



HF Antenna Tuning Unit R&S® FK 855U

For matching HF transceivers to antennas used in submarine applications

- ◆ Tuning range 1.5 MHz to 30 MHz
- ◆ Fully automatic tuning
- ◆ 400 W CW and PEP at 100 % duty cycle
- ◆ 1000 W CW and PEP with restrictions
- ◆ Tuning of all rod, whip and broadband antennas used in submarine applications
- ◆ Low probability of intercept (LPI)
- ◆ Extremely short setting time
- ◆ Silent tuning over the entire frequency range from 1.5 MHz to 30 MHz
- ◆ Maintenance-free
- ◆ MTBF 12 000 h (calculated)
- ◆ Continuous monitoring of operational status
- ◆ Extremely rugged design



ROHDE & SCHWARZ

Designed for submarine applications

Brief description

The R&S®FK 855U matches rod and whip antennas, as they are used in submarine applications, to the RF output of the Transceivers R&S®XK 2500/ R&S®XK 2900.

It can handle power up to 400 W CW and PEP at a 100% duty cycle and up to 1000 W with restrictions. The R&S®FK 855U operates in the frequency range from 1.5 MHz to 30 MHz where it performs an antenna impedance transformation into 50 Ω in both the receive and transmit mode. Additionally, it provides preselection in the receive mode.

Owing to the silent tuning features of the Transceivers R&S®XK 2500 and R&S®XK 2900, low probability of intercept (LPI) is enhanced.



Tuning functionality

Silent tuning over the entire frequency range from 1.5 MHz to 30 MHz

Before the ATU can be used for an application, it must be connected to an antenna to "learn" its characteristic. Learning takes place in a user-defined frequency range in the HF band (1.5 MHz to 30 MHz).

The ATU "learns" the antenna characteristic by receiving tuning data for a maximum of 1500 predefined frequencies. Once the tuning data for these frequencies is known and stored, the typical ATU setting time to these channels is less than 5 ms.

Repeated tuning

A change in environmental conditions may slightly alter the actual antenna tuning data as compared to the stored data.

The quality of antenna matching is therefore checked during operation by means of an integrated VSWR measuring device. If the required VSWR (<1.5:1) is not attained, the ATU can be retuned in less than typ. 100 ms.

The advantage for the user is low probability of intercept (LPI), since ATU frequency setting is performed very quickly and without any emission of RF power.

Design

The rugged design of the R&S®FK 855U allows it to be operated continuously 24 hours a day especially on board of submarines, installed in a submarine communications mast.

BITE

The ATU is included in the continuous monitoring of the system so that deviations from the normal operating status are displayed on the control unit.

ECM and overvoltage protection

All circuit boards are equipped with ECM filters. For protection against overvoltage as produced by lightning strokes to the antenna, the R&S®FK 855U output is provided with lightning protection.

Specifications

| | |
|--|---|
| Frequency range | transmit: 1.5 MHz to 30 MHz receive: 10 kHz to 30 MHz |
| RF input power | max. 400 W PEP and CW (without restrictions) 10 m rod antenna <1.8 MHz: max. 400 W PEP and CW 1.8 MHz to 2.5 MHz: max. 500 W PEP and CW 2.5 MHz to 30 MHz: max. 1000 W PEP and CW 12 m rod antenna 1.5 MHz to 2.2 MHz: max. 700 W PEP and CW 2.2 MHz to 30 MHz: max. 1000 W PEP and CW |
| Duty cycle | 100% for 400 W input power on all antennas 100% for 1 kW input power (10 m and 12 m rod antennas only and $f > 3.5$ MHz) 2:1 RX/TX for 1 kW input power (10 m and 12 m rod antennas only and $f \leq 3.5$ MHz), max. 10 min TX |
| Input impedance | 50 Ω , VSWR <1.5:1, typ. 1.3:1 |
| Antennas | rod antennas: 7 m to 12 m broadband antennas: nominal impedance 50 Ω , VSWR <3:1 wire antennas: 15 m to 30 m whip antennas: 5 m to 8 m |
| Silent tuning (memory size) | 1500 predefined frequencies for learning antenna characteristic |
| Tuning time | |
| First tuning | typ. <0.5 s, max. 3 s |
| Repeated tuning | typ. <0.1 s |
| Silent tuning | <5 ms |
| Antenna connection | unbalanced isolated M5 connection for antennas, 50 Ω adapter with coaxial N type connector on request, e.g. for broadband antennas |
| Power supply | 19 V to 31 V, approx. 1.2 A |
| RF tuning power | 40 W \pm 1 dB, VSWR <2 |
| Connectors | |
| RF connector | N female |
| Control and power supply | round, 26-contact |
| Antenna connector | M5 |
| Earthing screw | M8 |
| Maximum distance | |
| Between antenna base and ATU | \leq 30 cm |
| Between transceiver and ATU | \leq 50 m |
| Environmental data | |
| Temperature range | |
| Operating temperature range | -40 °C to +55 °C in line with MIL-STD-810E, meth. 501.3 and 502.1, cat. A2 and C2 |
| Storage temperature range | -40 °C to +85 °C in line with MIL-STD-810E, meth. 501.3 and 502.1, cat. A2 and C2 |
| Humidity | |
| Operation | 30 °C/55 °C, 95% rel. humidity, duration of 10 days; in line with MIL-STD-810E, meth. 507.3, proc. III |
| Vibration (without shockmount) | |
| Random | 4 Hz to 50 Hz, 0.01 g ² /Hz, 2 h per axis; in line with MIL-STD-810E, meth. 514.4, proc. I, cat. 9 |
| Shock resistance (without shockmount) | max. 40 g, 45 Hz to 2000 Hz spectrum, in line with MIL-STD-810E, meth. 516.4, proc. I 400 g, shock response spectrum in line with BV043, edition 1985, for submarines |
| Class of protection | IP 53 in line with EN 60529 (VDE0470) |
| Electromagnetic compatibility | in line with MIL-STD-461E (CS114, RE101, RE102, RS101, RS103) |
| MTTR | 30 min |
| MTBF | 12 000 h in line with MIL-HDBK-217E |
| Dimensions without shockmounts (W × H × D) | 310 mm × 290 mm × 516 mm |
| Depth including antenna insulator | 614 mm |
| Weight | 30 kg |
| Installation position | user-selectable |
| Color | RAL 7001, navy grey |

Ordering information

| Designation | Type | Order No. |
|------------------------------|-------------|----------------------------|
| Antenna Tuning Unit | R&S®FK 855U | 6116.3503.07 |
| Recommended extra | | |
| Shockmount | | on request |
| Cables and connectors | | |
| ATU Control Cable | R&S®GK 2903 | 6117.9505.xx ¹⁾ |
| Mating Connector Set | R&S®ZF 4106 | 6120.5507.02 |
| Documentation | | |
| User manual R&S®FK 855U | | 6124.8052.12 |

¹⁾ Order number depending on cable length.



More information at
www.rohde-schwarz.com
(search term: FK855U)



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