

Assisting Tools for Operation of Windows-Based T&M Instruments

Application Note

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Software tools allow to make the control of T&M instruments more convenient. The adoption of the following tools for Windows®-based T&M instruments is described:

- *Synergy*: One mouse and one keyboard control a group of T&M instruments
- *CamStudio*: Video clips of the display of a T&M instrument are recorded during operation

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1 Introduction

The T&M equipment in a development environment often comprises several T&M instruments. Such T&M instruments usually offer dynamic, complex configuration possibilities, and often some of the instruments shall be controlled concurrently. So, the demands for proper operation are high and support for convenient control is welcome.

This document describes how software tools can assist in controlling Windows^{®1}-based T&M instruments equipped with displays.

Multi-Instrument Control with one Mouse and Keyboard

T&M instruments which shall be controlled concurrently (e.g. a Multi-CMW) are usually positioned closely together at one workplace. Each instrument is usually controlled via own mouse and keyboard. The handling of more than one mouse and keyboard might be confusing: Whenever changing from one instrument to another one, the operator first has to select the right mouse and keyboard before clicking or entering a value. The **Synergy** tool allows to control all instruments of a group with just one mouse and one keyboard. The user simply changes the instrument to be controlled by moving the mouse cursor off the edge of one instrument's monitor in direction to the desired instrument. For applying the feature the instruments have to be connected in a LAN.

Notes:

- Of course, Synergy can also be adopted for a group of desktop computers each of them controlling one T&M instrument via remote desktop.
- The "Mouse without borders" tool from Microsoft is one of several alternatives to Synergy.
- Synergy is also appropriate for Linux and Mac OS X computers.

Video Clips of T&M Operations

The **CamStudio** tool allows to record video clips in AVI or SWF format of the display of a Windows-based T&M instrument during operation. This feature is useful for generating presentations (e.g. step by step operating procedures) and reports of recurring problems to be shown to technical support. Configuration and operation are easy and convenient.

¹ Windows is a registered trademark of the Microsoft Corporation in the U.S. and other countries.

2 Multi-Instrument Control with one Mouse and Keyboard

2.1 Functional Description

Rohde & Schwarz has tested and recommends Synergy as multi-instrument control tool (see [1], [2]). Synergy is free and Open Source software. It works on Windows, Mac OS X and Linux. Synergy allows to configure up to 5 x 3 monitors in a 2-dimensional grid.

Fig. 1 illustrates how a stack of three T&M instruments is managed with Synergy.

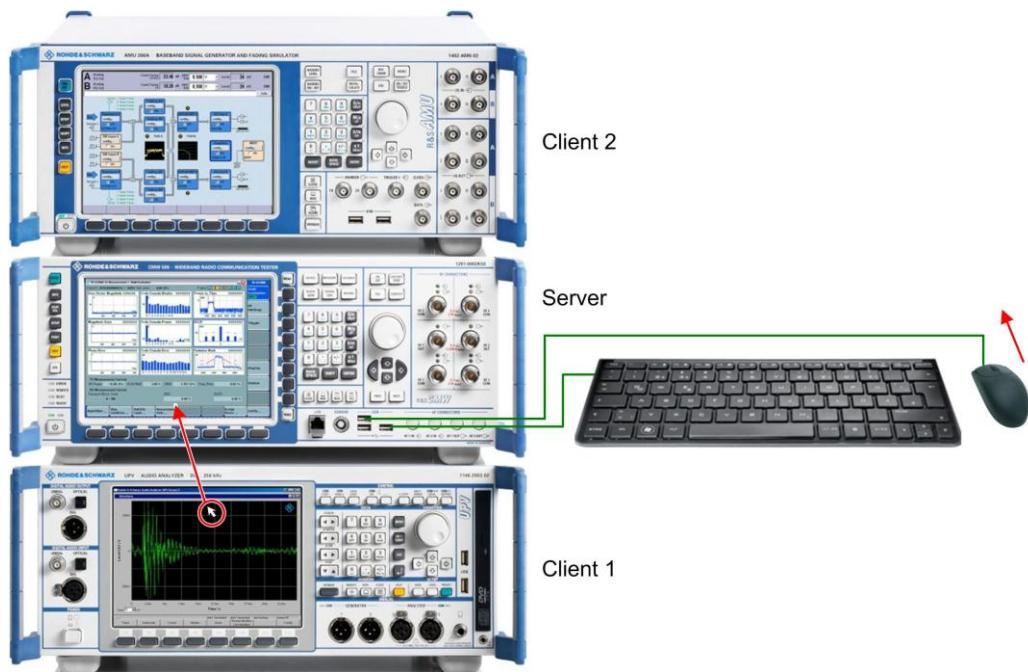


Fig.1: Controlling a stack of three T&M instruments with Synergy

Multi-instrument control with one keyboard and mouse as adopted for T&M instruments has the following characteristics:

- The T&M instruments (with displays) forming a group are positioned closely together in a stack, row or 2-dimensional grid.
- The T&M instruments are connected via LAN.
- One T&M instrument is defined as server. It is recommended to position the server in the center of the group. The other T&M instruments are defined as clients. The server instrument has a keyboard and a mouse which are used to control the server and the clients as well.
- Shared mouse and keyboard: The server assigns the mouse and keyboard to itself or to one client depending on the cursor position: That instrument is controlled by the server's mouse and keyboard on which display the cursor is present. If the mouse cursor is moved off the edge of one instrument's display in direction to the adjacent instrument, the cursor appears on the edge of the adjacent instrument's display and the controlled instrument changes accordingly.

2.2 Setup

The instructions below refer to Windows T&M instruments. For more details and instructions for other operating systems see <http://synergy-foss.org/help/user-guide.pdf>.

Preparations

- Position the T&M instruments in a stack, row or 2-dimensional grid according to your needs.
- Connect the T&M instruments in a LAN.
- Connect each T&M instrument with a mouse and a keyboard for the initial installation and configuration (this can also be done just before installation and configuration).
- Switch on all T&M instruments.

Downloading Synergy

- Download Synergy (i.e. the Synergy installer file) from <http://synergy-foss.org/de/>.
- Copy the downloaded installer file onto all T&M instruments, e.g. into "C:\temp\".

Installing Synergy

On each T&M instrument proceed as follows:

1. Double click on the Synergy installer file and execute the file.
2. In the License Agreement window, click "I Agree".

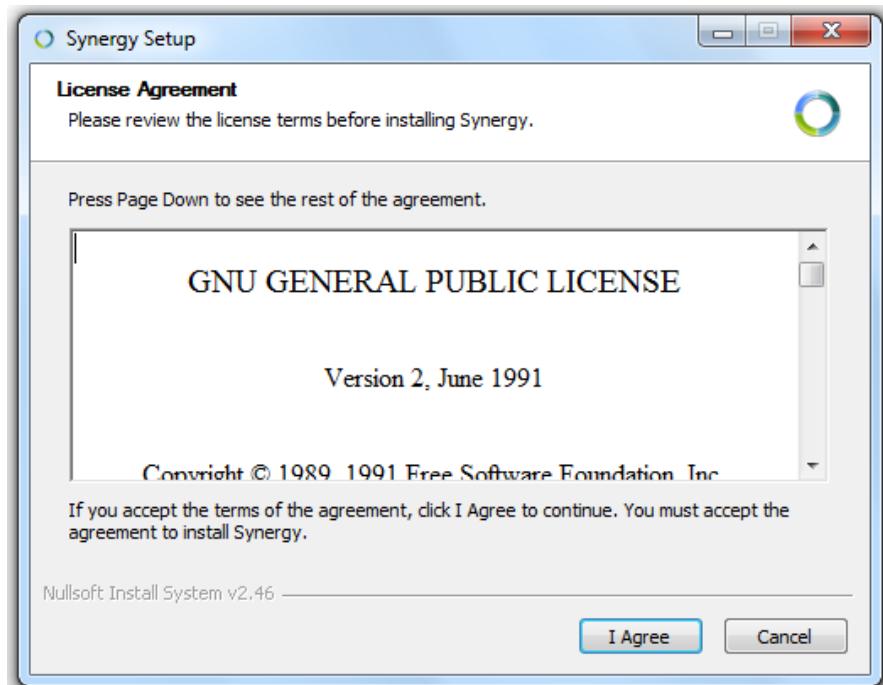


Fig. 2: Synergy license agreement

3. Choose the install location: "C:\Program Files\Synergy".

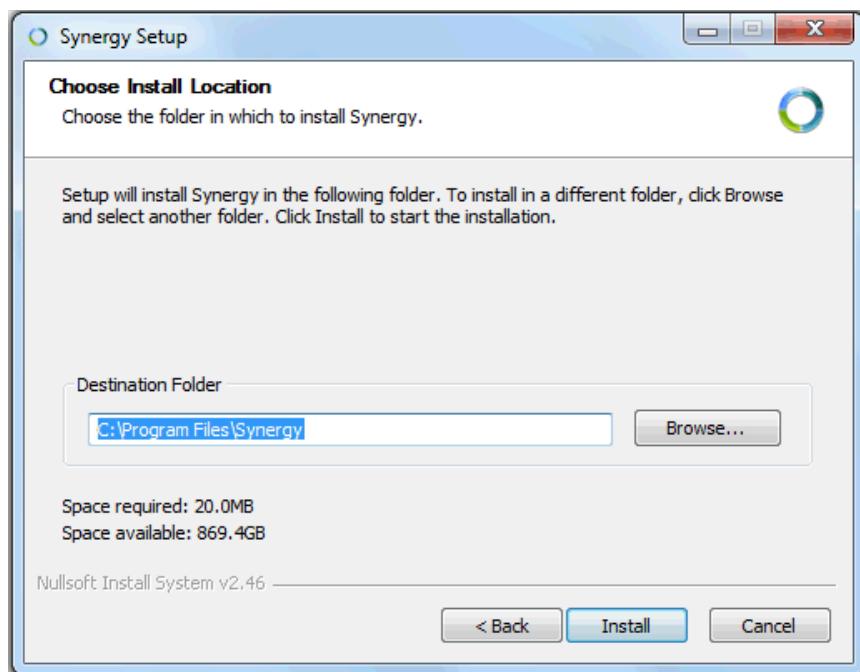


Fig. 3: Synergy destination folder

4. Click "Install" to begin the installation.
5. Once finished, click "Close" to finish the installation.

2.3 Configuration

Prerequisites:

You have determined the server T&M instrument and the relative positions of the client T&M instruments.

You have the host names of the clients at hand or you are prepared to get them.

Configurations on the Server T&M Instrument

The server T&M instrument needs to know about all clients that will connect to it. The clients are identified by their host names. The relative positions of the T&M instruments are defined by a drag & drop mechanism and a 2-dimensional grid.

Proceed as follows:

1. Start Synergy on the server T&M instrument by double clicking on the Synergy symbol (or by double clicking on the synergy.exe file in the programs directory). The setup wizard appears (in case Synergy is started the first time on this instrument).

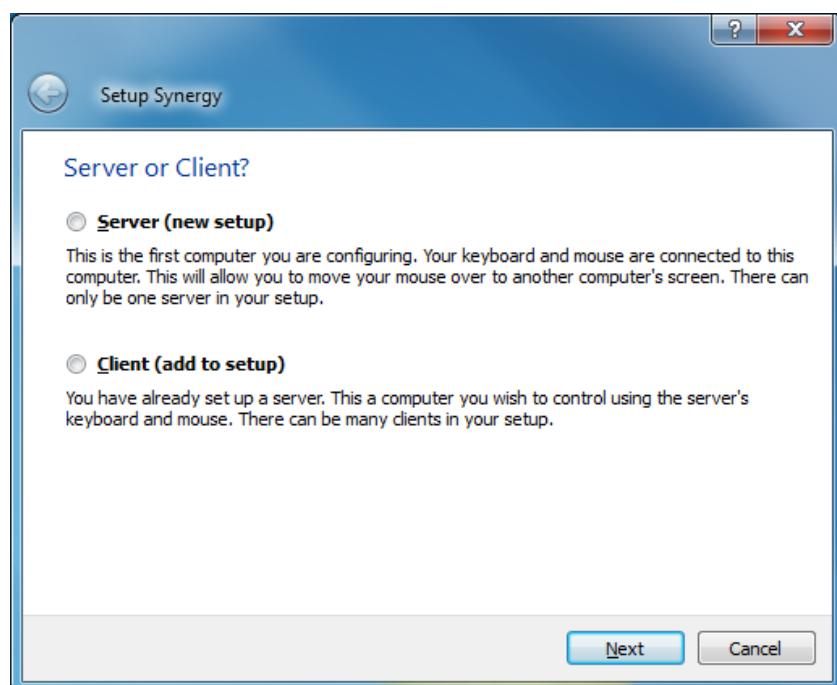


Fig. 4: Synergy setup wizard

2. Select the "Server (new setup)" radio box, then click on "Next".
3. Set the startup mode to "Service" and click on "Finish".

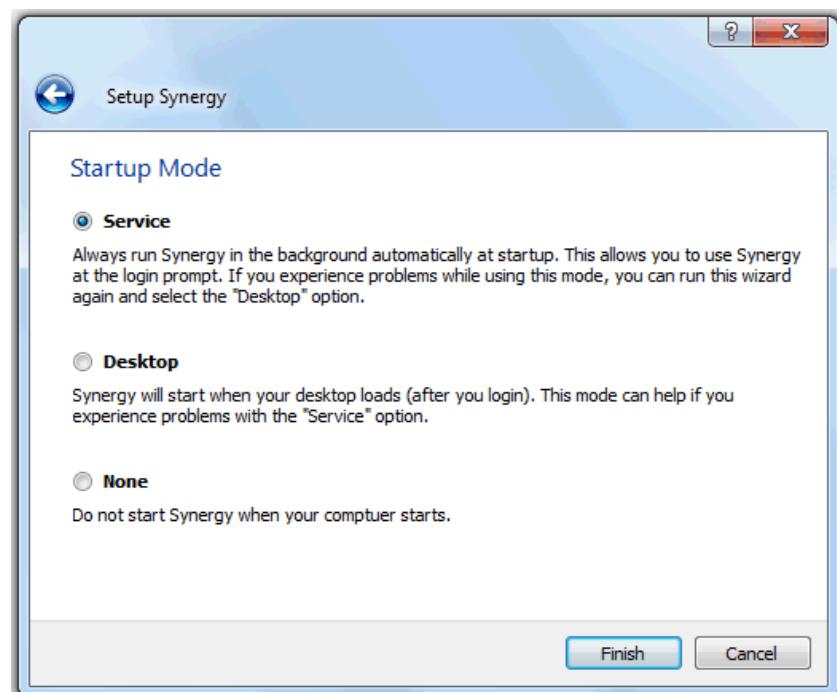


Fig. 5: Synergy server configuration – startup mode

The Setup wizard is closed and the Synergy main window is shown.

Note: At later starts of Synergy all re-configurations can be done from the Synergy main window (e.g. select Edit > Settings via the menu).

- In the Synergy main window, select the "Server (share ...)" checkbox on top of the screen and the "Configure interactively" radio box, then click on the "Configure Server..." button which opens the "Server Configuration" window.

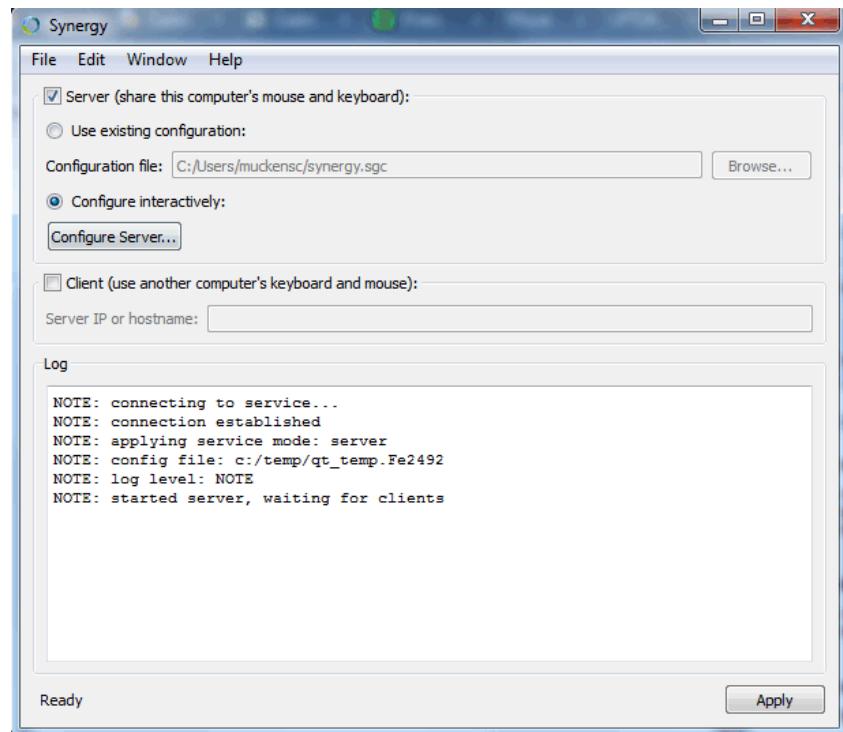


Fig. 6: Synergy server configuration – configure server

- Drag the screen icon from the upper right corner into the desired panel of the grid in order to define the position of the server T&M instrument.
Note: The server screen icon gets its name automatically.

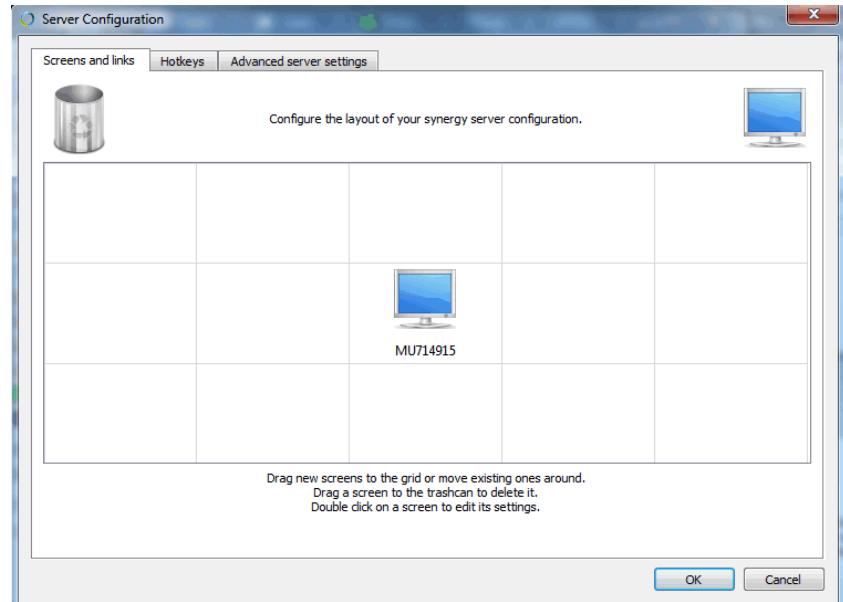


Fig. 7: Synergy server configuration – position server in grid

- Add a client by dragging the screen icon from the upper right corner into a panel of the grid according to the relative position of the client instrument you want to add.

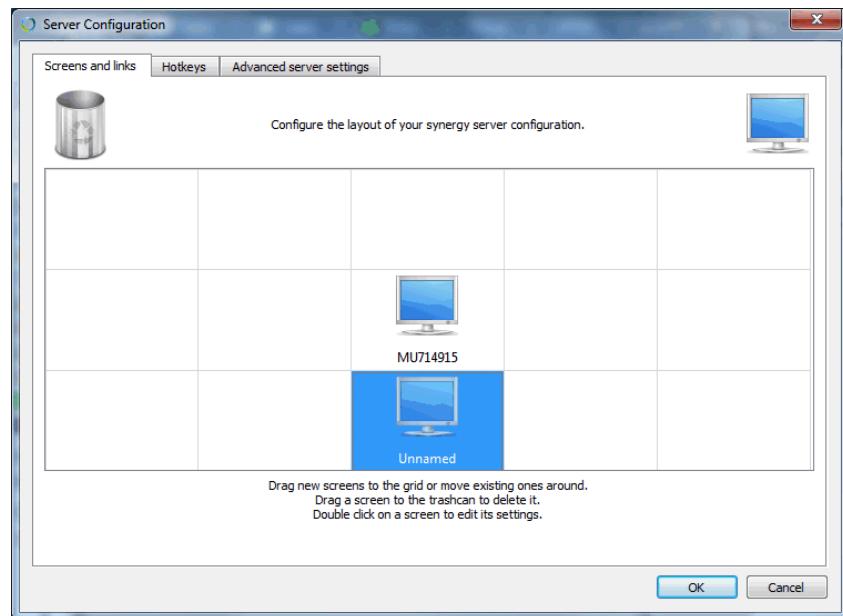


Fig. 8: Synergy server configuration – add client

- Double click on the client screen icon (which opens the "Screen Settings" window), and then enter the client's host name in the "Screen name" row. Afterwards click on "OK" to close the "Screen Settings" window.

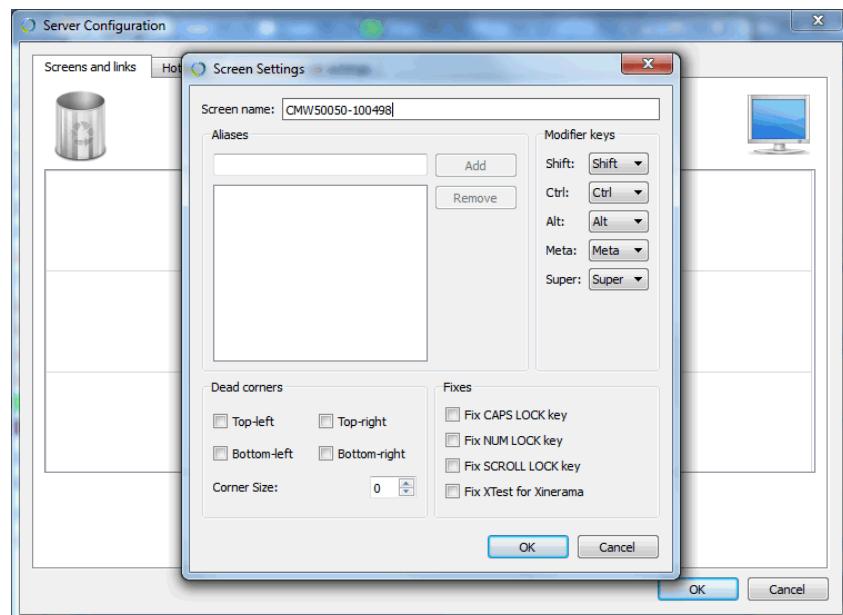


Fig. 9: Synergy server configuration – enter client name

- Add all other clients in the same way as described above.
- Click on "OK" to close the "Server Configuration" window.
- Click on "Apply" in the main window to activate the settings.

Configurations on the Client T&M Instruments

Once you have configured the server, you need to connect each client to the server.

Prerequisite: You need a mouse and a keyboard for configuring the client instruments.

Proceed as follows for each client instrument:

1. Start Synergy on the client instrument by double clicking on the Synergy symbol. The setup wizard appears (in case Synergy is started the first time on this instrument).
2. Select the "Client (add to setup)" radio box, then click on "Next".
3. Set the startup mode to "Service" and click on "Finish" (in service mode, Synergy will automatically run at startup). The main Synergy window is shown.
4. Check "Client (use another ...)" and enter the server's IP address or host name. Then click on "Apply".

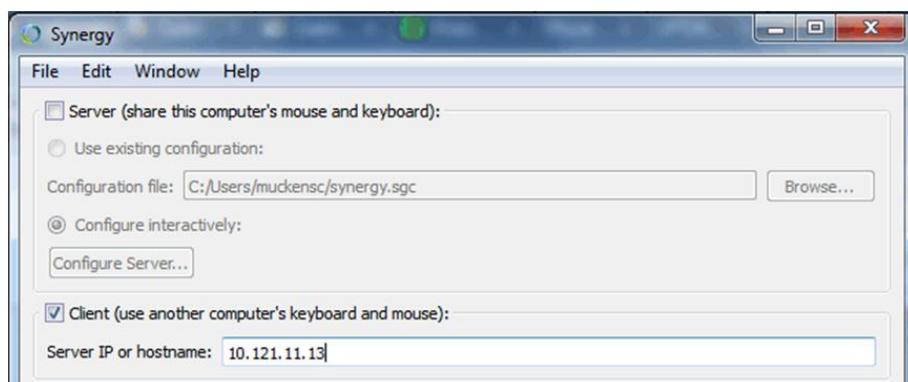


Fig. 10: Synergy client configuration – server IP

Verification

- Verify that the T&M instruments have the relative positions as configured in the Synergy grid of the server instrument.

2.4 Operation: Starting Multi-Instrument Control

Prerequisites:

All setup and configuration steps have been executed on all T&M instruments.
All T&M instruments are running.

1. Double click on the Synergy symbol at the server T&M instrument.
The Synergy window is displayed.
2. Click on "Apply".
Synergy automatically establishes the server's mouse and keyboard control for the client T&M instruments where Synergy runs in the background.

Note:

After you have finished your work, take care that a T&M instrument which shall separately be controlled again (e.g. by another user) is released from the central control: On the server instrument, open Synergy and go to the "Screens and links" tab under "Server Configuration"; then drag the screen symbol of the T&M instrument to be released into the trashcan.

3 Video Clips of T&M Operations

3.1 Functional Description

There are various software tools which allow to record the display activities of a computer. Here, the computer is a T&M instrument equipped with a display, and the operator's mouse actions and the resulting effects shall be recorded. R&S has tested and recommends CamStudio which is free and Open Source software.

CamStudio can create video files in AVI (Audio Video Interleave) format, which is industry-standard for Windows-based systems, and in SWF (originally Shockwave Flash, now Small Web Format) format, which is Adobe's flash file format. Internally, CamStudio generates SWF files by converting AVI files with its built-in SWF producer.

CamStudio runs on all Windows XP and Windows 7 T&M instruments. The screenshots are taken from Windows 7 instruments. Setup, configuration and handling is the same for Windows XP instruments.



Fig. 11: CamStudio

3.2 Setup

Proceed as follows to install CamStudio:

1. Go to the CamStudio website <http://camstudio.org/> .
2. Download the CamStudio installer file.
3. Copy the downloaded installer file onto the T&M instrument, e.g. into "C:\temp\".
4. On the T&M instrument, double click the CamStudio installer file and execute the file. The setup wizard is opened (see **Fig. 12**).



Fig. 12: CamStudio setup wizard

5. Follow the instructions of the setup wizard.

3.3 Configuration

You can immediately record video clips after having started CamStudio without any configuration. In this case the default configurations are taken which should be appropriate in most cases.

Default Configuration

The default configuration includes:

- Shortcuts: F8 = Record/Pause, F9 = Stop, F10 = Cancel Recording
- AVI video format

Changing the Configuration via the Options Menu

Many configuration possibilities are contained in "Options" in the menu bar. From there, the main handling options are available in the "Program Options" item (see Fig. 13).

Hints:

- If you enable "Minimize program on start recording", then the CamStudio window is hidden. No area of interest is covered by CamStudio during recording but you have to stop recording by a keyboard shortcut or by getting back the CamStudio window first (e.g. for Windows 7 via "Show hidden icons" from the bottom task bar).
- If you want to avoid automatic replay after recording, select "Play AVI file when recording stops" and then "Do not play AVI file".
- You can define the player for your video clips via "Play AVI file when recording stops".

- Define the location and name of the recorded video clip via "Directory for recording" and "Name of AVI file" (the Windows temporary directory is "C:\Windows\temp").

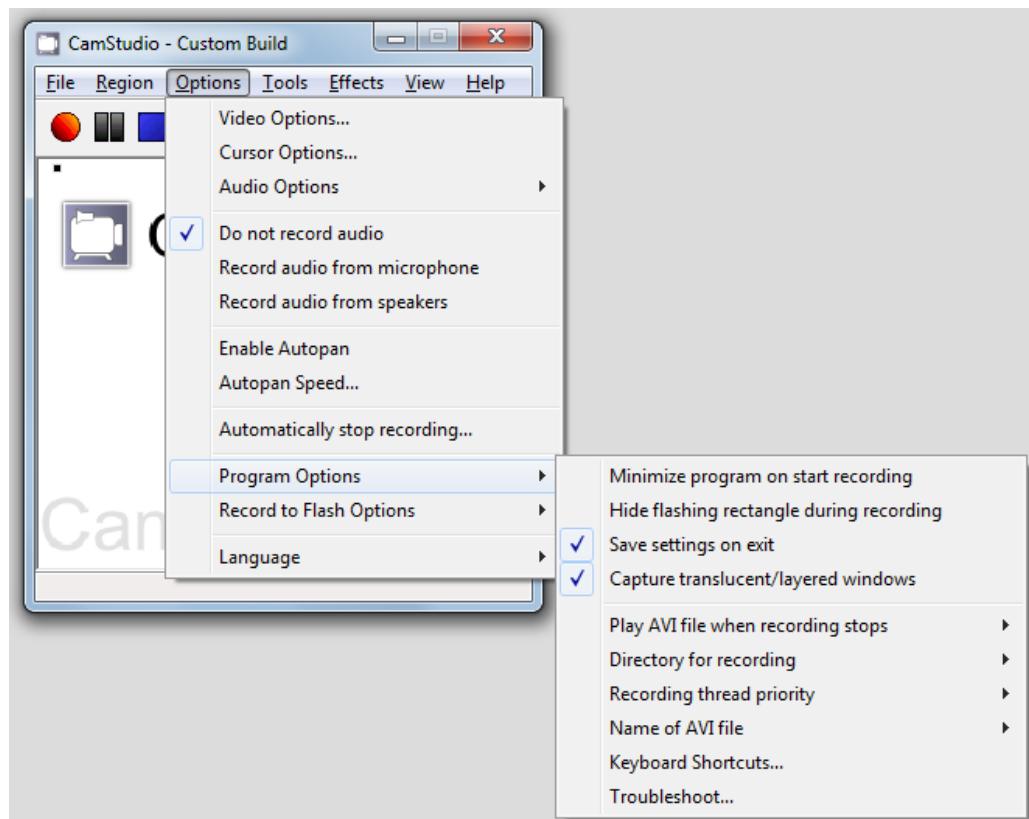


Fig. 13: CamStudio – options > program options

- Select "Keyboard Shortcuts..." in order to view the current keyboard shortcuts or to change them. The settings are done in a simple way via checkboxes and list boxes.

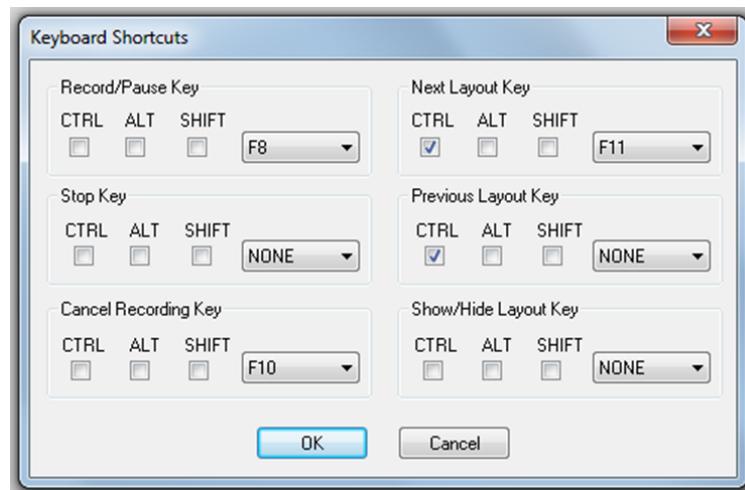


Fig. 14: CamStudio – keyboard shortcuts

Other Options, Hints

- The "Video Options..." under "Options" have effects on the quality of the recorded video clips and on the size of the clips (higher quality requires more storage space). You can keep the default settings.
- Disable "Do not record audio".
- You can make your cursor more visible during playback by highlighting it, changing its shape, or changing its size. Select the "Options" tab, then click on "Cursor Options...". These cursor options are only visible during playback, not during the recording.

3.4 Operation

CamStudio is very easy to use; you can start and try immediately without further reading.

Video clips of working with CamStudio are available on Youtube and may be more helpful than detailed descriptions. Therefore, the following descriptions are kept short.

- Double click on the CamStudio icon to start the program.
- If you like, click on the toggle view icon to have displayed a compact CamStudio window.

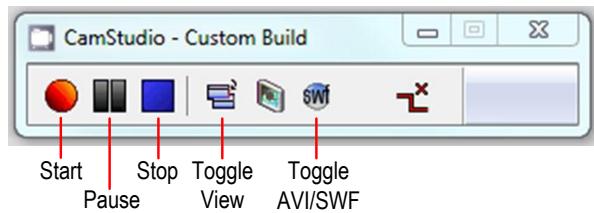


Fig. 15: Compact CamStudio window

- If you are unsure what format is best for you, use the AVI format.
- Click on the start icon to start recording.
If you have enabled "Options" > "Program Options" > "Minimize program on start recording", then the CamStudio window is hidden. You will have to pause/stop recording by a keyboard shortcut or by getting back the CamStudio window first (e.g. for Windows 7 via "Show hidden icons" from the bottom task bar).
Note: If you minimize the program via the "Minimize" icon in the title bar, the recording is stopped.
- Click on the pause icon to stop recording temporarily.
- Click on the start icon again to resume recording in case a recording pause is ongoing.
- Click on the stop icon to stop recording.
The video clip is automatically stored. The storage of long videos takes some time. Playback is automatically started if you have not enabled "Options" > Program Options" >"Play AVI file when recording stops" > "Do not play AVI file".
- See the list of recorded video clips in the directory defined in "Options" > "Program Options" > "Directory for recording".
- Select a video file and double click on it to start the playback of the video.

3.5 Troubleshooting

FSW and ZNB Instruments

No Recording with Current Compressor:

If you start recording with the default settings on a FSW or ZNB, the following error note is displayed: "CamStudio could not record the AVI file using current compressor. Use default compressor?"

Solution:

1. Click "No" to close the window displaying the error message.
2. In CamStudio go to "Options" > "Video Options...".
3. Change the selected compressor or keep (!) the selected compressor.
4. Click "OK" to activate the compressor selection.

No Recording due to Missing MSVCR100.dll:

It can happen that the following error message occurs when starting recording on a FSW or ZNB: "The program can't start because MSVCR100.dll is missing from your computer. ..."

"MSVCR" stands for "Microsoft Visual C++ Redistributable" which provides runtime components of Visual C++ Libraries required to run applications developed with Visual C++ on a computer that does not have Visual C++ installed.

Solution:

You need the x86 version of MSVCR which corresponds to the 32 bit Windows of your T&M instrument.

1. Go to <http://www.microsoft.com/en-us/download/details.aspx?id=5555> on the Microsoft website.
2. Download the MSVCR package.
3. Install the MSVCR package.

4 References

- [1] Multi-monitoring tool Synergy, download
<http://synergy-foss.org/de/>
- [2] Multi-monitoring tool Synergy, user guide
<http://synergy-foss.org/help/user-guide.pdf>
- [3] Streaming video tool CamStudio
<http://camstudio.org/>

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