Operating Manual

Radio Network Analyzer

R&S® TSML-x

1153.6000.11	**R&S TSML-W**
1153.6000.12	**R&S TSML-C**
1153.6000.13	**R&S TSML-G**
1153.6000.15	**R&S TSML-CW**
1153.6000.20	**R&S TSML-GW**

ROHDE & SCHWARZ

Test and Measurement

Dear Customer,

Throughout this manual, TSML-x is generally used as an abbreviation for the Radio Network Analyzer R&S® TSML-x.
The firmware of the instrument makes use of valuable open source software packages.
They listed below together with their corresponding open source license.
The verbatim license texts are provided on the CD-ROM (included in delivery).

Package	Link	License
Open SSL	http://www.openssl.org/	OpenSSL/SSLeavy
Fastest Fourier Transform in the West	http://www.fftw.org/	GNU GPL v.2

The OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/) includes cryptographic software written by Eric Young (eay@cryptsoft.com) and software written by Tim Hudson (tjh@cryptsoft.com).
Rohde & Schwarz would like to thank the open source community for their valuable contribution to embedded computing.

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Trade names are trademarks of the owners.

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Important Notes

If you are using the R&S ViCom interface to control this R&S TSMx scanner, carefully follow all instructions in the ViCom manual, located in the ..\doc subdirectory of the accompanying CD-ROM. The latest ViCom version can be downloaded from the product homepage in the internet under: http://www.rohde-schwarz.com – Section Download/Software. Unless explicitly noted, the abbreviation R&S TSML is valid for all models in the series.

Manuals

This manual describes how to put the analyzer into operation. Additional documentation and release notes for the radio network analyzer are provided in the ..\doc section of the accompanying CD-ROM.

The ViCom programming interface for R&S TSMx analyzers is explained in detail with the ViCom manual.

CD-ROM

The CD-ROM labeled **R&S TSML Utilities, Interface and Documentation** applies the following directory structure:

- Documentation (Operating Manual, ViCom Manual   ..\Doc
  and Release Notes)
- Utility tool for firmware updates   ..\TsmxFirmwareInstall
- Utility tool for recalling instrument setup and option key   ..\TsmxOptionKeyInstaller
  installation
- Utility tool for TSMx IEEE1394 device driver installation   ..\IEEE1394
- Setup program for R&S ViCom programming interface   ..\ViCom
- Backup copy of the instrument flash card contents   ..\ACE_Files

Internet

The latest versions of all the related products data like Data Sheets, Application Notes, Application Cards, Firmware, Software and Device Drivers could be downloaded from the product homepage in the internet under: http://www.rohde-schwarz.com.

Search for your analyzer type and select the menu item "DOWNLOADS".

ROHDE&SCHWARZ
EC Certificate of Conformity

CE

Certificate No.: 2009 - 48

This is to certify that:

Equipment type	Stock No.	Designation
TSMU	1153.6000.02	Radio Network Analyzer
TSMU-H	1153.6000.03	
TSML-W	1153.6000.11	
TSML-C	1153.6000.12	
TSML-G	1153.6000.13	
TSML-CW	1153.6000.15	
TSML-GW	1153.6000.20	
TSMQ	1153.6000.50	

complies with the provisions of the Directive of the Council of the European Union on the approximation of the laws of the Member States

- relating to electromagnetic compatibility
  (2004/108/EC)

Conformity is proven by compliance with the following standards:

EN 61326 – 1: 2006
EN 61326 – 2 – 1: 2006
EN 55011: 2007 + A2: 2007

For the assessment of electromagnetic compatibility, the limits of radio interference for Class B equipment as well as the immunity to interference for operation in industry have been used as a basis.

The product complies with the requirements of the Directive relating to the radio interference of vehicles (72/245/EEC adapted by 2004/104/EC, 2005/49/EC, 2005/83/EC, 2006/28/EC, after-market equipment in accordance with Annex I, paragraph 3.2.9 of the Directive); proof of compliance provided by the measurements as described in Annex I, paragraphs 6.5, 6.6, 6.8, 6.9.

ROHDE & SCHWARZ GmbH & Co. KG
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Munich, 2009-09-22   Central Quality Management MF-QZ / Radde

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Deutschland / Germany

TÜV SÜD
Automotive

Bescheinigung Nr. / *Attestation No.*: 7021-06	
Antragsteller / *Applicant*:	ROHDE & SCHWARZ GmbH & Co. KG, PF 80 14 69, D-81614 München
Typ / *Type*:	TSMU / TSML / TSMQ (1153.6000.xx) Blatt / *Sheet* 1/1

B E S C H E I N I G U N G
A T T E S T A T I O N

GEMÄSS RICHTLINIE 2004/104/EG, ANHANG I, 3.2.9
WITH REGARD TO DIRECTIVE 2004/104/EC, ANNEX I, 3.2.9

Nr. / *No.* 7021-06

Antragsteller *Applicant*	ROHDE & SCHWARZ
Allgemeine Beschreibung des Produkts *General description of the product*	Funknetz Analysator *Radio Network Analyzer*
Typ *Type*	TSMU / TSML / TSMQ (1153.6000.xx)
Vom Antragsteller eingereichte Informationen *Information submitted by the applicant*	Systembeschreibung *System description*
Diese EUB kann für jeden Fahrzeugtyp mit folgenden Einschränkungen verwendet werden *This ESA can be used on any vehicle type with the following restrictions*	12V, Masse der Batterie negativ an der Karosserie (Versorgungs-spannung von 9-18V DC) *12V, battery negative on the body (nominal electrical system of 9-18V DC)*
Einbauvorschriften (gegebenenfalls) *Installation conditions, if any*	nicht vorhanden *not applicable*

Wir bestätigen, dass das oben beschriebene Produkt keine Funktionen im Zusammenhang mit Störfestigkeit gemäß Richtlinie 72/245/EWG in der Fassung der Richtlinie 2004/104/EG betrifft. Prüfungen der Störfestigkeit gemäß dieser Richtlinie sind nicht erforderlich.
We confirm that the product described above is not immunity-related according to Directive 72/245/EEC, as last amended by Directive 2004/104/EC. Any testing according to immunity as defined in this Directive is not required.

Der Sachverständige
The Expert

Dipl.-Ing. (FH) Stefan Rainer

München, 27.10.2006

1 General Description

Using the radio network analyzer series R&S TSML always requires the availability of a host PC software. The high speed link between the analyzer and the host PC software based on the IEEE 1394a standard.

There are two different possibilities for the host PC software to run and control the analyzer:

1. Applying the ready to use Drive Test Software Platform **R&S ROMES** (**not** part of this package!)

2. Utilizing the **R&S ViCom** programming interface package and integrating this analyzer as an OEM product into a customer specific software application.

In combination with the R&S ROMES software and depending on the model and enabled firmware options, this radio network analyzer can be used as a powerful and budget-priced instrument for interference analysis and network scanning in 2G and 3G networks or RF power and spectrum measurements.

This R&S TSML analyzer also supports the ViCom interface. This software interface and a description is part of the shipment. R&S ViCom interface is a C++ DLL based user interface designed for customers who want to integrate this scanner into their own software application.

The following models of the analyzer are currently available:

R&S TSML-W   Radio network analyzer for WCDMA networks

R&S TSML-C   Radio network analyzer for CDMA/CDMA2000/1xEV-DO networks

R&S TSML-G   Radio network analyzer for GSM networks

R&S TSML-CW   Radio network analyzer for CW measurements

R&S TSML-GW   Radio network analyzer for GSM / WCDMA measurements

(For details, refer to the R&S TSML data sheet and application notes.)

2 System Requirements

Controlling and accessing measurement data with the R&S TSML radio network analyzer series requires the availability of a IEEE 1394 network adapter on the host PC.

IEEE 1394 interface requirements:
- OHCI chip set
- data rate 400 Mbit/s
- compliant with IEEE1394a-2000 standard
- compliant with OHCI 1.1 WHQL requirements

Operating system requirements:

- Windows XP SP2 or newer

Not mandatory for normal operation but very helpful for troubleshooting and servicing of the analyzer, Rohde & Schwarz recommends the availability of a RS-232 interface on the host PC
(see **Troubleshooting via the RS-232-C Interface**).

3 Preparations for Use

Unpacking the Analyzer

The analyzer is shipped in a shipping box. Open the box, take the analyzer out of the box and make sure that all items listed on the packing list are included.

If the analyzer or any included items are damaged, immediately notify the forwarder that shipped the analyzer to you and keep the box and packing material.

For any future transport or shipment of the analyzer, the original shipping box should be used.

TSMx IEEE 1394 Device Driver Installation

Interfacing this R&S TSML radio network analyzer with the host PC software (R&S ROMES or R&S ViCom) requires the installation of the appropriate IEEE 1394 TSMx device driver prior to initial connection.

This TSMx 1394 device driver package is part of this shipment and located in the CD-ROM directory:

> **..\IEEE1394**

The installer utility could be started directly from the CD-ROM by running the corresponding executable.

Refer to the Release Notes in the ..\doc subdirectory of the CD-ROM or search in the product homepage under: http://www.rohde-schwarz.com section Firmware/Download for detailed information about this topic.

INFO	Device driver installation requires ***administrator privileges*** on the host PC!
	Device driver installation needs to be done only once in a multi-TSMx environment, where you connect more than one instrument to the same host PC.
	Normally this device driver is already available with a valid R&S ROMES installation of version 3NG or higher. So this step could be neglected but reinstallation does not harm.

Rack Mounting

The receiver can be mounted in a 19" rack using the R&S TSMU-Z2 rack adapter in accordance with the mounting instructions supplied. To obtain the ordering number, please contact your local Rohde & Schwarz representative.

NOTICE	**Danger of instrument damage!**
	Allow for sufficient air supply in the rack. Make sure that there is sufficient space between the ventilation holes and the rack casing.

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4 Putting the Analyzer into Operation

CAUTION	**Risk of injury and instrument damage**
⚠️	Handling and working with the instrument can cause injury to people or damage to the instrument.
	Make sure to follow the instructions in the following sections in order not to endanger people and to avoid damage to the instrument
	This is of particular importance when using the device for the first time. Also observe the general Safety Instructions at the beginning of this manual.

Prerequisites

To operate the analyzer correctly, you need the following equipment and software installations:

- Host PC with IEEE1394 interface adapter R&S TSMx 1394 device driver installed

  1394 network adapter is not part of the package; (see **"System Requirements and TSMx IEEE 1394 Device Driver Installation"**)

- Antenna

  not part of the package (optional accessory)

- Connection cables

  partly part of the package; (see **Connecting the External Devices**)

- DC power supply

  not part of the package: (optional accessory R&S TSML-Z1/TSMU-Z1)

- R&S ROMES measurement software with appropriate TSMx license(s)

  not part of the package

- Customer software application based on R&S ViCom

  R&S ViCom interface and a test application is part of the package (refer to the **ViCom** manual for installation details)

- **Optional**: GPS unit which provides the pulse per second (PPS) output for accurate time synchronization

  not part of the package optional accessory TSMx-PPS GPS Module

EMI protective measures

To prevent electromagnetic interference, always operate the instrument when it is closed and with all shielding covers installed. Only appropriate shielded signal and control cables may be used.

Connecting the External Devices

➢ Connect the IEEE 1394 port of the host PC to any of the IEEE1394 analyzer ports (1 or 2). Two IEEE 1394 cables with different connector types for the host PC adapters are included in the package.

➢ More than one radio network analyzer could be connected to the host PC using the spare port of the first analyzer and cascading additional analyzer(s) **in a daisy chain topology!**

➢ Connect an RF antenna or signal generator input to the RF IN connector of the analyzer (the antenna is not part of the package).

NOTICE **Danger of instrument damage!**

Do not to inject more than the maximum rated RF input power. Otherwise, the input stage could be severely damaged.

R&S TSML: -10 dBm

➢ Connect the PPS output of the GPS device to the PULSE IN connector of the R&S TSML (optional). (This will improve frequency accuracy).

Input type: 3.3 to 5 V TTL, max. +/-12 V DC; declaration of the high precision edge of the PPS signal could be configured via software!

➢ **Optional:** Additional multifunctional input/output connector PULSE IN/OUT. Used e.g. as distance trigger input (only used for distance triggered RF power scan measurements, R&S TSMU-KK35).

Input type: max +/- 12 V DC

➢ **Optional:** The RS232 connector should be connected with the RS-232-C interface of the host PC via a null-modem cable (for service purposes and troubleshooting; see **Troubleshooting**).

➢ Finally, connect the R&S TSML to the power supply
Not mandatory for normal operation but very helpful for troubleshooting and servicing of the analyzer, Rohde & Schwarz recommends the availability of a RS-232 interface on the host PC (see **Troubleshooting via the RS-232-C Interface**).
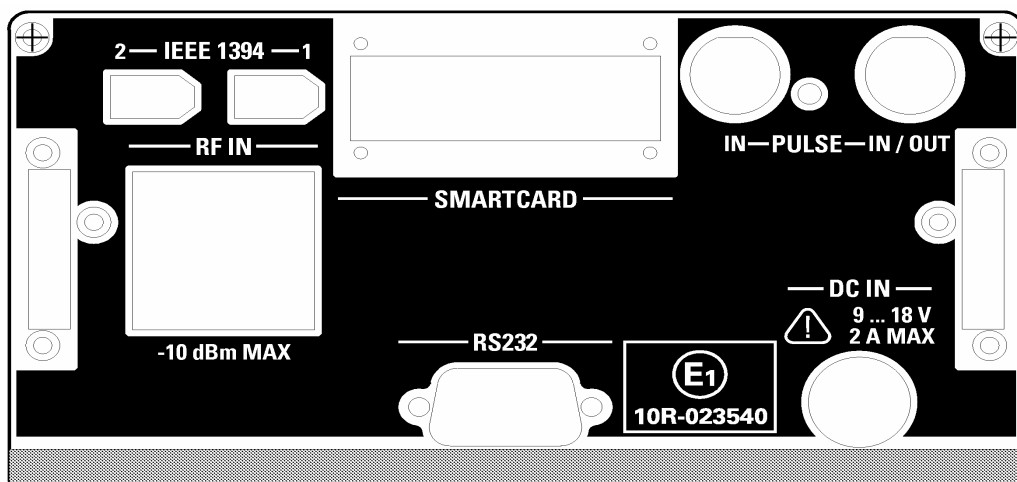
➢ See Fig. 2 for the complete wiring diagram.

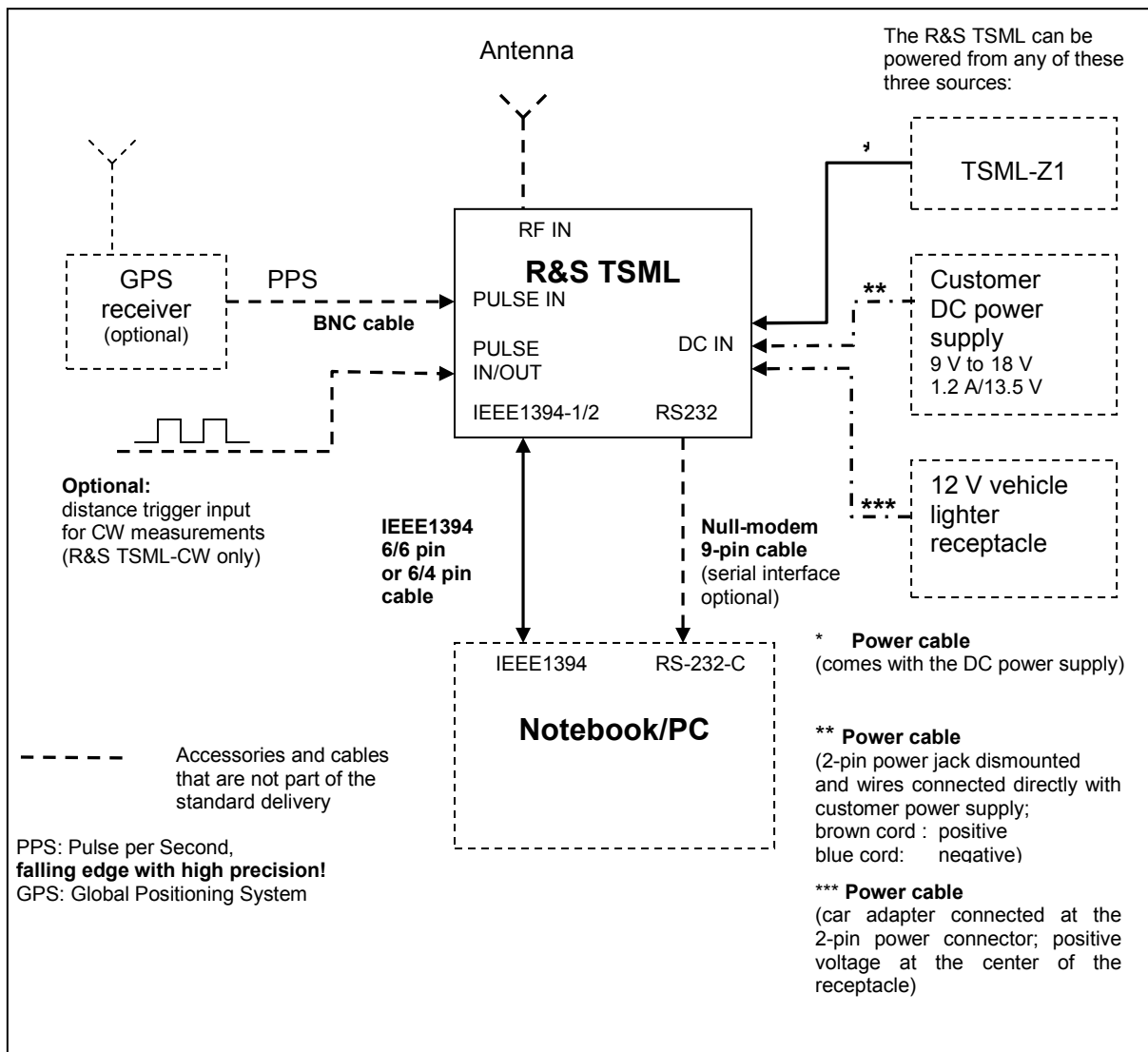Fig. 1   R&S TSML rear panel with connectors

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Fig. 2   Wiring diagram

Connecting the Analyzer to the Power Supply

DANGER	**Danger of shock hazard!**

⚠	- After moisture condensation, allow the receiver to dry before switching on.
	- The device is still power-supplied while it is in Standby Mode i.e. switched off with the power button but still connected with the DC Power Supply.
	- After connecting the Power Supply the device is immediately under power.
	- The DC-Connector is intended for disconnection.
	  If another DC Supply than TSML-Z1 is used:
	  a) Customer DC-Supply shall be in accordance with IEC / EN / UL / CSA 60950-1 or IEC / EN / UL / CSA EN EN61010-1.
	  b) 12 V vehicle cigarette lighter socked must be fused.

NOTICE	**Danger of instrument damage!**

	- Do not cover the ventilation holes.
	- Connect the receiver only with SELV (Safety Extra Low Voltage) power supplies.
	- An additional external fuse must be inserted if the DC power supply offers more than 35 A!
	- Use only EN 60950 approved external DC power supplies
	- The receiver may be connected only to DC supplies:
	
	  DC Input range: 9 V to 18 V with 10A max
	  DC input current: ~ 700 mA / 13.5 V

NOTICE	**EMI Protective Measures!**
	- Do not use DC and IEEE1394 cables longer than 3 m - No operation at DC mains excluded vehicle mains.

Rohde & Schwarz offers a compatible power supply, the R&S TSML-Z1. To obtain the ordering number, please contact your local Rohde & Schwarz representative.

Power On Sequence/Idle Mode

On applying DC power the analyzer enters power on mode and passes the power on sequence and boot loop. The self test during the power on sequence initiates various reboot cycles.

The power on sequence can be monitored by means of the front-panel LEDs (see Fig. 4 for LED location). Additional information will be output via the RS-232-C interface (see **Tracing Power On Sequence**).

LED	Color	State	Comment
PWR	Green	On	Continuously after power on
CONFIG STATE	Amber	On	About a second after PWR LED goes on
		Off	With each reboot cycle during initialization
		On	Continuously after completion of initialization
PROCESS STATE	Green	Off	Continuously after power on
PROCESS RUN	Green	Off	Continuously after power on

Fig. 3   Front-panel LEDs during power on sequence

Connecting a certain R&S TSML analyzer for the first time to a host PC initiates Windows device driver installation (see **Initial Connection – Windows Device Driver Installation**).

Radio network analyzers which once successfully passed Windows device driver installation directly enter the idle mode. In idle mode the analyzer is ready for being interfaced with the host PC software. (see **Tracing Power On Sequence**).

Initial Connection – Windows Device Driver Installation

The Windows "Found new Hardware dialog" pops up as soon as you connect an R&S TSMÖ analyzer for the first time to a certain host PC and Windows asks for the pleasant device driver. Select "Install software automatically" and complete Windows device driver installation.
Requirement: TSMx device driver installation prior to connection (see **TSMx IEEE 1394 Device Driver Installation**)!

The radio network analyzer enters idle mode after completion of the Windows device driver installation. In idle mode the analyzer is ready for being interfaced with the host PC software. (see **Application Program Download/Ready Mode**).
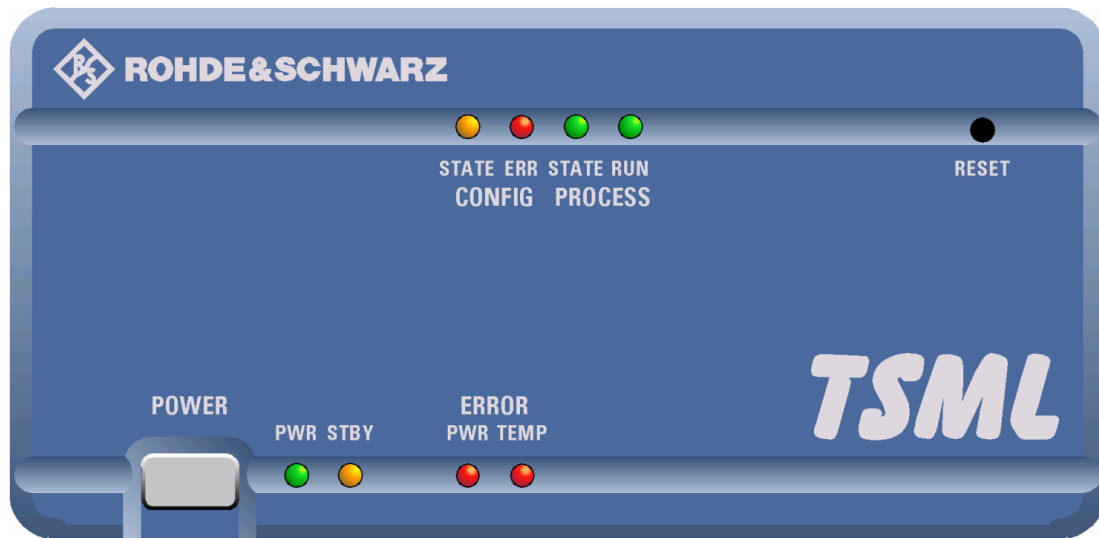
Fig. 4   R&S TSML front panel and LEDs

Application Program Download/Ready Mode

Entering idle mode (see **Power On Sequence/Idle Mode**) the R&S TSML analyzer is ready to be interfaced from the host PC software (R&S ROMES respectively R&S ViCom).
While loading the TSML software driver or workspace in R&S ROMES software the application program (*.elf) will be downloaded from the host and the availability of pleasant instrument options will be checked.
Similarly the program download and option check will be executed while calling the LoadTSMx function in the R&S ViCom interface.

Please refer to the corresponding R&S ROMES respectively ViCom manuals for details on this matters.

The analyzer changes to the ready mode after receiving the application program from the host. The instrument is now ready for ROMES or ViCom originated measurement tasks.

The ready mode is indicated by the front-panel LEDs: The green PROCESS LEDs STATE and RUN start blinking alternately (see **Tracing Application Program Download and Ready Mode**).

Measuring Mode

The unit changes into the measuring mode after receiving a "Start Measurement/Recording" command. For information on how to carry out R&S TSML measurements with R&S ROMES software or with R&S ViCom interface, please refer to the corresponding manuals.

There is no change in LED indication on the front panel. The green PROCESS LEDs STATE and RUN continue blinking alternately (see **Tracing Measuring Mode**).

Analyzer Reset

Unloading the R&S TSML software driver in ROMES, closing ROMES software or unloading the R&S TSMx module in the R&S ViCom interface initiates an analyzer reset. After the reset had been completed, the R&S TSML analyzer passes power-on sequence and enters the idle mode again (see **Power On Sequence/Idle Mode**). The R&S TSML is now ready for a new application program download.
Pressing the reset button on the front panel also initiates an analyzer reset cycle.

NOTICE	**Danger of software crash**
	Do not press the reset button during ordinary R&S TSML measurements with the R&S ROMES software or R&S ViCom interface. Otherwise, it could happen that the host PC software is not closed properly. As a result, the application will crash and must be shut down from the Windows Task Manager.

Standby Mode

You can switch the R&S TSML analyzer into the standby mode by pressing the POWER button on the front panel (see Fig. 4). In the standby mode, the program execution on the R&S TSML will be stopped immediately and the unit will be powered off.
The amber STBY LED on the front panel indicates the standby mode.

NOTICE	**Danger of measurement disruption**
	Do not press the power button ongoing R&S TSML measurements with the R&S ROMES software or R&S ViCom interface!

Pressing the POWER button in the standby mode initiates power-on sequence again (see **Power On Sequence/Idle Mode**).

5 Firmware Updates

For firmware updates the **TsmxFirmwareInstall** utility tool will be provided. The latest version of the utility including the current firmware file could be downloaded from the product homepage in the internet under: http://www.rohde-schwarz.com.
Search for your analyzer type and select the menu item "DOWNLOADS" –> "FIRMWARE".

This tool is interactive and guides you through the entire firmware update process.

NOTICE	**Danger of instrument damage!**
	Make sure that neither ROMES nor any other utility tool interfaces with the TSML at the same time. Shut down any active utility before starting the **TsmxFirmwareInstall** tool!

Requirements

- PC/Notebook with IEEE1394 interface adapter and R&S TSML analyzer connected.

- R&S TSMx IEEE 1394 driver installed on the host PC.

- RS-232 interface (COM1) of PC/notebook and R&S TSML connected via a null-modem cable (see **RS-232-C Output** for terminal settings).

- R&S TSML powered up and power on sequence completed successfully (see **Power On Sequence/Idle Mode**).

- No other application interfacing with the R&S TSML.

Program Start

Reset the R&S TSML analyzer and start the utility by running the TsmxFirmwareInstall.exe in the program directory. Any of the available firmware versions located in the program subfolder **..\Firmware**, can be selected from a dialog box during program execution.

6 Instrument Setup and Software Options

The **TsmxOptionKeyInstaller** utility tool is used to recall the instrument setup and to install new firmware options. This tool is located on the accompanying CD-ROM respectively could be downloaded from the internet under: http://www.rohde-schwarz.com.

Search for your analyzer type and select the menu item "DOWNLOADS" –> "SOFTWARE".

Program Requirements

- PC/Notebook with IEEE1394 interface adapter and R&S TSML analyzer connected
  (It is possible to connect more than one analyzer in a daisy chain topology!).

- R&S TSMx IEEE 1394 driver installed on the host PC

- RS-232 interface (COM1) of PC/notebook and R&S TSML connected via a null-modem cable
  (see **RS-232-C Output** for terminal settings).

- R&S TSML powered up and power on sequence completed successfully (see **Power On Sequence/Idle Mode**).

- No other software application interfacing with the R&S TSML

Program Start

The utility will be started by running the OptionKeyInstaller.exe in the program directory. The program needs a few seconds to set up the connection with all the connected R&S TSML device(s). All analyzers start indicating "ready mode" after a while.
The instrument-related data for a certain analyzer will be displayed as soon as the connection is established.
If there is more than one instrument connected use the combo box "**Select TSMx**" to select the desired analyzer by choosing the appropriate serial number.

Recalling Instrument Setup

Select the **R&S TSMx Info** property page. This page displays all the related instrument data.

- **Hardware State**
- **Serial Numbers**
- **Firmware Version**
- **Calibration Data**

Recalling Enabled Firmware Options / Verifying Device Key Installation

Select the **"TSMx Options"** property page. To address a certain analyzer select the appropriate serial number in the "**Select TSMx**" combo box for that purpose.

The text **"The Device Key is installed"** is output in this program dialog, if a valid device key is installed for a certain instrument.
A missing device key will be output with **"No Device Key has been found"** in the program dialog.
A valid device key installation is mandatory for ordering additional firmware options.

A list box displays the available firmware options for a certain analyzer.

INFO Customers with missing device key installation on their R&S TSML analyzer are kindly asked to get in contact with their local R&S representatives to update their instrument with the latest version of option licensing.

Reordering Firmware Options

Reordering firmware options require solely the supplement of the device serial number when placing the option order.
Only in cases where no device key is installed for a certain analyzer (see **Recalling Enabled Firmware Options / Verifying Device Key Installation)** the device specific identification file (*.hex) is mandatory for generating the option license files at Rohde & Schwarz.
In such cases press the button **"Get Device ID File..."** in the "TSMx Options" tab to read out the device identification file. A dialog box opens to define the storage location for this file.
Attach this ID file with the firmware option order.

INFO Reordering additional firmware options for a **R&S TSML** analyzer types is not supported as this kind of analyzers is shipped with a fixed and dedicated set of firmware options.

Post-Installation of Firmware Options

Reordered firmware options are shipped as license files on a separate CD-ROM or could be downloaded from the company web server (http://cms.rohde-schwarz.com/options) and need to be installed by the customer using the TsmxOptionKeyInstaller utility.

INFO	Only reordered firmware options need to be installed in a post process. Shipped analyzers are already equipped with pre-installed firmware options. z

INFO	Reordering additional firmware options for a **R&S TSML** analyzer types is not supported as this kind of analyzers is shipped with a fixed and dedicated set of firmware options.

Please refer to the **SWInstallationManual_**xxx**.pdf** and the **FWReleaseNote_xxx.pdf** in the ..\doc subdirectory of the CD-ROM for details on how to proceed.
xxx: Version info string

7 R&S ViCom Interface

General

R&S ViCom interface is a software package designed planning to develop their own software applications and integrating the R&S TSML analyzer as an OEM product into their product.
The R&S ViCom package, which is part of this shipment, need to be installed on the host PC and includes documentation and sample applications.

INFO   Interfacing the R&S TSML analyzers via the R&S ViCom interface generally requires the availability of dedicated OEM firmware options (R&STSMU-K**3**x) on the instrument.

Per default the R&S TSMQ and R&S TSML analyzers are equipped with a fixed set of OEM firmware options whereas these OEM firmware options for the R&S TSMU / R&S TSMU-H analyzers need to be installed seperately.

Please ask your local R&S representative for questions on this matter.

Requirements

- Dedicated OEM option(s) R&S TSMU-K**3**x installed on the instrument (see **Recalling Enabled Firmware Options / Verifying Device Key Installation**).

- R&S ViCom software interface package installed on the host PC

- Firmware version from **10.24** (see **Recalling Instrument Setup**).

- R&S TSMx 1394 device driver installed on the host PC.

Installation

The setup program including sample applications and documentation is shipped with the CD-ROM and is located in the subdirectory **..\ViCom**.

The latest ViCom version could be downloaded from the product homepage in the internet under: http://www.rohde-schwarz.com – Section Download/Software.

INFO   If there is already an existing R&S ViCom installation on the host PC this version need to be uninstalled first (Start->Settings->Add and Remove Programs) before the R&S ViCom setup program can be started.

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8 Troubleshooting

Means of Error Detection

Front Panel LEDs

The following LEDs on the front panel indicate an error (see Fig. 4):

ERROR TEMP:	red -	lit:	**Temperature Failure**
			Temperature inside the device is too high.
CONFIG STATE ERR:			**Configuration State Failure**
	red -	flash:	No flash card inserted in flash card slot.
		lit:	Data on flash card is invalid or program error.
ERROR PWR:	red -	lit:	**Power Failure**
			At least one internal voltage rail is out of tolerance.

RS-232-C Output

During startup and normal operation, the R&S TSML outputs status information via the RS-232-C connector on the rear panel parallel with standard communication via the IEEE1394 interface. Monitoring the output information on the serial interface does not decrease the analyzer's performance in any manner, but is always a valuable tool to verify the analyzer's current state.

To display the status information on the computer, the following steps are necessary:

Connect a serial 9-pin null modem cable between the RS-232-C socket of the analyzer and the serial interface of your PC.

- Set up a terminal program connection on your computer's RS-232-C interface with the following settings:

Bits per second:	115200
Data bits:	8
Parity:	no parity
Stop bit:	1
Flow control:	no flow control

- Start the terminal session.

Troubleshooting Errors Indicated by Front Panel LEDs

Temperature Failure

The electronic equipment in the radio network analyzer is protected against thermal destruction. If the temperature inside the analyzer exceeds a specific limit, the unit changes to the TEMP ERROR mode and switches off the main voltages.

To switch the unit to standby mode, press the POWER button.

If the temperature error occurs repeatedly within the operating temperature range, return the device to Rohde & Schwarz service.

Configuration State Failure

Both, FPGA configuration data and the boot code are read from the internal compact flash (CF) card during power on sequence.

CONFIG ERR LED (LED blinking): indicates *No Flash Card Inserted*

-> the configuration data cannot be read from the CF card.

Switch off the instrument, remove the CF card and check whether the card could be read on a Windows PC with Flash Card Reader or PCMCIA slot (PCMCIA adapter is needed!). The directory structure on the card and its contents should be the same as in ..\ACE Files on the accompanying CD-ROM.

To access the CF card, remove the small metal plate at the rear panel labeled with **SMART CARD** by loosening the screws and pull it out of the slot.

If the flash card is detected correctly in the PC and the file structure is identical, push the CF card into the slot and power on the instrument again.

In the event of a repeated error or a card-read error on the PC, contact Rohde & Schwarz support.

CONFIG ERR LED (LED illuminated, during the power-on sequence): indicates *Flash Card Error*

-> the flash card may contain erroneous or corrupt files.

Remove the CF card from the instrument and insert it in a Flash Card Reader or PCMCIA slot (a PCMCIA adapter is needed) on your PC. Check the directory and file structure on the card. It should be the same as in ...\ACE Files on the accompanying CD-ROM.

With this information in hand plus the instrument's serial number read from the label on the rear panel, contact Rohde & Schwarz support.

CONFIG ERR LED (LED illuminated while ordinary ROMES / ViCom applications): indicates **Program Failure on the analyzer**

-> at this stage, the instrument won't no longer respond to any software command. This could be checked by monitoring the RS-232-C output (see **Tracing Measuring Mode**) and the PROCESS LEDs on the front panel (see **Measuring Mode**). The blinking of the front panel LEDs signaling measurement mode will be frozen.

In this case, end the task of the controlling software application from the Windows Task Manager and reset the R&S TSML analyzer. Wait for the instrument to complete the power on sequence and initiate a new measurement session.

If the error persists, contact Rohde & Schwarz support.

Power Failure

At least one internal voltage rail is out of range. Return the device to Rohde & Schwarz service.

Troubleshooting via the RS-232-C Interface

Monitor the status information output on the serial interface (see **Troubleshooting via the RS-232-C Interface**) to check whether the instrument is functioning properly.

Tracing Power On Sequence

Press the reset button on the front panel. If the unit is in standby mode, press the power button. In both cases, the following listing should appear on the "Hyper Terminal" screen (see Listing 1):

NOTICE	**Danger of instrument damage!**
	Be sure that no software application on the host PC is connected with the instrument for this test.

```
Pipelined Version of DSOCM.
-----------------
Tsmu Boot Stage 0
dwTag >> 16 = 0000065503
ÿÿ
dwTag >> 16 = 0000065535
ÿ
Pipelined Version of DSOCM.
Pipelined Version of DSOCM.
---
---
----------------------------
TSMx BOOT STAGE 1   V.11020000
built: Tue Nov 28 19:22:25 GMT 2006
Performance Test 169 137 119
M_Pci.ChipInfo.u8RevisionId=00000061
dwPciReg24=0090b801
dwPciReg28=00bdbbab
PCI chip Revision ID = 0x61
SerialNumberVerify(TRUE)=1
M_Mt.bFirmwareMajor=0000000b
M_Mt.wFirmwareMinor=00000002
Firmware 11.0002
M_Mt.dwSoftwareVersion=11020000
Tue Nov 28 19:24:56 2006

forcing bus reset
IRQ busReset, dwNodeID=0xc000ffc1
busReset packet, dwNodeID=0xc000ffc1, dwSelfIDGeneration=1
IRQ busReset, dwNodeID=0x8000ffc0
busReset packet, dwNodeID=0x8000ffc0, dwSelfIDGeneration=2
```

Listing 1   Terminal output during power on sequence

If the output corresponds with **Listing 1** where the number of IRQ bus resets at the end of the output can vary the network analyzer completed the power on sequence and is ready for the application program download via the IEEE1394 interface.

In the event of no output string, check the "Hyper Terminal" settings and the connection cabling and reset the instrument.

If the error persists or the output end with "…bus reset not possible, contact Rohde & Schwarz support.

Tracing Application Program Download and Ready Mode

The R&S TSML application program will be downloaded from the host PC either during ROMES driver configuration or while calling the LoadTsmx function of the ViCom interface. (refer to the ROMES respectively ViCom manual for details).

After program download, the radio network analyzer will start some initialization routines. Finally the receiver will enter ready mode. Any measurement from ROMES / ViCom software or ViCom could be initiated at this point. Please refer to the ROMES or ViCom manual for details.

In idle mode and depending on the availability of a valid PPS input signal on the PULSE IN connector respectively a GSM input signal on the RF antenna, the receiver will start to correct the internal system clock. An output like shown in **Listing 2** should appear at the terminal log.

```
m_dwPostofficeProtocolNumber=3
Tx packet size = 2048
PostOfficeState set to 1
Pipelined Version of DSOCM.
Start of Program StarterPipelined Version of DSOCM.
-----------------------------
TSMx MEASUREMENT APPLICATION   V.11020000
built: Tue Nov 28 19:25:12 GMT 2006
M_Pci.ChipInfo.u8RevisionId=00000061
---
SerialNumberVerify(TRUE)=1
M_Mt.bFirmwareMajor=0000000b
M_Mt.wFirmwareMinor=00000002
Firmware 11.0002
M_Mt.dwSoftwareVersion=11020000
Tue Nov 28 19:26:30 2006

M_Rec.bDeviceVariantNumber=11
FE Temperature = 47°
UMTS Filter Implemented
M_Rec.FstrTsmuData.st_LevelCal & VALID=1
M_Rec.FstrTsmuData.st_IFFilterMeas & VALID=1
M_Rec.FstrTsmuData.st_UMTSFilter & VALID=1
TSMx ADC Phase Shift adjusted to 37%. Window 89%, Error Level = 22%
forcing bus reset
IRQ busReset, dwNodeID=0x8000ffc0
busReset packet, dwNodeID=0x8000ffc0, dwSelfIDGeneration=20
---
IRQ busReset, dwNodeID=0x8000ffc0
busReset packet, dwNodeID=0x8000ffc0, dwSelfIDGeneration=21
m_dwPostofficeProtocolNumber=3
Tx packet size = 2048
PostOfficeState set to 1
FPGA Configuration:
H01V10B0
Fri Nov  5 10:34:56 2004

FPGA Configuration:
H01V10B0
Fri Nov  5 10:34:56 2004

GSM TCXO Correction (-512 to +511) = -25
GSM TCXO Correction (-512 to +511) = -23
"GSM900 / GSM1800 used for GSM Synchronisation."
GSM TCXO Correction (-512 to +511) = -25
GSM TCXO Correction (-512 to +511) = -24
GSM TCXO Correction (-512 to +511) = -25
GSM TCXO Correction (-512 to +511) = -25
GSM TCXO Correction (-512 to +511) = -24
GSM TCXO Correction (-512 to +511) = -26
```

Initialization sequence

Synchronization
~ 1 output line/sec

Only if a GSM signal is available on the RF input connector!

Listing 2   Terminal output during program download and in the ready mode

Tracing Measuring Mode

Starting measurement/recording in the R&S ROMES software respectively launching a measurement command with the R&S ViCom interface initiates a new measurement task at the analyzer. The instrument switches from ready mode to measuring mode.
Stopping measurement/recording in the R&S ROMES software or with the R&S ViCom interface switches the unit back to ready mode.
Please refer to the R&S ROMES or R&S ViCom manual for details.

Output like shown in **Listing 3** should appear on the terminal program screen.

```
---
PPS TCXO Correction (-512 to +511) = -24
"Start Frame Arrived"                                          "Start
"Start Frame Arrived"                                          Measurement/
GSM TCXO Correction (-512 to +511) = -23                       Recording"
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
---
---
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24                       "Stop
PPS TCXO Correction (-512 to +511) = -24                       Measurement/
PPS TCXO Correction (-512 to +511) = -24                       Recording"
StopMeasFrameArrived
PPS TCXO Correction (-512 to +511) = -24
PPS TCXO Correction (-512 to +511) = -24
---
---
```

Listing 3   Terminal output in measuring mode

Problems after Firmware Update

General

Under certain cases the radio network analyzer will not boot after a firmware update, and the **CONFIG** LED on the front panel indicate an error.
The cause is usually a wrong setting of the configuration directory on the compact flash card of the device while executing firmware update.

In such a case, this mal function could be solved by the customer by editing the ini-file of the analyzer flash card on a PC with flash card slot.

How to Solve the Configuration Problem Locally

Remove power supply from the analyzer and pull out the flash card from the instrument. The flash card is accessible from the rear panel by loosing four screws of the metal plate cover named "SMART CARD". Remove this plate.
Insert the card in the PC card reader or PCMCIA slot of a PC/notebook.
Open the xilinx.sys file in the root of the flash card with an editor and change the **dir** variable according to the following table:

Before modification		After modification
dir = H01V10B0;	→	dir = H00V10B0;
dir = H00V10B0;	→	dir = H01V10B0;

Insert the edited flash card into the radio network analyzer again and connect it with the power supply again. The unit should now pass boot sequence correctly. If this failure persists, contact Rohde & Schwarz support.

***Background**: Two separate configuration directories are located on the flash card of each instrument (H01V10B0 and H00V10B0). The xilinx.sys file in the root directory defines which one is the bootable directory.
Different configuration directories are necessary, because of two different versions of the printed circuit board (PCB) inside the R&S TSML. In some cases after firmware update, the incorrect configuration directory may be activated which doesn't comply with the PCB board version.