Operating Manual

Radio Network Analyzer

R&S® TSMU   R&S® TSMQ

1153.6000.02   **1153.6000.50**

R&S® TSMU-H

1153.6000.03

Printed in Germany

ROHDE & SCHWARZ
Test and Measurement Division

Dear Customer,

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Before putting the product into operation for the first time, make sure to read the following

S a f e t y   I n s t r u c t i o n s

Rohde & Schwarz makes every effort to keep the safety standard of its products up to date and to offer its customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. This product has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, Rohde & Schwarz will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its operating manual and within its performance limits (see data sheet, documentation, the following safety instructions). Using the products requires technical skills and knowledge of English. It is therefore essential that the products be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

Observe operating instructions	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

Supply voltage ON/OFF	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double/reinforced insulation

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in other parts of the documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by Rohde & Schwarz, including instruments, systems and all accessories.

Tags and their meaning

DANGER	This tag indicates a safety hazard with a high potential of risk for the user that can result in death or serious injuries.
WARNING	This tag indicates a safety hazard with a medium potential of risk for the user that can result in death or serious injuries.
CAUTION	This tag indicates a safety hazard with a low potential of risk for the user that can result in slight or minor injuries.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist. It is therefore essential to make sure that the tags described here are always used only in connection with the associated documentation and the associated product. The use of tags in connection with unassociated products or unassociated documentation can result in misinterpretations and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude max. 2000 m. Unless specified otherwise in the data sheet, a tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.

2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).

3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

4. If products/components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.

5. If handling the product yields hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation.

6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.

8. Prior to switching on the product, it must be ensured that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.

9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.

10. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.

11. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.

12. Never use the product if the power cable is damaged. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.

13. The product may be operated only from TN/TT supply networks fused with max. 16 A.

14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise this can result in sparks, fire and/or injuries.

15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

16. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.

18. Never remove the cover or part of the housing while you are operating the product. This will expose circuits and components and can lead to injuries, fire or damage to the product.

19. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a skilled electrician.

20. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.

21. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.

22. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.

23. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock or damage to the product, which can also lead to personal injury.

24. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.

25. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.

26. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.

27. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries are hazardous waste. Dispose of them only in specially marked containers. Observe local regulations regarding waste disposal. Do not short-circuit batteries or storage batteries.

28. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.

29. Please be aware of the weight of the product. Be careful when moving it; otherwise you may injure your back or other parts of your body.

30. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves).

31. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.

32. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle; the manufacturer assumes no responsibility for accidents or collisions.

33. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes informaciones de seguridad

Informaciones de seguridad

Es el principio de Rohde & Schwarz de tener a sus productos siempre al día con los estandards de seguridad y de ofrecer a sus clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. Este producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, deberá el usuario atenerse a todas las informaciones, informaciones de seguridad y notas de alerta. Rohde&Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto solamente fue elaborado para ser utilizado en la indústria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del maluso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones del correspondiente manual del uso y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso de los productos hace necesarios conocimientos profundos y el conocimiento del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso de los productos a personas péritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

Ver manual de instrucciones del uso	Informaciones para maquinaria con uns peso de > 18kg	Peligro de golpe de corriente	¡Advertencia! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construción con peligro de carga electroestática

potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en otro capítulo de esta documentación y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por Rohde&Schwarz bajo la denominación de „producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO	Indica un punto de peligro con gran potencial de riesgo para el ususario.Punto de peligro que puede llevar hasta la muerte o graves heridas.
ADVERTENCIA	Indica un punto de peligro con un protencial de riesgo mediano para el usuario. Punto de peligro que puede llevar hasta la muerte o graves heridas .
ATENCIÓN	Indica un punto de peligro con un protencial de riesgo pequeño para el usuario. Punto de peligro que puede llevar hasta heridas leves o pequeñas
CUIDADO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el ámbito de la comunidad económica europea. Pueden existir definiciones diferentes a esta definición. Por eso se debera tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue: como posición de funcionamiento se define principalmente la posición con el suelo de la caja para abajo , modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar. A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de ±10% sobre el voltaje nominal y de ±5% sobre la frecuencia nominal.

2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal périto autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de

seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).

3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se producieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averiguar los motivos de estas reacciones.

4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.

5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberan ser tenidas en cuenta las prescipciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescipciones de seguridad especiales en la descripción del producto.

6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo de exposición a radiaciones aumentadas de riesgo aumentado para evitar riesgos.

7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.

8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.

9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.

10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto ya que puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.

11. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (medida del cable de distribución aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

12. No utilice nunca el producto si está dañado el cable eléctrico. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.

13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A.

14. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.

15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.

16. En las mediciones en circuitos de corriente con una tensión de entrada de Ueff > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).

17. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.

18. Nunca abra la tapa o parte de ella si el producto está en funcionamiento. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.

19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.

20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, deberá la toma de corriente estar protegida de manera que los productos o los usuarios estén suficientemente protegidos.

21. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.

22. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.

23. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente o de daños en el producto lo cual también puede llevar al peligro de personas.

24. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.

25. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.

26. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.

27. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Baterías y acumuladores son deshechos problemáticos. Por favor tirenlos en los recipientes especiales para este fín. Por favor tengan en cuenta las prescripciones nacionales de cada país referente al tratamiento de deshechos. Nunca sometan las baterías o acumuladores a un corto circuito.

28. Tengan en consideración de que en caso de un incendio pueden escaparse gases tóxicos del producto, que pueden causar daños a la salud.

29. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.

30. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).

31. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujecion en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean tenidas en cuenta. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.

32. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo y el fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.

33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

QUALITÄTSZERTIFIKAT

Sehr geehrter Kunde,
Sie haben sich für den Kauf eines Rohde & Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Managementsystems entwickelt, gefertigt und geprüft.
Das Rohde & Schwarz Managementsystem ist zertifiziert nach:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

CERTIFICATE OF QUALITY

Dear Customer,
you have decided to buy a Rohde & Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards.
The Rohde & Schwarz quality management system is certified according to:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

CERTIFICAT DE QUALITÉ

Cher Client,
vous avez choisi d'acheter un produit Rohde & Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité.
Le système de gestion qualité de Rohde & Schwarz a été homologué conformément aux normes:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:1996

ROHDE & SCHWARZ

1171.0200.11-01.00

ROHDE&SCHWARZ
EC Certificate of Conformity

CE

Certificate No.: 2003-40

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	
TSMQ	1153.6000.50	Quad Tec Drive Test Receiver

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 electrical equipment for use within defined voltage limits
  (73/23/EEC revised by 93/68/EEC)

- relating to electromagnetic compatibility
  (89/336/EEC revised by 91/263/EEC, 92/31/EEC, 93/68/EEC)

Conformity is proven by compliance with the following standards:

EN61010-1 : 2001-12
EN61326 : 1997 + A1 : 1998 + A2 : 2001 + A3 : 2003
EN55011 : 1998 + A1 : 1999 + A2 : 2002

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.

Affixing the EC conformity mark as from 2003

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstr. 15, D-81671 München
Munich, 2006-12-13   Central Quality Management FS-QZ / Radde

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

Spare Parts Express Service

Phone: **+49 89 4129 - 12465**

Fax: **+49 89 41 29 - 13306**

E-mail:werner.breidling@rsd.rohde-schwarz.com

In case of urgent spare parts requirements for this Rohde & Schwarz unit, please contact our spare parts express service.

Outside business hours, please leave us a message or send a fax or e-mail. We shall contact you promptly.

Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your Rohde & Schwarz equipment always up-to-date,
please subscribe to our electronic newsletter at

http://www.rohde-schwarz.com/www/response.nsf/newsletterpreselection

or request the desired information and upgrades via email from your Customer Support Center (addresses see below).

Feedback

We want to know if we are meeting your support needs. If you have any comments please email us and let us know CustomerSupport.Feedback@rohde-schwarz.com.

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◆ Sales Locations
◆ Service Locations
◆ National Websites

Important Notes

In this document, the R&S product series R&S® TSMU, R&S® TSMU-H and R&S® TSMQ is generally abbreviated as R&S TSMx. Unless explicitly noted, the abbreviation R&S TSMx is valid for all models in this series.

ATTENTION

Customers, who ordered this R&S TSMx receiver with OEM option(s) R&S TSMU-K3x and don't use R&S® ROMES to control the receiver, carefully follow all instructions in Section 7: "Interfacing the R&S TSMx with Customer Software Application"

Manuals

This manual describes how to put the analyzer into operation. Additional documentation for the radio network analyzer is provided on the accompanying CD-ROM.

For specifications and typical applications, refer to the R&S TSMx datasheet and R&S ROMES application notes.

CD-ROM

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

- Latest pdf-version of this document and release notes   ..\Doc
- Utility tool for firmware updates   ..\TsmxFirmwareInstall
- Utility tool for recalling instrument setup and option key installation   ..\TsmxOptionKeyInstaller
- Utility tool for R&S TSMx IEEE1394 device driver installation ..\IEEE1394
- Backup copy of the instrument flash card contents   ..\ACE_Files
- Backup copy of the instrument identification file   ..\IdentData
- Backup copy of device- and option-Keys   ..\OptionKeys
- Set of interface files for OEM integration   ..\CustomerApplicationFiles

   (OEM integration of R&S TSMx receiver requires license agreement with R&S and dedicated OEM option(s) R&S TSMU-K3x installed on the instrument!)

Please look in the sub directory ...\Doc of this CD-ROM for the latest version of this operating manual and updated release notes!

1 General Description

The Radio Network Analyzer seriesR&S TSMx, in a first priority, had been designed to work in combination with the **Coverage Measurement Software R&S ROMES** running on a Windows PC / notebook. The high speed interface between receiver and host is implemented in the IEEE1394 connection.

Together with this ROMES software, the Radio Network Analyzer can be used as a powerful instrument for UMTS, CDMA and GSM interference analysis and CW measurements.

It is also imaginable to run and control the R&S TSMx unit in a stand alone solution with a PC / notebook and a customer software. (see **Interfacing the R&S TSMx with Customer Software** Application).

Currently there are the following model variants of the analyzer available:

R&S TSMU: Radio Network Analyzer (Standard input power, Single Tech)

R&S TSMU-H: Radio Network Analyzer (Extended input power, Single Tech)

R&S TSMQ: Radio Network Analyzer (Quad-Tech)

(For details please refer to the R&S TSMx datasheet and ROMES application notes.)

2 System Requirements

Controlling and measuring with the R&S TSMx radio network analyzer requires a system controller in form of a personal computer (PC) or notebook with IEEE 1394 interface.

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

For diagnostic purposes and servicing the R&S TSMx, trace and diagnostic data is output via the serial RS-232-C interface of the instrument (see **Troubleshooting via the RS-232-C Interface**).

3 Preparations for Use

Unpacking the Analyzer

The analyzer is being shipped in a accessory suitcase. Take the suitcase out of the shipping box, open the suitcase and make sure that all items listed in the packing list are included.

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

For further transport or shipment of the analyzer the original suitcase and shipping box should be used .

TMSx IEEE1394 Device Driver Installation

Controlling the R&S TSMx receiver with R&S ROMES software or any customer software application requires the installation of the appropriate IEEE1394 device driver on the host PC.

A **IEEE1394 Installer** with the latest device driver version is part of this instrument shipment and located in the CD-ROM directory:

>   **..\IEEE1394**

The installer utility could be started directly from this directory by running the corresponding executable.

Refer to firmware release notes in the **..\doc** subdirectory of the CD-ROM for detailed information about this topic.

After completion of the installation process the host system is ready to control the TSMx receiver.

Note:
*   *You will need system administrator privileges on your computer to run the installation!*

Rack Mounting

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

4 Putting the Analyzer into Operation

CAUTION

To prevent damage to the instrument and to avoid placing anyone in danger, always follow the instructions in the following sections. This is especially important when using the instrument for the first time.

Prerequisites

To operate the analyzer correctly, you need the following equipment:

- PC/notebook with IEEE1394 interface adapter   not part of the package; (see **System Requirements**)

- R&S TSMx IEEE1394 device driver   part of the package; (see **Preparations for Use**)

- Antenna   a magnetic mount multi-band antenna for AMPS/GSM/PCN/PCS/UMTS with FME→N adapter is part of the package

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

- DC power supply   optional part of the package: R&S TSMU-Z1

- R&S ROMES measurement software   not part of the package

- Alternatively to R&S ROMES, customer interface DLLs   **(see Interfacing the R&S TSMx with Customer Software Application)**

- Optional: GPS unit which supports The pulse per second (PPS) output   not part of the package

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 PC/notebook IEEE1394 port to any ot the IEEE1394 ports (1 or 2). Two different IEEE1394 cables are included in the package.

➢ Further R&S TSMx receivers can be cascaded using the spare IEEE1394 port (2).

➢ Connect the antenna FME-connector to the FME↔N adapter and connect the adapter to the RF IN connector. Both, a multi-band antenna and the adapter are part of the package.

> ⚠️ **ATTENTION**
>
> Do not to inject more than the maximum rated RF input power. Otherwise, the input stage could be severely damaged.
>
> ➢ R&S TSMU/TSMQ: -10 dBm
>
> ➢ R&S TSMU-H: 0 dBm

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

   Input type: 3.3 – 5 V TTL, max. +/-12 V DC; falling edge of input signal with high precision!

➢ Additional multifunctional input/output connector PULSE IN/OUT. Used as distance trigger input (only used for distance triggered RF power scan measurements, R&S TSMU-K15, K35).

   Input type: max +/- 12 V DC.

➢ The RS232 connector should be connected with the RS-232-C interface on the PC/notebook via a null-modem cable (necessary only for service purposes and troubleshooting; see **Troubleshooting**).

➢ Connect the R&S TSMx to the power supply (see **Connecting the Instrument to the Power Supply**).
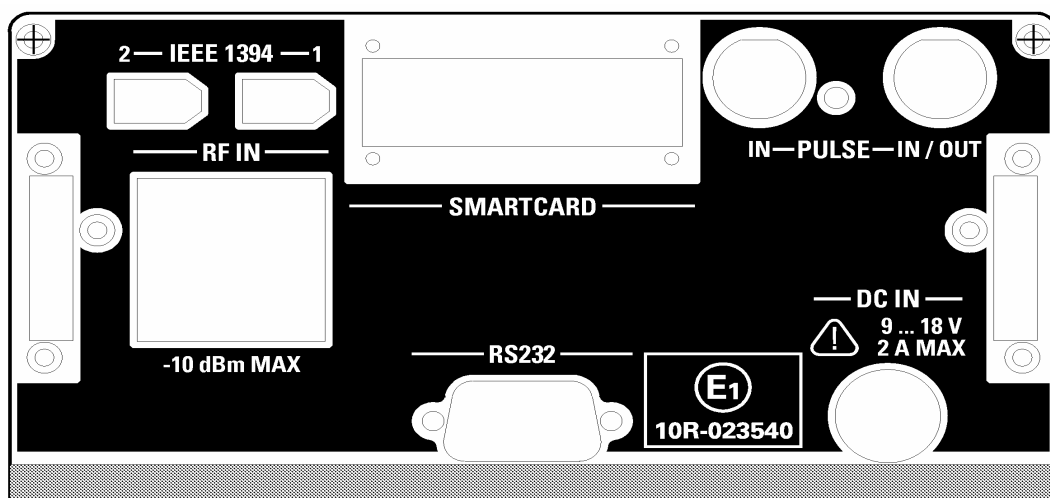
➢ See Fig. 2 for the complete wiring diagram

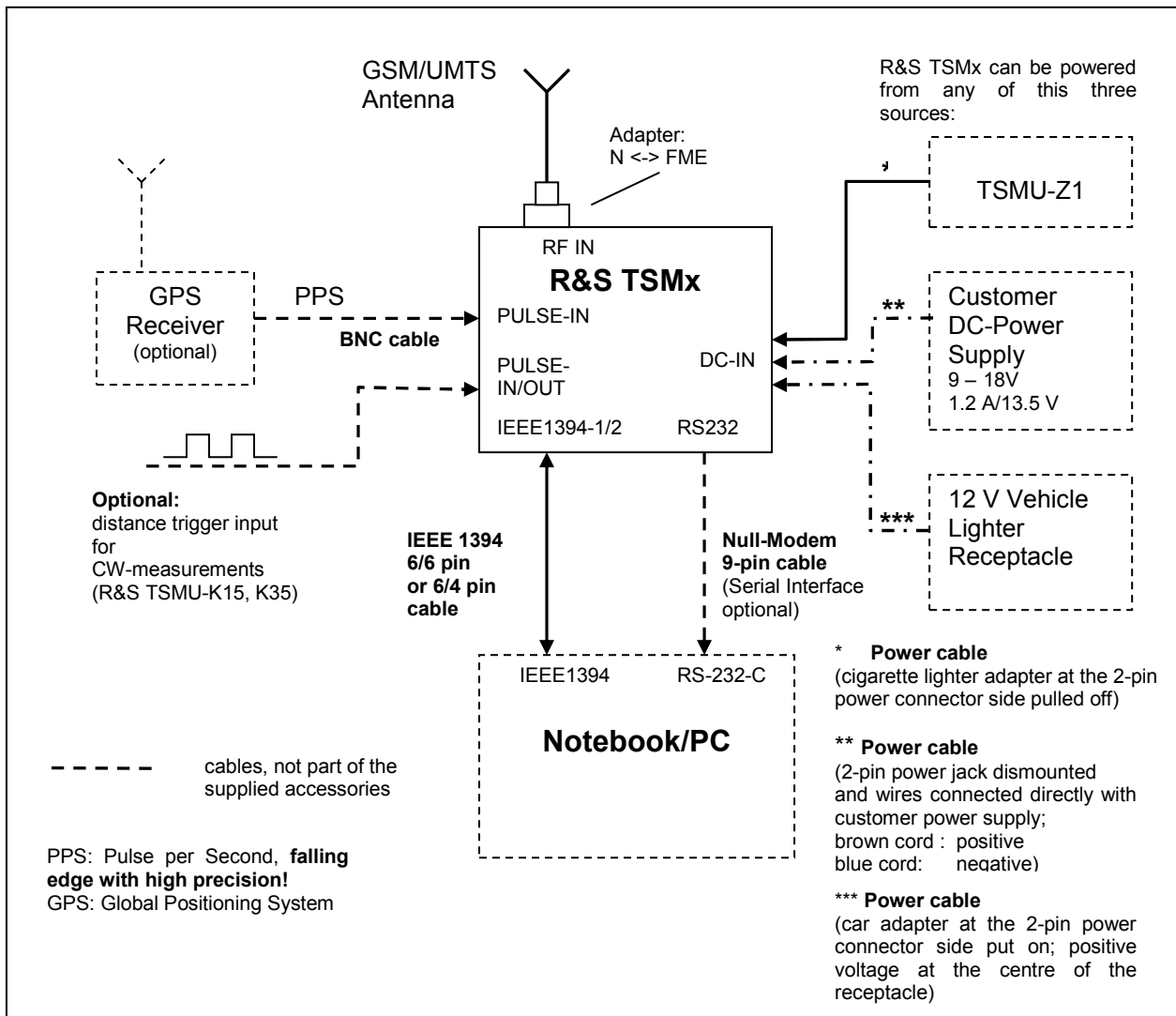Fig. 1   R&S TSMx Rear Panel with Connectors

Fig. 2　Wiring Diagram

Connecting the Instrument to the Power Supply

DANGER
- Danger off shock hazard
- After moisture condensation, allow the receiver to dry before switching on.

ATTENTION
- Do not cover the ventilation holes.
- Connect the receiver only with SELV (Safety Extra Low Voltage) power supplies.
- 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

DC Input current: ~ 700 mA / 13.5 V

- An additional external fuse must be inserted if the DC power supply offers more than 35 A.

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

Power On Sequence/Idle Mode

As soon as you connect the R&S TSMx to the power supply, the instrument switches to the power on mode and completes the power on sequence. The performance test during the power on sequence initiates various reboot cycles on the instrument.

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

After completing the power on sequence, the radio network analyzer switches to the idle mode and is ready for the application program download via the IEEE1394 interface (see **ROMES Application Program Download/Ready Mode**).
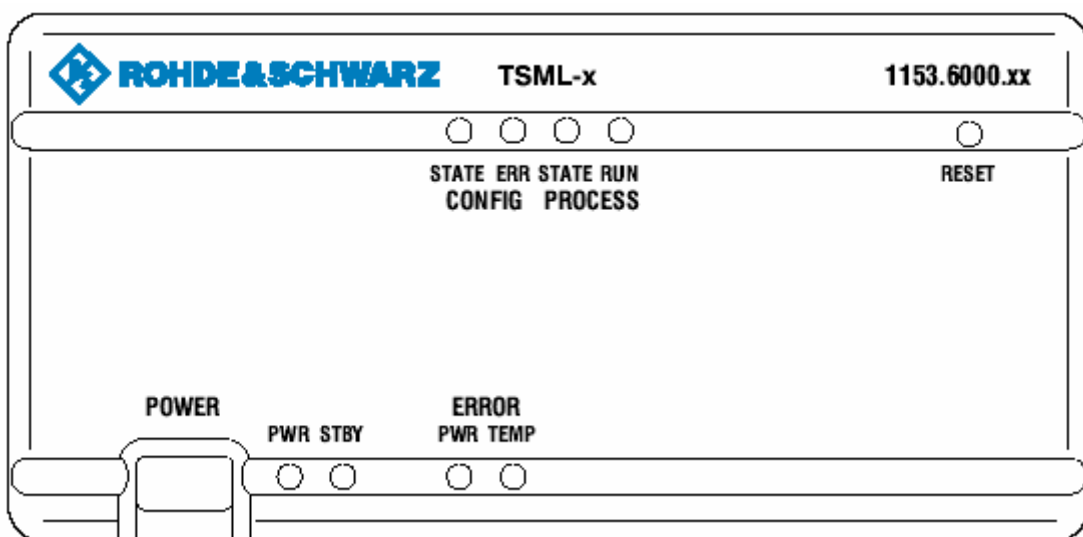

Fig. 4   R&S TSMx Front Panel and LED's

ROMES Application Program Download/Ready Mode

Start the ROMES software application after the power on sequence has been completed (see **Power On Sequence**). The TSMx application program will be downloaded from the host PC either during ROMES software start or while loading the TSMx software driver in ROMES. This depends on the availability of a ROMES option dongle. Please refer to the ROMES software manual for details.
For information on how to configure and carry out ROMES R&S TSMx measurements, please refer to the ROMES manual either.
The instrument changes to the ready mode after finishing the program download and completing some initialization routines. The instrument is now ready for ROMES-originated measurement commands.
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** for monitoring Program Download and Ready Mode).

ROMES Measuring Mode

The unit switches to the measuring mode immediately after receiving a ROMES "Start Measurement/Recording" command. For information on how to carry out R&S TSMx measurements with ROMES, please refer to the ROMES manual.

There is no change in LED indication on the front panel. The green PROCESS LEDs STATE and RUN continue blinking alternately.

(see
Tracing ROMES Measuring Mode for monitoring the measuring mode)

Instrument Reset

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

ATTENTION

Do not press the reset button during ordinary R&S TSMx measurements with the ROMES software. Otherwise, the ROMES application will not be able to close properly. As a result, the ROMES software will crash and must be shut down from the Windows Task Manager.

Standby Mode

You can switch the R&S TSMx to 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 TSMx will be stopped immediately and the unit will be powered off.
The amber STBY LED on the front panel indicates the standby mode.

Do not press the power button during ordinary R&S TSMx measurements with the ROMES software!

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

5 Firmware Updates

The **TsmxFirmwareInstall** utility tool on the accompanying CD-ROM is used to update the instrument firmware.

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

CAUTION

Make sure that neither ROMES nor any other utility tool interfaces with the R&S TSMx at the same time. Shut down any active utility before starting the TsmxFirmwareInstall tool!

Requirements

- PC/Notebook with IEEE1394 interface

- Appropriate Rohde & Schwarz IEEE1394 driver on host PC
  (see Firmware Release Notes in the subfolder ..\doc of the CD-ROM)

- PC/notebook and R&S TSMx connected with the accessory IEEE1394 cable

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

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

- No other application interfacing with the TSMx

Program Start

The firmware update program is located in the CD-ROM directory **..\TsmxFirmwareInstall**. Reset the TSMx receiver and start the utility by running the TsmxFirmwareInstall.exe in the same directory. Any of the available firmware versions located in the program subfolder **..\Firmware**, can be selected from a dialog box during program execution.

Note:
  *Please refer to the firmware release notes in the CD-ROM subfolder ..**Doc** for installer utility details and new features with each version.*

6 Instrument Setup and Software Options

The **TsmxOptionKeyInstaller** utility tool on the accompanying CD-ROM can be used to recall the instrument setup and to install new options.

Note:
Please refer to the firmware release notes in the CD-ROM subfolder ..\Doc for OptionKeyInstaller utility details and new features with each version.

Program Requirements

- PC/notebook with IEEE1394 interface

- Appropriate Rohde & Schwarz IEEE1394 driver on host PC
  (see Release Notes in the subfolder ..\doc of the CD-ROM)

- PC/notebook and R&S TSMx connected with the accessory IEEE1394 cable.

  It is possible to connect more than one instrument in a daisy chain connection The open IEEE1394 connector on the first instrument is the output port for the next instrument).

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

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

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

Program Start

The program is located in the CD-ROM directory **..\TsmxOptionKeyInstaller** and can be started running the TsmxOptionKeyInstaller.exe. The program needs a few seconds to set up the connection with the R&S TSMx. The instrument-related data will be displayed as soon as the connection is established.
Use the combo box "**Select TSMx**" to choose one specific instrument by serial number in a multiple-TSMx environment.

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**

Verifying Option Key Installation/Recalling Enabled Software Options

Select the **"TSMx Options"** property page of the TsmxOptionKeyInstaller utility. As mentioned in the program requirements, the utility tool offers the possibility to access more than one TSMx instrument at the same time in a daisy chained connection. To address a certain instrument 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 key is installed for a certain instrument.
The list box underneath displays all the available option key based options for an instrument.

If there is no device key installed for a certain instrument, there is an output **"No Device Key has been found"** in the program dialog.

Note:
Customers with no installed device key(s) on their TSMx instrument(s) are kindly asked to get in contact with their local R&S representatives to receive the appropriate key(s).

Installation of Software Options

Optional R&S TSMx software options for an instrument upgrade are shipped with a separate CD-ROM and need to be installed with this TsmxOptionKeyInstaller utility.
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

Ordering Additional Software Options

Normally, orderings for R&S TSMx option upgrades require solely the supplement of the serial number of the device.
Only in cases where no device key is installed on a certain instrument (see Verifying Option Key Installation/Recalling Enabled Software Options) the device specific identification file (*.hex) for a specific instrument has to be supplemented with the order.

To read out the device identification file press the button **"Get Device ID File..."** in the "TSMx Options" tab. A dialog box opens, where you can define the storage location for this file.

Please supply this identification file only in cases where no device key is installed on a certain instrument.

7 Interfacing the R&S TSMx with Customer Software Application

General

Interfacing the R&S TSMx with a 3'rd party software application requires a special R&S license agreement and dedicated OEM software options installed on the instrument (R&STSMU-K3x).
Please ask your local R&S representative for questions on this matter.

The shipment of instruments with OEM options is accompanied with a set of interface files.
Additionally, a software support package for instruments with OEM option is available. Ask your local R&S representative for questions on this matter.

Requirements

Requirements for interfacing the R&S TSMx with OEM option in a 3'rd party software application:

- Signed R&S license agreement

- Dedicated OEM option(s) TSMU-K**3**x installed on the instrument (see **Verifying Option Key Installation/Recalling Enabled Software Options**)

- Customer software application updated with the latest set of interface DLL's and files (see **Preparations for Use** for details).

- Appropriate firmware version **10.1024** or higher. It is recommended to upgrade the firmware of older instruments in the field too
- (see **Instrument Setup and Software Options**).

- Appropriate R&S IEEE1394 driver version **(see application notes in …**\doc)

Preparations before Use

Manadtory for **any** instrument with OEM option:
Extract windows_system.zip, located in the CD-ROM directory **..*CustomerApplicationFiles*** into the Windows "*SYSTEM32*" directory of the host PC. Older file versions on the host PC need to be replaced. You may need administrator privileges on the host PC for this purpose.

Mandatory for instruments with single OEM option TSMU-K31 (PN Scanner UMTS):
Extract the zipped file OEM_OptionK31_Vxx_yy.zip, located in the CD-ROM directory **..*CustomerApplicationFiles***, into the working directory of the TSMx software application. Overwrite older file versions, if they already exist in this directory.

Mandatory for instruments with both OEM options TSMU-K31 **and** TSMU-K34 (BCH-Demodulator):
Extract the zipped file OEM_OptionK31_Vxx_yy.zip and OEM_OptionK34_Vxx_yy.zip, both located in the CD-ROM directory **..*CustomerApplicationFiles***, into the working directory of the TSMx software application. Overwrite older file versions, if they already exist in this directory.

Change in R&S TSMx Option Handling

The OEM options of previously shipped R&S TSMxs (before August 05) had been coded by means of application file licensing. Drawback of this method was the necessity to recompile the application file for every new instrument with OEM option and therefore to update the customer software application regularly with this latest version of the application file.

This method has been replaced with option key licensing. So now and for the future, integrating a new instrument doesn't imply to replace the application file in the 3'rd party software application (TSMx_Application.elf). It only requires the appropriate option key on the instrument itself.

R&S TSMx's from earlier shipments (before August 05) should be updated with option keys for working properly in the 3'rd party application! Ask your local R&S representative for questions on this matter.

---

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:	red -	flash: lit:	**Configuration State Failure** No flash card inserted in flash card slot. 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 TSMx 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 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

The R&S TSMx configuration data and the boot sequence are read from the internal compact flash (CF) card. If the CONFIG ERR LED indicates *No Flash Card Inserted* (LED blinking) immediately after the analyzer has been powered on, the configuration data cannot be read from the CF card.

Switch off the instrument, remove the CF card and check whether the card can be read on a Windows PC with Flash Card Reader or PCMCIA slot (PCMCIA adapter is needed!). The directory structure on the card 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 **SMART CARD** by loosening the screws and pulling the card out of the slot.

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

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

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

The reason for the *Flash Card Error* during ordinary ROMES measurements is usually a program failure in the instrument itself. At this stage, the instrument will no longer respond to the ROMES application. You can check this by monitoring the RS-232-C output (see **Tracing** ROMES Measuring Mode) and the PROCESS LEDs on the front panel (see **ROMES Measuring Mode**). If an error occurs, the blinking of the LEDs stops!

In this case, shut down the ROMES application from the Windows Task Manager and reset the R&S TSMx. Wait for the R&S TSMx to complete the power on sequence and then set up a new ROMES measurement.

If the error persists, contact Rohde & Schwarz support.

(For information on how to perform ROMES measurements, refer to the ROMES documentation.)

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 outputted 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):

ATTENTION

Be sure that neither the ROMES software nor the R&S TSMxUpdate program or customer application communicates with the R&S TSMx at 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

Start the ROMES software application after the power on sequence has been completed (see **Power On Sequence**). The TSMx application program will be downloaded from the host PC either during ROMES software start or while loading the R&S TSMx software driver in ROMES (refer to the ROMES manual for details).

After program download, an initialization routine will start on the R&S TSMx and the unit will then switch to the ready mode. It is now ready for any measurement task initiated in the ROMES software using "Start Measurement/Recording". Please refer to the ROMES manual for details.

Depending on the availability of a valid PPS input signal on the PULSE IN connector or a GSM input signal on the RF antenna, the unit will start continuously to correct the internal system clock. Output like shown in **Listing 2** should appear at the terminal output.

```
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 ROMES Measuring Mode

Pressing "Start Measurement/Recording" in the ROMES measurement software launches a new measurement task on the R&S TSMx. The unit switches from ready mode to measuring mode.
"Stop Measurement/Recording" in ROMES switches the unit back to ready mode.
Please refer to the ROMES 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

The instrument will not boot after a firmware update, and the **CONFIG** LED on the front panel indicates an error.
The cause is usually a discrepancy between the hardware version of the controller board inside the unit and the active configuration directory on the R&S TSMx compact flash card.

In such a case, you can manually correct this mismatch on the compact flash card.

How to Solve the Configuration Problem Manually:

Remove the flash card from the instrument and 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;	$\rightarrow$	dir = *H00V10B0;*
dir = H00V10B0;	$\rightarrow$	dir = *H01V10B0;*

The unit should now boot after you insert the edited flash card. If it does not boot, contact Rohde & Schwarz support.

Background: Two separate configuration directories are stored on the flash card of each instrument (H01V10B0 and H00V10B0). The xilinx.sys file defines which one is the active directory. Two separate configuration directories are necessary, because two different versions of a printed board inside the R&S TSMx were manufactured. In some cases, the incorrect configuration directory may be activated with the xilinx.sys file, causing the unit not to boot.