

Meeting Tomorrow's Challenges

Test & Measurement Solutions
for Aerospace and Defense

75 Years of
Driving
Innovation


ROHDE & SCHWARZ

From multimode radar to the network-centric battlefield, mission success depends on the performance of electronic systems for detection, interception, encryption, dissemination, communication, and interdiction. These systems must all perform flawlessly, and tomorrow's challenges must be anticipated and met today.

Rohde&Schwarz plays an integral role in meeting the challenges tomorrow will bring. We're one of the world's leading innovators in electronic test & measurement, radiocommunications, and radiomonitoring and radiolocation. The scope and performance of our technologies is second to none.

Aerospace and defense programs rely on the unsurpassed performance and quality of Rohde&Schwarz solutions. Since we keep all manufacturing in-house, we can maintain the tight control on quality that only co-located engineering and manufacturing can provide. We also provide a unique level of support. With facilities in over 70 countries, comprehensive service, and the ability to serve any need including custom solutions and systems, we not only win on performance – we win on support too.

The force behind innovation

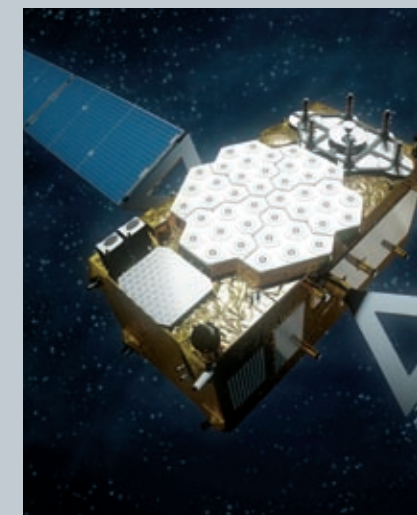
Rohde&Schwarz has been developing test & measurement solutions for 75 years, starting with our first frequency meter in 1933. We've been instrumental in moving the technological benchmark – with developments such as state-of-the art TOI performance and 120 MHz modulation bandwidth in our high performance spectrum analyzers.

True four-port 50 GHz network analysis, highly innovative signal generators with up to two signal paths in one instrument (including 2x2 MIMO realtime fading), power meters with smart sensor technology, the R&S®FSMR one-box test receiver, and the industry-leading new R&S®PR 100 handheld radiomonitoring receiver are further examples of pacesetting Rohde&Schwarz products.

For decades, Rohde&Schwarz solutions have been in use by military services and government agencies. Aerospace and defense contractors use our test & measurement solutions in cutting-edge R&D, production, and operational support programs alike. We work collaboratively with the aerospace and defense industry to bring focused solutions that meet our customers' exacting requirements. Our developments are integral parts of many of the most cutting-edge defense programs in the world today.

Confidence in Rohde&Schwarz solutions is underscored by the numerous direct government contracts won over the last decade. As an example, the U.S. Army awarded Rohde&Schwarz a 4000-unit contract for the R&S®SMB signal generator, which will replace their legacy analog signal generators.

Test & measurement technology is key to the proper functioning of electronic systems in all branches of the military





Designed for the job

We understand the specific needs of the aerospace and defense community, and design our solutions to meet these needs.

Instrument security

Aerospace and defense security requirements demand the ability to remove user data and instrument usage information. Many of our instruments offer removable data storage and memory clearing procedures to address these security issues. Easy-to-follow, clearly written application notes simplify compliance with recommended procedures.

Software-code compatibility

Software-code compatibility is another critical requirement for aerospace and defense ATE systems. Due to the costs and technical issues surrounding TPS modifications, legacy TPS programs demand that upgrade and replacement instrumentation be code-compatible. Rohde&Schwarz takes the issue of code compatibility seriously, and many of our instruments provide near drop-in replacement for key legacy instrumentation.

Longevity

From system development and demonstration to production and field-operational support, Rohde&Schwarz instrumentation is designed to meet the aerospace and defense industry's long program life cycles. Our modular

instruments allow users to add additional capabilities as required, and we regularly provide enhancements to keep our instruments at the forefront of technology.

Repair and calibration autonomy

We offer a wide range of service and support choices, from complete turnkey services to specialized "self-maintainer" programs. We work collaboratively with aerospace and defense metrology organizations to ensure that technical, business, and process requirements are met. Our calibration and adjustment tools give the aerospace and defense metrologist a large degree of autonomy.

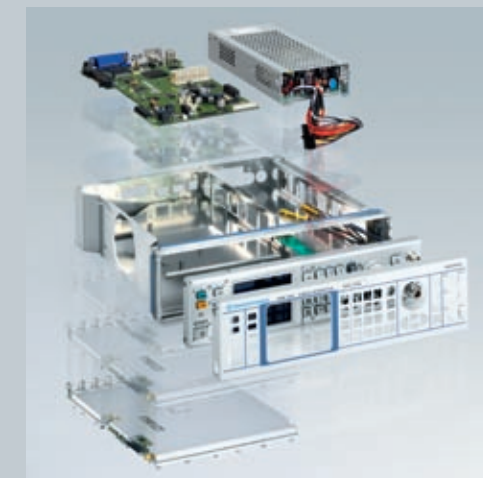
LXI solutions

Rohde&Schwarz products are designed to provide maximum functionality and flexibility together with a small form factor to satisfy emerging system test requirements. Conformant to LXI and supported by IVI drivers, they fit seamlessly together with other concepts, e.g. synthetic instruments, into framework standards required by next generation ATEs. We actively support the LXI Consortium and the move to open standards for modular instrument platforms. We joined the Consortium as a strategic member at an early stage in 2004, we chair the Conformance Working Group, and we are leading the effort to define the conformance process. Over 30 Rohde&Schwarz instruments are certified LXI-conformant, including spectrum analyzers, network analyzers, and signal generators.

Many Rohde&Schwarz instruments offer removable data media for the secure storage of settings and test data.

Code compatibility with important legacy instruments makes many Rohde&Schwarz spectrum analyzers and signal generators drop-in replacements for older instruments.

Instruments such as the R&S®SMB 100A consist of just a few modules for ease of service. Replacement modules come factory-adjusted, so instruments can be returned to use immediately after servicing. User calibration is also possible.



EMC expertise

In a high-energy environment, EMC is critical. Rohde&Schwarz is an established world leader in electro-magnetic compatibility testing, with deep expertise in all aspects of this exacting discipline.

We offer one-stop shopping for all EMC challenges:

- From emission (EMI) to immunity (EMS) and pulse tests
- From single test instruments and a complete range of accessories to turnkey solutions, including training on the job
- From detection of low-level emission up to test levels of several thousand volts per meter
- From 10 Hz to 40 GHz
- For all types of equipment, from electronic sub assemblies to complex systems
- For all major national and international EMC standards, e.g. MIL-STD-461F, VG 95373, GAM EG 13, DEF-STAN 59-411, and RTCA DO-160

The German military operates Europe's largest EMC test center using Rohde & Schwarz technology. The Tiger attack helicopter uses the R&S®M3AR radio.



Test system solutions

We develop and manufacture standard test systems as well as custom turnkey solutions. This includes entire EMC test centers complete with instruments, antenna systems, and software, as well as systems for testing LRUs and SRUs in R&D, production and maintenance. We also work with local integration partners to provide turnkey systems.

We offer the full range of development services:

- Test parameter and performance requirements
- Overall system design
- Project consulting and management
- System implementation and integration
- Installation and performance verification
- On-site system and software training
- Upgrades, optimization, and replacement of outdated equipment
- Solutions for innovative form factors, technologies, and standards

Our solutions combine leading-edge performance with expandability for tomorrow's innovations. Modular designs help maintain the value of your investment in our solutions, and our constant innovation ensures that you are always ahead of the technology curve.



Rohde & Schwarz systems are used to test the complete avionics suit of the Tornado fighter.



The R&S®TS 6030 system tests radio equipment down to the module level.

Test & measurement applications

As a recognized leader in test instrumentation, we provide focused solutions for the aerospace and defense industry – for radar, electronic warfare, communications, guidance, satellite testing, radiomonitoring and more. Our technology supports key applications that help assure leading-edge system performance.

Radar and electronic warfare

Surveillance, identification, targeting, control, intelligence gathering, and self-protection systems are becoming ever more complex and integrated. With the rapid advances across the entire spectrum of radar and electronic warfare technology, the capabilities of test & measurement systems must be continuously enhanced. Rohde & Schwarz solutions are at the leading edge of performance, capability, and ease of use – key requirements in meeting these demanding test challenges.

Our solutions include:

- ▮ Flexible signal generator solutions for creating complex pulsed signals even with modulation (such as chirps or barker sequences) or pulse trains with the option of setting variable pulse parameters
- ▮ High-performance signal analyzers with up to 120 MHz analysis bandwidth for measuring chirped FM, BPSK or custom digital modulation on continuous as well as pulsed signals
- ▮ Signal source analyzers which simplify test setups as they combine a phase noise test system with a high-performance spectrum analyzer in a single unit
- ▮ Network analyzers capable of high-resolution pulse profile measurements in a lean and straightforward test setup
- ▮ Signal generators with excellent phase noise performance. These instruments are the perfect choice when generating digitally modulated signals or stable LO signals in radar and EW hardware design and test applications

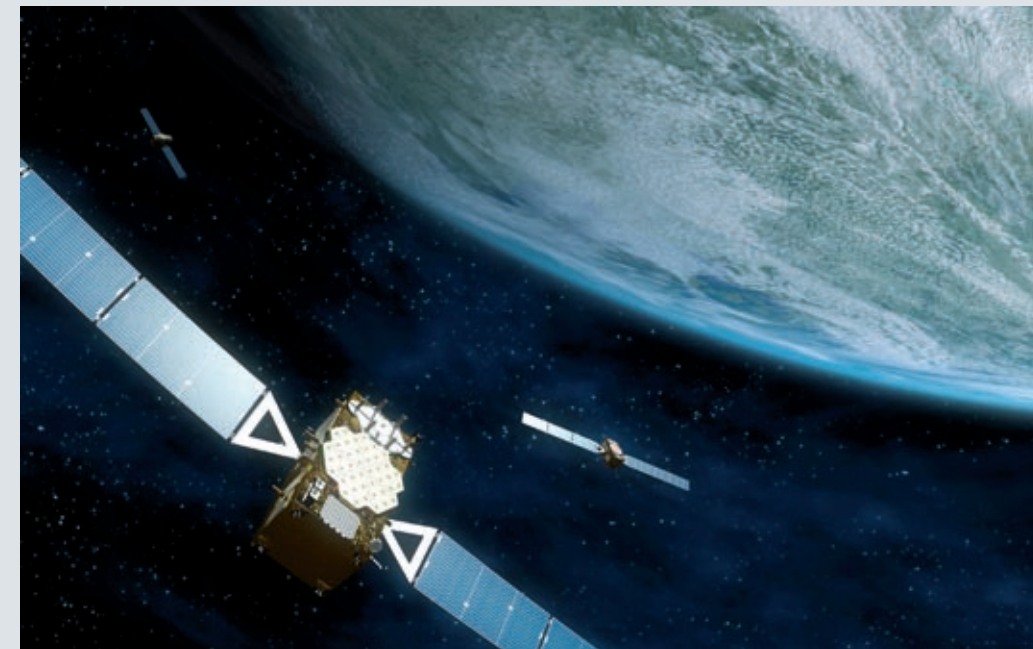


Navigation and guidance

Civil aviation and military operations alike depend on accurate distance, location, and direction measuring systems for public safety and military mission success. VOR, ILS, DME, and GPS electronic systems are just a few of the areas that require unique test & measurement capabilities. With demonstrated experience in this field, Rohde & Schwarz provides accurate, flexible, high-performance test solutions to cover every need, from design, development, and production to operational maintenance.

Our solutions include:

- ▮ The most complete signal generation solution for producing highly accurate test signals for VOR, ILS, and DME in R&D, calibration applications, or field use
- ▮ Vector signal generators that provide the accurate and repeatable signals essential for satellite navigation testing. They can generate dynamic signals for up to eight satellites, and are easy to configure for RF or localization testing of navigation receivers, even with real satellite condition data
- ▮ The R&S®FSMR measuring receiver handles the complete calibration of VOR/ILS generators or navigation testers
- ▮ The R&S®FSU and R&S®FSQ spectrum and signal analyzers have the performance and flexibility needed for development, production, and maintenance of VOR/ILS ground infrastructure
- ▮ For ground and flight inspection of VOR and ILS installations, the R&S®EVS300 has the low weight, high accuracy, and measurement speed this application requires



Satellite communications

Satellite testing brings unique challenges, from the satellite and its payload to the ground station terminal. Rigorous testing is necessary to ensure that the satellite works right the first time – there is no room for error. RF and microwave measurements must be as accurate as possible, from SSPA and TWTA components or LO and PLL subsystems to complete satellite assembly, test, and integration. With our leadership in spectrum analysis, cutting-edge network analyzer technology, and broad signal generator and power meter portfolio, we have the right tools to ensure that your satellite system is tested correctly.

Our solutions include:

- A full range of signal generators, spectrum analyzers, network analyzers and power meters for R&D, installation, maintenance and monitoring of satellite components and systems
- High-performance signal analyzers which capture up to 120 MHz in one shot for wideband modulation measurements or frequency response and group delay tests



Military communications

As a manufacturer of test & measurement equipment as well as secure military radios for airborne, ship-borne, and ground operation, Rohde & Schwarz has the combined expertise to meet any test challenge, from legacy communications through to the latest SDR designs. Our equipment is used for testing ADC/DAC, local oscillator, power amplifier, transmitter/receiver, and antenna subsystems. Rohde & Schwarz is a leader in test solutions for OFDM and MIMO technologies, and has broad expertise in all of the latest commercial communications standards.

Our solutions include:

- Vector signal generators and analyzers to generate and analyze many types of unmodulated and modulated signals: from CW to analog or pulse modulation, from simple digital modulation such as BPSK or QPSK to the most complex and generic OFDM modulation schemes. Wide modulation (up to 200 MHz) and demodulation bandwidths (up to 120 MHz) allow tests even on wideband multicarrier systems
- Flexible fading solutions for signal generators allow the testing of military communications equipment under real-world conditions such as moving transmitters and receivers or multipath signal propagation
- Short frequency and level setting times in our signal generators, which is essential when generating signals for tests of hopping systems



Test & measurement instruments

Field testing

Civil aviation and military applications alike require reliable, accurate, and portable instruments to meet their demanding field test requirements. Rohde & Schwarz offers a wide range of portable and handheld instruments which offer the user unexcelled capability in very convenient form factors. From the portable R&S®ZVL combination spectrum/network analyzer and the unparalleled R&S®FSH handheld spectrum analyzer to the R&S®EVS300 VOR/ILS analyzer, we equip users with the tools to keep systems running to specification.

Our solutions include:

- A broad range of portable signal generators, spectrum analyzers, and network analyzers that are ideal for field use
- Power sensors that can be operated on a battery-powered base unit, as well as standalone with a laptop. They require only simple measurement setups, while delivering highly accurate test results



Our test & measurement instruments are in use around the world. Prime contractors, subcontractors, and military services alike choose Rohde & Schwarz to meet their

most demanding test needs. Here we show just a small selection of the wide range of instruments we offer.



The R&S®FSMR measuring receiver is a fast and accurate single-box solution for calibrating signal generators and attenuators. It combines multiple instrument capabilities:

- High-precision level calibrator (absolute and relative level)
- Spectrum analyzer
- Power meter base unit
- Modulation analyzer for AM/FM/φM
- Audio analyzer with THD and SINAD measurement and separate audio input
- VOR/ILS analyzer
- Support of vector signal analysis to analyze digital modulation formats



The R&S®FSUP signal source analyzer is a versatile and accurate single-box solution for characterizing signal sources up to 50 GHz. It combines a flexible phase noise tester, a VCO tester, and a high-performance spectrum analyzer in a single unit.

- Support of direct phase noise measurements as well as setups with two DUTs
- Cross-correlation method for enhanced dynamic range
- Complete VCO characterization
- Low-noise DC supply
- Spectrum analyzer with R&S®FSU performance and features
- Support of noise figure measurements and vector signal analysis



The R&S®FSU spectrum analyzer is designed for high performance requirements. Its RF performance makes it the ideal analyzing tool for aerospace and defense applications.

- Frequency coverage up to 67 GHz in one sweep
- Highest accuracy
- Widest dynamic range
- Best phase noise performance presently available
- Code compatibility with a wide range of legacy instruments
- Removable mass storage for use in secure areas



The R&S®FSQ signal analyzer combines two instruments in one. It offers comprehensive signal analysis with the dynamic range of a high-end spectrum analyzer.

- Frequency range up to 40 GHz
- Universal vector signal analysis function down to bit-stream level
- Up to 120 MHz analysis bandwidth
- Generic OFDM demodulator
- Up to 705 Msample I/Q memory
- Bidirectional digital I/Q interface
- Code compatibility with a wide range of legacy spectrum analyzers
- Removable mass storage



The R&S®FSV signal analyzer is a very fast and wideband mid-range instrument for general-purpose applications.

- Fastest signal analyzer on the market with up to 1000 sweeps/s
- 40 MHz analysis bandwidth, e.g. for analyzing wideband radar chirps
- Touchscreen for convenient manual operation
- Measurement uncertainty <0.4 dB up to 7 GHz
- Removable hard disk as standard



The R&S®FSH 18 spectrum analyzer puts bench-level RF measurement up to 18 GHz in a compact, battery-operable handheld of only 2.5 kg (5.5 lb).



The R&S®ESMD wideband monitoring receiver sets new standards for realtime spectrum monitoring and processing. Highest RF performance plus powerful digital signal processing are the basis for fast and reliable signal detection and analysis.

- Frequency range from 20 MHz to 3.6 GHz, optionally from 9 kHz to 26.5 GHz
- 20 MHz realtime bandwidth (expandable up to 80 MHz)
- Gap-free FFT spectrum computation
- Demodulation bandwidth up to 20 MHz (31 IF filters)
- RF, IF, and video spectrum
- Scan speed up to 70 GHz/s
- Expandable to a direction finder



The R&S®SMA 100A analog signal generator offers excellent signal quality, high output power, and analog modulation capabilities, plus high-performance pulse modulation for radar tests.

- Fast frequency and level setting
- Outstanding SSB phase noise performance
- Generation of highly accurate VOR, ILS, and DME signals
- Emulation of a wide range of legacy signal generators
- Removable mass storage for use in secure areas



The R&S®SMB 100A analog signal generator is a mid-range instrument with best-of-class signal quality, making it a perfect all-purpose RF source.

- Wide frequency range from 9 kHz to 6 GHz
- High output power
- Capability to generate CW or analog modulated signals
- Compact size
- Awarded large U.S. Army contract



The R&S®ESU test receiver breaks new ground for testing MIL-STD-461/462 EMI, with fully compliant test for MIL-STD-461 A-F and DO 160.

- Frequency coverage from 20 Hz to 40 GHz
- High sensitivity across the entire frequency range (built-in preamplifier)
- Built-in preselector (single-box solution)
- FFT-based time domain scan for extremely fast overview measurements
- Onboard report generator
- Removable mass storage for use in secure areas



The R&S®ZVA network analyzer is a high-end instrument for challenging R&D tasks. It sets new standards in numerous areas and is well suited for measurements on active and frequency-converting devices.

- Pulsed measurements including pulse profile measurements with wide bandwidth and high time resolution
- Arbitrary frequency conversion measurements including mixer measurements
- Four-port architecture with integrated second source
- Coherent sources with adjustable phase offset
- Removable mass storage for use in secure areas



The R&S®ZVA-Z75, R&S®ZVA-Z110 and R&S®ZVA-Z325 external frequency converters facilitate network analysis in the V band from 50 GHz to 75 GHz, in the W band from 75 GHz to 110 GHz or in the J band from 220 GHz to 325 GHz, respectively, in combination with an R&S®ZVA or R&S®ZVT network analyzer.



The R&S®SMF 100A microwave generator sets a new standard in signal quality, speed, and flexibility.

- Outstanding pulse capabilities for radar component and system tests
- Generation of CW and analog modulated signals
- Best phase noise performance
- Emulation of legacy signal generators
- Removable mass storage for use in secure areas



The R&S®SMR microwave signal generator ranges up to 60 GHz, making it ideal for challenging tasks such as clock generation or radar receiver tests.

- Analog modulation capabilities
- Optional IF upconverter to convert complex digitally modulated signals to the microwave range
- Small form factor



The R&S®SMU 200A vector signal generator offers very high signal quality and flexibility, making it a perfect solution for generating complex modulated signals.

- Up to two RF outputs and two baseband sections for interference and intermodulation testing with just one device
- Easy setup and generation of analog and digital modulation formats and proprietary signals
- Optional baseband fading for multipath propagation scenarios
- 2x2 MIMO realtime fading with just one instrument



The R&S®UPV audio analyzer is a universal instrument for audio and low frequency analysis, with generator and analyzer functionality in the analog domain, and optionally in the digital domain.

- Linear and non-linear distortion measurements
- FFT and waveform analysis
- Protocol and interface measurements in the digital domain



The R&S®EVS 300 ILS/VOR analyzer is a portable level and modulation analyzer designed specifically for starting up, checking and maintaining ILS, VOR and marker beacon systems. Its numerous software options enable users to analyze the frequency and time domains of received signals without having to take along extra T&M equipment.

- High-precision level and modulation measurements
- GPS, trigger and remote control interfaces
- Realtime data logging
- Two independent measurement channels (option)
- Support for the R&S®NRT and R&S®NRP power sensors



The R&S®NRP-Z power sensors provide top accuracy and ease of use.

- Highest precision at fast measurement speed
- Operable from the R&S®NRP base unit, a signal generator, or spectrum or network analyzer, or stand-alone when connected directly to a PC via USB

Secure radiocommunications

When a threat looms, failure is not an option. Command and control require robust, high-volume voice and data communications. Military radio systems must be secure, interoperable, and utterly reliable. Rohde & Schwarz is among the leading global suppliers of radiocommunications systems for ground, air, and naval forces, including HF/VHF/UHF radios in all power classes. In addition to stationary, vehicular, and man-portable transceivers, we supply hardware and software for EPM and automatic link establishment (ALE), LAN and tactical Internet interfaces, tactical antennas, couplers, and filters for integration on all military platforms.

The open system architecture of our software-defined R&S®M3xR multiband platform means great flexibility, and has proven its mettle in climates and conditions around the world. It meets all encryption requirements, including COMSEC and TRANSEC, and uses spectra efficiently to maximize bandwidth for tomorrow's network-centric scenarios. As an established single-source provider, we are a partner of NATO and the militaries of many countries. We have the experience, technical prowess, and ongoing innovation to assure the highest levels of performance and availability of our systems. Their modular design allows them to grow with changing requirements. Users can source complete systems from us, including dedicated test systems for autonomous service and maintenance.

The NH90 helicopter, like many land, air, and sea platforms, uses Rohde & Schwarz radio technology



Radiomonitoring and radiolocation

Rohde & Schwarz is a prime supplier of equipment and systems for the detection, location, and analysis of radio-communications signals. Whether national security, search-and-rescue, or the battlefield, our systems let users know what's out there. Here again, we stand out with a depth of expertise that comes only from long experience with many different conditions and circumstances. As a result, we can offer systems to cover the entire scope from satellite to local area monitoring. In fact, we lead the world in full-coverage automatic radiomonitoring systems.

Rohde & Schwarz radiomonitoring, radiolocation, and analysis systems make a vital contribution to situation awareness. For example, the new R&S®PR 100 portable radiomonitoring receiver leads the field in handheld signal detection, tracing, and debugging (picture on left). It revolutionizes close-range reconnaissance, for locating transmitters and intercepting signal emissions.



Service and support – where you need it, the way you need it

Military applications span the globe, and so does the Rohde & Schwarz service network – we're local no matter where you are. Our users enjoy industry-leading service, with realtime, person-to-person technical support anywhere in the world. Service locations in over 70 countries and technical support centers in North America, Asia, and Europe assure fast access at any time.

We're committed to customer satisfaction, so we stand fully behind the quality of our service, with no hidden terms. We're also committed to service flexibility. We provide the level of support you need, from complete turnkey service contracts to self-service options for customers who prefer to keep all maintenance, calibration, and repair in-house.

Customer-centric

One size does not fit all, especially in the aerospace and defense field. Each customer has a unique set of parameters and requirements. To address these, we provide customization at any level. Contractors use our custom test systems for fast, robust quality assurance on the production line. Customer-centric solutions assure users of the optimum answer to their specific challenge.

Meeting your challenges

For test & measurement, radiocommunications and radiomonitoring solutions, few if any companies can match our ability to help you meet your challenges, today and tomorrow. Let us show you exactly what this means. Contact your local Rohde & Schwarz representative, visit rohde-schwarz.com to learn more and find the location nearest you, or call one of our customer support centers. We look forward to meeting your challenge.

Our service network spans the globe.



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