

Products: R&S®FSL, R&S®FSP, R&S®FSU, R&S®FSQ, R&S®ESCI, R&S®ESPI, R&S®ESU

TraceRecorder Software Tool for Storing Trace Data

Application Note 1MA105

Unattended observation of spectrum occupancy for finding spurious emissions or seldom-occurring interferers is a common task for spectrum analyzers and test receivers. Sometimes spectrum data has to be monitored over quite a long period of time. TraceRecorder, a small, free-of-charge software tool for storing measurement data from Rohde & Schwarz spectrum analyzers and test receivers helps you to perform this measurement task. Running on a PC, it connects to the spectrum analyzer or receiver via a LAN interface. For standalone operation, it is possible to run it directly on a spectrum analyzer or receiver, eliminating the need for an additional computer during data acquisition.



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1 Overview

Finding spurious emissions or seldom-occurring interferers is a burdensome task for spectrum analyzers and test receivers. Observation often has to be performed over long periods of time. Setting the instruments to peak hold mode does not always solve the problem, since it is impossible in later evaluation to see the time at which spectrum anomalies occurred.

TraceRecorder, a small, free-of-charge, software tool for storing measurement data from Rohde & Schwarz spectrum analyzers and test receivers helps to solve this measurement task. Running on a PC, it connects to the spectrum analyzer via the LAN interface. For standalone operation, it is possible to run it directly on a spectrum analyzer or test receiver, eliminating the need for a computer during data acquisition.

The stored data may later be analyzed by another application program, FsxRecordPlay, which is also available for free.

The Rohde & Schwarz R&S®FSL, R&S®FSP, R&S®FSQ and R&S®FSU spectrum analyzers are abbreviated to FSL, FSP, FSQ and FSU in the remainder of this Application Note. The Rohde & Schwarz R&S®ESCI, R&S®ESPI and R&S®ESU EMI test receivers are abbreviated to ESCI, ESPI and ESU in the remainder of this Application Note.

The test receivers are mentioned explicitly only further on, where operation is different to spectrum analyzers.

2 Software Features



Fig 1 TraceRecorder menu

Installing and Starting TraceRecorder on Your PC

TraceRecorder allows the acquisition of trace data at a variable recording interval. The shortest possible interval depends on the sweep time settings of the spectrum analyzer and the time needed to transfer the data. With the FSP, FSU and FSQ, approximately six sweeps per second can be recorded; the FSL reaches approximately four sweeps per second. The longest possible interval is more than ten days. When the recording interval is set to greater than 1 s, a progress bar shows the time to the next sweep.

Setup your instrument to your needs prior to starting TraceRecorder. TraceRecorder does not change instrument settings such as center frequency, span, bandwidth and so on.

Switch test receivers to spectrum analyzer mode. Receiver mode is not supported by TraceRecorder.

Once started, TraceRecorder records data until stopped manually.

You can select the trace number to be recorded. Depending on the spectrum analyzer, trace 1 to trace 4 data can be stored (one trace at a time).

The data is stored in ASCII format, allowing post-processing with text editors or spreadsheets such as Microsoft Word or Excel. The ASCII data separator can be set according to your needs.

If memory consumption is an issue, you can also store the data in binary format. TraceRecorder works together with another application program, FSxRecordPlay, which is available free-of-charge from Rohde & Schwarz.

3 Installing and Starting TraceRecorder on Your PC

To install the TraceRecorder program on your PC, execute the file TraceRecorder_<version number>.exe with a double-click. The installation wizard is activated; the first option is to choose the language (English or German) for the installation.

Follow the instructions from the installation wizard. In the course of the installation, select the directory where you want to install the program (default: C:\Program files\Rohde&Schwarz\TraceRecorder). Do **not** restart your computer when prompted during installation.

When installation is completed, a windows appears, where you are prompted to immediately run TraceRecorder program. Deselect the checkbox, if you want to start TraceRecorder later.

TraceRecorder requires approximately 12 Mbyte memory on the hard disk. The wizard also adds an entry for TraceRecorder to the Start->Programs menu of the computer.

No other parameters are required for installation.

If selected, TraceRecorder starts automatically after installation.



Fig 2 Start Menu

Click the "show options" button to see the entry fields.

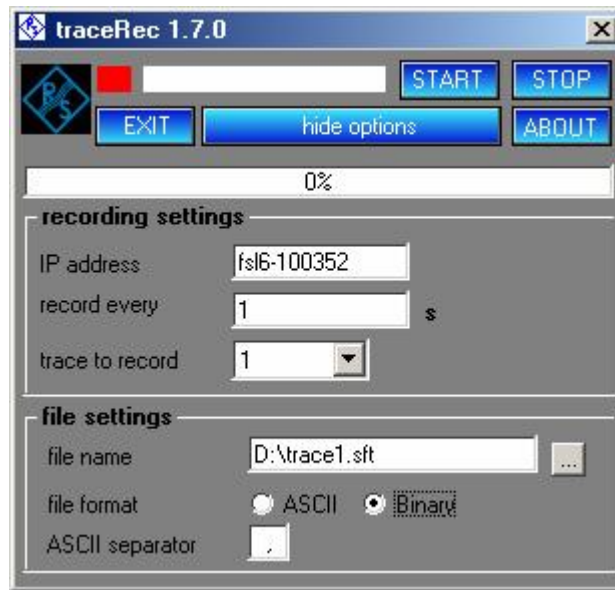


Fig 3 Optional settings

Note: Before starting TraceRecorder, you have to set up your spectrum analyzer manually. Choose frequency settings, RF bandwidth, video bandwidth, sweep time and detector settings according to your needs. Test receivers are supported in Spectrum Analyzer mode only.

Set the IP address of your spectrum analyzer in the IP address field of TraceRecorder. Entries like 192.168.0.10 are common. Alternatively, you can enter the computer name of your spectrum analyzer. In the picture above, this is "fsl6-100532". A DHCP and name server in your local area network are required for proper operation. For further details on LAN connection, refer to the manual for your spectrum analyzer or contact your LAN administrator.

Specify the recording interval in the field "record every".

Select the appropriate trace number to be stored.

Specify a file name for the stored data by editing the entry field. When you click the select button, a file name consisting of the IP address of your spectrum analyzer followed by the current date and time will be suggested. You can overwrite this name if you wish.

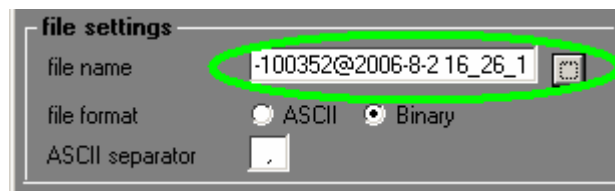


Fig 4 The select button suggests a file name

Installing and Starting TraceRecorder on Your PC

You can now start recording by clicking the START button of TraceRecorder. An indicator to the left of the START button shows the activity of the program.

If you set record intervals > 1 s, a countdown indicator at the bottom of the program window will show the time to the next recording.

To stop recording, click the STOP button.

Note: *Restarting TraceRecorder without changing the file name will result in a warning. Confirm or change the file name accordingly.*

For de-installation, Rohde & Schwarz supplies the program uninstall.exe, which completely removes the TraceRecorder program from the computer.

When TraceRecorder starts, the registration form appears. Please register the installation. Registration is free-of-charge and does not result in any further commitments for you or your company.

If TraceRecorder has not been registered, you can nevertheless start the program by clicking the *Continue* button.

The screenshot shows a window titled "Registration Form" with a close button in the top right corner. The window content is as follows:

Welcome to TraceRecorder, version 1.7 Rohde & Schwarz GmbH&CoKG

You are using an unregistered version of TraceRecorder. This version has full functionality and no expiration date. As we are continuously improving the program, we depend on your comments and experience with TraceRecorder. Therefore, we kindly ask you to register TraceRecorder. Registration is free of charge and does not obligate you or your company.

To register:

1. Fill out the registration form below.
2. Click 'Copy Registration Form to Clipboard'.
3. Open your mail client and paste the clipboard into the email message field with 'Ctrl-V'.
4. Send the registration form to TM-Applications@rsd.rohde-schwarz.com.

You will receive an email from Rohde & Schwarz with your registration key.

Name *

* The registration key is derived from your name. Please fill out Email and country as well. All other fields may be filled out optionally. Please help us by also providing these few details.

Company	<input type="text"/>	Dep.	<input type="text"/>
Street	<input type="text"/>	City	<input type="text"/>
Telephone	<input type="text"/>	Country *	... <input type="text"/>

E-Mail *

Comments

Copy Registration Form to Clipboard

Once you received your registration key

1. Enter your User Name and Registration Key.
2. Click 'Continue'.

TraceRecorder will start immediately. This registration form will no longer appear at program start.

User Name	<input type="text"/>	Continue
Key Code	<input type="text"/>	

Fig 5 Registration form

Starting TraceRecorder on a Spectrum Analyzer or Test Receiver

If you complete the registration form, you will be sent a keycode. Enter the code in the registration form and click the Continue button. The main window for TraceRecorder appears.

Once TraceRecorder has been registered, the registration form does not appear again.

4 Starting TraceRecorder on a Spectrum Analyzer or Test Receiver

To store data from TraceRecorder without using a computer connection, you can run TraceRecorder on your spectrum analyzer or test receiver. TraceRecorder uses a Visual Basic runtime engine, which is normally not installed on your spectrum analyzer. The TraceRecorder setup program copies all necessary files to the spectrum analyzer.

Note: *TraceRecorder will work only on instruments equipped with Windows XP. It will not work with Windows NT. To prevent damage to the software of your analyzer, only experienced users should perform the installation process.*

To install the TraceRecorder program on your spectrum analyzer, connect a keyboard and mouse to your instrument.

Note: *For installing TraceRecorder on the **FSP**, **FSU** and **FSQ** spectrum analyzers and on **ESCI**, **ESPI** and **ESU** test receivers, an additional software component *crtdll.dll* must be present in the same folder as the TraceRecorder setup program. *Crtdll.dll* is a Windows component, which is normally not necessary for spectrum analyzer operation, but is a prerequisite for the installer program used for TraceRecorder. *Crtdll.dll* is available for download at [1MA105](#).*

1. Copy the TraceRecorder setup program **and** *crtdll.dll* to a memory stick and attach the stick to your spectrum analyzer.
2. Execute the file *TraceRecorder_<version number>.exe* with a double-click. The installation wizard is activated; the first option is to choose the language (English or German) for the installation wizard.

Follow the instructions from the installation wizard. In the course of the installation, select the directory where you want to install the program (default: C:\Program files\Rohde&Schwarz\TraceRecorder). Do **not** restart your computer when prompted during installation.

When installation is completed, a windows appears, where you are prompted to immediately run TraceRecorder program. Deselect the checkbox, if you want to start TraceRecorder later.

Note: *Do not restart instrument during installation process, choose **No** when prompted.*

TraceRecorder requires approximately 12 Mbyte on the mass memory of the spectrum analyzer. The installation wizard also adds an entry for TraceRecorder to the Start->Programs menu of the spectrum analyzer.

Starting TraceRecorder on a Spectrum Analyzer or Test Receiver

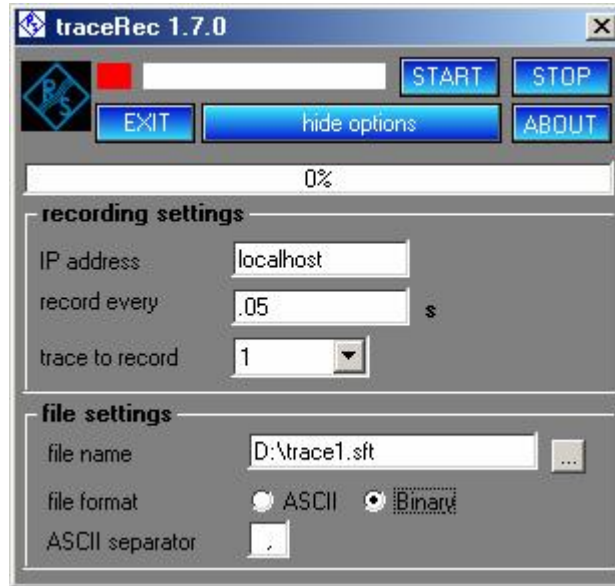


Fig 6 Installation on a spectrum analyzer or test receiver

The default settings of the program show the entry "localhost" in the IP address field. This corresponds to IP address 127.0.0.1 and addresses the computer on which the program is running, which is the spectrum analyzer in this case.

You now can operate the program as described above.

Note: Do not store trace data on the storage medium of the spectrum analyzer. Use a USB memory stick or an external USB hard disk drive to store data.

For de-installation, run TraceRecorder_xx.exe setup program again. You will be prompted to uninstall TraceRecorder.

5 Hardware and Software Requirements

PC hardware requirements

	Minimum	Recommended
CPU	Pentium 600 MHz	Pentium III 600 MHz or later
RAM	256 Mbyte	256 Mbyte
Hard disk	15 Mbyte free space	50 Mbyte free hard disk space
Monitor	SGA monitor (800x640)	SVGA color monitor, resolution 800x600 or better
LAN	10 Mbit	100 Mbit

PC software requirements

	Minimum	Recommended
OS	Windows 2000 / XP	Windows 2000 / XP
OS add-ons	---	Microsoft Internet Explorer 5.0 or later
LAN driver	---	---
VISA	---	---

Instrument software requirements

	Supported	Not supported
OS	Windows XP	Instrumentes running under Windows NT are not supported

6 Memory Consumption of Stored Data and Record Length

A stored trace file consists of a header of 553 bytes and 5008 bytes per trace of ASCII data or 2040 bytes of binary data. The header is only stored once in every file.

You can estimate the capabilities of storing data on a memory stick as follows:

If you use a memory stick with a capacity of 128 Mbyte, you can store approximately $128,000,000 / 5008 = 25500$ traces in ASCII format. If you record one trace every second, this gives you a recording time of $25500 * 1 \text{ s}$ or nearly 7 hours.

If you want to record data over a period of 20 days for example, you must set the record time interval longer than 68 s or use a memory stick with a higher storage capacity.

The calculation of data stored in binary format is similar. Binary format yields about 2.5 times more recording time compared to ASCII format.

7 Evaluation of Stored Data

Data stored in ASCII format may easily be evaluated with any program of your choice. Please note, that spreadsheets such as Microsoft Excel might not be suited, since trace data are stored in lines. The maximum number of cells in a line of Microsoft Excel is 256, which is not enough for the more than 501 measurement data of one trace.

```
ENDSTOP;0x00000097
CAPDELAYTIME;1.000000
Type;FSL-6;

Version;1.30;

Date;01.August 2006;

Mode;Spectrum;

Center Freq;100000004.500000;Hz

Freq Offset;0.000000;Hz

Span;0.000000;Hz

x-Axis;Linear;

Start;99999999.500000;Hz

Stop;100000009.500000;Hz

Ref.Level;0.000000;dEm

Level Offset;0.000000;dB

Ref Position;100.000000;%

y-Axis;Logarithmic;

Level Range;100.000000;dB

RF Att;20.000000;dB

REW;1000000.000000;Hz

VEW;3000000.000000;Hz

SWT;0.002500;s

Trace Mode;Clear Write;

Detector;RMS;

Sweep Count;0;

Trace 1;;

x-Unit;Hz;

y-Unit;dEm;

Values;501;
Section 1;2006.8.1_15.59.10:550
-65.54443,-66.87174,-66.73483,-65.09657,-62.56383,
```

Fig 7 File stored in ASCII format, "," used as separator (not all trace data shown)

Evaluation of Stored Data

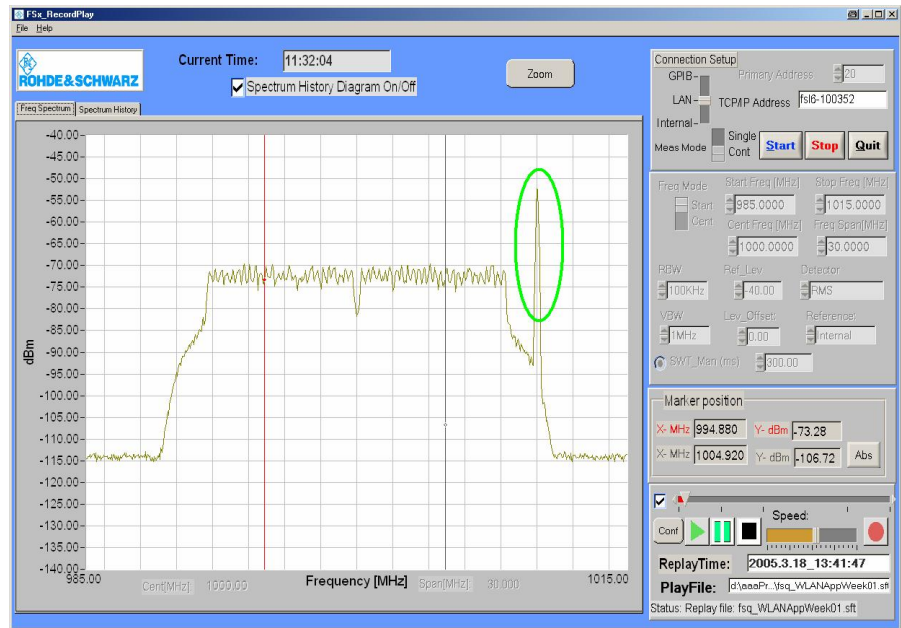


Fig 9 Frequency Spectrum display of FsxRecordPlay

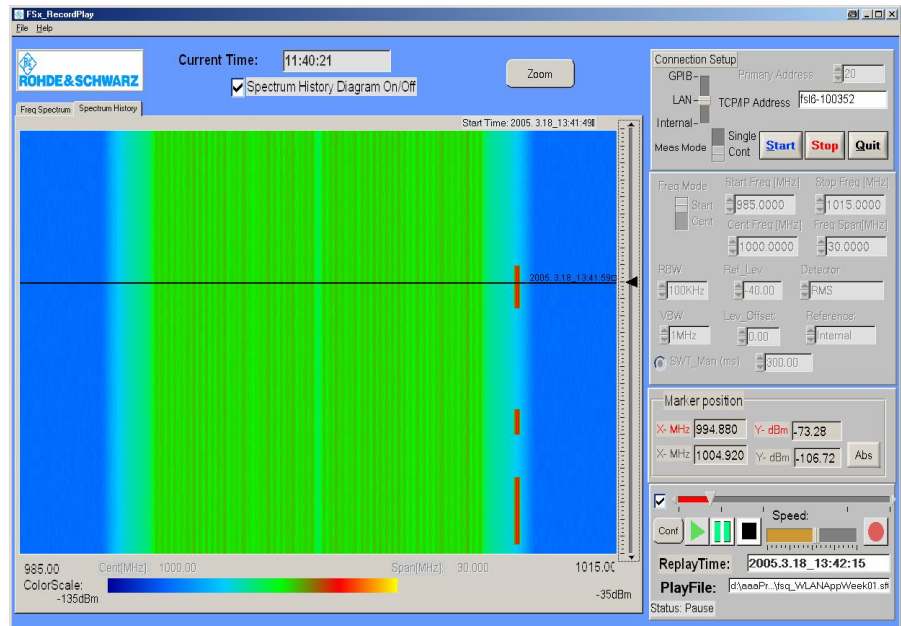


Fig 10 Spectrum History display of FsxRecordPlay

8 Additional Information

This Application Note and the associated TraceRecorder program are updated from time to time. Please visit the website 1MA105 to download the latest versions. After installation, the latest program information can be found in the file *history.rtf* in the installation directory. You can also access this file from the link *Programs / TraceRecorder / History* in your *Start Programs* folder.

Please send any comments or suggestions about this application note to TM-Applications@rsd.rohde-schwarz.com.

Note: *Rohde & Schwarz offers a complete range of products for professional Spectrum Monitoring. Please see information on [Spectrum Monitoring](#) on our web site or contact your local [Rohde & Schwarz](#) representative*



9 Ordering Information

Please note that a complete range of spectrum analyzers and test receivers is available from Rohde & Schwarz.

For additional information about these analyzers and receivers, see the Rohde & Schwarz website www.rohde-schwarz.com or contact your local representative.

Signal analyzers and spectrum analyzers, ordering information

Type of instrument	Designation and range	Order No.
R&S [®] FSP3	Spectrum Analyzer 9 kHz to 3 GHz	1093.4495.03
R&S [®] FSP7	Spectrum Analyzer 9 kHz to 7 GHz	1093.4495.07
R&S [®] FSP13	Spectrum Analyzer 9 kHz to 13 GHz	1093.4495.13
R&S [®] FSP30	Spectrum Analyzer 9 kHz to 30 GHz	1093.4495.30
R&S [®] FSP40	Spectrum Analyzer 9 kHz to 40 GHz	1093.4495.40
R&S [®] FSQ3	Signal Analyzer 20 Hz to 3.6 GHz	1155.5001.03
R&S [®] FSQ8	Signal Analyzer 20 Hz to 8 GHz	1155.5001.08
R&S [®] FSQ26	Signal Analyzer 20 Hz to 26.5 GHz	1155.5001.26
R&S [®] FSU3	Spectrum Analyzer 20 Hz to 3.6 GHz	1166.1660.03
R&S [®] FSU8	Spectrum Analyzer 20 Hz to 8 GHz	1166.1660.08
R&S [®] FSU26	Spectrum Analyzer 20 Hz to 26.5 GHz	1166.1660.26
R&S [®] FSU46	Spectrum Analyzer 20 Hz to 46 GHz	1166.1660.46
R&S [®] FSL3	Spectrum Analyzer 9 kHz to 3 GHz	1300.2502.03
R&S [®] FSL6	Spectrum Analyzer 9 kHz to 6 GHz	1300.2502.06
R&S [®] ESCI	EMI Test Receiver 9 kHz to 3 GHz	1166.5950.03
R&S [®] ESPI3	EMI Test Receiver 9 kHz to 3 GHz	1164.6407.03
R&S [®] ESPI7	EMI Test Receiver 9 kHz to 7 GHz	1164.6407.07
R&S [®] ESU8	Test Receiver 9 kHz to 8 GHz	1302.6005.08
R&S [®] ESU26	Test Receiver 9 kHz to 26 GHz	1302.6005.26
R&S [®] ESU40	Test Receiver 9 kHz to 40 GHz	1302.6005.40



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