling/disabling of optional tests and future customer dedicated tests.

Execute selected test in loop
All the selected tests will be executed in loop until operator abort test. To be able to check the result history, all testrounds with failing results are saved as date/time format file name.
Check the test history log to find the failing testrounds Then open the testreport browser and look for the report with the same datetime stamp filename

Show test information dialog on test start
Enable this option to display the test information memo text before starting the test. Test continues when operator presses the enter button. Operator information about switch settings, termination plugs and cable connections and so on may be put here. This text is edited in the TP2101 file manager.
See chapter 08, TP2101 File manager.

Self learn - Test program parameters

Test program parameter loaded and saved together with a test program name. Defines all parameter setting related to the TP2101 Self learn software.

Test addressing

Auto addressing	If enabled, self learn automatically detects the first and last scannercard in the system.
	and automatically insert the below system pins.
From pin	First system pin in self learn.
To pin	Last system pin in self learn.

Self learn Short page

This page sets the parameters used by the first net detection scan test. All system pins are scanned against each other. This test tells the system how the nets of the test object are organised, i.e. which pins are connected to each other.
This test does not say anything about how the pins are connected!

Delays

Charge   The time in microseconds or milliseconds for charging nets/pins before sampling the result of a net scan self learn.

Discharge   The time in microseconds or milliseconds for discharging nets/pins before starting a net scan self learn.

Press the **\<Set\>** to start the charge/discharge dialog for changing the current settings.

Max System Insulation
Select Max system Short-selflearn insulation (range: 500 Kohm – 10 Mohm).
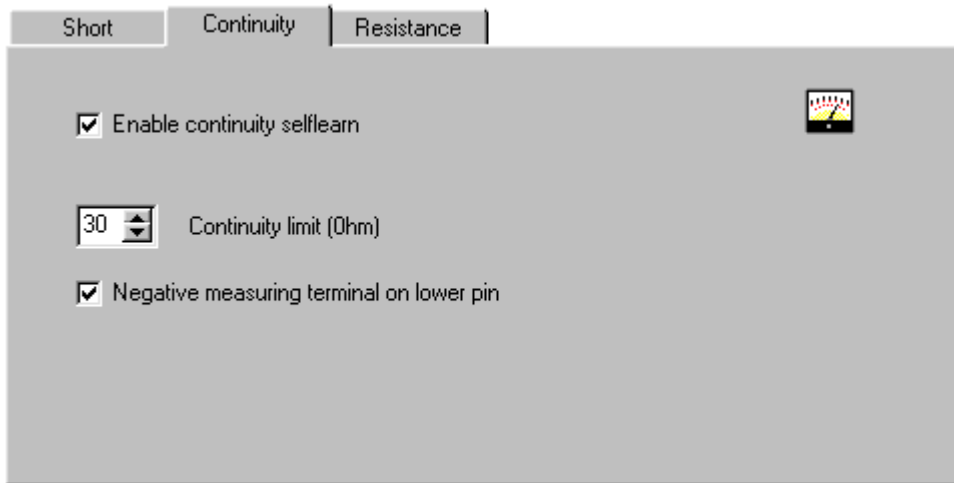
Ignore second detection of pin
Normally a system pin should be detected only one time during self learn. If not, this might indicate high capacitance loading, which may cause unstable results. To accept only the first detection of the returned pins, enable this option.
Note: A diode in the test object can also result in the above situation. The right action has to be taken from the operator in such cases.

Self learn Continuity page

This page sets the parameters used by the second net continuity test after the net detection self learn. All system pins in each net are analog measured against the first pin in the net.

Enable continuity self learn
Enable/disable continuity self learn.
Note: If you disable continuity self learn, the tester will not detect any resistor or diodes on the unit under test.
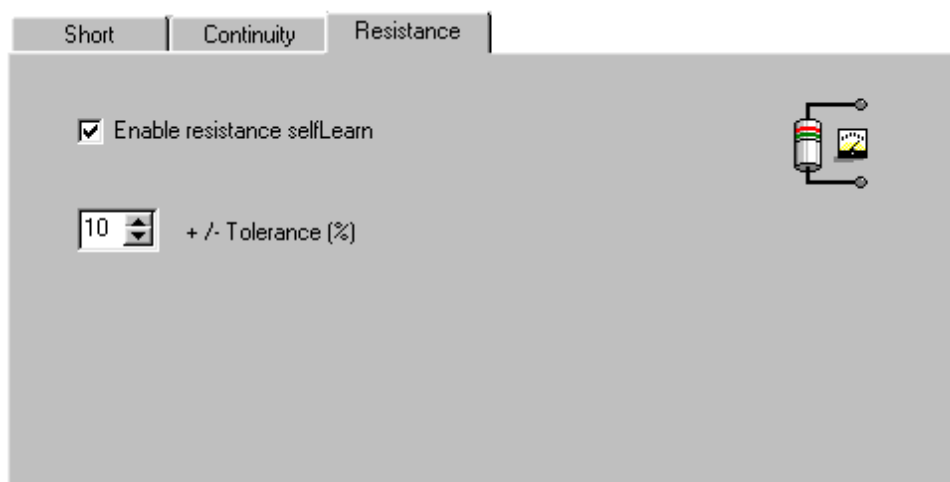
Continuity limit
If measured result between two pins in the net are below or equal to this limit, it is included in the net as a zero ohm connection. If above this limit, the net is split into sub nets for further investigation by the Resistance self learn.

Negative measuring terminal on lower pin
This option will set the first pin in the net as the negative measuring point. It can be important to enable this in order to get stable resistor measurements.

Self learn Resistance page

This page sets the parameters used by the third resistance test after the continuity self learn. All system pins in each sub net are analog measured against the first pin in the net to try to find the ohmic connection value. Measured value will be automatically inserted in the Resistor test program as a resistor measurement.

Enable resistance self learn
Enable/disable resistance self learn

+ - Tolerance (%)
Inserted as default resistance tolerances in test program in percent of expected value.

Test Stations - General System and Test program parameter

Consists of both a general system parameter and a Test program parameter.
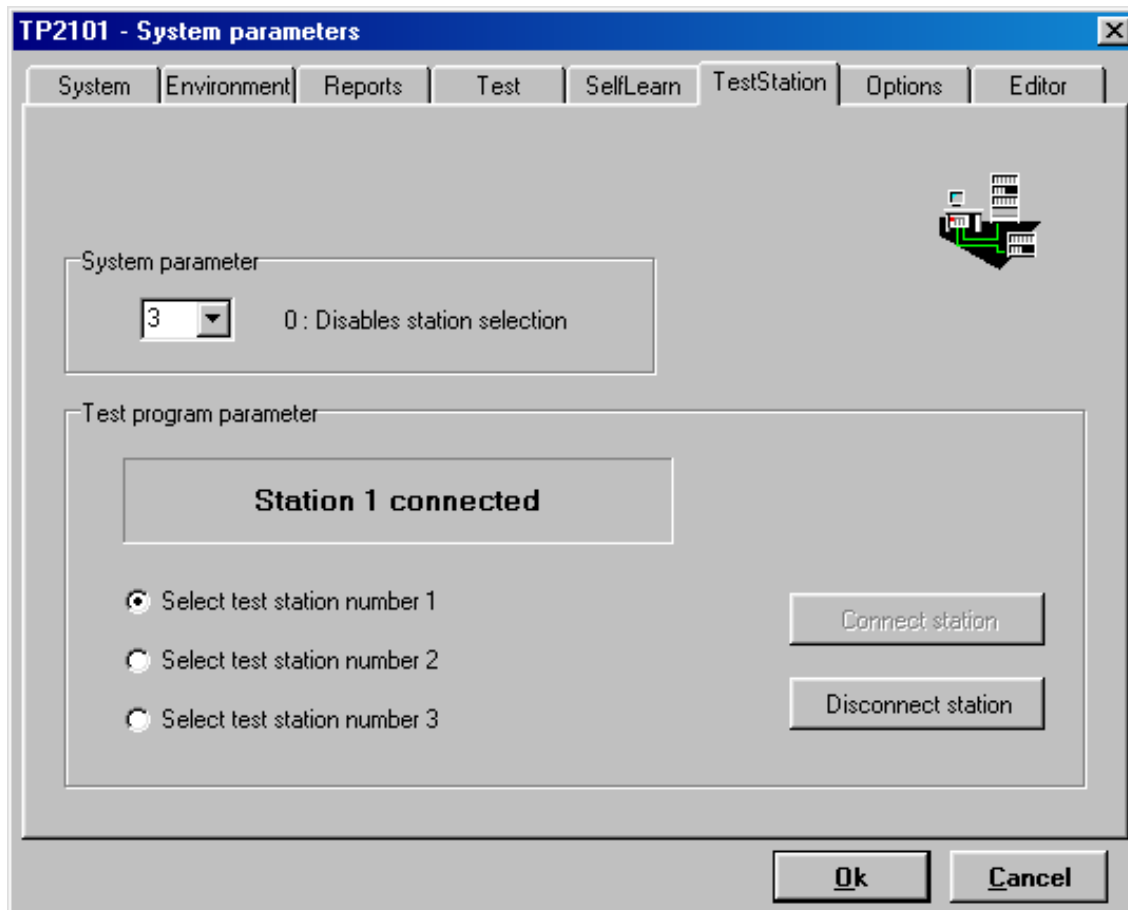
Number of stations System Parameter
Defines the available number of connected test stations.
[0] means station selection disabled. Connection to the test object is through direct single bus cables.
Maximum number of test stations can be 3.

Change test station Test program parameter
Select test station to be connected with the current test program.
Every time test is loaded, the selected station is automatically connected.

Options - General System parameter

Consists of three general system parameter pages

Calibration parameter page

This page sets parameters used when running analog calibrations and checks. It requires the TP2101 Calibration card Pn.315-1000 to be connected to the tester. This card has a number of calibrated resistors and capacitors.
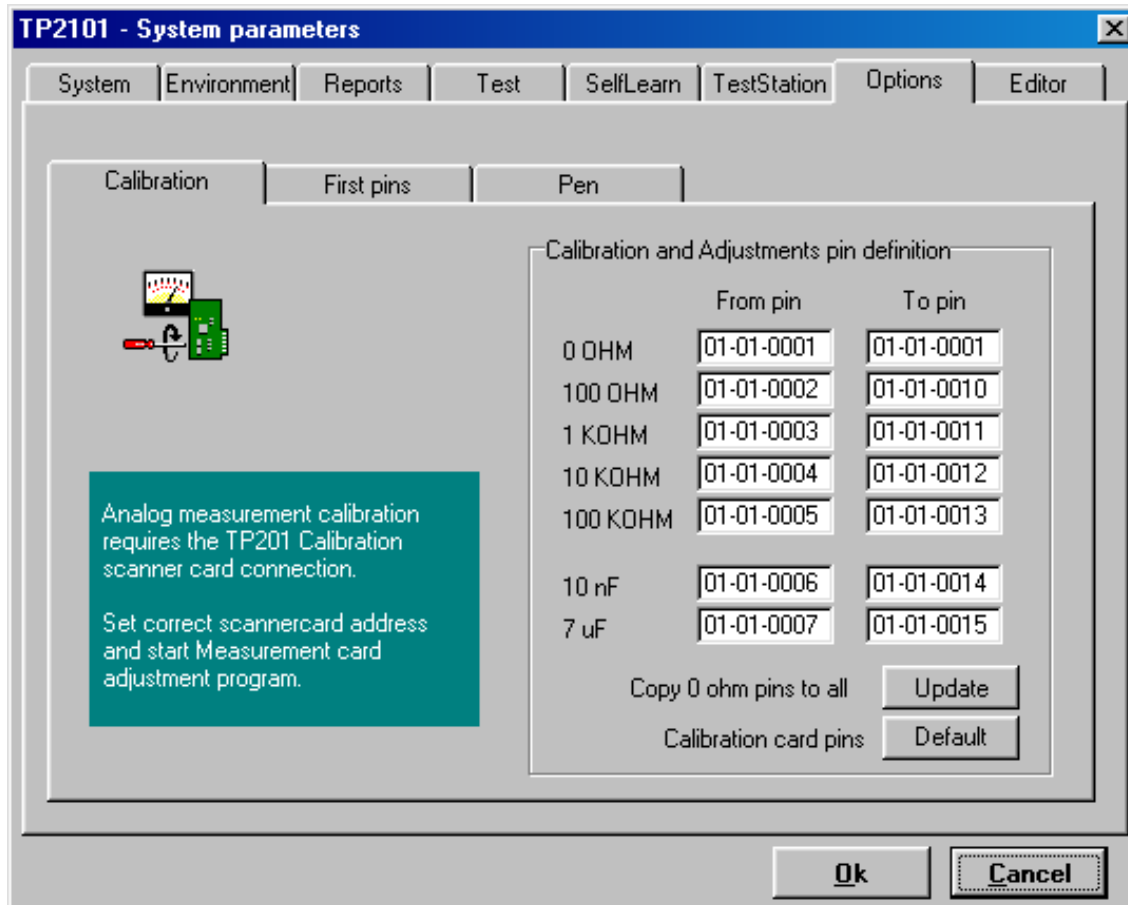
Calibration and Adjustment pin definition

When using the TP2101 calibration card, the pin definitions are automatically predefined for all systems.

If system is calibrated using other devices like the calibration plug X2, system pins which are connected to the respected resistors and capacitors in the test plug must be edited manually. These pins may change with the type of scannercard used. The TP2101 Pen program may be used if connections are unknown.

If the calibration card or plug is connected to another scannercard address, just change the [0 Ohm from Pin] pin definition and press the **<Update>** button to automatically change all measurements to another scannercard address.

Pressing the **<Default>** button sets the correct pinnumbers used for TP2101 Calibration card partnumber: 315-1000.

First Pin page

This page defines the default delays used when nets or pins require extended short test charge/discharge delays due to for example high capacitance load. It is used primarily during Self learn and in the Net Editor.

Default First pin short delays

Net size limit   Self learn: If the net size of the current net scan is larger than this limit, the first pin in this net will be inserted in the FirstPin text file. When re-testing this net, the input long delays will automatically be inserted into the test program. The delays inserted are set in the below parameters.
Editor: Used to automatically insert long delays before all nets larger or equal to the net size limit. The delays inserted are set in the below parameters.

Charge   the time in microseconds or milliseconds for charging nets/pins before sampling the result of a net scan.
Discharge   the time in microseconds or milliseconds for discharging nets/pins before starting a net scan.

Press the **<Set>** button to start the charge/discharge dialog for changing the current settings.

Pen page

This page defines the system parameter and the visual appearance of the Pen program.

Enable detection alarm
Enable/disable sound alarm when a pin is detected during pen probing.

Enable filter
Enable/disable the short detection filter function. When enabled the system only sees one pin per net.

Detect program undefined pin
Write system pins not used by test program to pen screen log when detected by Pen.
Undefined pins may exists when test programs are generated from CAD data.
Test programs made by self learn normally includes all system pins in test program.

Enable append pins mode
Write pins to Pen screen log in the same sequence as probed by the operator. Screen will not be cleared after a Pen probe lift as in normal mode.

Enable default scanning
Automatically starts pen scanning when Pen program is started. If disabled, operator must manually give a connect- scan- command in the Pen program.

Insulation
The resulting insulation between nets in Kohm is calculated from the above parameter.

Default net delays
Delays used when number of pins detected are below number set in [Large Net size limit] parameter.

Charge	the time in microseconds or milliseconds for charging nets/pins before sampling the result of a net detection scan.
Discharge	The time in microseconds or milliseconds for discharging nets/pins before starting a net detection scan.

Press the **<Set>** button to start the charge/discharge dialog for changing the current settings.

Large Net delays

Large Net size limit	If number of detected pins are more than set limit, use below extended delays. If less, use above default net delays.
Charge	the time in microseconds or milliseconds for charging nets/pins before sampling the result of a net detection scan.
Discharge	The time in microseconds or milliseconds for discharging nets/pins before starting a net detection scan.

Editor - General System parameter

Defines the visual appearance of the Editor windows.
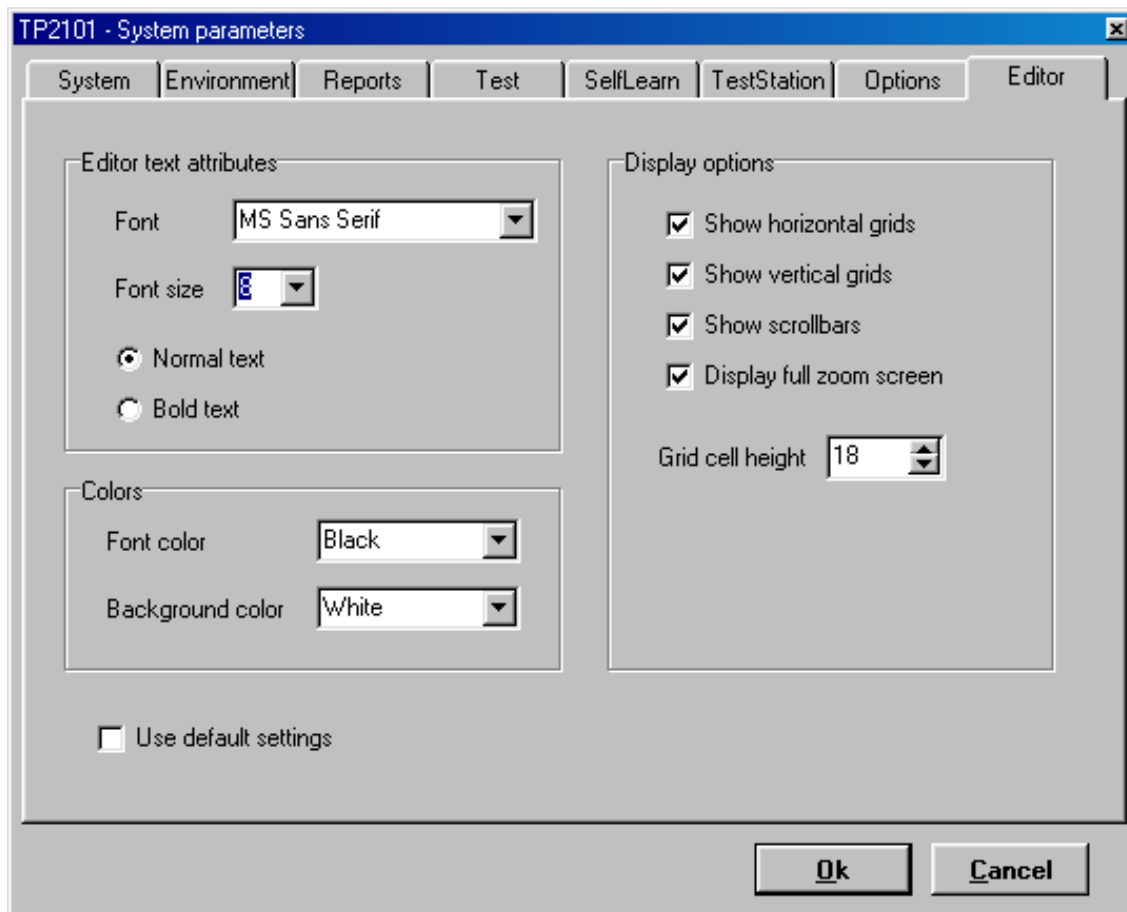
Editor text attributes

Font	Set font type of the editor program list window.
Font size	Set font size of the editor program list window.
Normal text	Font text of the editor program list window in normal text mode.
Bold text	Font text of the editor program list window in bold text mode.

Colours

Font colour	Font text colour of the editor program list window.
Background colour	Background colour of the editor program list window.

Display options

Show horizontal lines	enable/disable display of editor program row lines.
Show vertical lines	enable/disable display of editor program column lines.
Show scrollbars	enable/disable display of scrollbars
Grid cell height	Set height of editor program lines.

Use default settings   Set all parameters to default installation values.

FILE SYSTEM DESCRIPTION

System files

C:\TPWINX\

TP2101system.EXE	TP2101 system control/tray icon and operatorstatus program
TPWtest.EXE	Tester software
TPWlearn.EXE	Selflearning program
TPWedit.EXE	Test program editor
TPWdbug.EXE	Analog measure utility program
TPWpen.EXE	Pen detection utility program
TPWdiag.EXE	System hardware diagnostic and selftest programs
TPWreport.EXE	Test report browser
TPWlabels.EXE	Pin names editor
TPWCapChk.EXE	Capacitor-check charge current plotter
TP2101.INI	General system parameter settings
TP2101.TAR	System capacitance compensation settings
TP2101.PWF	User/password file
TP2101.DLL	TP2101-PCI bus driver file
PlxApi.DLL	PCI System drivers
borlndmm.DLL	"
cc3250mt.DLL	"

Test programs

C:\TPWINX\Proglib\

All TP2101 test programs are located in separate directories.
A test consists of the following files:

Testname.INI	Test parameter file
Testname.CON	Testprogram describing the organization of pins in nets
Testname.RES	Testprogram containing the resistor and diodes measurements
Testname.CAP	Testprogram containing the capacitor measurements
Testname.SWC	Testprogram containing the switch test
Testname.CHK	Testprogram containing the optional capacitor polarity check test
Testname.CRD	File describing fo required scannercard addresses and cardtypes
Testname.NIX	Internal Index file for netnumbering
Testname.NNX	Net name file storing customers net label texts.
Testname.PIN	Default optional generic pinname table
Testname.QUA	Quality report description textfile
Testname.IGN	Text file containing systempins to be ignored during test
Testname.1ST	Text file containing system priority pins tested with prolonged delays
Testname.MTX	File storing usereditable information of testobject
Testname.001-640	Pinlabel cardfiles storing customer pinlabels on testobject
	One labelfile exists per scannercard address.
	1 – 32 shelf 1 / scannercard 1 to 32
	65 –96 shelf 2 / scannercard 1 to 32

129 – 160	shelf 3 / scannercard 1 to 32
193 – 224	shelf 4 / scannercard 1 to 32
257 – 288	shelf 5 / scannercard 1 to 32
321 – 352	shelf 6 / scannercard 1 to 32

Testname.XID	Cardtype file (*.CRD) converted to textformat
Testname.XIN	Net test file (*.CON) converted to textformat
Testname.XIR	Resistance test file (*.RES) converted to textformat
Testname.XIC	Capacitance test file (*.CAP) converted to textformat

Backup files

C:\TPWINX\Backup\

Testname.TPZ	Compressed testprogram files

Default system files

C:\TPWINX\Defsys\

linec.CHD	Default textfile example of capacitor polarity check test
linec.NID	Default net index data file (internal use).
linec.PID	Default textfile example of the generic pin name table file
linec.RED	Default textfile example of a relay test
linec.SWD	Default textfileexample of a switch test
linec.RTF	Default rich textfile of a testreport heading

Documentation help files

C:\TPWINX\Help\

TPWusermanual.PDF	User operator manual acrobat document
TPWhardwaremanual.PDF	User hardware manual acrobat document

Pinname library files

C:\TPWINX\Library\

filename.TXT	Textfile describing pinnames of customer connectors.

Testreport files

C:\TPWINX\Reports\

filename.REP   Textfile testreports.

TP2101 System Icon files

C:\TPWINX\Icons\

TP2101 driver setup files

C:\TPWINX\Drivers\

WDM\PCI9030.SYS   PCI driver setup system file
WDM\PciSdk.INF   PCI driver setup system file

PIN NAME EDITOR

The Pinname editor utility program incorporates routines for editing pinnames in an easy way.
A testprogram creates a pin name card data file for each equipped scannercard in the testprogram.
All files will have the same name as the loaded testprogram with an extension number indicating
which scannercard position it belongs to.
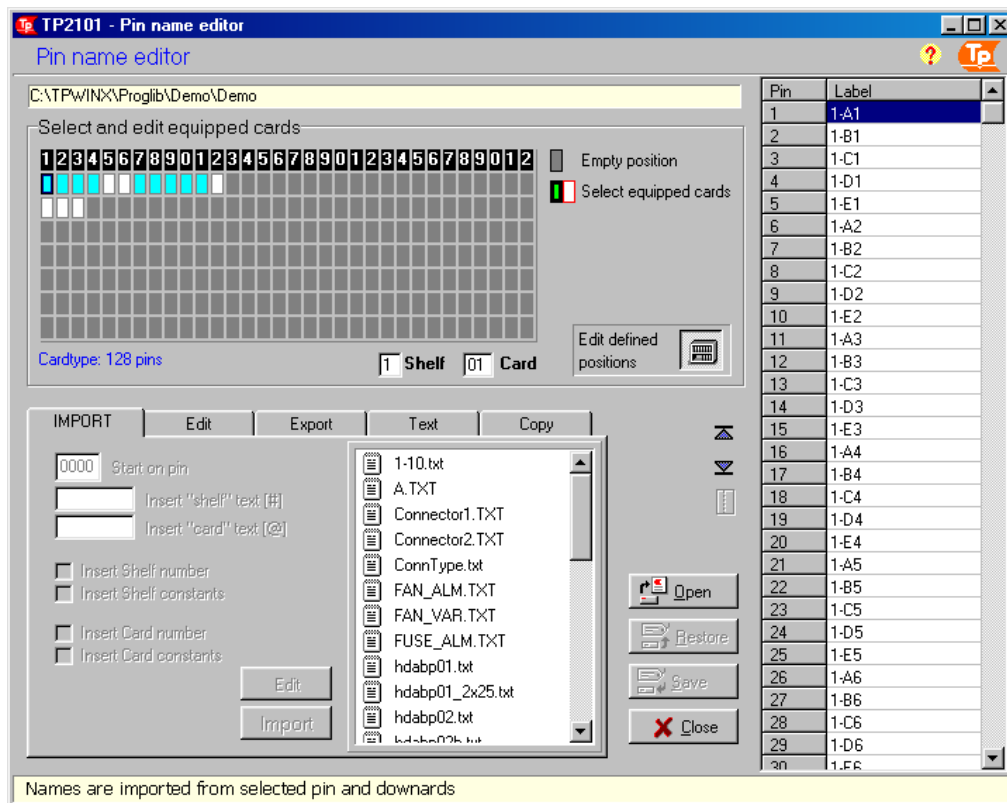
Open a new testprogram with the Open button.

To see the pinnames for a card, select a card position in the Scanner cards graphical overview
with the mouse or the arrowkeys. The pinname list table to the right shows the actual pin names on
the selected card position.
The pin names may be edited directly in the pin names list, or by using the editor functions in the
five tab pages at the bottom.
Saving changed pinnames is done by pressing the Save button. All pinnames of all cardpositions
are saved.
If not saved you can press the Restore button to reload the original pin names for a card position.

Note: The cardconfiguration button in the lower right corner of the "Scanner cards "frame controls
the mode of all the edit functions.
Button down: Editing only allowed on "known" scannercards. (Cardconfiguration file *.CRD)
Button up: Editing allowed on all system available scannercard addresses.

Import Library
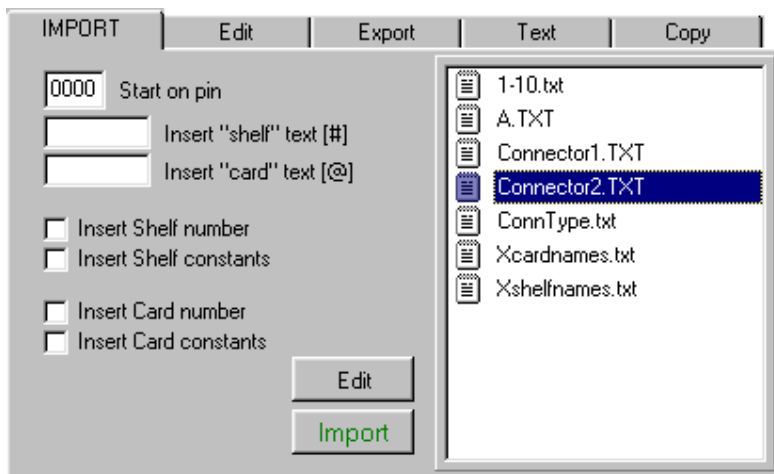
Pinnames for scanner cards with common connector types are generated easy by importing from a connector library file. Select a card position and import a file (TXT) form the library filebox. Use Edit to see the file or edit it.

A connector library file is defined as a list of text starting from the default pin offset 0:

0	POW1-1
1	POW1-3
2	POW1-5
3	POW1-2

. . .

To import and update pinnames press the Import button.
Pinnames will be changed for all selected pinnumbers according to the below selected options:

Start on pin   = First pin number of imported connector naming

Insert Shelf number = Insert Shelf number (Controller number, 1 to last controller number)
Insert Shelf text   = Insert shelf text (See Text Page tab)

Insert Card number = Insert card number (Scannercard position, 1 o 32)
Insert Card text   = Insert card text (See Text page tab)

The pinnames are changed from the cursor position in the Pin name list and downwards. You may also select a range of cards in the Card position window. A number of cards equipped with the same connector type may this way be updated in one action.

Pinname editor

Insert:
This command automatically inserts pinnames according to the selected settings.
Select pinnumber position to start insertion or select a range in the pinname list.

Replace:
This command replaces all instances of Find Text with Inserted text for selected pins and by
specified editor rules.

Clear:
Deletes all pinnames for selected pins.

Clear card:
Clear pinnames for entire card. Select a range of card positions to clear a number of cards at the
same time.

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Insert:

Number of pins	=	Type in the number of pins to insert names. If a range of pins is selected, number of pins is updated automatically.
First name number	=	The first connector number given
Increment	=	Connector number is incremented by this figure
Repeat number	=	A sequence of connector number may be repeated by this number.
Enable repeat number	=	Select the above option
Insert text	=	Common connector name used
Find text	=	Type in text to be replaced by Insert Text.
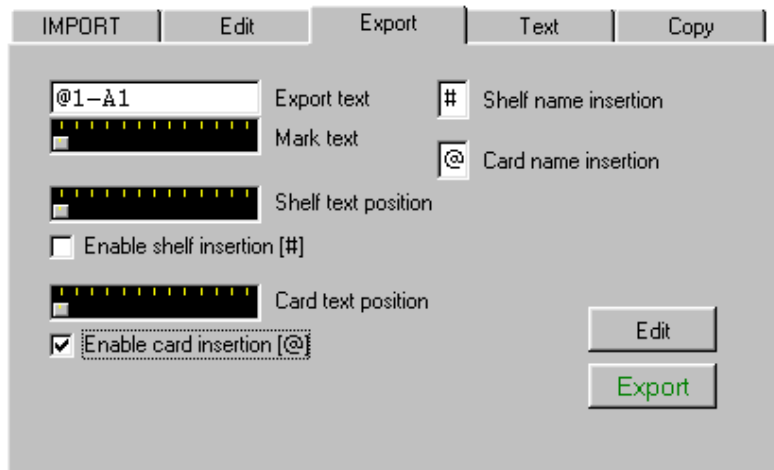
Export library

Pinnames for a connector type can be exported to a connector library file. Mark out the pinname part to export, and optionally position the Shelf name insertion symbol and Card name position symbol. When later importing the library file, shelf and card name may be auto inserted at these positions.

Mark text　　　　　　=　Use slider to select text part to export
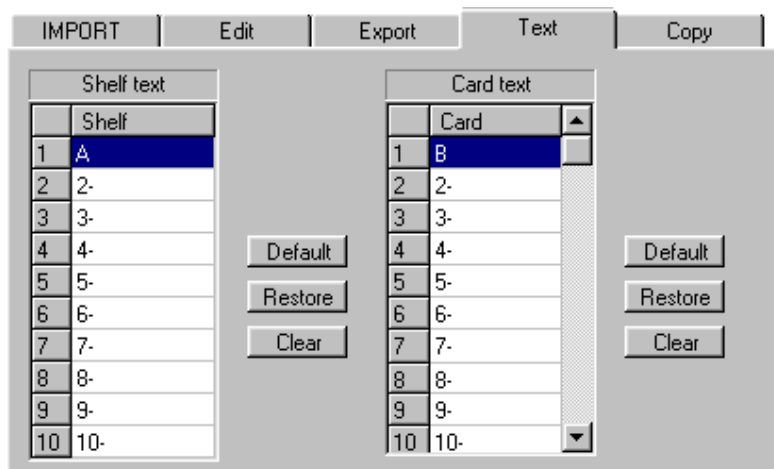
Shelf text position　　=　Use slider to position auto shelf name insertion

Card text position　　=　Use slider to position auto card name insertion

Shelf name insertion　=　Type shelf name insertion symbol

Card name insertion　=　Type card name insertion symbol

Text

When using auto insertion of shelf and card names, the names can be stored here:
10 shelf names and 32 Card names.
When importing connector library file, select the Insert Shelf/Card constants options
under the Import library page tab.

Text is saved to file when closing the program.

Copy cardfiles
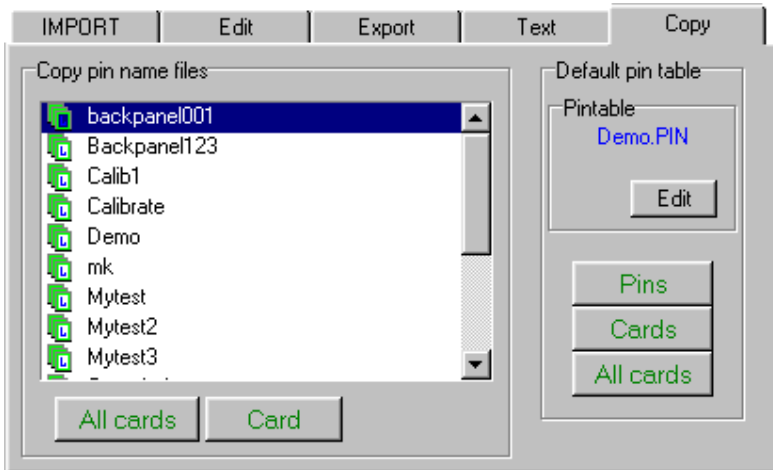
When making testprograms for testobjects belonging to the same product family or using the same connector type, it is often convenient to copy already made pinname files instead of going through the complete editing process.

To copy all pinnames on one card position select the card address position .
Select the pin name files from the Test pin name files window and press copy.
All the pinnames are copied into the pinname editor. Press the Save button to save and update the pinname file.

To copy pinnames of more than one cardposition, first select a range of cardpositions. Select the Test pin name files source and press copy. Note that when copying more than one card all changes will be written and saved directly to the pinname files.

To copy all pinname files from one program to another, press the Copy all button.

Default pin table
Pinnames may be generated from the default pin table ("Programname.PIN")
Press Edit button to see or edit the pintable textfile.
Pinnames of a range of pins or complete cards may be generated using these options.
(See appendix C)

MAKING A NEW TESTPROGRAM

Generating a new testprogram can be done by connecting a sample of the testobject to the TP2101 system and run through a selflearning procedure. To make life easier it is highly recommended that the testobject connected is a known good sample. To try to figure out what is correct or not among tens of thousands of pins can be a very time-consuming matter!
The operator should investigate the testobject so precautions can be taken before starting the selflearn. This especially relates to components on the testobject such as capacitors, resistors, diodes and active components.

Create a new test

Making a new testprogram starts by generating a complete set of default test files.
Click on the Load testprogram button to start the Tp2101 file handler program.

TP2101 file handler
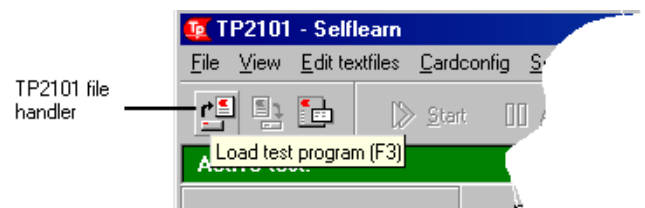
Select *New empty Directory and Testprogram* under the *File* menu.
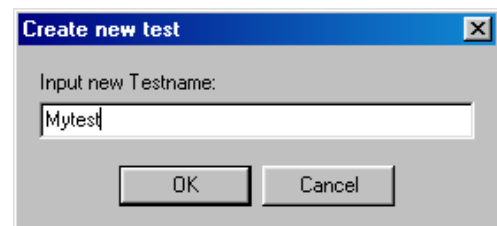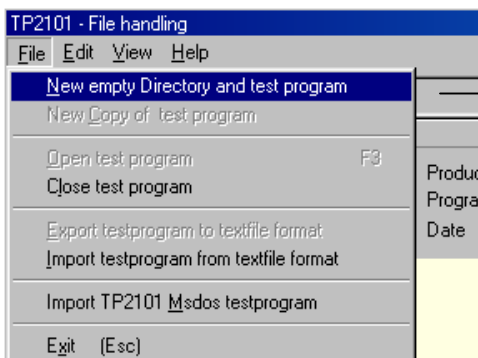
Write in the new testname.
Do not enter any path name. The test will be stored in a directory with this name under the system defined program path
(C:/TPWIN/PROGLIB/Mytest)

All the necessary test program files will be generated and located under a test directory with your selected program name. The test files will by default have the same name as the test directory.

Note that there are several possibilities to create tests:
- Make new default empty testfiles
- Make new testfiles using data from another test
- Importing and generating test from a set of text files
- Importing and converting testfiles from the DOS test data format.
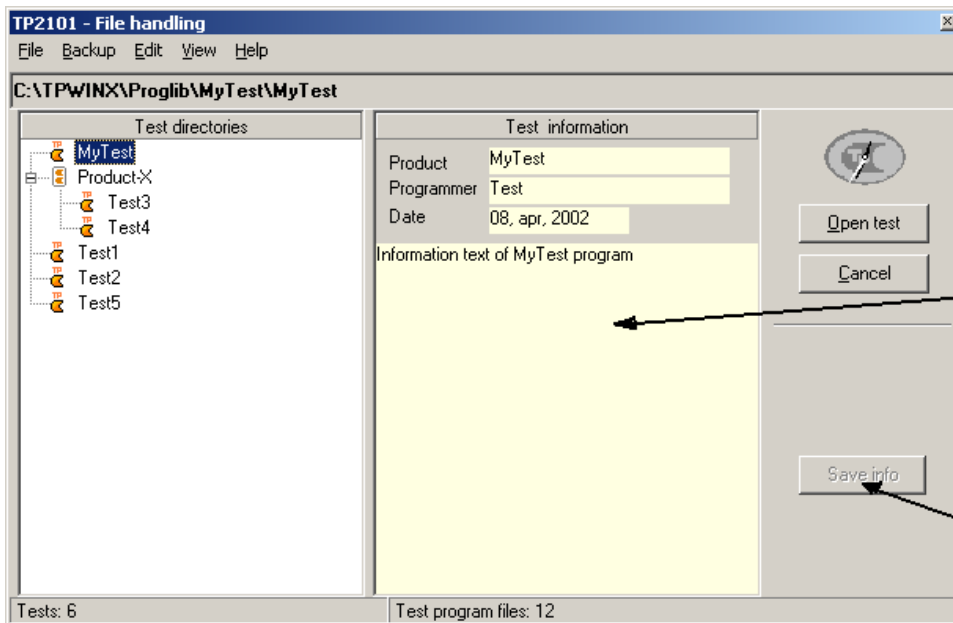
To see the new created testfiles select View-Show all testprogram files.

In the Test Information window write any text you want to be saved with the test.

Press the Save Info button to store this information in the Mytest.MTX file.

Make sure that *Mytest* is selected in the Test directories window and Press the Open button to load the new test. The green status line on the Selflearn screen should now display the full path of your new test: C:\TPWINX\PROGLIB\Mytest

If you have your scannercards connected to the testobject, you are now ready to start a selflearning procedure.

Scanner card detection setup

First the system have to know how it is connected to the testobject. That means, how many scannercards and the type, pin size and position on the bus system. Press the card configuration button to start the card configuration dialog.
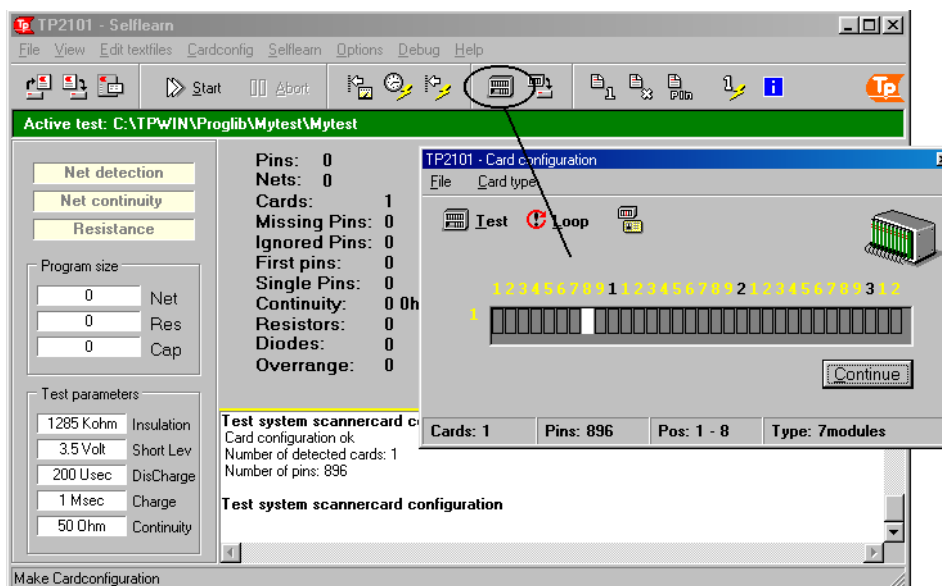
The colour code indicates the found scannercards on the bus. At the same time the system checks unknown scannercards definitions or bus system and scannercards with hardware problems.

Unknown scannercards will be grey coloured surrounded by a red rectangle. There are two possibilities of unknown cards: Wrong identity or wrong number of modules.

TP2101 - Card configuration

File   Card type

Test   Loop

1234567891123456789212345678931 2

Identity: 0   Modules: 00000000   00000000

Cards: 1   Pins: 0   Pos: 1 - 8   Identity error
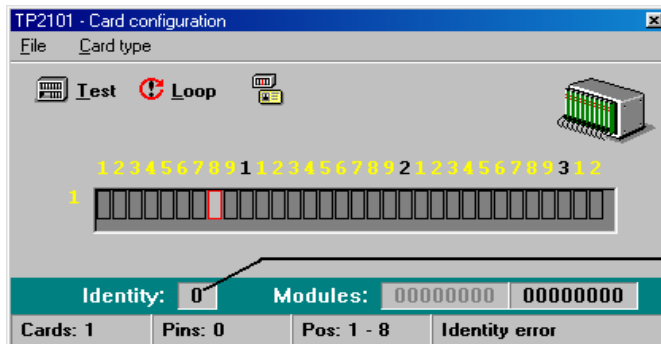
Wrong identity:
This is a hardware DIP switch setting on all the scannercard types.
The DIP switch address must be a known valid value to the system cardtype data.

TP2101 - Card configuration

File   Card type

Test   Loop

1234567891123456789212345678931 2

Identity: 1   Modules: 00000000   01111101

Cards: 1   Pins: 0   Pos: 1 - 8   Module error
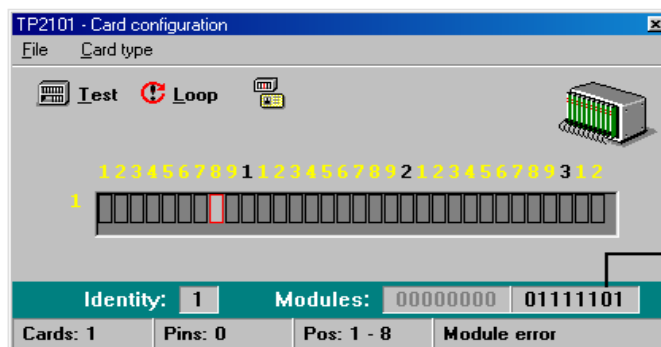
Wrong number of modules:
If the scannercard definition of the found Identity is a module equipped card, the number of modules and there positions must be known to the system cardtype data.
(1 to 8 modules for single cards
1 to 16 modules for double cards)

By pointing the mouse at a card address position, the operator may se the individual card detection status after the card configuration test.

In addition press the right mousebutton to see details about the status:
Identity shows the detected DIP switch settings.
Modules shows the detected modules and their positions.

Take whatever action necessary to have a valid card configuration.

Scanner card type definitions

After installing the software or the first time a scannercard type is connected to the system, you may have to describe the card for the system. The system can store and detect 32 different scannercard types.
To view the current cardtypes press the Cardtype button.

To change or add cardtypes select the *Card type – Program system cardtype configuration* menu option to enter the TP2101 cardtype dialog.
See chapter 13. Card types for more details on how to program cardtypes.
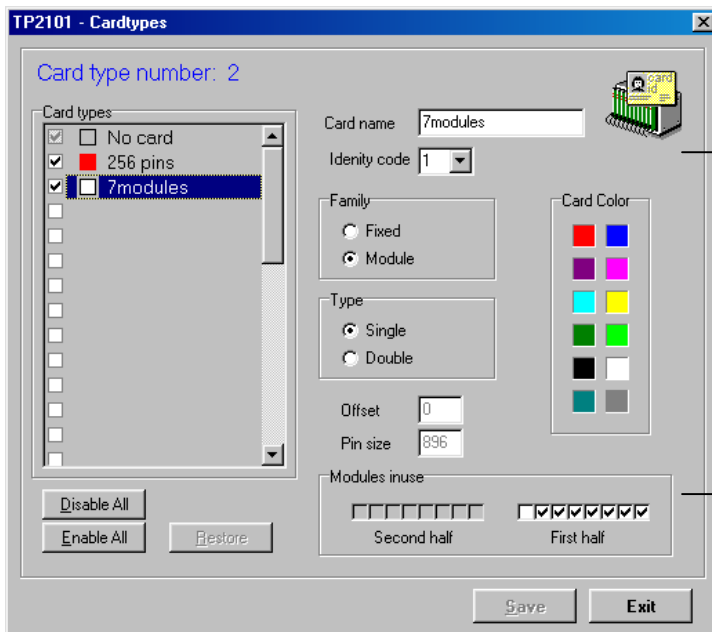
Identity settings
(DIP switch on cannercard)

Module definitions:
Rightmost= module No 1
(Pin1 to 128) and so on..

Selflearn test parameters

Assuming that the card configuration is ok, the next thing to check before starting the selflearning is the parameters. Click on the System parameter button to show the common TP2101 system parameter dialog. The dialog will open on the Selflearn parameter page.
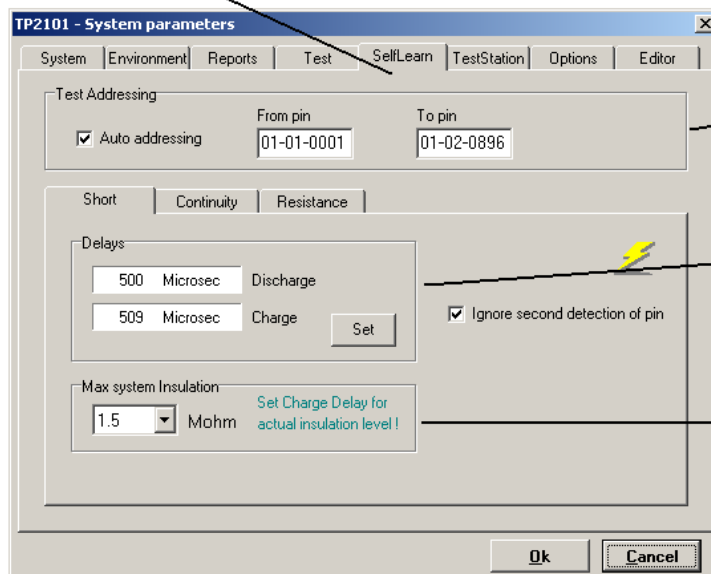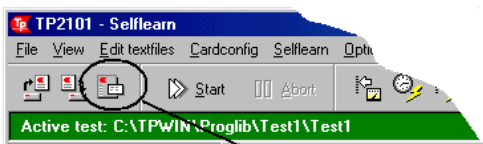
First an last pin in current system calculated from the Card configuration check result.

Discharge and Charge time delay between each testpoint connection.

Maximum system isolation resistance between testpoints seen by the test system.

The three sub pages relates to the three automatic main learn procedures run when starting the selflearn:

Short: This is where the sw scans through all pins to find out which pins are connected to which and organizes the pins in nets.
Generally set Discharge and Charge timedelay to at least 1 Msec. Saving testtime should not be a prime effort in selflearn, since a stable result is our main goal.
Also keep the insulation limit low to (<1Mohm) to ignore ghost errors.

Continuity: This procedure is measuring all pins within net after net to diagnose the nature of the connection: Is the pin directly shorted to the other pins in the net or is it connected via a resistor or diode?
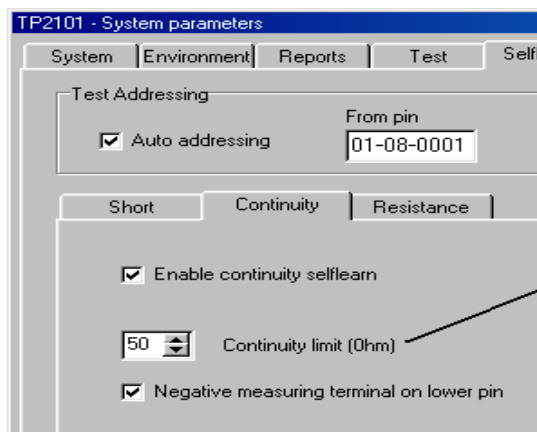
Maximum resistance value defining a connection between pins as shorted. (full net connection)

Generally use a high continuity level in selflearn (>50ohm).
Bad connections to the connectors of the testobject should not inflict on the result at this stage.

Resistance: If the result of the continuity measurement is above limit (>50ohm), it is defined as a resistor/diode. This procedure is measuring the resistor value and inserting a component measurement test in the final program.

Starting the automatic learning

Now we should be ready to start the self learning procedure.

Press the Start button.
The Card configuration dialog window will do a final check of the scannercards connected.

If accepting the result, press the Continue button to proceed with the selflearn.
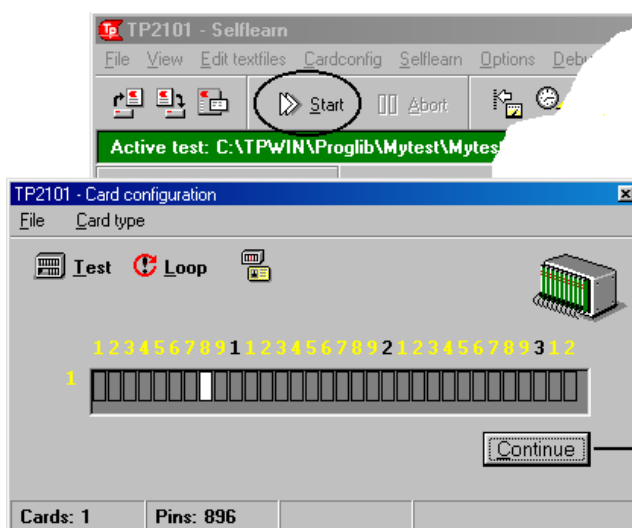
Start selflearn

Now the 3 learn procedures will run automatically:
1. Net detection
2. Net continuity
3. Resistance/diode measurement

First time a new testproduct is learned, the program will halt and display the Insert Delays dialog. Simply explained the system might need more testtime when scanning large nets of many pins. Or more specific: Longer discharge time of testvoltage on previous pin, and longer charge time of testvoltage on next pin. This is typically related to ground and power nets in all testobjects.
When the TP2101 detects a large net (typically over 100 pins), it halts execution and displays the dialog window below. When pressing the Restart button, the Selflearn will restart the selflearn from the beginning and test this large net with prolonged delays to improve stability.
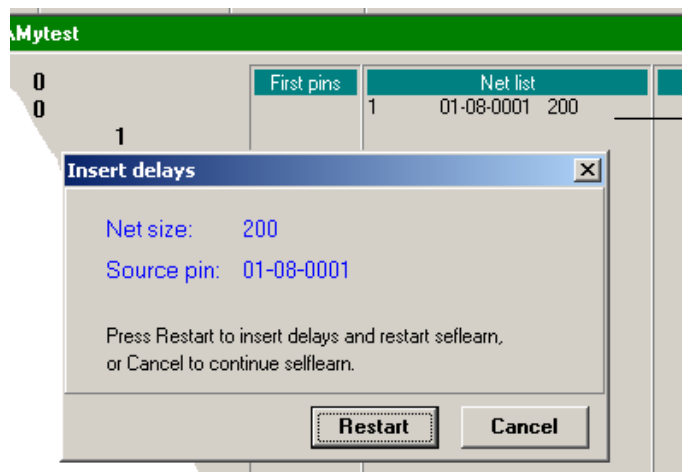
Net list info window shows all current detected nets of more than 2 pins represented by the first detected pin of the net.

What really happens is: When pressing Restart, the first pin of the large net, in this case 01-08-001, are written into the Mytest.1ST test file. This is just a textfile listing pins representing nets that should be delayed during selflearn. Every time selflearn are executing the Net detection scan, it will first test these pins using longer delays. (typically 100 msec)
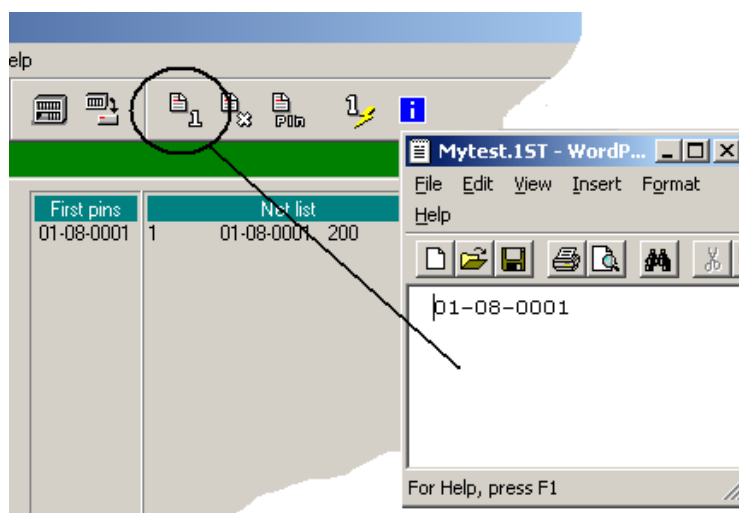
To see or edit the first pin text file, press the first pin button to open it in Wordpad.

If the data about the nets and its sizes and pins are known, this file could of course be prepared before starting selflearn. Just write the pins into the Mytest.1ST textfile

Common problems

If the result of the Net scan detection is not 100% correct, this will often show in the result after the continuity and resistance selflearn.

In our example below pins 01-08-477 and 481 are obviously detected as one net (net 202) because they both are connected to pin 401. However, when continuity and resistance tries to measure between these pins, the result is no connection at all. It shows as open or overrange resistors.

These failures are often caused by too little Discharge/charge delays due to the level of capacitance on these Pins/nets. To overcome such problems, try to write one pin from these nets into the First pin text file and restart the complete selflearn.
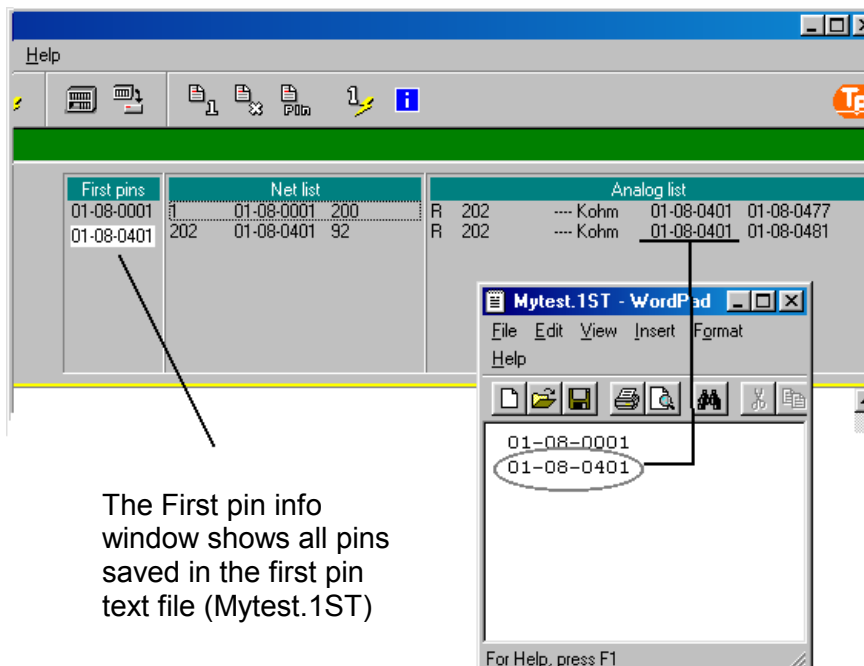
The First pin info window shows all pins saved in the first pin text file (Mytest.1ST)

Finishing the selflearn

Take a look at the selflearn result :
- Pins: This is the number of pins detected by the system. It should match exactly the number of pins theoretically caclulated after the Card configuration check.
- Missing pins: Should be zero.

Press the "Save test program button" to save the result to disk.

CUSTOMIZING PIN NAMES

The TP2101 test reports usually displays testpoints in two ways. The TP2101 system pinnumber format is always shown. (See Appendix A: Pin numbering). The second optional format is a customer generated pinname format that normally corresponds to the pinname system on a range of products. Pin names can be up to 10 characters long and are saved together with each testprogram in datafiles with extensions reflecting which scannercard address it belongs to. 000 = address 1, 001 = address 2 and so on.

Updating pin names

Basically writing pinnames may be done in three ways:
- Manual editing
- Generating from default pin table
- Using pin name library files

Manual editing

All pinnames may of course be written manually. This is ok for a range of pins like small connectors and special test connections. But in a testprogram of several 1000 pins this is not very practical.
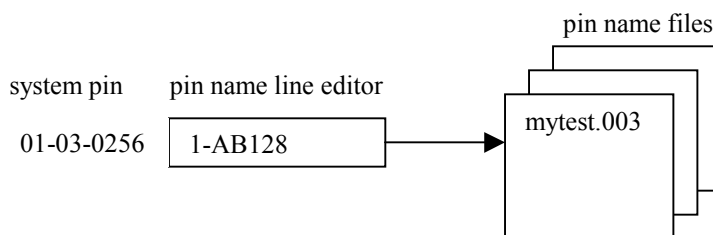
Manually editing pins may be done:
1. in the TP2101 Editor
2. in the TP2101 Pin name editor.
3. in the TP2101 Pen utility

Making pinnames from the System generic pinname table.

When a testsystem consists of a large number of identical scannercards using the same connector pin layout, like in a rack test system, this is a very time saving way of making pinnames. All pins in the system are given pinnames automatically in one action. This however requires a TP2101 pin table in the correct format. Usually one default pin table is distributed with each test system, describing the connectors of the supplied scannercards. A pintable can consists of up to 10 different connector types. It is a normal text file and may be edited with any text editor. (Notepad, WordPad...)

When making a new testprogram, a copy of this default pintable is copied into the new testdirectory with the same name as the new selected testname. The extension will be .PIN. Usually the programmer then has to modify this pin table to correspond to the current test set-up. This normally means: Edit the table data describing the type of scannercards and their position on the bus.

This is done in the CARD TYPE TABLE #. The **#** number is usually the bus number (controller number). First item is cards position 01 and the last is 32 on the bus. Each item must be a valid existing PIN TABLE # number.

(see Appendix B Pin type table for detailed information how to edit the Pin table.)
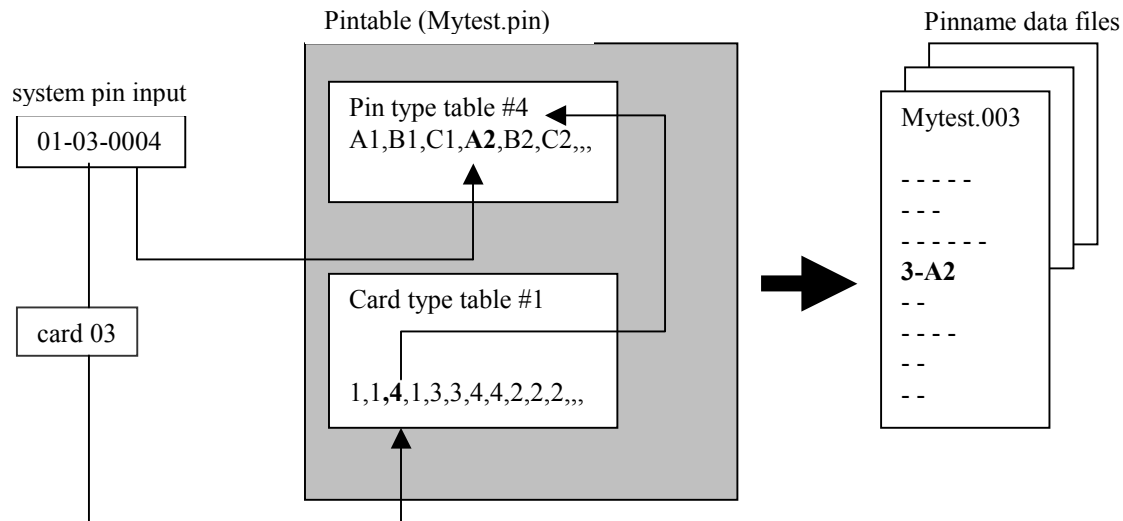
Updating pinnames from Generic pin table may be done:
1. Start the TP2101 pin name editor and select page [Copy]. To update all pins in test, press [All cards] button.
    To select one or a range of cards, mark the positions in the physical scanner cards overview and press [Cards] button.
    To select one or a range of pins, mark the pins in the pinname editor list and press the [Pins] button.
    (See chapter 17 Pin name editor)

2. Start the TP2101 Editor and press the Pinname edit button.
    Select menu option [Pinnames].
    To make names for all pins, select [Reload all pinnames from default pin table] or [Make all pinnames from default pin table].
    To update one pin or a range of pins select [Reload pinname from default pin table]
    (See chapter 11 Editor.

Making pinnames using pinname library files
Because the above described Generic pin table edit options has many limitations and are often by customers considered difficult to use, using pinname library files is the most flexible solution. Basically the pin name library file just consists of a list of text describing pin names. Since this is a text file the programmer can make or edit it with any texteditor. The software can use these lists to update the selected pin name data files.

The list is organized i two columns. First column is numbered from 0 and upwards. This number links the text in the second column to a system pin number offset. When updating pinnames for a cardposition, new names are updated for the pinnumbers offset by these numbers.

By adding a charactercode into the library text, the software can automatically insert a card position text to the pin name. The same can be done for the shelf number. (bus/controller number).

Updating pinnames from pin name library files:

- Start TP2101 pin name editor and select page [Import library].
- To select one or a range of cards, mark the positions in the physical scanner cards overview.
- Select the position in the pin number editor list from where you want to update the new names.

- Select a library file in the library filebox and set the Shelf/Card text insertion options.
- Press [Import] button. (See chapter 17 Pin name editor)
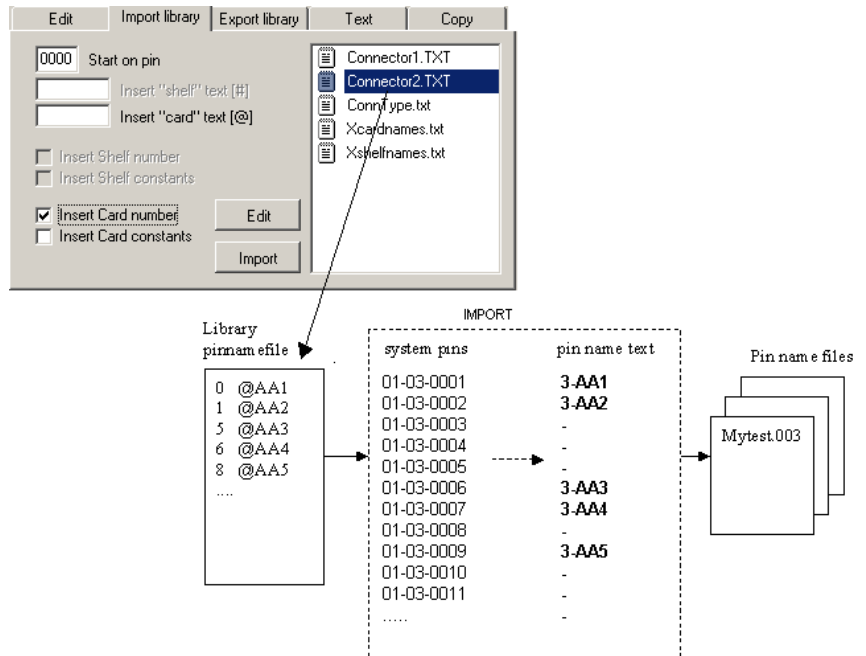
Mapping a new connector layout

The pin connector tables in the Generic default pintable and the pin name library files are one time jobs and can be made in many ways. They can of course be made from the design data sheets of the scannercards/adapters.

Another way is to use the options in the TP2101 Pen software. Let's use a connector as an exercise. It has 48 pins in 3 columns of 16 pins. The TP2101 system pins is shown from 1 to 48.

A logical way to label such connectors would be to name each row A,B and C and count from 1 to 16.
Now we just have to find out which system pins are connected to the physical connector pins.

- Select menu [Pin labels – Show pin label editor] to display the Pin name generator window.
- Write the name of the first row 'A', into the [Insert connector text] edit box.
- Write number of pins in one row : 16
- Write first label number : 1
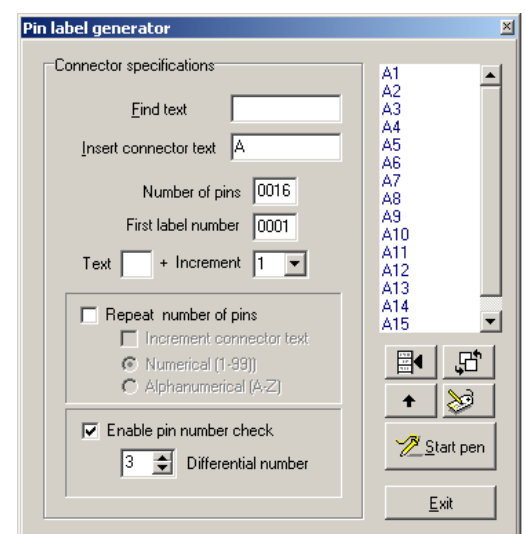
A preview of the result is now visible in the scrollbox.
Press the <Start Pen> button.
Now touch the pins on the A-row one by one of the connector in the correct order starting on connector pin A1.
The pen detection will automatically stop when 16 pins have been found.
The result in the Pen list window should now display 16 system pins with their correct pinnames.
Now just change connector text to B and do same thing for the second row and so on.
Press [Start Pen] button each time you want the numbering to start from 1.

HINT!
If the designer of the card has done a good job, the connector layout is organized properly. For example like in our example. Then You can even <u>enable a pin number check.</u> This is very practical when probing large high-density connectors of hundreds of pins. The software will then halt and arrest you if probing is incorrect. For example skipping or touching wrong pins. Collecting of pins will continue automatically when the correct pins are probed.
- Select the [Enable pin number check] .
- If probing vertically the A, B and C rows, input 3 in the [Differential number] editor. If probing horizontally input 1 instead.

In our example You can even probe the entire connector in one run and have the correct pinnames:
- Delete the input in the [Insert connector text] editor.
- Enable the [Repeat number of pins] checkbox.
- Enable the [Increment connector text] and select [Alphanumerical (A-Z)]
- Press the [Start Pen] button
Now probe all 48 pins on the connector vertically on the A-row , then B and C-row.

Saving detected pins to a Pin name library file.

To view or edit the result ,go to menuoption [Library – open connector library file] and select the filename and it will open in the WordPad editor.

Select menu option [Library – Save as connector library file].
In the "Save as" dialog window, select a name for the library file and press the Save button.
The program will automatically sort the list on the detected system pinnumbers and store the result.

To view or edit the result ,go to menuoption [Library – open connector library file] and select the filename and it will open in the WordPad editor.

0	A1
1	B1
2	C1
3	A2
4	B2
5	C2
6	A3
7	B3
8	C3
9	A4
10	B4
11	C4
12	A5
13	B5
14	C5
15	A6
16	B6
17	C6
18	A7
19	B7
20	C7
21	-
-	-
-	-

IMPORTING TP2101 MSDOS TYPE PROGRAMS

Customers already using the TP2101 in the MSDOS type software environment, normally wish to be able to run the old testprograms in the new Windows software. Unfortunately the MSDOS testfiles are not 100 percent compatible with the new Windows testprogram. So naturally the TP2101 Windows software supports utility options to convert MSDOS testprogram to Windows format.

The standard procedure would normally be in two steps:
- Import Msdos TP2101 system setups to TP2101 Windows setup
- Import and converts Msdos TP2101 testprograms to TP2101 Windows testprograms.

Import Msdos TP2101 system setup

Open the TP2101 File handler and select menu option <File – Import Msdos TP2101 system setup.> This will open the "Import Mdos TP2101 system setup" dialog box. Browse if necessary to your Msdos Tp2101 system directory and select the LINEC.SYS system file. Press Open.
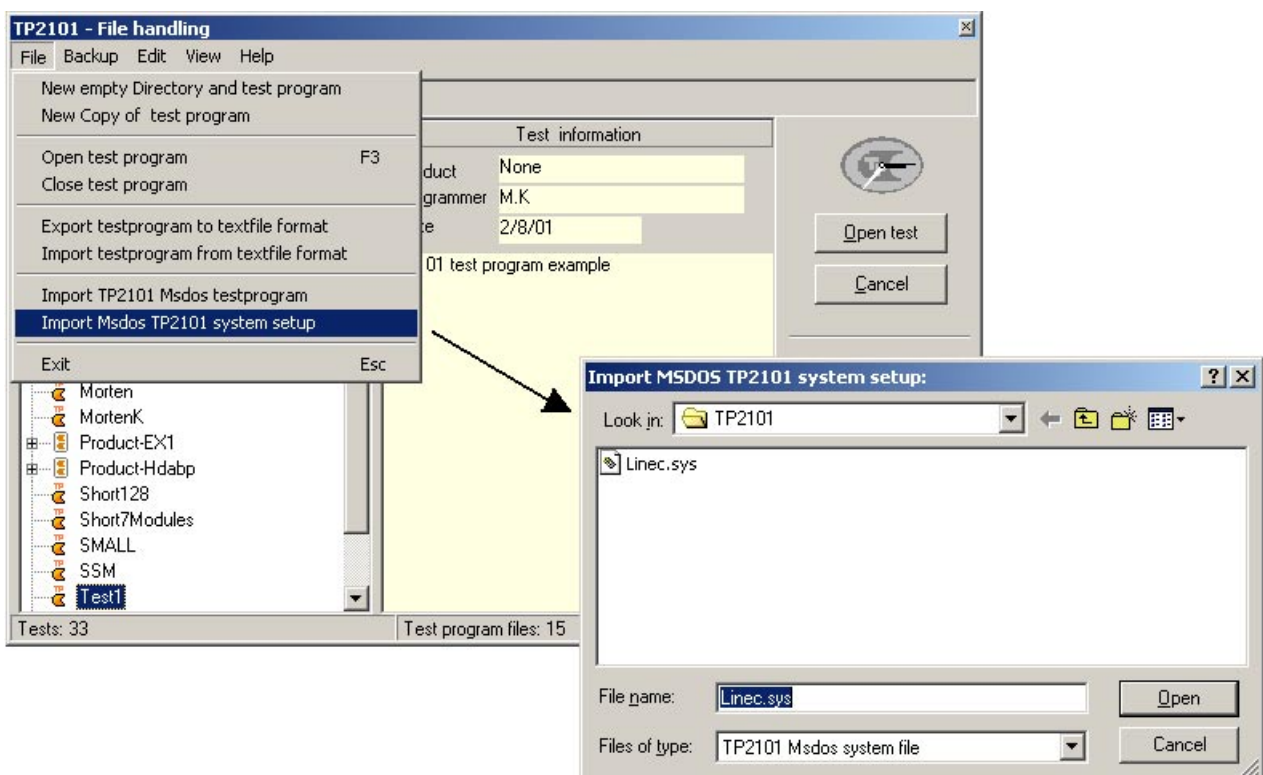
These items will be updated in the Windows TP2101 system file TP2101.INI :
- Number of controller cards
- Number of test stations
- Cardtype definitions
- Cardtype relayfunction definitions

Import Msdos testprograms

Open the TP2101 File handler and select menu option <File – Import MSDOS test program>.
This will open the "Import from TP2101 MSDOS format" dialog box.
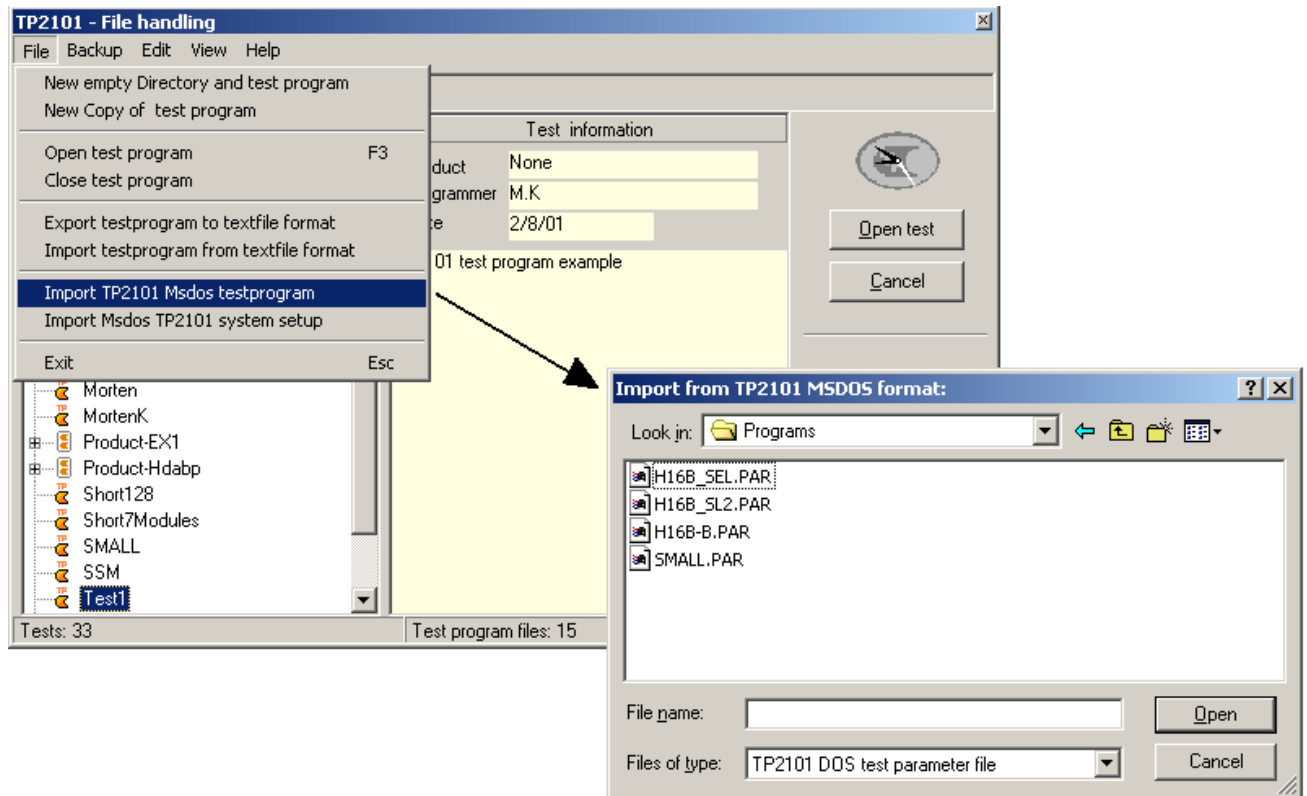
Navigate to the directory containing the MSDOS testprogram to convert.
All existing DOS testprogram will be shown by the DOS type test parameter file (* .PAR)

Select the testname from the list and press the Open button.
An information window will now show you the progress while converting the test.

Since the TP2101 window organizes all testprograms in separate testdirectories, a new test
directory is created under the TP2101 Windows Program library directory. For example :
C:\TPWIN\PROGLIB\H16B-B.PAR\ All the imported DOS test files will be transferred to this
directory. Most DOS test files are simply copied to the new directory. The rest are converted and
copied. See below list for details.

- create new Windows testdirectory using original MSDOS test name.
- copy MSDOS test firstpin file source to Windows test directory (testname.1ST)
- copy MSDOS test ignorepin file source to Windows test directory (testname.IGN)
- copy MSDOS test default pintable file source to Windows test directory (testname.PIN)
- copy MSDOS test capacitor check file source to Windows test directory (testname.CHK)
- copy all MSDOS pinlabel source files to Windows test directory (testname.000-999)

- create a default test parameter file (testname.INI)
  Explanation:
  The DOS test parameter file used file extension PAR. The Windows test stores its parameters instead in a standard Windows INI text file (testname.INI)
  Note: The new testparameters is default values. If the test requires special settings like longer Discharge/charge delays or a specific insulation limit, this has to be changed the usual way after the test has been converted and loaded.
- convert and copy MSDOS net connection datafile to Windows test directory (testname.CON)
  Explanation:
   In the MSDOS test the net connection data file also stores all the data for the resistors, diodes and capacitors tests. The conversion for DOS to Windows extracts these measurements and put them in separate files: (tesname.RES and testname.CAP)
   In addition the DOS testcommands syntax is updated to the Windows commands.
- generate new net index and net name testfiles. (testname.NIX, testname.NNX)
  Explanation:
  The TP2101 MSDOS software did not support netname labeling and editing. A default netname file is therefore generated using the existing netindex number. Net index 1 receives net name '1' and so on.
- create a new TP2101 Windows test information file (testname.MTX)
  Explanation:
  This Windows option test file can stores text information about the actual product like : Testobject name, responsible programmer, general test information.
- copy card configuration file to Windows test directory (testname.CRD) ,
  Explanation:
   Special consideration has to be taken concerning the test cards configuration data. See next paragraph.

You should now be able to load and run all the imported Msdos TP2101 testprograms!

Details about Scanner Card Configuration test data.

The card configuration file (testname.CRD) which describes the cardtype and address on the bus used in the test of course has to match the scanner card type definitions in the Windows software. Lets say the original DOS test for example requires a scannercard with 640 pins defined as cardtype 2. To be able to run the imported test in Windows, the TP2101 Windows Card Type definition must have exactly the same cardtype definition for card type number 2. This means the same card identity and number of pins or modules.

If this is not the case, two possibilities exists:
1. Change the Windows general system Card types to match the old DOS cardtype definition. You can do this automatically (See previous <Import Msdos TP2101 system setup>), or change the configurations manually as shown below.
2. Make a new Card Configuration data file belonging to the specific test.

1. Change Card type definition manually

Consider the cardtype data below. For a testprogram using a 640 pins scannercard, the DOS cardtype definition and the Windows cardtype definition match since both have a 640 pins card defined as card type number 2. Both have identity code= 1, and number of pins = 640 (in this case a 5 module card)

DOS dialog
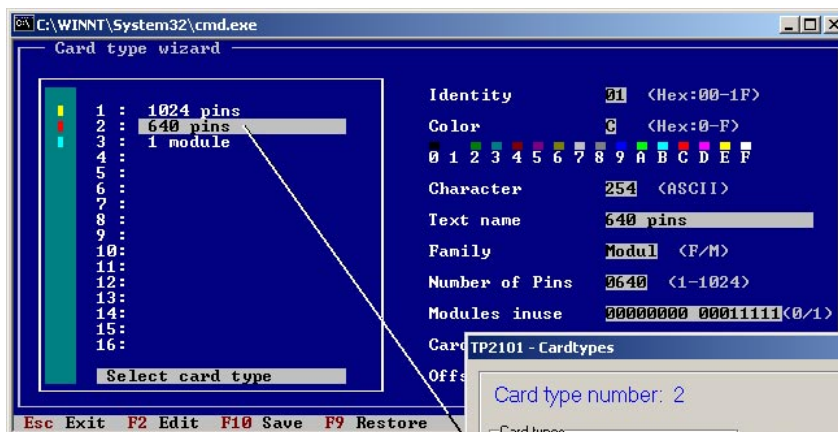
Windows dialog
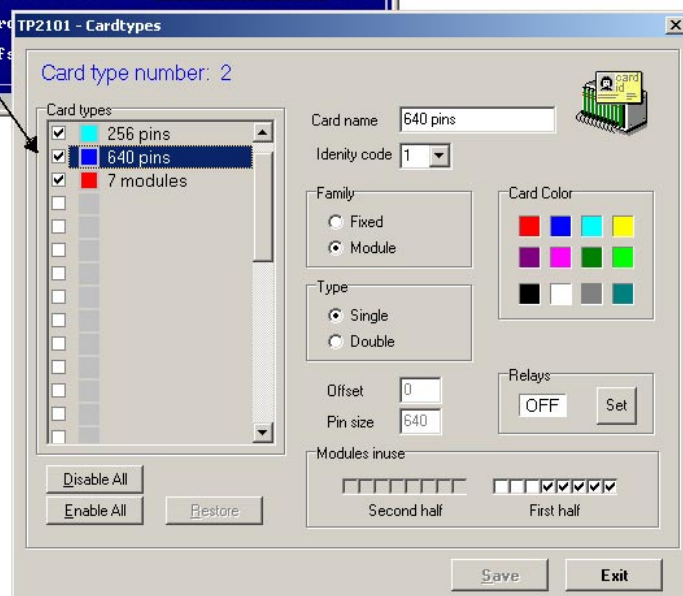
2. Make a new test Card configuration file

Changing the general Card type definitions for the whole system, of course affects all existing testprograms. The result can be that it is not possible to run a test because the system doesn't recognize the cardtypes.

We can instead make a new test card configuration file. This only effects the specific test.
- Be sure the test in question is loaded.
- Connect all the scannercards used for this test. Check that all scanner cards are powered up.
- Open the Card configuration dialog window in for example SelfLearn and check that the result is correct.
- Select <Save New card configuration> in the <File> menu option.
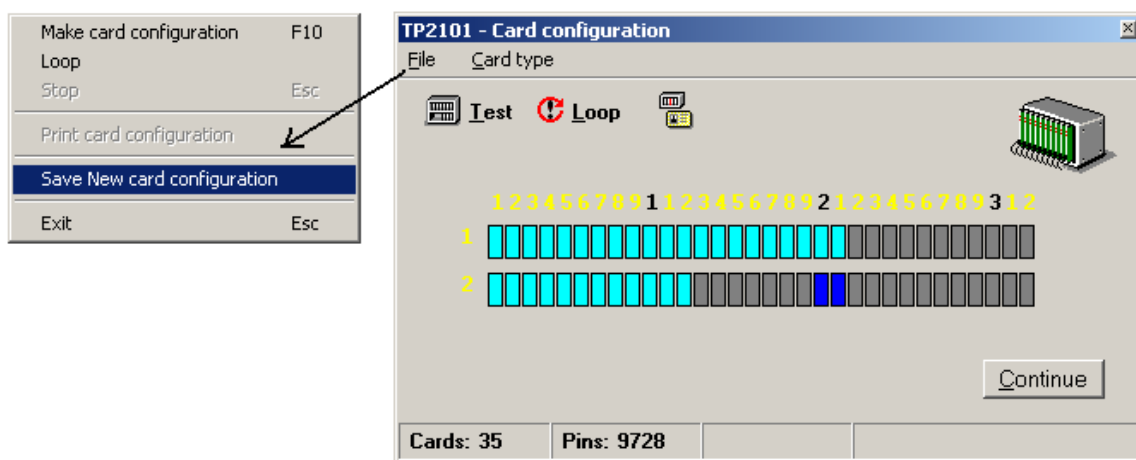
Start the TP2101 Test window. Now it should be possible to run the test.

SWITCH TEST

This test enables the operator to insert tests of manually operated switches and termination plugs i.e. A typical test will display a message prompting the operator to set a switch in one position. As soon as the TP2101 measures the correct ohmic value the operator is told to toggle the switch to another position and so on.

The SWITCH_RES command is doing the actual measurement between two points, *From pin and To pin*. The correct value is in the *Expected result* parameter and the upper and lower limits is the *Maximum* and *Minimum* parameters.

Programming the test

The test is written as a textfile using any textfile editor. (Wordpad or Notepad) The name of the testfile is "TESTNAME".SWC.
When creating a new testprogram, a default switch test will be made with a syntax summary and an test example for two measurements:

```
; Switch test. (Example)
; Syntax:
; SWITCH_TEXT      <Any text to display on screen>      max 40 characters
; SWITCH_RES       <From pin>, <To pin>, TP2101 system pins (01-01-0001)
                   <Expected result>, Ohm/Kohm

; SWITCH_TIMEOUT <Timeout delay>    Seconds, default(0)=unlimited
-----------------------------------------------------------------
SWITCH_TIMEOUT 0
SWITCH_TEXT +50V POWER ON
SWITCH_RES 1-32-0128, 1-32-0096, 100K, 110K, 90K
SWITCH_TEXT +50V POWER OFF
SWITCH_RES 1-32-0128, 1-32-0096, open,
```

Syntax reference:

SWITCH_TEXT command to display a message on screen
1 parameter

Any text to display on screen   10 characters per line. 3 lines visible

SWITCH_RES command starting measurement loop test
 4 parameters

From pin	TP2101 system pin (01-01-0001)
To pin	TP2101 system pin (01-01-0001)
Expected result	Ohm/Kohm
	Alternative result input:
	Open = >999999 Ohm (Minimum not used)
	Close = 0 Ohm to Maximum value. (Minimum not used)
Maximum	Ohm/Kohm. Measured value>maximum not accepted result
Minimum	Ohm/Kohm. Measured value<minimum not accepted

SWITCH_TIMEOUT command setting measurement timeout
1 parameter

Timeout delay   Seconds,   default= 0 :unlimited(no timeout)

CAPACITOR CHECK TEST

This test requires scannercards equipped with relays used to switch the voltage to the capacitor terminals on the testobject.

The capacitor check test is an optional test for checking large capacitors. It may be used when the value is to large to measure with the standard Capacitance measurement test. The test is capable of detecting the presence of the capacitor, the polarity and if it is shorted and to some degree the size. The actual value can not be measured directly.
The test is performed by connecting a +8 voltage across the capacitor and monitoring the current. As the capacitor charges, the current will decrease towards 0 milliampere after a specific time. By setting the fall time and current level, a simple check of the capacitor is made.

Description of failure types: This dialog display the theoretical system insulation level used in the fast short detection test. This parameter is stored with the test programs and defines the maximum ohmic threshold when nets / test points are detected as shorted. The actual insulation level is determined by the Charge delay set in the Insulation Charge delay dialog. See chapter 14.

Reversed capacitor polarity:
If the polarity is reversed, the typical capacitor will not be able to charge normally, and the current will stabilize at a higher value.

Wrong capacitor value:
A significant change of the capacitor value will affect the fall time of the current charge curve. A larger capacitor results in a longer fall time, a smaller in a shorter fall time.

Open capacitor (not equipped)
Results in a constant 0 mAmp current.

Shorted capacitor
Results in a constant 8 mAmp current.

Programming the test

The test is written as a textfile using any textfile editor. (WordPad or Notepad) The name of the testfile is "TESTNAME".CHK.
When creating a new testprogram, a default capacitance test will be made with a syntax summary and an test example for a single measurement:

```
; Syntax:
; SET <Short tolerance> <Open tolerance> (8.00-0.00 mAmp)
;     default: 7.98/0.10 mA
; TEXT <Any text to display on screen>
; CHECK <Rack-card-pin> <Rack-card-pin> <Relays(1-4)> <Timeout(1-60 sec)>,
<Threshold(8.00-0.00 mA)>
; ENABLETIMEOUT  (valid measurements only after Timeout parameter)
; DISABLETIMEOUT (Passes and aborts test when result is less than Threshold
parameter)
; SAMPLETIME <50-5000> (Milliseconds) default:500  Intervals between
measurements. Sampleinterval should be shorter than Timeout.
;-------------------------------------------------------------------

Check 1-01-0126 1-01-0096 4 3 0.1
```

Syntax reference:

CHECK   command executing the test
5 parameters:

Positive capacitor terminal   TP2101 systempin format: 01-01-0001
Negative capacitor terminal   TP2101 systempin format: 01-01-0001
Relay number   Number from 1 to 4.
                                       A scannercard may have up to 4 relays.
Timeout   Time limit in seconds. See Timeout command below!
Current threshold   Maximum level in milliampere
                                       If the measured value is above this limit after Timeout, the test
                                       fails.

SET   command defining short and open thresholds
2 parameters:

Short threshold   Results above this limit is reported as shorted capacitor
                                       Default: 7.98 mAmp
Open threshold   Results below this limit is reported as open capacitor.
                                       Default: 0.10 mAmp

DISABLETIMEOUT   command for selecting the function of the TIMEOUT parameter.
No parameters
                                       Test will pass and abort measurement as soon as result is
                                       equal or below Current threshold parameter.
                                       Test will fail and abort if result is above threshold after
                                       Timeout parameter.

ENABLETIMEOUT   command for selecting the function of the TIMEOUT parameter.
No parameters
                                       Test will wait until Timeout parameter has elapsed before
                                       checking result and pass or fail measurement.
                                       This is the default mode.

SAMPLETIME   command defining intervals between measuring.
1 parameter:

Interval   Time interval in milliseconds from 50 to 1000
                                       Always set interval to less than Timeout parameter.

TEXT   command for writing operator text to screen.
1 parameter

Text   Text displayed in the popup dialog window.
                                        Message window closes when operator presses
                                        the ESCAPE key or Ok button.

The easiest way to find the actual test parameter values, is to use the TP2101 Capacitor check
utility program (TPWCAPCHK.EXE)
This program draws the normal and reversed capacitor charge current waveforms.
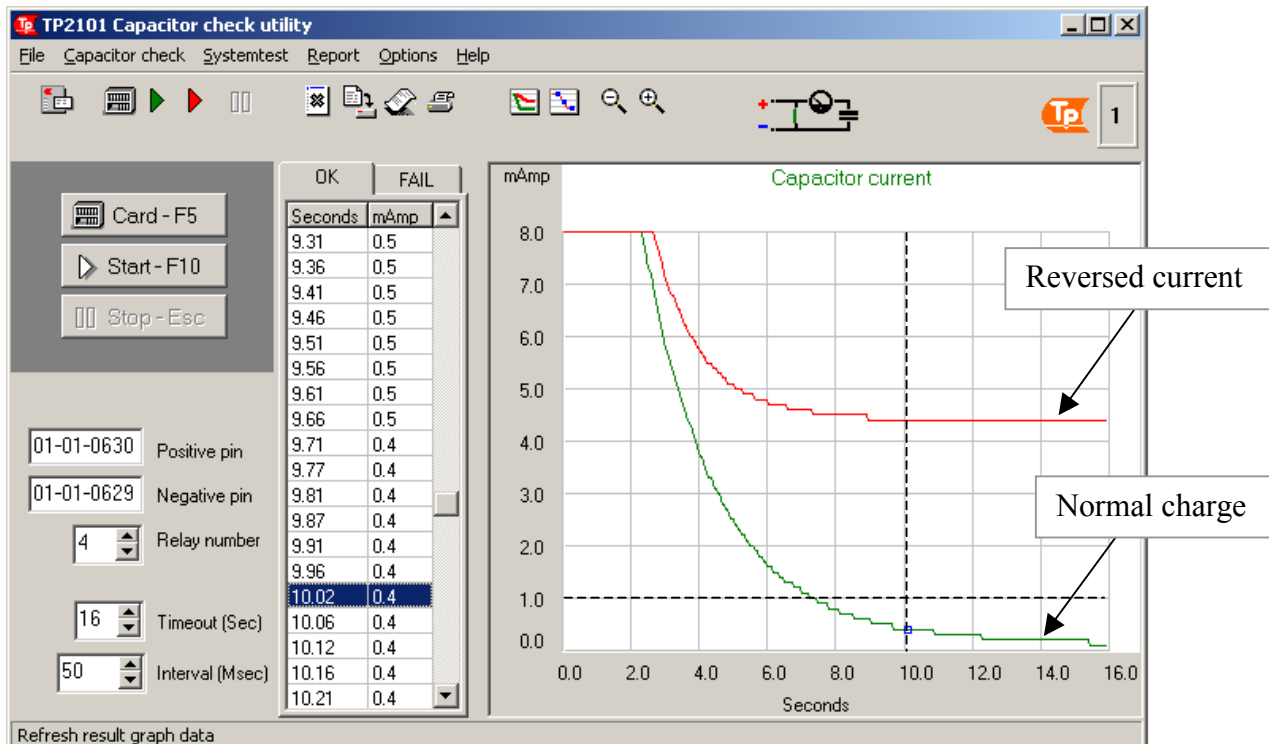
This shows an example for a 2200 microfarad capacitor. The correct result is the green waveform. In the reversed direction, the current never goes below 4.0 mAmp. This makes it easy to test the polarity of the capacitor. After 10 seconds the current should be around 0.4 mAmp.
Set Timeout parameter to for example 10 seconds and Current threshold to about 1.0 mAmp as below.
CHECK 01-01-0630 01-01-0629   4   10   1.0

A complete list of all the measurements is saved in the OK and FAIL lists. Select a sample in these lists to show the exact point on the waveform.

Note: Some types of capacitors does not show enough difference between normal and reversed current to do a stable test of the polarity. In these cases the test will of course detect if the capacitor is existing and ok, but the polarity must be checked visually by the operator!
Insert a TEXT command with a message to remind the operator:
TEXT Check polarity!

Appendix A Scannercard pin numbering

Although there are many different types of scannercards, all TP2101 pin numbering has the same format.

The format of a scannercard pin number is S-C-P where:

S   - the shelf number.
C   - the card position in the shelf.
P   - the pin number on the scannercard.

For example pin 3-02-0001 is pin number 1 on card 2 in shelf 3.

Appendix B Pin name file description

User defined names may have up to thirteen characters for every TP2101 pin number. To make up user defined names the pin name file uses the following items:

- Shelf tables
- Card tables
- Cardtype tables
- Pin tables
- Conversion table
- Divider1 and divider2
- End of file

A table consist of a heading, data and trailer.

Example:

Card table #01 Table for shelf 1.	←——	Heading
a,b,c,d;	←——	Data
End of table	←——	Trailer

The heading include the table name «Card table #01» and in addition there may be some comments like «Table for shelf 1».

The data must be separated by a comma and ended with a semicolon.

The trailer is always «*End of table*».

In addition there may be lines with only comments. A line with comments must always begin with a semicolon (;).

Description of the different tables.

Conversion table.

This table gives which shelf table, card table and cardtype table to use.

Example:

Conversion table	Explanation
01,02,03,04;	The first data shows the TP2101 controller number.
02,**02**,03,04;	The second data shows the shelf table number.
03,02,**03**,04;	The third data shows the card table number.
04,02,03,**04**;	The fourth data shows the cardtype table number.
End of table	For example 01,02,03,04; means:
	TP2101 controller 1, shelf table 2, card table 3 and cardtype table 4

Shelf table.

This table gives the name to use instead of the TP 2101 shelf number. It must contain the same number of data items as number of cards in the shelf.
Example:

```
Shelf table #01 Multi
01,01,01,01,01;
End of table
```

If all cards in the same shelf have identical shelf names, the «Shelf table single» may be used.
It must contain only one data item. A «Shelf table single» fills up every position in the table with the same data (shelf name).
Example:

```
Shelf table #01 Single
01;
End of table
```
$\longrightarrow$
```
Shelf table #01 Multi
01,01,01,01,01;
End of table
```

Card table.

This table gives the name to insert instead of the TP2101 card number.
Example:

```
Card table #01
A1,A2,A3,A4,A5;
End of table
```

Pin table.

This table gives the name to insert instead of the TP2101 pin number.
Example:

```
Pin table #01
A01,A02,A03,A04,A05;
End of table
```

Cardtype table.

This table indicates which pin table to use for the pin number name.
Example:

```
Cardtype table #01
1,2,1,2,1;
End of table
```

Dividers.

Dividers are used to divide the three different parts in the pin name.
Example:

```
        ➥ Divider 1
AA  : A1  - A03
            ➥ Divider 2
```

Technical data for the pin name file.

Table name	Max. no. of tables	Max. no. of items	Max. no. of characters in every data item (*)
Shelf table	9	64	3
Card table	9	64	4
Cardtype table	9	64	Contain numbers
Pin table	10	1024	10
Divider1	-	-	1
Divider2	-	-	1

(*) Total available characters in complete pin name are 13, including dividers.

Conversion of TP2101 pin numbers to user defined pin names.

For this example the rack has the layout shown in fig. A. It consists of three shelves equipped with two types of cards: 10 pins and 6 pins cards. The task is now to define a pin name file describing the linkage between the TP 2101 pin numbering format and the user defined names for this particular rack type.

Fig. A
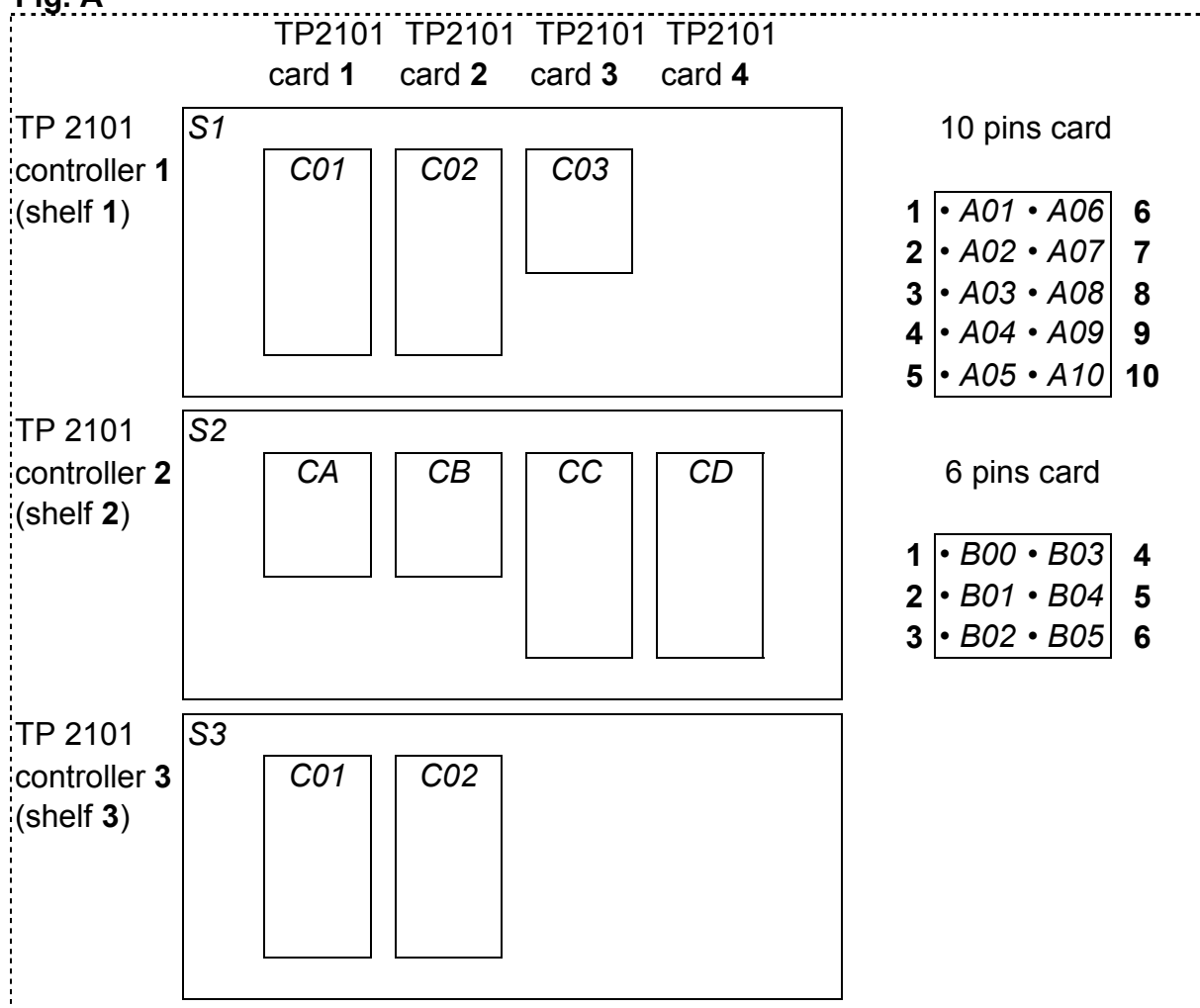
TP2101 numbers are shown in **bold**, while user defined names are shown in *italic* inside the rack and cards.

Referring to the rack in fig. A, first make all tables for shelf 1 in the rack:

Define shelf name for shelf 1.
A «Shelf table single» is used since all cards in shelf 1 will use *S1* as shelf name.
Shelf names may be any combination of letters and figures of up to three characters.

```
Shelf table #01 Single
S1;
End of table
```

Define card names for cards in shelf 1.
Card names are put in table positions directly related to its TP2101 card number.
(1,2,3...32). Card1 = *C01*, card2 = *C02*, card3 = *C03* ...
Card names may be any combination of letters and figures of up to four characters.

```
Card table #01
C01,C02,C03;
End of table
```

Define all types of cards in the system, one table for each cardtype.
Pin names are put in table positions directly related to its TP2101 pin number.
(1,2,3...1024)
Pin1 = *B00*, pin2 = *B01*, pin3 = *B02*, pin4 = *B03*, pin5 = *B04*, pin6 = *B05*.
Pin names may be any combination of letters and figures of up to ten characters.

```
Pin table #01 for 6 pins cards.
B00,B01,B02,B03,B04,B05;
End of table

Pin table #02 for 10 pins cards.
A01,A02,A03,A04,A05,A06,A07,A08,A09,A10;
End of table
```

Define card types for shelf 1.
Put in one of the two pin table numbers above describing the card in table position
directly related to the TP2101 card number. Card1 = 10 pins, card2 = 10 pins, card3
= 6 pins.

```
Cardtype table #01
2,2,1;
End of table
```

Define conversion table for shelf 1.
All necessary tables for describing shelf 1 is now finished. Combine these in the
conversion table: TP 2101 controller 1 (shelf 1), shelf table 01, card table 01,
cardtype table 01.

```
Conversion table
```

```
01,01,01,01;
End of table
```

Use the same procedure for shelf 2 and 3, and get the finished pin name file.
Each shelf (TP2101 controller) has its own line in the conversion table, beginning
with TP2101 controller number followed by three tables of any combination. Added
tables needed to describe shelf 2 and shelf 3 are in **bold** characters.

```
Shelf table #01 Single
S1;
End of table
Shelf table #02 Single
S2;
End of table
Shelf table #03 Single
S3;
End of table
Card table #01
C01,C02,C03;
End of table
Card table #02
CA,CB,CC,CD;
End of table
Pin table #01 for 6 pins cards.
B00,B01,B02,B03,B04,B05;
End of table
Pin table #02 for 10 pins cards.
A01,A02,A03,A04,A05,A06,A07,A08,A09,A10;
End of table
Cardtype table #01
2,2,1;
End of table
Cardtype table #02
1,1,2,2;
End of table
Conversion table
01,01,01,01;
02,02,02,02;
03,03,01,02;
End of table
```

Define dividers.

The user may use the existing dividers or define new ones.

These characters separate the three parts in the pin name: *S1 : C01 - A01*

```
Divider1 = :
Divider2 = -
```

Terminate the pin name file.

```
End Of File
```

Special pin name file features.

Multiple shelf table names.
In most cases all cards in the same shelf uses identical shelf names. In such cases use the «Shelf table single» with only one data item.
However if one or more cards should have individual shelf names in the same shelf, the «Shelf table multi» must be used. One data item for each card in the shelf must be added defining shelf names to be used.

Example:

Shelf table #01 Multi *S1,X00,S1;* End of table
Card table #01 *C01,C02,C03;* End of table
Pin table #01 for 6 pins cards. *B00,B01,B02,B03,B04,B05;* End of table
Cardtype table #01 2,2,1; End of table
Conversion table 01,01,01,01; End of table
Divider1 = **-** Divider2 = **-**
End of file

These examples makes use of the pin name file above:

TP 2101 pin number	$\longrightarrow$	User defined pin name
1-01-0001	$\longrightarrow$	*S1-C01-B00*
1-02-0003	$\longrightarrow$	*X00-C02- B02*
1-03-0004	$\longrightarrow$	*S1-C03-B03*

Disable shelf name and card name.

Shelf or card names may in some cases be irrelevant and not required in the presentation of a pin name. Use @ for this purpose. Used in the shelf table or card table, the character @ accordingly disables the use of shelf name or card name.

Example:

```
Shelf table #1 Multi
@,1,@,1,1;
End of table

Card table #1
a,@,@,d,e,f;
End of table

Cardtype table #1
1,1,1,1,1;
End of table

Pin table #1
A1,A2,A3,A4,A5,A6,A7,A8,A9,A10;
End of table

Conversion table
01,01,01,01;
End of table

Divider1 = /
Divider2 = -

End of file
```

These examples makes use of the pin name file above:

TP 2101 pin no.	User defined pin name	Explanation
1-01-0001	a-A1	No shelf name and no divider1
1-02-0002	1/A2	No card name and no divider2
1-03-0003	A3	No shelf name, card name or dividers
1-03-0004	1/d-A4	Show all information

Appendix C TP2101 text format conversion syntax

Net list commands: 5 parameters

Functional test description	Parameter 1	Parameter 2	Parameter 3	Parameter 4	Parameter 5
	Net index	Net name (optional)	Command	Pin	Pin name (optional)
Start of net	1 - 999999	13 characters	NET	01-01-0001	13 characters
Start of subnet	none	none	SUB	01-01-0001	13 characters
Pin	none	none	none	01-01-0001	13 characters
			Command	Discharge	Charge
Net delays	none	none	DELAY	100-999 US 1-999 MS	100-999 US 1-999 MS
			Command		
Reset delays	none	none	RSTDELAY	none	none
			Command	Level (Kohm)	
Insulation level	none	none	INSULLEV	600-15000	none
			Command	Level (ohm)	
Continuity level	none	none	CONTLEV	0-99	none

Text examples:
Use comma (,) or semicolon (;) as parameter separators in Net-, Resistor- and Capacitor-list.
Include all separators even if parameters are empty.

Net list (* . XIN)
The Netname and pinname text is optional parameters.


```
1,      SIGNA,      NET,          01-01-0001,   00-AA1,
2,      SIGNB,      NET,          01-01-0002,   00-AA2,
,       ,           DELAY,        500 us  10 ms,
3,      GROUND,     NET,          01-02-0005,   00-AA5
,       ,           ,             01-02-0006,   00-AA6,
,       ,           ,             01-02-0406,   00-AB256,
,       ,           RSTDELAY,
4,      POW,        NET,          01-01-0064,   00-AC01,
,       ,           ,             01-01-0065,   x,
,       ,           SUB,          01-02-0002,   Pow1A,
```

Resistance/Diode commands: 9 parameters

Description	Par1	Par2	Par3	4	Par5	6	Par7	Par8	Par9
	Command	Net index	Positive pin	name	Negative pin	name	Value (OHM)	+Tolerance (%)	-Tolerance (%)
Resistor	RES	1-999999	01-01-0001		01-01-0001		0–150000 0-150 KOHM	0 - 99	0 – 99
Diode	DIO	1-999999	01-01-0001		01-01-0001		0-150000 0-150 KOHM	0 - 99	0 - 99

Resistance list (* . XIR)
RES,   4,   01-01-0064, 00-AC01,   01-02-0002, POW1A ,   15 Kohm,   10, 10,
DIO,   4,   01-01-0064,   ,   01-05-0033, x,   560 ohm,   10 ,10,

The pinnames are just for information.

Capacitance command: 9 parameters

Description	Par1	Par2	Par3	4	Par5	6	Par7	Par8	Par9
	Command	Net index	Positive pin	name	Negative pin	name	Value (pF) pF=picoF nF=nanoF uF=microF	+Tolerance (%)	-Tolerance (%)
Capacitor	CAP	1-999999	01-01-0001		01-01-0001		100–150000 1-999 nF 1-90 uF	0 - 99	0 – 99

Capacitance list (* . XIC)
CAP,   4,   01-01-0064, 00-AC01,   01-02-0002, POW1A ,   7 uF,   10, 10,

The pinnames are just for information.

Card configuration list (* . XID)
s1-s10.. marks number of shelf (controller)
```
Position 1 to 32 sets scanner card type number according to listposition in the
Cardtype configuration dialog.

S1     3 2 1 1 1 1 1 1 1 1 1 1 2 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
S2     2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```