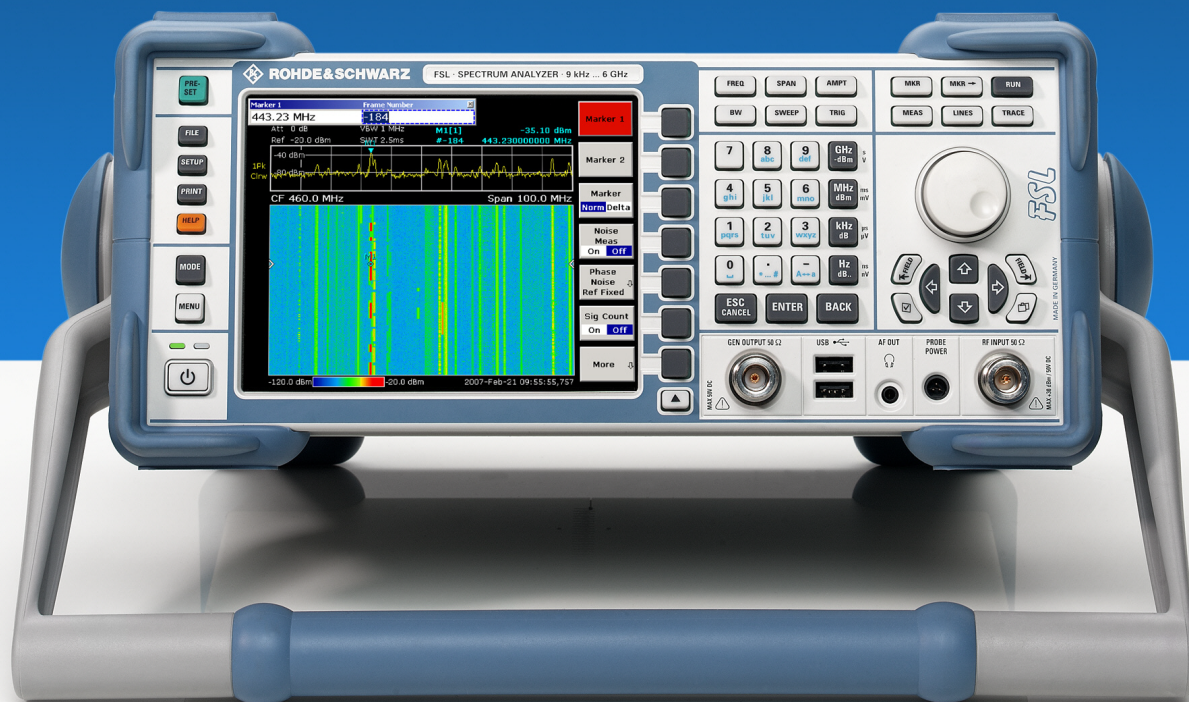


Service Manual Instrument



Spectrum Analyzer

R&S® FSL3

1300.2502K03

1300.2502K13

R&S® FSL6

1300.2502K06

1300.2502K16

R&S® FSL18

1300.2502K18

1300.2502K28



Grouped Safety Messages

Make sure to read through and observe the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standard of our products up to date and to offer our 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. The product described here 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, the Rohde & Schwarz group of companies 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, if expressly permitted, also 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 product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Symbols and safety labels

							
Observe product documentation	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 relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.

Grouped Safety Messages

Tags and their meaning

DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message.

In the product documentation, the word ATTENTION is used synonymously.

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 in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation 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 2000 m above sea level, max. transport altitude 4500 m above sea level.
A tolerance of $\pm 10\%$ shall apply to the nominal voltage and of $\pm 5\%$ 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.

Grouped Safety Messages

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/operator 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 (corresponding to the 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. Check the power cable on a regular basis to ensure that it is in proper operating condition. 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 (higher fuse only after consulting with the Rohde & Schwarz group of companies).
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 $V_{rms} > 30\text{ V}$, 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. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so 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 license electrician.

Grouped Safety Messages

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 liquids, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock for the user 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. Do not short-circuit batteries and storage batteries.
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 must be recycled and kept separate from residual waste. Batteries and storage batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
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. The product can be very heavy. Be careful when moving it to avoid back or other physical injuries.
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 product 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.
34. Prior to cleaning, disconnect the product from the AC supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluent for cellulose lacquers.

Informaciones elementales de seguridad

¡Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros 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. El presente 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 estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas 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 está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. 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 mal uso del producto.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones de la correspondiente documentación de producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos profundos y conocimientos básicas del idioma inglés. Por eso se debe tener en cuenta que el producto sólo pueda ser operado por personal especializado o personas minuciosamente instruidas con las capacidades correspondientes. 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. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto y entréguela a usuarios posteriores.

Símbolos y definiciones de seguridad

							
Ver documentación de producto	Informaciones para maquinaria con un 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 construcción con peligro de carga electrostática

					
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

Informaciones elementales de seguridad

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 el capítulo correspondiente de la documentación de producto y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por el grupo de empresas 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	Identifica un peligro directo con riesgo elevado de provocar muerte o lesiones de gravedad si no se toman las medidas oportunas.
ADVERTENCIA	Identifica un posible peligro con riesgo medio de provocar muerte o lesiones (de gravedad) si no se toman las medidas oportunas.
ATENCIÓN	Identifica un peligro con riesgo reducido de provocar lesiones de gravedad media o leve si no se toman las medidas oportunas.
AVISO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo. En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación de producto 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

- 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 por principio 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, transporte hasta 4.500 m sobre el nivel del mar.
Se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal.

trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal especializado 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. Después 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 la corriente conductora, control de funcionamiento).
- En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de

Informaciones elementales de seguridad

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 produjeran 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, deberán ser tenidas en cuenta las prescripciones 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 prescripciones de seguridad especiales en la descripción del producto.
 6. Ciertos productos, como por ejemplo las instalaciones de radiocomunicación RF, 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/usuario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo aumentado de exposición a radiaciones 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 de la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dado cambiar los fusibles correspondientes del producto.
 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. 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 asegurarse de que el enchufe sea de fácil acceso y nabejo (según la 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 bastidores o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

Informaciones elementales de seguridad

12. No utilice nunca el producto si está dañado el cable eléctrico. Compruebe regularmente el correcto estado de los cables de conexión a red. 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 (utilización de fusibles de mayor amperaje sólo previa consulta con el grupo de empresas Rohde & Schwarz).
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 $U_{eff} > 30 \text{ V}$ 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 del estándar IEC950/EN60950.
18. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. 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, el circuito de suministro de corriente deberá estar protegido de manera que usuarios y productos 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 cortocircuitos 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 líquidos 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 para el usuario 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.

Informaciones elementales de seguridad

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. No cortocircuitar baterías ni acumuladores. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención células de litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Las baterías y acumuladores deben reutilizarse y no deben acceder a los vertederos. Las baterías y acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de evacuación y reciclaje.
28. 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.
29. El producto puede poseer un peso elevado. Muévelo con cuidado para evitar lesiones en la espalda u otras partes corporales.
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 sujeción 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 observadas. 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. El fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
33. Dado el caso de que esté integrado un producto de láser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación de producto. De otra manera pondrá en peligro su salud, ya que el rayo láser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo láser.
34. Antes de proceder a la limpieza, desconecte el producto de la red. Realice la limpieza con un paño suave, que no se deshilache. No utilice de ninguna manera agentes limpiadores químicos como, por ejemplo, alcohol, acetona o nitrodiluyente.



ROHDE & SCHWARZ

Kundeninformation zur Batterieverordnung (BattV)

Dieses Gerät enthält eine schadstoffhaltige Batterie. Diese darf nicht mit dem Hausmüll entsorgt werden.

Nach Ende der Lebensdauer darf die Entsorgung nur über eine Rohde&Schwarz-Kundendienststelle oder eine geeignete Sammelstelle erfolgen.

Safety Regulations for Batteries (according to BattV)

This equipment houses a battery containing harmful substances that must not be disposed of as normal household waste.

After its useful life, the battery may only be disposed of at a Rohde & Schwarz service center or at a suitable depot.

Normas de Seguridad para Baterías (Según BattV)

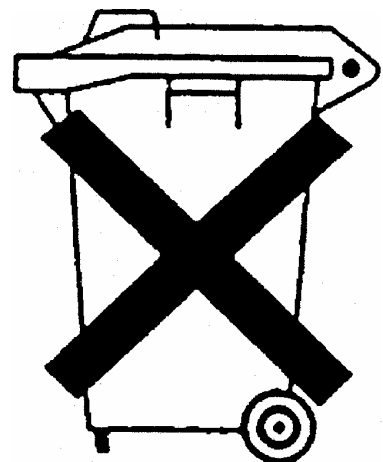
Este equipo lleva una batería que contiene sustancias perjudiciales, que no se debe desechar en los contenedores de basura domésticos.

Después de la vida útil, la batería sólo se podrá eliminar en un centro de servicio de Rohde & Schwarz o en un depósito apropiado.

Consignes de sécurité pour batteries (selon BattV)

Cet appareil est équipé d'une pile comprenant des substances nocives. Ne jamais la jeter dans une poubelle pour ordures ménagères.

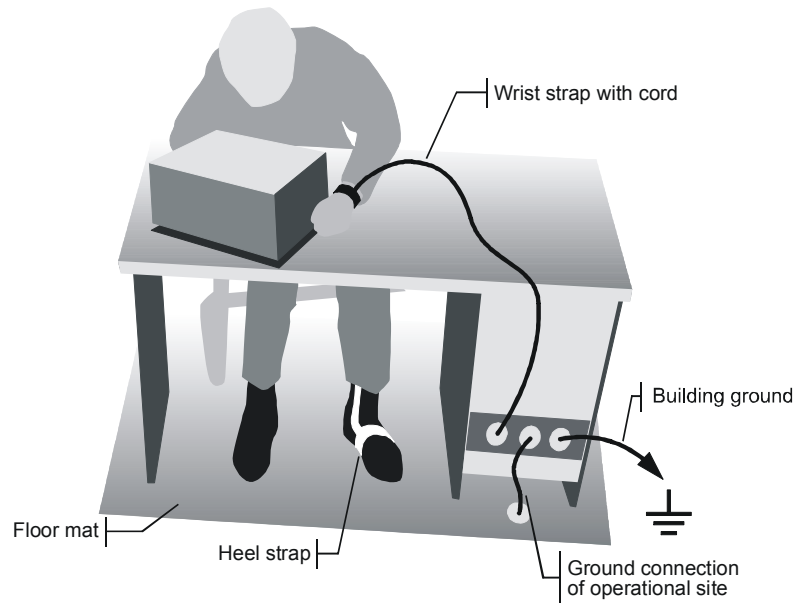
Une pile usagée doit uniquement être éliminée par un centre de service client de Rohde & Schwarz ou peut être collectée pour être traitée spécialement comme déchets dangereux.



Instructions for Electrostatic Discharge Protection

NOTICE

To avoid damage of electronic components, the operational site must be protected against electrostatic discharge (ESD).



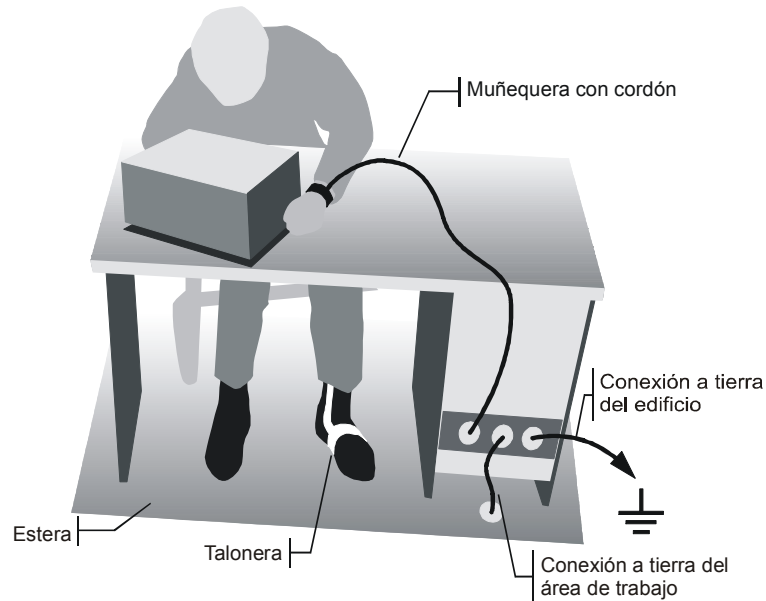
The following two methods of ESD protection may be used together or separately:

- Wrist strap with cord to ground connection
- Conductive floor mat and heel strap combination

Instrucciones para la protección contra descargas electroestáticas

AVISO

Para evitar averías en los componentes electrónicos, el área de trabajo tiene que estar protegido contra descargas electroestáticas ESD (electrostatic discharge).



Los siguientes dos métodos de protección ESD pueden ser usados juntos o separados:

- Muñequera con cordón para conexión a tierra
- Combinación de estera antiestática y talonera

Safety Instructions for Units with Removable Cabinet

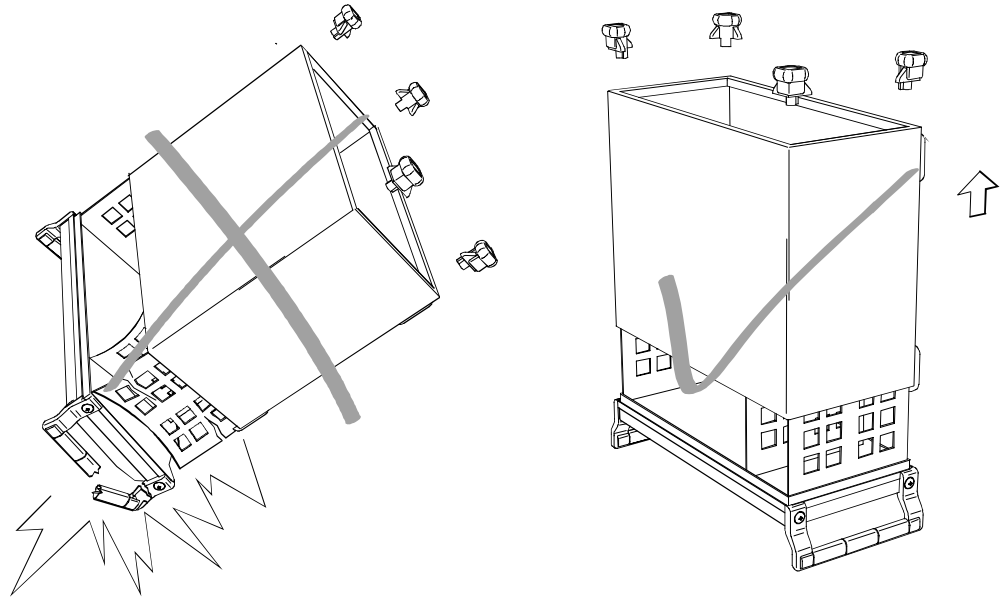
WARNING



Danger of injuries

When removing the rear feet, the unit can slip out of the cabinet.

Put the unit onto the front handles, before removing the rear feet and taking off the cabinet. Thus the risk of personal injuries and damages to the unit is avoided.



When mounting the cabinet take care not to pen in the fingers. Also pay attention not to damage or pull off cables. Screw the rear feet back on immediately after mounting the cabinet. Do not move the unit with the rear feet missing.

Informaciones de seguridad para aparatos con tubo de quita y pon

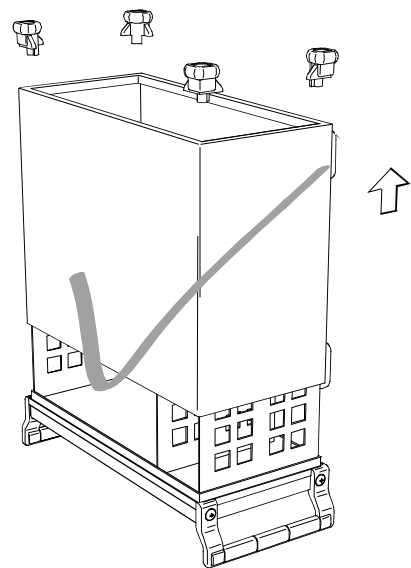
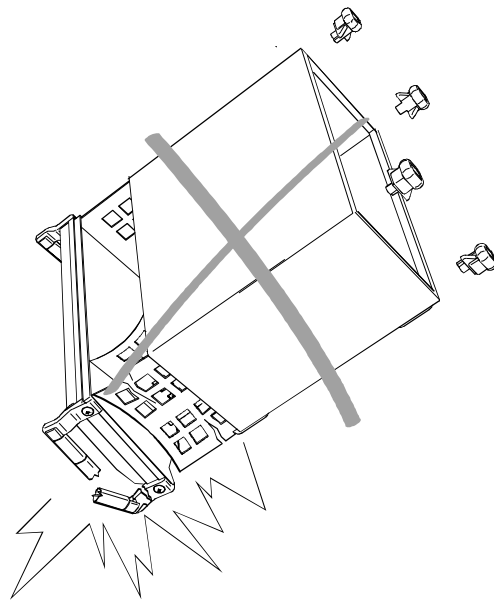
ADVERTENCIA



Peligro de heridas

Al sacar los piés de la pared posterior puede deslizarse el aparato fuera de la caja.

Posicionar el aparato de manera segura sobre las asas delanteras, antes de sacar los piés de la pared posterior y entonces sacar la caja. De esta manera evitarán el riesgo de daños en personas y daños en el aparato.



Existe el riesgo de heridas en el momento de poner otra vez la caja, como por ejemplo posiblemente engancharse los dedos. Por favor tengan además en cuenta de que no se enganchen o desconecten cables. Por favor atornillen los piés de la pared posterior directamente despues de poner la caja. No muevan el aparato nunca sin que los piés de la pared posterior estén atornillados.

Procedure in Case of Service and Ordering of Spare Parts

This section contains information on shipping an instrument to your service center and ordering spare parts.

Please contact your local Rohde & Schwarz service center if you need service or repair work of your equipment or to order spare parts. The list of the Rohde & Schwarz representatives is provided at the beginning of this service manual. You can find the current address of your representative on our homepage www.rohde-schwarz.com. Navigate to Service & Support / Service Locations.

Shipping the Instrument

We require the following information in order to answer your inquiry fast and correctly and to determine whether the warranty is still valid for your instrument:

- Instrument model
- Serial number
- Firmware version
- Must the instrument be returned with this firmware?
- Detailed error description in case of repair
- Indication of desired calibration
- Contact person for possible questions

In some countries, an RMA process is available for the return shipment of the instrument. For details, contact your local representative.

When shipping the instrument, be careful to provide for sufficient mechanical and antistatic protection.

- Use the original packaging for transporting or shipping the instrument. The protective caps for the front and rear prevent damage to the operating elements and the connectors.
- If you do not use the original packaging, provide for sufficient padding to prevent the instrument from slipping inside the box. Wrap antistatic packing foil around the instrument to protect it from electrostatic charging.

Rohde & Schwarz offers repair and calibrations of the test systems it produces. The calibration documentation fulfills ISO 17025 requirements.

Shipping Defective Modules

Also when shipping a module, be careful to provide for sufficient mechanical and antistatic protection.

- Ship the module in a sturdy, padded box.
- Wrap the module in antistatic foil.

If the packaging is only antistatic but not conductive, additional conductive packaging is required. The additional packaging is not required if the tightly fitting packaging is conductive.

Exception:

If the module contains a battery, the tightly fitting packaging must always consist of antistatic, non-chargeable material to protect the battery from being discharged.

Ordering Spare Parts

To deliver spare parts promptly and correctly, we need the following information:

- Stock number (see list of spare parts in chapter "Documents")
- Designation
- Component number according to list of spare parts
- Number of pieces
- Instrument type for which the spare part is needed
- Instrument stock number
- Instrument serial number
- Contact person for possible questions

Refurbished Modules

Refurbished modules are an economical alternative to original modules. Bear in mind that refurbished modules are not new, but repaired and fully tested parts. They may have traces from use, but they are electrically and mechanically equivalent to new modules.

Your Rohde & Schwarz representative will be happy to inform you about which modules are available as refurbished modules.

Taking Back Defective Replaced Modules

Defective modules of the replacement program which cannot be repaired are taken back within three months following delivery. A repurchasing value is credited.

Excluded are parts which cannot be repaired, e.g. printed boards that are burnt, broken or damaged by attempts to repair them, incomplete modules, and parts with severe mechanical damage.

Please return the defective replacement modules, together with the accompanying document for returned merchandise, which you received with the spare module. We need the following information:

- Stock number, serial number and designation of the removed part
- Detailed error description
- Stock number, serial number and type of instrument from which the module was removed
- Date of removal
- Name of the engineer/technician who replaced the module
- R&S ordering number
- Service reference number (if available)

Contents of Manuals for Spectrum Analyzer R&S FSL

Service Manual - Instrument

The Service Manual - instrument informs on how to check compliance with rated specifications, on instrument function, repair, troubleshooting, and fault elimination. It contains all information required for repairing the R&S FSL by the replacement of modules.

The Service Manual comprises five chapters and an annex containing the R&S FSL circuit documentation:

- | | |
|------------------|---|
| Chapter 1 | provides all the information necessary to check for compliance with rated specifications. The required test equipment is included, too. |
| Chapter 2 | describes the manual adjustment of the calibration source and of the frequency accuracy as well as the automatic adjustment of individual module data following module replacement. |
| Chapter 3 | describes the design as well as simple measures for repair and fault diagnosis, in particular, the replacement of modules. |
| Chapter 4 | contains information on the extension and modification by installing instrument software and retrofitting options. |
| Chapter 5 | describes the shipping of the instrument and ordering of spare parts and contains spare parts lists and exploded views. |

Quick Start Guide

This manual is delivered with the instrument in printed form and in PDF format on the CD-ROM. It provides the information needed to set up and start working with the instrument. Basic operations and basic measurements are described. Also a brief introduction to remote control is given. More detailed descriptions are provided in the Operating Manual.

Operating Manual

This manual is a supplement to the Quick Start Guide and is available in PDF format on the CD delivered with the instrument. To retain the familiar structure that applies to all operating manuals of Rohde&Schwarz Test & Measurement instruments, the chapters 1 and 3 exist, but only in form of references to the corresponding Quick Start Guide chapters. In this manual, all instrument functions are described in detail. For additional information on default settings and parameters, refer to the data sheets. The set of measurement examples in the Quick Start Guide is expanded by more advanced measurement examples. In addition to the brief introduction to remote control in the Quick Start Guide, a description of the commands and programming examples is given. Information on maintenance, instrument interfaces and error messages is also provided.

Internet Site

The Internet site at: [R&S FSL Spectrum Analyzer](#) provides the most up to date information on the R&S FSUP. The current operating manual at a time is available as printable PDF file in the download area. Also provided for download are firmware updates including the associated release notes, instrument drivers, current data sheets and application notes.

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1 Performance Test

Test Instructions

To ensure proper conditions for the performance check and prevent setting errors, the instrument must be prepared as follows:

- Allow for a minimum warm-up time of 30 minutes at ambient temperature.
- Carry out all internal adjustments (start of the self alignment: [**Setup: Self Alignment**]).
- Press the **PRESET** key to establish a defined initial state before configuring a new measurement.

The following sections describe the procedures for checking the rated values. The values are specified in the data sheet. Additional uncertainties introduced by the measurement equipment must be taken into account when checking the rated values. Unless specified otherwise, all measurements will be performed with external reference frequency.

Inputs for settings during measurements are shown as follows:

[<KEY>] Press a key on the front panel, e.g. [**SPAN**].

[<Softkey>] Press a softkey, e.g. [Peak].

[<nn unit>] Enter a value and terminate by entering the unit, e.g. [**12 kHz**].

Successive entries are separated by [:], e.g. [**BW** : Res BW Manual : **3 kHz**].

Measurement Equipment and Accessories

Item	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.	Use
1	Signal generator	Frequency: R&S FSL 3/ 6 : 10 MHz to 6 GHz R&S FSL 18 : 10 MHz to 18 GHz Uncertainty of frequency: 0.1 ppm, 0.05 ppm with option R&S FSL-B4 Phase noise at 500 MHz: < -105 dBc (1Hz) @ 10 kHz < -110 dBc (1Hz) @ 100 kHz < -130 dBc (1Hz) @ 1 MHz	R&S SMR20	1104.0002.20	Frequency response Frequency accuracy of reference oscillator
2	Signal generator	Frequency: 10 MHz to 6 GHz			3 rd order IM
3	Power sensor	R&S FSL 3/ 6 : 10 MHz to 6 GHz R&S FSL 18 : 10 MHz to 18 GHz	R&S NRP-Z11 R&S NRP-Z21	1138.3004.02 1137.6000.02	Frequency response
4	50-Ω termination	10 MHz to 6 GHz Return loss ≤ -10 dB			Noise display
5	6-dB power combiner	10 MHz to 6 GHz			3 rd order IM
6	6-dB power splitter	R&S FSL 3/ 6 : 10 MHz to 6 GHz R&S FSL 18 : 10 MHz to 18 GHz			Frequency response
7	N cable	Attenuation < 0.5 dB to 6 GHz for Model 3/6; Attenuation < 3 dB to 18 GHz for FSL28			Tracking generator output level

Performance Test R&S FSL

Checking Reference Frequency Accuracy

Test equipment: Signal generator (refer to "Measurement Equipment", item 1):
Accuracy < 1×10^{-9}
Frequency 1 GHz

Test setup: ➤ Connect the signal generator to the RF input of the R&S FSL.

R&S FSL settings: - [**SETUP** : Reference Int / Ext]
➤ Toggle to internal reference (Int).

Signal generator settings: - Frequency 1 GHz
- Level -30 dBm (at R&S FSL input)

R&S FSL settings: - [**PRESET**]
- [**FREQ : 1 GHz**]
- [**SPAN : 100 kHz**]
- [**BW** : Res BW Manual : **10 kHz**]
- [**MKR** : Sig Count]

Measurement: ➤ Read out the frequency value (Count:) of the marker.

Nominal frequency:

Model without OCXO (option R&S FSL-B4): 1.0 GHz $\pm$ 2 kHz

Model with OCXO (option R&S FSL-B4): 1.0 GHz $\pm$ 200 Hz

Note: *The frequency of the reference oscillator can be adjusted by means of a service function (refer to chapter "Adjustment").*

Checking Level Accuracy and Frequency Response

Test equipment: - Signal generator: Refer to "Measurement Equipment", item 1.
- Power sensor: Refer to "Measurement Equipment", item 3.
- 6 dB power splitter (refer to "Measurement Equipment", item 6)

Frequency range:
R&S FSL 3: 10 MHz to 3 GHz
R&S FSL 6: 10 MHz to 6 GHz

Checking frequency response

Determining the level accuracy at 65.833 MHz

- Test setup:
- Connect power sensor to the USB port of the R&S FSL and execute function 'ZERO' when there is no signal applied to the power sensor.
 - Connect the RF input of the power splitter to the RF output of the signal generator.
 - Connect output 1 of the splitter to the power sensor.
 - Connect output 2 of the splitter to the RF input of the R&S FSL

Signal generator settings:

- Frequency 65.833 MHz
- Level -14 dBm

- Measurement:
- Determine output power of the signal generator with the power meter. Adjust the output power of the signal generator until the power meter shows -10 ± 0.1 dBm.

- R&S FSL settings:
- [**PRESET**]
 - [**AMPT** : RF Atten Manual : **10 dB**]
 - [**AMPT** : **0 dBm**]
 - [**SPAN** : **30 kHz**]
 - [**BW** : Res BW Manual : **10 kHz**]
 - [**TRACE** : Detector Manual Select : RMS : **ENTER**]
 - [**FREQ** : Center : **65.833 MHz**]
 - Set marker to peak of signal:
 - [**MKR->** : Peak]

Evaluation:

The difference between the signal levels measured with the power meter and the R&S FSL (level reading of marker 1) reflects the absolute level accuracy of the R&S FSL. It can be calculated as follows:

$$\text{Level accuracy}_{65.833\text{MHz}} = L_{\text{FSL}} - L_{\text{power meter}}$$

- Test setup:
- Connect power sensor to the USB port of the R&S FSL and execute function 'ZERO' when there is no signal applied to the power sensor.
 - Connect RF output of signal generator to input of splitter.
 - Connect output 1 of splitter to power sensor / power meter.
 - Connect output 2 of splitter to RF input of the R&S FSL.

Signal generator settings:

- Level -4 dBm
- Frequency $\{f_{in}\}^*$

R&S FSL settings:

- [**PRESET**]
- [**AMPT** : RF Atten Manual : RF_Att *)]
- [**AMPT** : **0 dBm**]
- [**SPAN** : **100 kHz**]
- [**BW** : Res BW Manual : **10 kHz**]
- [**TRACE** : Detector Manual Select : RMS : **ENTER**]
- [**FREQ** : Center : { f_{in} } *)]
- [**AMPT** : Preamp : On / Off *)]

*) Refer to table under "Performance Test Report" for values of RF_Att, Preamp and f_{in} .

Reference measurement:

- f_{in} = **65.833 MHz**
- Determine signal level $L_{\text{power meter}}$.
- Adjust the output power of the signal generator until the power meter shows -30 ± 1 dBm.
- Set marker to peak of signal:
- [**MKR->** : Peak]

The signal level L_{FSL} is displayed by the level reading of marker 1.

$$\text{Ref}_{65.833\text{MHz}} = L_{\text{FSL}} - L_{\text{power meter}}$$

Measurement

Signal generator settings:

- Frequency f_{in}

Refer to "Performance Test Report" table for values of f_{in} .

Power meter settings:

Determine signal level $L_{\text{power meter}}$. To achieve higher accuracy, compensating for the frequency response of the power sensor is recommended.

R&S FSL settings:

- [**FREQ** : Center : { f_{in} }]

Refer to "Performance Test Report" table for values of f_{in} .

- Set marker to peak of signal:
- [**MKR->** : Peak]

The signal level L_{FSL} is displayed by the level reading of marker 1.

Evaluation:

The frequency response can be calculated as follows:

$$\text{Frequency response} = L_{\text{FSL}} - L_{\text{power meter}} - \text{Ref}_{65.833 \text{ MHz}}$$

Checking RF Attenuator

Test principle:	The RF attenuator of the R&S FSL can be switched from 0 to 30 dB in 5 dB increments .				
Test equipment:	- Signal generator (refer to section "Measurement Equipment and Accessories", item 1) <table> <tr> <td>Frequency</td><td>65.833 MHz</td></tr> <tr> <td>Maximum level</td><td>≥ 6 dBm</td></tr> </table>	Frequency	65.833 MHz	Maximum level	≥ 6 dBm
Frequency	65.833 MHz				
Maximum level	≥ 6 dBm				
Test setup:	➤ Connect the RF output of the signal generator to the input of the splitter. ➤ Connect output 1 of the splitter to the power sensor / power meter. ➤ Connect output 2 of the splitter to the RF input of the R&S FSL.				
Signal generator settings:	- Frequency 65.833 MHz - Level -14 dBm ➤ Determine the output power of the signal generator with the power meter. Adjust the output power of the signal generator until the power meter shows -25 dBm ± 0.2 dB.				
R&S FSL settings:	- [PRESET] - [FREQ : 65.833 MHz] - [SPAN : 500 Hz] - [BW : Res BW Manual : 1 kHz] - [BW : Video BW Manual : 30 Hz] - [AMPT : Ref Level : 0 dBm] - [AMPT : RF Atten Manual : 10 dB]				
Reference measurement:	➤ Set the marker to the peak of the signal. - [MKR-> : Peak] The signal level L is displayed by the level reading of the marker. $\text{Ref}_{\text{0dBm}} = L - L_{\text{power meter}}$				

Measurement

Signal generator settings:

- Frequency 65.833 MHz
- Level Ref_Lev *) – 14 dB

- Determine the output power of the signal generator with the power meter. Adjust the output power of the generator until the power meter shows the value from the table below.

R&S FSL settings:

- [**AMPT** : RF Atten Manual : { a_{FSL} }]
- [**AMPT** : {-10 dBm + a_{FSL} } **dBm**]
- [**MKR->** : Peak]

Evaluation:

The signal level L is displayed by the level reading of the marker.

The difference between the level inaccuracy of the R&S FSL at 10 dB RF_Att (Ref_{0dBm}) is the uncertainty of the RF attenuation:

$$\text{Uncertainty} = (L - L_{\text{power meter}}) - \text{Ref}_{0\text{dBm}}$$

Signal level at input	-35 dBm	-25 dBm	-15 dBm	-5 dBm
a_{FSL}	0 dB	10 dB	20 dB	30 dB
Preamp	OFF	OFF	OFF	OFF
Reference Level	-10 dBm	0 dBm	10 dBm	20 dBm

When a RF preamplifier is installed its gain accuracy has to be checked. Perform the two measurements with the settings from the table below,. The gain error of the preamp is calculated from the difference between the two level uncertainties .

$$\text{Uncertainty} = (L - L_{\text{power meter}}) - \text{Ref}_{0\text{dBm}}$$

Signal level at input	-10 dBm	-30 dBm
a_{FSL}	10 dB	10 dB
Preamp	OFF	ON
Reference Level	0 dBm	-20 dBm

Checking Reference Level Switching (IF Gain)

The R&S FSL has only one IF Gain setting. The setting of the reference level has only impact on a graphical shift on the display. Therefore the IF Gain switching does not need to be verified.

Checking Noise Display

Test equipment:	50 Ω termination (refer to "Measurement Equipment", item 4)
Test setup:	➤ Terminate the RF input of the R&S FSL with 50 Ω .
R&S FSL settings:	- [PRESET] - [AMPT : RF Atten Manual : 0 dB] - [SPAN : 0 Hz] - [BW : Res BW Manual : 1 kHz] - [BW : Video BW Manual 1 Hz] - [SWEEP : Sweep Time Manual : 0.2 s] - [AMPT : -40 dBm] - [FREQ : Center : {f_n}] Refer to "Performance Test Report" table for values of f_n.
Measurement:	➤ Set marker to peak: - [MKR-> : Peak]
Evaluation:	The noise level is displayed by the level reading of marker 1. If the RF preamplifier is present, repeat the measurement with the RF Preamp set to on: " AMPT : Preamp On"

Checking Phase Noise

Test equipment:	Signal generator (refer to "Measurement Equipment", item 3) Frequency 500 MHz Level ≥ 0 dBm Phase noise at 500 MHz: < -110 dBc/Hz @ 10 kHz < -110 dBc/Hz @ 100 kHz < -130 dBc/Hz @ 1 MHz
Test setup:	➤ Connect RF output of the signal generator to RF input of the R&S FSL.
Signal generator settings:	- Frequency 500 MHz - Level -10 dBm
R&S FSL settings:	- [PRESET] - [FREQ : Center : 500 MHz] - [AMPT : -10 dBm] - [SPAN : {2.2 * offset}] Depending on the offset of the phase noise measurement, the span is set to 2.2 times the offset. - [TRACE 1 : Trace Mode: Average] - [SWEEP : Sweep Count : 20 : ENTER] ➤ Activate phase noise marker: - [MKR : Phase Noise] - [MKR : Marker 2 : {offset}]
Evaluation:	Refer to "Performance Test Report" table for values of offset. The phase noise is displayed in the marker field by the reading 'Delta 1 [T1 PHN]'.

Checking Display Linearity

Test equipment:

- Signal generator (refer to section "Measurement Equipment and Accessories", item 1)
- Power sensor (refer to section "Measurement Equipment and Accessories", item 3)
- 6-dB power splitter (refer to section "Measurement Equipment and Accessories", item 6)

Test setup:

- Connect the power sensor to the R&S FSL and execute function 'ZERO' when there is no signal applied to the power sensor.
- Connect the RF output of the signal generator to the input of the splitter.
- Connect output 1 of the splitter to the power sensor / power meter.
- Connect output 2 of the splitter to the RF input of the R&S FSL.

1st Measurement

0 to 30 dB below reference level

Signal generator settings:

- Frequency 65.833 MHz
- Level + 6 dBm

- Determine the output power of the signal generator with the power meter. Adjust the output power of the generator until the power meter shows 0 dBm.

R&S FSL settings:

- [**PRESET**]
- [**AMPT: 0 dBm**]
- [**FREQ: 65.833 MHz**]
- [**SPAN : 10 kHz**]
- [**BW : Res BW Manual : 1 kHz**]
- [**SWEEP: Sweep Time Manual : 1 s**]
- [**TRACE : Detector Manual : Average**]

Reference measurement:

- Set the marker to the peak of the signal.
- [**MKR->**: Peak]

The signal level L is displayed by the level reading of the marker.

$$\text{Ref}_{0\text{dBm}} = L - L_{\text{power meter}}$$

Signal generator settings:

- Frequency 65.833 MHz
- Level Sig_Lev + 6 dB

Refer to table under "Performance Test Report" for values of {Sig_Lev}.

- Determine the output power of the signal generator with the power meter. Adjust the output power of the generator until the power meter shows the value of {Sig_Lev}.

Evaluation:	The signal level L is displayed by the level reading of the marker. The difference between the level inaccuracy of the R&S FSL and Ref_{0dBm} is the uncertainty of the display linearity: $Linearity_{uncertainty} = (L - L_{power\ meter}) - Ref_{0dBm}$
2nd Measurement 30 to 50 dB below reference level	Because the sensitivity of the power meter is limited, the internal RF attenuator of the R&S FSL is used to increase the dynamic range of the input signal.
R&S FSL settings:	- [AMPT : 20 dBm]
Signal generator settings:	- Frequency 65.833 MHz - Level - 4 dBm ➤ Determine the output power of the signal generator with the power meter. Adjust the output power of the generator until the power meter shows -10 dBm.
Reference measurement:	➤ Set the marker to the peak of the signal. - [MKR->: Peak] The signal level L is displayed by the level reading of the marker. With the result of the 1st linearity measurement, a new correction factor is to be calculated. "Linearity_{uncertainty} (-30dB)" is the measured uncertainty of the R&S FSL linearity at 30 dB below reference level. $Ref_{20dBm} = (L - L_{power\ meter}) - Linearity_{uncertainty} (-30dB)$
Signal generator settings:	- Frequency 65.833 MHz - Level Sig_Lev + 6 dB Refer to table under "Performance Test Report" for values of {Sig_Lev}. ➤ Determine the output power of the signal generator with the power meter. Adjust the output power of the generator until the power meter shows the value Sig_Lev ± 0.2 dB.
Evaluation:	The signal level L is displayed by the level reading of the marker. The difference between the level inaccuracy of the R&S FSL and Ref_{20dBm} is the uncertainty of the display linearity: $Linearity_{uncertainty} = (L - L_{power\ meter}) - Ref_{20dBm}$
Alternative measurement	It is also allowed to measure the display linearity on a different frequency or against an external step attenuator. With an external step attenuator a frequency should be used where the uncertainty of the attenuator is calibrated. Frequencies below 30 MHz are not recommended.

Checking Third Order Intercept Point

Test equipment:	- 2 signal generators, refer to "Measurement Equipment", items 1 & 2. Frequency range: <table> <tr> <td>R&S FSL 3:</td><td>10 MHz to 3 GHz</td></tr> <tr> <td>R&S FSL 6:</td><td>10 MHz to 6 GHz</td></tr> </table> Maximum level ≥ 0 dBm - 6 dB power combiner (refer to "Measurement Equipment", item 3) Frequency range <table> <tr> <td>R&S FSL 3:</td><td>10 MHz to 3 GHz</td></tr> <tr> <td>R&S FSL 6:</td><td>10 MHz to 6 GHz</td></tr> </table>	R&S FSL 3:	10 MHz to 3 GHz	R&S FSL 6:	10 MHz to 6 GHz	R&S FSL 3:	10 MHz to 3 GHz	R&S FSL 6:	10 MHz to 6 GHz
R&S FSL 3:	10 MHz to 3 GHz								
R&S FSL 6:	10 MHz to 6 GHz								
R&S FSL 3:	10 MHz to 3 GHz								
R&S FSL 6:	10 MHz to 6 GHz								
Test setup:	➤ Connect RF outputs of the signal generators to the inputs of the coupler. ➤ Connect output of the coupler to RF input of the R&S FSL.								
Signal generator settings (both generators):	- Frequency: Generator 1 $f_{g1} = f_{in} - 500$ kHz - Generator 2 $f_{g2} = f_{in} + 500$ kHz Refer to "Performance Test Report" table for values of f_{in}. ➤ Deactivate the automatic level control of the generators to avoid intermodulation between the generators. ➤ Adjust the output level of signal generators for an input level at the R&S FSL of -15 dBm ± 0.5 dB (reading on the display of the R&S FSL).								
R&S FSL settings:	- [PRESET] - [AMPT : RF Atten Manual : 0 dB] - [AMPT : -10 dBm] - [SPAN : 3.5 MHz] - [BW : Res BW Manual : 30 kHz] - [BW : Video BW Manual : 1 kHz] - [FREQ : Center : $\{f_{in}\}$] Refer to "Performance Test Report" table for values of f_{in}.								
Measurement:	➤ [MEAS : TOI]								
Evaluation:	The third order intercept point (TOI) referenced to the input signal is displayed in the marker field by the reading [TOI].								

Performance Test Tracking Generator - R&S FSL Models 13, and 16

Checking Output Level

Test equipment:	- N cable (refer to "Measurement Equipment", item 7) - Frequency up to 6 GHz - Maximum attenuation < 0.5 dB
Test setup:	➤ Connect tracking generator output to RF input of the R&S FSL.
R&S FSL settings (1 st Measurement):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 1 MHz] - [FREQ : Stop : 3000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : {level+15} dBm] Refer to table under "Performance Test Report" for values of {level}.
R&S FSL settings (2 nd Measurement, R&S FSL-6 only):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 3000 MHz] - [FREQ : Stop : 5000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : {level+15} dBm] Refer to table under "Performance Test Report" for values of {level}.
R&S FSL settings (3 rd Measurement, R&S FSL-6 only):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 5000 MHz] - [FREQ : Stop : 6000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : {level+15} dBm] Refer to table under "Performance Test Report" for values of {level}.
Measurement:	Set marker to peak: - [MKR-> : Peak] Set marker to minimum value: - [MKR-> : More : Min]

Performance Test Tracking Generator - R&S FSL Model 28

Checking Output Level

Test equipment:	- N cable (refer to "Measurement Equipment", item 7)				
	<table> <tr> <td>Frequency</td><td>up to 18 GHz</td></tr> <tr> <td>Maximum attenuation</td><td>< 3dB</td></tr> </table>	Frequency	up to 18 GHz	Maximum attenuation	< 3dB
Frequency	up to 18 GHz				
Maximum attenuation	< 3dB				
Test setup:	➤ Connect tracking generator output to RF input of the R&S FSL.				
R&S FSL settings (1 st Measurement):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 10 MHz] - [FREQ : Stop : 6000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : 10 dBm] Refer to table under "Performance Test Report" for values of {level}.				
R&S FSL settings (2 nd Measurement, R&S FSL-6 only):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 6000 MHz] - [FREQ : Stop : 12000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : 0 dBm] Refer to table under "Performance Test Report" for values of {level}.				
R&S FSL settings (3 rd Measurement, R&S FSL-6 only):	- [PRESET] - [MENU : Tracking Generator : Source Power {level}] - [FREQ : Start : 12000 MHz] - [FREQ : Stop : 18000 MHz] - [BW : Res BW Manual : 100 kHz] - [AMPT : Ref Level Manual : 0 dBm] Refer to table under "Performance Test Report" for values of {level}.				
Measurement:	Set marker to peak: - [MKR-> : Peak] Set marker to minimum value: - [MKR-> : More : Min]				

Performance Test Report R&S FSL

Table 1-1 Performance Test Report

ROHDE & SCHWARZ	Performance Test Report	Spectrum Analyzer	R&S FSL	Version 25-Nov-08
Model (R&S FSL-3 / 6 / 18): Order number: 1300.2502. Serial number: Test person: Date: Signature:				

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Frequency accuracy Reference oscillator	Page 1.2					
Model w/o Opt. B4		999.998	_____	1000.002	MHz	
Model with Opt. B4		999.9998	_____	1000.0002	MHz	
Level accuracy at 65.833 MHz	Page 1.2	-0.3	_____	+0.3	dB	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Frequency response	Page 1.3					
RF attenuation 5 dB						
RF Preamp = Off						
R&S FSL 3 / 6 / 18:						
f_{fresp}						
10 MHz		-0.5	_____	+0.5	dB	
100 MHz		-0.5	_____	+0.5	dB	
500 MHz		-0.5	_____	+0.5	dB	
1000 MHz		-0.5	_____	+0.5	dB	
1500 MHz		-0.5	_____	+0.5	dB	
2000 MHz		-0.5	_____	+0.5	dB	
2500 MHz		-0.5	_____	+0.5	dB	
2990 MHz		-0.5	_____	+0.5	dB	
R&S FSL 6 / 18:						
3500 MHz		-0.8	_____	+0.8	dB	
4000 MHz		-0.8	_____	+0.8	dB	
4500 MHz		-0.8	_____	+0.8	dB	
5000 MHz		-0.8	_____	+0.8	dB	
5500 MHz		-0.8	_____	+0.8	dB	
5990 MHz		-0.8	_____	+0.8	dB	
R&S FSL 18:						
7000 MHz		-1.2	_____	-1.2	dB	
8000 MHz		-1.2	_____	-1.2	dB	
9000 MHz		-1.2	_____	-1.2	dB	
10000 MHz		-1.2	_____	-1.2	dB	
11000 MHz		-1.2	_____	-1.2	dB	
12000 MHz		-1.2	_____	-1.2	dB	
13000 MHz		-1.2	_____	-1.2	dB	
14000 MHz		-1.2	_____	-1.2	dB	
15000 MHz		-1.2	_____	-1.2	dB	
16000 MHz		-1.2	_____	-1.2	dB	
17000 MHz		-1.2	_____	-1.2	dB	
18000 MHz		-1.2	_____	-1.2	dB	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Frequency response	Page 1.3					
RF attenuation 10 dB						
RF Preamp = Off						
R&S FSL 3/ 6 / 18:						
f_{resp}						
10 MHz		-0.5	_____	+0.5	dB	
100 MHz		-0.5	_____	+0.5	dB	
500 MHz		-0.5	_____	+0.5	dB	
1000 MHz		-0.5	_____	+0.5	dB	
1500 MHz		-0.5	_____	+0.5	dB	
2000 MHz		-0.5	_____	+0.5	dB	
2500 MHz		-0.5	_____	+0.5	dB	
2990 MHz		-0.5	_____	+0.5	dB	
R&S FSL 6 / 18:						
3500 MHz		-0.8	_____	+0.8	dB	
4000 MHz		-0.8	_____	+0.8	dB	
4500 MHz		-0.8	_____	+0.8	dB	
5000 MHz		-0.8	_____	+0.8	dB	
5500 MHz		-0.8	_____	+0.8	dB	
5990 MHz		-0.8	_____	+0.8	dB	
R&S FSL 18:						
7000 MHz		-1.2	_____	-1.2	dB	
8000 MHz		-1.2	_____	-1.2	dB	
9000 MHz		-1.2	_____	-1.2	dB	
10000 MHz		-1.2	_____	-1.2	dB	
11000 MHz		-1.2	_____	-1.2	dB	
12000 MHz		-1.2	_____	-1.2	dB	
13000 MHz		-1.2	_____	-1.2	dB	
14000 MHz		-1.2	_____	-1.2	dB	
15000 MHz		-1.2	_____	-1.2	dB	
16000 MHz		-1.2	_____	-1.2	dB	
17000 MHz		-1.2	_____	-1.2	dB	
18000 MHz		-1.2	_____	-1.2	dB	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Frequency response	Page 1.3					
RF attenuation 20 dB						
RF Preamp = Off						
R&S FSL 3/6 / 18:						
f_{fresp}						
10 MHz		-0.5	_____	+0.5	dB	
100 MHz		-0.5	_____	+0.5	dB	
500 MHz		-0.5	_____	+0.5	dB	
1000 MHz		-0.5	_____	+0.5	dB	
1500 MHz		-0.5	_____	+0.5	dB	
2000 MHz		-0.5	_____	+0.5	dB	
2500 MHz		-0.5	_____	+0.5	dB	
2990 MHz		-0.5	_____	+0.5	dB	
R&S FSL 6 / 18:						
3500 MHz		-0.8	_____	+0.8	dB	
4000 MHz		-0.8	_____	+0.8	dB	
4500 MHz		-0.8	_____	+0.8	dB	
5000 MHz		-0.8	_____	+0.8	dB	
5500 MHz		-0.8	_____	+0.8	dB	
5990 MHz		-0.8	_____	+0.8	dB	
R&S FSL 18:						
7000 MHz		-1.2	_____	-1.2	dB	
8000 MHz		-1.2	_____	-1.2	dB	
9000 MHz		-1.2	_____	-1.2	dB	
10000 MHz		-1.2	_____	-1.2	dB	
11000 MHz		-1.2	_____	-1.2	dB	
12000 MHz		-1.2	_____	-1.2	dB	
13000 MHz		-1.2	_____	-1.2	dB	
14000 MHz		-1.2	_____	-1.2	dB	
15000 MHz		-1.2	_____	-1.2	dB	
16000 MHz		-1.2	_____	-1.2	dB	
17000 MHz		-1.2	_____	-1.2	dB	
18000 MHz		-1.2	_____	-1.2	dB	

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Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Noise display RF Preamp = Off f_{noise} 9 kHz 95 kHz 1005 kHz	Page 1.7	- - -	 	-70 (1 kHz) -70 (1 kHz) -85 (1 kHz)	dBm dBm dBm	
Noise display in 1 kHz RF Preamp = Off R&S FSL 3 / 6: f_{noise} 10.01 MHz 50.01 MHz 199.99 MHz 499.99 MHz 999.99 MHz 1499.99 MHz 1999.99 MHz 2499.99 MHz 2999.99 MHz	Page 1.7	- - - - - - - - -	 	-100 -110 -110 -110 -110 -110 -110 -110 -110	dBm dBm dBm dBm dBm dBm dBm dBm dBm	
Noise display in 1 kHz RF Preamp = Off R&S FSL 6: f_{noise} 3499.99 MHz 3999.99 MHz 4499.99 MHz 4999.99 MHz 5499.99 MHz 5999.99 MHz	Page 1.7	- - - - - -	 	-106 -106 -106 -106 -100 -100	dBm dBm dBm dBm dBm dBm	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Noise display in 1 kHz RF Preamp = Off R&S FSL18: f_{noise}	Page 1.7					
10.01 MHz		-	_____	-100	dBm	
50.01 MHz		-	_____	-110	dBm	
199.99 MHz		-	_____	-110	dBm	
499.99 MHz		-	_____	-110	dBm	
999.99 MHz		-	_____	-110	dBm	
1499.99 MHz		-	_____	-110	dBm	
1999.99 MHz		-	_____	-110	dBm	
2499.99 MHz		-	_____	-110	dBm	
2999.99 MHz		-	_____	-110	dBm	
3499.99 MHz		-	_____	-106	dBm	
3999.99 MHz		-	_____	-106	dBm	
4499.99 MHz		-	_____	-106	dBm	
4999.99 MHz		-	_____	-106	dBm	
5499.99 MHz		-	_____	-106	dBm	
5999.99 MHz		-	_____	-106	dBm	
6999.99 MHz		-	_____	-106	dBm	
7999.99 MHz		-	_____	-106	dBm	
8999.99 MHz		-	_____	-106	dBm	
9999.99 MHz		-	_____	-106	dBm	
10999.99 MHz		-	_____	-106	dBm	
11999.99 MHz		-	_____	-106	dBm	
12999.99 MHz		-	_____	-100	dBm	
13999.99 MHz		-	_____	-100	dBm	
14999.99 MHz		-	_____	-100	dBm	
15999.99 MHz		-	_____	-100	dBm	
16999.99 MHz		-	_____	-100	dBm	
17999.99 MHz		-	_____	-100	dBm	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Noise display in 1 kHz RF Preamp = On f_{noise} 9 kHz 95 kHz 1005 kHz	Page 1.7	- - -	 	-85 -85 -100	dBm dBm dBm	
Noise display in 1 kHz RF Preamp = On R&S FSL 3 / 6 / 18 f_{noise} 10.01 MHz 50.01 MHz 199.99 MHz 499.99 MHz 999.99 MHz 1499.99 MHz 1999.99 MHz 2499.99 MHz 2999.99 MHz	Page 1.7	- - - - - - - - -	 	-115 -122 -122 -122 -122 -122 -122 -122 -122	dBm dBm dBm dBm dBm dBm dBm dBm dBm	
Noise display in 1 kHz RF Preamp = On R&S FSL 6: f_{noise} 3499.99 MHz 3999.99 MHz 4499.99 MHz 4999.99 MHz 5499.99 MHz 5999.99 MHz	Page 1.7	- - - - - -	 	-116 -116 -116 -116 -110 -110	dBm dBm dBm dBm dBm dBm	
Noise display in 1 kHz RF Preamp = On R&S FSL 18: f_{noise} 3499.99 MHz 3999.99 MHz 4499.99 MHz 4999.99 MHz 5499.99 MHz 5999.99 MHz	Page 1.7	- - - - - -	 	-119 -119 -119 -119 -115 -115	dBm dBm dBm dBm dBm dBm	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Phase noise Offset frequency: 10 kHz 100 kHz 1 MHz	Page 1.8	- - -	 	-98 -98 -115	 dBc (1 Hz) dBc (1 Hz) dBc (1 Hz)	
Display linearity 0 to -30 dB Reference level: 0 dBm Sig_Lev : 0 dBm -5 dBm -10 dBm -15 dBm -20 dBm -25 dBm -30 dBm	Page 1.8	- -0.2 -0.2 -0.2 -0.2 -0.2 -0.2	Reference 	- +0.2 +0.2 +0.2 +0.2 +0.2 +0.2	- dB dB dB dB dB dB	
Display linearity -30 to -50 dB Reference level: 20 dBm Sig_Lev : -10 dBm -15 dBm -20 dBm -25 dBm -30 dBm	Page 1.8	- -0.2 -0.2 -0.2 -0.2	Reference 	- +0.2 +0.2 +0.2 +0.2	- dB dB dB dB	
3rd order intercept point, fin R&S FSL 3 / 6: 30 MHz 500 MHz 1000 MHz 2990 MHz R&S FSL 6: 4000 MHz 5000 MHz 5990 MHz	Page 1.11	10 10 10 10 10 10 10	 	- - - - - - -	 dBm dBm dBm dBm dBm dBm dBm	

Performance Test Report Tracking Generator

Table 1-2: Performance Test Report Tracking Generator

ROHDE & SCHWARZ	Performance Test Report	Tracking Generator
Serial number: Test person: Date: Signature:		

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Level accuracy FSL3 /6	Page 1.12					
10 MHz to 3 GHz Output level: 0 dBm		-6	_____	+6	dBm	
3 GHz to 5 GHz Output level: 0 dBm		-8	_____	+8	dBm	
5 GHz to 6 GHz Output level: 0 dBm		-12	_____	+12	dBm	

Characteristic	Included in	Min. value	Actual value	Max. value	Unit	Tolerance
Level accuracy FSL18	Page 1.12					
10 MHz to 6 GHz Output level: 0 dBm		-20	_____	+5	dBm	
6 GHz to 12 GHz Output level: 0 dBm		-25	_____	+0	dBm	
12 GHz to 18 GHz Output level: 0 dBm		-30	_____	+0	dBm	

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2 Adjustment

NOTICE

Risk of warranty void

Any unauthorized adjustment will void warranty!
The adjustment should be carried out by qualified personnel only since any change considerably influences the measurement accuracy of the instrument.

Measuring Equipment

Table 2-1 Measuring Equipment and Accessories for Manual Adjustment of the R&S FSL Reference Oscillator

Item	Type of equipment	Specifications recommended	Equipment recommended	R&S Order No.	Use
1	Signal generator	Frequency: 1 GHz Output level: >20 dBm Uncertainty of frequency: 0.1 ppm	R&S SMT06		Frequency Accuracy of Reference Oscillator

Adjusting the Frequency Accuracy

Automatic adjustment of the reference oscillator without adjustment software: (Instruments with and without option R&S FSL-B4)

Test equipment: Signal generator (refer to "Measurement Equipment", item 1):
 Frequency 1000 MHz
 Level -15 dBm
 Frequency accuracy $<1 \times 10^{-9}$

Note: If the frequency accuracy of the signal generator is not sufficient, adjust the frequency with a frequency counter to the correct frequency before the adjustment.

Test setup: ➤ Connect RF output of the signal generator to RF input of the R&S FSL.

FSL settings: [**SETUP**: MORE: SERVICE: PASSWORD: **894129**

Adjustment: **Note:** Before the following measurement, the FSL must warm up for at least 30 minutes to heat up the reference oscillator.

➤ Start automatic adjustment by entering service function

[**SETUP** : MORE : SERVICE : SERVICE FUNCTION : **2.3.12**]

The instrument is performing the automatic adjustment. The new tuning values are stored in EEPROM automatically.

Troubleshooting

Check the input signal:

The automatic adjustment routine will check the power level of the input signal. The adjustment will be aborted, if the input level is not within the range from -10 dBm to -20 dBm. The automatic adjustment will also be aborted if the input signal is not within the nominal frequency range:

Model without OCXO (option R&S FSL-B4): 1.0 GHz $\pm$ 20 kHz

Model with OCXO (option R&S FSL-B4): 1.0 GHz $\pm$ 2 kHz

For verification proceed as follows:

R&S FSL settings: [**SETUP** : REFERENCE : INT]
 ➤ Toggle to internal reference.

Signal generator settings: Frequency 1 GHz as above

R&S FSL settings: [**PRESET**]
 [**FREQ : 1 GHz**]
 [**SPAN : 100 kHz**]
 [**BW : MANUAL RES BW : 10 kHz**]
 [**MARKER : SIG COUNT : ON**]

Measurement: ➤ Read out the power level of the marker and check whether the input level is within the range from -10 dBm to -20 dBm.
 ➤ Read out the frequency value (Count:) of the marker and check whether the input signal frequency is in the nominal frequency range as shown above.

Check warming up of instrument: The automatic adjustment routine will check the drift of the internal reference oscillator. If there is too much drift (warming up is not completed) the adjustment will be aborted.

Check the R&S FSL-B4 option: Power down the instrument, remove option R&S FSL-B4, power up again and perform the automatic adjustment, as described before. If this works fine, probably the R&S FSL-B4 option is defective.

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3 Repair

This chapter describes the design of the R&S FSL, simple measures for repair and troubleshooting and, in particular, the replacement of modules. For troubleshooting and diagnostics, a self test is available for polling diagnostic voltages of the modules and detecting limit violations.

The firmware update and the installation of options are described in chapter 4 of this service manual.

Instrument Design and Function Description

A schematic of the R&S FSL design is presented in the block diagrams below and in the attachments (see also chapter 5).

Block Diagram

See also the drawings in chapter 5 for a detailed block circuit.

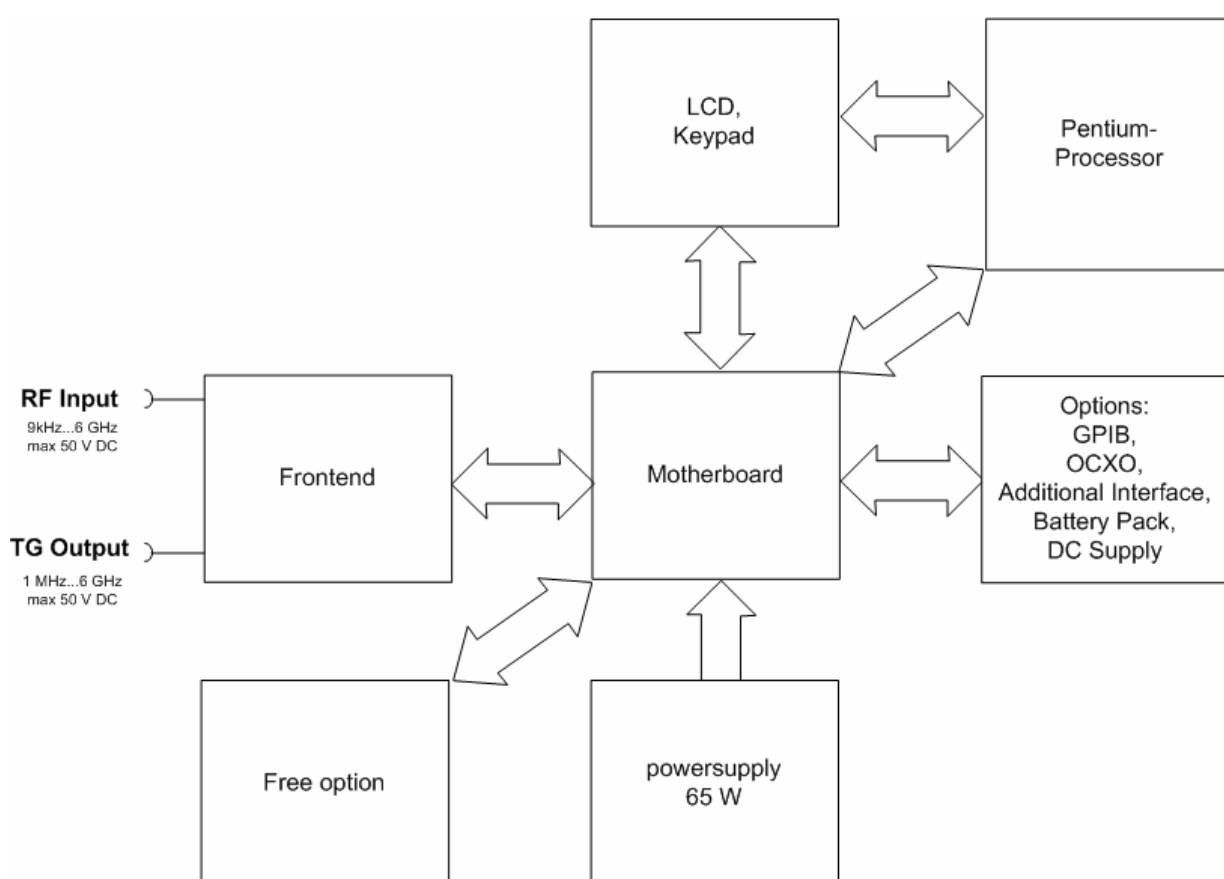


Fig. 3-1 Block diagram

Description of Block Diagram

The R&S FSL is a triple-conversion heterodyne receiver for the frequency range from 9 kHz to 3 GHz, 6 GHz or 18 (20) GHz, depending on the instrument model. After signals are received, they are processed by the frontend to a digital IF of approx. 49 MHz. This IF is fed to the motherboard where the digital filtering is provided. The remaining data are transferred to the host processor via a PCI interface. The hardware settings are controlled via a serial interface on the motherboard that is set from the host via the PCI interface.

In R&S FSL models with a tracking generator up to 6 GHz, the TG is located on the frontend module.

Frontend

The frontend converts the receive frequencies to an IF of 49 MHz. The module also includes the required local oscillators and associated frequency processing circuits and the AD-Converter.

The RF signal passes from the input connector via the limiter and the input switch to the electronic input attenuator, which can be set from 0 dB to -30 dB in steps of 5 dB. The input signal is applied to the switch as well as a 65.833 MHz signal which has a close tolerance level for the self-alignment routine of the instrument. After the input attenuator a 15 dB RF amplifier can be switched into the signal path when the RF preamplifier option is fitted. In the FSH18 an external relay is used to switch the RF input directly to input 1 or via a 10 dB pad to input 2 of the frontend module.

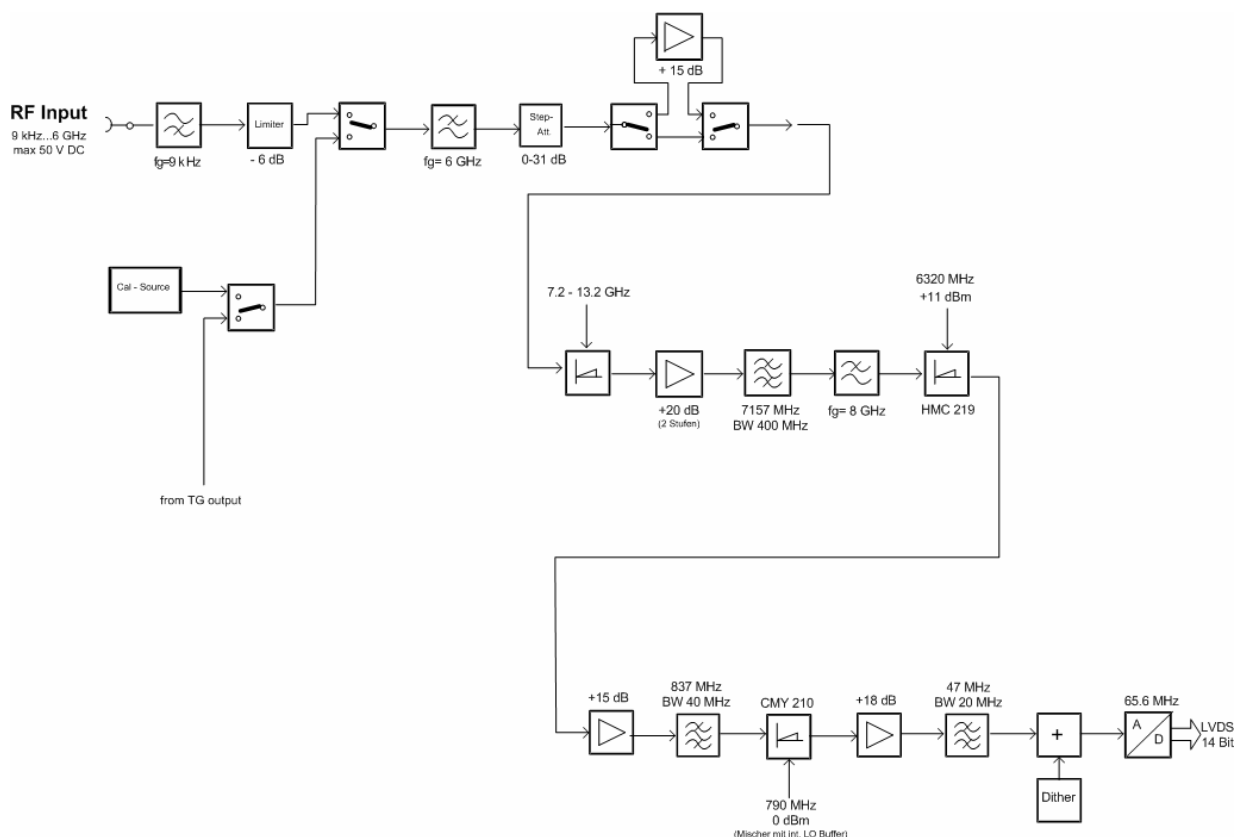


Fig. 3-2 RF-to-IF conversion R&S FSL3 / 6

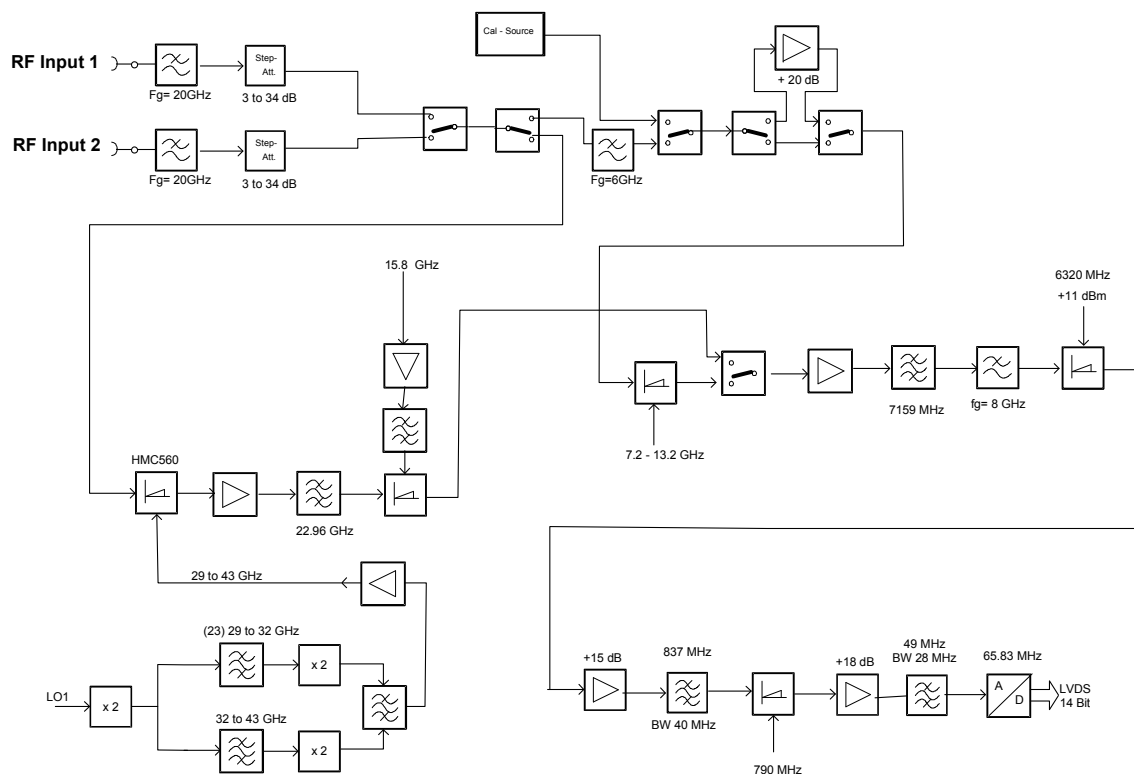


Fig. 3-3 RF-to-IF conversion R&S FSL18

The input signal up to 6 GHz is converted to the first IF of 7159 MHz. This lowpass at the mixer input provides for suppression of the image frequency (image = LO + IF) such that the conversion remains unambiguous. The mixer is followed by a low-noise IF amplifier, which compensates for the loss due to mixing. The signal then passes a filter with a 3 dB bandwidth of approximately 500 MHz for filtering the first intermediate frequency. A second mixer converts the signal to 839 MHz, a third mixer to 49 MHz. The bandpass filters in between the mixers have a bandwidth of 40 MHz in the second IF and approx. 20 MHz in the third IF. The last IF is digitized using a 14 bit ADC running at 65.833 MHz. The data is sent to the motherboard via a parallel interface.

For the R&S FSL18 up to 6 GHz the same signal path as in the R&S FSL6 is used. Above 6 GHz a 1st IF of about 22.96 GHz is used. The LO signal for this frequency band ranges from 28.96 to 42.96 GHz. It is generated from the 1st LO signal from the low band path by multiplying with a factor of 4. The 2nd IF in this band is generated by a fixed frequency conversion to 7.159 GHz. The 15.8 GHz LO signal is generated from the sub harmonic of the 2nd local of the 6 GHz path by multiplying with 5. This 2nd IF is then feed into the 1st IF of the 6 GHz signal path, where it is converted down to the intermediate frequencies 839 MHz and 49 MHz and digitized.

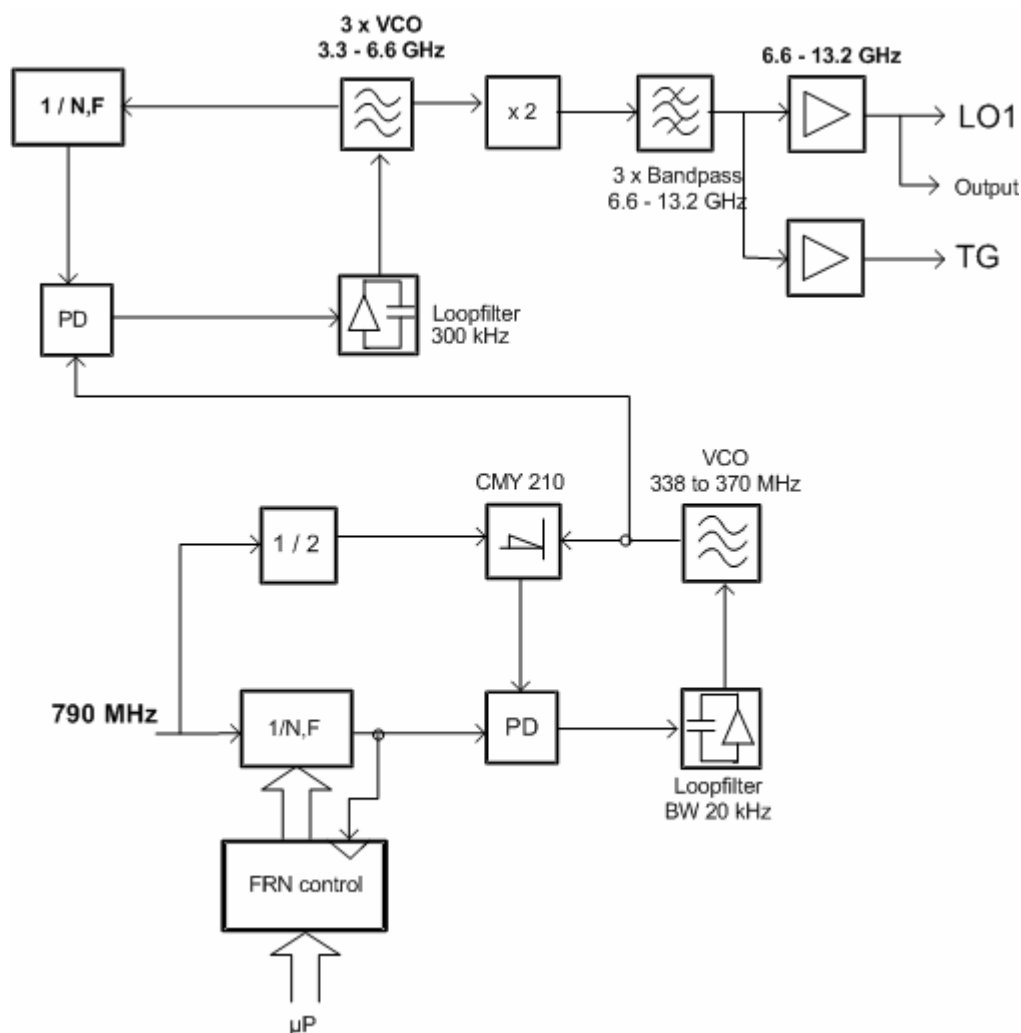


Fig. 3-4 Generation of first local oscillator frequency

The first local oscillator frequency is generated on the frontend using three VCOs, which are synchronized to a sweep VCO running from 338 MHz to 370 MHz and doubled in frequency to reach the LO1 frequency of 7159 MHz to 13159 MHz. For good phase noise performance, the sweep VCO is first mixed with 395 MHz ($LO3 / 2$) and then synchronized to the output of a fractional N divider.

As reference signal for the LO1 synthesizer and for the third local oscillator, a 790 MHz oscillator is used (Fig.3-4). This VCO is synchronized to a TCXO at 10 MHz. With the OCXO option or with an external 10 MHz reference connected, this temperature-compensated quartz oscillator is synchronized to one of these signals. If neither is present, the TCXO is adjusted with a digital-to-analog converter on the board. A VCO at 3.16 GHz is synchronized to the 790 MHz and doubled in frequency for the use as the second local oscillator.

The reference frequency for the tracking generator and the clock for the analog-to-digital converter in the signal path are generated by frequency division of the 790 MHz signal.

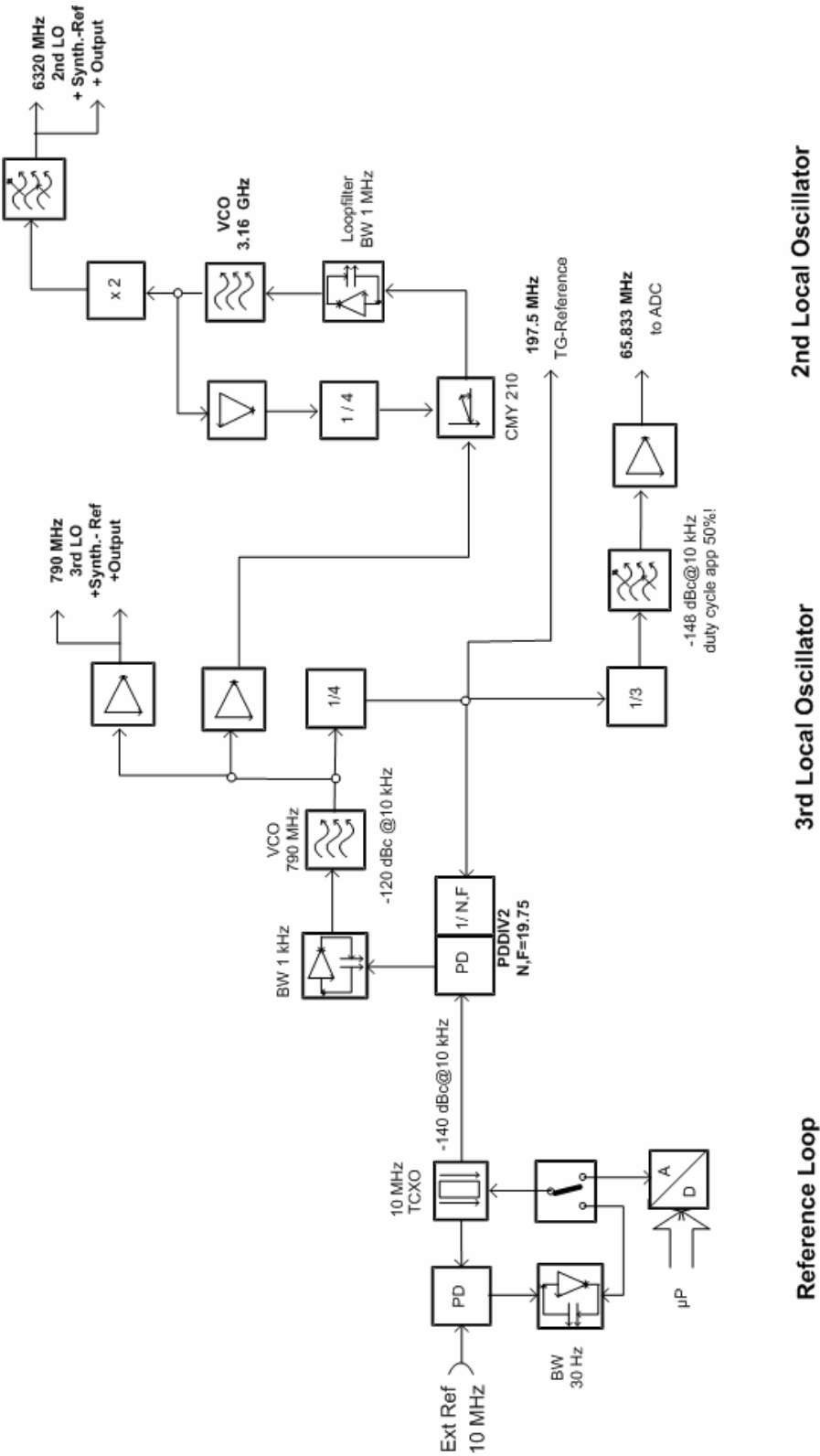


Fig. 3-5 Generation of second and third local oscillator frequencies

The structure in Fig. 3-5 is used for the tracking generator section on the frontend module. A signal at the first IF (7159 MHz) is generated with a VCO which is synchronized to 197.5 MHz. This relatively high frequency is used for acceptable phase noise performance. The 7159 MHz signal is mixed with the first local oscillator of the receiver section and amplified to gain a signal on the set input frequency. The level is controlled with a variable attenuator in between the VCO and the mixer. For the adjustment of the tracking level, a switch between the RF input and the TG output is implemented and used in the self-alignment routine of the R&S FSL.

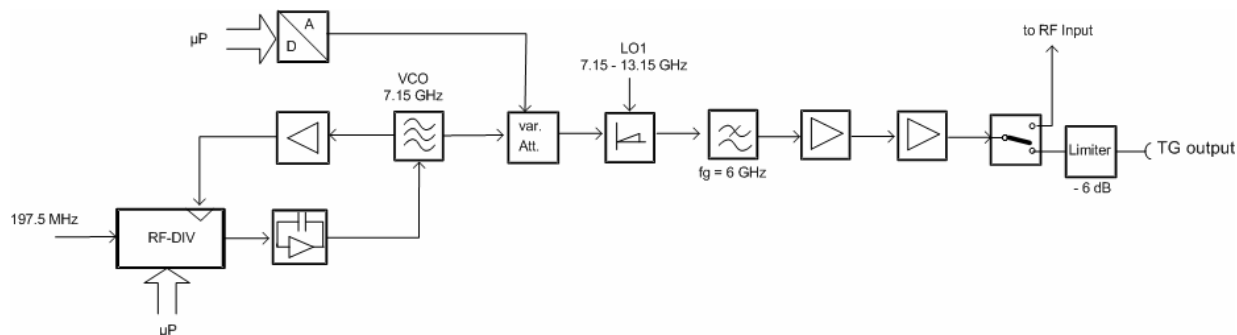


Fig. 3-6 Tracking generator R&S FSL3/6

In the FSL18 the tracking generator is implemented on a own module. Figure 3-7 and 3-8 show the block diagram for this circuit. The tracking generator is feed with three local oscillator signals from the frontend module:

- LO1 at X304 (5.75 to 10.75 GHz for $f_e = 0$ to 20 GHz , level 0 to +5 dBm)
- LO2 at X301 (3.16 GHz to 3.17 GHz level , -8 to -5 dBm)
- LO3 at X305 (790 MHz or 792.5 MHz -5 to 0 dBm)

This three signals are mixed together with a fourth frequency which is generated on the tracking module with a direct digital synthesizer to generate a signal which is exactly on the receiving frequency of the frontend.

The output level of the module is approximately 6 dBm at the low frequency end. It drops till about -15 dBm at 18 GHz. The output attenuator is switched independent of the frequency response to 10/ 20 or 30 dB when the source power is set to -10 / -20 or -30 dBm.

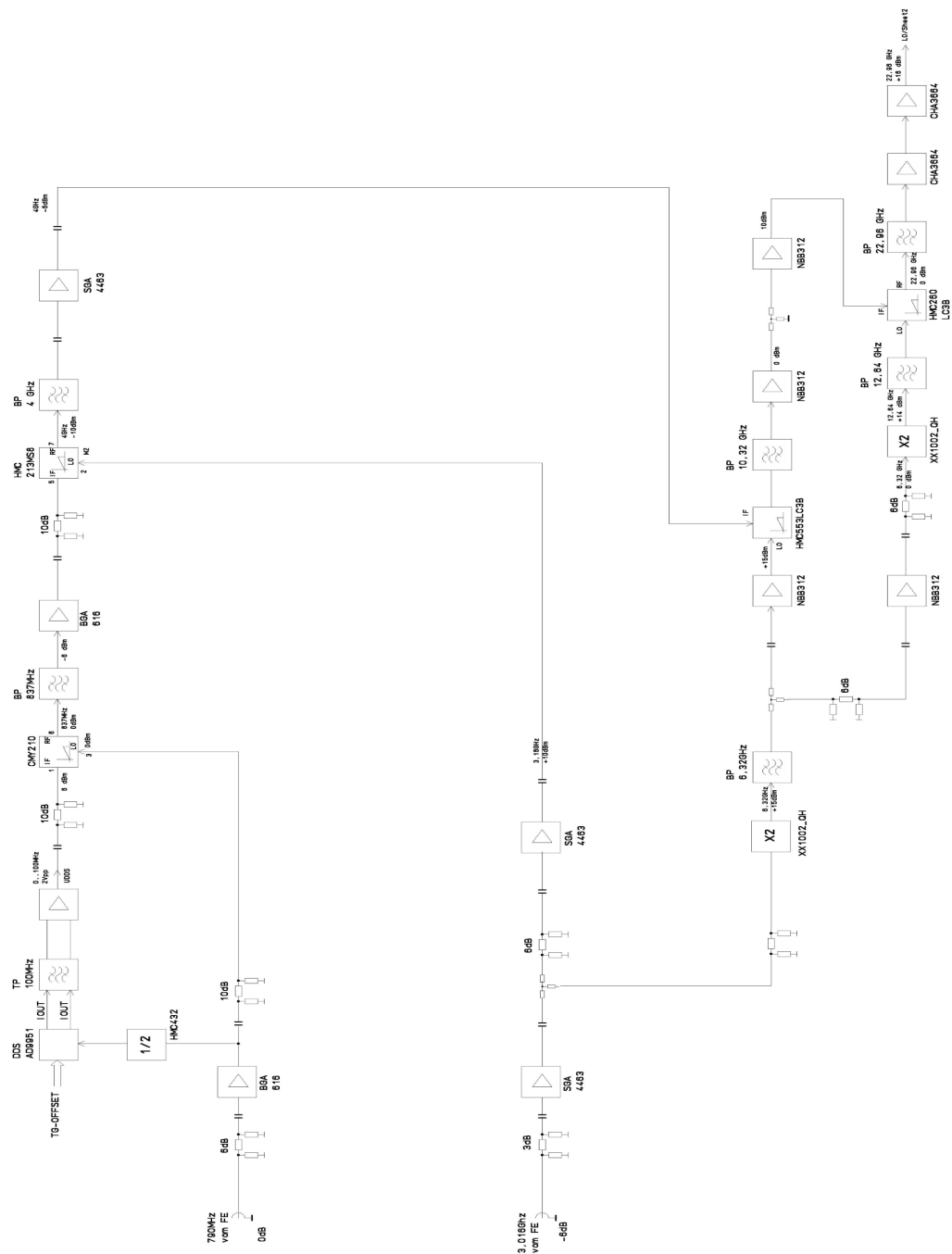


Fig. 3-7 Tracking-Generator R&S FSL 18, Part 1

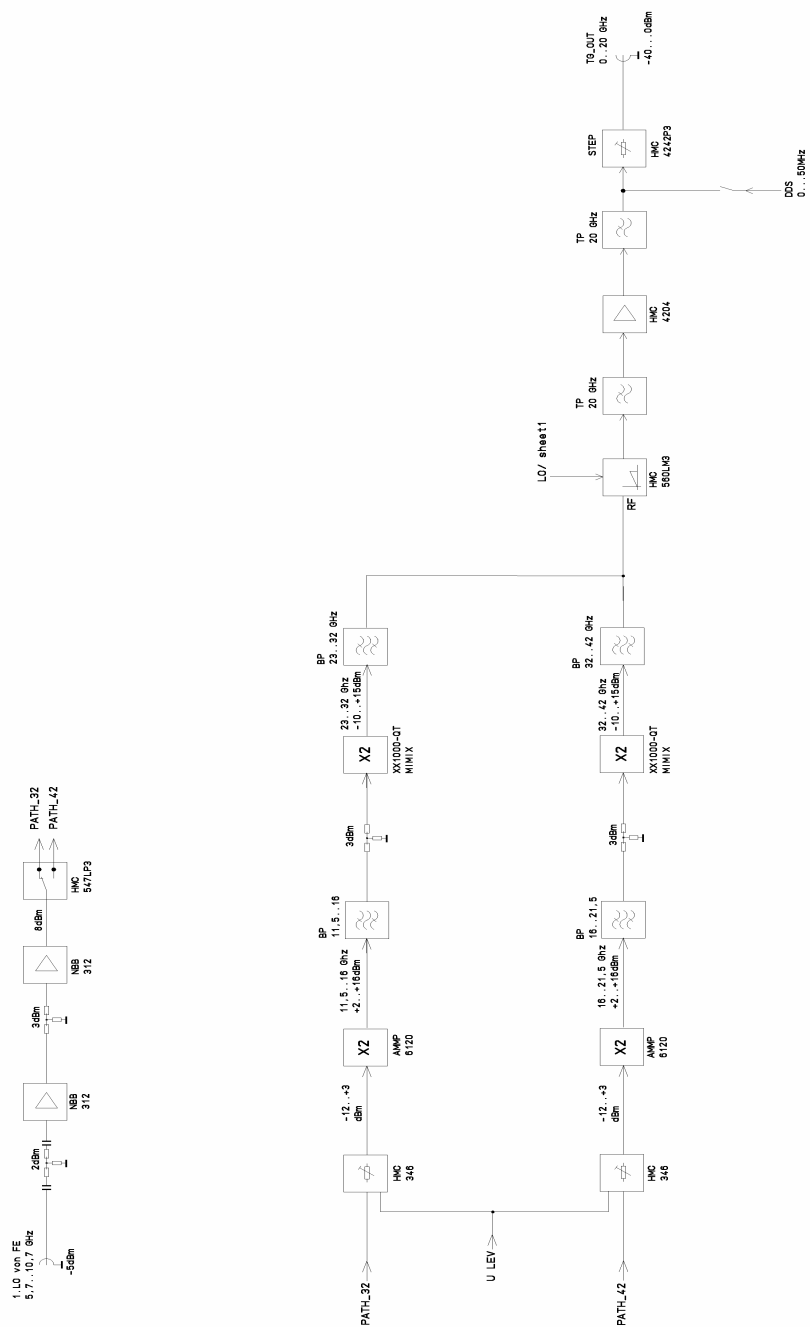


Fig. 3-8 Tracking Generator R&S FSL18, Part2

Processing of Measured Data - Motherboard

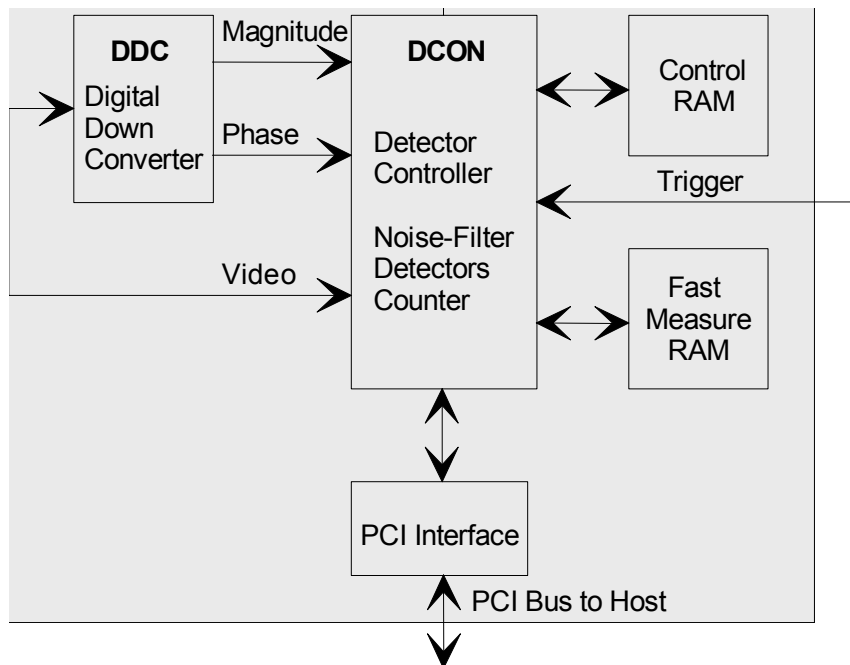


Fig. 3-9 Processing of measured data

Spectrum Analysis Using Swept Resolution Filters

In this operating mode, the resolution bandwidths are generated digitally with the aid of the DDC. This IC first mixes its input IF into the baseband using an NCO, and then filters the obtained I/Q signal via a high decimation filter (HDF) and a finite impulse response (FIR) stage. At the end of the DDC processing chain, the I/Q signal in the CORDIC block is split into magnitude and phase. For signal processing in the DDC, the IF signal from the IF filter module directly represents the linear IF.

For a conventional log display of the analyzed spectrum, the magnitude data is converted to logarithmic values and lowpass-filtered with a single-stage IIR filter representing the video filter. In linear mode or with RMS detection, the linear to logarithmic converter is bypassed.

The signal path is further routed to the detector logic, where the results are processed; i.e. peak max., peak min., sample, average and RMS values as well as the number of measured values and quasi-peak values are determined. With the detectors that have to be used in linear scale, for example average or RMS, the host processor does the conversion to logarithmic values itself.

With measurement data rates >1 MHz in zero span, detector data has to be stored in the measurement RAM because online storage is no longer possible at these high speeds. Upon completion of the sweep, the sweep data is read by the host from the measurement RAM, processed and displayed.

FFT Bandwidth

In the FFT bandwidth mode, the synthesizer is set to the desired center frequency and the signal path is routed via ADC to the DDC. The DDC first mixes the input IF into the baseband using a numerically controlled oscillator (NCO), and then the obtained I/Q data is filtered in a high decimation filter (HDF) and a finite impulse response (FIR) stage. The I/Q output data is then stored by the DDC in the I/Q RAM. With data logging completed, the I/Q data from the I/Q RAM is transferred to the host via DDC and PCI interface FPGA. The host then performs the FFT for this sweep section.

DC Power Supply (Option R&S FSL-B30)

With the DC power supply option, the R&S FSL can be operated from a DC voltage of 10 V to 28 V. A DC/DC converter transforms the input voltage to the same voltages as the AC power supply does. The option is installed on the rear panel of the R&S FSL.

Battery Pack (Option R&S FSL-B31)

Option R&S FSL-B31 is a battery pack for the R&S FSL. If option R&S FSL-B30 is installed, the R&S FSL can be operated independently of the AC supply for approx. one hour. The option comprises a charger, two NiMH battery packs and an external power supply. The charger and the batteries are accommodated in a housing that can be installed on the top of the R&S FSL in no time.

The battery pack is charged by means of the power supply that is included. Option R&S FSL-B32 is an additional battery pack (without external power supply).

OCXO Reference (Option R&S FSL-B4)

The R&S FSL contains the R&S FSL-B4 option, an oven-controlled crystal oscillator (OCXO). This OCXO generates a 10 MHz signal, which is routed to the frontend and used as a reference signal.

Front Panel

The front panel consists of an aluminum case panel (part of the R&S FSL frame) and a mounting plate which accommodates the LCD, the backlight inverter, the keyboard mat with the membrane and the rotary knob. The case panel incorporates the controller.

LCD

The color LCD provides users with a visible output of any information, measurements, etc. The resolution of the LCD is 640 * 480 pixels (VGA).

The display incorporates a cold cathode tube for illumination. The high voltage required for this purpose is generated in an extra DC/AC converter mounted next to the display on the mounting plate and connected both to the display and the controller board via a cable.

Keyboard

The keyboard consisting of a keyboard mat and a membrane release a contact when the rubber key is pressed. Two LEDs for the STANDBY/ON key (orange for STANDBY/green for ON) are also accommodated on this membrane.

The key evaluation and LED are controlled via a film cable connector on the controller board. Like the two LEDs, it is controlled in a special microprocessor on the controller board by means of a matrix technique. This microprocessor allows the status of the STANDBY/ON key to be stored when the instrument is switched off via the power switch.

Controller

The controller contains all the necessary components on a board, including the processor, memory chips (SIMM modules), I/O devices (ISA bus), lithium battery, IEC/IEEE bus controller, two serial interfaces (COM1/2), a parallel interface (LPT), LCD graphics controller, external VGA monitor graphics interface (monitor) and an external keyboard connection (keyboard PS/2).

In addition, a floppy controller for an external floppy disk drive and an IDE hard disk controller are integrated on the controller board.

Power Supply Module

The power supply module provides all currents necessary for the operation of the R&S FSL. It can be switched off by means of the power switch on the rear panel.

The power supply module is a primary clocked switching power supply. On the secondary side, it generates the following DC voltages: +5.2 V, +12 V, -12 V.

Module Replacement

This section describes the service concept and contains the spare parts list and the basic documents for the overall R&S FSL instrument.

Note: The numbers indicated in brackets refer to the position in the list of mechanical parts in chapter 5.
These items correspond to the item numbers in the illustrations on board replacement (see also chapter 5):

1300.2502 (Spectrum Analyzer R&S FSL, items 1-99),
1300.2525 (R&S FSL base unit, items 100-699),
1300.2531 (Front Panel, items 700-940),
1300.2502 (OCXO R&S FSL-B4, item 1000),
1300.2502 (Additional Interface R&S FSL-B5, item 1100),
1300.2502 (IEC/IEEE Bus R&S FSL-B10, item 1200),
1300.2502 (DC Power Supply R&S FSL-B30, items 1300-1320),
1300.2502 (Battery Pack R&S FSL-B31 items 1400-1420),

Note: The words "left" and "right" in the manual always refer to the front view of the instrument.

CAUTION



Shock hazard

For module replacement, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC and DC power connector.
Read all safety instructions at the beginning of this manual carefully before module replacement!

NOTICE

Risk of damage to the electronic components of the modules

Protect the operational site against electrostatic discharge to avoid damage to electronic components of the modules.
For details refer to the safety instructions at the beginning of this manual.

Overview of the Modules

Table 3-1 Overview - module replacement

Module	Required tests and adjustments after replacement		
	Function tests and system error correction	Adjustment	Other
Controller	SYSTEM MESSAGES/ SELFTEST / CAL		BIOS update
Flash disk	SYSTEM MESSAGES/ SELFTEST / CAL		Cold boot/ EEPROM update using service function / FW update
Lithium battery	SYSTEM MESSAGES/ SELFTEST / CAL		
LCD / DC/AC converter			
Push-button board set			
Flexible switchboard			
Power supply	SYSTEM MESSAGES/ SELFTEST / CAL		
Fan			
RF input connector	SELFTEST / CAL	Frequency response	
Motherboard	SYSTEM MESSAGES/ SELFTEST / CAL		NO Cold boot/ EEPROM update using service function
Front connector board			
Frontend	SYSTEM MESSAGES/ SELFTEST / CAL	Frequency response	Cold boot
OCXO R&S FSL-B4	SYSTEM MESSAGES/ SELFTEST / CAL	Frequency accuracy	
Additional Interface R&S FSL-B5	SYSTEM MESSAGES/ SELFTEST / CAL		
IEC/IEEE Bus R&S FSL-B10	SYSTEM MESSAGES/ SELFTEST / CAL		
DC Power Supply R&S FSL-B30			
Tracking Generator 18 GHz	SYSTEM MESSAGES/ SELFTEST / CAL		
Battery Pack R&S FSL-B31			

Performing a Cold Boot

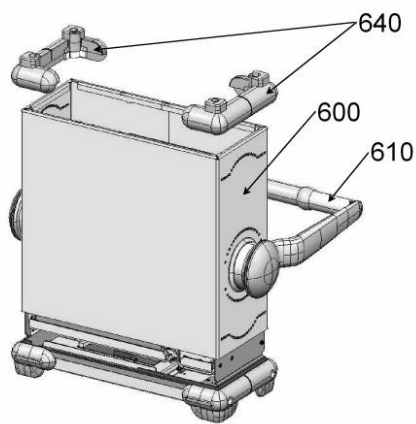
- Connect the power cable, press and hold down the decimal-point key and switch on power at the rear panel simultaneously. Release the decimal point when the BIOS memory test or the recognized hard disk message appears. *Do not keep the key pressed until the Windows logo is displayed!*
- Verify that during start up of the analyzer firmware the **INFO - COLDBOOT** message box is displayed:
Coldboot active!
- If this message box is not shown, switch off the analyzer and perform a cold boot with the pressed decimal-point key again. It is mandatory before proceeding that this **Coldboot active!** message has been displayed on the screen.

Replacing the Controller A90

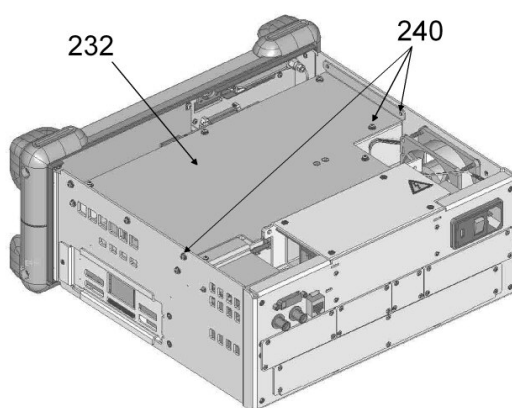
(See chapter 5, spare parts list, item 162, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Controller

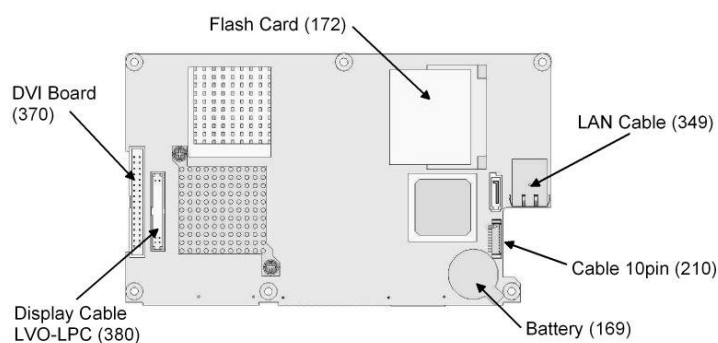
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side. Remove the cover (232) to the bottom of the instrument.

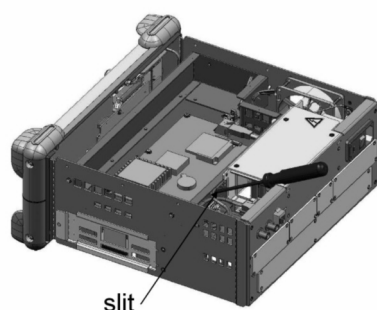


- Disconnect cable DVI board (370), cable 10pin (210), cable LVO-LPC (380) and LAN cable (349) at the controller (162).



- Unscrew six combination screws (200) at the component side of the controller (162).
- Remove the controller (162) to the bottom of the instrument.

Note: The force needed to disconnect the controller connector of the motherboard is high. Pulling the controller to the bottom is best done by means of the slits. Using a flat, blunt tool, carefully push the board step by step to the bottom. Do not insert the tool too deep into the slits!



- Remove the flash card (172) from the controller (162).

Installing the New Controller and Completing the Instruments

- Insert the flash card (172) into the new controller (162).
- Connect cable 10pin (210) to the new controller (162).
- Carefully plug the new controller (162) to the motherboard and fasten it using the six combination screws (200).
- Connect display cable DVI board (370), cable 10pin (210), cable LVO-LPC (380) and LAN cable (349) to the controller (162).
- Remount the cover (232) to the bottom of the instrument. Screw the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).

Putting into Operation

- Connect the instrument to the mains and switch on the instrument power switch. The instrument is now in standby mode.
- **BIOS Update:**
You can download the BIOS image from Gloris, section "Firmware/Software".
Select "FW by type" and choose "FSL".
Follow the instructions in the PDF file on how to create the boot CD ROM.
- Disconnect the instrument from the AC supply (remove the battery pack, if there is one!).
- Plug a USB CD ROM drive with BIOS update CD ROM and a USB keyboard into the USB connector.
- Connect the instrument to the AC supply and switch on the power switch. The instrument is now in standby mode.
- Switch on the R&S FSL and wait until the memory test appears on the boot screen and then press the DEL key. The BIOS screen appears.
- Select "Advanced BIOS Features" with the cursor keys and press ENTER.
- Select "Select Boot Options" and press ENTER.
- Select "First Boot Device" with the cursor keys.
- Press the "+" key until USB-CDROM appears as "First Boot Device".
- Press the F10 key and confirm the "SAVE to CMOS and EXIT" query with "Y".
- The R&S FSL will now reboot and automatically starts the BIOS update from the CD ROM. Please note that under NO circumstance during the BIOS update should the power be switched off.
- After the BIOS update has finished, a message is displayed indicating that you can switch off the power.
- Switch off the power, unplug the USB CD ROM drive and keyboard. Insert the battery pack, if there is one.
- Switch on the power and the R&S FSL will restart.
- After starting the instrument, check whether the option is listed in table hardware info:
- [**SETUP** : MORE : SYSTEM INFO : HARDWARE INFO]
- Start self test and check results:
- [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
- [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Lithium Battery on the Controller

(See chapter 5, spare parts list, item 169, and explosion drawings 1300.2525.01 sheet 1, 2, 4.)

The lithium battery is accommodated on the controller.

WARNING



Danger of fire or intoxication

Lithium batteries must not be exposed to high temperatures or fire.

Keep away from children to avoid intoxication.

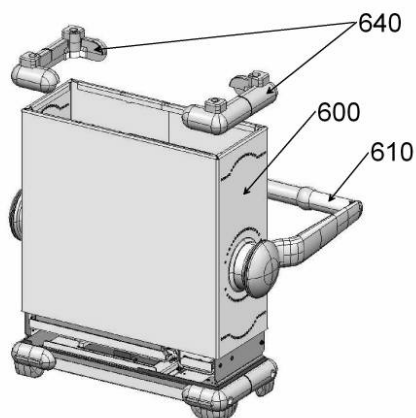
If the battery is replaced improperly, there is danger of explosion. Only replace the battery with R&S type (see spare parts list, item 169).

Lithium batteries are hazardous waste and must be disposed of in dedicated containers. Observe local regulations regarding waste disposal.

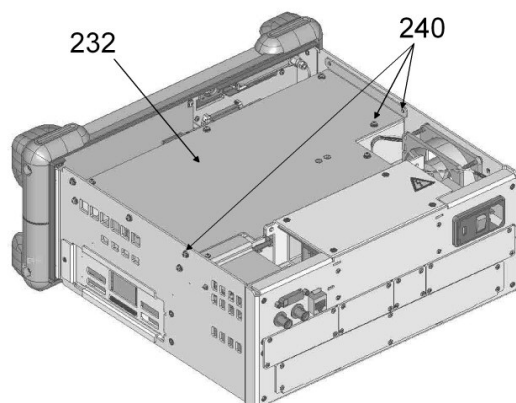
Do not short-circuit the battery!

Opening the Instrument

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.

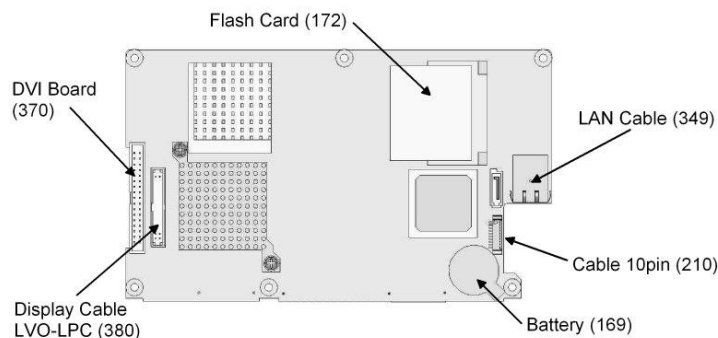


- Unscrew the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side. Remove the cover (232) to the bottom of the instrument.



Removing the Lithium Battery

- Carefully push contact springs of the battery holder up and remove battery (169).



Installing the New Battery and Completing the Instrument

- Carefully push contact springs of the battery holder up and insert battery into the holder beneath the springs.

Note: The plus pole (+) of the battery points upwards.

WARNING



Risk of discharge

Do not short-circuit the battery!

- Remount the cover (232) to the bottom of the instrument. Screw the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).

Putting into Operation

- Connect the instrument to the mains and switch on its power switch. The instrument is now in standby mode.
- After the change of the battery a cold boot is necessary. See "Performing a Cold Boot" section in this chapter.
- After starting the instrument, check hardware info:
 - [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing Flash Card A60

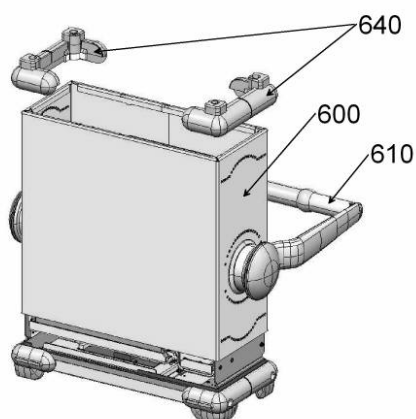
(See chapter 5, spare parts list, item 172, and explosion drawings 1300.2525.01 sheet 1, 2, 4.)

The spare part is already formatted for the R&S FSL and contains the complete software.

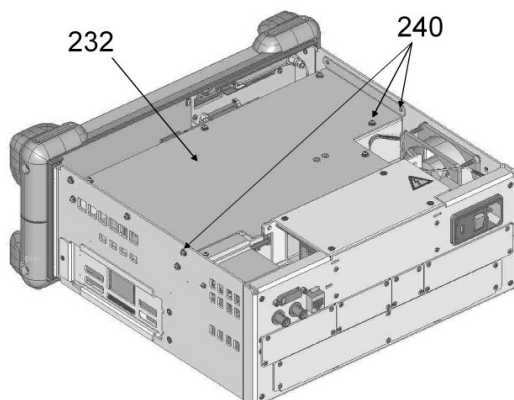
Note: Do not replace the flash card and the motherboard at the same time. If the service function cannot be performed, for example because the R&S FSL application does not boot up, do not replace also the motherboard. In this case, reinstall the old flash card and then replace the motherboard.

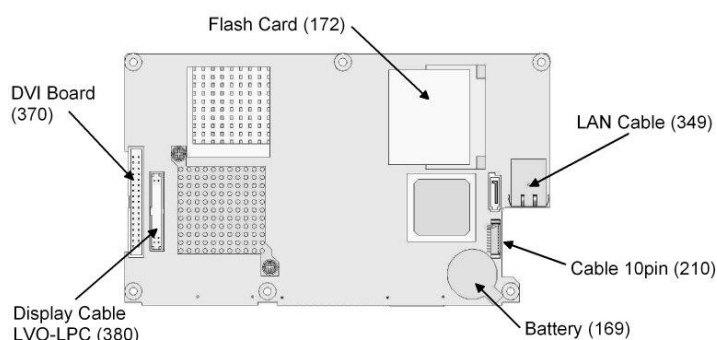
Opening the Instrument and Removing the Controller and Flash Card

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side. Remove the cover (232) to the bottom of the instrument.





- Remove the flash card (172) from the controller (162).

Installing the New Flash Card and Completing the Instruments

- Insert the new flash card (172) into the controller (162).
- Remount the cover (232) to the bottom of the instrument. Screw the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).

Putting into Operation

- Connect the instrument to the mains and switch on the instrument power switch. The instrument is now in standby mode.
- A cold boot is necessary after replacing the flash card.
See "Performing a Cold Boot" section in this chapter.
- A backup of the EEPROM files must be made with the aid of a service function.
 - [SETUP : MORE : SERVICE : ENTER PASSWORD : 20122004 ENTER]
 - [SETUP : MORE : SERVICE : SERVICE FUNCTION : 10.0.4 ENTER]
- After starting the instrument, check hardware info:
 - [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
-

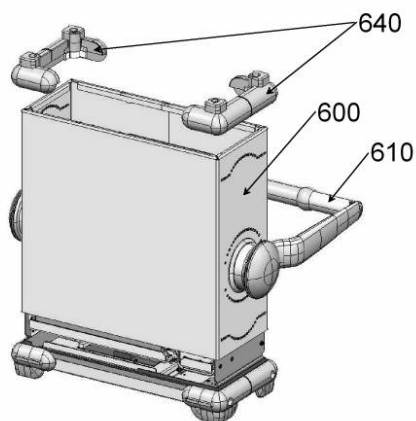
Note: In case a R&S FS-K0, R&S FS-K901 or another 30 day trial key was installed or should be installed in the future, also the time control key must be entered. Please request the code via the service support database.

Replacing the TFT Display

(See chapter 5, spare parts list, items 760, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

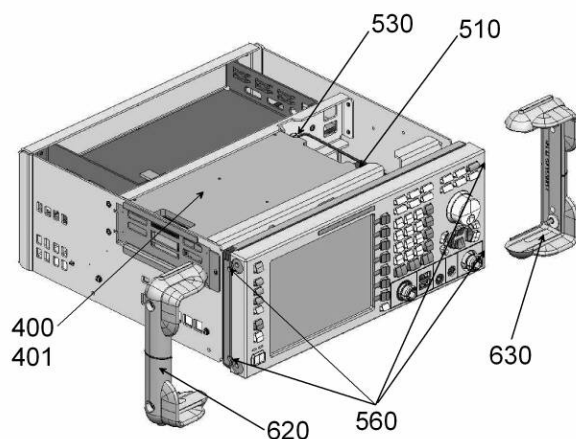
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



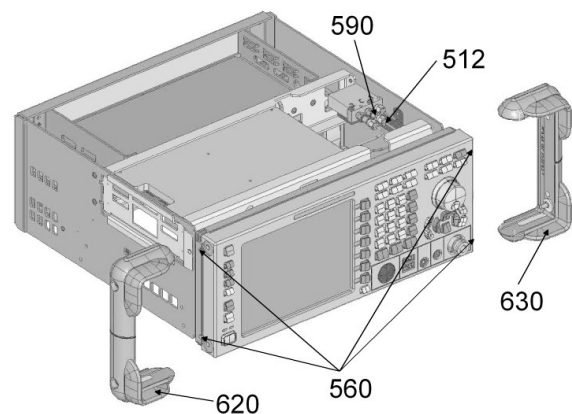
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

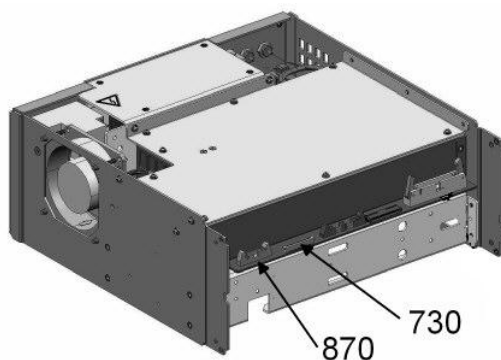


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

- Pull off the connecting cables to front connector (870), flexible switchboard (730) and display connector (940).

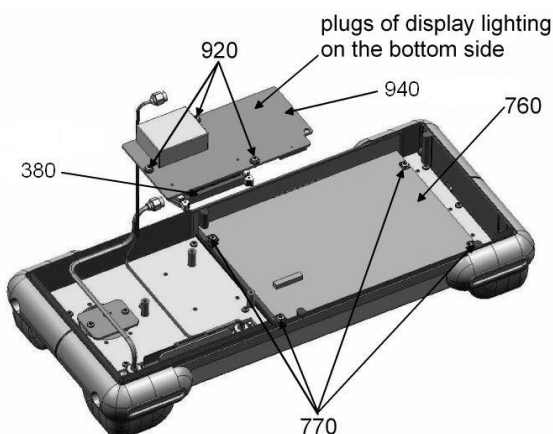
Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the LVO Displayconnector

- Remove ribbon cable (380) at LVO Displayconnector (940).
- Unscrew the three combination screws (920) and remove the LVO Displayconnector (940) with ribbon cable (380).
- Pull off the two plugs of the display lighting on the LVO Displayconnector (940).



Removing the LCD

- Unscrew the four combination screws (770) at the display (760) and remove it.

Installing the New LCD and Completing the Instrument

- When mounting the LVO Displayconnector (940) to the display (760), make sure it is free of mechanical stress.
- Mount the display and screw in the four combination screws (770) at the display (760).
- Affix the two plugs of the display lighting to the LVO Displayconnector (940).
- Reconnect the LVO Displayconnector (940) to the display (760). You must hear the connection engage.
- Screw in the three combination screws (920), making sure LVO (940) is free of mechanical stress.
- Replace the front panel and affix the cables to the front connector (870), flexible switchboard (730) and ribbon cable W41 (380).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

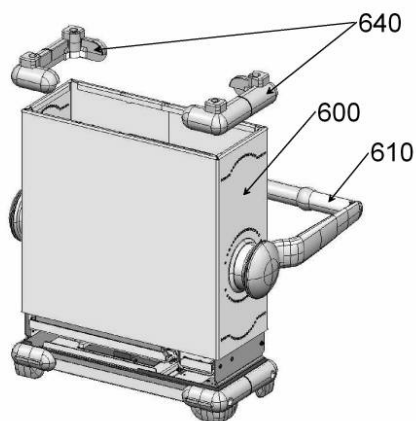
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the LVO Displayconnector in the Front Module

(See chapter 5, spare parts list, items 940, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

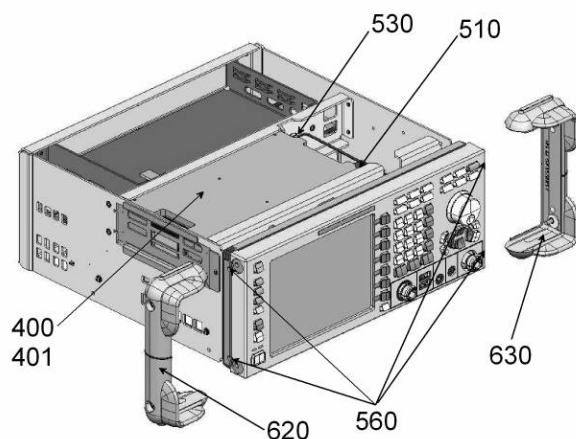
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



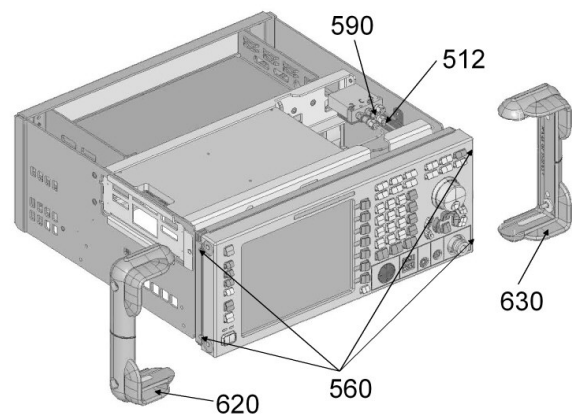
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

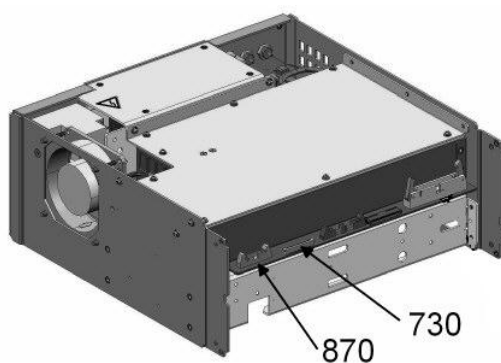


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

- Pull off the connecting cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).

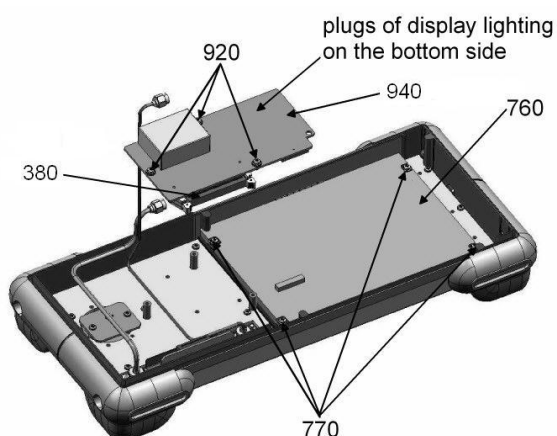
Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the LVO Displayconnector

- Unscrew the three combination screws (920) and remove the LVO Displayconnector (940) with ribbon cable (380).
- Pull off the two plugs of the display lighting on the bottom side.
- Disconnect ribbon cable W41 (380) at the LVO Displayconnector (940).



Installing the New LVO Displayconnector and Completing the Instrument

- When mounting the LVO Displayconnector (940) to the display (760), make sure it is free of mechanical stress.
- Reconnect ribbon cable W41 (380) to LVO Displayconnector (940).
- Affix the two plugs of the display lighting to the LVO Displayconnector (940).
- Reconnect the LVO Displayconnector (940) to the display (760). You must hear the connection engage.
- Screw in the three combination screws (920), making sure LVO (940) is free of mechanical stress.
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

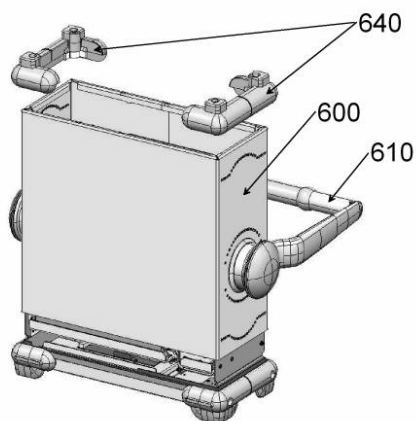
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Push-Button Board Set in the Front Module

(See chapter 5, spare parts list, items 720, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

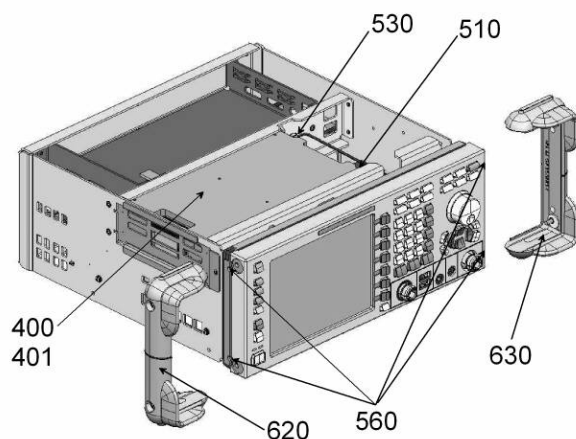
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



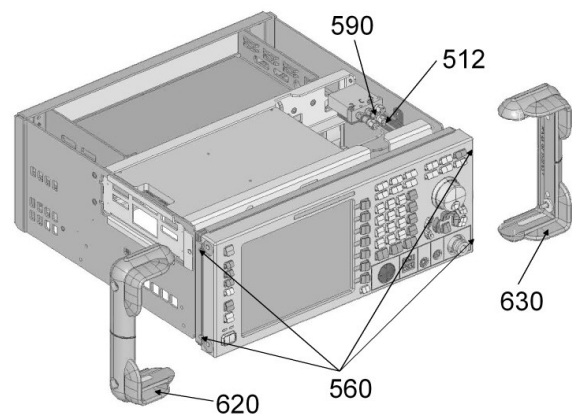
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

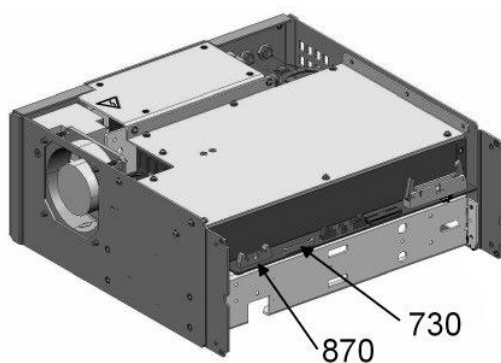


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

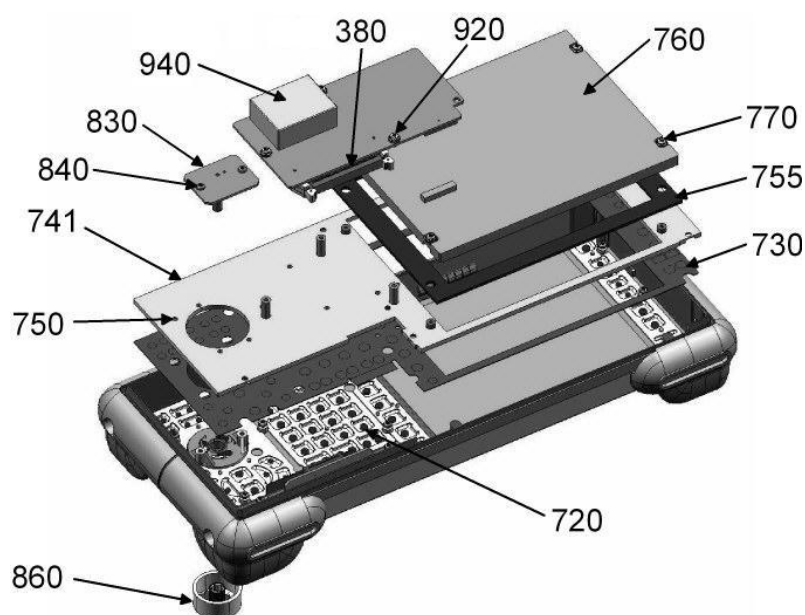
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the Push-Button Board Set



- Unscrew the three combination screws (920) and remove the LVO Displayconnector (940) with ribbon cable.
- Pull off the two plugs of the display lighting on the bottom side of LVO Displayconnector (940).
- Unscrew the four combination screws (770) at the display (760) and remove it.
- Remove the powder seal (755).
- Remove the knob (860) at the front side.
- Disconnect the flat cable at the encoder board (830).
- Unscrew the two die-cast screws (840) at the encoder board (830) and remove it.
- Unscrew the nine die-cast screws (750) at the keyboard panel (741) and remove it.
- Remove the flexible switchboard (730).
- Remove the push-button board set (720).

Installing the New Push-Button Board Set and Completing the Instrument

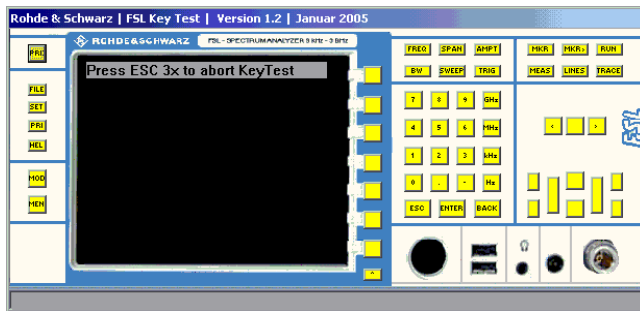
- Mount the new push-button board set (720) onto the front cover.
- Mount the flexible switchboard (730).
- Mount the keyboard panel (741) with nine die-cast screws (750).
- Mount the encoder board (830) with two die-cast screws (840).
- Connect the flat cable to the encoder board (830).
- Mount the knob (860) to the encoder board at the front side.
- Mount the powder seal (755).
- Mount the display and screw the four combination screws (770) at the display (760).
- When mounting the LVO Displayconnector (940) to the display (760), make sure it is free of mechanical stress.
- Affix the two plugs of the display lighting to the LVO Displayconnector (940).
- Reconnect the LVO Displayconnector (940) to the display (760). You must hear the connection engage.
- Screw in the three combination screws (920), making sure LVO (940) is free of mechanical stress.
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).
- Screw four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

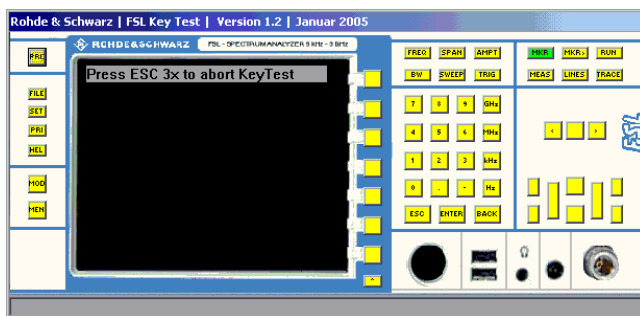
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).

Check the Push-Button Board Set

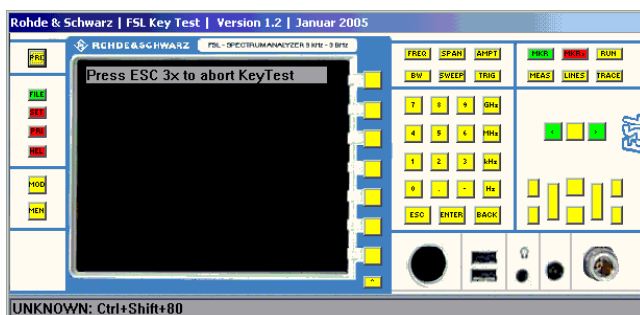
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Starting the key test tool:
 - [SETUP : MORE : SERVICE : ENTER PASSWORD : 894129 ENTER]
 - [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.14.0 ENTER]



- After the first pressing of a key the corresponding button changes its color from yellow to green:



- If the key is pressed a second time, the corresponding button changes its color from green to red.
- If a key does not match the given key code, the corresponding button does not change its color and the unknown key code is displayed at the dialog status line.



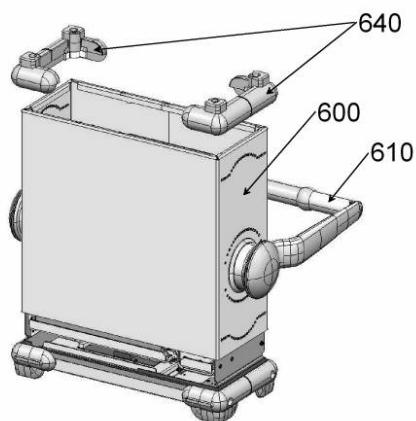
- To verify that all keys work properly, all keys should be pressed twice and finally all displayed buttons should have a red color. Otherwise the keyboard does not work properly.
- Press ESC key thrice to abort the key test tool during the test.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Flexible Switchboard in the Front Module

(See chapter 5, spare parts list, items 730, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

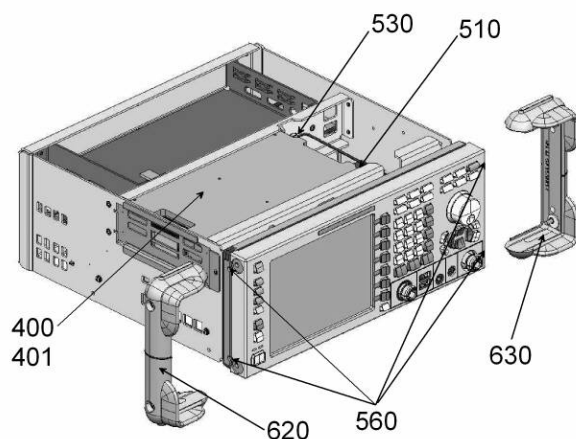
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



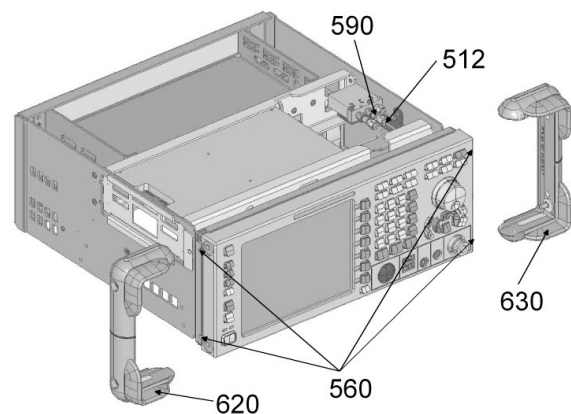
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

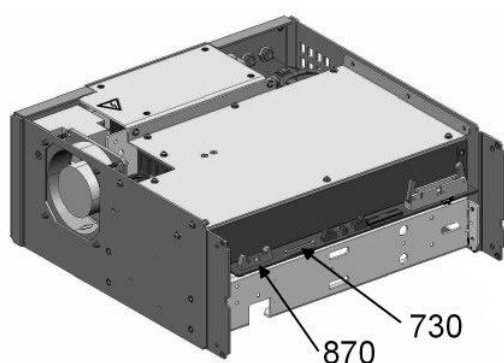


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

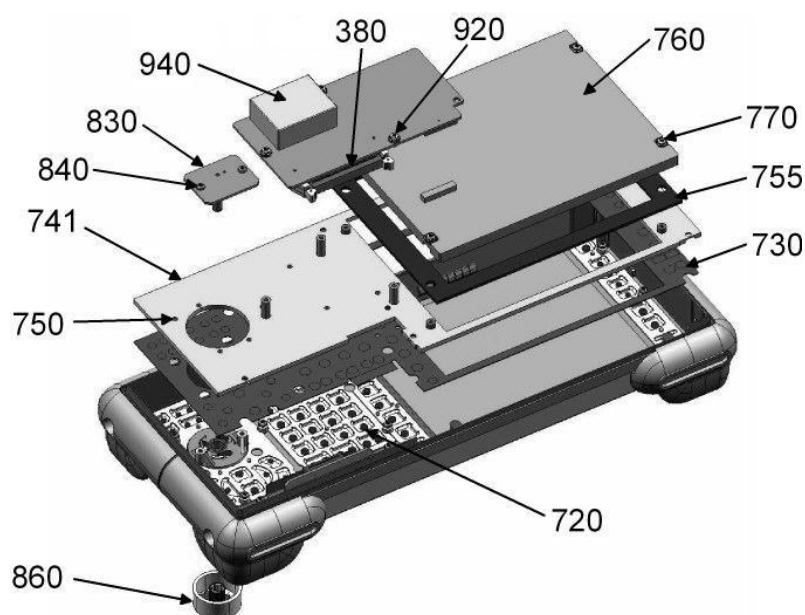
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the Flexible Switchboard



- Unscrew the three combination screws (920) and remove the LVO Displayconnector (940) with ribbon cable (380).
- Pull off the two plugs of the display lighting on the bottom side of LVO Displayconnector (940).
- Unscrew the four combination screws (770) at the display (760) and remove it.
- Remove the powder seal (755).
- Remove the knob (860) at the front.
- Disconnect the flat cable at the encoder board (830).
- Unscrew the two die-cast screws (840) at the encoder board (830) and remove it.
- Unscrew the nine die-cast screws (750) at the keyboard panel (741) and remove it.
- Remove the flexible switchboard (730).

Installing the New Flexible Switchboard and Completing the Instrument

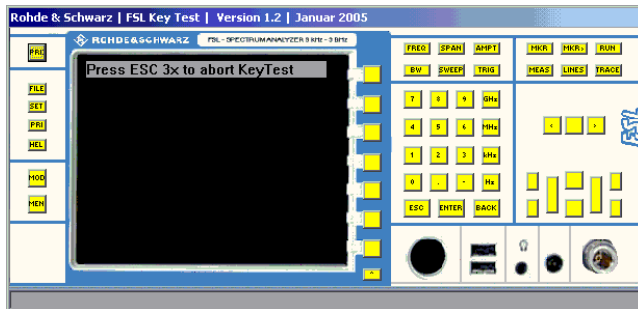
- Mount the new flexible switchboard (730).
- Mount the keyboard panel (741) with nine die-cast screws (750).
- Mount the encoder board (830) with two die-cast screws (840).
- Connect the flat cable to the encoder board (830).
- Mount the knob (860) to the encoder board at the front side.
- Mount the powder seal (755).
- Mount the display and screw in the four combination screws (770) at the display (760).
- When mounting the LVO Displayconnector (940) to the display (760), make sure it is free of mechanical stress.
- Affix the two plugs of the display lighting to the LVO Displayconnector (940).
- Reconnect the LVO Displayconnector (940) to the display (760). You must hear the connection engage.
- Screw in the three combination screws (920), making sure LVO (940) is free of mechanical stress.
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).
- Screw four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

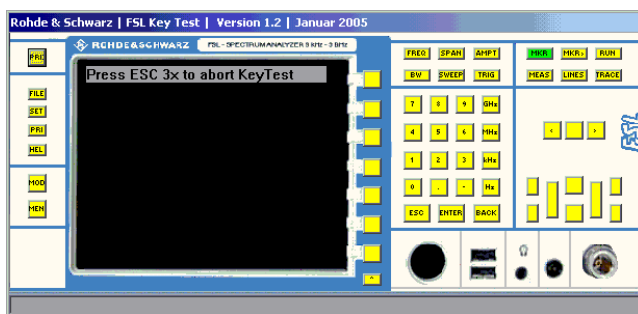
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw the two rear-panel feet (640).

Check the Flexible Switchboard

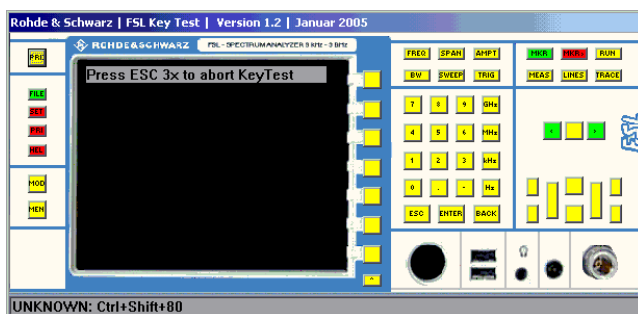
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Starting the key test tool:
 - [SETUP : MORE : SERVICE : ENTER PASSWORD : 894129 ENTER]
 - [SETUP : MORE : SERVICE : SERVICE FUNCTION : 2.0.14.0 ENTER]



- After the first pressing of a key the corresponding button changes its color from yellow to green:



- If the key is pressed a second time, the corresponding button changes its color from green to red.
- If a key does not match the given key code, the corresponding button does not change its color and the unknown key code is displayed at the dialog status line.



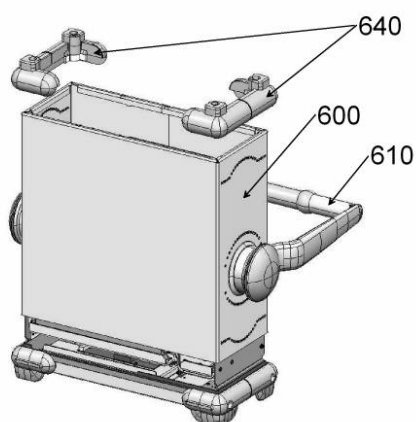
- To verify that all keys work properly, all keys should be pressed twice and finally all displayed buttons should have a red color. Otherwise the keyboard does not work properly.
- Press ESC key thrice to abort the key test tool during the test.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Encoder Board in the Front Module

(See chapter 5, spare parts list, items 830, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

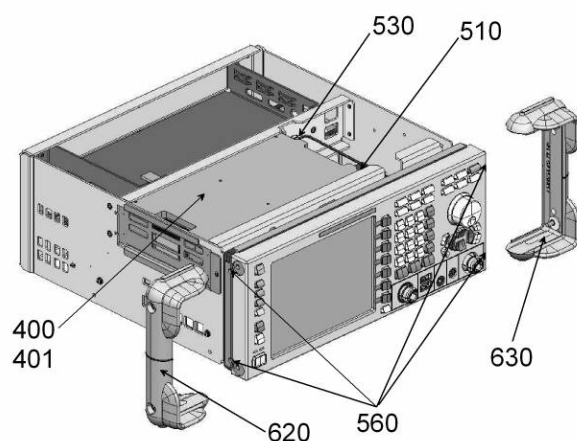
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



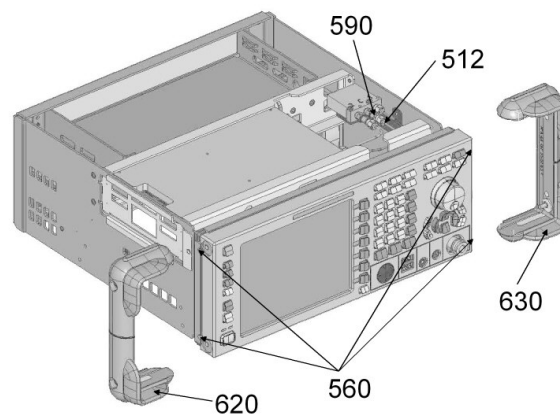
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- FSL3/6:



FSL18:

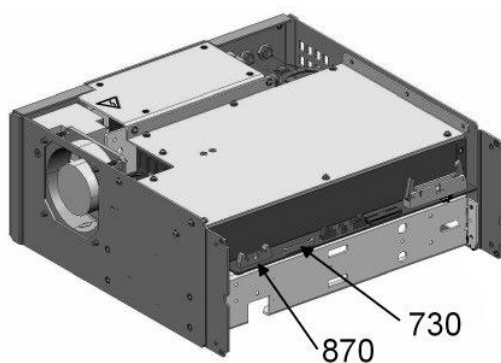


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

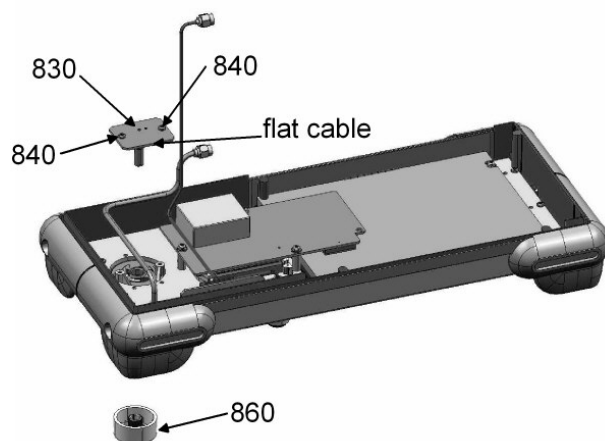
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and display connector (940).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the Encoder Board



- Remove the knob (860) at the front.
- Disconnect the flat cable at the encoder board (830).
- Unscrew the two die-cast screws (840) at the encoder board (830) and remove it.

Installing the New Encoder Board and Completing the Instrument

- Mount the new encoder board (830) with two die-cast screws (840).
- Connect the flat cable to the encoder board (830).
- Mount the knob (860) to the encoder board at the front.
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and display connector (940).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

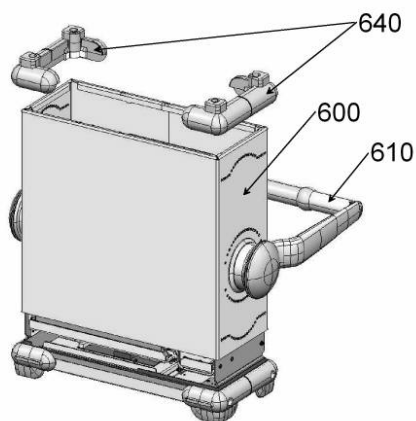
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Front Connector in the Front Module

(See chapter 5, spare parts list, items 870, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

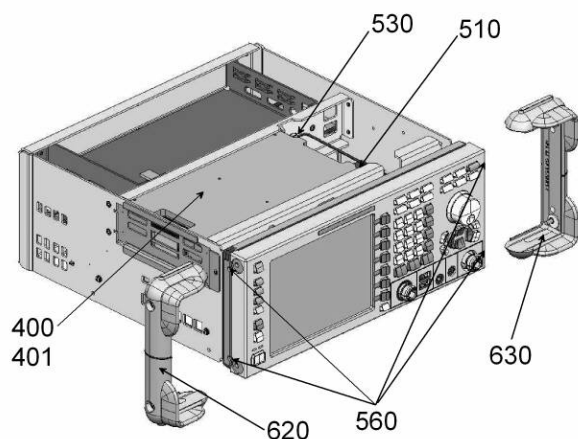
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



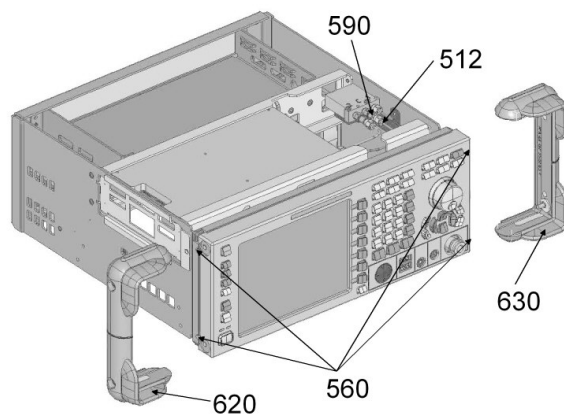
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

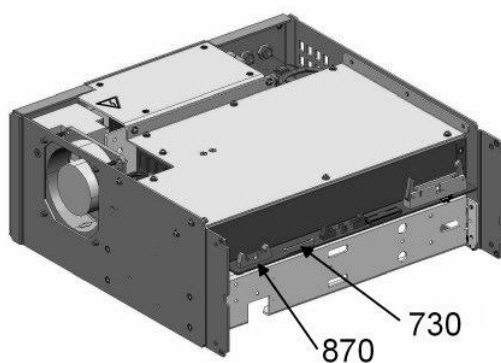


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

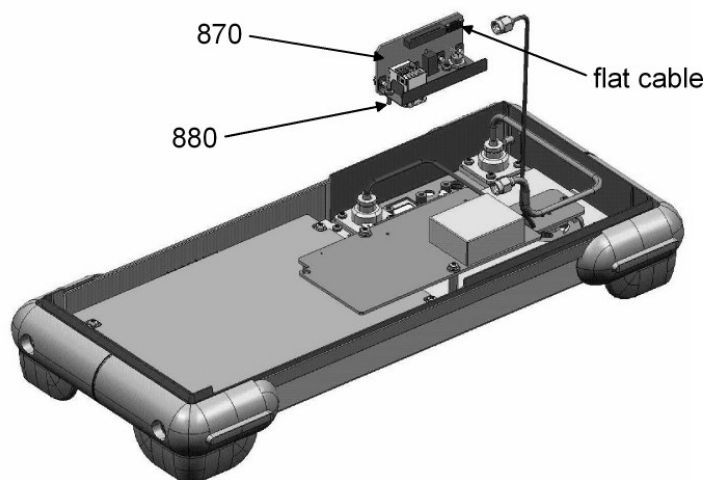
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and display connector (940).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the Front Connector



- Remove flat cable at the front connector (870).
- Unscrew the three die-cast screws (880) at the front connector (870) and remove it.

Installing the New Front Connector and Completing the Instrument

- Mount the new front connector (870) with three die-cast screws (880).
- Reconnect flat cable to front connector (870).
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and display connector (940).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

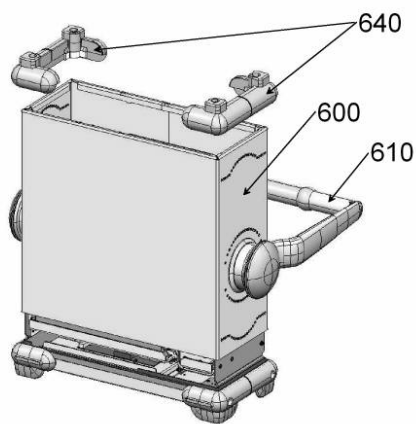
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Screened Filter Glass in the Front Module

(See chapter 5, spare parts list, items 710, and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

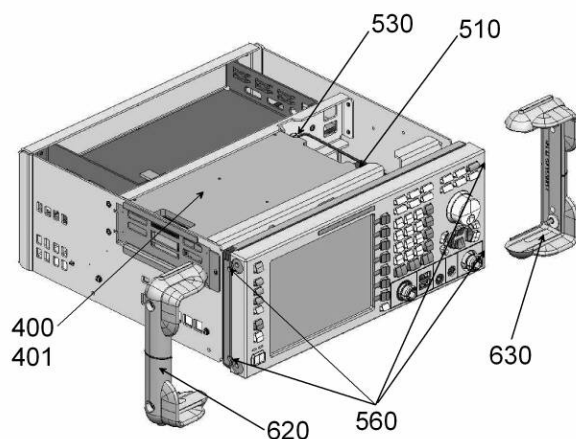
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



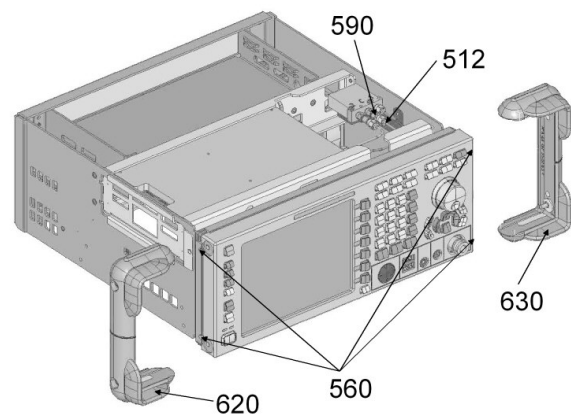
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
- R&S FSL3/6:



R&S FSL18:

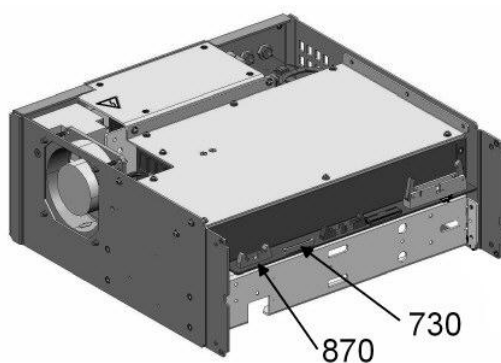


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

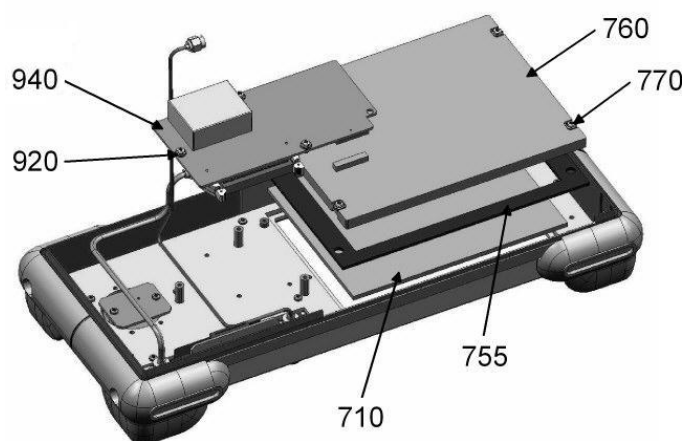
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and display connector (940).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the Screened Filter Glass



- Unscrew the three combination screws (920) and remove the LVO Displayconnector (940) with ribbon cable.
- Unscrew the four combination screws (770) at the display (760) and remove it.
- Remove the powder seal (755).
- Remove the screened filter glass (710).

Installing the New Screened Filter Glass and Completing the Instrument

- Mount the new screened filter glass (710).

Note: Remove the green foil (inside unit) and the white foil (at front of unit) of the new screened filter glass (710).

- Mount the powder seal (755).
- Mount the display and screw in the four combination screws (770) at the display (760).
- When mounting the LVO Displayconnector (940) to the display (760), make sure it is free of mechanical stress.
- Reconnect the LVO Displayconnector (940) to the display (760). You must hear the connection engage.
- Screw in the three combination screws (920), making sure LVO (940) is free of mechanical stress.
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) to frontend (400, 401) or DC Block (590).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

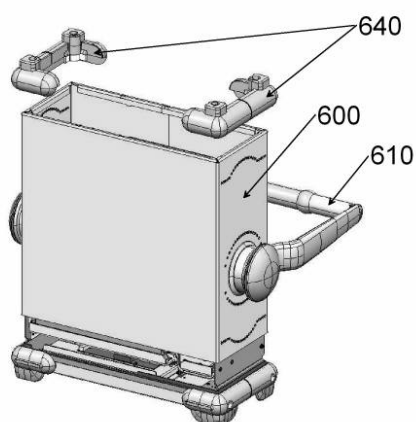
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing RF Cable W1 or RF Cable W2 (FSL3/6)

(See chapter 5, spare parts list, items 510, 530 and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

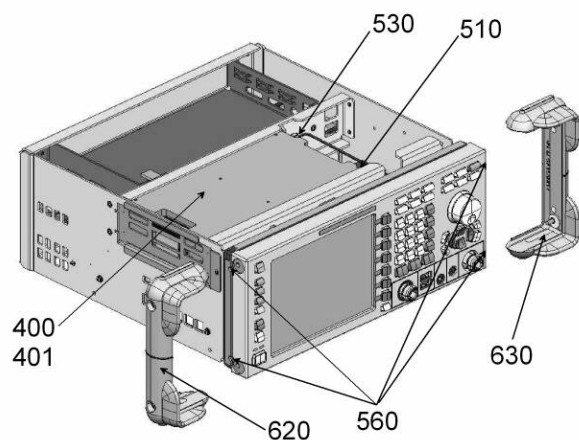
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (510, FSL3/6) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401).
- Unscrew four screws (560) at both sides of the front panel.

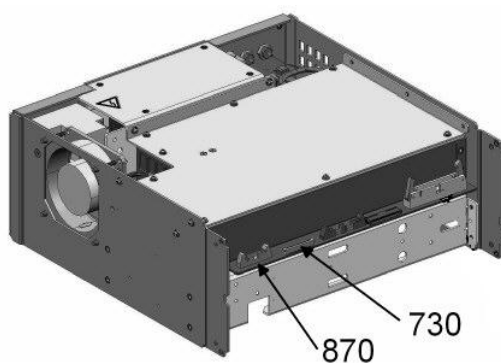


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

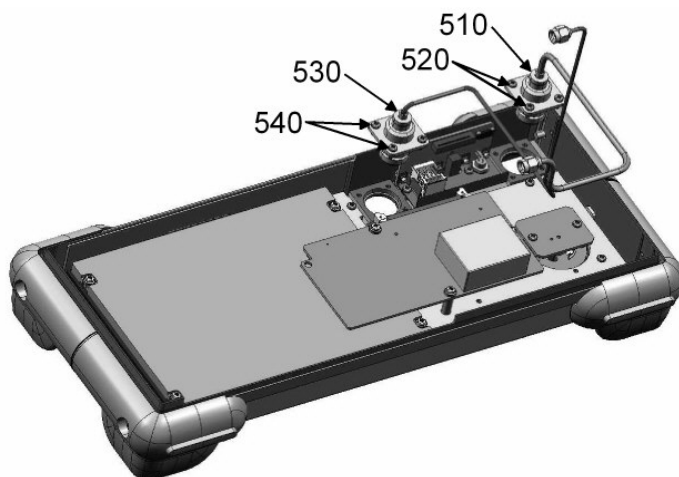
- Pull off the connecting cables to front connector (870), flexible switchboard (730) and display connector (940).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.

Removing the RF Cable W1 or RF Cable W2



- Unscrew the four die-cast screws (520 or 540) and remove RF cable W1 (510) or RF cable W2 (530).

Installing the New RF Cable W1 or RF Cable W2 and Completing the Instrument

- Mount the new RF cable W1 (510) or RF cable W2 (530) onto the front module with four die-cast screws (520 or 540).
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and display connector (940).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510) and RF cable W2 (530, only models with tracking generator) at frontend (400).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

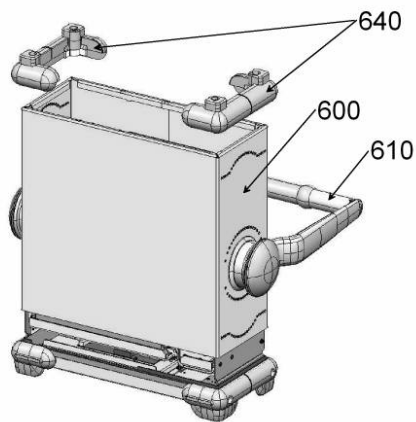
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Only cable RF Input W1:
 - Perform a frequency response correction as described in chapter 2 "Adjustment".
- Perform a calibration as described in chapter 1 "Performance Test".

Replacing RF Input Adaptor X1 (R&S FSL18)

(See chapter 5, *spare parts list*, items 511 and explosion drawings 1300.2525.01 sheet 1, 2, 4 and 1300.2531.01.)

Opening the Instrument and Removing the Front Module

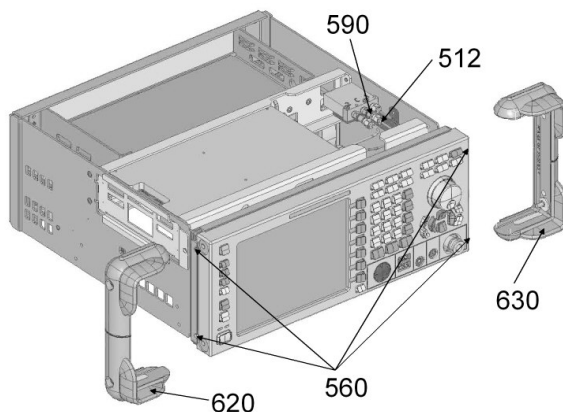
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- Disconnect RF cable W1 (512) at DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.

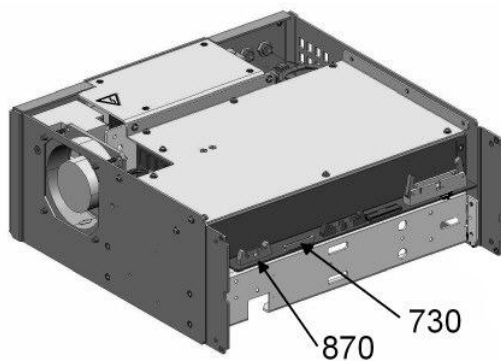


Remove the front panel to the front of the instrument.

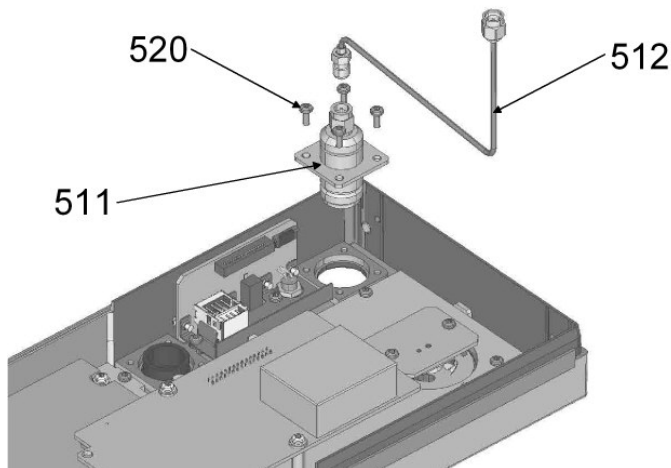
Note: Be aware that the cables are still connected to the motherboard.

- Pull off the connecting cables to front connector (870), flexible switchboard (730) and ribbon cable W41 (380).

Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.



- Unscrew the four die-cast screws (520) and remove adaptor (511) and RF cable W1 (512).
- Unscrew RF cable W1 (512) at adaptor (511).

Installing the New RF Adaptor and Completing the Instrument

- Mount RF cable W1 (512) at the new adaptor (511).
- Mount the new RF adaptor (511) with RF cable W1 (512) onto the front module with four die-cast screws (520).
- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and LVO display connector (940).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (512) to DC Block (590).
- Screw in the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

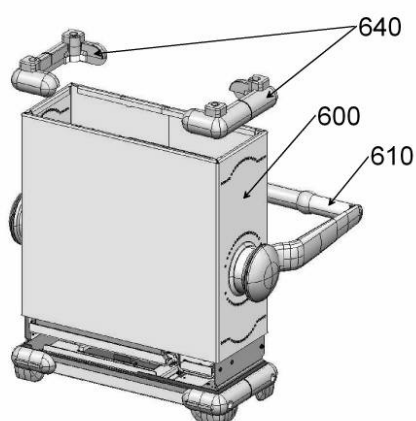
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Only cable RF Input W1:
 - Perform a frequency response correction as described in chapter 2 “Adjustment”.
- Perform a calibration as described in chapter 1 “Performance Test”.

Replacing the Power Supply

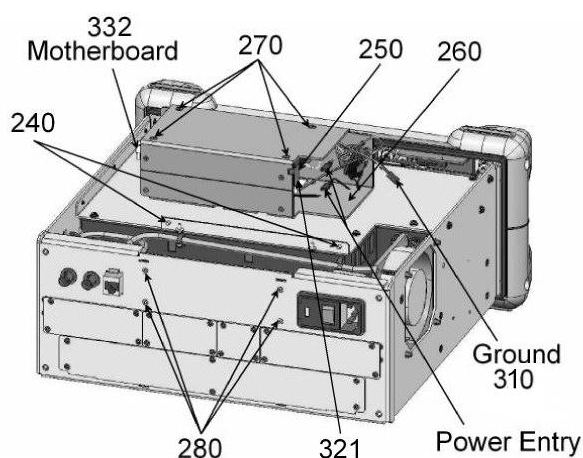
(See chapter 5, spare parts list, item 250, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Power Supply

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Disconnect cables to ground, motherboard and power entry.
- Unscrew the nine combination screws (240) at the bottom of the instrument.
- Unscrew the four screws (280) at the rear of the instrument and remove the power supply (250) with holder (260) and cables to the bottom of the instrument.
- Disconnect cables (310, 321, 332) at the power supply (250).
- Unscrew the four combination screws (270) from inside of power supply holder (260) and remove the power supply (250).



Installing the New Power Supply

- Mount the new power supply (250) with four combination screws (270) into the holder (260)
- Connect cables (310, 321, 332) to the power supply (250).
- Mount the power supply (250) with holder (260) and cables into the instrument with four screws (280) at the rear of the instrument.
- Screw the two combination screws (240) at the bottom of the instrument.
- Connect cables to ground, motherboard and power entry.

Note: *Connect the blue and the black wires to either of the two outside plugs of the power entry.*

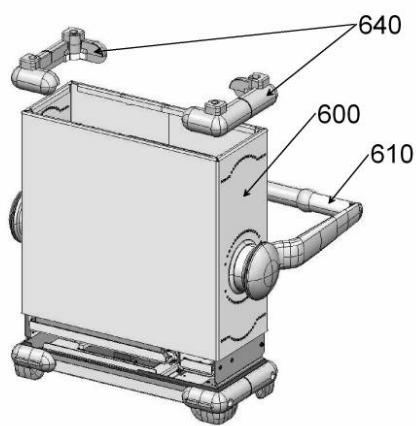
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Fan

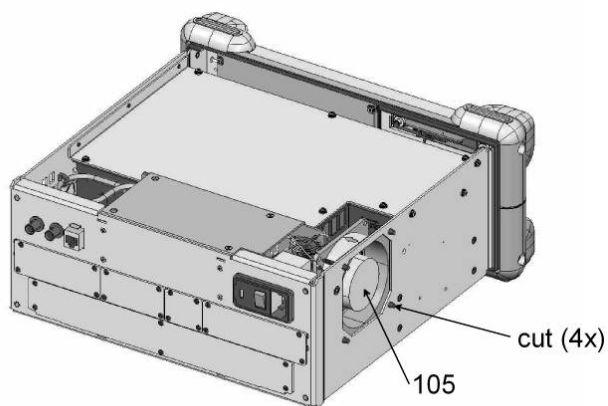
(See chapter 5, spare parts list, item 105, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Power Supply

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Remove the fan (105) from the instrument frame.
- Disconnect the fan cable at the motherboard connector X35 (FAN).



Installing the New Fan and Completing the Instrument

- Connect the fan cable at the motherboard connector X35 (FAN).
- Insert the new fan (105) and mount it to the frame with the rubber studs.

Note: *Please note the direction of the airflow printed on the fan. The fan must blow the cold air into the instrument.
Make sure to route the cables with enough space to the fan.*

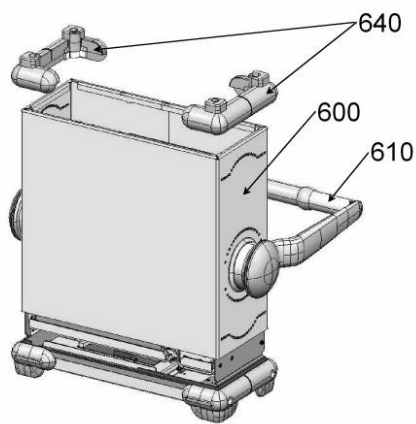
- Cut the rubber studs outside the frame.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.

Replacing the DVI Board A95

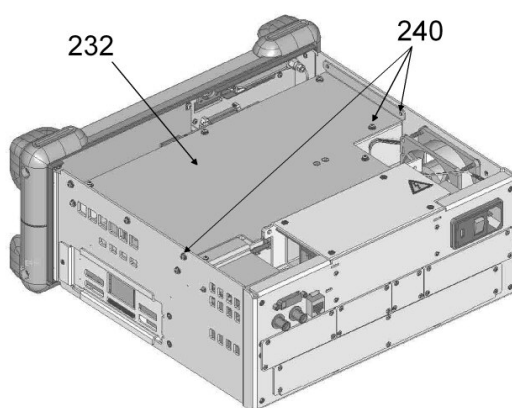
(See chapter 5, spare parts list, item 370, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the DVI Board

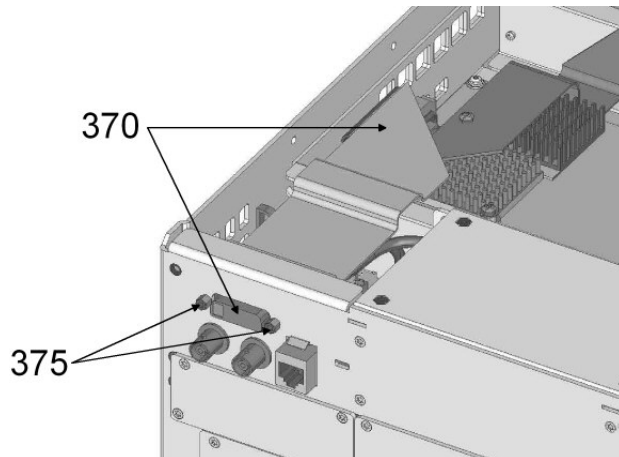
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side. Remove the cover (232) to the bottom of the instrument.



- Remove both lockingscrews (375) from the instrument frame.
- Disconnect cable DVI board (370) at controller (162) and remove DVI board (370).



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➤
➤

Installing the New DVI Board and Completing the Instrument

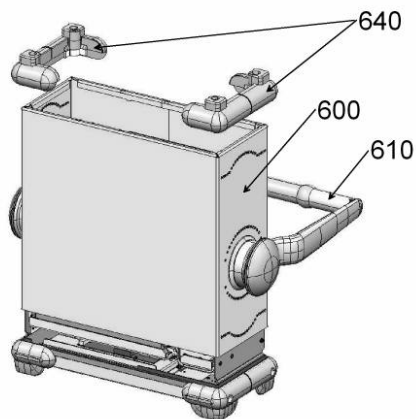
- Mount the new DVI board (370) with two lockingscrews (375) into the instrument frame.
- Connect cable DVI board (370) to controller (162)
- Remount the cover (232) to the bottom of the instrument. Screw the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Check the DVI connector by using an external monitor.

Replacing the RF Frontend A100

(See chapter 5, spare parts list, item 400,401,407,408 and explosion drawing 1300.2525.01 sheet 1 2,4)

Opening the Instrument and Removing the Board

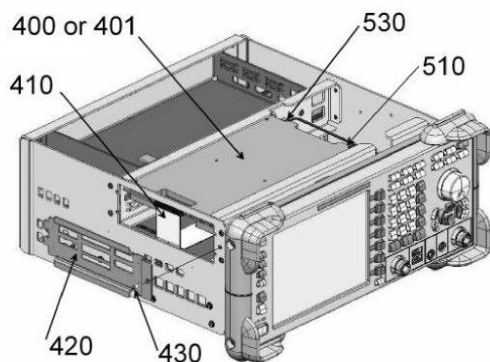
- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



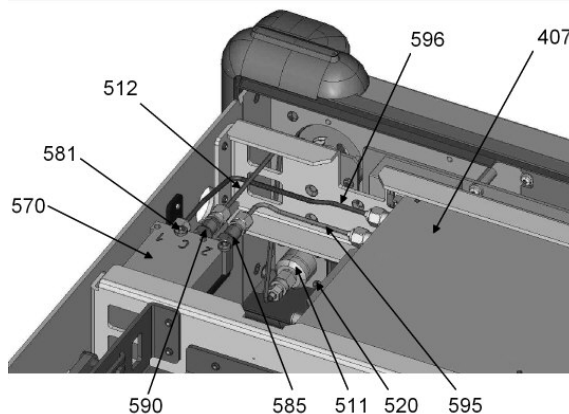
- R&S FSL3/6:
Disconnect RF cable W1 (510) and RF cable W2 (530, only models with tracking generator) at frontend (400 or 401).
- R&S FSL18 (without Tracking Generator):
Disconnect RF cable W12 (595) and RF cable W13 (596) at frontend (407).
- R&S FSL18 (with Tracking Generator):
Disconnect RF cable W12 (595), RF cable W13 (596), RF cable W18 (545) and RF cable W19 (546) at frontend (408).
- Unscrew one screw (430) and remove the locking plate (420).
- Disconnect data cable W4 (410) at the frontend board (400, 401,407 or 408).
- R&S FSL18 (with Tracking Generator):
Disconnect RF cable W20 (547)

- Push out board to the left side of the instrument.

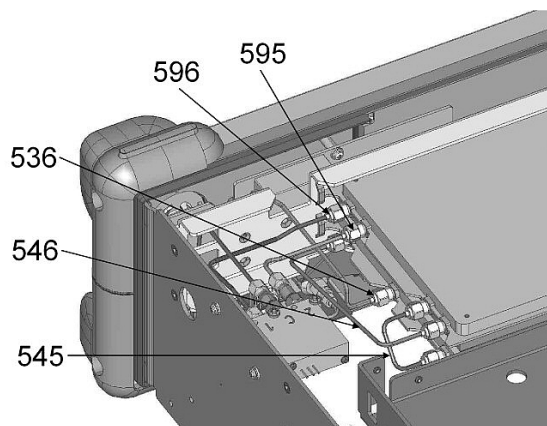
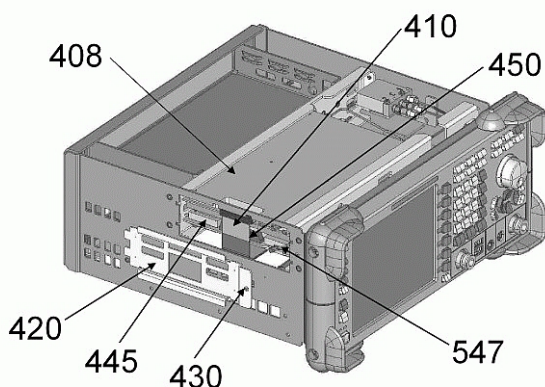
R&S FSL3/6:



R&S FSL18 (without Tracking Generator):



- R&S FSL18 (with Tracking Generator):



Installing the New Frontend Board and Completing the Instrument

- Plug the new frontend board into the instrument and reconnect data cable W4 (410) and RF cable W20 (547, only FSL18 with Tracking Generator) to the board.
- Mount the locking plate (420) with one screw (430).
- R&S FSL3/6:
Connect RF cable W1 (510) and RF cable W2 (530, only models with tracking generator) to Frontend (400 or 401).
- R&S FSL18 (without Tracking Generator):
Connect RF cable W12 (595) and RF cable W13 (596) to frontend (407).
- R&S FSL18 (with Tracking Generator):
Connect RF cable W12 (595), RF cable W13 (596), RF cable W18 (545) and RF cable W19 (546) to frontend (408).
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.

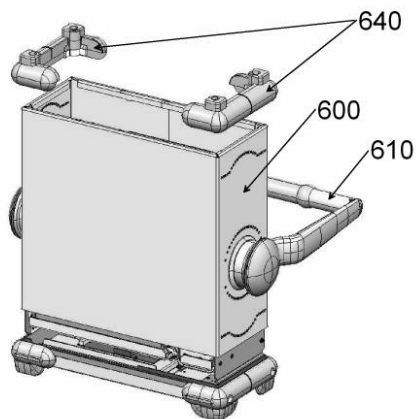
- A cold boot is necessary after replacing the frontend.
See "Performing a Cold Boot" section in this chapter.
- After starting the instrument check:
- [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
- [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
- [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Perform a frequency response correction using the correction software.
- Calibrate the instrument as described in chapter 1.

Replacing the Tracking Generator TG-20GHz A200 (FSL18, Mod.28)

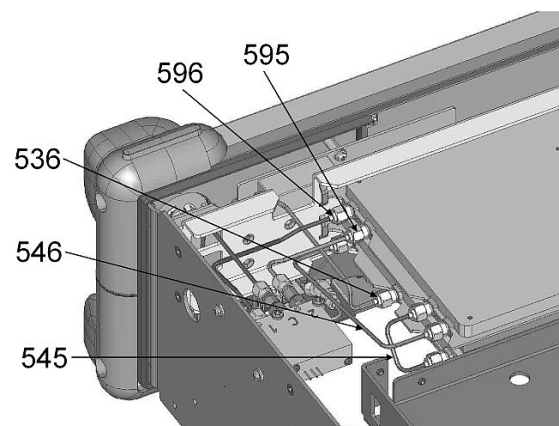
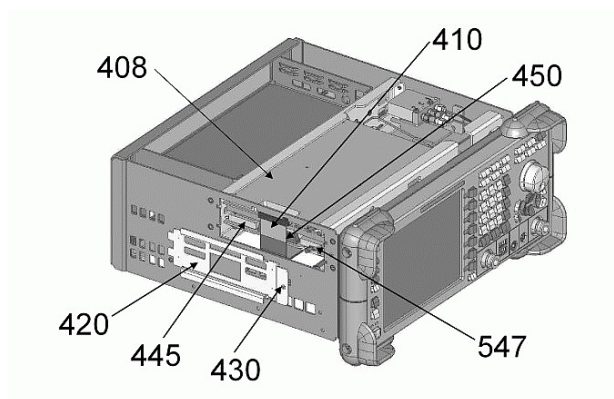
(See chapter 5, spare parts list, item 445 and explosion drawing 1300.2525.01 sheet 1 2,4)

Opening the Instrument and Removing the Board

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Disconnect RF cable W2 (536), RF cable W18 (545) and RF cable W19 (546) at TG-20GHz (445).
- Unscrew one screw (430) and remove the locking plate (420).
- Disconnect data cable W4 (410) at the frontend (408), data cable W10 (450) and RF cable W20 (547) at TG-20GHz (445).
- Push out board to the left side of the instrument.



Installing the New TG-20GHz Board and Completing the Instrument

- Plug the new TG-20GHz board into the instrument and reconnect data cable W10 (450) and RF cable W20 (547) to TG-20GHz (445) and data cable W4 (410) to the frontend (408).
- Mount the locking plate (420) with one screw (430).
- Connect RF cable W2 (536), RF cable W18 (545) and RF cable W19 (546) to TG-20GHz (445).
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- A cold boot is necessary after replacing the tracking generator.
See "Performing a Cold Boot" section in this chapter.
- After starting the instrument check:
- [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
- [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
- [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Perform a frequency response correction using the correction software.
- Calibrate the instrument as described in chapter 1.

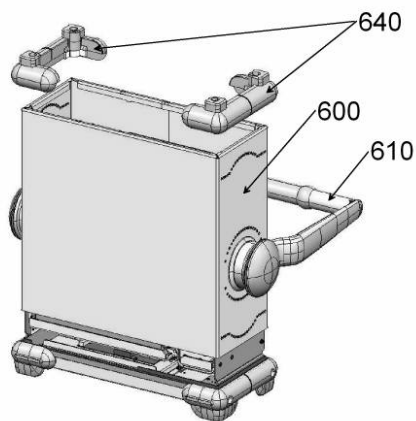
Replacing the Motherboard A10

(See chapter 5, spare parts list, item 112, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Note: Do not replace the motherboard and the flash card at the same time. If the instrument does not allow you to enter the service function, do not replace also the flash card.
In this case, reinstall the old motherboard and then replace the flash card.

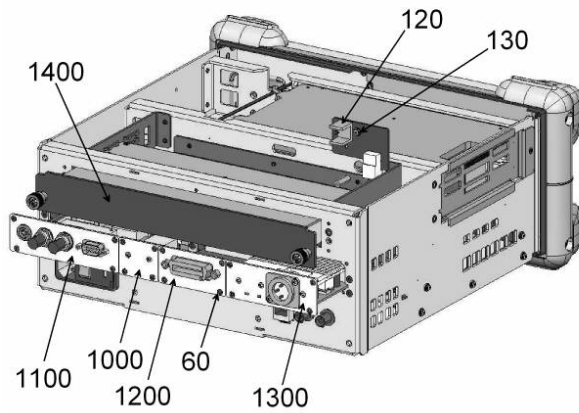
Opening the Instrument

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



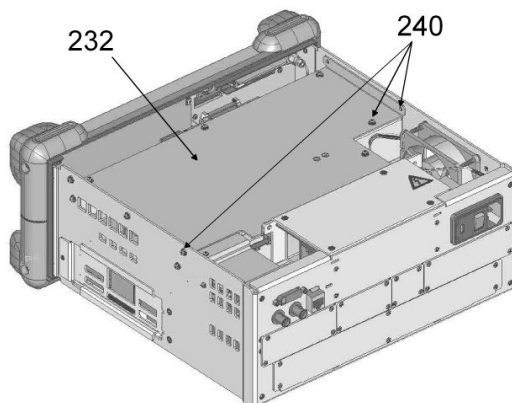
Removing Hardware Options and Battery Adapter

- Unscrew four screws (60) at every option and remove the OCXO board (1000), additional interface (1100), IEC/IEEE bus (1200) and DC power supply (1300) to the rear of the instrument.
- Unscrew two thumbscrews and remove the battery pack option (1400) to the rear of the instrument.
- Unscrew the two combination screws (130) and remove the battery adapter (120) to the top of the instrument.



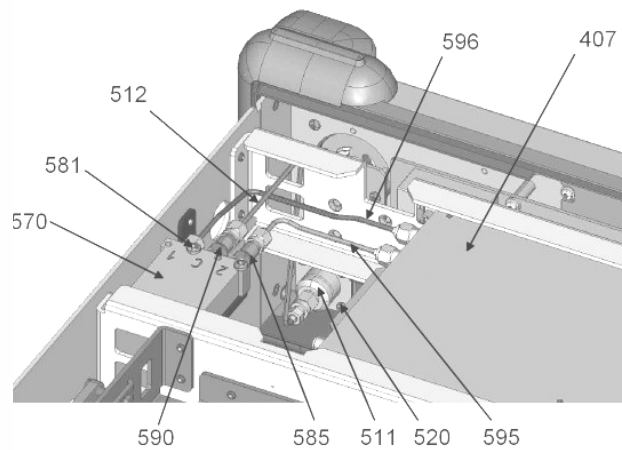
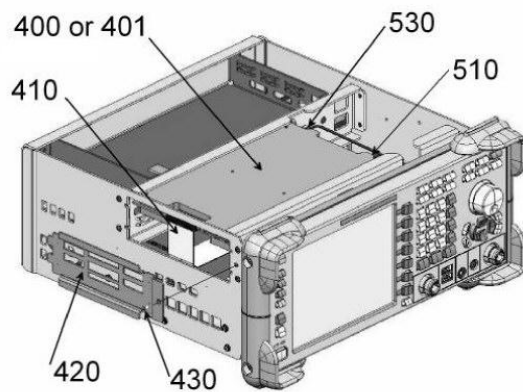
Removing LPC Cover

- Unscrew the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side. Remove the cover (232) to the bottom of the instrument.



Removing the Frontend Board

- FSL3/6:
Disconnect RF cable W1 (510) and RF cable W2 (530, only models with tracking generator) at frontend (400 or 401).
- FSL18:
Disconnect RF cable W12 (595) and RF cable W13 (596) at frontend (407).
- Unscrew one screw (430) and remove the locking plate (420).
- Disconnect data cable W4 (410) at the frontend board (400, 401 or 407).
- Push out board to the left side of the instrument.

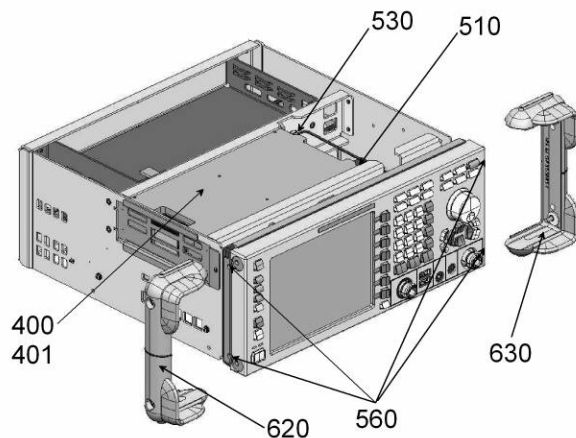


Removing the Front Module

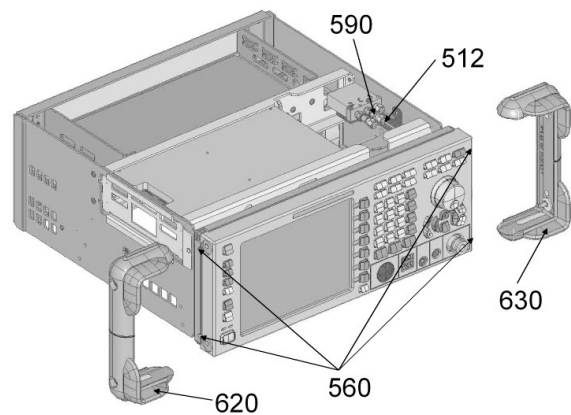
- Unscrew and remove the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.

- R&S FSL18: Disconnect RF cable W1 (512) at DC Block (590).
- Unscrew four screws (560) at both sides of the front panel.
-
- R&S FSL3/6:



R&S FSL18:

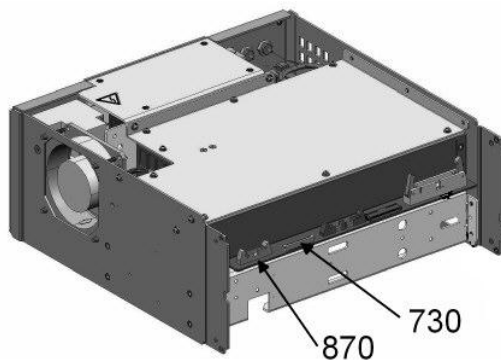


- Remove the front panel to the front of the instrument.

Note: Be aware that the cables are still connected to the motherboard.

- Pull off the connecting cables to front connector (870) and flexible switchboard (730).

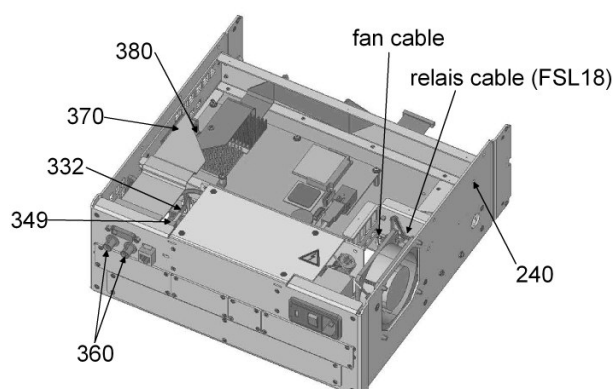
Note: When pulling off the connecting cables, be careful with the flexible switchboard (730). It is a film cable which can only be disconnected after sliding up the lock of the film cable plug.



- Place the front module on a clean surface.
- Remove ribbon cable (380) at LVO Displayconnector (940).

Disconnecting Cables

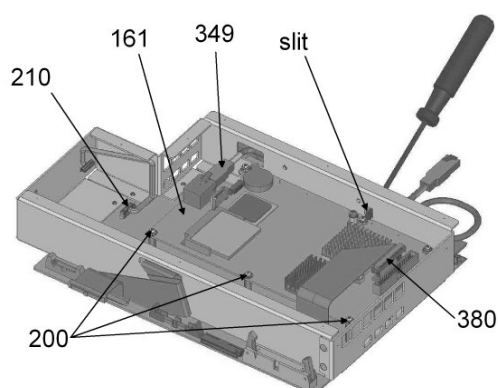
- Disconnect the fan cable at the motherboard connector X35 (FAN)
- FSL18: Disconnect the relais cable at the motherboard connector X113.
- Disconnect the LAN cable RJ45 (349) at the rear panel coupler (340).
- Disconnect both cable W3 (360) and power supply cable (332) at the motherboard.
- Disconnect cable DVI board (370) and displaycable (380) at controller (162).



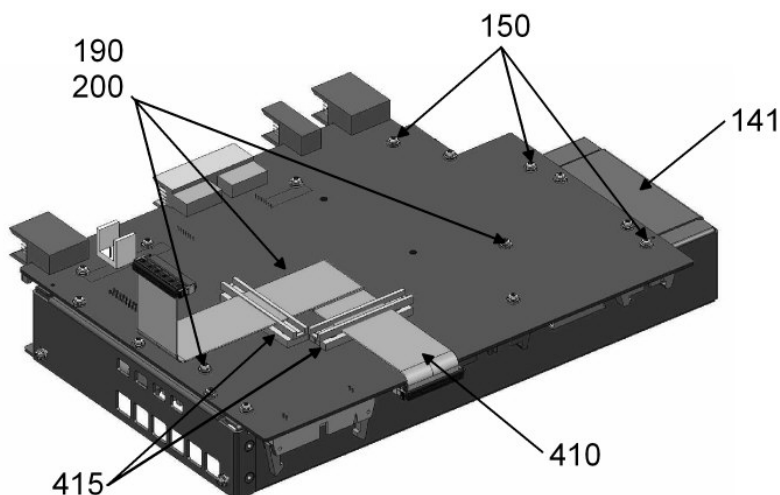
Removing the Motherboard

- Unscrew the three combination screws (240), two combination screws (240) at the left-hand side and one combination screw (240) at the right-hand side.
- Remove the motherboard (112) including LPC shielding box (142) and controller (162) to the bottom of the instrument.
- Disconnect cable 10pin (210), LAN cable RJ45 (349) and cable LVO-LPC (380) at controller (162).
- Unscrew six combination screws (200) and remove the controller (162).

Note: The force needed to disconnect the controller connector of the motherboard is high. Pulling the controller to the bottom is best done by means of the slits. Using a flat, blunt tool, carefully push the board step by step to the bottom. Do not insert the tool too deep into the slits!



- Unscrew 15 combination screws (150) and remove the LPC shielding box (142) from motherboard.
- Disconnect and remove cable 10pin (210) and data cable W4 (410) from motherboard.
- Unscrew 3 combination screws (200) and remove 3 spacer (190).



Installing the New Motherboard

- Mount the 3 spacer (190) with 3 combination screws (200).
- Mount the LPC shielding box (142) with 15 combination screws (150) to motherboard.
- Connect cable 10pin (210) to motherboard.
- Carefully plug the controller (162) to the motherboard and fasten it using the six combination screws (200).
- Connect LAN cable (349) and cable LVO-LPC (380) to the controller (162).
- Mount the motherboard unit to the instrument and screw in three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side of the instrument.
- Connect cable DVI board (370) to controller (162).
- Connect both W3 cables (360), the power supply cable (332), the fan cable and the relais cable (FSL18) to the motherboard.
- Connect the RJ45 LAN cable (349) to the rear panel coupler (340) and the controller (162).
- Mount the cover (232) to the bottom of the instrument. Screw in the nine combination screws (240) at the bottom of the instrument, three combination screws (240) at the left-hand side and two combination screws (240) at the right-hand side.
- Mount the battery adapter (120) with two combination screws (130).
- Remount all hardware options into the instrument.
- Connect data cable W4 (410) to the motherboard and secure it using two cable holders (415).
- Plug the frontend board into the instrument and reconnect data cable W4 (410) to the board.
- Mount the locking plate (420) with one screw (430).
- Connect ribbon cable (380) to LVO Displayconnector (940) at front panel.

- Replace the front panel and affix the cables to front connector (870), flexible switchboard (730) and display connector (940).
- Screw in four screws (560) at both sides of the front panel.
- Connect RF cable W1 (510, FSL3/6) or RF cable W1 (512, FSL18) and RF cable W2 (530, only models with tracking generator) at frontend (400, 401) or DC Block (590).
- Screw the two front-panel feet (620, 630) (designation: BW2-shock mount.front).

Note: *Foot (620) is only for the left-hand side, and foot (630) is only for the right-hand side of the instrument.*

- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).

Putting into Operation

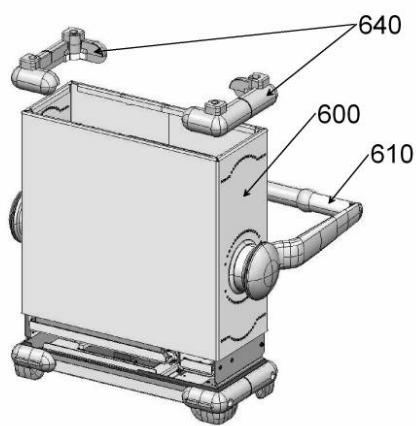
- Connect the instrument to the mains and switch on the instrument power switch. The instrument is now in standby mode.
- No cold boot after replacing the motherboard!
- Switch on the instrument with the ON/STANDBY key.
- A backup of the EEPROM files must be made with the aid of a service function.
 - [SETUP : MORE : SERVICE : ENTER PASSWORD : 20122004 ENTER]
 - [SETUP : MORE : SERVICE : SERVICE FUNCTION : 10.0.3 ENTER]
- After starting the instrument, check hardware info:
 - [SETUP : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Battery Adapter Board

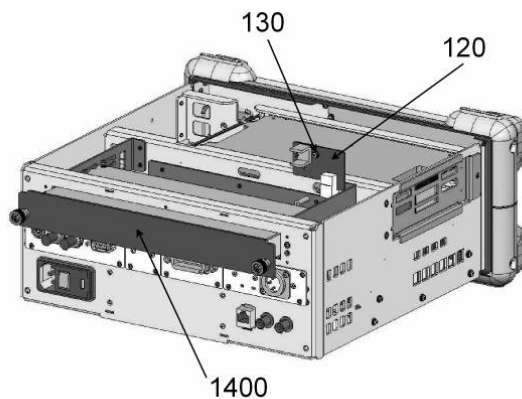
(See chapter 5, spare parts list, item 120, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Battery Adapter

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Unscrew two thumbscrews and remove the battery pack option (1400) to the rear of the instrument.
- Unscrew the two combination screws (130) and remove the battery adapter (120) to the top of the instrument.



Installing the New Battery Adapter and Completing the Instrument

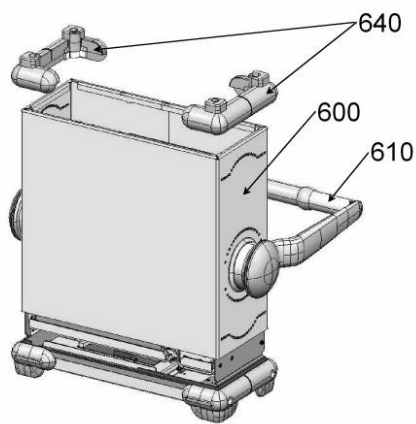
- Mount the new battery adapter (120) with two combination screws (130).
- Mount the battery pack option back into the instrument.
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.

Replacing the Relais Unit A101 (FSL18)

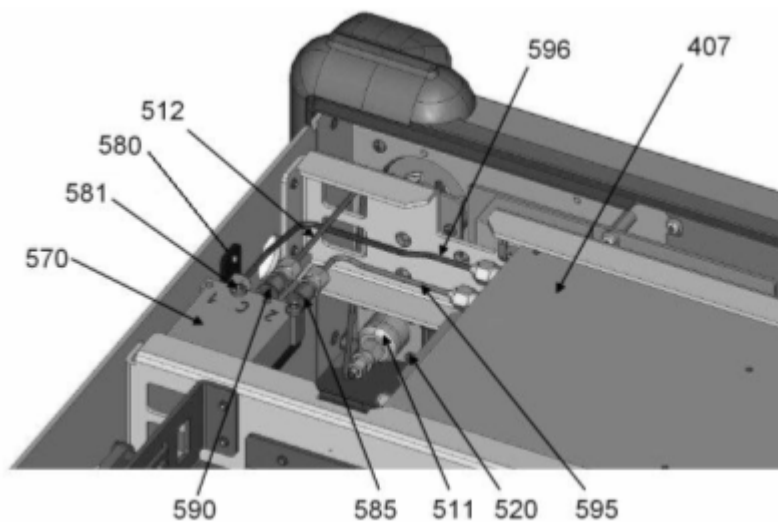
(See chapter 5, spare parts list, item 570, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Relais Unit

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Remove Attenuator (585), DC Block (590) and RF cable W13 (596) at relais unit (570).
- Disconnect cable relais unit at motherboard (112) X113.
- Unscrew two screws (581) and remove relais unit (570).



Installing the New Relais Unit and Completing the Instrument

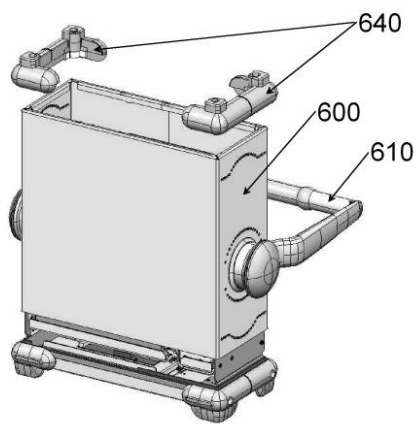
- Mount the new relais unit (570) and screw in the two combination screws (581).
- Connect cable relais unit to motherboard (112) X113.
- Mount Attenuator (585), DC Block (590) and RF cable W13 (596) to relais unit (570).
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Perform a frequency response correction using the correction software.
- Calibrate the instrument as described in chapter 1.

Replacing the Attenuator A102 (FSL18)

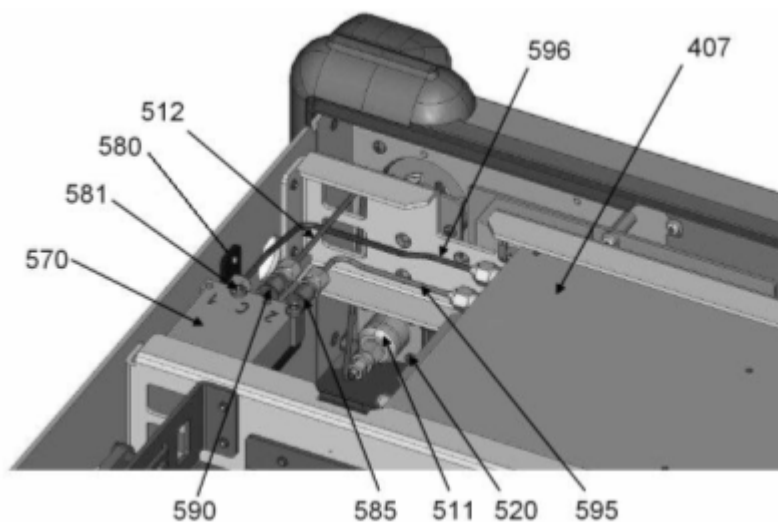
(See chapter 5, spare parts list, item 585, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Attenuator

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Remove RF cable W12 (595) at attenuator (585).
- Unscrew and remove attenuator (585).



Installing the New Attenuator and Completing the Instrument

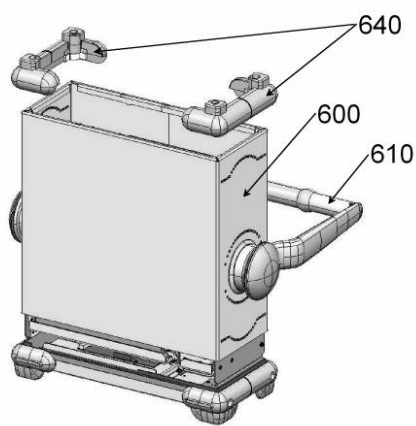
- Mount the new attenuator (585) to relais unit (570).
- Connect RF cable W12 (595) to attenuator (585).
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [SETUP : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [SETUP : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Perform a frequency response correction using the correction software.
- Calibrate the instrument as described in chapter 1.

Replacing the DC Block A103 (FSL18)

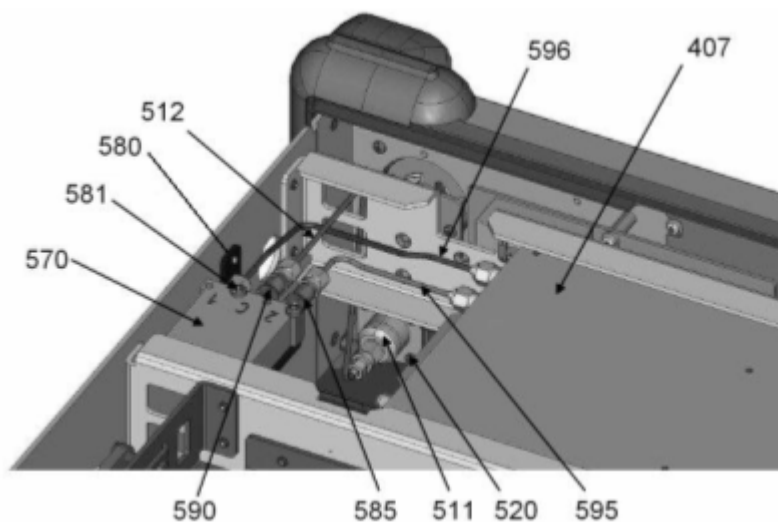
(See chapter 5, spare parts list, item 590, and explosion drawings 1300.2525.01 sheet 1, 2, 4)

Opening the Instrument and Removing the Attenuator

- Switch off the instrument and disconnect the power plug.
- Unscrew and remove the two rear-panel feet (640) (designation: BW2-shock mount.rear).
- Push the enclosure (600) with handle (610) backwards and remove it.



- Remove RF cable W1 (512) at DC block (590).
- Unscrew and remove DC block (590).



Installing the New DC Block and Completing the Instrument

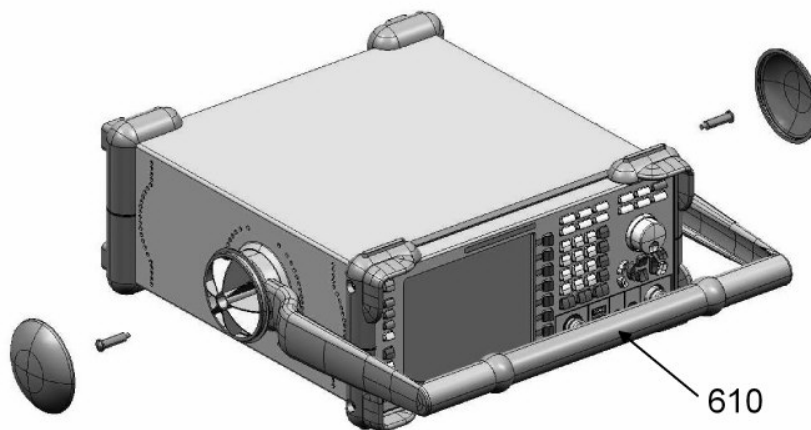
- Mount the new DC block (590) to relais unit (570).
- Connect RF cable W1 (512) to DC block (590).
- Replace the enclosure (600) with handle (610) and push it back to the instrument.
- Mount and screw in the two rear-panel feet (640).
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]
- Perform a frequency response correction using the correction software.
- Calibrate the instrument as described in chapter 1.

Replacing the Swivel Handle

(See chapter 5, spare parts list, item 610, and explosion drawings 1300.2525.01 sheet 4)

Removing the Handle

- Switch off the instrument and disconnect the power plug.
- Remove the blue cover on both sides.
- Unscrew and remove the swivel handle (610).



Installing the New Handle

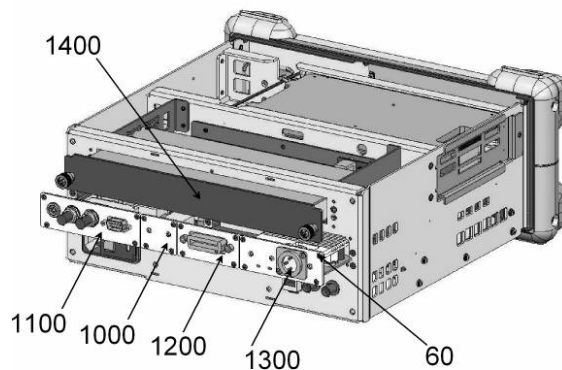
- Remove the blue cover on both sides of the new handle.
- Mount and screw the handle (610) to the instrument.
- Mount both blue covers.

Replacing the OCXO Board (Option R&S FSL-B4)

(See chapter 5, spare parts list, item 1000, and explosion drawings 1300.2502.01)

Removing the OCXO Board

- Switch off the instrument and disconnect the power plug.
- Unscrew four screws (60) and remove the OCXO board (1000) to the rear of the instrument.



Installing the New OCXO Board and Completing the Instrument

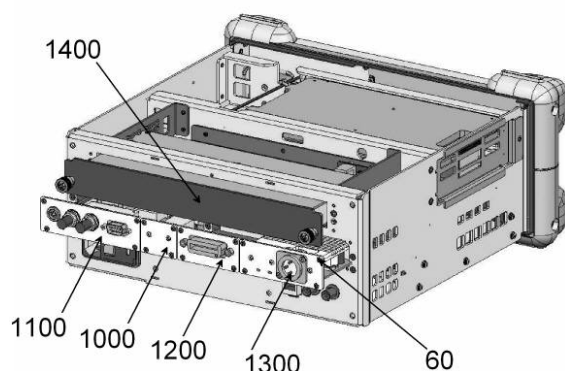
- Mount the new OCXO board (1000) with four screws (60) to the rear of the instrument.
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- After starting the instrument, check whether the option is listed in table hardware info:
 - [**SETUP** : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Additional Interface (Option R&S FSL-B5)

(See chapter 5, spare parts list, item 1100, and explosion drawings 1300.2502.01)

Removing the Additional Interface

- Switch off the instrument and disconnect the power plug.
- Unscrew four screws (60) and remove the additional interface (1100) to the rear of the instrument.



Installing the New Additional Interface and Completing the Instrument

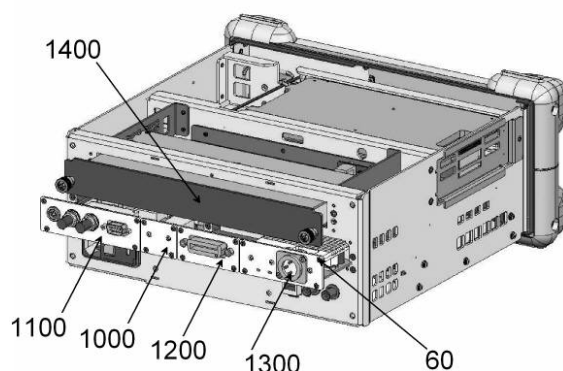
- Mount the new additional interface (1100) with four screws (60) to the rear of the instrument.
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- After starting the instrument, check whether the option is listed in table hardware info:
 - [**SETUP** : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the IEC/IEEE Bus Board (Option R&S FSL-B10)

(See chapter 5, spare parts list, item 1200, and explosion drawings 1300.2502.01)

Removing the IEC/IEEE Bus Board

- Switch off the instrument and disconnect the power plug.
- Unscrew four screws (60) and remove the IEC/IEEE bus board (1200) to the rear of the instrument.



Installing the New IEC/IEEE Bus Board and Completing the Instrument

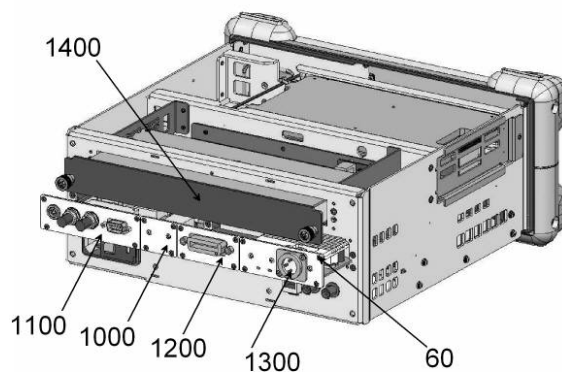
- Mount the new IEC/IEEE bus board (1200) with four screws (60) to the rear of the instrument.
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- This option is not listed in the table hardware info.
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the DC Power Supply (Option R&S FSL-B30)

(See chapter 5, spare parts list, item 1300, and explosion drawings 1300.2502.01)

Removing the DC Power Supply

- Switch off the instrument and disconnect the power plug.
- Unscrew four screws (60) and remove the DC power supply (1300) to the rear of the instrument.



Installing the New DC Power Supply and Completing the Instrument

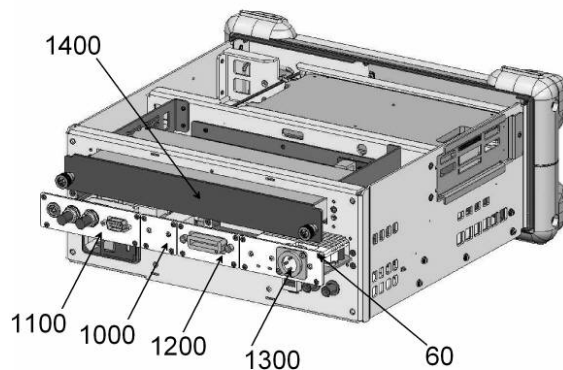
- Mount the new DC power supply (1300) with four screws (60) to the rear of the instrument.
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- After starting the instrument, check whether the option is listed in table hardware info:
 - [**SETUP** : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Replacing the Battery Pack (Option R&S FSL-B31)

(See chapter 5, spare parts list, item 1400, and explosion drawings 1300.2502.01)

Removing the Battery Pack

- Switch off the instrument and disconnect the power plug.
- Unscrew two thumbscrews and remove the battery pack (1400) to the rear of the instrument.



Installing the New Battery Pack and Completing the Instrument

- Mount the new battery pack (1400) with two thumbscrews to the rear of the instrument.
- Connect the instrument to the mains, switch on the instrument power switch and switch on the instrument with the ON/STANDBY key.
- After starting the instrument, check whether the option is listed in table hardware info:
 - [**SETUP** : MORE : SYSTEM INFO : HARDWARE INFO]
- Start selftest and check results:
 - [**SETUP** : MORE : SERVICE : SELFTEST], then [SELFTEST RESULTS]
- Start alignment and check the result:
 - [**SETUP** : ALIGNMENT : SELF ALIGNMENT], then [SHOW ALIGN RESULTS]

Troubleshooting

Malfunctions may have simple causes but also may be caused by faulty components.

These troubleshooting instructions enable you to locate error causes down to board level and make the instrument ready for use again by means of board replacement.

We recommend that the instrument be shipped to our experts in the service centers (see address list) for module replacement and further error elimination.

CAUTION



Shock hazard

Disconnect boards from the AC supply before you plug or unplug them!
Be careful not to cause short-circuits when measuring voltages!

The following utilities are provided in the R&S FSL for diagnostic purposes:

- Permanent monitoring of levels and frequencies in the instrument
- Self test
- System error correction

Note: When problems occur, first check whether any connections (cables, plug-in connections of boards etc) are damaged or wrongly connected.

Measuring Equipment and Accessories

Item	Type of equipment	Specifications recommended	Equipment recommended	R&S-Order No.	Use
1	DC meter		R&S URE	0350.5315.02	Troubleshooting
2	Spectrum Analyzer	Frequency Range 10 MHz to 11 GHz	FSL18	1300.2502.18	Test of Tracking Generator in FSL18

Troubleshooting Start-up Problems

Error: R&S FSL cannot be switched on.

- Check power-on switch at the rear.
If the power switch is OFF: Switch on power supply.
- Measure voltages on the power supply connector, if the power supply starts, but the screen remains dark:

Pin 1	rated value: +12 V
Pin 2	rated value: +5.2 V
Pin 3	rated value: +5.2 V
Pin 4	rated value: GND
Pin 5	rated value: GND
Pin 6	rated value: -12 V

Error: Fan does not work.

- Check voltage at connector:
X35 pins 1+ 3 : rated value 6 V to 12 V
 - voltage o.k.: fan is defective
 - voltage too low: fan is blocked or power consumption too high

Error: TG Level out of specification (FSL18 only)

- Before you exchange the tracking generator module make shure that the signals coming from the frontend module have the right frequency and level :
 - LO1 at X304 (5.75 to 10.75 GHz for fe = 0 to 20 GHz , level 0 to +5 dBm)
 - LO2 at X301 (3.16 GHz to 3.17 GHz level , -8 to -5 dBm)
 - LO3 at X305 (790 MHz or 792.5 MHz -5 to 0 dBm)

Troubleshooting Problems with Boot Process

Error: R&S FSL does not start the measurement application.

Following switch-on, the R&S FSL first boots the computer BIOS. After successful initialization of the computer, the Windows XP operating system starts up. Subsequently, the test application is loaded as start-up program. Simultaneously, self tests are performed at various locations and error messages, if any, are output. For troubleshooting, it is advisable to connect a keyboard to the keyboard socket.

➤ Start R&S FSL

Subsequent to switching on the R&S FSL, the following BIOS message is displayed:

```
Award Modular BIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2000, Award Software, Inc.
```

```
R&S ANALYZER BIOS V2.1-20-1
```

```
Main Processor      : Intel Celeron (R) 400 MHz
```

```
Memory Testing      :
```

The computer starts the hardware test and the message:

```
ESC to skip Memory test...
```

The test results are displayed on the screen. If errors occur during the boot procedure, these messages may indicate defects.

```
Award Modular BIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2000, Award Software, Inc.
```

```
R&S ANALYZER BIOS V1.1-20-1
```

```
Main Processor      : Intel Celeron (R) 400 MHz
```

```
Memory Testing      : 532240K OK + 1024K Shared Memory
```

```
01/17/03-i815E-LPC47B2-6A69REF2C-00
```

If no result of the memory test is indicated, the memory is defective.

The memory test issues the memory capacity of the controller. The basic version of the R&S FSL provides 512 Mbytes. Subsequently, BIOS starts the hardware check and displays all PC boards found.

This procedure may be interrupted using the ESC key on the connected external keyboard; any other key continues the boot process.

```
Award Modular BIOS v6.00PG, An Energy Star Ally
Copyright (C) 1984-2000, Award Software, Inc.
```

```
R&S ANALYZER BIOS V2.1-20-1
```

```
Main Processor      : Intel Celeron (R) 400 MHz (100x7.0)
```

```
Memory Testing      : 532240K OK + 1024K Shared Memory
```

```
Main Memory Clock is 100 MHz
```

```
Primary Master      : IBM-DJSA-205 JS10ABOA   (depending on the flash disk installed)
```

```
Primary Slave       : None
```

```
Secondary Master    : None
```

```
Secondary Slave     : None
```

```
01/17/03-i815E-LPC47B2-6A69REF2C-00
```

If this flash disk entry is missing, the flash disk may be faulty.

Then the SETUP is displayed.

This procedure may also be interrupted using the ESC key.

The contents partly depend on the hardware provided:

Award Software, Inc.
System Configurations

CPU Type	: Intel Pentium III	Base Memory	: 640K
CPU ID/ucode	: 068A/00	Extended	: 5201
CPU Clock	: 400 MHz	Memory	: 92K
		Cache	256K
		Memory	

Diskette Drive A	: 1.44M, 3.5 in.	Display Type	: EGA/VGA
Diskette Drive B	: None	Serial Port(s)	: 3F8
Pri. Master Disk	: LBA, ATA 66 , 5001MB	Parallel Port(s)	: 378
Pri. Slave Disk	: None	SDRAM at Row(s)	: 2 3
Sec. Master Disk	: None	Display Cache	: None
Sec. Slave Disk	: None	Size	

PCI device listing.....

Bus No.	Device No.	Funct No.	Vendor	/Device	Class	Device Class	IRQ
0	2	0	8086	1132	0300	Display Cntrlr	10
0	31	1	8086	244B	0101	DIE Cntrlr	14
0	31	2	8086	2442	0C03	Serial Bus Cntrlr	11
0	31	3	8086	2443	0C05	SMBus Cntrlr	NA
0	31	4	8086	2444	0C03	Serial Bus Cntrlr	9
1	8	0	8086	2449	0200	Network Cntrlr	11
1	13	0	162F	4013	FF00	Unknown PCI Device	11

Verifying DMI Pool Data Update Success

The PCI hardware test is displayed in the lower half of the screen. All modules found during the test are displayed with their names and PCI device IDs. The Device Class column lists the types of PCI devices. The motherboard of the R&S FSL is indicated as "Unknown PCI Device".

If the line "Unknown PCI Device" is missing, the motherboard was not identified and the measuring application cannot be started. If the remaining PCI devices have all been identified, the motherboard will probably contain the error and must be replaced.

After this test, the BIOS has been loaded and the operating system is started.

If the message "No System Disk or Disk error ..." is displayed at this point, the contents of the flash disk are not correct. Replace the flash disk.

If the operating system on the flash disk has been destroyed and cannot be loaded correctly, Windows XP reacts by displaying a "blue screen". This blue screen contains all essential information on the internal states of the computer. Windows XP and the instrument firmware must be updated. Contact the service to perform the update.

Subsequent to starting the operation system, the application for the R&S FSL is loaded in a start-up program. The program start is initiated automatically and generates a window that displays information on the start-up procedure.



If a "blue screen" is displayed during loading, a cold start may be necessary. Proceed as follows in such a case: Perform a cold boot (see "Performing a Cold Boot" section in this chapter) or a firmware update from the backup partition, if a cold boot does not succeed (for details refer to the user manual).

Contents - Chapter 4 "Software Update/Installing Options"

4 Software Update / Installing Options..... 4.1

 Installation of new R&S FSL Software4.1

 Installing the Options.....4.1

4 Software Update / Installing Options

This chapter contains information on updating software, restoring the operating-system installation and installing options to the R&S FSL. Additional manuals obtained together with a software/firmware update or with subsequently acquired options can be filed here.

Installation of new R&S FSL Software

For information on updating software refer to the release notes. The most recent version is provided on our Internet site at www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

Installing the Options

A list of all available hardware and software options is provided on our Internet site at www.rohde-schwarz.com. You can also follow the link on the CD supplied with the instrument.

The following hardware options are available with the R&S FSL:

OCXO Reference	R&S FSL-B4	1300.6008.02
DC Power Supply	R&S FSL-B30	1300.6308.02
Battery Pack	R&S FSL-B31	1300.6408.02
Additional Interfaces	R&S FSL-B5	1300.6108.02
GPIO interface	R&S FSL-B10	1300.6208.02
RF preamplifier 9 kHz to 3/6 GHz	R&S FSL-B22	1300.5953.02
Small resolution filters	R&S FSL-B7	1300.5601.02
Gated Sweep	R&S FSL-B8	1300.5701.02
TV Trigger	R&S FSL-B6	1300.5901.02

For retrofitting, please note the mounting instructions enclosed with the options.

WARNING



Shock hazard

Before opening the cabinet, ensure that the instrument is switched off and disconnected from the power supply by removing the plug from the AC and DC power connector.

Read all safety instructions at the beginning of this manual carefully!

NOTICE**Risk of damage to the instrument**

Protect the operational site against electrostatic discharge to avoid damage to electronic components of the modules. For details refer to the safety instructions at the beginning of this manual.

When installing hardware options, note the following:

- Switch off instrument and disconnect the power supply cables.
- Unscrew that part of the rear-panel where the option has to be inserted.
- Plug in the option and fix it using the screws you had previously removed.
- Switch on the R&S FSL.
- Install additional software, if supplied, according to the instructions enclosed with the option.
- If an adjustment is required for this option, the appropriate hints are to be found in the installation instructions for the option.

Contents - Chapter 5 "Documents"

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Table 5-2 List of all R&S FSL part and spare parts.....5.3

5 Documents

This chapter contains the spare parts list and the documents for the complete R&S FSL unit. For general information about spare parts for our products please refer to the sheet "Procedure in Case of Service and Ordering of Spare Parts" at the beginning of this manual

Spare Parts

The stock numbers necessary for ordering replacement parts and modules can be found in the component lists further down.

NOTICE

Risk of mechanical damage to the instrument.

When replacing a module, follow the safety instructions at the beginning of this service manual and the repair instructions given in chapter 3.

When shipping a module, be careful to provide for sufficient mechanical and antistatical protection

Available Power Cables

Table 5-1 List of power cables available

Stock No.	Earthed-contact connector	Preferably used in
DS 0006.7013.00	BS1363: 1967' 10 A 250 V complying with IEC 83: 1975 standard B2	Great Britain
DS 0006.7020.00	Type 12 , 10 A 250 V complying with SEV-regulation 1011.1059, standard sheet S 24 507	Switzerland
DS 0006.7036.00	Type 498/13 10 A 250 V complying with US-regulation UL 498, or with IEC 83	USA/Canada
DS 0041.4752.00	GB2099 , GB1002 10 A 250 V approvals CCC	China
DS 0041.6232.00	JIS C 8303 7A 125V AC approvals PSE (JET)	Japan
DS 0006.7107.00	Type SAA3 10 A, 250 V, complying with AS C112-1964 Ap.	Australia
DS 0025.2365.00	DIN 49 441, 10 A, 250 V, straight approvals VDE,ÖVE,CEBEC,KEMA,S,D,N,FI,LCIE,IMQ,UCIEE	Europe (except Switzerland)
DS 0086.4400.00	DIN 49 441, 10 A, 250 V, angular approvals VDE,ÖVE,CEBEC,KEMA,S,D,N,FI,LCIE,IMQ,UCIEE	



Spare Parts List

Mechanical Drawings

List of R&S FSL parts including spare parts

The R&S FSL is constructed in accordance with R&S design 2000.

Overall dimension: W x H x L, 408.8 x 158.1 x 465.3

Overall dimension
without handle: W x H x L, 342.3 x 158.1 x 367.0

Rack mount: 3E 3/4 T350

Accessories: 19" Adapter ZZA-S334, Stock No. 1109.4487.00

Note: The recommended spare parts are marked with an x in the last column.

Table 5-2 List of all R&S FSL part and spare parts

Position	Designation	Stock No.	Number	Electrical designation	Recommended spare parts
Drawing 1300.2502.01 (R&S FSL Spectrum Analyzer)					
10	BASIC UNIT R&S FSL (without Tracking)	1300.2525.02	1 S		
20	BASIC UNIT R&S FSL (with Tracking)	1300.2525.03	1 S		
27	BASIC UNIT R&S FSL18 (without Tracking)	1300.2525.06	1 S		
28	BASIC UNIT R&S FSL18 (with Tracking)	1300.2525.07	1 S		
30	LABEL FSL3	1300.4328.00	1 S		
40	LABEL FSL6	1300.4434.00	1 S		
45	LABEL FSL18	1300.4811.00	1 S		
50	REAR PANEL FOR BATTERY	1300.2860.00	1 S		
52	REAR PANEL FOR ADD. INTERFACE	1300.2977.00	1 S		
54	REAR PANEL FOR OCXO	1300.2983.00	1 S		
56	REAR PANEL FOR IEC-BUS	1300.2990.00	1 S		
58	REAR PANEL FOR DC-POWER	1300.2825.00	1 S		
60	SCREW DIN965-M2.5x6-A4-PA	1148.3288.00	22 S		
61	SCREW DIN965-M2.5x6-A4-PA	1148.3288.00	18 S		
1000	OCXO (R&S FSL-B4)	1300.3180.02	1 S	A61	X
1100	ADDITIONAL INTERFACE (R&S FSL-B5)	1300.3209.02	1 S	A60	X

List of R&S FSL parts including spare parts

R&S FSL

Position	Designation	Stock No.	Number	Electrical designation	Recommended spare parts
1200	IEC-BUS (R&S FSL-B10)	1300.3167.02	1 S	A62	X
1300	DC SUPPLY (R&S FSL-B30)	1300.3238.02	1 S	A63	X
1330	CONNECTOR 3 PINS (R&S FSL-B30)	0520.5048.00	1 S		X
1400	BATTERY PACK (R&S FSL-B31)	1300.6420.00	1 S	A64	X
Drawing 1300.2525.01 sheet 1, sheet 2, sheet 4 (Basic Unit R&S FSL)					
101	FRAME R&S FSL WITH DVI	1303.6896.00	1 S		
105	FAN 80X80X25	1300.2790.00	1 S	E1	X
112	MOTHERBOARD-UDC	2112.1800.02	1 S	A10	X
120	BATTERY ADAPTER	1300.3109.02	1 S	A11	X
130	COMBINATION SCREW M2.5x6-A2	1148.3059.00	2 S		
142	LPC SHIELDING BOX / UDC-MB	1303.6880.00	1 S		
150	COMBINATION SCREW M2.5x6-A2	1148.3059.00	18 S		
162	CONTROLLER LPC 8/3	1091.0534.00	1 S	A90	X
169	LITHIUM BATTERY	0858.2049.00	1 S	G1	X
172	FLASH CARD R&S FSL WITH SOFTWARE (LPC8)	1300.4928.02	1 S	A50	X
190	SPACER M2.5X18	1300.4705.00	3 S		
200	COMBINATION SCREW M2.5x6-A2	1148.3059.00	9 S		
210	CABLE 10P AWG26	1300.4463.00	1 S	W6	
232	LPC/DVI COVER	1303.6909.00	1 S		
240	COMBINATION SCREW M2.5x6-A2	1148.3059.00	14 S		
250	POWER SUPPLY	1300.4134.00	1 S	A20	X
260	HOLDER POWER SUPPLY	1300.2625.00	1 S		
265	LABEL (FLASH)	0042.5169.00	1 S		
270	COMBINATION SCREW M2.5x6-A2	1148.3059.00	4 S		
280	SCREW DIN965/ISR-M2.5x6-A4-PA	1148.3288.00	4 S		
289	POWER ENTRY FILTERED	2100.3610.00	1 S	A21	X
291	FUSE	0099.6729.00	2 S		
300	GROUND WIRE 1	1300.2731.00	1 S	W11	
310	GROUND WIRE 2	1300.2748.00	1 S	W17	

Position	Designation	Stock No.	Number	Electrical designation	Recommended spare parts
321	POWER CABLE	1300.3873.00	1 S		
325	CABLE TIE	0015.9038.00	1 S		
332	POWER SUPPLY CABLE 12 PINS	1300.3773.00	1 S		
340	RJ45 COUPLER JACK STRAIGHT	1093.9122.00	1 S	X91	X
342	SILICONE CORD RD 4X8MM	1130.0164.00	1 S		
349	PATCHCABLE CAT 6 0.5M	0041.9283.00	1 S	W8	
351	CABLE HOLDER	1130.0941.00	3 S		
360	CABLE W3	1300.2777.00	2 S	W3 / W5	X
370	DVI BOARD	1303.7070.02	1 S	A95	X
375	LOCKING SCREW	1093.9180.00	2 S		
380	DISPLAYCABLE LVO-LPC	1303.6915.00	1 S	W41	
385	HOLDER	0254.2055.00	2 S		
400	FRONTEND (WITHOUT TRACKING)	1300.3609.05	1 S	A100	X
401	FRONTEND (WITH TRACKING GEN.)	1300.3609.06	1 S	A100	X
407	FRONTEND 18 GHZ	1300.3667.02	1 S	A100	X
408	FRONTEND 20 GHZ	1300.3667.06	1 S	A100	X
410	DATA CABLE W4	1300.2783.00	1 S		
415	FLAT CABLE HOLDER	0627.2116.00	2 S		
419	PROTECTION CAP	1066.2095.00	2 S		
420	LOCKING PLATE	1300.2654.00	1 S		
430	SCREW DIN965/ISR-M2.5x6-A4-PA	1148.3288.00	1 S		
445	TG 20 GHZ	1300.3709.02	1 S	A200	X
450	DATA CABLE W10	1303.6667.00	1 S	W10	
501	FRONT PANEL R&S FSL	1300.2531.04	1 S		
510	RF CABLE W1	1300.2754.00	1 S	W1	X
511	ADAPTOR N / SMA	0343.0257.00	1 S	X1	X
512	RF CABLE W1	1300.3915.00	1 S	W1	
520	DIE-CAST SCREW 2.5x6	1300.4457.00	4 S		
530	RF CABLE W2	1300.2760.00	1 S	W2	X

List of R&S FSL parts including spare parts

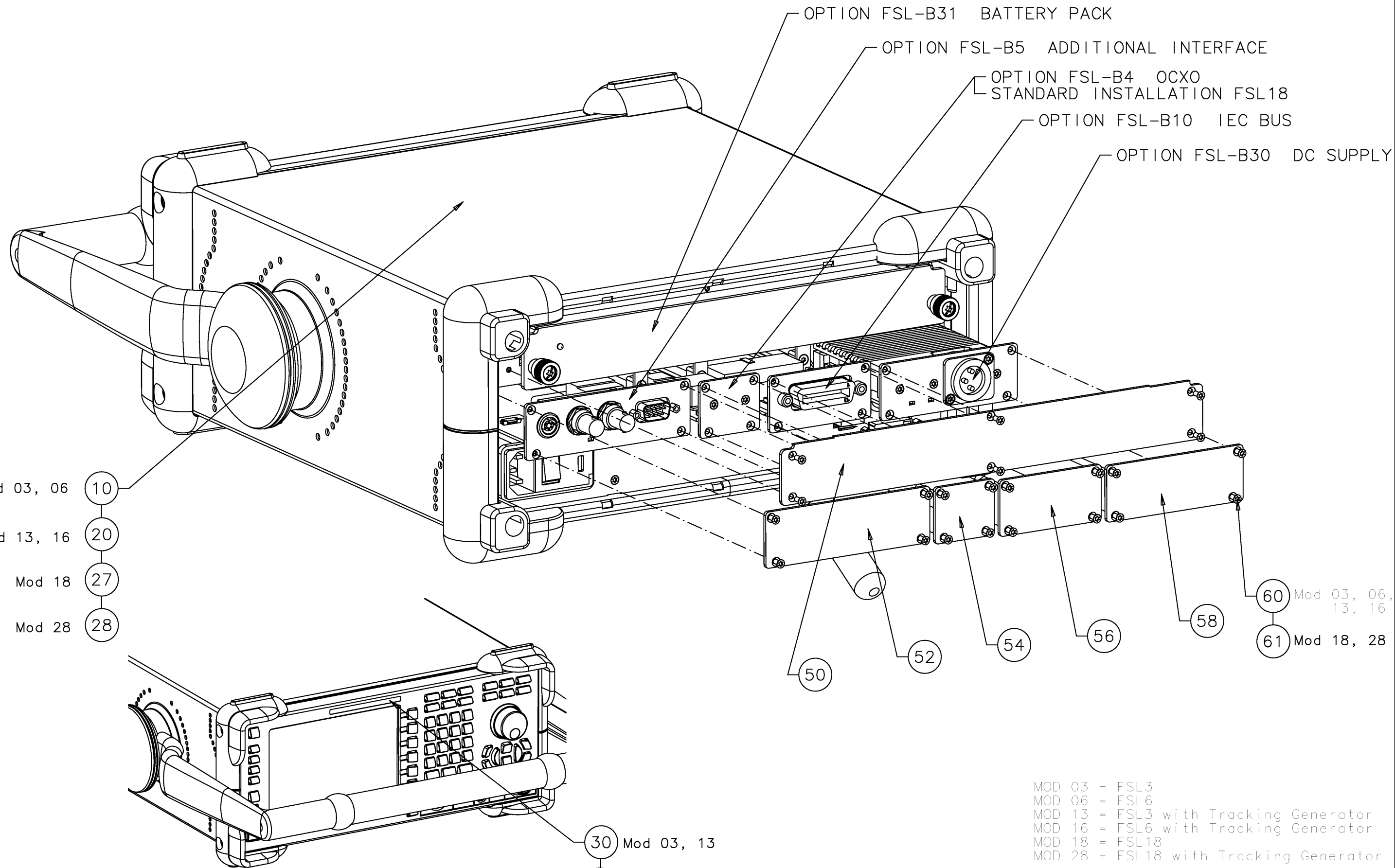
R&S FSL

Position	Designation	Stock No.	Number	Electrical designation	Recommended spare parts
535	ADAPTOR N / SMA	0343.0257.00	1 S	X2	X
536	RF CABLE W2	1303.7192.00	1 S	W2	
540	DIE-CAST SCREW 2.5x6	1300.4457.00	4 S		
545	RF CABLE W18	1303.7205.00	1 S	W18	
546	RF CABLE W19	1303.7211.00	1 S	W19	
547	RF CABLE W20	1303.7228.00	1 S	W20	
550	COVER RD17.4	1300.4440.00	1 S		
560	SCREW DIN965/ISR-M2.5x6-A4-PA	1148.3288.00	4 S		
570	RELAIS UNIT	1305.2117.00	1 S	A101	X
575	RELAIS HOLDER	1300.4886.00	1 S		
580	COMBINATION SCREW M2.5x6-A2	1148.3059.00	2 S		
581	SCREW DIN7985/ISR-M3X16-A4-PA	1148.2898.00	2 S		
585	ATTENUATOR	2028.9363.00	1 S	A102	X
590	DC BLOCK	3584.5825.00	1 S	A103	X
595	RF CABLE W12	1300.3921.00	1 S	W12	
596	RF CABLE W13	1300.3938.00	1 S	W13	
600	BW2-TUBE 3E3/4T350 R&S FSL	1300.2677.00	1 S		
610	BW2-SWIVEL HANDLE 3/4	1096.6501.00	1 S		X
620	BW2-SHOCK MOUNT. FR. LEFT 3HU	1096.6430.00	1 S		X
630	BW2-SHOCK MOUNT. FR. RIGHT 3HU	1096.6447.00	1 S		X
640	BW2-SHOCK MOUNT. REAR 3HU	1096.6460.00	2 S		X
660	OCXO	1300.3180.02	1 S	A61	X
665	SCREW DIN965-M2.5x6-A4-PA	1148.3288.00	4 S		
Drawing 1300.2531.01 (FRONT PANEL)					
701	FRONT COVER R&S FSL2	1300.4905.00	1 S		
705	SEALING 2.0 SI	0396.1035.00	0,88 M		
710	SCREENED FILTER GLASS	1300.4311.00	1 S		X
720	PUSH-BUTTON BOARD SET	1300.4086.00	1 S	A11	X
730	FLEXIBLE SWITCHBOARD	1300.4092.00	1 S	A12	X

Position	Designation	Stock No.	Number	Electrical designation	Recommended spare parts
741	KEYBOARD PANEL	1300.3780.00	1 S		
750	DIE-CAST SCREW 2.5x6	1300.4457.00	9 S		
755	POWDER SEAL	1300.3321.00	1 S		
760	TFT DISPLAY 640x3x480 6.5INCH	0041.6932.00	1 S	A40	X
770	COMBINATION SCREW M2.5x6-A2	1148.3059.00	4 S		
830	ENCODER BOARD	1300.3044.02	1 S	A30	X
840	DIE-CAST SCREW 2.5x6	1300.4457.00	2 S		
850	FLEX-STRIP.10P. R=0.5	1300.4470.00	1 S		
855	COLLAR	0852.1105.00	1 S		
860	KNOB	0852.1086.00	1 S		
870	FRONT CONNECTOR	1300.3838.02	1 S	A20	X
880	DIE-CAST SCREW 2.5x6	1300.4457.00	3 S		
890	SHROUD 9.6X13.9	0852.1234.00	1 S		
900	SPRING STRIP	1300.3438.00	2 S		
920	COMBINATION SCREW M2.5x6-A2	1148.3059.00	3 S		
930	RIBBON CABLE W41	1300.3796.00	1 S	W41	
940	LVO DISPLAYCONNECTOR OPTREX	1303.7063.00	1 S	A41	X
960	ABSORBER GLASS PLATE	1300.4992.00	4 S		

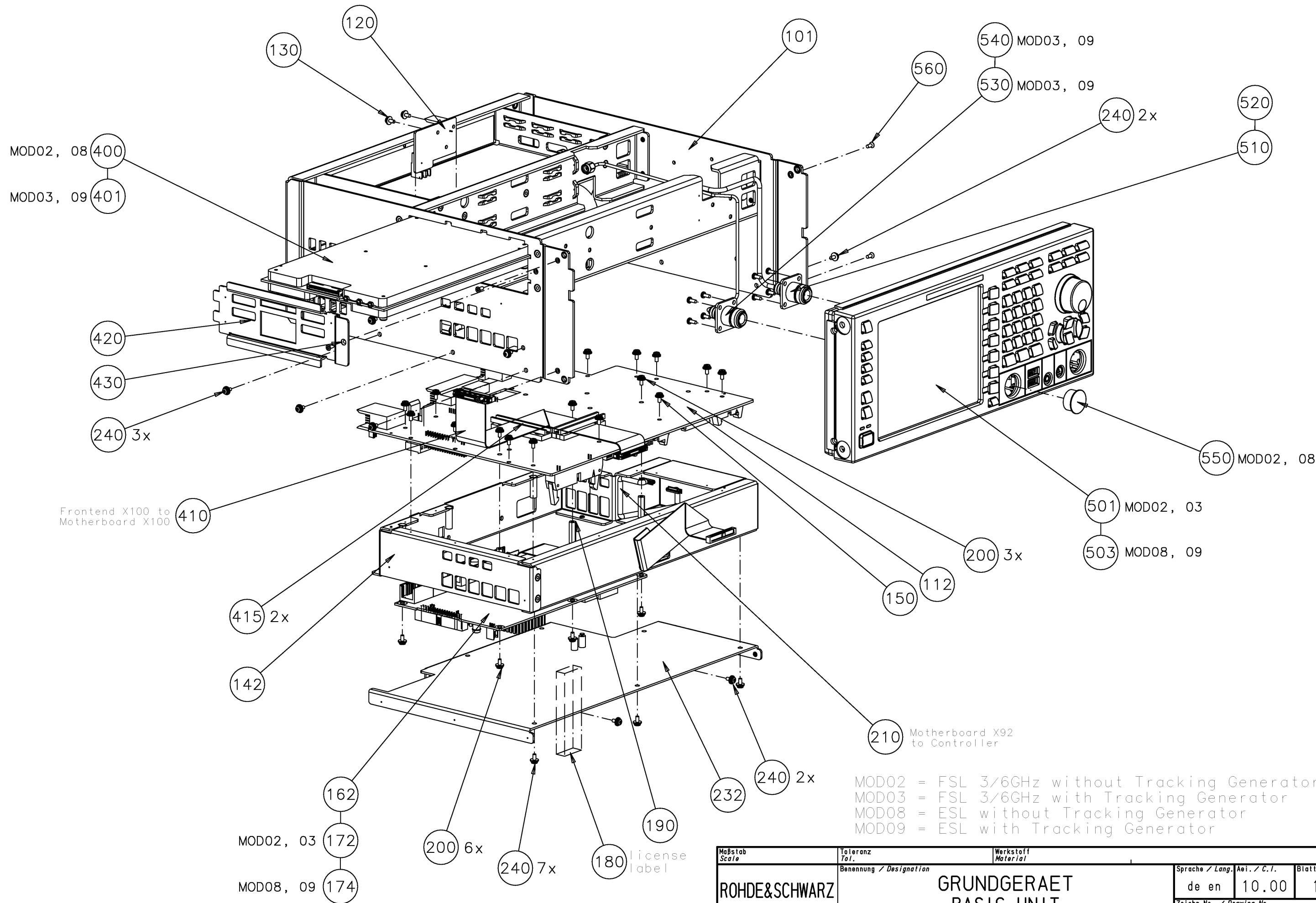
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Projektions-
methode
Projection
Method



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Projektions-
methode
Projection
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang.	Äsl. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	GRUNDGERÄT BASIC UNIT	de en	10.00	1
Datum Date	2008-06-05	Abteilung Dept.	1ESK	Name Name	Wn
			Zeichn.Nr. / Drawing No.		
			1300.2525.01 D		

Maßstab Scale	Toleranz Tol.	Werkstoff Material			Sprache / Lang.			Äst. / C.I.		Blatt / Sh.	
ROHDE&SCHWARZ	Benennung / Designation GRUNDGERAET BASIC UNIT				de en			14.00		2	
					Zeichn.Nr. / Drawing No. 1300.2525.01					D	
FSL	Datum Date	2008-11-13	Abteilung Dept.	1ESK	Name Name	Wn/VL					

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Projektions-
methode
Projection
Method

bottom view

pinch off
rubber stubs (4x)
Gummistifte
abzwicken (4x)

detail wiring power supply

blue or black

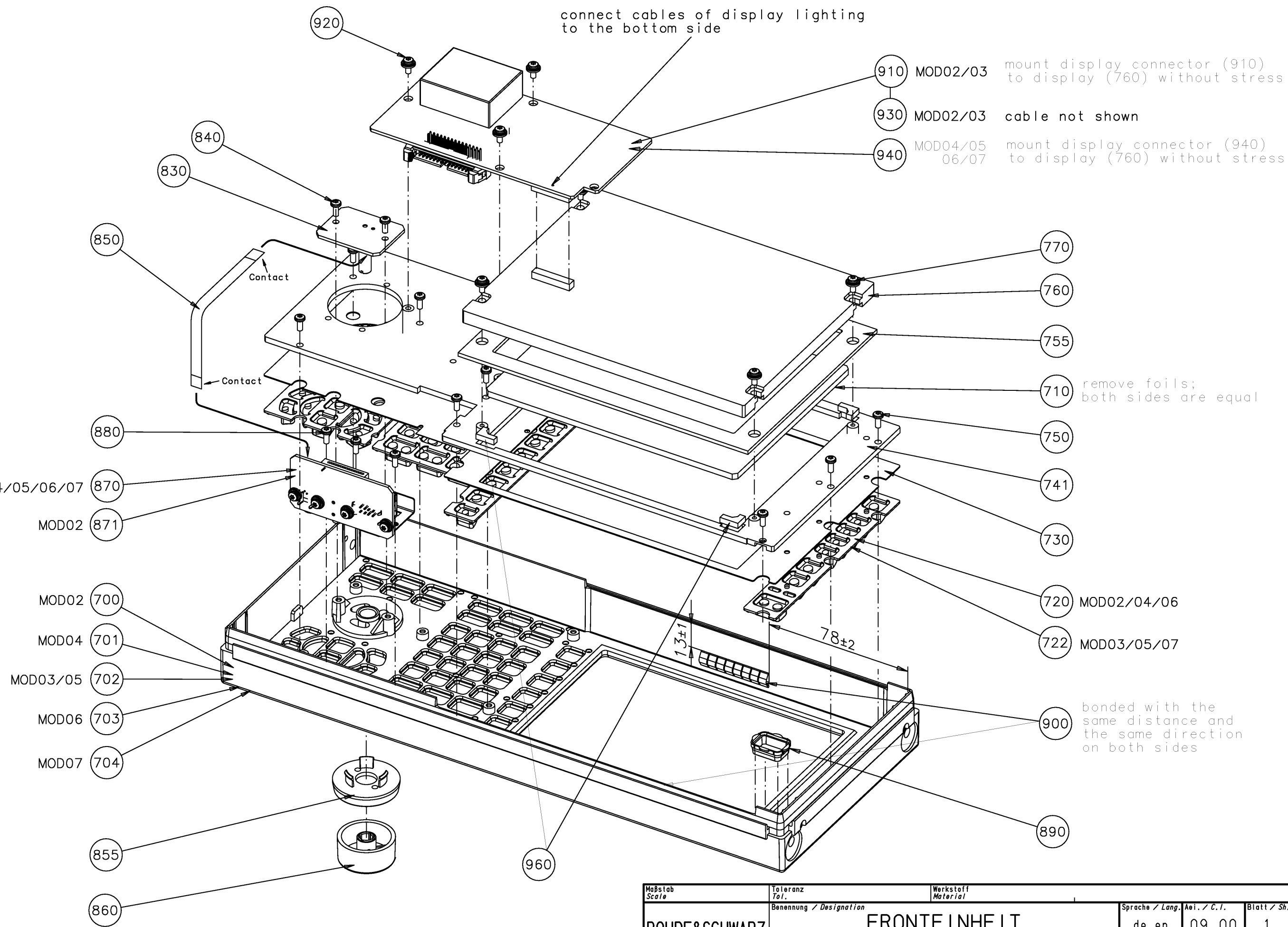
Motherboard X67

Frame

Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang. de en	Äst. / C.I. 02.00	Blatt / Sh. 4
ROHDE&SCHWARZ	Benennung / Designation GRUNDGERAET BASIC UNIT	Datum Date 2008-11-13	Abteilung Dept. 1ESK	Name Name Wn/VL	Zeichn.Nr. / Drawing No. 1300.2525.01
					D

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Projektions-
methode
Projection
Method



Maßstab Scale	Toleranz Tol.	Werkstoff Material	Sprache / Lang.	Äst. / C.I.	Blatt / Sh.
ROHDE&SCHWARZ	Benennung / Designation	FRONTEINHEIT FRONT PANEL	de en	09.00	1
Datum Date	2008-06-04	Abteilung Dept.	1ESK	Name Name	TF
			Zeichn.Nr. / Drawing No.		
			1300.2531.01 D		

Block Circuit Diagram

[illegible]

Mod 03 = FSL3	Mod 18 = FSL18
Mod 06 = FSL6	Mod 28 = FSL18 with Tracking Generator
Mod 13 = FSL3 with Tracking Generator	
Mod 14 = FSL3-N	
Mod 16 = FSL6 with Tracking Generator	

Bindende Angaben ueber Varianten,
Trimmwerte, Bauteile und
nicht bestueckte Bauteile siehe ST.

For binding information on models,
trimming and components values and
nonfitted components see parts list



ACHTUNG: ESD!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.

ATTENTION: ESD!
Electrostatic sensitive devices require a special handling.

FSL

Designat.: FSL SPECTRUM ANALYZER

Name : Pfeil

1300.2502.01 S