I.Scan / Spectral Service tool

INSTALLATION AND DIAGNOSTIC TOOL

User manual

PHA300777-1

INDEX

DESCRIPTION

The **I.Scan** / **Spectral Service Tool** (part number 640100015) and the software **Test I.Scan** and **Test Spectral** enable System Sensor and Autronica addressable loops from the Controlmaster range to be tested:

- Identification of addresses and any problems on this loop as open circuit, duplicate address…
- Test of an address (integrated and remote indicator command, self-test, measurement of the analog value, etc.)
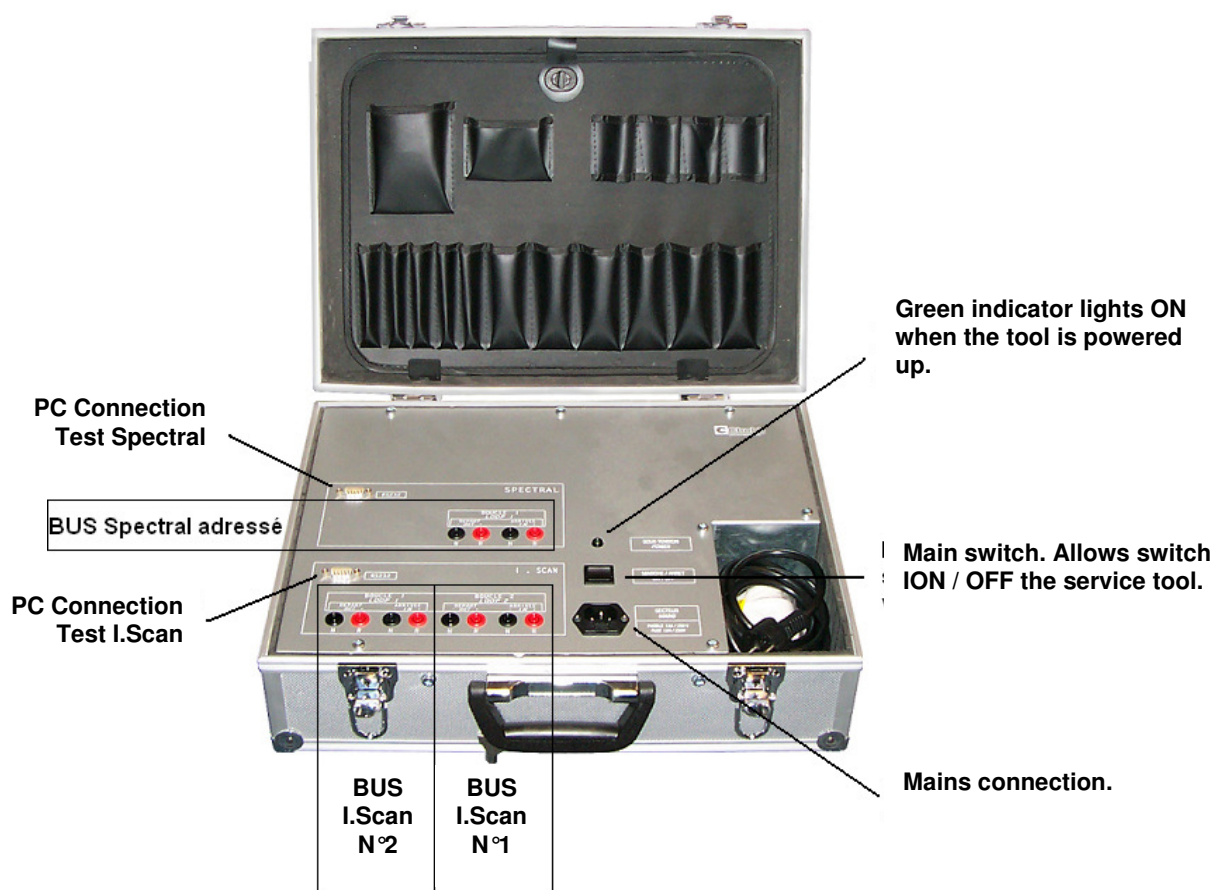
EQUIPMENT

Overall dimensions: 367 x 290 x 145 mm

Backed-up mains power supply, with battery autonomy greater than 12 hours.

Delivered with:

- Installation manual
- Serial cable,
- Mains lead of length 2.5 m with mains plug for France and adapter for England.
- Bag of connectors
- Female / female Null modem

Green indicator lights ON when the tool is powered up.

PC Connection Test Spectral

BUS Spectral adressé

PC Connection Test I.Scan

Main switch. Allows switch ION / OFF the service tool.

Mains connection.

BUS I.Scan N°2

BUS I.Scan N°1

PCA301090-1

CONNECTING THE SERVICE TOOL

The loop to be tested shall be connected directly on the **I.Scan / Spectral Service Tool** using dedicated pins **Spectral Loop** or **I.Scan loop**.

One of the serial ports of the computer is then to be connected to the tool.

The **I.Scan / Spectral Service Tool** must be powered using the mains connector. UK adaptor is provided.

⚠️ **All connections must be made with the power off. When the tests have been carried out, the tool must be switched off before disconnecting the loops and passing on to the following tests.**
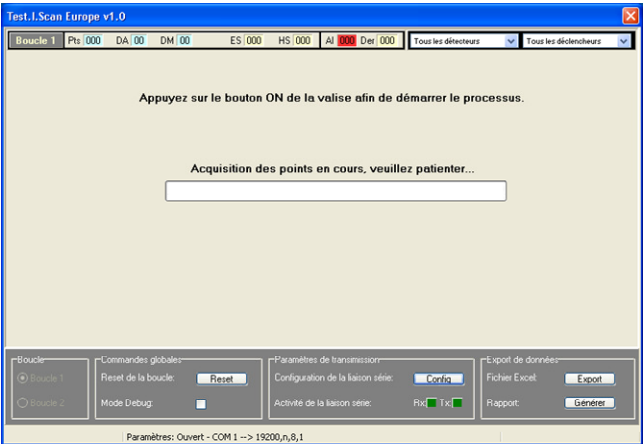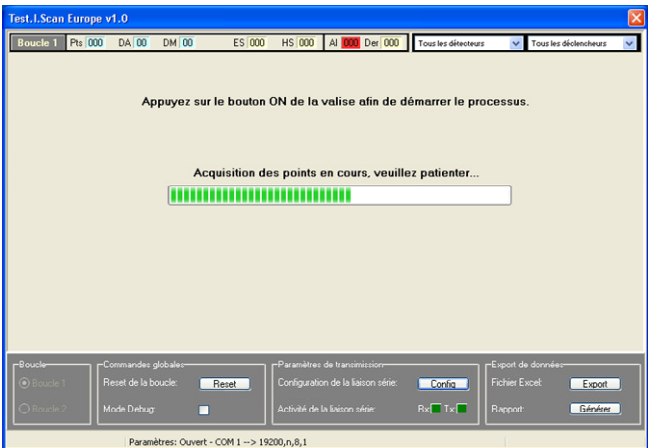
PART I

SYSTEM SENSOR LOOP CONNECTED DEVICES

POWERING ON THE TEST I.SCAN

⚠️ **Test I.Scan shall be used for System Sensor loop connected devices. For Autronica devices please refer to the corresponding chapter POWERING ON THE TEST SPECTRAL**

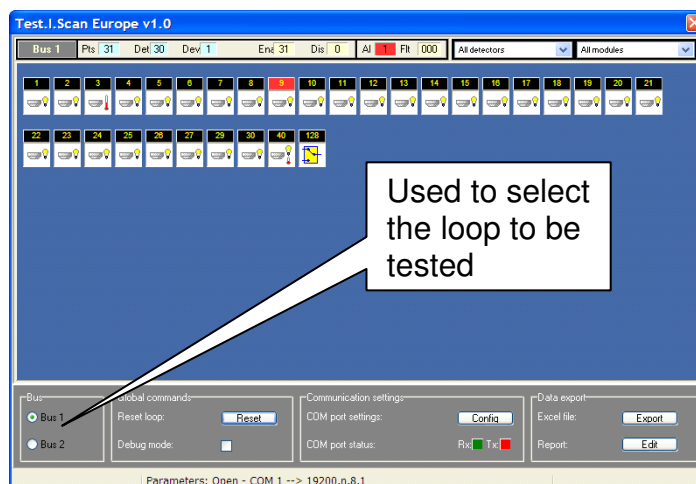Display when the **Test I.Scan** is powered off:

Display after switching on using the on/off button of the **I.Scan / Spectral Service Tool:**

Display at the end of the time needed for reading points.

By default, the data of the first addressed loop is displayed,

The "loop" menu allows the user to select the loop to be tested.

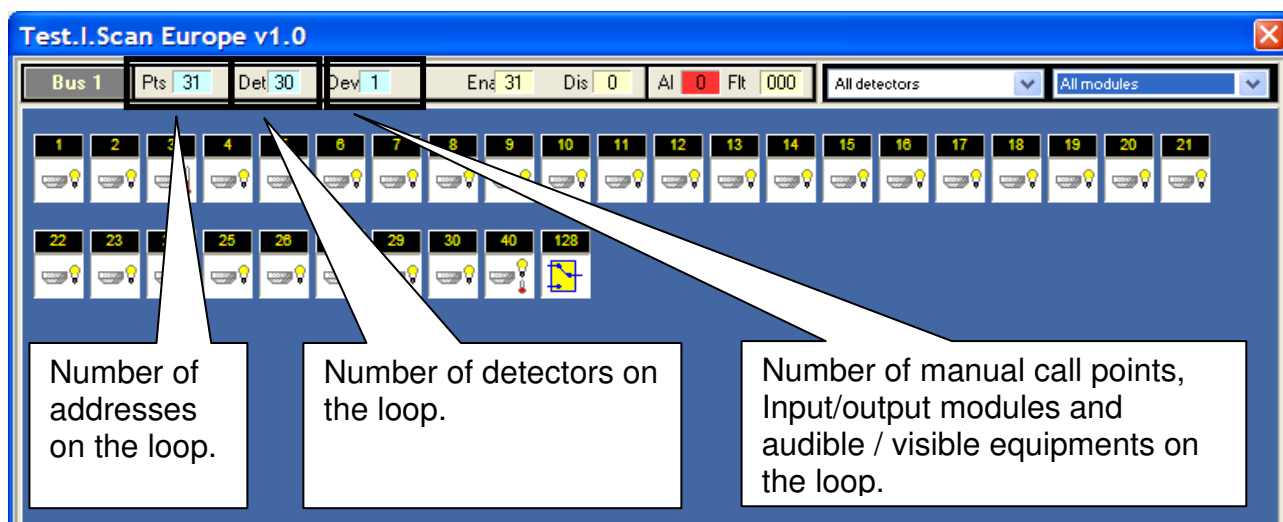Used to select the loop to be tested

GENERAL FUNCTIONS

Identification of loop addresses

The **I.Scan** / **Spectral Service Tool** can be used to identify loop addresses.

The addresses are coded by code wheels on the detectors, call points and inputs/outputs. The addresses of the manual call points and outputs are displayed with the value coded by the code wheels + 100 (for example, a manual call point coded 25 by the wheels will be displayed as 125)
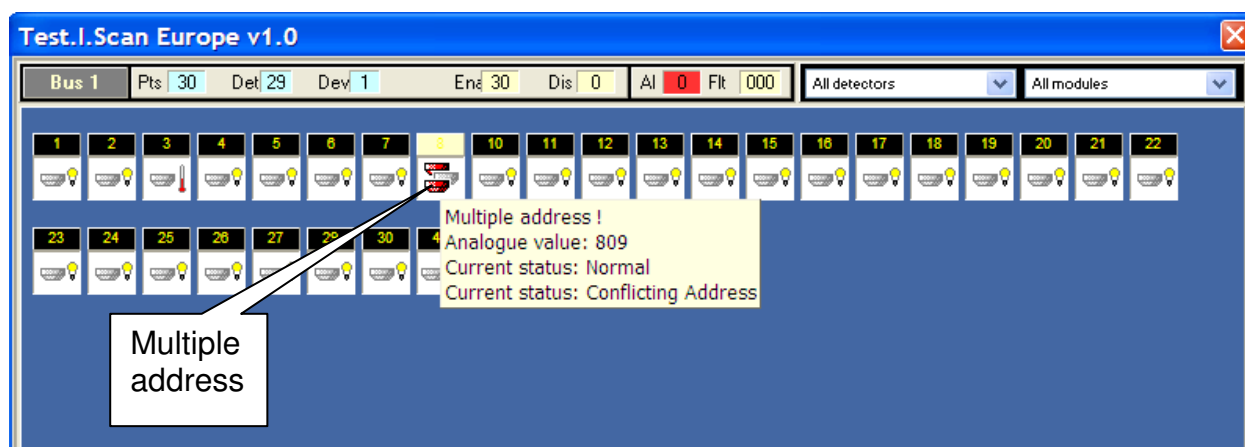
For practical reasons, the addresses are displayed in increasing numerical order.

The detectors, call points and inputs/outputs are represented by the symbols described in appendix 2.
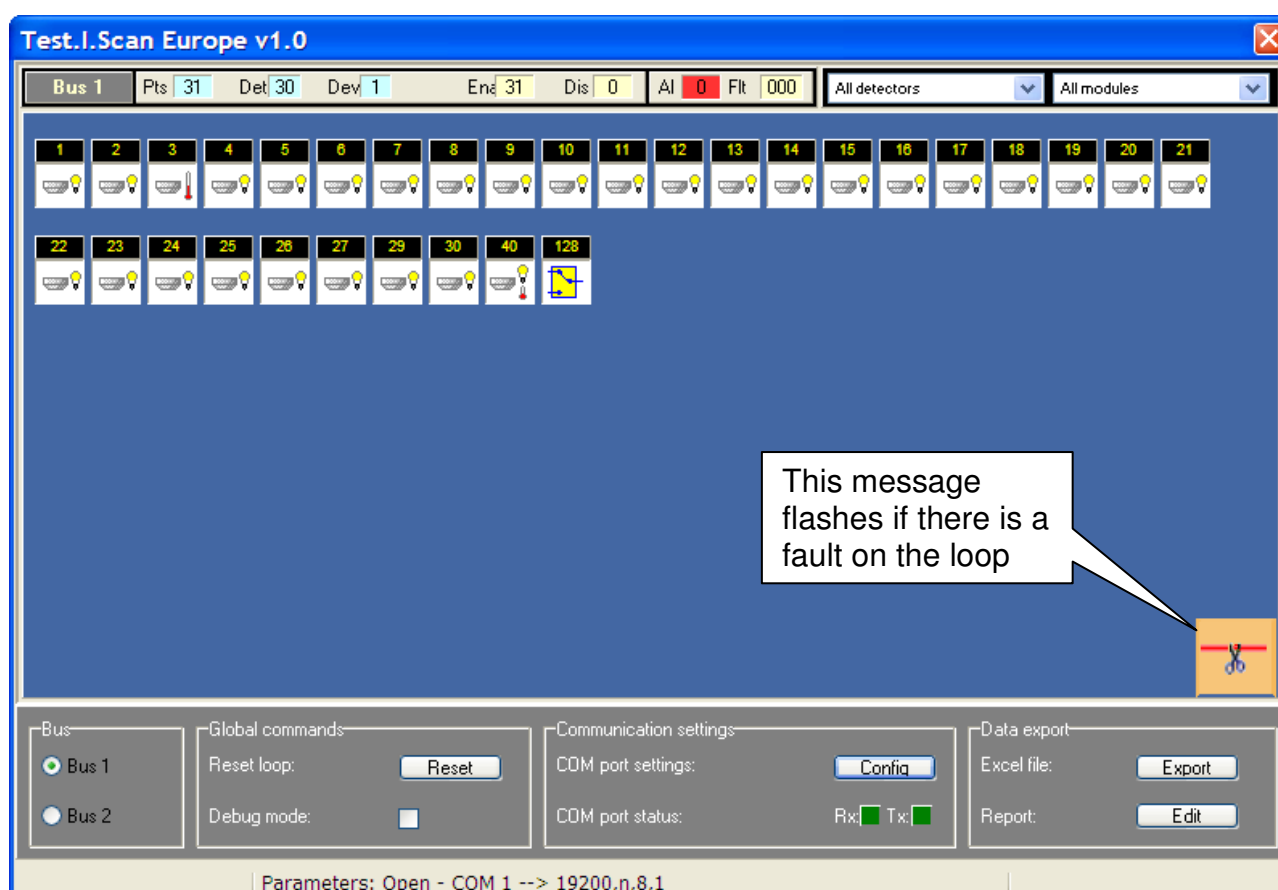

Number of addresses on the loop.

Number of detectors on the loop.

Number of manual call points, Input/output modules and audible / visible equipments on the loop.

There is no link between these addresses and the position of the detector, call point etc. on the loop.

Display showing a duplicate address
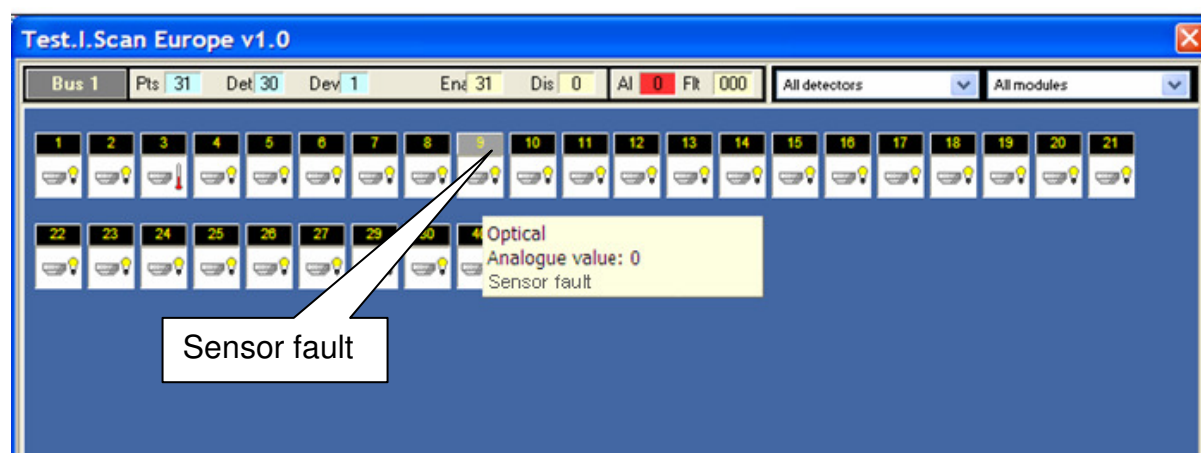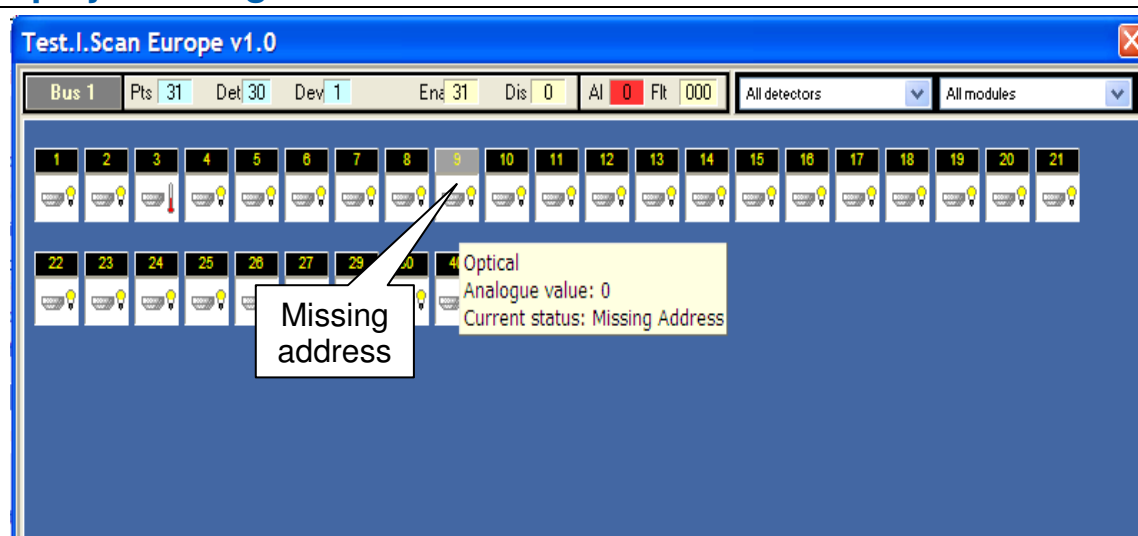

Multiple address

Multiple address !
Analogue value: 809
Current status: Normal
Current status: Conflicting Address

Display showing a fault on the loop

This message flashes if there is a fault on the loop

Display showing a faulty detector

Sensor fault

Display showing an address which has been removed


Missing address

Accessing the data for an address

Positioning the mouse on an address shows the type of address and its main characteristics

Right-clicking an address brings up the commands associated with this address. The commands differ according to the type of address.

Example of commands accessible for a laser type detector (depending on the type of detector, certain commands may not be available.
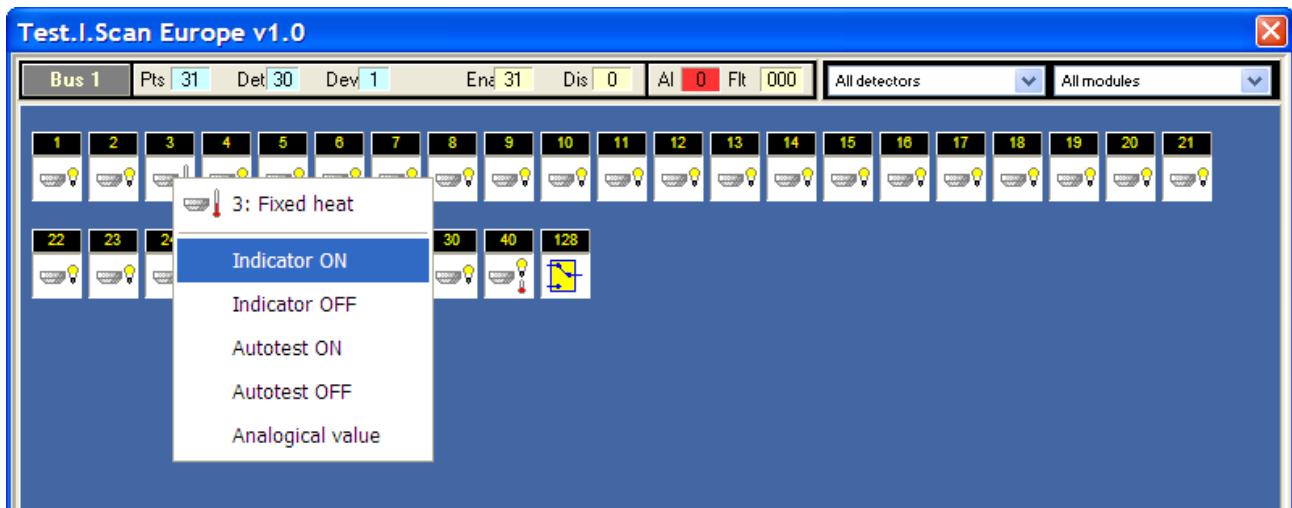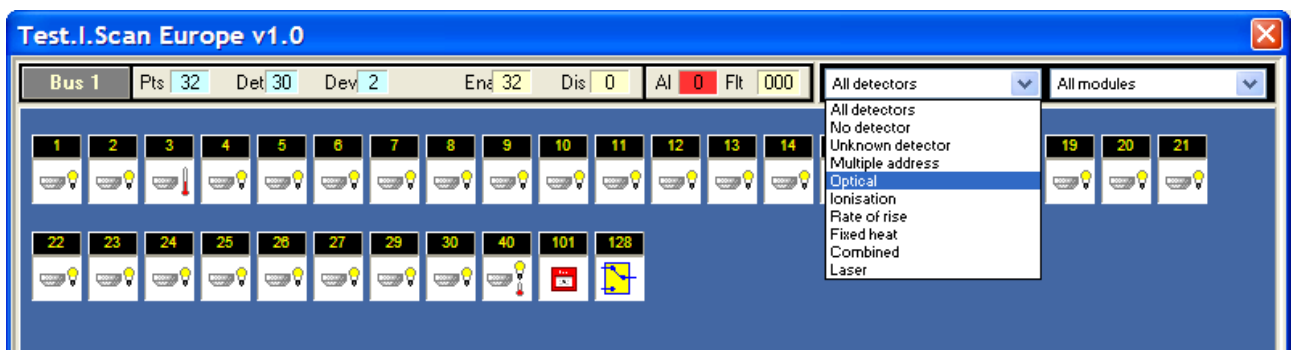
Commands associated with call points.
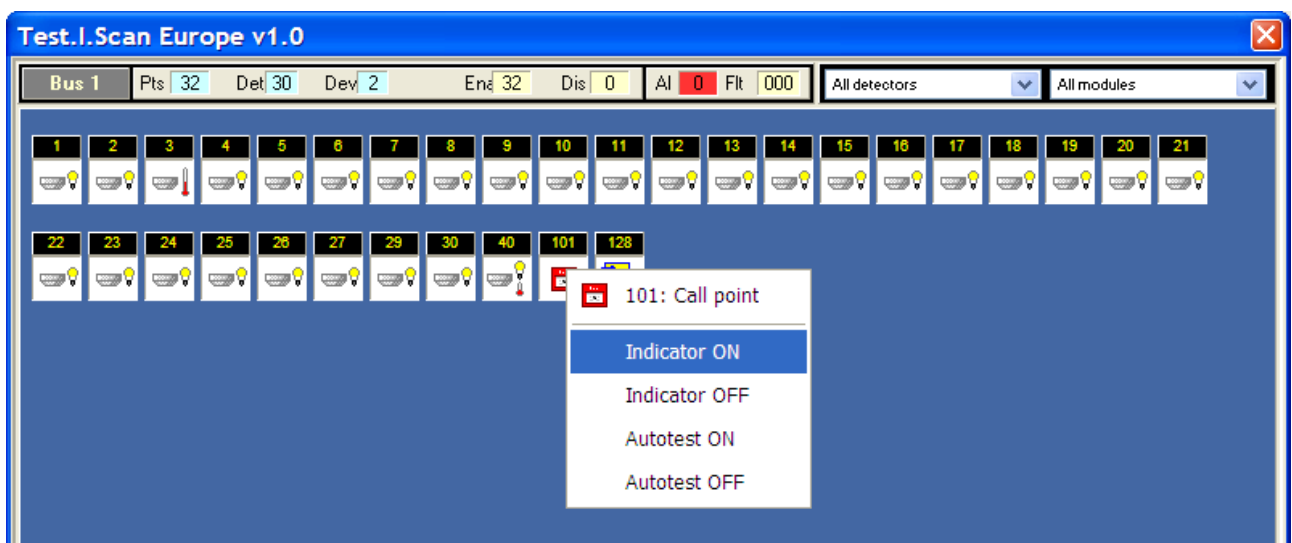
Note: the commands "Autotest ON" and "Autotest OFF" are not functional on call points.
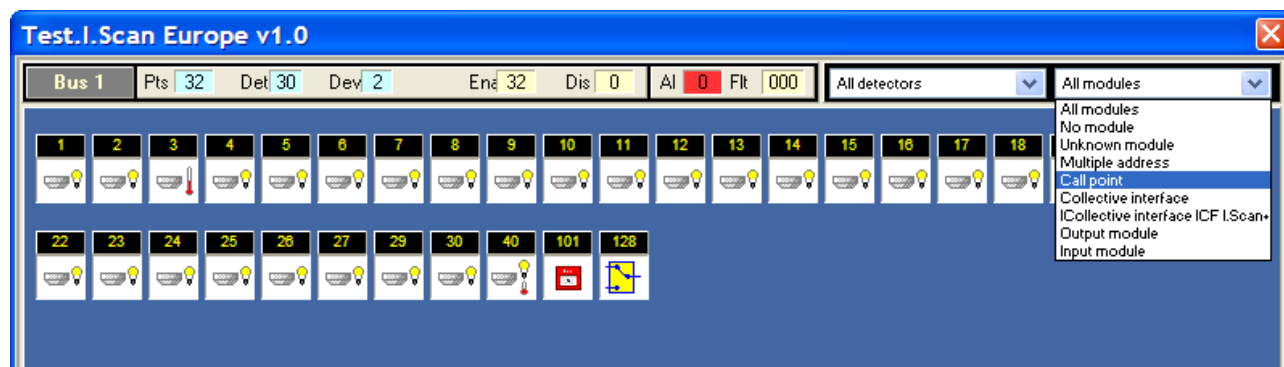
Display filtering
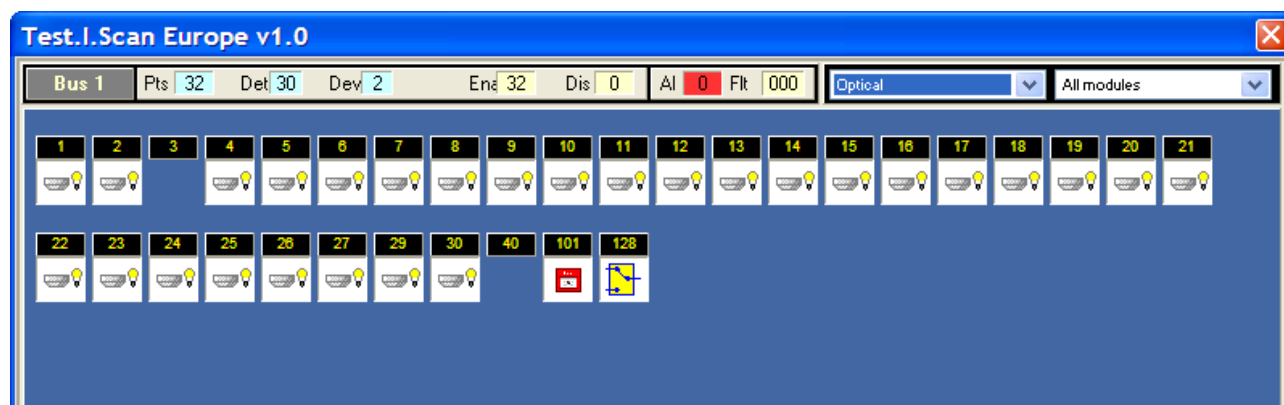
The addresses displayed may be filtered.

Detector filtering menu:

Call point and input/output module filtering menu:

Example of filtering result:

To make it easier to check the loop, the icons of addresses excluded by filtering are no longer displayed, but their numbers remain visible.

Note on the address test

In local test mode:
- Detectors using the electromagnet
- Call points activated manually

Details are given on the screen.

To continue the tests, the user must:
- Either assign an OFF self-test for this address or,
- Reset the loop

TESTING AN ADDRESSED LOOP

This menu allows the user to test all the addresses of a loop by sending them successively a command to turn on their integrated alarm indicator and alarm indicator output.

The command acts on an address for about 5 seconds then the system automatically passes on to the next address.

When the system reaches the test for the last address on the loop, it automatically goes back to the test on the first address on the loop.

To start this test, check the "Debug mode" box.

The red dot indicated the address under test

Select to start the test
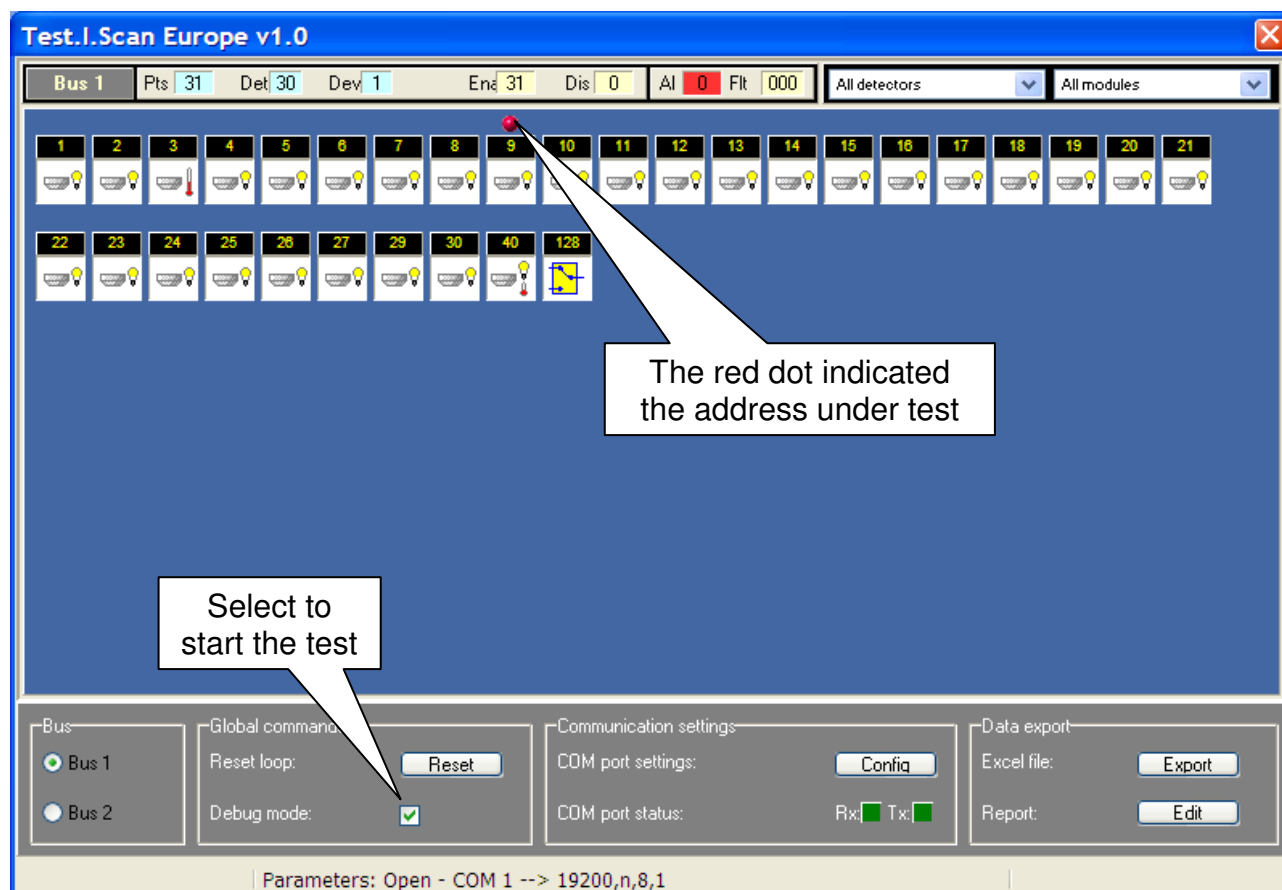
By following the loop, it is easy to identify addresses which are not working as their LED and alarm output indicator do not turn on. The user must then check:

- The address (if there is duplicate addressing, the LEDs of all the detectors are turned on)
- The wiring

If the problem cannot be resolved, replace the address.

To finish this test, uncheck the "Debug mode" box.

TESTING A DETECTOR

Alarm indicator command

This command activates the alarm indicator integrated in the detector and at the action indicator output.

The command is given by right-clicking the address then selecting "Indicator ON" from the menu

The command is terminated by selecting "Indicator OFF" from the menu.

The red dot indicates the address is being tested
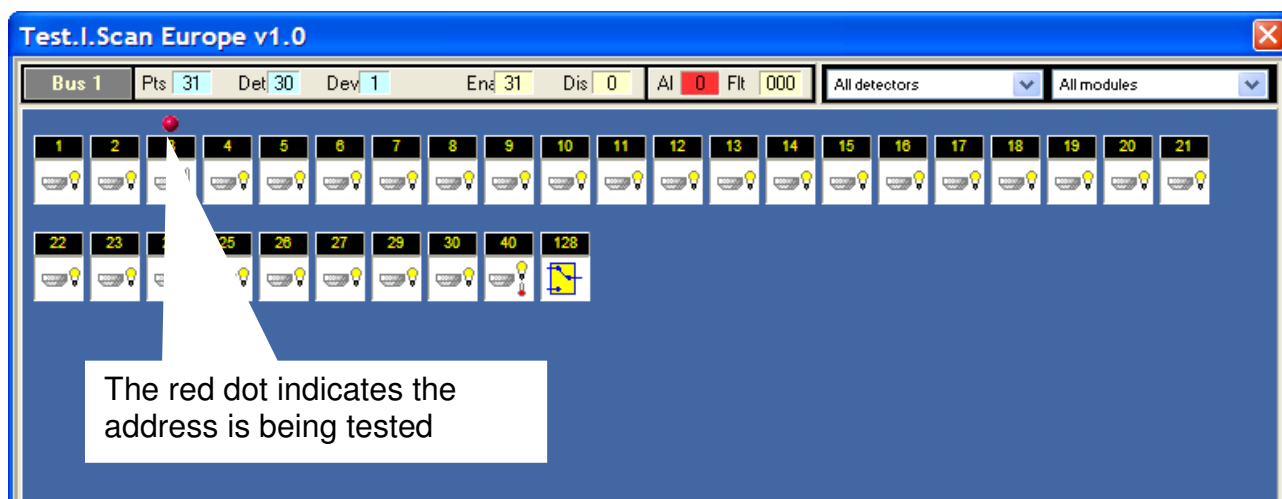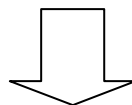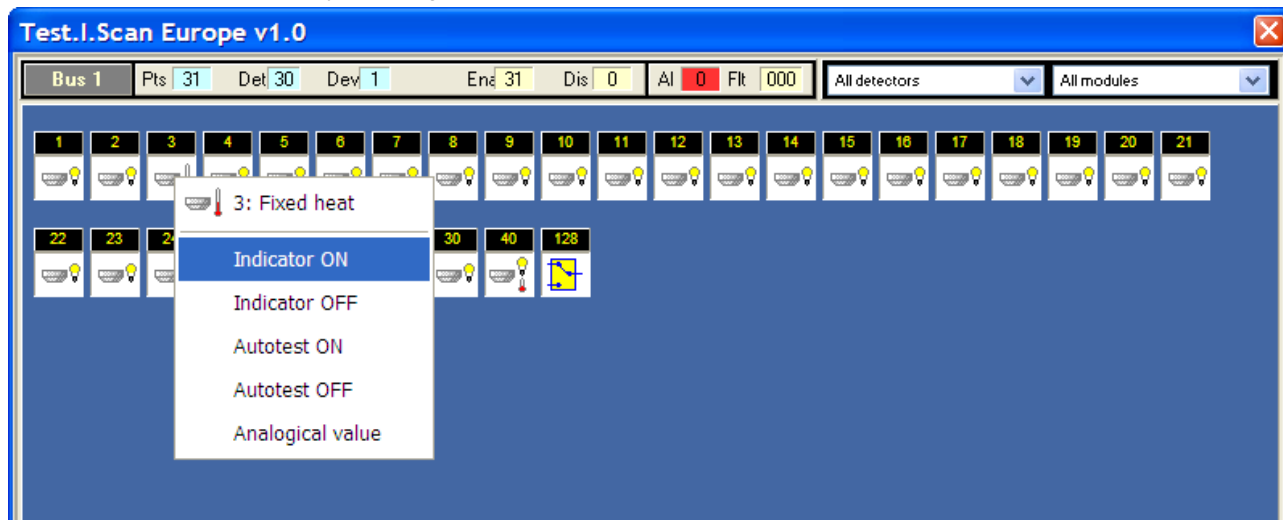
AUTOTEST COMMAND

This test only applies to detectors

This command makes the detector simulate a signal representing a fire alarm condition.

- The command is given by right-clicking the address then selecting "Autotest ON" from the menu. The signal from the address is given after a few seconds
- The command is terminated by selecting "Autotest OFF" from the menu. The return to standby signaling is given after a few seconds (during this time delay, the indicator flashes)

The red rectangle indicates that the address being self-tested has changed to alarm mode.
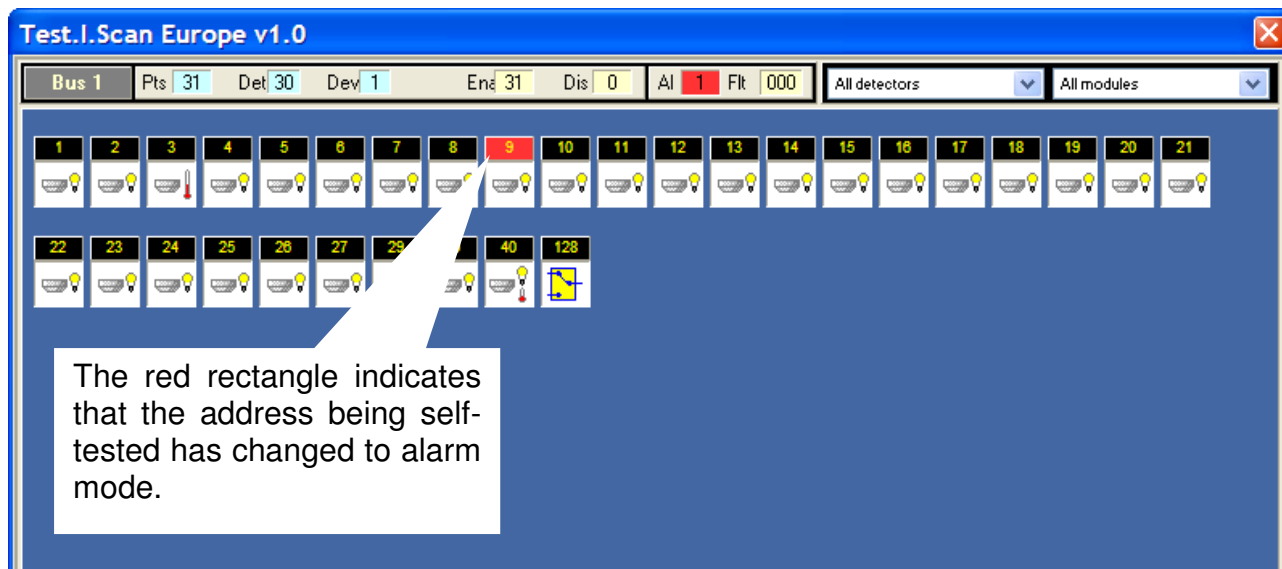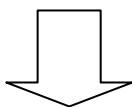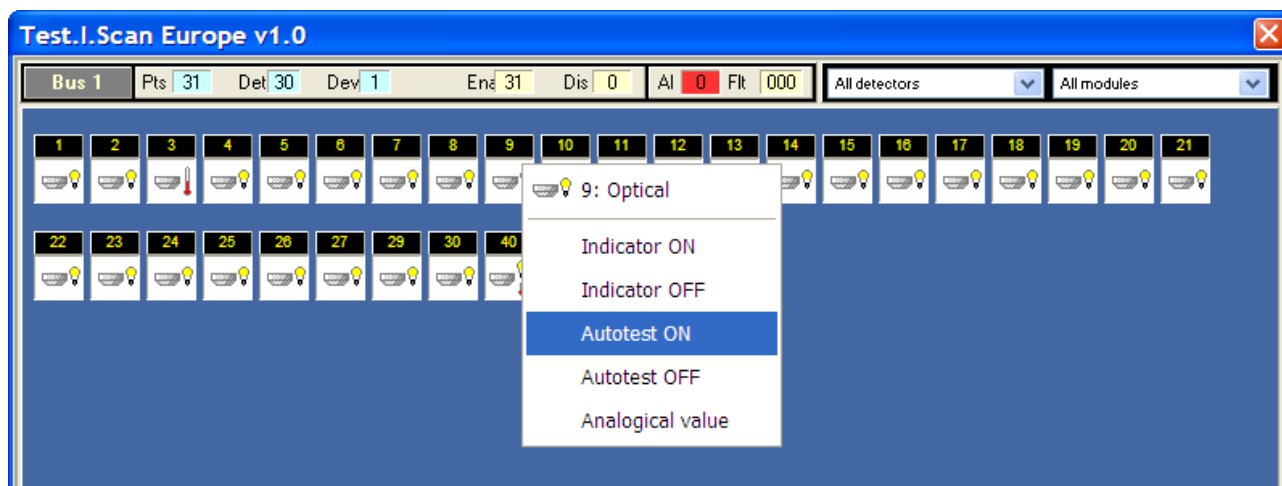
Note:

- the result of the self-test and the result of the test using the electromagnet are identical
- If a detector is dirty, it may change to fault following the test

Accessing the analog value

This function gives the user access to the analog value of the sensor. The chart is also used to indicate the alarm thresholds (the number of alarm thresholds differs according to the type of detector).

- The command is given by right-clicking the address then selecting "analogical value" from the menu
- The command is terminated by selecting "close" from the menu.
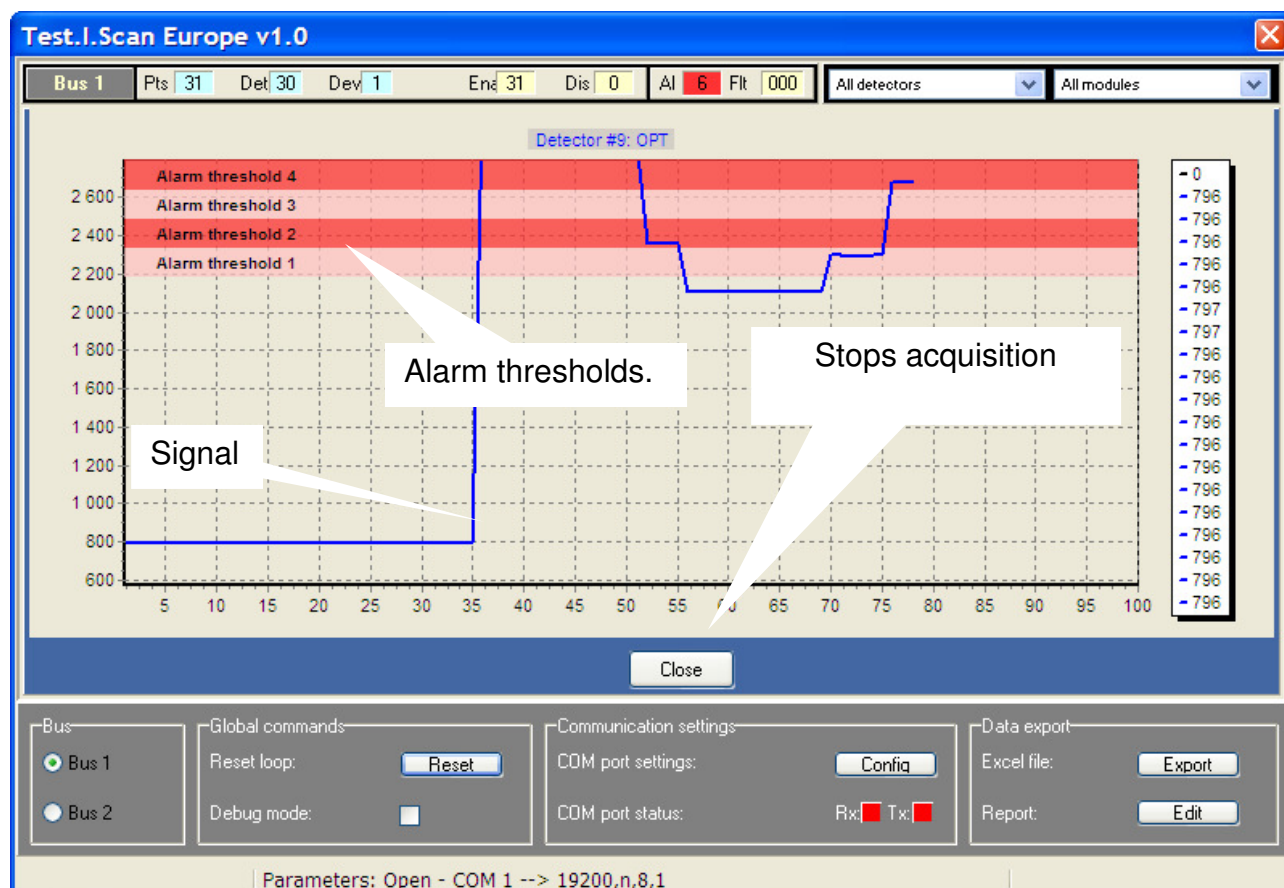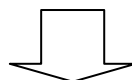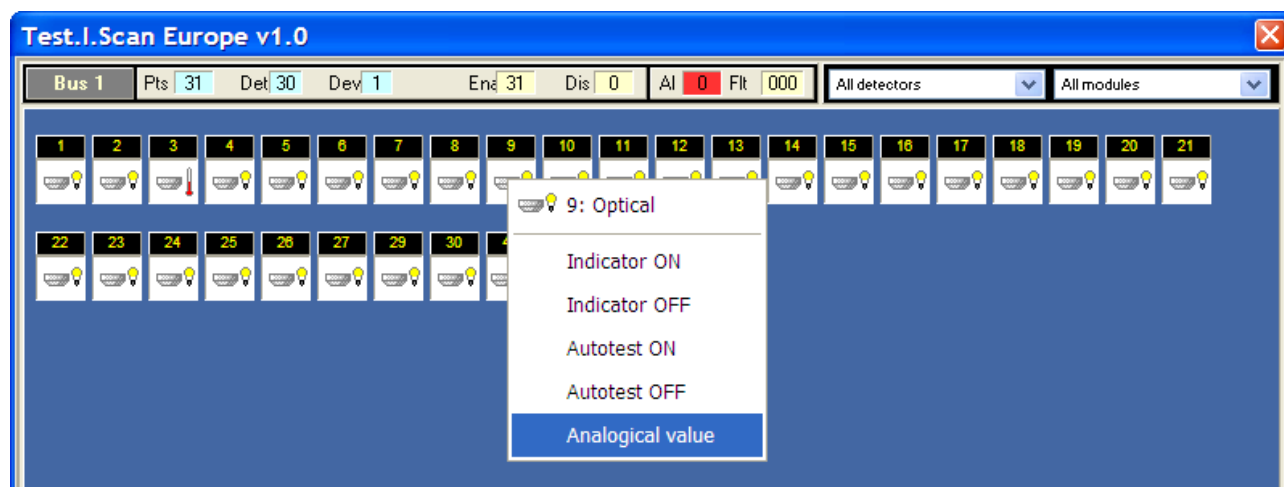
TESTING A MANUAL CALL POINT

An action indicator is tested in the same way as the alarm indicators for a detector

TESTING AN OUTPUT

This command tests an output.
- The output command is given by selecting "Tone 1 / Output ON" from the menu
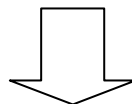- The command is terminated by selecting "Output OFF" from the menu.
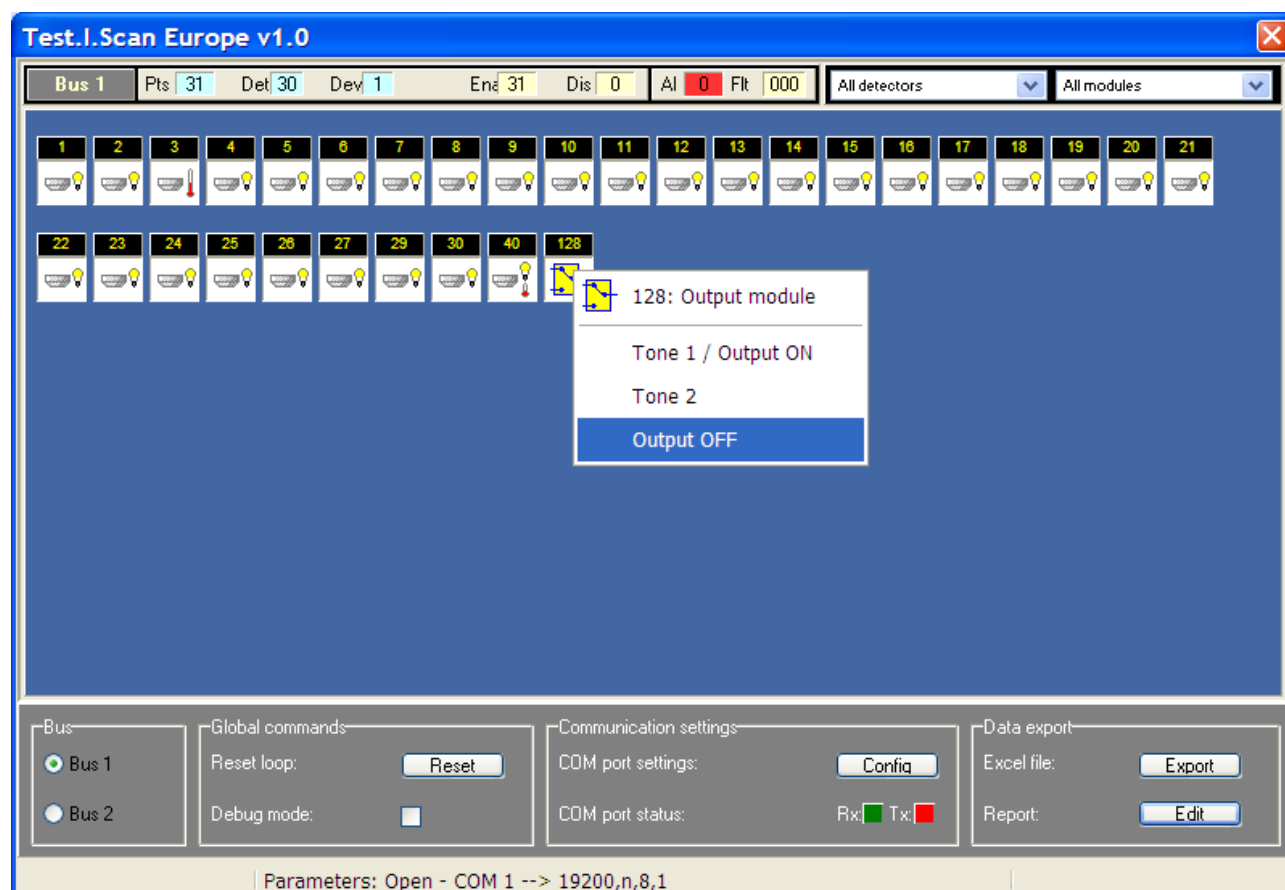
REPORTS

I.Scan / Spectral Service Tool generates two types of report.

■ A report of the addresses identified on the addressed loop. This report may be used to create Chubb expert site data.

■ A report of addresses with the corresponding analog values.

Report for analogue values
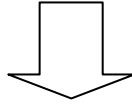
Address	Address type	Analogue value (03/12/2007)
1	Optical	801
2	Optical	770
3	Fixed heat	933
4	Optical	798
5	Optical	801
6	Optical	800
7	Optical	800
8	Optical	799
9	Optical	796
10	Optical	801
11	Optical	801
12	Optical	800
13	Optical	801
14	Optical	800
15	Optical	800
16	Optical	801
17	Optical	802
18	Optical	801
19	Optical	801
20	Optical	801
21	Optical	800
22	Optical	800
23	Optical	801
24	Optical	801
25	Optical	801
26	Optical	802
27	Optical	804
29	Optical	801
30	Optical	870
40	Combined	800
128	Output module	

SETTING TRANSMISSION PARAMETERS

The transmission parameters for data exchanged between the PC and the *System Sensor service tool* are preset. It is however possible to change them by selecting the "config" menu.
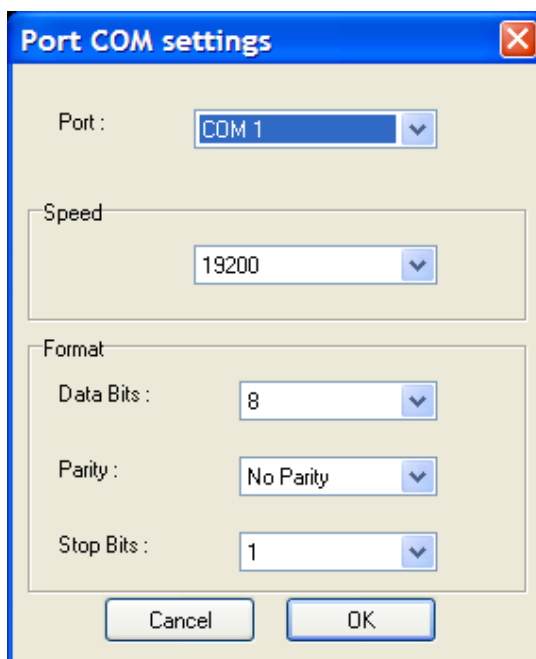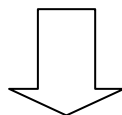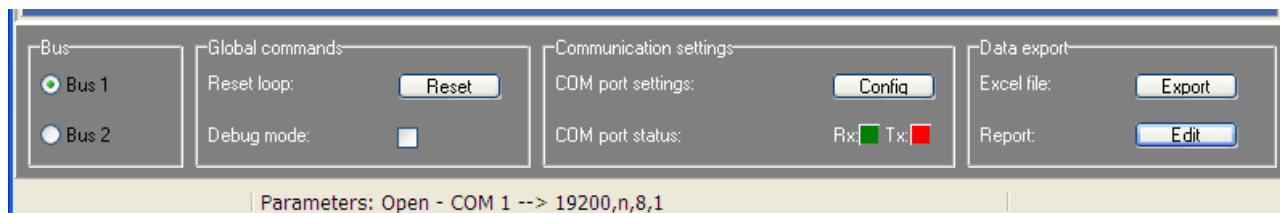
SYMBOLS

⊟⚡ Ionic

⊟💡 Optical

⊟🌡 Heat

⊟💡 Combined

▦ Conventional interface

⊟✳ Optical laser

⎗---⌐ Optical beam

▭ Optical beam

▤ Multiple address

✂ Bus fault

PART II

AUTRONICA LOOP CONNECTED DEVICES

MINIMUM PC-REQUIREMENTS

⚠ **Test I.Scan shall be used for System Sensor loop connected devices. For System Sensor devices please refer to the corresponding chapter POWERING ON THE TEST I.Scan**

- Intel 486 DX 100MHz or higher, when not running SMVCurves facility
- Intel Pentium 133Mhz or higher, running all facilities available
- Windows 95 or Windows NT
- 32Mb of RAM is recommended
- Monitor with resolution of 1024 x 768 hicolor (16 bit), is recommended
- Mouse or other pointing device

THE "TOPOLOGY" WINDOW

The Topology window is the first window most users will access, in order to get a graphical view of the AutroSafe loop. Before TEST SPECTRAL has presented a loop in the topology window, most of the TEST SPECTRAL commands are without meaning.

Select Loop Driver
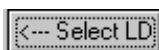
The **Select Loop Driver** button allows you to select which loop driver module (BSD-310 / BSD-311) or other module (for example, communication Module BSL-310 or Output Module BSJ-310) to communicate with. By default, loop driver 1 (LD1) is selected.

When pressing the **START** button (see next chapter) a graphical presentation of the selected module will appear. The examples below show two different presentations.

⚠ **The default loop driver selection BSD-310 shall not be modify**

Example: A Loop Driver BSD-310 has been selected
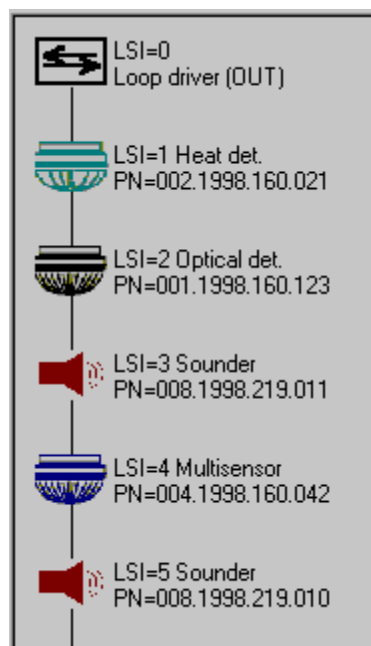
Example: Communication Module BSL-310 has been selected
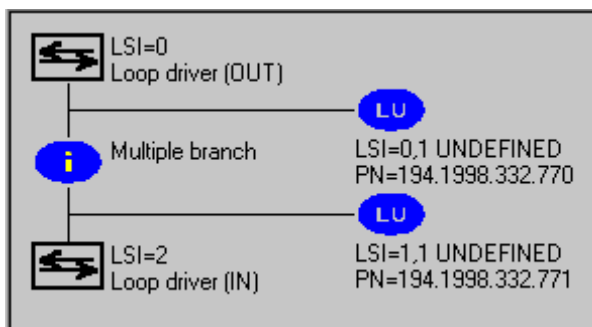
The START Button

Pressing the **START** button tells *Test Spectral* to find all points connected to the selected loop driver, and present them graphically in a correct electrical sequence. Points will be presented with unique symbols for each type, and with important information such as Production Number (PN), and the Loop Sequence Index (LSI). In case of illegal topologies, like multiple branch-off and loop break, these will be presented with self-explaining symbols.

For a complete list of symbols available, see the corresponding chapter.

As long *Test Spectral* is searching for new points on the loop, a flashlight will sweep across the screen, and the **START** button will change to a STOP button.

Each time Test Spectral finds something irregular; it will beep, and in some cases terminate the topology scan with an error message. When topology is completed, *Test Spectral* tests for break in the positive wire. If there is a break, the position can be located automatically. This will take less than 20 seconds.
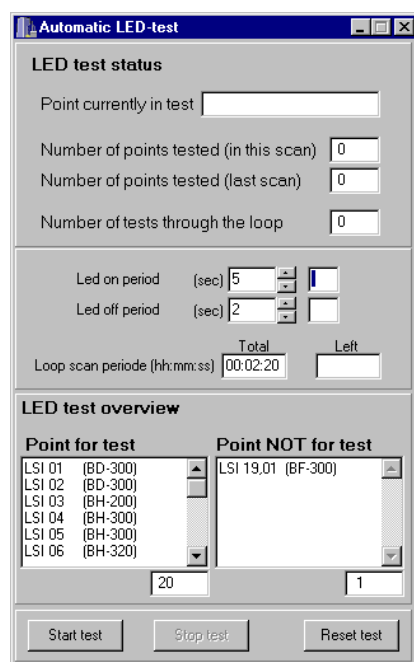
The STOP Button

Pressing the **STOP** button, forces *Test Spectral* to stop the topology scan which has been started. When this button is pressed, topology presented on screen may be incorrect. Pressing **START** again will clear all points and start powering up from the beginning.

Test LEDs Button

This function will be available when *Test Spectral* has a loop up and running (Visible in the topology window). When the test is started, *Test Spectral* will come up with a new window (see the figure below), and all other functions will be blocked until this test is finished.

The test will start with LSI 1 and select points on increased LSI values, branches will be taken before it goes further on the main loop (E.g. 1, 2, 3, 3.1, 3.2, 3.3, 4, 5, …).

The test will turn ON and OFF the LED on one point at the time. During the test, the next point at the loop will be selected, as described above, and then all LEDs will turn on and wait for the specified seconds "LED on period". Then all LEDs will turn off and wait for the specified "LED off period" before the sequence is repeated for the next point. The actual point in test is listed in the "**Point currently in test**" box. The Loop scan period gives the total time, and the time left, for a LED test to finish the whole loop.

The "LED test overview" lists out the number of points to test and the number of points that does not have any LED to test. The list box identifies the point by LSI and type name.

The Led ON and OFF period can be changed during the test, and the test can be stopped and started again where it stopped. Reset test will make the test scan start over again with the first LSI.

The window has to be closed (x in the upper right) to go back to the main *Test Spectral* view.

Self-Verify Test

This is a full SV test of all points on the loop. It will list all available points. The point that does not have the SV functionality will be listed as "Not tested", all other points will be listed with the test result. The points are selected by increasing LSI where branches are finished before it goes further on the main loop.

```
SV test                                                    _ □ X

POINT IN TEST :          TEST STATUS :           LOOP STATUS :

LSI :    [        ]  □ Set SV ON     Number of units    [    ]    Number of units on the loop : 029
                     □ Wait for ALARM
Type :   [        ]  □ Alarm received  Number of units succeed  [    ]   Number of units to test    : 023
                     □ Set SV OFF
Start time : [      ] □ Saved in list   Number of units failed   [    ]

Timeout :  [          ]                Number of units not tested [    ]        --:--:--


SV TEST OF LOOP

Site ID:
Panel/Loop ID:
Serviced by:

Number of units on the loop : 029
Number of units to test     : 023

Test started:
   Date: 10/12/01
   Time: 12:51:24

LSI     Prod. nr.      Type       SW-ver Class    StartTime  EndTime  dTime  Result
------------------------------------------------------------------------------------




  [ Start SV ]   [ Stop SV ]   [ Reset ]   [ Save to file ]
```

LSI: Loop Sequence Index
SW-ver: Software version
Class: setting of the sensibility
SMV: Standardized Measuring Value
Compensation: Compensation for pollution
Point type: Type of addressed point, see equivalence **Autronica-Chubb** hereafter:

AUTRONICA	CHUBB
BH-200	SPECTRAL O
BH-300	SPECTRAL O$^+$
BH-500/EX	SPECTRAL O^{EX}
BH-220	SPECTRAL M
BH-320	SPECTRAL M$^+$
BH-520/EX	SPECTRAL M^{EX}
BD-200	SPECTRAL T
BD-300	SPECTRAL T$^+$
BD-500/EX	SPECTRAL T^{EX}

The test result will be listed with LSI, production number (without Type id number), point type, software version, Class setting, start and end of test, and time used for this test, and at the end the test result. Tested points will have text in red or green colour, depending on the test result. Points not tested will have black text.

POINT IN TEST
This box will list the point in test, the timeout progress bar indicates the timeout period for the actual command.

TEST STATUS
This lists the SV test status so far in the test.

LOOP STATUS
This gives you the information about the loop as it is before the test starts. (Number of units on the loop and number of units that has the SV function implemented).

Reset
This button will reset the test result and get ready for a new test.

Start SV
This will start the SV test. It starts with LSI 0,1 and goes from there.

Stop SV
This button will terminate the SV test. It will finish the point that is started and then terminate.

Save to file
This will save the SV test log to file. The format of the report file will be Rich Text (Easy to read with Word and WordPad). The window has to be closed (x in the upper right) to go back to the main *Test Spectral* view.

The Report Button

Pressing the Report button allows you to generate a report for the selected loop. The report provides useful information, as shown on the report example below.
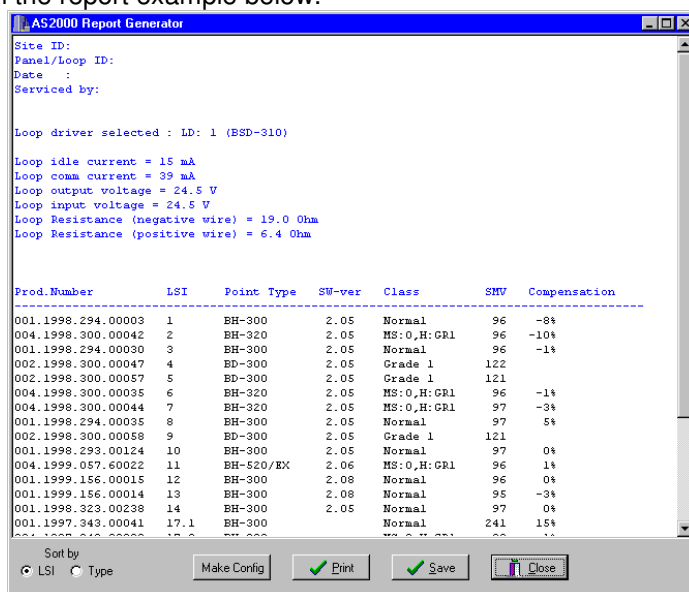
It is possible to sort by Loop Sequence Indexes (LSI) or by type.
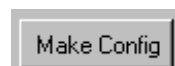
Clicking the "**Make Configuration**" button, allows you to generate a *CSU* file, which the AutroSafe configuration Tool can convert to **AutroConfig** format. This means you can tell the configuration tool what is on the loop, and let the configuration tool generates the configuration for this loop.

The Loop Measure Button

Loop Measure

This command tells the selected loop driver to measure the loop resistance, current consumption and loop voltages. The result will be presented in a dialog box (shown below), and can be used to check the loop condition. Note that current and resistance measuring is not very exact, and should only be used as a guiding result.

If the loop is not closed, the resistance will be presented as an Open Loop.

```
AS-2000 Point Event Notification        _ □ X

Loop driver information from LD: 1 (BSD-310)


Loop idle current = 15 mA
Loop comm current = 39 mA
Loop output voltage = 24.5 V
Loop input voltage = 24.5 V
Res- = 76.0 Ohm
Res+ = 6.4 Ohm
```
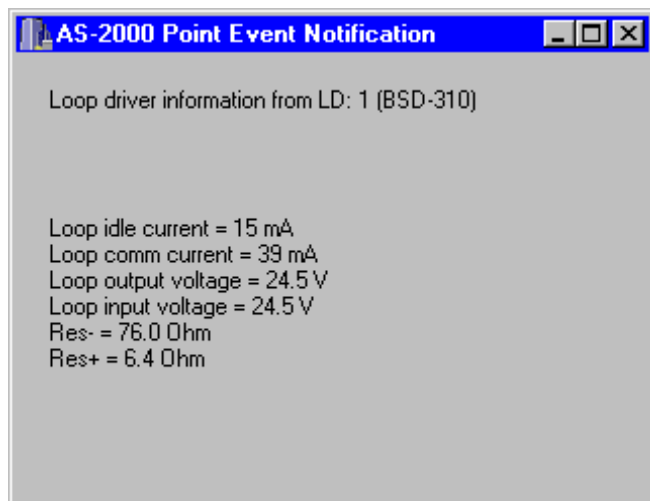
The Loop Power OFF Button

Power OFF

This command turns off the loop power at both sides of the selected loop driver.

The 'Test Break (+)' Button

Test break [+]

If the user clicks this button, *Test Spectral* will perform a test for break in the positive wire. If a break is found, *Test Spectral* may locate the break, if desirable. This test is also performed automatically when the **START** button is clicked.

Comfail Bargraph

```
0   Com.fail 100%
        0%
```
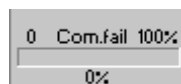
The Comfail status field presents the number of ALCOM communication failures per time unit (the sample period is defined in the Setup window). The default sample period is 5 seconds.

Status Bar

A *status bar* at the bottom of the screen gives the following information:

| Scanning topology | | Points: 01 | | | LD: 1 (BSD-310) |

Test Spectral *status*
Gives the status of TEST SPECTRAL at the moment, and tells if input is expected from the user.

Points:
The total number of points is shown.

Earth failure on + and - wire (if present).

States the chosen Loop Driver module (BSD-310) or other module (for example, the Communication Module BSL-310 or Output Module BSJ-310).

Static and Dynamic Loop Unit Information

LSI=0
Loop driver (OUT)

LSI=1 Optical det.
PN=001.1998.294.003

LSI=2 Multisensor
PN=004.1998.300.042

When pointing on a loop unit in the topology window, a hand symbol will appear, and static information related to this unit will be shown in the field to the right.

If the user left-clicks the mouse pointing on a loop unit, *dynamic* information related to this unit will be shown (i.e. information applicable at the moment, for example, the current temperature).

To achieve this information *Test Spectral* communicates with the selected point.

BH-300
001.1998.294.030
SW Comp
2.05 -1%
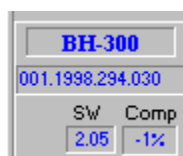
Static Information
Loop Unit Type
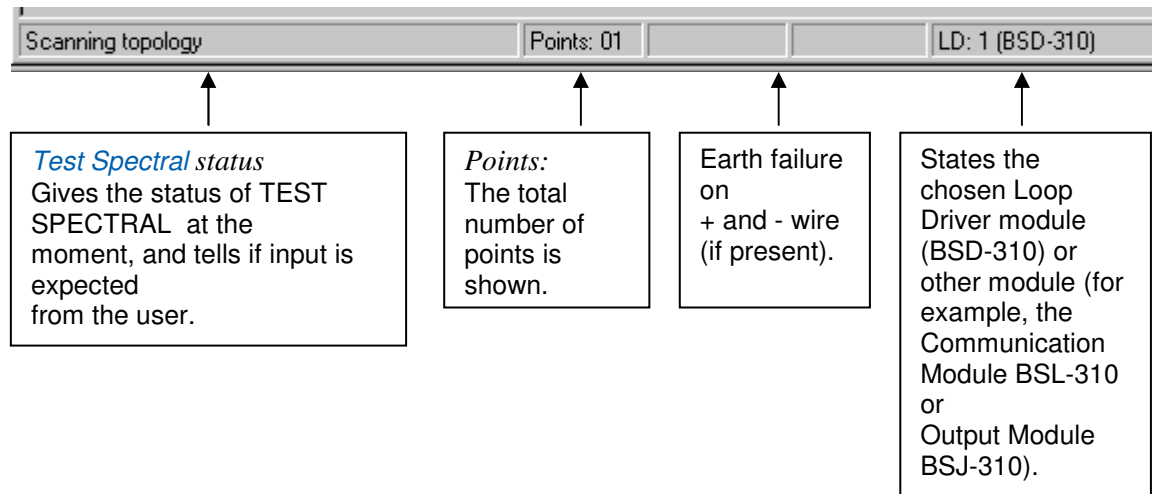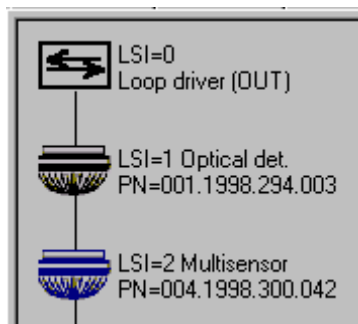Production Number
SW: Software
Comp: Grade of compensation for pollution
(optical detectors, Multisensors)

BH-300
001.1998.294.030
SW Comp
2.05 -1%

Static information

Dynamic Information
Condition: normal (quiescent),
alarm, fault, test, disablement,
fault warning (prealarm)
SMV: Standardized Measuring Value
Temp: Temperature

Condition
NORMAL
SMV Temp
97 21

Dynamic information

Right Clicking the Mouse

LED ▶
SV ▶
Add to SMVCurves ▶
Adjust contamination filter
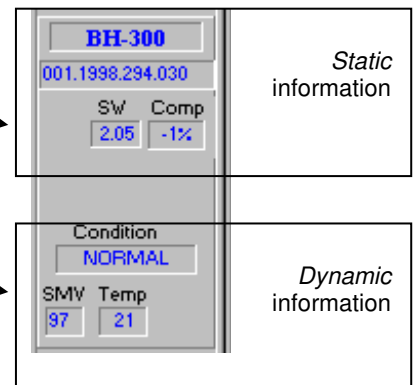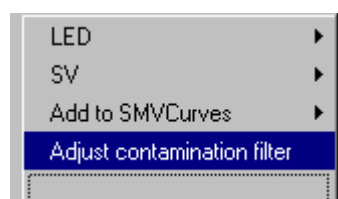
If the user right clicks the mouse pointing at a loop unit, a popup-menu, like the one at the left, appears on the screen. In this menu, the user reaches commands executing at the specific point which is selected. Available commands will vary, depending on the point type.

The popup- menu commands are described below.

LED
With this command, you can turn on or off the LED-indicator on a point. Only one LED on the loop will be on at the same time, so when you choose to turn a LED on, *Test Spectral* automatically turns off all other LED's.

Add to SMVCurves
With this command the user can set which points to be selected for the SMVCurves window. In the SMVCurves window, up to 4 curves could be presented at the same time, so the user has to select which one of these 4 to associate with the selected point.

Adjust contamination filter
This function is only available in Service mode (Password protected). The function will in service mode be available when you point at an Optical or Multisensor detector.
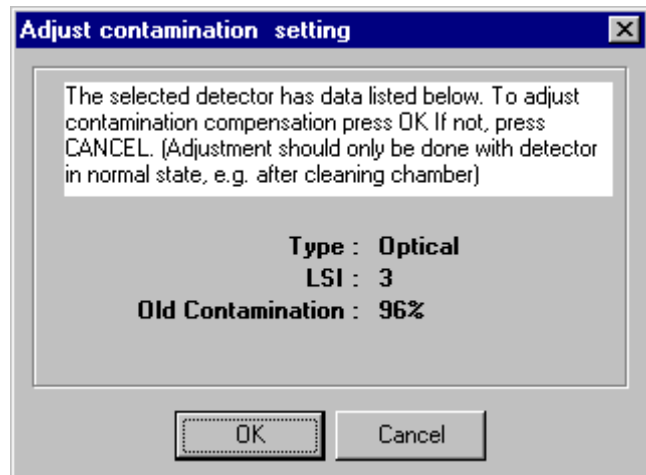
When the command is selected, *Test Spectral* starts to communicate with the detector to get the actual contamination setting/ values. When this procedure is completed an information window with the result will appear, with the following information (example):

Pressing OK will start the adjustment of the contamination filter. This is indicated in the status line at the bottom of the window. When the adjustment is completed, a new window will appear, giving the result of the adjustment (example):

The New compensation value set in the detector is given in red text. Do not expect this value to be absolute zero.
This function is to be used when the optical chamber has been cleaned to adjust the contamination filter setting. If not, the detector signal will be too high or low, depending on the type of dust that has been removed. The detector will adjust itself if this function is skipped after cleaning the chamber, but it will take some weeks.
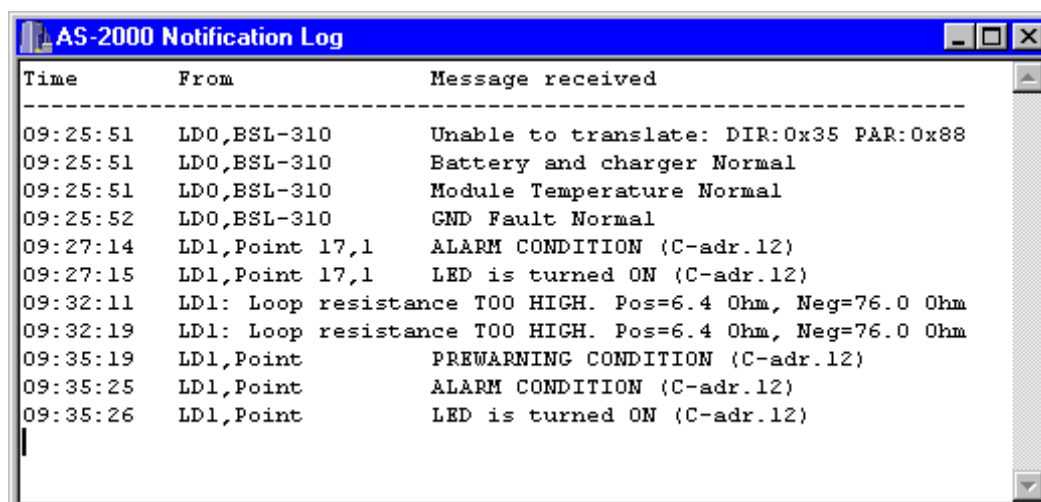It is important that the chamber is properly dried out, and that the detector does not have any abnormal environmental condition.

Notifications Button

The *Test Spectral* Notification Log is a popup window where all important messages / notifications from AutroSafe components will appear. The log will contain time stamps, and the log may be copied and pasted into text editors for documentation or storing.

The Notification log (separate window that describes received events) will for this version not be set in front (as the selected window) every time *Test Spectral* receives an event. So if you close the window it may not appear by it self on the next event. It can then be displayed by pushing the "Notification" button.

```
AS-2000 Notification Log                                      _ □ ✕
Time        From                Message received
--------------------------------------------------------------------
09:25:51    LD0,BSL-310         Unable to translate: DIR:0x35 PAR:0x88
09:25:51    LD0,BSL-310         Battery and charger Normal
09:25:51    LD0,BSL-310         Module Temperature Normal
09:25:52    LD0,BSL-310         GND Fault Normal
09:27:14    LD1,Point 17,1      ALARM CONDITION (C-adr.12)
09:27:15    LD1,Point 17,1      LED is turned ON (C-adr.12)
09:32:11    LD1: Loop resistance TOO HIGH. Pos=6.4 Ohm, Neg=76.0 Ohm
09:32:19    LD1: Loop resistance TOO HIGH. Pos=6.4 Ohm, Neg=76.0 Ohm
09:35:19    LD1,Point           PREWARNING CONDITION (C-adr.12)
09:35:25    LD1,Point           ALARM CONDITION (C-adr.12)
09:35:26    LD1,Point           LED is turned ON (C-adr.12)
```

THE SMV_CURVES WINDOW

In the SMV_Curves window, the user can watch up to four SMVcurves at one time. The X-axis shows a period of time of 360 seconds (6 minutes), and the Y-axis shows the SMV (Standardized Measuring Value). The limits for Pre-alarm and Alarm are drawn in yellow color, and are the same for all point types.

As you can se, the background color of the SMV_Curves window goes from green (in the normal operating area) through orange (in the pre-alarm area), and up to red (in the alarm area). Maximum SMV is 255, minimum is 0.

Four detectors are drawn in green at the bottom of the window. These detectors will change color, depending on which condition they are in:

Condition	Color
Fault	White
Normal	Green
Pre-alarm	Orange
Alarm	Red

There are two steps that has to be done to be able to watch a point's SMV-curve.

1. Select which point to watch.
2. Enable drawing of that specific point.

These two steps are explained in detail in the following chapters.

Selecting a Point to Watch in SMV_Curves

There are two different ways to select a point.
The easiest and most common used, is to enter the topology window, and right click at the point you want to select. In the Popup menu that appears, select *AddtoSMVCurves* (see corresponding chapter), and choose one detector curve to assign the point to.

Another way to select a point is to double click at one of the four detector symbols in the SMV_Curves window. You are then asked to tell the C-address of the point, which is usually unknown low-level information used internally by the system. But, in cases where a point gives some kind of information that results in a message on the screen, the C-address is given in this message as a supplement to the LSI.

Enabling / Disabling Drawing of a Specific Curve

To be able to select which of the selected points to watch at a time, each detector curve can be enabled or disabled individually. This is done by checking or unchecking the checkbox next to the detector curve symbol you want to enable/disable.

Enabling / Disabling SMV_Curves Function

☐ SMV-Curves

SMV_Curves is a function that takes a lot of resources of Windows95. In some cases, other applications may slow down, and Windows95 will have a fairly slow response to your input. Because of this, you are given the choice whether to update the enabled curves, or not. If the checkbox is checked, curves will be updated. If the checkbox is unchecked, the system is operating quicker, but curves are not being updated, and all SMV data stored will be lost.

THE SMVGRAPH WINDOW

In the SMVGraph window, the user can watch instant SMV bar graphs for all points on the loop. The X-axis shows the LSI (Loop Sequence Indexes) if topology is presented in the topology screen. If LSI is unknown, the point will be labeled as a question mark.

The individual bar graphs will be updated every time *Test Spectral* receives a new SMV from a point. It is important to notice that *Test Spectral* never asks for a SMV, so if a point has disabled "SMVtransition" or set "SMV-transition window" to high, the bar graph for this point may never be updated.

Only 20 points (graphs) can be shown on the screen at the same time. To watch other points, right click the mouse in the graph area, while dragging left or right.

SMVGraph Selector

⦿ Actual   ○ Min   ○ Max

With this selector, you can switch between showing actual (instant) values, minimum or maximum values. Selection is done by clicking the radio-button next to the mode you want to watch. Minimum values are calculated from the moment *Test Spectral* was started, or since the last "Reset Min/Max "or "Reset all".

Update
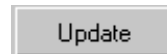
Update	The Update command updates all bargraphs by reading fresh values from all points.

Function Reset Min / Max

Reset Min/Max	This function resets all stored minimum and maximum values.

Function Reset All

Reset all	This function resets minimum, maximum and actual values.

THE SETUP WINDOW
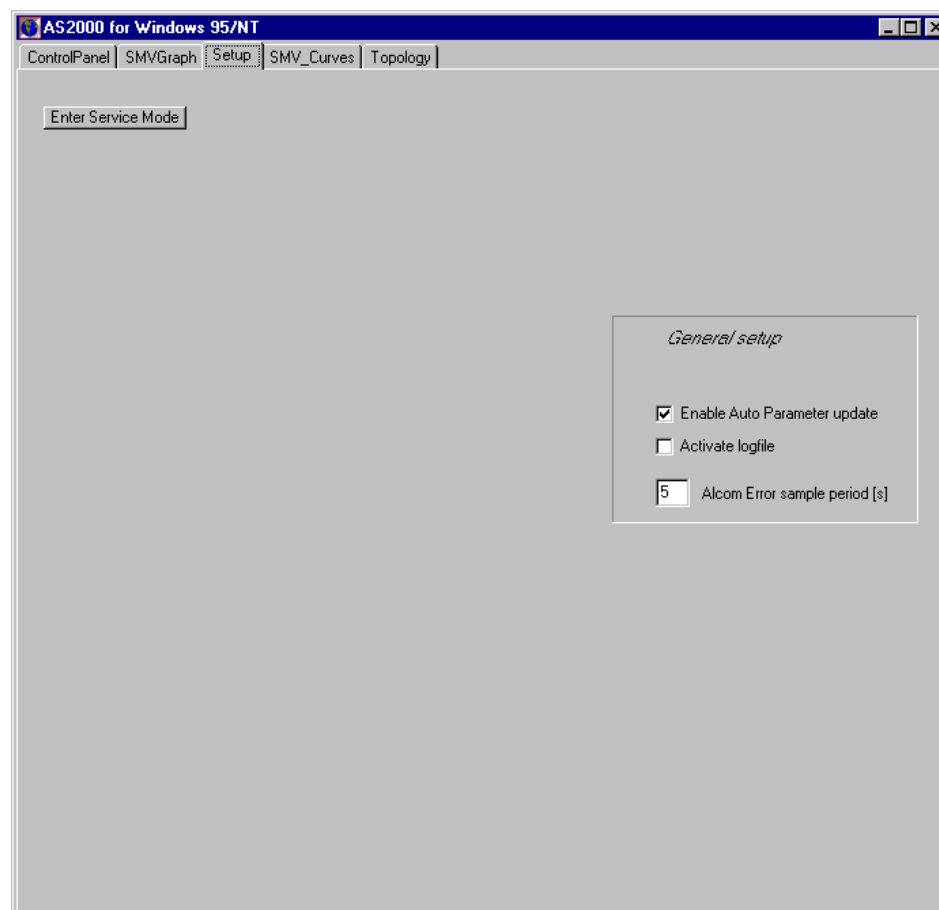
Enter service Mode.
Clicking this button will give you a password dialog box and with the correct password you will be given access to more advanced function (Contamination adjustment and configuration).

Enable Auto Parameter Update:
Toggle function; when ticking off this selection (default enabled), the program will continuously update the data which is generated in the report for the selected loop (The report is generated when pressing the Report button).

Logfile Active:
Toggle function; when ticking of this selection, *all* events will be recorded and placed in the log file.

Alcom Error Sample Period(s):
Here you can state the loop error sample period (default 5 seconds) which is shown in the Comfail status field. The status field presents the number of ALCOM communication failures per time unit.
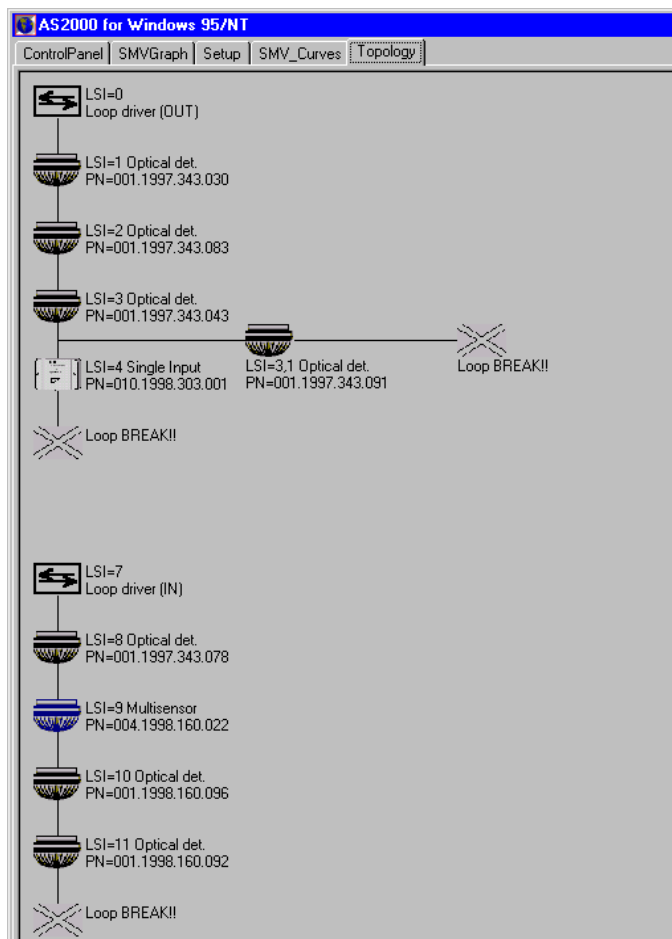

SYMBOLS

|	
	Loop driver (P0)
	Heat detector (BD-200/300/500)
	Optical smoke detector (BH-200/300/500)
	Multisensor (smoke&heat) detector (BH-220/320/520)
	Manual callpoint (BF-200/300/500)
	Addressable sounder (BBR-200, BBR-110)
	Input / Output unit (BN-300,BN-310,BN-320,BN-201)
	Topology ERROR Probably caused by multiple branch-off, which is illegal. By double-clicking this symbol, a list of the points causing the branch will appear.
	Loop Break Indicates a break in the loop wire at indicated position
	Loop Short-circuit Indicates a short-circuit on the loop wire.
	Loop Communication Error Indicates a communication error.

Example 1: Break in Loop Wiring

In this example, *Test Spectral* couldn't find the 'IN' side of the Loop driver, when powering up from the 'OUT' side. Since *Test Spectral* can't know which of point LSI-4 or LSI-3.1 is the main loop, and which is the branch, *Test Spectral* presents a break symbol after both. *Test Spectral* will then power up the loop from the 'IN' side, and find the points on the other side of the break. Note that if there is more than one break in the main loop, there may be several points missing in the loop topology presentation.

Example 2: Multiple Branch-off (Star-connection)
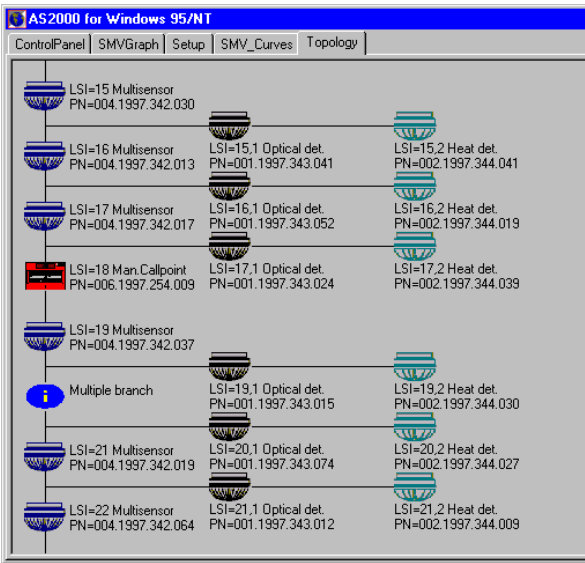
In this example, *Test Spectral* has given a warning between LSI 19 and 21. This is to indicate that when closing LSI 19's switch, more than 2 new points where powered up. *Test Spectral* cannot present more than 3 points
in a star-connection, and since more than 1 branch-off is illegal in an AutroSafe system, this warning is given.

So in this case, LSI-21, LSI-19.1 and LSI-20.1 are connected to the same point, LSI-19. A possible solution to this problem would be to connect branch 19.1 to 19.2 between the manual callpoint (LSI18) and the Multisensor (LS19).

Note that *Test Spectral* cannot present more than 3 points in a star connection.
If there were more than LSI-21, LSI-19.1 and LSI-20 connected to LSI-19, these additional would not be presented in the topology window.

Example 3: Inadequate Interpretation of Loop Topology
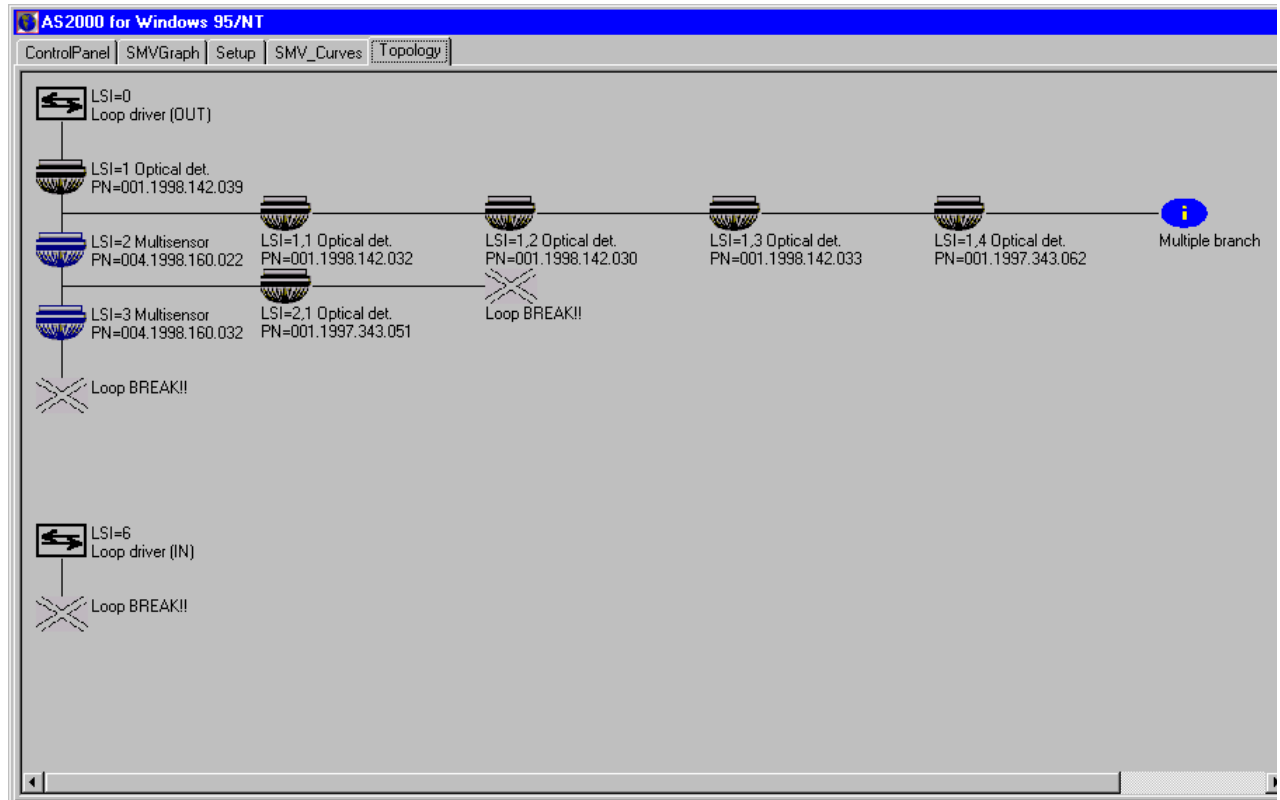
In certain situations, *Test Spectral* may not give a totally correct presentation of the loop topology. Several factors may affect the interpretation of the loop topology, for example, whether a point belongs to the main loop or a branch-off, which point is registered first during power up, if there is an illegal branch-off, etc.

In this example, *Test Spectral* informs you that there is one multiple branch-off, and that there is a break in the loop wire. Note that this is actually not the fact, but a result of how the program may interpret the loop in such a situation.

When more than one point powers up at the same time, *Test Spectral* has to guess which one belongs to the 'main loop', and which one is a branch off.

If *Test Spectral* comes to a break in the loop wire, it will swap the last assumption (main loop and branch-off), and continue. But if *Test Spectral* makes a bad guess, and the branch chosen to be the main loop contains a new branch-off (illegal), *Test Spectral* has problems.

Then the last assumption is verified to be true, and the topology presented will be difficult to understand. The presentation is not wrong, but it may be very inadequate.

In the example above, *Test Spectral* guesses that LSI-2 is on the main loop, and LSI-1.1 is the branch off. This is actually not true, LSI-1.1 is the main loop.
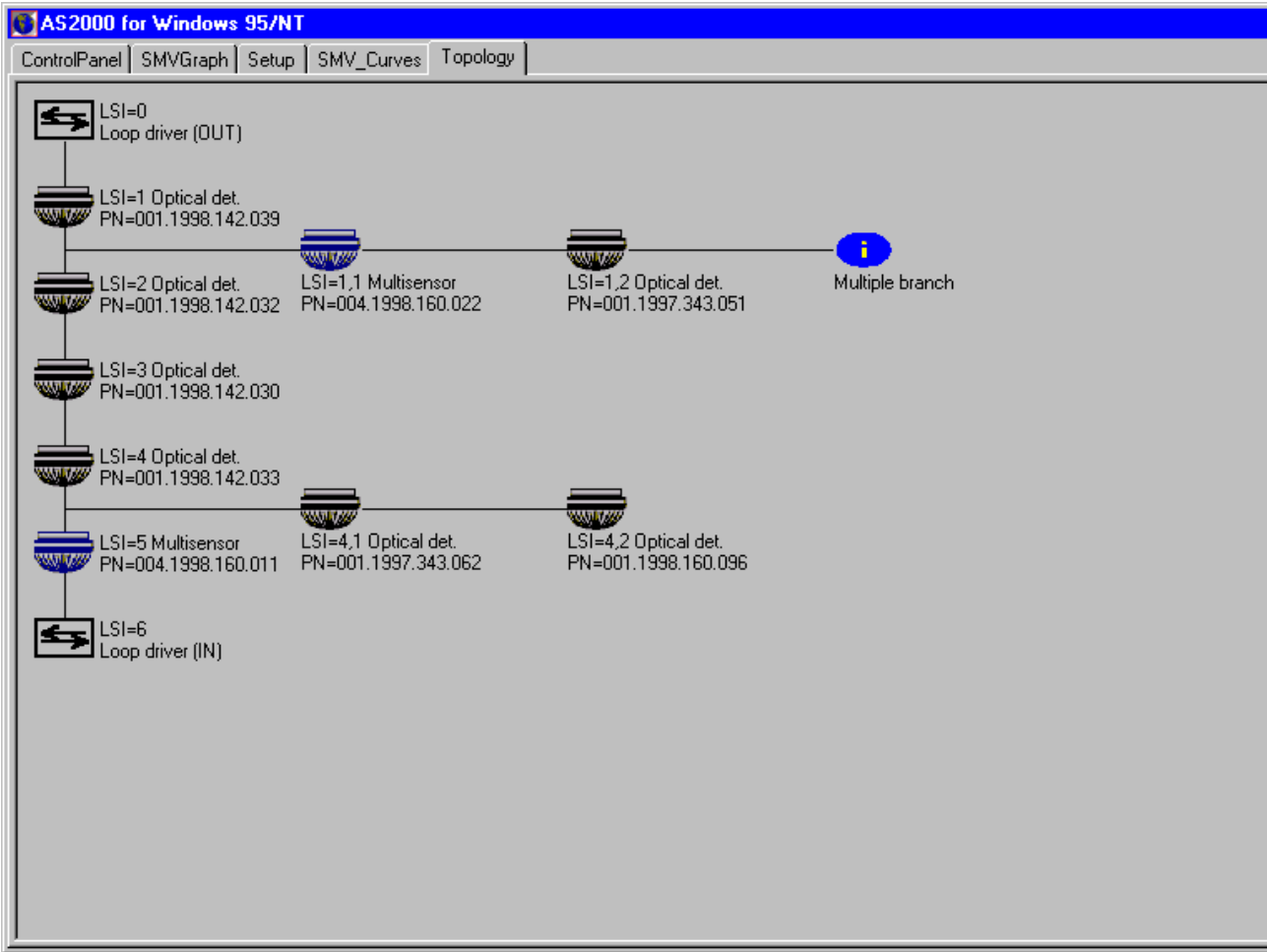
Normally, *Test Spectral* will find out that it has made a mistake, and switch the last guess made. In this example, however, *Test Spectral* meets a branch after LSI-2, and *since a branch in a branch-off is illegal*, it assumes that this is still on the main loop, and that the last guess (LSI-2) was correct. But as it can't find more points on what it thinks is the main loop, it assumes the loop has a break at this point.

So because of the illegal branch LSI-2.1, Test Spectral is mislead to believe it is still on the main loop.

As the assumed branch 1.1 is powered up, two points get powered up at the same time at the end of the branch. This is illegal (no branch-off in branch-off's), so *Test Spectral* has to place a warning symbol there, and stop presenting the rest of the branch.

The two points where actually the last point in what should have been the main loop and the 'IN' side of the loop driver (closed loop).
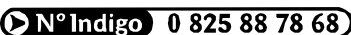
Below, the correct topology is presented, As *Test Spectral* would have presented it if it hadn't guessed wrong in the case of LSI-2, or if the illegal multiple branch-off didn't affect the presentation.

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