R&S®EDS300
DME/PULSE Analyzer
User Manual

ROHDE & SCHWARZ

Make ideas real

This manual applies to the following R&S®EDS300 models with software version 4.20 and later:

- R&S®EDS300 (5202.7006.02)

(For exceptions see the data sheet.)

In addition to the base unit, the following options are described:

- R&S®EDS-B1 Additional RX Unit (5202.7170.02)
- R&S®EDS-B2 Low-Power Interrogator (5202.8160.02)
- R&S®EDS-B4 High-Power Interrogator (5202.8177.02)
- R&S®EDS-B5 High-Power Amplifier (5202.7193.02)
- R&S®EDS-K1 TACAN Analysis (5202.8102.02)
- R&S®EDS-K2 Pulse Shape Analysis (5202.8119.02)
- R&S®EDS-K3 GPS Synchronization (5202.8125.02)
- R&S®EDS-K5 Multi-DME Mode (5202.8131.02)

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®EDS300 is indicated as R&S EDS300. R&S®EDS-Bxy/-Kxy is indicated as R&S EDS-Bxy/-Kxy.

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1 Safety and regulatory information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the following sections.

Intended use

The R&S EDS300 is an analyzer designed for installing, testing and servicing pulsed terrestrial navigation systems like DME and TACAN ground equipment. Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

Target audience

This document is aimed at installers, technicians and operators of the R&S EDS300. It assumes the readers are familiar with basic handling of electrical equipment and have knowledge of avionic navigation systems.

Where do I find safety information?

Safety information is part of the product documentation. It warns you of potential dangers and gives instructions on how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

● In Chapter 1.1, "Safety instructions", on page 7. The same information is provided in many languages in printed format. The printed "Safety Instructions" for "DC-Powered Products for Mobile Use" (document number 1171.2049.99) are delivered with the product.

● Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the specifications document, manuals and the printed "Safety Instructions" document. If you are unsure about the appropriate use, contact Rohde & Schwarz customer support.

Using the product requires specialists or specially trained personnel. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

Reconfigure or adjust the product only as described in the product documentation or the specifications document. Any other modifications can affect safety and are not permitted.

Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. If any part of the product is damaged or broken, stop using the product. Contact Rohde & Schwarz customer support at https://www.rohde-schwarz.com/support.

Connecting the product

Before connecting the interfaces or measuring inputs of the product to other products or electrical circuits, make sure that the other products or electrical circuits provide special protection against electric shock. This protection principle is referred to as SELV (safety extra-low voltage) and is based on a low voltage level and increased insulation. Exceptions are indicated by a measurement category on the product and given in the specifications document.

Operating the product

The product is intended for mobile use. The maximum weight of the product is provided in the specifications document. If the product casing is not waterproof, use an adequate weather protection to carry the product outdoors with you.

When operating the product on a mobile platform, such as a vehicle, aircraft or drone, make sure that the product is properly secured. Refer to the instructions provided by the manufacturer of the mobile platform. If stacking is possible, secure the whole stack of products so that they cannot fall over and cause injury.

Observe the ambient conditions such as altitude, operating temperature and climatic loads; see the specifications document.

Due to their exposed location, mobile communications systems are at risk of damage from lightning. This also poses a risk to persons nearby. When the risk of lightning is present, remove antennas from exposed locations, e.g. vehicle roofs. Do not operate the product until the lightning risk has passed.

Connecting to power

The product runs on DC voltage. For the specifications of the supply voltage for the product, refer to the specifications document. Only connect the product to a power source that provides a protection against electric shock.

Take the following measures for your safety:

- If you connect the product to an external power supply, use one recommended in the product documentation.
- Before switching on the product, ensure that the voltage and polarity indicated on the product matches the available power source.
- Only use intact cables and route them carefully so that they cannot be damaged. Also ensure that nobody can trip over loose cables.

Using headphones

Take the following measures to prevent hearing damage. Before using headphones, check the volume and reduce it if necessary. If you monitor varying signal levels, take off the headphones and wait until the signal has settled. Then adjust the volume.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

⚠	Potential hazard Read the product documentation to avoid personal injury or product damage.

⎓	DC - direct current Connect to a DC power supply of the specified voltage range.

1.2 Labels on the product

Labels on the casing inform about:

- Personal safety, see "Meaning of safety labels" on page 9
- Product and environment safety, see Table 1-1
- Identification of the product, see Chapter 4.2.3, "Device ID", on page 28:

Table 1-1: Labels regarding product and environment safety

♻	Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see "Disposing of electrical and electronic equipment" on page 164.

1.3 Warning messages in the documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

NOTICE

Potential risks of damage. Could result in damage to the supported product or to other property.

1.4 Korea certification class A

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

2 Documentation overview

This section provides an overview of the R&S EDS300 user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/EDS300

Further documents are available at:

www.rohde-schwarz.com/product/EDS300.

Getting Started manual

Introduces the R&S EDS300 and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc.

A printed version is delivered with the instrument.

User manual

The user manual contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.

The user manual is also available for download or for immediate display on the Internet.

Specifications and brochures

The specifications document, also known as the data sheet, contains the technical specifications of the R&S EDS300. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

Release notes and open source acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current software version, and describe the software installation.

The software uses several valuable open source software packages. An open source acknowledgment document provides verbatim license texts of the used open source software.

Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/appnotes.

3 Welcome to the R&S EDS300

The R&S EDS300 is an analyzer designed for installing, testing and servicing pulsed terrestrial navigation systems like DME and TACAN ground equipment. Its wide dynamic range and compact design make the R&S EDS300 ideal especially for wired and field measurements on DME and TACAN ground stations.

The R&S EDS300 provides high-precision stimulus and analysis functions for DME / TACAN signals in the frequency range from 960 MHz to 1215 MHz. It performs TX/RX measurements required for DME and TACAN ground stations in line with the relevant civil and military standards accurately and efficiently.

The R&S EDS300 can precisely determine characteristic parameters such as peak power, main delay, reply efficiency, and can decode the identifier of the ground station to be tested. The instrument also measures the parameters of TACAN stations (R&S EDS-K1 option) and performs in-depth pulse analysis (R&S EDS-K2 option).

The modular design of the R&S EDS300 provides a high degree of flexibility to adapt it to the task at hand. An interrogator (R&S EDS-B2 option) with adjustable output power (-80 dBm to +30 dBm peak power) is available for RX measurements. Measured data can be exported to a control system via remote control (LAN), or stored on a USB flash drive.

4 Getting started

4.1 Preparing for use

Here, you can find basic information about setting up the product for the first time.

4.1.1 Lifting and carrying

The carrying handle on the side of the instrument is designed to lift or carry the instrument. Do not apply excessive external force to the handle. The maximum weight of the product is provided in the data sheet.

4.1.2 Unpacking and checking

1. Unpack the product carefully.

2. Retain the original packing material. Use it when transporting or shipping the product later.

3. Using the delivery notes, check the equipment for completeness.

4. Check the equipment for damage.

   If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

4.1.3 Choosing the operating site

Specific operating conditions ensure proper operation and avoid damage to the product and connected devices. For information on environmental conditions such as ambient temperature and humidity, see the data sheet.

If you operate the product with an external power supply, you can use it indoors only in pollution degree 2 environments where nonconductive contamination can occur.

See also "Operating the product" on page 8.

Operating altitude

The maximum operating altitude is provided in the data sheet.

Electromagnetic compatibility classes

The electromagnetic compatibility (EMC) class indicates where you can operate the product. The EMC class of the product is given in the specifications document.

- Class B equipment is suitable for use in:
  – Residential environments
  – Environments that are directly connected to a low-voltage supply network that supplies residential buildings
- Class A equipment is intended for use in industrial environments. It can cause radio disturbances in residential environments due to possible conducted and radiated disturbances. It is therefore not suitable for class B environments.
  If class A equipment causes radio disturbances, take appropriate measures to eliminate them.

4.1.4 Setting up the product indoors

The R&S EDS300 can be operated in various places without detrimental effects on its features. Even the movement caused by transportation or mobile use does not impair its functioning.

See also:

- "Intended use" on page 7

4.1.4.1 Placing the product on a bench top

If you want to set up the R&S EDS300 on a benchtop or prepare the R&S EDS300 for mobile use, proceed as follows.

To place the product on a bench top

1. Place the product on a stable, flat and level surface. Ensure that the surface can support the weight of the product. For information on the weight, see the data sheet.

2. Always fold the feet completely in or out. With folded-out feet, do not place anything on top or underneath the product.

3. **CAUTION!** A stack of products can fall over and cause injury. Never stack more than three products on top of each other. Instead, mount them in a rack.
   Stack as follows:
   - If the products have foldable feet, fold them in completely.
   - It is best if all products have the same dimensions (width and length). If the products have different dimensions, stack according to size and place the smallest product on top.
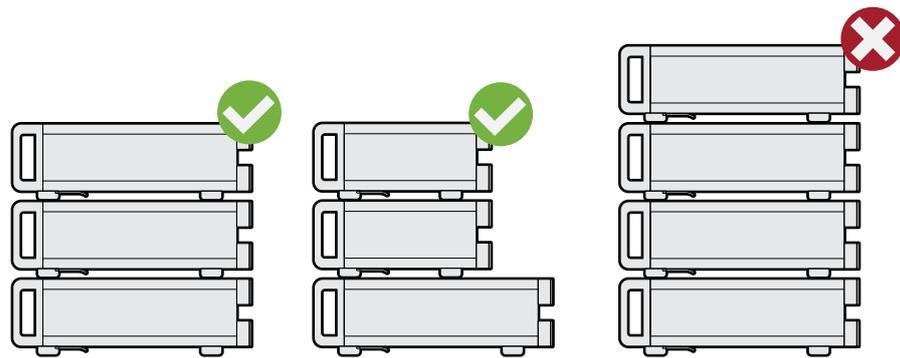
Left   = Stacked correctly, same dimensions
Middle = Stacked correctly, different dimensions
Right   = Stacked incorrectly, too many products

4. **NOTICE!** Overheating can damage the product.

   Prevent overheating as follows:

   ● Keep a minimum distance of 10 cm between the fan openings of the product and any object in the vicinity.
   ● Do not place the product next to heat-generating equipment such as radiators or other products.

4.1.4.2 Mounting the R&S EDS300 in a rack

If you use the product in a vehicle or in aircraft, install it in a rack provided for this purpose. Secure the product safely so that it cannot fall out and hurt passengers when the vehicle or aircraft is moving.

To prepare the rack

1. Observe the requirements and instructions in "Operating the product" on page 8.

2. **NOTICE!** Insufficient airflow can cause overheating and damage the product.

   Design and implement an efficient ventilation concept for the rack.

To mount the R&S EDS300 in a rack

1. Use an adapter kit to prepare the R&S EDS300 for rack mounting.

   a) Order the rack adapter kit designed for the R&S EDS300. For the order number, see the data sheet.
   b) Mount the adapter kit. Follow the assembly instructions provided with the adapter kit.

2. Lift the R&S EDS300 to shelf height.

3. Grab the handle and push the R&S EDS300 onto the shelf until the rack brackets fit closely to the rack.

4. Tighten all screws in the rack brackets with a tightening torque of 1.2 Nm to secure the R&S EDS300 in the rack.

To unmount the R&S EDS300 from a rack

1. Loosen the screws at the rack brackets.

2. Remove the R&S EDS300 from the rack.

3. If placing the R&S EDS300 on a bench top again, unmount the adapter kit from the R&S EDS300. Follow the instructions provided with the adapter kit.

4.1.5 Considerations for test setup

Cable selection and electromagnetic interference (EMI)

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:
- Use high-quality shielded cables, for example, double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Ensure that connected external devices comply with EMC regulations.

Signal input and output levels

Information on signal levels is provided in the data sheet. Keep the signal levels within the specified ranges to avoid damage to the product and connected devices.

4.1.6 Connecting to power

The R&S EDS300 is equipped with a DC power supply connector on the rear panel of the instrument.

DC power can be supplied by one of the following sources:
- The provided DC power supply unit connected to a 230 V AC power supply (for indoor use only)
- External DC power sources with a voltage of 24 VDC±5%, protected by a 5 A fuse
  For altitudes above 2000 m, provide operator protection for the external DC power supply unit with double or re-inforced insulation certified for the used altitude.

Do not connect the instrument to available DC networks.

For safety information, see "Connecting to power" on page 8.

To connect the provided DC power supply

1. Plug the AC power cable of the provided DC power supply unit into a two-pin power outlet with ground contact.

   The green operating LED on the power supply unit lights up.

2. Connect the DC power supply unit to the "POWER supply" connector on the back of the R&S EDS300 (see Chapter 4.2.2, "Rear panel view", on page 25).

   The yellow "Standby" LED on the R&S EDS300 lights up.

To connect an optional external DC power supply

1. If necessary, connect a 12-Volt to 24-Volt DC/DC converter to the DC power supply. The supported DC range is provided in the data sheet.

2. Connect the DC power supply unit (or the DC/DC converter) to the "POWER supply" connector on the back of the R&S EDS300 (see Chapter 4.2.2, "Rear panel view", on page 25).

   The yellow "Standby" LED on the R&S EDS300 lights up.

4.1.7 Connecting external devices

Various interfaces for external devices are provided.

4.1.7.1 Connecting an antenna

The standard R&S EDS300 base unit provides two receiving antenna connections ("RF1 IN/OUT", "RF2 IN", see Chapter 4.2.1, "Front panel view", on page 20).

If the interrogator option R&S EDS-B2 is installed on the R&S EDS300, the instrument can also provide HF output to a transmitter antenna via the "RF1 IN/OUT" connector (see also "Antenna connections RF1 IN/OUT and RF2 IN" on page 22).

To connect a receiver antenna

► Connect the receiver antenna to the "RF1 IN/OUT" or the "RF2 IN" interface on the front panel of the R&S EDS300.
The "RF2 IN" connector provides a higher sensitivity.
For details, see Table 5-1.

To connect a transmit antenna

1. Connect the transmit antenna to the "RF1 IN/OUT" on the front panel of the R&S EDS300.

2. If necessary, insert an attenuation element between the laboratory equipment and the R&S EDS300 to prevent destruction of laboratory equipment in laboratory operation.

   The R&S EDS300 transmitter antenna provides a maximum output of 500 W (57 dBm).

4.1.7.2 Connecting a suppressor line

Using a bi-directional suppressor line, the instruments in an aircraft send signals to each other. While a signal is being sent on the suppressor line, no other instrument can send a signal at the same time. Any receivers are switched off temporarily to avoid overloading.

► Connect the suppressor line to the "SUPPRESS IN / OUT" interface on the rear panel of the R&S EDS300 (see Chapter 4.2.2.2, "SUPPRESS IN / OUT connector", on page 26).

4.1.7.3 Connecting a GPS receiver

You can connect a GPS receiver to the RS232 interface on the rear panel of the R&S EDS300 (see also Chapter 4.2.2.9, "RS232 GPS interface", on page 28).

GPS support requires option R&S EDS-K3.

If available, the NMEA protocol data provided by the GPS receiver is displayed and stored with the recorded data.

4.1.7.4 Connecting an external monitor

You can connect an external monitor (or projector) to the "DVI" connector on the instrument's rear panel (see also Chapter 4.2.2.8, "DVI", on page 28). The screen resolution is always 640x480 pixels.

4.1.8 Activating the TACAN option

The TACAN (Tactical Air Navigation) option R&S EDS-K1 is implemented as a USB stick. The TACAN stick is linked to the R&S EDS300 unambiguously via the instrument's MAC address. The R&S EDS300 can evaluate TACAN signals only if the TACAN stick with the TACAN software is inserted in one of the USB ports.

The TACAN stick must be inserted *before* the R&S EDS300 is switched on. Do not remove the stick before switching off the R&S EDS300, or else the application is closed.

When the R&S EDS300 firmware is started, the TACAN functionality is copied from the stick to the RAM. After the R&S EDS300 is shut down, no TACAN functionality remains in the instrument.

The TACAN stick cannot be used to store data; however, a second USB stick can be connected simultaneously for data logging.

4.1.9 Switching on or off

The power state is indicated by two LEDs over the "Power" key.

Table 4-1: Overview of power states

Status	Left LED	Right LED	Position of power switch
Off	Off	Off	[0]
Ready	⬤ green		[I]
Standby		⬤ orange	[I]

To switch on the product

The product is off but connected to power.

The right power LED is yellow. See Table 4-1.

► Press the [Power] key.

The left power LED lights up green. The product boots.

After the instrument has fully booted, the most recently used measurement mode is automatically started.

To shut down the product

The product is in the ready state.

► Press the [Power] key.

The operating system shuts down. The LED changes to orange.

To disconnect from power

The product is in the standby state.

The right power LED is yellow. See Table 4-1.

► **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first.

Disconnect the product from the power source.

4.2 Instrument tour

4.2.1 Front panel view

This chapter describes the front panel of the R&S EDS300, including all function keys and connectors.
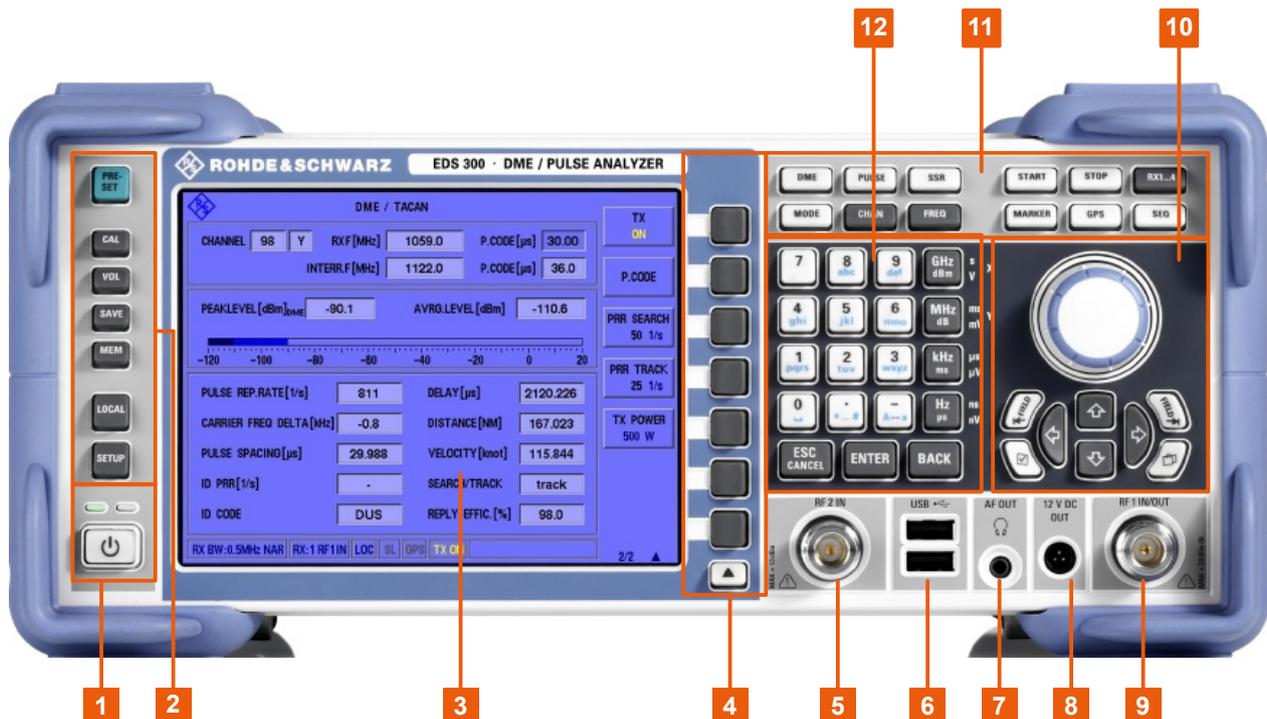
Figure 4-1: Front panel view of the R&S EDS300

1 = Power key (ON / OFF switch) with status LEDs
2 = System keys
3 = TFT Colour Display
4 = Softkeys
5 = RF 2 IN connector
6 = USB interface
7 = Headphone output AF OUT
8 = Voltage supply for external consumers: 12 VDC OUT
9 = RF 1 IN/OUT connector
10 = Navigation controls and general functions
11 = Measurement keys
12 = Keypad

4.2.1.1 Power key

The [Power] key is located on the lower left corner of the front panel. It starts up and shuts down the instrument.

See also "Connecting to power" on page 8 and Chapter 4.1.9, "Switching on or off", on page 19.

The status LEDs indicate the status of operation, see Table 4-1.

4.2.1.2 System keys

System keys set the instrument to a predefined state, change basic settings, and provide print and display functions.

A detailed description of the corresponding functions is provided in Chapter 9, "General instrument setup", on page 85.

Table 4-2: SYSTEM keys

SYSTEM key	Assigned functions
[PRESET]	Resets the instrument to the default state.
[CAL]	Starts a calibration on the R&S EDS300
[VOL]	Volume control for audio output
[SAVE]	for future use
[MEM]	
[LOCAL]	Switches between remote and local operation of the R&S EDS300
[SETUP]	Provides basic instrument configuration functions, e.g.: ● Reference frequency (external/internal), noise source ● Date, time, display configuration ● LAN interface ● Self-alignment ● Software update and enabling of options ● Information about instrument configuration incl. software version and system error messages ● Service support functions (self test etc.)

4.2.1.3 Softkeys

Softkeys are variable, software-defined keys. The functions depend on the measurement mode and current display.

The arrow toggles between different sets of functions in the same menu, if more menu items are available than softkeys.

4.2.1.4 Front panel interfaces

Various interfaces are provided on the front panel of the R&S EDS300.

Antenna connections RF1 IN/OUT and RF2 IN

The standard R&S EDS300 base unit provides two receiving antenna connections ("RF1 IN/OUT", "RF2 IN".

See also Chapter 4.1.5, "Considerations for test setup", on page 16 and Chapter 4.1.7.1, "Connecting an antenna", on page 17.

Table 4-3: Specification of RF input for the receiver units

Input level:	Max. +13 dBm (depending on attenuation mode)
Frequency range:	960 MHz ... 1215 MHz
VSWR:	<1.5
Connector:	N-socket, 50Ω

RF output with interrogator options

If the R&S EDS300 is equipped with the interrogator option R&S EDS-B2, the "RF1 IN/OUT" connector can provide HF output to a transmitter antenna. The antenna has an equivalent frequency range and (peak) power range (1 W).

Table 4-4: Specification of low-power interrogator, option R&S EDS-B2

Output power:	max. 1 W (+30 dBm) ±1.5 dB
Frequency range:	960 MHz ... 1215 MHz
Channel offset:	1 MHz
Distance range:	5.4 NM (approx. 10 km)
Resolution:	0.1 m
Deviation:	≤5 m
Connector:	N-socket, 50 Ω

USB interface

The front panel provides two female USB connectors (USB-A) to connect devices like a memory stick to store and reload instrument settings and measurement data. Only USB sticks using the FAT / FAT32 file system are supported.

The connectors are standard USB 2.0 ports with a maximum transmission rate of approximately 30 Mbit/s.

The rear panel provides further USB connectors (standard 3.0), see Chapter 4.2.2.5, "USB", on page 27.

Headphone output AF OUT

Audio output is available by connecting a headphone to the 3.5 mm jack plug "AF OUT".

Note the safety information provided in "Using headphones" on page 8.

For details, see Chapter 9.6, "Configuring the display and audio output", on page 97.

Voltage supply for external consumers: 12 VDC OUT

The R&S EDS300 provides a power supply for connected external devices at the 3-pole circular "12 VDC OUT" connector. The output for external consumers such as an active receiving antenna is supplied permanently with 12 VDC / 300 mA.

4.2.1.5 Navigation controls and general functions

The navigation controls include a rotary knob and navigation keys. They allow you to navigate within the display or within dialog boxes.

Rotary knob

The rotary knob has several functions:

- Increases (clockwise direction) or decreases (counter-clockwise direction) numeric values with a defined increment in editing mode.
- Scrolls within lists, tables or tree views.
- Acts like the [ENTER] key, when it is pressed.
- Shifts the selection bar within focused areas (e.g. lists), if the edit mode is activated.
- Moves the scroll bar vertically, if the scroll bar is focused and the edit mode is activated.

Turning or pressing the rotary knob is equivalent to pressing the [Up] and [Down] keys or the [ENTER] key in the keypad.

Up/ Down Keys

The up and down arrow keys do the following:

- In a numeric edit dialog box, increase or decrease the instrument parameter.
- In a list, table, window or dialog box, scroll vertically.

Left/ Right Keys

The left and right arrow keys do the following:

- In an alphanumeric edit dialog box, move the cursor forward and back.
- In a list, table, window or dialog box, scroll horizontally.

General function keys

Key	Function
	Creates a screenshot of the current display
	For future use
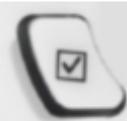
4.2.1.6 Measurement keys

Measurement keys provide access to the most common measurement settings and functions.

A detailed description of the corresponding functions is provided in Chapter 7, "Configuring and performing measurements", on page 56.

Table 4-5: Measurement keys

Measurement key	Assigned functions
DME	Selects DME/TACAN measurement mode
PULSE	Selects Pulse view mode
SSR	For future use
MODE	For future use
CHAN	Selects DME/TACAN channel number for measurements
FREQ	Toggles between RX and TX settings; Sets the center frequency and the start and stop frequencies for the RX and TX frequency range under consideration.
START STOP	Starts and stops streaming or storing measurement data.
RX1..4	Selects the receiver antenna input for measurement
MARKER	Sets and positions a measurement marker in "Pulse" view
GPS	Selects GPS mode Requires R&S EDS-K3
SEQ	Selects Multi-DME mode Requires R&S EDS-K5

4.2.1.7 Keypad

The keys in the data entry keypad are used to enter alphanumeric data and units.

Data entry keys are only enabled while the cursor is placed on a data input field in a dialog. Their function depends on the data type of the input field.

Keys	Description
0...9/abc	Enters the corresponding numbers (in numeric input fields) or characters (character input fields).
.	Inserts a decimal point (numeric input fields) or dot (character input fields) at the cursor position. Multiple decimal points are not allowed.
-	Changes the sign of a numeric parameter. For alphanumeric parameters, inserts a hyphen at the cursor position.
+/-	Changes the sign of a numeric parameter. For alphanumeric parameters, inserts a hyphen at the cursor position.
Unit keys	Adds the selected unit to the entered numeric value and completes the entry.
_	Adds a blank in a character input field.
***... #**	Enters special characters. Toggles through the available characters if the key is pressed several times in a row.
A ↔ a	Toggles between uppercase and lowercase characters.
[BACK]	Deletes the last character before the cursor position or the selected character sequence.
[ENTER]	- Concludes the entry of dimensionless entries. For other entries, this key can be used instead of the default unit key. The new value is accepted. - Confirms ("OK") and closes open input windows. - In a dialog box, selects the default or focused button. - In a dialog box, activates the edit mode for the focused area, if available. - In a dialog box, activates or deactivates the selected option of the focused area. - Calls the next menu level. Pressing the rotary knob has the same effect.
[ESC/ESC / Cancel]	- Closes the open window without accepting new entries; the old value or parameter is retained. - Closes all kinds of dialog boxes. - In dialog boxes that contain a "Cancel" button that it activates that button.

4.2.2 Rear panel view

This figure shows the rear panel view of the R&S EDS300. The individual elements are described in more detail in the subsequent sections.

The meanings of the labels on the product are described in Chapter 1.2, "Labels on the product", on page 9.

Figure 4-2: Rear panel view of the R&S EDS300

1 = DC power supply connection
2 = Chapter 4.2.2.2, "SUPPRESS IN / OUT connector", on page 26
3 = ANALOG IN connector
5 = ANALOG OUT connector
7 = TRIGGER OUT connector
8 = TRIGGER IN connector
9 = USB
10 = REF 10 MHz IN/OUT
11 = LAN interface
12 = DVI
13 = RS232 GPS interface
14 = Speaker for audio output

4.2.2.1 DC power supply connection

To ensure high mobility and flexibility while using the R&S EDS300, it is equipped with a DC power supply connector on the rear panel of the instrument.

For safety information, refer to "Connecting to power" on page 8.

For details, refer to Chapter 4.1.6, "Connecting to power", on page 16.

4.2.2.2 SUPPRESS IN / OUT connector

The R&S EDS300 allows for a suppressor line signal to be input or output via the BNC "SUPPRESS IN / OUT" connector (see Chapter 4.1.7.2, "Connecting a suppressor line", on page 18).

The (digital) voltage levels for the input can range from 8 V to 30 V (when active).

The (digital) voltage levels for the output depend on the power supply of the R&S EDS300. The power supply ranges from 20 V to 28 V.

The output voltage is the supplied voltage minus approx. 1 V.

In both cases, the impedance is 30 kΩ.

4.2.2.3 ANALOG IN / ANALOG OUT connectors

The R&S EDS300 can provide various analog signals as output at the "ANALOG OUT" BNC connector. The signal is output with a peak power level of 4 V and an impedance of 50 Ω.

Configure which signal to output in the general instrument settings.

(See Chapter 7.1.2, "Configuring signal output", on page 58).

The R&S EDS300 can also analyze analog baseband signals from another device via the "ANALOG IN" BNC connector. Input the signal with a peak power level of 1 V and an impedance of 50 Ω.

4.2.2.4 TRIGGER INPUT / OUTPUT

Use the female BNC "TRIGGER INPUT" connector to input an external trigger. An external trigger, for example from the DME transmission system, can control the measurement on the R&S EDS300. The (digital) voltage levels can range from 3.3 V to 33 V. The input impedance is 100 kΩ.

Use the female BNC "TRIGGER OUTPUT" connector to provide a trigger signal from the R&S EDS300 to another connected device, such as the DME transmission system. The trigger can be a pulse, ARB, or MRB signal, for example. The (digital) output signal is TTL compatible (0 V / 5 V). The output impedance is 50 Ω.

Control the trigger signal in the measurement settings.

(See "Trigger Out Mode" on page 59, "Trigger Source" on page 76).

4.2.2.5 USB

The rear panel provides additional female USB (USB-A) connectors to connect a memory device or power sensor.

The connectors are standard USB 3.0 ports with a maximum transmission rate of 40 Mbit/s.

For further USB connectors, see also "USB interface" on page 22.

4.2.2.6 REF 10 MHz IN/OUT

The "REF 10 MHz IN/OUT" connector can provide an external reference signal to the R&S EDS300, or from the R&S EDS300 to a connected device. In either case, the ref-

erence signal is at 10 MHz, with a power level of 1 V$_{eff}$. The connector is a 50 Ω BNC socket.

Configure whether the connector is used for input or output in the general instrument settings.

(See Chapter 7.1.3, "Configuring the reference frequency", on page 60).

4.2.2.7 LAN interface

Use the "LAN" interface to connect the R&S EDS300 to a local network for remote control, printouts or data transfer. The data can be transferred with a rate of up to 1 Gbit per second. Configure the IP address and subnet mask in the general instrument settings.

(See Chapter 9.2, "Setting up a network (LAN) connection", on page 86).

4.2.2.8 DVI

You can connect an external (TFT) monitor or other display device to the R&S EDS300's DVI (Digital visual interface) to provide an enlarged display. The interface consists of a DVI-D socket (24+1).

For details, see Chapter 4.1.7.4, "Connecting an external monitor", on page 18.

4.2.2.9 RS232 GPS interface

2-port RS232, 9-pin D-Sub connector for a GPS receiver providing NMEA protocol data. The NMEA protocol data is displayed and stored with the recorded data.

GPS support requires option R&S EDS-K3.

4.2.3 Device ID

The unique device identifier is provided as a barcode sticker on the rear panel of the R&S EDS300.

It consists of the device order number and a serial number.

The serial number is used to define the **default instrument name**, which is:

<Type><variant>-<serial_number>

For example, `EDS300-123456`.

The instrument name is required to establish a connection to the instrument in a LAN.

4.3 Operating basics

This chapter provides an overview on how to work with the R&S EDS300. It describes what kind of information is displayed on the screen and how to operate the R&S EDS300 via the front panel keys and other interaction methods.

4.3.1 Understanding the display information

The following figure shows a typical screen display on the R&S EDS300. All different screen elements are labeled. They are explained in more detail in the following sections.
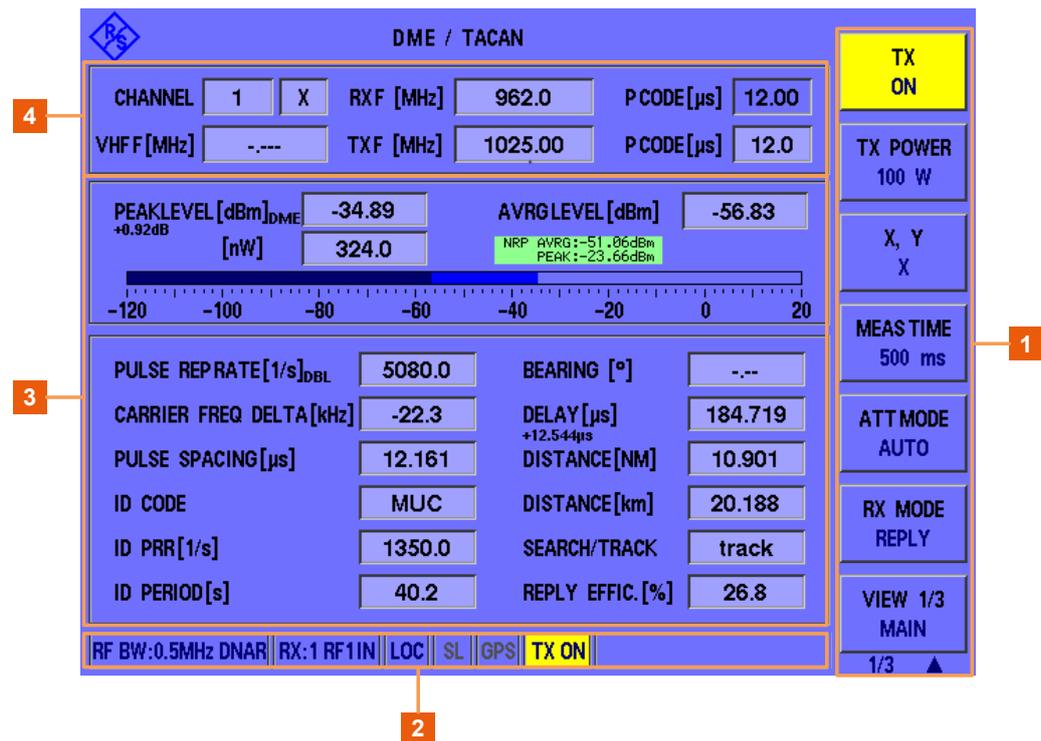

Figure 4-3: Typical R&S EDS300 screen display (using DME mode as an example)

1 = Softkeys to edit settings and activate functions
2 = Status bar
3 = Measurement result area
4 = Measurement settings area

Softkeys

Softkeys are virtual function keys whose actual function is defined by the software, depending on the currently selected measurement mode or key, or both.

Sometimes, more functions are available than softkeys can be displayed at the same time. In this case, a second or third menu of functions is available, indicated by "1/2" and "2/2" (or "1/3", "2/3", "3/3", respectively) beneath the softkeys in the display. To switch between the menus of softkey functions, press the "More softkeys" key beneath the softkeys on the front panel of the R&S EDS300.

Measurement settings and results area

During a measurement, the available settings are displayed at the top of the screen; the measurement results at the bottom. If a general instrument setting or data management function is selected, the settings and information are displayed in the main part of the screen.

Which settings and results are displayed depends on the current measurement or instrument function.

See the following chapters for details:

- Chapter 7, "Configuring and performing measurements", on page 56
- Chapter 9, "General instrument setup", on page 85
- Chapter 8, "Data management", on page 79

Status bar

The status bar at the bottom of the screen contains information on the operating status of the instrument and connected devices.
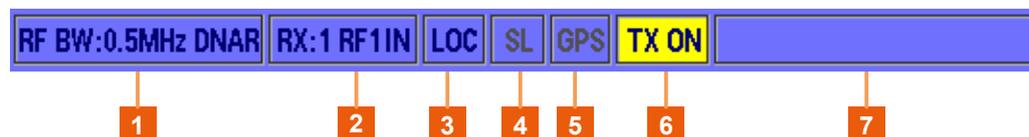
Figure 4-4: R&S EDS300 status bar

Table 4-6: Information in the R&S EDS300 status bar

	Section	Function	Example
1	Input settings	Input settings, e.g. the used RF and demodulation bandwidth (narrow, wide).	`RF BW:0.5MHz DNAR`
2	RX connectors	Connector used for each receive channel (RX1 / RX2 (optional))	`RX:1 RF1 IN` (The RF input for receive channel "RX1" is provided by the [RF1 IN] connector)

	Section	Function	Example
3	Operating mode	Local or remote operation of the instrument **LOC**: local operation (directly on the instrument) **REM**: remote operation by external PC (can be stopped using [LOCAL] key on front panel) **RLC**: (REMOTELOCK) local operation is locked by remote control	`LOC`
4	Suppress line status	Indicates incoming suppressor line signal (see Chapter 4.2.2.2, "SUPPRESS IN / OUT connector", on page 26)	"SL"
5	GPS status	GPS connection available or not (see Chapter 4.2.2.9, "RS232 GPS interface", on page 28)	"GPS"
6	TX status	Indicates use of "RF1 IN/OUT" connector for transmission (see "Antenna connections RF1 IN/OUT and RF2 IN" on page 22)	`TX ON`
7	Operating status	Messages on the data logging status of the instrument, if applicable (see Error and status messages).	`USB LOGGING ON`

4.3.2 Accessing the functionality

All functions available on the R&S EDS300 can be accessed using the keys on the front panel of the instrument. Some keys provide a softkey menu on the display with further functions and settings.

To change a setting or activate a function

1. Select a key on the front panel of the instrument to activate a function directly, or to display a softkey menu.

2.

   Select the softkey for the setting or function as required.
   If necessary, select the "More softkeys" key to switch to the second softkey menu.

   The function is activated, or a new window is displayed to view or change specific settings.

3. To set the focus on a specific setting in the displayed window, scroll through the individual settings by turning the rotary knob or pressing the Up and Down arrow keys on the front panel (see Chapter 4.2.1.5, "Navigation controls and general functions", on page 23).

4. To edit the currently selected setting, press the rotary knob or the [ENTER] key on the front panel.

5. Scroll through the available setting values by turning the rotary knob or pressing the Up and Down arrow keys on the front panel, or enter a numeric or alphanumeric value as described in Chapter 4.3.3, "Entering data", on page 32.

6. Confirm the new setting by pressing the rotary knob or the [ENTER] key on the front panel.

4.3.3   Entering data

Data can be entered in input fields using elements provided by the front panel, e.g. the keypad, rotary knob, or navigation keys.

The rotary knob has the same effect as the [ENTER] key when it is pressed.

ⓘ **Red input fields - invalid input**

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If you enter invalid data in an input field, the value is displayed in red and cannot be stored.

4.3.3.1   Entering numeric parameters

If a field requires numeric input, the keypad provides only numbers.

1. Enter the parameter value using the keypad, or change the currently used parameter value by turning the rotary knob or pressing the Up or Down arrow keys.

2. After entering the numeric value via keypad, press the corresponding unit key. The unit is added to the entry.

3. If the parameter does not require a unit, confirm the entered value by pressing the [ENTER] key or any of the unit keys.

4.3.3.2   Entering alphanumeric parameters

If a field requires alphanumeric input, you can use the keypad on the front panel of the R&S EDS300. Every alphanumeric key represents several characters and one number. The decimal point key (.) represents special characters, and the sign key (-) toggles between capital and small letters. For the assignment, refer to Table 4-7.

Entering numbers and (special) characters via the keypad

1. Press the key once to enter the first possible value.

2. All characters available via this key are displayed.

3. To choose another value provided by this key, press the key again, until your desired value is displayed.

4. With every key stroke, the next possible value of this key is displayed. If all possible values have been displayed, the series starts with the first value again. For information on the series refer to Table 4-7.

5. To change from capital to small letters and vice versa, press the sign key (-).

6. When you have chosen the desired value, wait for 2 seconds (to use the same key again), or start the next entry by pressing another key.

Entering a blank

► Press the "0" key and wait 2 seconds.

Correcting an entry

1. Using the arrow keys (see Chapter 4.2.1.5, "Navigation controls and general functions", on page 23), move the cursor to the right of the entry you want to delete.

2. Press the [BACK] key.

   The entry to the left of the cursor is deleted.

3. Enter your correction.

Completing the entry

► Press the [ENTER] key or the rotary knob.

   For numeric values, the default unit is appended to the numeric input.
   To enter a value using a different unit, select the corresponding

Aborting the entry

► Press the [ESC] key.
   The previous entry is restored.

Table 4-7: Keys for alphanumeric parameters

Key name (upper inscription)	Series of (special) characters and number provided
7	7 µΩ°€¥ $ ¢
8	A B C 8 ÄÆÅÇ
9	D E F 9 É
4	G H I 4
5	J K L 5
6	M N O 6 Ñ Ö
1	P Q R S 1
2	T U V 2 Ü
3	W X Y Z 3
0	<blank> 0 – @ + / \ < > = % &

Key name (upper inscription)	Series of (special) characters and number provided
.	. * : _ , ; " ' ? ( ) #
–	<toggles between capital and small letters>

4.3.4 Error and status messages

If errors or irregularities are detected, a keyword or error message is displayed at the top of the window. If an error occurs that affects the measurement, [UNCAL] is displayed in red letters at the top of the screen. In this case, check the error log for missed errors. The [UNCAL] display is only removed when the R&S EDS300 is switched off.

All error and status messages displayed on the R&S EDS300 are also stored to an error log on the instrument for later inspection.

(See Chapter 9.3.1, "Error log", on page 90).

The status bar contains status messages for the used power supply or data operations.

Table 4-8: Status messages

Message	Description
Mains	The AC power adapter is currently supplying power to the R&S EDS300.
Mount USB-Stick	No USB storage device has been connected to the R&S EDS300 yet, for example for data logging.
Can't mount USB-Stick	The USB storage device connected to the R&S EDS300 could not be read correctly.
Mount USB-Stick: OK	The USB storage device connected to the R&S EDS300 is ready to store data.
USB LOGGING ON	Data logging to a USB storage device is active. (See Chapter 8, "Data management", on page 79)
LOGGING STOPPED	Data logging to a USB storage device was stopped. (See Chapter 8, "Data management", on page 79)

5 Measurement basics

Some background knowledge on basic terms and principles used in DME/Pulse measurements is provided here for a better understanding of the required configuration settings.

5.1 Evaluating DME signals

DME ground stations constantly send out squitter pulses or replies to other aircraft DME interrogations. Therefore, the interrogator needs to recognize which answers belong to their own requests. This task is usually solved in 3 possible modes (stages):

Search mode: In this mode, the interrogator sends request pulses on a specific channel to a ground station and searches the corresponding reply pulses in the output pulses of the ground station.

Initially, there is no information about the possible distance of the ground station. After sending out an interrogation, all reply pulses for a specified duration (5 ms) are collected. For a certain number of interrogations, the pulses can be expected to accumulate around one delay value, because one sender's reply pulses all have the same delay. Other pulses are spread randomly. If the accumulation is clear enough, the R&S EDS300 changes to "track" mode.

In this mode, the pulse repetition rate can be up to 150 pp/s (pulse pairs per second). However, after 30 seconds the pulse repetition rate in the search mode must be reduced to 30 pp/s.

Track mode: The delay and relative speed of the reply pulse is known. So for every outgoing pulse the R&S EDS300 can calculate a prediction where the next reply pulse is expected. If a reply pulse matches the prediction, a new distance value for the ground station is generated. The *reply efficiency* describes the percentage of valid replies (see Chapter 5.2, "Reply efficiency", on page 36). As long as the reply efficiency is above a specified threshold (e.g. 50 %), the R&S EDS300 remains in "track" mode.

Memory mode: The number of valid replies is too low to obtain reliable distance information, e.g. due to difficult receiving situations or during ID transmission. The R&S EDS300 still sends out pulses and calculates a prediction from the last valid replies. If the reply efficiency rises above the specified threshold, the R&S EDS300 immediately returns to the "track" mode. But after a specified time (by default: 10 s) the track is considered to be lost and the R&S EDS300 returns to the "search" mode to start over.

The **reply efficiency** is the criterion to switch between search/track/memory mode. It is calculated with all interrogations during a specific time (for example the last 2 s). If this

value is decreased, the R&S EDS300 moves to the "track" mode more quickly, but also returns to the "memory" mode more quickly.

5.2 Reply efficiency

The reply efficiency of a DME system is the ratio of the number of received reply pulses to the number of transmitted interrogation pulses. A reply efficiency of 100 % is very rarely achieved. There are several reasons why no reply pulse is sent on an interrogation pulse request:

- Interrogation pulse occurs during the dead time of the receiver.
- Interrogation pulse occurs in the key down time of an ID sequence (or during an MRB/ARB sequence of a TACAN ground station).
- Level of the interrogation pulse is below the receiver sensitivity of the ground station.

The reply efficiency drops dramatically when the maximum distance to the ground station is reached.

You must define a minimum reply efficiency that must be exceeded before the interrogator switches to track or search mode (see Chapter 5.1, "Evaluating DME signals", on page 35). Lower values are useful in difficult receiving conditions, for instance when the signals are weak. However, if the value is too low, random pulses that are mistaken for a reply can mislead the interrogator into thinking it is on a good track. Thus, you must determine the appropriate setting for the current transmission situation.

5.3 RF attenuator

Access: [DME] / [Pulse] > "Att.Mode Auto"

The attenuation mode determines the sensitivity of the receiver board. Depending on the level of the incoming signal, the attenuator must avoid overload due to high-level signals, while avoiding signal distortion for weak signals. The attenuation mode changes the sensitivity of the receiver board by selecting a different signal path for each mode.
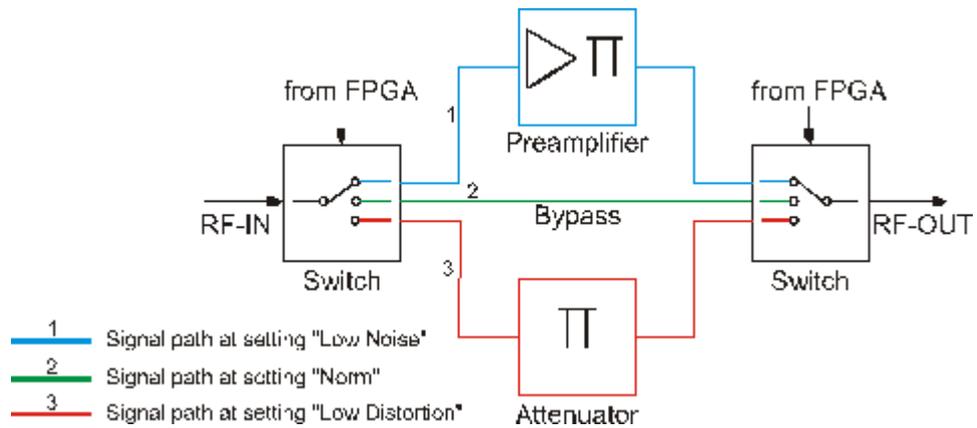
Figure 5-1: Signal paths for different attenuation modes

Select the attenuator mode such that the input level always remains within the specified range. For details, see "Antenna connections RF1 IN/OUT and RF2 IN" on page 22.

Table 5-1: Measurement ranges for different attenuation modes

Attenuation mode	Average input level	Peak input level
Low Noise	-110 dBm to -10 dBm	-100 dBm to -10 dBm
Norm	-100 dBm to +5 dBm	-90 dBm to +5 dBm
Low Distortion	-85 dBm to +13 dBm	-75 dBm to +13 dBm
Auto	-110 dBm to +13 dBm	-100 dBm to +13 dBm

6 Measurements and results

The R&S EDS300 provides different measurement modes depending on the task at hand and the required results.

- **DME/TACAN measurement mode:** determines numeric signal parameters for a specific DME/TACAN interrogator or transponder channel. The measurement results can be logged and output simultaneously to the measurement.
  TACAN measurements require the TACAN option (R&S EDS-K1).

- **Pulse analysis mode:** measures the power levels at a specific interrogator or transponder channel frequency to detect pulses and displays them in a power vs. time diagram. Additional signal parameters are not determined. Data logging is not available.
  Pulse analysis requires the Pulse Shape Analysis option (R&S EDS-K2).

Remote command:

`<RX>:MEASMODE?` on page 123

6.1 DME and TACAN measurement mode

Access: [DME]

If the appropriate hardware option (Low-Power Interrogator, R&S EDS300-B2) is installed, the R&S EDS300 can act as a DME interrogator. It sends out pulses to the ground station which returns the signals to the R&S EDS300 at a different frequency with a delay (see Chapter 5.1, "Evaluating DME signals", on page 35).

The Low-Power Interrogator provides a pulse output power of 1 W for the local area (testing DME / TACAN ground stations, range 5.4 NM).

Basic measurement process

Initially, there is no information about the possible distance of the ground station. Thus, the R&S EDS300 interrogator starts in search mode. It sends request pulses on a specific channel to a ground station. Then it searches the corresponding reply pulses in the output pulses of the ground station.

Once a certain number of reply pulses accumulate around one delay value, the R&S EDS300 changes to track mode and reduces the reply pulse rate. While in the track mode, the R&S EDS300 displays the slant range to the ground station (indicated in nautical miles and meters). If the R&S EDS300 loses the synchronization, it moves to the memory mode and attempts to restore the synchronization based on the defined request rate. If synchronization is successful, the R&S EDS300 returns to the track mode. Otherwise it returns to the search mode, increasing the number of request pulses to restore the synchronization.

Receiver modes

The R&S EDS300 can measure either the pulses sent by the interrogator to the ground station, or the reply pulses sent from the ground station to the interrogator. You specify which signals you want to measure and analyze in the measurement settings.

Remote command:

`<RX>:MEASMODE_DME` on page 123

6.1.1   Displayed measurement settings

For all DME/Pulse measurements, the following common settings are displayed (for details see Chapter 7.2, "Configuring DME measurements", on page 65):
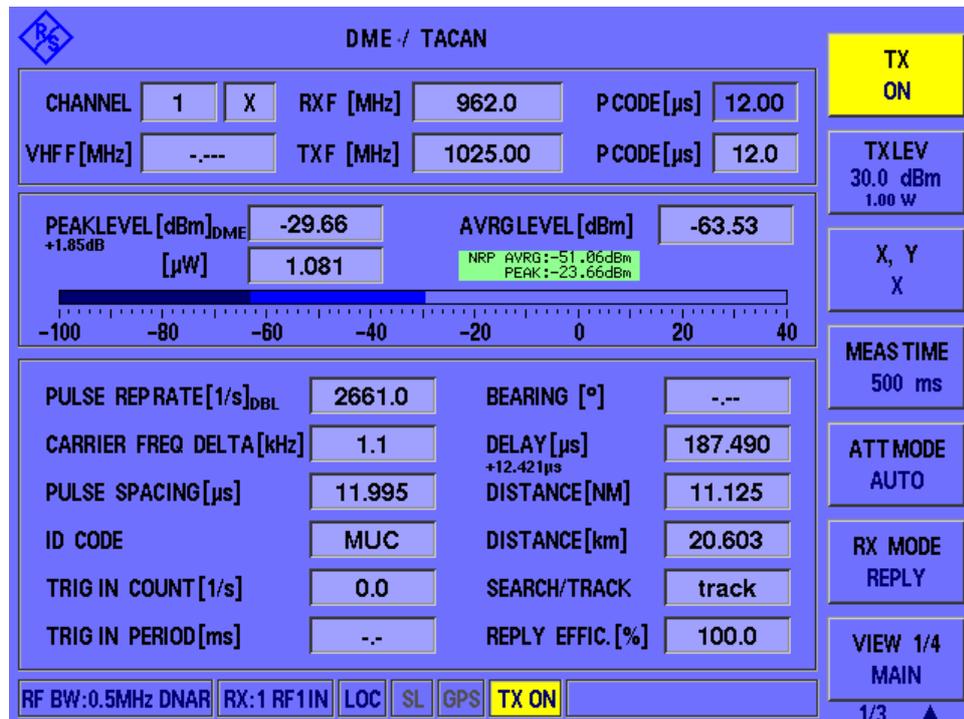
Table 6-1: Distance measurement settings

Display	Description
CHANNEL	DME/TACAN channel according to the ICAO frequency list
RX F [MHz]	Receiver frequency for the reply pulses of the ground station
P.CODE [µs]	Reply pulse code (distance of the double pulses), according to the ICAO frequency list
VHFF	Corresponding VHF frequency for the selected DME channel, for reference only

Display	Description
TX.F [MHz]	Transmit frequency for the interrogator pulse transmitted to the ground station by the R&S EDS300
P.CODE [µs]	Interrogator pulse code (distance of the double pulses), according to the ICAO frequency list.

6.1.2 DME measurement results

Access: [DME]

Distance measurements are performed in a specific mode on the R&S EDS300, the "DME" mode.

The following results are displayed for a distance measurement.

Graphical results are described in Chapter 7.3, "Performing pulse analysis", on page 70.

Background information on distance measurement equipment (DME) is provided in Chapter 5.1, "Evaluating DME signals", on page 35.
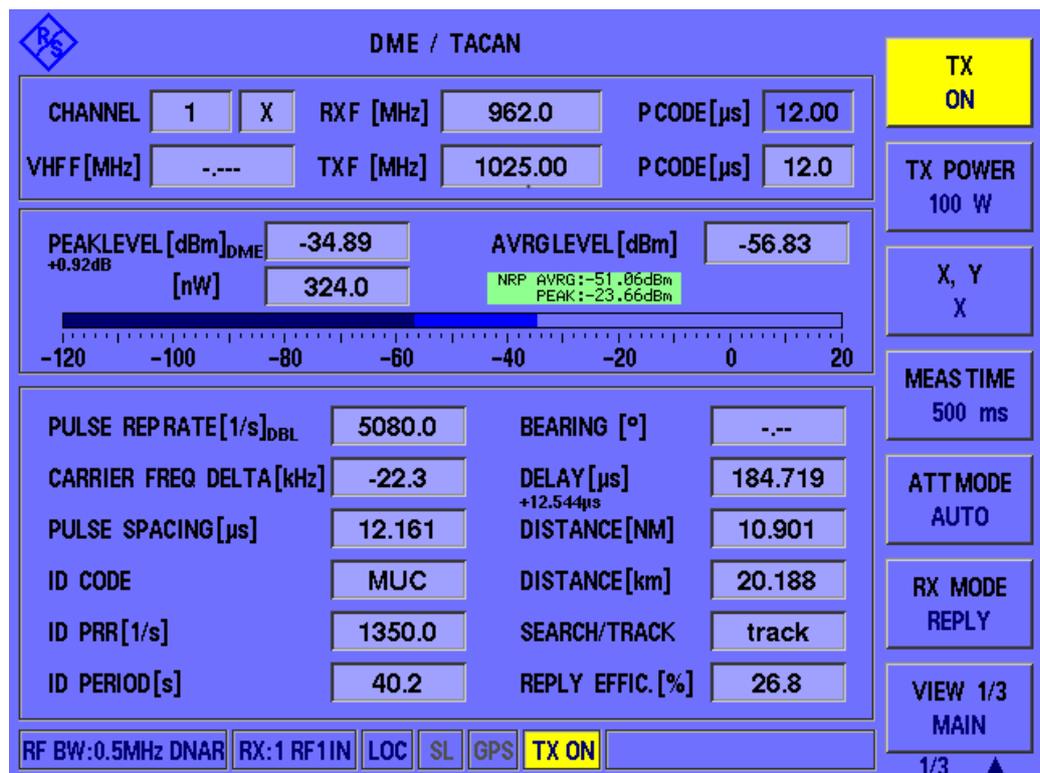
For reference measurements requiring very high accuracy, you can connect a power sensor from the R&S NRP family to the R&S EDS300 USB port. Results delivered by the power sensor are displayed on the R&S EDS300 without further configuration. See "NRP AVRG/NRP PEAK" on page 41.

PEAKLEVEL [dBm]/[W]

Measured peak level of the received signal

Note: A small "DME" indicates that the level refers to valid DME pulses (only double pulses with the correct pulse spacing). The signal can also contain components with higher levels which are not DME (like jammers).

If no "DME" is displayed, the maximum level in the signal is provided.

If external attenuation is applied (see "External Attenuation" on page 58), the attenuation considered for the peak level is indicated.

Remote command:
`<RX>:DME:PEAKLEVEL?` on page 155

AVRG.LEVEL [dBm]

Average measured level of the received signal

Remote command:
`<RX>:DME:AVRGLEVEL?` on page 154

NRP AVRG/NRP PEAK

Average and peak measured level of an optional power sensor input connected to the R&S EDS300.

Remote command:
`GETNRPPOW` on page 157

Bargraph

Graphical display of the measured received signal level.
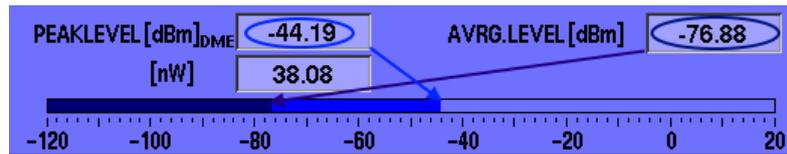
The dark blue bar indicates the average level; the light blue bar indicates the peak level.

PULSE REPETITION RATE [1/s]
Measured pulse repetition rate of the DME signal, i.e. number of interrogator/reply pulses (pairs) per second; only updated once per second

"DBL" indicates that double bursts are counted, "SGL" indicates that single pulses are counted (see Count Pulses).

Remote command:
<RX>:DME:PULSE_REPT_RATE? on page 155

CARRIER FREQ DELTA [kHz]
Measured frequency deviation relative to the defined channel frequency

Remote command:
<RX>:DME:CARRIER_F_DELTA? on page 154

PULSE SPACING [µs]
Measured pulse spacing between the pulses of a pulse pair

Remote command:
<RX>:DME:PULSE_SPACING? on page 155

ID-CODE
Decoded Morse-ID with three or four letters. Since the ID is usually only transmitted every 40 seconds, the ID remains on screen for 60 seconds.

Remote command:
<RX>:DME:ID_CODE? on page 154

ID PRR [1/s]
Pulse repetition rate during ID transmissions. When an ID is detected, this field blinks yellow and indicates the measured frequency.

Remote command:
<RX>:DME:ID_PRR? on page 154

ID Period [s]
Time between two measured ID sequences

BEARING [°]
TACAN signals only (requires option R&S EDS300-K1):

Direction of the ground station in relation to the R&S EDS300.

Remote command:
<RX>:TACAN:BEARING? on page 157

DELAY [µs]

Reply delay time, that is: the delay time between the interrogator and reply pulse, including the ground station delay (50 µs for X channels / 56 µs for Y channels).

If a delay offset is configured, it is also considered in the displayed delay value and for all other parameters based on the delay (see `<RX>:DST:DELAY_OFFSET` on page 131).

Requires R&S EDS-B2.

Remote command:
`<RX>:DST:DELAY?` on page 156

DISTANCE [km]

Measured distance in kilometers, calculated from the DELAY [µs]

Requires R&S EDS-B2.

Remote command:
`<RX>:DST:DST?` on page 156

DISTANCE [NM]

Measured distance in nautical miles, calculated from the DELAY [µs]

Requires R&S EDS-B2.

Remote command:
`<RX>:DST:DST?` on page 156

SEARCH/TRACK

Current mode of the interrogator (see Chapter 5.1, "Evaluating DME signals", on page 35)

"Search$_{30}$" indicates that the search mode has lasted longer than 30 seconds and thus the PPR has been reduced to 30 pulses per second.

Remote command:
`<RX>:DST:SOT?` on page 154

REPLY EFFIC. [%]

Reply efficiency, ratio of the valid reply pulses relative to the transmitted interrogator pulses in percent

Remote command:
`<RX>:DST:REPEFF?` on page 153

6.1.3   TACAN measurement results

Access: [DME] > "View" (> "TACAN1")

The DME part of the measurement is identical to Chapter 5.1, "Evaluating DME signals", on page 35. However, additional parameters are displayed, including:

* The bearing
* The modulation depth of the AF signals
* The frequency of the AF signals

- The phase shift between the two AF tones
- The absolute phase of the 15 Hz signal to the main reference burst (MRB)
- The absolute phase of the 135 Hz signal to the auxiliary reference burst (ARB)

The R&S EDS300 can evaluate TACAN signals only if the TACAN stick with the TACAN software is inserted in one of the USB ports (see Chapter 4.1.8, "Activating the TACAN option", on page 18).

If the TACAN stick is inserted, the DME view automatically includes the TACAN-specific results and functions. **In addition to the DME results described in Chapter 6.1.2, "DME measurement results", on page 40**, the following additional results are provided for TACAN signals.

The extended DME/TACAN view consists of several individual pages. To scroll through the results, select the "View" softkey in the DME menu until the required page is displayed.

The main view is identical to the DME view described in Chapter 6.1.2, "DME measurement results", on page 40.

The displayed measurement *settings* are described in Chapter 6.1.1, "Displayed measurement settings", on page 39.
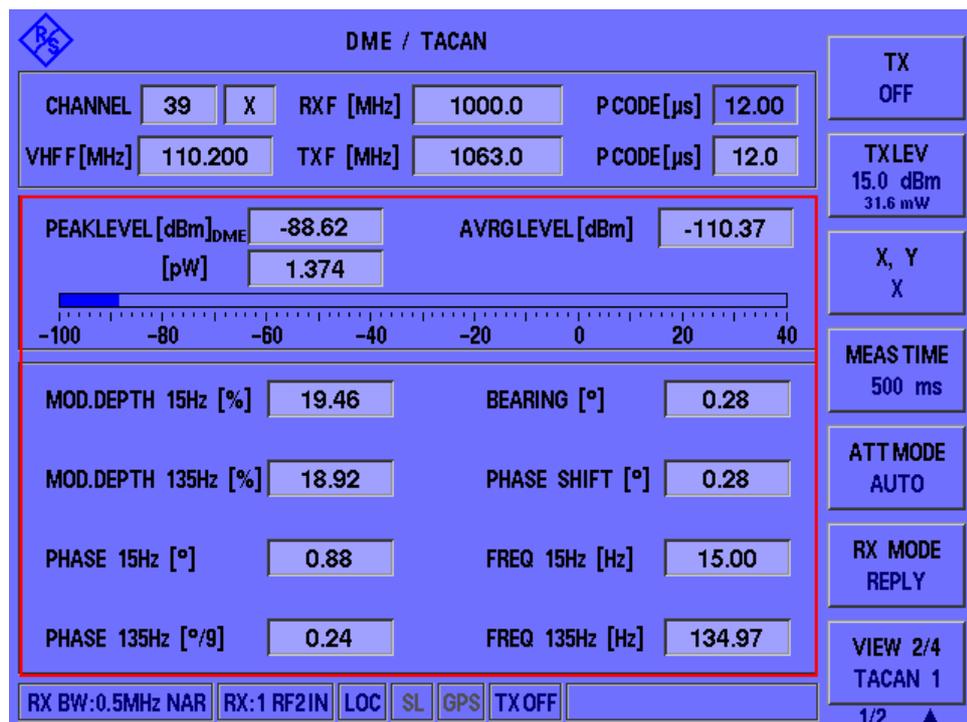
Figure 6-1: TACAN measurement results (page 1)
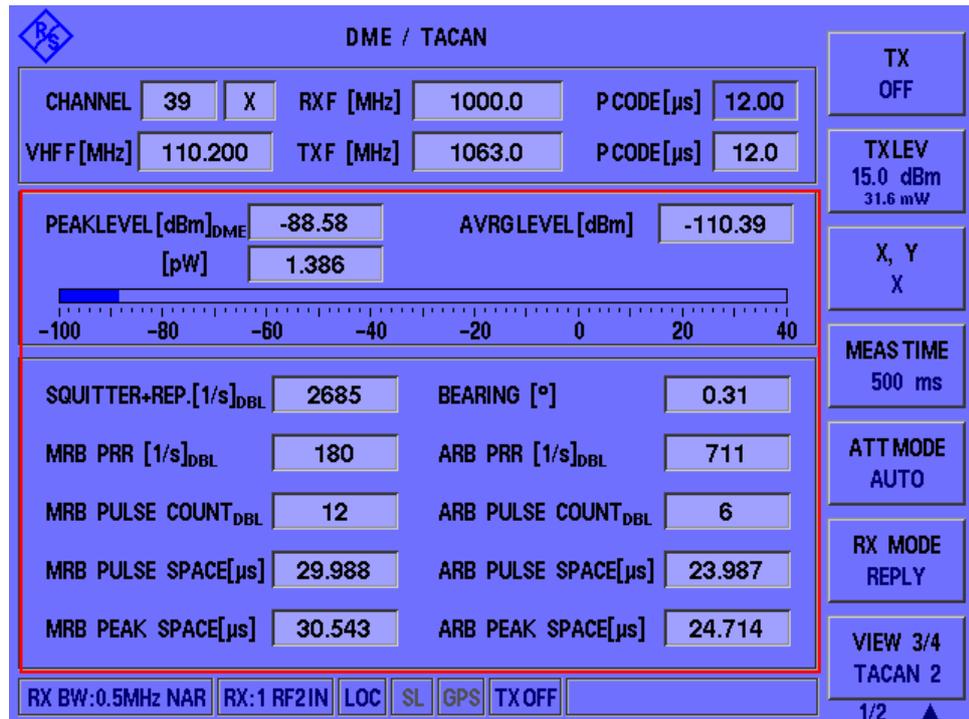
Figure 6-2: TACAN measurement results (page 2)

MOD.DEPTH 15Hz [%]
Measured modulation depth of the 15 Hz signal

Remote command:
<RX>:TACAN:MOD_DEPTH_15HZ? on page 158

MOD.DEPTH 135Hz [%]
Measured modulation depth of the 135 Hz signal

Remote command:

<RX>:TACAN:MOD_DEPTH_135HZ? on page 158

BEARING [°]

Direction of the ground station in relation to the R&S EDS300.

Remote command:

<RX>:TACAN:BEARING? on page 157

PHASE SHIFT [°]

Measured phase shift between the 15 Hz and 135 Hz components

Remote command:

<RX>:TACAN:PHASE_SHIFT? on page 159

FREQ 15Hz [Hz]

Measured frequency of nominal 15 Hz components

Remote command:

<RX>:TACAN:FREQ_15HZ? on page 157

FREQ 135Hz [Hz]

Measured frequency of nominal 135 Hz components

Remote command:

<RX>:TACAN:FREQ_135HZ? on page 157

PHASE 15Hz [°]

Measured phase of the 15 Hz components compared to the MRB; this value is updated 15 times per second.

Remote command:

<RX>:TACAN:PHASE_15HZ? on page 158

PHASE 135Hz [°/9]

Measured phase (0° to 40°) of the 135 Hz components compared to the ARB; this value is updated 120 times per second.

Remote command:

<RX>:TACAN:PHASE_135HZ? on page 158

Squitter+Rep [1/s]

Number of measured pulses, including the replies from the ground station to the inter-rogator's pulses

"DBL" indicates that double bursts are counted, "SGL" indicates that single pulses are counted (see Count Pulses).

MRB PRR [1/s]

Measured pulse repetition rate of the MRB (Main Reference Burst)

"DBL" indicates that double bursts are counted (X channels), "SGL" indicates that single pulses are counted (Y channels).

MRB PULSE COUNT

Number of pulses measured in one MRB.

"DBL" indicates that double bursts are counted (X channels), "SGL" indicates that single pulses are counted (Y channels).

MRB PULSE SPACE [µs]

Measured pulse spacing between two pulses of the MRB

MRB PEAK SPACE [µs]

Maximum measured pulse spacing between two pulses of the MRB

ARB PRR [1/s]

Measured pulse repetition rate of the ARB (Auxiliary Reference Burst)

"DBL" indicates that double bursts are counted (X channels), "SGL" indicates that single pulses are counted (Y channels).

ARB PULSE COUNT

Number of pulses measured in one ARB

"DBL" indicates that double bursts are counted (X channels), "SGL" indicates that single pulses are counted (Y channels).

ARB PULSE SPACE [µs]

Measured pulse spacing between two pulses of the ARB

ARB PEAK SPACE [µs]

Maximum measured pulse spacing between two pulses of the ARB.

6.2 Multi-DME measurements

Access: [SEQ]

Multi-DME measurements are a special method of performing distance measurements for 10 ground stations at the same time.

(i) The optional R&S EDS300-K5 (Multi-DME) software is only usable in connection with the R&S EDS300-B2 or R&S EDS300-B4 (low- or high-power interrogator) hardware options and a second RX module option R&S EDS300-B1.

10 different DME channels can be received and analyzed at the same time in a time-multiplex process. To this end, all defined channels are started in sequence in a fixed time grid of 5 ms. The "Signal In" settings apply without restriction also for the multi-DME mode. For multi-DME, both RX modules are switched on the same RF input, which is selected in the setup for TX Board 1. If the interrogator is active, a query pulse is sent at an interval (slot) of every 5 ms. Thus, the pulse repeat rate (PRR) is permanently 20/s for every defined channel, regardless of whether the distance measurement is currently in the search, track or memory mode.

The following settings and results are displayed for a Multi-DME measurement.

Display	Description Remote command
SLOT	Slots 1 … 10 The slot selected for entry is indicated by a green frame.
CHAN	Display and setting of the channel Set the receiving frequency via the channel setting according to the ICAO frequency list. Select the channel number extension directly.
Level [dBm]	Measured level of the received signal in dBm If the reception level is too high (overload), it is displayed in red and cannot be used.
PS [µs]	Display of the measured pulse spacing between the pulses of a pulse pair (pulse spacing)
Freq [kHz]	Display of the measured deviation relative to the set channel frequency (carrier frequency delta)
ID-CODE	The decoded code of the identifier The background is highlighted in yellow during the transmission of the ID code; if the identifier is decoded, it is displayed for at least 60 seconds.
Dist [NM]	Display of the measured distance in nautical miles The delay time (main delay) of the ground station (50 µs for X channels / 56µs for Y channels) is considered when converting the time to slant range. Values are only displayed if the interrogator function is activated in the corresponding slot.
Search/Track	Display of the current distance measurement mode The measurement always starts in search mode. After synchronizing to a DME station, the measurement switches to track mode. If synchronization fails, the measurement switches to memory mode after the time set in "SETUP" > "DME INTERROG" > "MEMORY TIME". Then it attempts to restore the synchronization. If resynchronization is not successful, the measurement switches to search mode, otherwise back to track mode. Values are only displayed if the interrogator function is enabled in the corresponding slot.
Reply Eff. [%]	Display of the reply efficiency Rating of the valid reply pulses relative to the transmitted request pulses in percent

ⓘ If the same channel is set for two or more slots, you can only activate the interrogator in one of these slots. Otherwise, the query rate exceeds 20/s for this channel.

A pulse is sent only if "TX ON" is enabled, and during search or track mode. Using the high-power interrogator, the pulse output power is always 500 W. Using the low-power interrogator, the pulse output power is specified in the distance measurement mode.

Interrog. enabled
Activates the interrogator function for the selected slot.

6.3 Graphical pulse analysis

Access: [PULSE]

R&S EDS300 pulse analysis is used to test the RF output signal of DME / TACAN ground stations and interrogators and analyze pulse characteristics graphically. In "Pulse" mode, the power levels at a specific interrogator or transponder channel frequency are measured. If user-defined criteria are fulfilled, a pulse is detected and displayed in a power vs time diagram, similarly to an oscilloscope. Additionally, characteristic pulse parameters are determined using markers in the diagram.
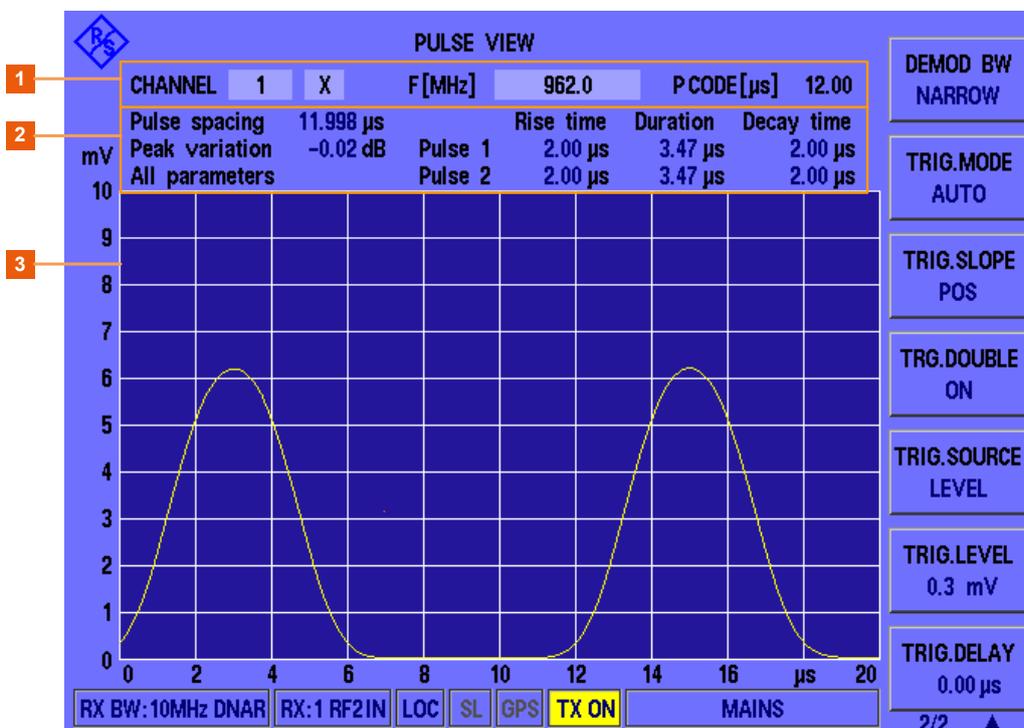
Figure 6-3: Default Pulse analysis view (All parameters)

1 = Selected receiver channel and frequency for measurement
2 = Marker and analysis results
3 = Power vs time diagram for measured channel

You can change the channel and frequency to be measured directly in the Pulse view, see "Changing the receiver (RX) channel number" on page 66 and "Changing the receiver (RX) frequency" on page 67.

The pulse code according to the ICAO frequency list is indicated for reference (see also Chapter B, "DME channel frequency list", on page 166).

Pulse mode is meant for graphical analysis; data streaming and data logging is not available. However, you can query the pulse trace data remotely. For numeric results, perform a DME/TACAN measurement (see Chapter 6.1, "DME and TACAN measurement mode", on page 38).

Analysis mode

By default, all main pulse characteristics are determined automatically ("All parameters"). The analysis mode determines which pulse parameters are indicated in the

"Pulse" view. Which analysis function is currently selected is displayed in the results area and on the "Analysis" softkey.

Markers

To determine the individual pulse parameters, the markers must be set to different points in the pulse traces. Thus, displaying the markers in the diagram is not useful for full analysis. In this case, only the parameter results are displayed in the "Pulse" view (see Figure 6-3).

For individual parameter analysis, the markers are displayed graphically in the diagram. The position and values of the markers are indicated numerically in the pulse results area.

Remote command:

"Pulse" view: `<RX>:MEASMODE_PULSE` on page 124

Results:

Trace data: `<RX>:PULSEVIEW:DATASET?` on page 160

Pulse parameters: `<RX>:PULSEVIEW:ANALYSIS?` on page 161

Analysis mode
Determines which pulse parameters are indicated in the "Pulse" view. Which analysis function is currently selected is displayed in the results area and on the "Analysis" softkey.

If the analysis is not successful, the mode in the results area is faded gray.

Pulse rise time
Pulse rise time for each pulse in µs, calculated as the difference between two markers (M2-M1). Marker 1 is set at 10 % of the rising pulse slope, marker 2 is set at 90 % of the rising pulse slope.
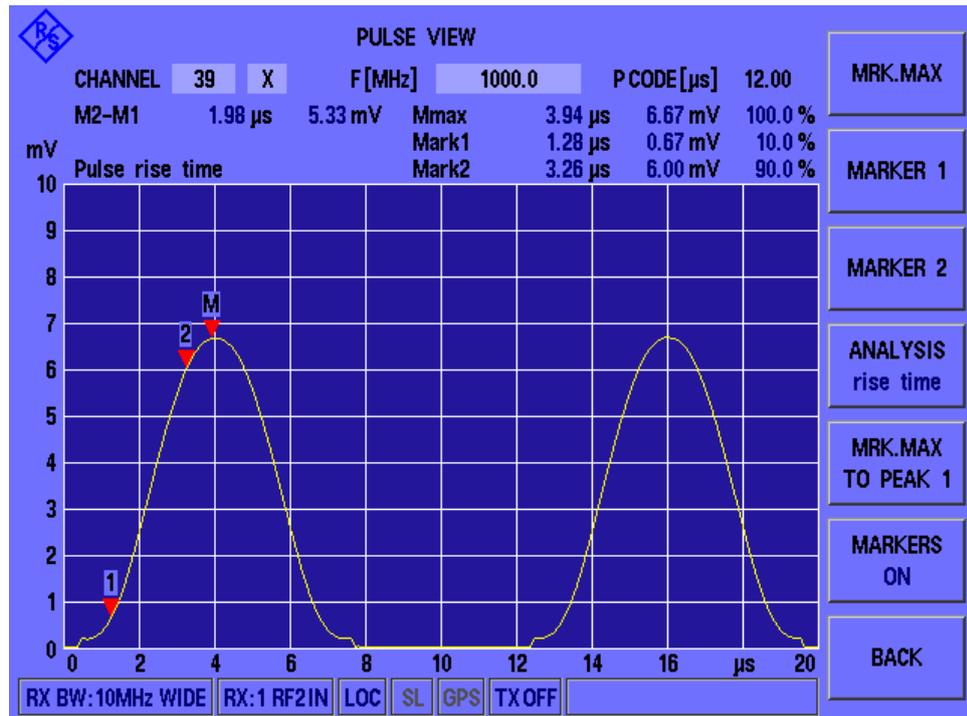
Figure 6-4: Pulse rise time results in Pulse view

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Pulse duration
Pulse duration for each pulse in μs, calculated as the difference between two markers (M2-M1). Marker 1 is set at 50 % of the rising pulse slope, marker 2 is set at 50 % of the falling pulse slope.
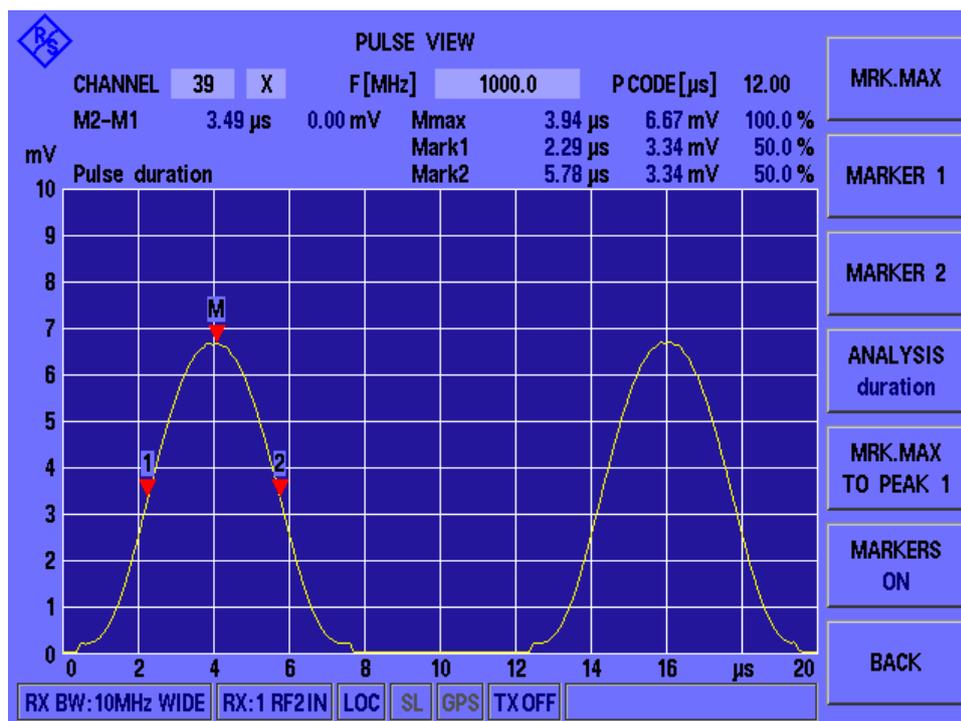
Figure 6-5: Pulse duration results in Pulse view

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Pulse decay time
Pulse decay time for each pulse in μs, calculated as the difference between two markers (M2-M1). Marker 1 is set at 90 % of the falling pulse slope, marker 2 is set at 10 % of the rising pulse slope.
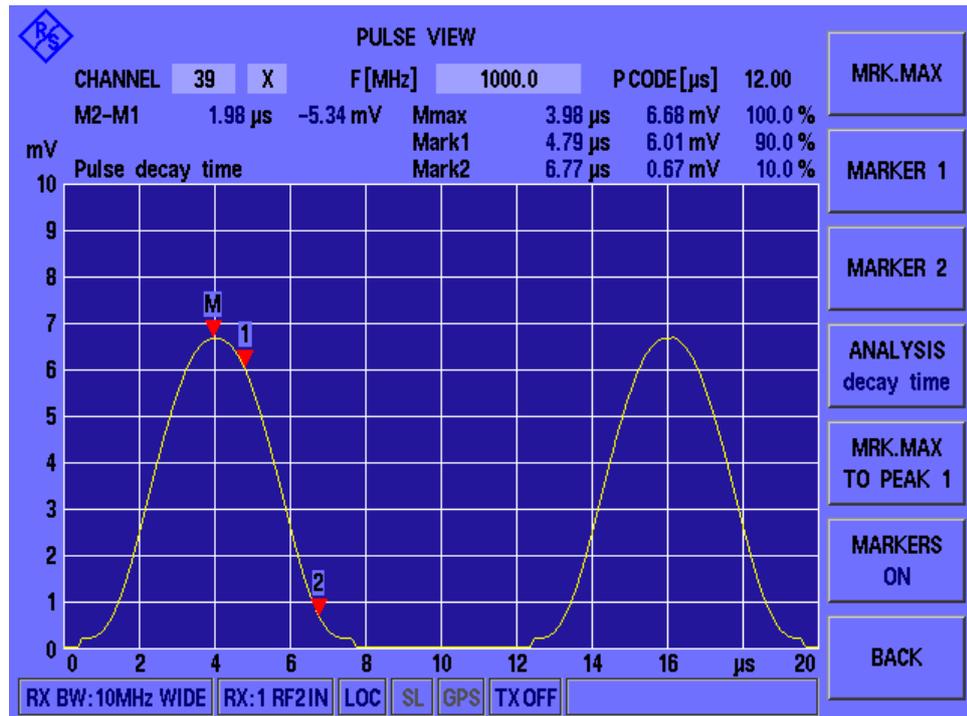
Figure 6-6: Pulse decay time results in Pulse view

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Pulse spacing

Pulse spacing between the pulses of a pulse pair in µs, calculated as the difference between two markers (M2-M1). Marker 1 is set at 50 % of the rising slope of the first pulse, marker 2 is set at 50 % of the rising slope of the second pulse.
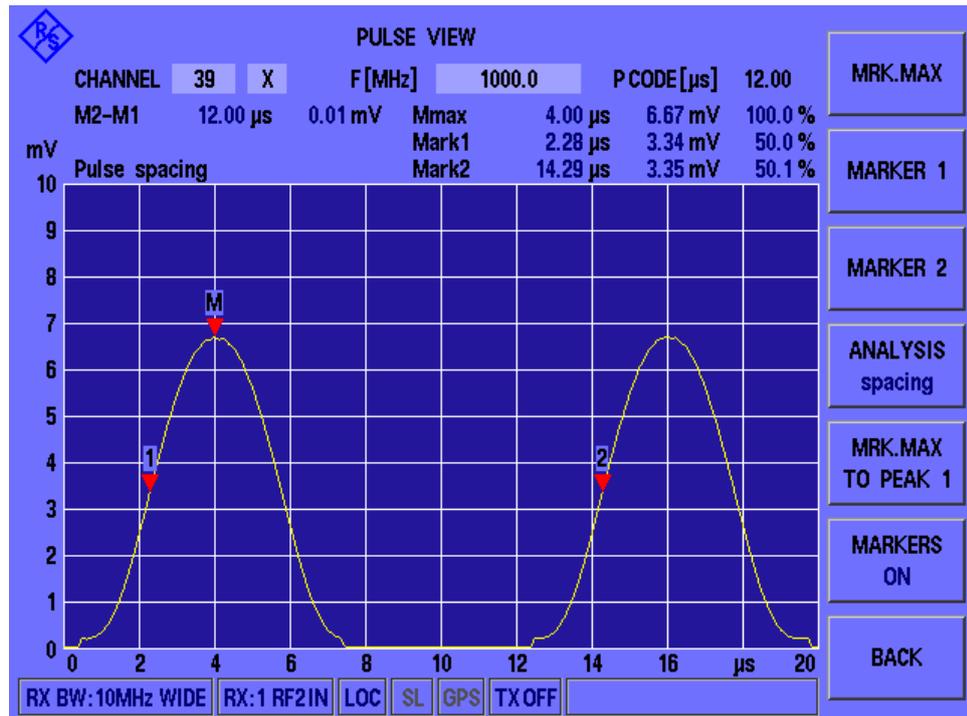
Figure 6-7: Pulse spacing results in Pulse view

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Peak variation

Variation in pulse peak power values between two pulses, in dB.

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Mark1

Measured power level in pulse 1, the time it was measured and percentage of total measured power.

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Mark2

Measured power level in pulse 2, the time it was measured and percentage of total measured power.

Remote command:
<RX>:PULSEVIEW:ANALYSIS? on page 161

Mmax

Maximum measured power level in the selected pulse (see "Pulse selection for peak marker (Mrk. Max to Peak 1/2)" on page 78), the time it was measured and percentage of total measured power at time of maximum.

Mrk. max to peak 1

The difference between two markers (M2-M1). Marker 1 is set to the peak power level of the first pulse, marker 2 is set to the peak power level of the second pulse.

Remote command:

`<RX>:PULSEVIEW:ANALYSIS?` on page 161

M2-M1

Difference between the time and power values for marker 2 and marker 1.

7 Configuring and performing measurements

7.1 Configuring signal input and output

Access: [SETUP]

The R&S EDS300 can analyze signals received by its RF IN interface, but also provide output to the same interface. Furthermore, a reference signal can be provided as input to the R&S EDS300 to improve accuracy of the measurements. All settings concerning signal input and output are described here.

ⓘ   Signal input and output settings are maintained even when you switch measurement modes.

💡   For reference measurements requiring very high accuracy, you can connect a power sensor from the R&S NRP family to the R&S EDS300 USB port. Results delivered by the power sensor are displayed on the R&S EDS300 without further configuration. See also Chapter 6.1.2, "DME measurement results", on page 40.

7.1.1 Configuring the input signal for analysis

Access: [SETUP] > "Signal In"

The signal to be analyzed by the R&S EDS300 can be obtained from different input connectors.
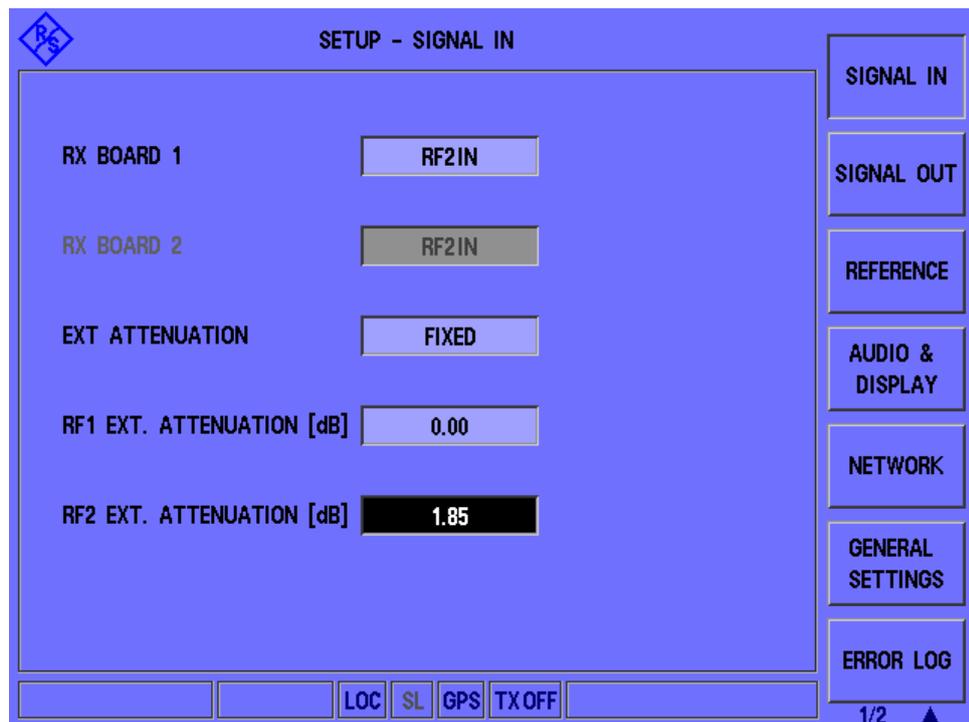
Input for RX Board 1

Defines the input signal for the first receiver board, that is, which connector the input signal is taken from.

"RF 1 IN"   RF input from the "RF 1 IN/OUT" connector on the front panel of the R&S EDS300

"RF 2 IN"   RF input from the "RF 2 IN" connector on the front panel of the R&S EDS300

Remote command:
<RX>:SETUP:INPUT on page 120
SETRX on page 129

Input from (optional) RX Board 2

Defines the input signal for the optional second receiver board. The same signals are available as for the first receiver board (Input for RX Board 1).

Only available if a second receiver board is installed on the instrument (requires R&S EDS300-B1).

Note: In Multi-DME mode, the same input signal is used for both receiver boards; thus, only the "RX Board 1" setting is available.

Remote command:
SETRX on page 129

External Attenuation

If enabled, external attenuation is considered when measuring the RF input. The attenuation value is indicated as an offset to the peak level in the measurement results (see "PEAKLEVEL [dBm]/[W]" on page 41).

"None"   No external attenuation is considered.

"Fixed"   A fixed attenuation is considered for the measured RF input (see "Fixed External Attenuation for RF Input 1/2" on page 58). You can define a different attenuation level for each RF input connector.

Remote command:
SETUP:EXT_ATTENUATION_TYPE on page 120

Fixed External Attenuation for RF Input 1/2

Defines the fixed power level by which the signal at the RF input 1 or 2 is attenuated during the measurement (for External Attenuation = "Fixed").

Remote command:
SETUP:RF1_EXTATTENUATION on page 120
SETUP:RF2_EXTATTENUATION on page 120

7.1.2   Configuring signal output

Access: [SETUP] > "Signal Out"

Different signals can be provided at one of the R&S EDS300's output connectors.
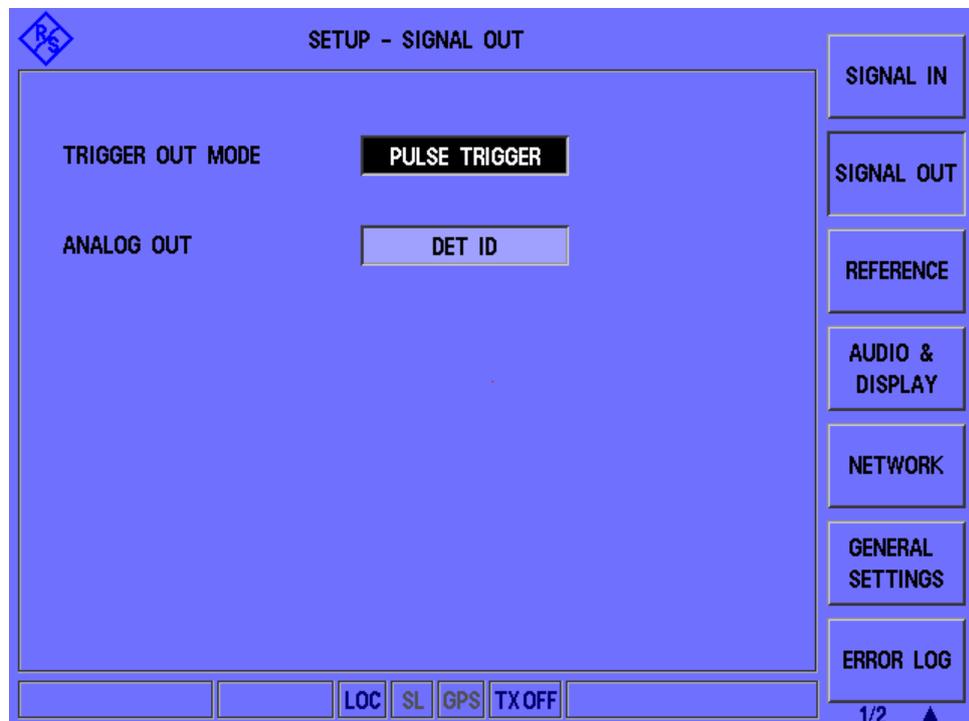
Trigger Out Mode

Defines the type of trigger signal to be provided at the [TRIGGER OUTPUT] connector on the rear panel of the R&S EDS300.

"PULSE_TRIGGER"

For each measured DME pulse, a square pulse with the same pulse width is output synchronously.

"PULSE DECODED"

For each measured DME pulse *pair* with the correct pulse code (=pulse spacing), a square pulse with a 1 µs pulse width is output.

"INTERROG TRIGGER"

For each transmitted interrogator pulse pair, a square pulse with a 1 µs pulse width is output.

"ID_CODE"

A high signal is output during the ID transmission.

"MRB_TRGGER"

For each decoded MRB (main reference burst), a square pulse with a 1 µs pulse width is output.
Only available for TACAN analysis

"ARB_TRIGGER"

For each decoded ARB (auxiliary reference burst), a square pulse with a 1 µs pulse width is output.
Only available for TACAN analysis (requires option R&S EDS300-K1).

"MDME SLOT"   Each time the channel is switched, a square pulse with a 1 µs pulse width is output.
Only available for Multi-DME analysis

Remote command:
SETUP:TRIGGER_OUT_MODE on page 122

Analog Out

Defines the type of analog signal to be provided at the [ANALOG OUTPUT] connector on the rear panel of the R&S EDS300.

"RX_DEMOD"   The demodulated baseband signal is output.

"DET ENVELOPE"

The peak detector envelope of the pulse signal is output.

"DET 15HZ"   The 15 Hz component in the peak detector envelope of the pulse signal is output.
Only available for TACAN analysis

"DET 135HZ"   The 135 Hz component in the peak detector envelope of the pulse signal is output.
Only available for TACAN analysis

"DET ID"   The audio signal (detector envelope) of the ID is output (at 1350 Hz, audible Morse code).

Remote command:
SETUP:ANALOG_OUT_MODE on page 119

7.1.3   Configuring the reference frequency

Access: [SETUP] > "Reference"

The R&S EDS300 can use the internal reference source or an external reference source as the frequency standard for all internal oscillators. A 10 MHz crystal oscillator is used as the internal reference source. If the external reference is used, all internal oscillators of the R&S EDS300 are synchronized to the external reference frequency. A reference frequency can also be provided by the R&S EDS300 to other devices that are connected to this instrument to synchronize multiple devices in a measurement setup.
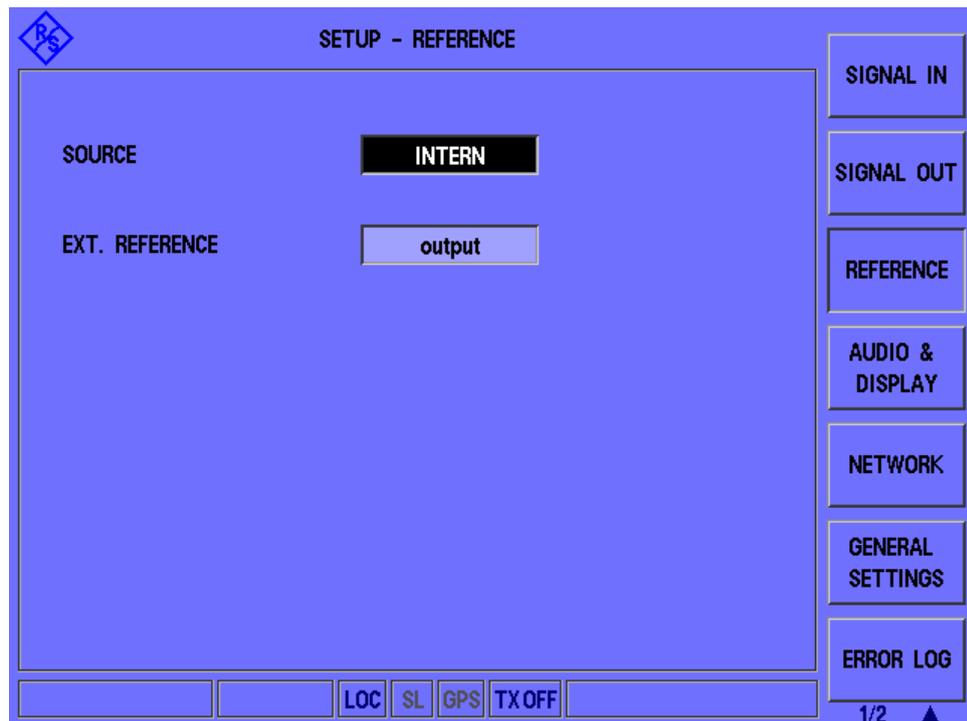
Source
Defines whether the [REF 10 MHz IN/OUT] connector on the rear panel of the R&S EDS300 is used to receive a reference frequency from an external device, or to provide the internal reference frequency of the R&S EDS300 as output to a connected device.

"Intern"   The internal reference frequency of the R&S EDS300 is provided as output to a device at the [REF 10 MHz IN/OUT] connector.

"Extern"   The R&S EDS300 uses the external reference frequency provided by another device at the [REF 10 MHz IN/OUT] connector.
                 The Ext. Reference field shows the availability of a reference signal at the connector.

Remote command:
SETUP:REFERENCE:SOURCE on page 121

Ext. Reference

Indicates the usage and state of a reference frequency at the [REF 10 MHz IN/OUT] connector.

"Present"   A 10 MHz reference signal is provided by an external device at the [REF 10 MHz IN/OUT] connector of the R&S EDS300.

"Not present"   No reference signal is available at the [REF 10 MHz IN/OUT] connector of the R&S EDS300. The internal 10 MHz reference signal is used for measurement with the R&S EDS300.

"Output"   The internal 10 MHz reference signal of the R&S EDS300 is provided as output to a device at the [REF 10 MHz IN/OUT] connector (Source = "Intern".

Remote command:
SETUP:REFERENCE:EXTREFERENCE? on page 121

7.1.4 Configuring DME interrogator signals

Access: [SETUP] > "DME Interrog"

The R&S EDS300 can act as a DME interrogator, sending out pulses to the ground station which returns the signals to the R&S EDS300 at a different frequency with a delay (see Chapter 5.1, "Evaluating DME signals", on page 35).
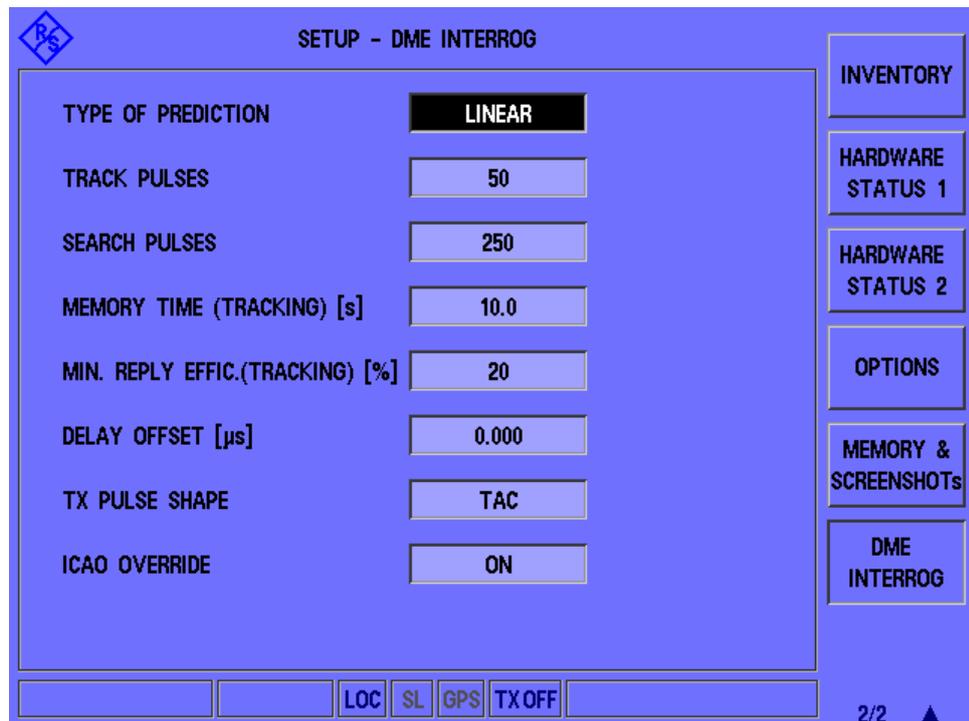
Type of Prediction

Defines the type of algorithm used to calculate the expected reply pulse.

During the search on a DME ground station, the time of arrival for the reply pulse is calculated from the relative speed between the DME ground station and the interrogator.

"Linear"   The time delay for the subsequent pulse is derived linearly from the previously measured delay.

"Static"   The relative speed is assumed to be zero; the time delay for the subsequent pulse is thus calculated from the mean value of previous time delays. This setting is meant for fixed monitoring stations.

Remote command:
<RX>:DST:PRED_TYPE on page 132

Track Pulses

Number of pulses during track mode for which the reply efficiency is calculated.

The larger the value, the more stable and accurate the results, but the slower the interrogator.

Remote command:
<RX>:DST:TPULSES on page 134

Search Pulses

Number of pulses during search mode for which the reply efficiency is calculated.

The larger the value, the more stable and accurate the results, but the slower the interrogator.

Remote command:
<RX>:DST:SPULSES on page 133

Memory Time (Tracking)

Defines the maximum time that the interrogator remains in memory mode. After this time, the next search mode is triggered. Define a period that is at least long enough to finalize ID transmission.

Valid values are between 0.1 seconds and 50 seconds.

Remote command:
<RX>:DST:MEM_TIME on page 131

Min. Reply Effic. (Tracking)

Minimum reply efficiency (in percent) after which the interrogator switches between tracking, memory and search modes (see Chapter 5.1, "Evaluating DME signals", on page 35).

Smaller values are better for difficult receiving conditions.

Valid values are between 20 % and 99 %.

Remote command:
<RX>:DST:MIN_REPLY_EFF on page 132

Delay Offset

Defines an offset to the delay between the transmission of the request pulse and the reply pulse.

This setting is useful to compensate for delay times caused by cable lengths, for example.

Valid values are between -100 µs and +100 µs.

Remote command:
<RX>:DST:DELAY_OFFSET on page 131

TX Pulse Shape

Defines the shape of the transmitted (TX) interrogator pulse, if enabled.

"DME"   Gauss pulse with a rise and fall time of 2.5 µs

"TAC"   Asymmetric Gauss pulse with a rise time of 2.0 µs and a fall time of 2.7 µs
                Only available for TACAN measurements, requires option R&S EDS300-K1.

DME	TAC
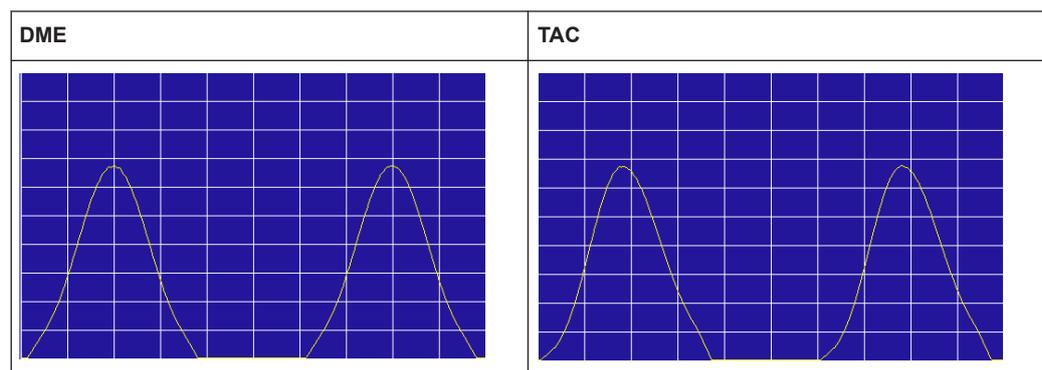
Remote command:
<RX>:DST:PULSE_SHAPE on page 133

ICAO Override

Ignores the ICAO specifications regarding the maximum pulse repetition rate.

If the ICAO override is enabled, pulse rates of up to 6000 pulses per second are available. The TX frequency range is extended to 962 MHz to 1213 MHz.

If this function is disabled, a maximum of 150 pulses per second are allowed for the first 30 seconds, then only 30 pulses per second are allowed. This restriction is required by the ICAO.

Remote command:
SETEXPERT on page 135

7.1.5 Receiving GPS signals

Access: [GPS]

A GPS input signal allows the R&S EDS300 to synchronize its time and positioning information with an accurate reference. Therefore, the R&S EDS300 provides an RS232 interface on its rear panel (see also Chapter 4.2.2.9, "RS232 GPS interface", on page 28).

In addition, the GPS option (R&S EDS300-K3) must be installed to evaluate and display the received GPS information.

The baud rate (or *signalling rate*) of the GPS signal is configurable. All GPS information and settings are available in the "GPS" window.

Figure 7-1: GPS view with GPS data

The following GPS data for the current position of the R&S EDS300 is displayed in the "GPS" window:

Table 7-1: GPS data in the GPS window

Label	Description	Unit
Latitude	Latitude	[°] Degree
Longitude	Longitude	[°] Degree
Altitude	Altitude	m
Speed	Speed (knots)	knots/h
Date	Date	dd.mm.yyyy

Label	Description	Unit
Speed	Speed (km/h)	km/h
Time	Time	hh.mm.ss
Protocol	GPS protocol, e.g. NMEA (National Marine Electronics Association)	
Status	GPS status and number of satellites detected	
GPRMC	The GPRMC (Global Positioning Recommended Minimum Specific = minimum information) dataset received by the R&S EDS300 is displayed as an ASCII character set with 4800 Bd.	
GPGGA	GPGGA (Global Positioning System Fix Dat) dataset containing the most important information of the GPS position and accuracy. Displayed as an ASCII character set with 4800 Bd.	
From COM	Data as received by the serial interface ([RS232])	

Baud Rate

Indicates and defines the currently used baud rate (or *signalling rate*) for the GPS signal. Values from 4800 Bd to 115200 Bd are available.

Remote command:
`SETGPSBAUD` on page 118

Sync

Time synchronization on incoming messages or PPS pulses makes the measurement more precise. Select the method of synchronization.

"NMEA"　　　　　Time synchronization on incoming messages

"PPS"　　　　　Time synchronization on PPS pulses

Remote command:
`SETGPSSYNC` on page 119

7.2 Configuring DME measurements

Access: [DME]

DME measurements for DME and (optionally) TACAN signals are configured in the "DME/TACAN" view.

See also Chapter 7.1.4, "Configuring DME interrogator signals", on page 61.

Changing the receiver (RX) channel number
Access: [CHAN]

A DME channel is uniquely identified by its channel number (+extension) or its receive frequency. Thus, if you set the receiver (RX) channel to a different (valid) value and apply the change, the associated parameters are automatically adapted according to the ICAO frequency list. The associated parameters are the channel frequency, transmit (TX) frequency, and pulse spacing.

To change the extension, use the Channel selection X, Y function.

The valid channel number range for DME channels is from 1 to 126 (see Chapter B, "DME channel frequency list", on page 166).

Remote command:
<RX>:DME:RFCH on page 127
<RX>:DME:RFCH_PS? on page 155

Channel selection X, Y
Access: [CHAN]

Switches between the channel codes X and Y according to the ICAO frequency list. The currently selected channel is indicated at the bottom of the softkey.

Changing the receiver (RX) frequency
Access: [FREQ]

A DME channel is uniquely identified by its channel number (+extension) or its receive frequency. Thus, if you set the receiver (RX) frequency to a different (valid) value and apply the change, the associated parameters are adapted according to the ICAO frequency list automatically. The associated parameters are the channel number (+extension), transmit (TX) frequency, and pulse spacing.

For combined VORTAC ground stations, the channel is not only uniquely defined by the channel number or the RX frequency, but also by the corresponding VHF frequency. If you enter a valid VHF frequency in the "RX freq" field, the R&S EDS300 recognizes it. The entered frequency is then displayed as the "VHF Frequency (VHFF)" on page 67, and the "RX freq" is set to the corresponding RX frequency. This function is only available with the TACAN option (R&S EDS300-K1).

The valid frequency range for DME channels is from 960 MHz to 1215 MHz (see Chapter B, "DME channel frequency list", on page 166).

If the frequency is inside the valid range, but not assigned to a channel according to the ICAO frequency list, and it is not a VHF frequency, the associated parameters are indicated in yellow.

Remote command:
<RX>:DME:FREQ on page 125

RX Pulse Code (P.Code)
Indicates the reply pulse code (spacing) for the selected DME channel in µ s.

Remote command:
<RX>:DME:RFCH_PS? on page 155

VHF Frequency (VHFF)
For combined VORTAC ground stations, the channel is not only uniquely defined by the channel number or the RX frequency, but also by the corresponding VHF frequency. If the RX freq has a corresponding VHF frequency, it is displayed in this field.

Since this field is read-only, you cannot enter a VHF frequency directly. However, if you enter a valid VHF frequency in the RX freq field, the R&S EDS300 recognizes it. The entered frequency is then displayed as the "VHFF", and the RX freq is set to the corresponding RX frequency.

This function is only available with the TACAN option (R&S EDS300-K1).

Interrogator Transmission (TX) frequency

The frequency at which the interrogator pulses are transmitted, if enabled (see "Transmitter (TX) State" on page 68).

The valid frequency range for interrogator channels is from 1025 MHz to 1150 MHz (see Chapter B, "DME channel frequency list", on page 166).

If ICAO Override is enabled, the TX frequency range is extended to 962 MHz to 1213 MHz.

If a frequency outside the valid range is entered, the value is indicated in red and cannot be stored.

Remote command:
<RX>:DME:TXFREQ on page 129

TX Pulse Code (P.Code)

Defines the interrogator pulse code (spacing) in μ s.

The valid value range is from 11 μs to 42 μs.

If you enter a value that does not comply with the ICAO channel definition (see Chapter B, "DME channel frequency list", on page 166), the input field is highlighted yellow.

Remote command:
<RX>:DME:RFCH_PS? on page 155
For double pulses:
<RX>:DST:TX_PCODE on page 130

Transmitter (TX) State

Activates and deactivates the interrogator. If activated, the R&S EDS300 transmits interrogator pulses to the ground station in the specified pulse repetition rate (see PRR for Search Mode/ PRR for Track Mode. An active transmitter is indicated by a yellow "TX ON" message in the status bar of the R&S EDS300 screen.

NOTICE! Risk of damage to the instrument or injury due to false transmission settings. Only change transmission settings while the transmitter is deactivated. Falsely entered settings can lead to unexpected output levels that can cause damage or injury.

Remote command:
<RX>:DST:TXON on page 134

Measurement Time

Defines the time span in which the results are averaged. Each measurement is performed 130 times per second. Thus, each measurement requires approximately 7.4 ms. For the minimum measurement time of 7 ms, only one measurement is performed, and no averaging takes place.

Values between 7 ms and 10 seconds are available, in 10 ms steps.

Remote command:
<RX>:DME:MEASTIME on page 126

Att.Mode

The attenuation mode defines the sensitivity of the receiver board by selecting a different signal path for each mode (see Figure 5-1).

The following attenuation modes are provided (for DME measurements only):

"Low Noise"	Provides a high sensitivity; Suitable when scanning the area for distant signals
"Normal"	Provides a normal sensitivity;
"Low Distortion"	
	Provides a low sensitivity Suitable when analyzing a nearby signal, to avoid overload due to high-level signals.
"Auto"	The signal attenuation is selected automatically according to the signal strength in each slot. This mode works best with clean signals. In difficult receiving conditions, the "Low Noise", "Normal" or "Low Distortion" modes can be more stable. When monitoring signals with mostly constant signal levels, it is also recommended that you use the "Low Noise", "Normal" or "Low Distortion" mode. If the R&S EDS300 has to adapt the attenuation frequently, indicated by a frequent clicking noise from the attenuator, minor shifts in the trace can occur.

Remote command:
<RX>:DME:ATTMODE on page 125

Receiver (RX) Mode
Defines the signal to be received and analyzed by the R&S EDS300, depending on the measurement task.

The currently selected mode is indicated on the softkey.

"Reply"	(Default) The signal transmitted by the DME ground station is measured.
"Interrogator"	The signal transmitted by the interrogator is measured. In this case, the RX frequency is set to the transmit frequency (see Table 6-1).

Remote command:
<RX>:DME:RXMODE on page 128

View
Switches between the different measurement results as described in Chapter 6, "Measurements and results", on page 38.

Remote command:
<RX>:DME:SET_VIEW on page 159

Interrogator Transmission (TX) Pulse Width
Defines the width of the pulses the R&S EDS300 interrogator transmits to the ground station.

Values between 0.8 µs and 4.5 µs are allowed.

Remote command:
<RX>:DST:TXPULSE_WIDTH on page 130

PRR for Search Mode

Defines the pulse repetition rate (PRR) for the interrogator's search mode.

The valid value range is from 5 to 6000 pulses per second. (If ICAO Override is disabled, a maximum of 150 pulses per second are possible; see Chapter 7.1.4, "Configuring DME interrogator signals", on page 61.)

Note that according to the DME specification, after 30 seconds the pulse repetition rate in the search mode must be reduced to 30 pulse pairs per second. In this case, "Search$_{30}$" is displayed in the "Search/Track" field.

Remote command:
`<RX>:DST:PRR` on page 133

PRR for Track Mode

Defines the pulse repetition rate (PRR) for the interrogator's track mode.

The valid value range is from 5 to 6000 pulses per second. (If ICAO Override is disabled, a maximum of 150 pulses per second are possible; see Chapter 7.1.4, "Configuring DME interrogator signals", on page 61.)

Remote command:
`<RX>:DST:PRR` on page 133

RF bandwidth (RF BW)

Defines the RF bandwidth for DME measurements.

"0.5 MHz"   500 kHz bandwidth

"10 MHz"   10 MHz bandwidth

Remote command:
`<RX>:DME:RF_BW` on page 128

Demodulation bandwidth Demod BW

Defines the bandwidth of the digital filter used for DME measurement.

"Narrow"   Narrow filter for narrow pulses. Adjacent pulses or signal effects outside the pulse are not measured. Wider pulses can be distorted or cut off. Measurement time increases.

"Wide"   Wide filter for wider pulses; entire pulse is measured without distortions. Adjacent pulses or signal effects outside the pulse are possibly included.

Remote command:
`<RX>:DME:DEMOD_BW` on page 126

7.3 Performing pulse analysis

R&S EDS300 pulse analysis is used to test the RF output signal of DME / TACAN ground stations and interrogators and analyze pulse characteristics graphically. In Pulse mode, the power levels at a specific interrogator or transponder channel frequency are measured. If user-defined criteria are fulfilled, a pulse is detected and dis-

played in a power vs time diagram, similarly to an oscilloscope. Additionally, characteristic pulse parameters are determined using markers in the diagram.

You can change the channel and frequency to be measured directly in the Pulse view, see "Changing the receiver (RX) channel number" on page 66 and "Changing the receiver (RX) frequency" on page 67.

The pulse code according to the ICAO frequency list is indicated for reference (see also Chapter B, "DME channel frequency list", on page 166).

7.3.1 Configuring the power vs. time diagram

Access: [Pulse]

The scaling and value range of the x-axis and y-axis in the power vs time diagram are configurable.

X-axis Scaling (Time/Div)

Time per division; defines the scaling of the x-axis, which consists of 10 divisions.

The valid value range is from 0.5 µs to 50 µs.

Note that the hardware supports a minimum of 2 µs/div. Lower values do not reduce the time between two captured points, but represent a zoomed display.

Remote command:
`<RX>:PULSEVIEW:TIMEDIV` on page 138

Y-axis Unit

Unit for the power values; the following units are available:

- V (linear scaling)
- W (square scaling)
- dBm (logarithmic scaling)

Remote command:
`<RX>:PULSEVIEW:UNIT` on page 142

Y-axis Scaling (<Unit>/Div)

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

Fixed values are available, depending on the specified Y-axis Unit.

Remote command:
`<RX>:PULSEVIEW:YSCALE_DB_DIV` on page 142
`<RX>:PULSEVIEW:YSCALE_MW_DIV` on page 143
`<RX>:PULSEVIEW:YSCALE_NW_DIV` on page 144
`<RX>:PULSEVIEW:YSCALE_PW_DIV` on page 144
`<RX>:PULSEVIEW:YSCALE_UW_DIV` on page 145
`<RX>:PULSEVIEW:YSCALE_V_DIV` on page 145
`<RX>:PULSEVIEW:YSCALE_MV_DIV` on page 143
`<RX>:PULSEVIEW:YSCALE_UV_DIV` on page 144

Y-axis Range (Max. Lev)

The maximum power level on the y-axis;

The valid value range depends on the specified Y-axis Unit:

- V: 10 µV to 10 V
- W: 1 pW to 200 mW
- dBm: -70 dBm to 30 dBm

Remote command:
`<RX>:PULSEVIEW:YSCALE_MAXLEV_DBM` on page 146
`<RX>:PULSEVIEW:YSCALE_MAXLEV_MW` on page 146
`<RX>:PULSEVIEW:YSCALE_MAXLEV_UW` on page 146
`<RX>:PULSEVIEW:YSCALE_MAXLEV_NW` on page 147
`<RX>:PULSEVIEW:YSCALE_MAXLEV_PW` on page 147
`<RX>:PULSEVIEW:YSCALE_MAXLEV_V` on page 147
`<RX>:PULSEVIEW:YSCALE_MAXLEV_MV` on page 148
`<RX>:PULSEVIEW:YSCALE_MAXLEV_UV` on page 148

Att.Mode

The attenuation mode defines the sensitivity of the receiver board by selecting a different signal path for each mode (see Figure 5-1).

The following attenuation modes are provided (for Pulse view measurements only):

"Low Noise"   Provides a high sensitivity
               Suitable when scanning the area for distant signals

"Normal"   Provides a normal sensitivity

"Low Distortion"

               Provides a low sensitivity
               Suitable when analyzing a nearby signal, to avoid overload due to high-level signals

"Auto"   The signal attenuation is set automatically *according to the power range* defined by "Y-axis Range (Max. Lev)" on page 72.

Remote command:
<RX>:DME:ATTMODE on page 125

Trace Mode

Defines the update mode for subsequent pulses (or pulse pairs)

"CLR/WR"   Clear/write (default): the pulse (pair) is overwritten by each new pulse (pair).

"AVRG"   The average is formed over several measurements. How many measurements are averaged is defined by the Average Count (AVRG) setting.
               As soon as the required number of pulses have been acquired, the display is updated after each sweep, averaging the specified number of previous pulses.

"Maxhold"   The maximum value is determined over all previously measured pulses (pairs) and displayed. The R&S EDS300 saves each trace point in the trace memory only if the new value is greater than the previous one.

Remote command:
<RX>:PULSEVIEW:TRACE on page 138

Average Count (AVRG)

Number of pulses used as a basis for averaged results ("Average" trace mode).

The valid value range is from 1 to 100.

Remote command:
<RX>:PULSEVIEW:AVRG on page 137

7.3.2 Configuring the pulse detection

Access: [Pulse] > "More softkeys"

Which pulses are detected and displayed in the power vs time diagram is configurable.

Changing the receiver (RX) channel number
Access: [CHAN]

A DME channel is uniquely identified by its channel number (+extension) or its receive frequency. Thus, if you set the receiver (RX) channel to a different (valid) value and apply the change, the associated parameters are automatically adapted according to the ICAO frequency list. The associated parameters are the channel frequency, transmit (TX) frequency, and pulse spacing.

To change the extension, use the Channel selection X, Y function.

The valid channel number range for DME channels is from 1 to 126 (see Chapter B, "DME channel frequency list", on page 166).

Remote command:
`<RX>:DME:RFCH` on page 127
`<RX>:DME:RFCH_PS?` on page 155

Channel selection X, Y
Access: [CHAN]

Switches between the channel codes X and Y according to the ICAO frequency list. The currently selected channel is indicated at the bottom of the softkey.

Changing the receiver (RX) frequency
Access: [FREQ]

A DME channel is uniquely identified by its channel number (+extension) or its receive frequency. Thus, if you set the receiver (RX) frequency to a different (valid) value and apply the change, the associated parameters are adapted according to the ICAO frequency list automatically. The associated parameters are the channel number (+extension), transmit (TX) frequency, and pulse spacing.

For combined VORTAC ground stations, the channel is not only uniquely defined by the channel number or the RX frequency, but also by the corresponding VHF frequency. If you enter a valid VHF frequency in the "RX freq" field, the R&S EDS300 recognizes it. The entered frequency is then displayed as the "VHF Frequency (VHFF)" on page 67, and the "RX freq" is set to the corresponding RX frequency. This function is only available with the TACAN option (R&S EDS300-K1).

The valid frequency range for DME channels is from 960 MHz to 1215 MHz (see Chapter B, "DME channel frequency list", on page 166).

If the frequency is inside the valid range, but not assigned to a channel according to the ICAO frequency list, and it is not a VHF frequency, the associated parameters are indicated in yellow.

Remote command:
<RX>:DME:FREQ on page 125

Demodulation bandwidth (Demod BW)
Defines the bandwidth of the digital filter used during pulse measurement.

The RF bandwidth remains fixed at 10 MHz and cannot be changed.

"Narrow"   Narrow filter (0.5 MHz). Suppresses adjacent channels, distorts the pulse shape for wider pulses.

"Wide"   Wide filter (10 MHz). For wider pulses. The entire pulse is measured without distortions. Adjacent pulses or signal effects outside the pulse can be included.

Remote command:
<RX>:PULSEVIEW:BW on page 137

Trigger Mode
Sets the trigger mode which determines the behavior of the instrument if no trigger occurs.

"Auto"   The instrument triggers automatically after a time interval if the trigger conditions are not fulfilled. If a real trigger occurs, a new measurement is started immediately. This mode helps you see the waveform even before the trigger conditions are set correctly. The waveform on the screen is not synchronized, and successive waveforms are not triggered at the same point of the waveform. The time interval depends on the time base settings.

"Normal"   The instrument acquires a waveform only if a trigger occurs, that is, if all trigger conditions are fulfilled. If no trigger occurs, no waveform is acquired and the last acquired waveform is displayed. If no waveform was captured before, none is displayed.
                When no trigger has been found for longer than one second, a message box appears that shows the time elapsed since the last trigger.

"Single shot"   The instrument performs a single sweep when you select the [ENTER] key and the trigger conditions are fulfilled. Each new sweep must be started manually.

Remote command:
<RX>:PULSEVIEW:TRIGMODE on page 140

Trigger Slope
Defines whether triggering occurs when the signal rises to the trigger level (positive slope) or falls down to it (negative slope).

Remote command:
<RX>:PULSEVIEW:TRIGSLOPE on page 141

Trigger Double

If enabled, triggering only occurs when a double pulse, that is: a pulse pair is detected. Single pulses do not trigger evaluation.

If disabled, each individual pulse that fulfills the trigger conditions is displayed and evaluated.

Remote command:
`<RX>:PULSEVIEW:TRIGDOUBLE` on page 139

Trigger Source

Defines the signal which triggers the measurement.

"Level"	The measured input signal
"External"	An external trigger signal provided by a device connected to the [trigger in] connector on the rear panel of the R&S EDS300; The defined trigger level is irrelevant.
"Interrog"	The pulses sent by the R&S EDS300 interrogator
"DME Pulse"	A detected DME double pulse
"TAC_MRB"	The TACAN main reference burst (if available)
"TAC_ARB"	The TACAN auxiliary reference burst (if available)

Remote command:
`<RX>:PULSEVIEW:TRIGSOURCE` on page 141

Trigger Level

Defines the trigger level that the specified trigger source must reach to trigger a measurement.

The valid value range depends on the selected Y-axis Unit and maximum level for the power axis:

- V: 0 µV to 2 V
- W: 0 mW to 80 mW
- dBm: -121 dBm to 19 dBm

Remote command:
`<RX>:PULSEVIEW:TRIGLEVRF_MV` on page 140

Trigger Delay

Defines the time distance from the trigger point to the zero point of the diagram. If the trigger delay is 0, the trigger point matches the zero point. Positive values move the trigger to the right of the zero point. Negative values allow for measurement values to be displayed that occur shortly *before* the actual trigger event.

During the trigger delay, no further trigger events are detected.

The valid delay times depend on the "X-axis Scaling (Time/Div)" on page 72 setting. A delay outside the displayed time range is not possible. The maximum delay times are from -20 µs to 320 µs.

Remote command:
`<RX>:PULSEVIEW:TRIGDELAY` on page 139

7.3.3 Using markers in pulse analysis

Access: [Marker]

In the graphical pulse analysis display, up to three markers can be enabled to indicate special points of interest in the diagram. The R&S EDS300 can then use these specific marker values to analyze characteristic pulse parameters.

As described in Chapter 6.3, "Graphical pulse analysis", on page 48, the markers are placed at specific positions in the measured signal automatically to analyze the selected parameters. However, you can also place the markers at any other measured value in the signal manually. The positions and values of all three markers, as well as the difference between the markers 1 and 2 are displayed in the results area of the Pulse view.
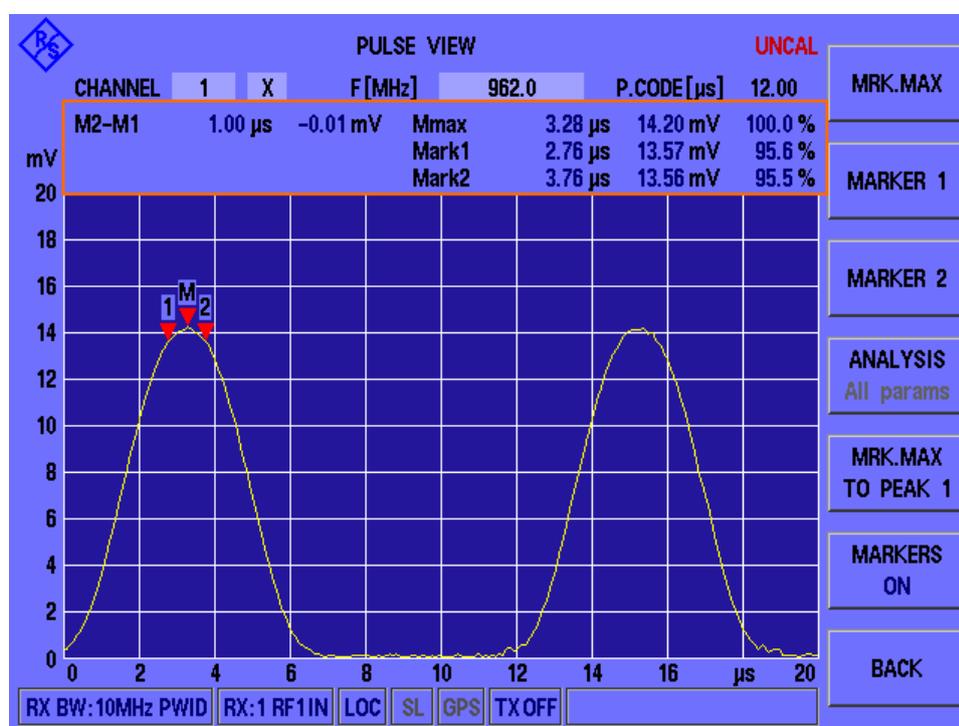
As soon as you select an analysis function, the manual marker positions are lost.

You cannot place the markers exactly at the defined positions required to determine the pulse parameters, if no sample was measured at that position. For automatic analysis, the required values are interpolated, if necessary.

Peak marker (Mrk. Max)

Allows you to place the peak marker to any position in the measured signal manually. Enter the time which defines the x-axis value of the marker, or move the marker using the rotary knob. The measured power value at the marker position is displayed in the result area ("Mmax") and defined as 100 %. The peak marker value is used as a reference for the delta markers 1 and 2.

Marker 1

Allows you to place marker 1 to any position in the measured signal manually. Enter the time which defines the x-axis value of the marker, or move the marker using the rotary knob. The measured power value at that time and the percentage of the Peak marker (Mrk. Max) power is displayed in the result area ("Mark1"). The difference between marker 2 and marker 1 is updated to the new result ("M2-M1").

Marker 2

Allows you to place marker 2 to any position in the measured signal manually. Enter the time which defines the x-axis value of the marker, or move the marker using the rotary knob. The measured power value at that time and the percentage of the Peak marker (Mrk. Max) power is displayed in the result area ("Mark2"). The difference between marker 2 and marker 1 is updated to the new result ("M2-M1").

Analysis functions

Selects the analysis function to be performed on the measured data. The currently selected function is indicated on the softkey. If manual positioning was active last, the previously selected function is indicated, but shaded gray.

If you select a function and confirm it, the markers are repositioned as required and manual positioning is lost.

"All parameters"	All parameters, see Figure 6-3.
"Pulse rise time"	See "Pulse rise time" on page 50
"Pulse duration"	See "Pulse duration" on page 51
"Pulse decay time"	See "Pulse decay time" on page 52
"Pulse spacing"	See "Pulse spacing" on page 53

Pulse selection for peak marker (Mrk. Max to Peak 1/2)

Selects the pulse for which the peak marker ("Mmax") is set to the maximum.

Markers On / Off

Enables or disables the display of the markers in the Pulse view.

Note: Even when markers are not displayed (Off), the selected analysis functions are performed.

Back

Returns to the "Pulse" menu previously displayed.

8 Data management

The R&S EDS300 allows you to store and load measurement settings, and export measurement data for analysis later. Finally, you can store the measurement results displayed on the screen.

8.1 Storing and recalling measurement settings (preset)

Possibly you would like to restore or repeat a measurement you performed under specific conditions on the R&S EDS300. Or you would like to troubleshoot a measurement and require a defined instrument state to detect the precise cause of the error. In these cases, you can store and recall instrument and measurement settings. Up to 20 different settings, referred to as *User Presets* can be stored and recalled on the instrument.

Settings stored in a User Preset

In each User Preset, the following current settings are stored:

- All measurement settings (seeChapter 7, "Configuring and performing measurements", on page 56)
- All general instrument settings except for the IP address and host name (see Chapter 9, "General instrument setup", on page 85)

The list of User Presets and the corresponding functions are available in the [Preset] softkey menu.

8.1.1 Storage and recall functions

Access: [Preset]

For each stored User Preset, the specified file name and the storage date are indicated in the "Preset" window. Empty User Presets are indicated by a simple "UserPreset" with no date.

```
                              PRESET                              ┌──────────┐
 ┌─┐                                                              │ FACTORY  │
 │R│                                                              │  PRESET  │
 │S│                                                              └──────────┘
 ┌────────────────────────────────────────────────────────┐      ┌──────────┐
 │  1  UserPreset                       02.02.2016 12:16:45 │      │  SELECT  │
 │  2  CGN                              02.02.2016 12:16:51 │      │ ┌──────┐ │
 │  3  TEST                             02.02.2016 12:17:38 │      │ │6_    │ │
 │  4  UserPreset                                           │      │ └──────┘ │
 │  5  UserPreset                                           │      └──────────┘
 │  6  ██████████████████████████████████████████████████  │      ┌──────────┐
 │  7  UserPreset                                           │      │          │
 │  8  UserPreset                                           │      │   SAVE   │
 │  9  UserPreset                                           │      │          │
 │ 10  UserPreset                                           │      └──────────┘
 │ 11  UserPreset                                           │      ┌──────────┐
 │ 12  UserPreset                                           │      │  RECALL  │
 │ 13  UserPreset                                           │      └──────────┘
 │ 14  UserPreset                                           │
 │ 15  UserPreset                                           │      ┌──────────┐
 │ 16  UserPreset                                           │      │  DELETE  │
 │ 17  UserPreset                                           │      └──────────┘
 │ 18  UserPreset                                           │
 │ 19  UserPreset                                           │      ┌──────────┐
 │ 20  UserPreset                                           │      │  RENAME  │
 └────────────────────────────────────────────────────────┘      └──────────┘
 ┌──────────┐┌──────┐┌───┬──┬───┬─────┐┌──────┐
 │          ││      ││LOC│SL│GPS│TX OFF││      │
 └──────────┘└──────┘└───┴──┴───┴─────┘└──────┘
```
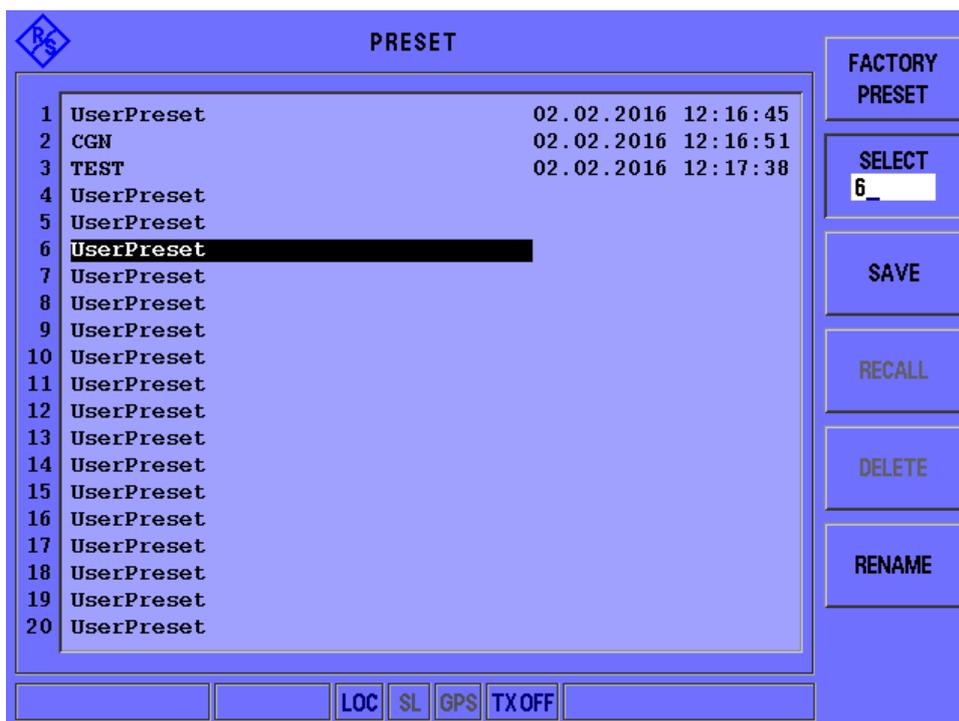
Factory Preset

When delivered, the R&S EDS300 has a default configuration. You can restore this defined initial state at any time as a known starting point for measurements. Presetting is often recommendable as a first step in troubleshooting when unusual measurement results arise.

Note: The instrument's IP address and host name are not reset.

Remote command:
FACTORY_PRESET on page 116

Select<x>

The number of the currently selected User Preset is indicated on the softkey. By default, the User Preset number 1 is selected. To select a different User Preset for a subsequent function, select the "Select<x>" softkey and enter the number of the User Preset.

Save

Stores the current measurement settings in the selected User Preset under the specified name, together with the current date and time.

If the selected User Preset already contained settings before, they are overwritten.

Recall

Overwrites the current measurement settings by the settings stored in the selected User Preset.

Delete

Deletes the settings and the name assigned to the selected User Preset.

Rename

Renames the selected User Preset.

8.2 Logging measurement data

During a measurement with the R&S EDS300, the input signal is captured and various results are calculated and displayed on the screen (see Chapter 6, "Measurements and results", on page 38). These results can also be stored to a connected USB memory device, simultaneously to the running measurement. In this case, data is stored continuously for all measurements that are performed after logging is started and until it is stopped. The data for each logging session is stored to a file in the main directory of the USB storage device. The file name includes the date and time, using the following syntax:

```
edslog_<dd.mm.yyyy><hh.mm.ss>.txt
```

The data is stored in FAT32 format, in files with a maximum size of 2 GB each.

The stored data corresponds to the results of the remote commands (see Chapter C, "Format description of DME measurement data", on page 182).

ⓘ The optional TACAN stick cannot be used to store data; however, a second USB stick can be connected simultaneously for data logging.

[START]

If a USB storage device is connected to the R&S EDS300, a data file is created on the USB device. All measurement results from the running measurement are stored in the file. The message USB LOGGING ON is displayed in the status bar.

If no USB device is detected, or the device cannot be read correctly, Can't mount USB-Stick is displayed.

Remote command:
<RX>:STREAM on page 153
Log interval:
SETUSBLOGTIME on page 151
Log file creation:
SETUSBLOGMODE on page 151

[STOP]

Data logging is stopped, the file is closed, and the message LOGGING STOPPED is displayed in the status bar. The USB device can be removed from the R&S EDS300.

Remote command:
`<RX>:STOPSTREAM` on page 152

8.3 Creating and storing screenshots

Access: [Setup] > "More Softkeys" > "Memory & Screenshots"

You can create a screenshot of the current display on the R&S EDS300 at any time during operation. Screenshots are useful to document measurement results, for example.

Creating a screenshot

When you select the [screenshot] key, the display is stored as a graphic file on the instrument (until it is explicitly deleted) and can be copied to a USB memory device later (see Exporting screenshots to a USB device). Internally, the screenshot files are named "Screenshot_", followed by a consecutive number.

If a USB device is connected to the R&S EDS300 when the screenshot is created, the screenshot is stored there directly as a `.PNG` file. A dialog box with the default file name is displayed. To change the name of the file on the USB device, click in the name field and overwrite the default name. Note, however, that the file is also stored internally, and the file name remains unchanged. Thus, if you export all screenshots to a USB device later, the same screenshot is stored with the internal name again.

The Number of Screenshots indicated in the "Setup - Memory & Screenshots" window is increased after each new screenshot.

Remote command:
`KEY 'DIRECTORY'`

Color vs. black and white screenshot ← Creating a screenshot
If you store the screenshot to a connected USB device immediately, you can define whether a color or black and white screenshot is stored.

When you create a screenshot, a dialog box with the default file name and the output color is displayed.
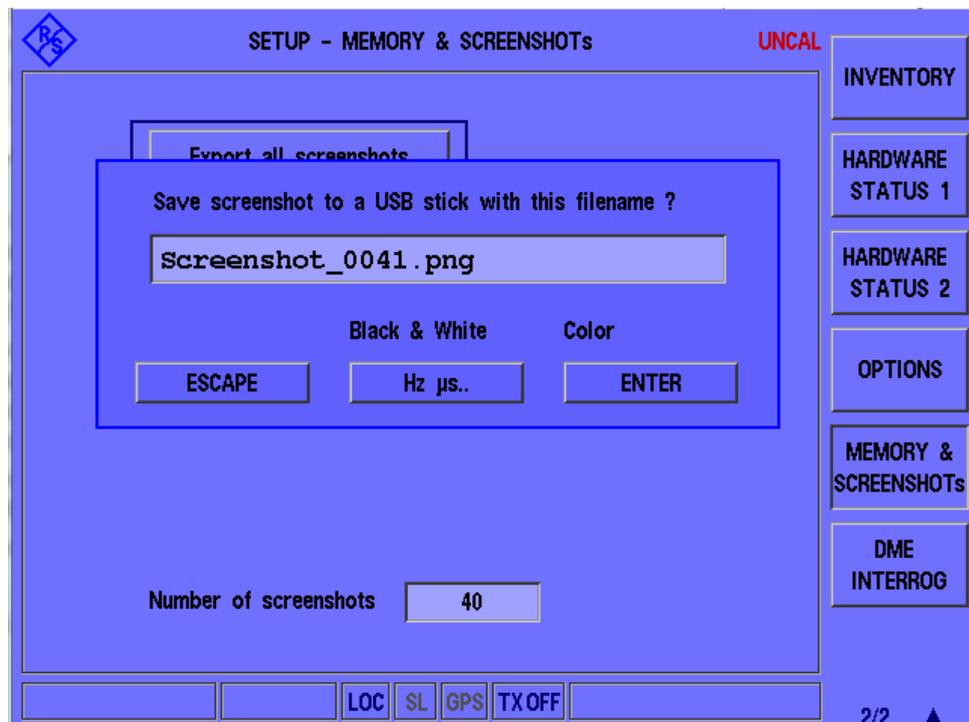
- For black & white output: Press the [HZ]/µs key.
- For color output: Press the [ENTER] key.

Exporting screenshots to a USB device
All screenshots on the R&S EDS300 are stored as `.PNG` files in the main directory of the connected USB device.

Note: If a USB device is connected to the R&S EDS300 while the screenshot is taken, the screenshot is immediately stored to the USB device as a `.PNG` file. However, it remains in the internal storage and is included in the export until it is deleted.

If you changed the name of a screenshot when it was stored to a USB device directly, and export all screenshots to a USB device later, the same screenshot is stored with the internal name again.

Deleting all screenshots stored on the R&S EDS300
All screenshots stored on the R&S EDS300 are deleted irrevocably.

Once the screenshots have been stored to an external memory device, you can delete them from the instrument. Otherwise, you copy them again each time you create new screenshots and want to store them to a USB device.

Number of Screenshots
Indicates the number of screenshots currently stored on the instrument.

8.4 Obtaining information on open-source resources

The software makes use of several valuable open source software packages. An open-source acknowledgment document provides verbatim license texts of the used open source software. You can copy the document to a USB stick for further inspection.

Access: [Setup] > "More Softkeys" > "Memory & Screenshots" > "Copy OSA text file to USB stick"

9 General instrument setup

Access: [SETUP]

Some basic instrument settings can be configured independently of the selected measurement mode. Usually, you configure most of these settings initially when you set up the instrument according to your personal preferences or requirements. Later you only adapt individual settings to special circumstances when necessary. Some special functions are provided for service and basic system configuration.

Additional settings in the [SETUP] softkey menu are described in these chapters:

- Chapter 8, "Data management", on page 79
- Chapter 7, "Configuring and performing measurements", on page 56

9.1 General settings

Access: [SETUP] > "General Settings"
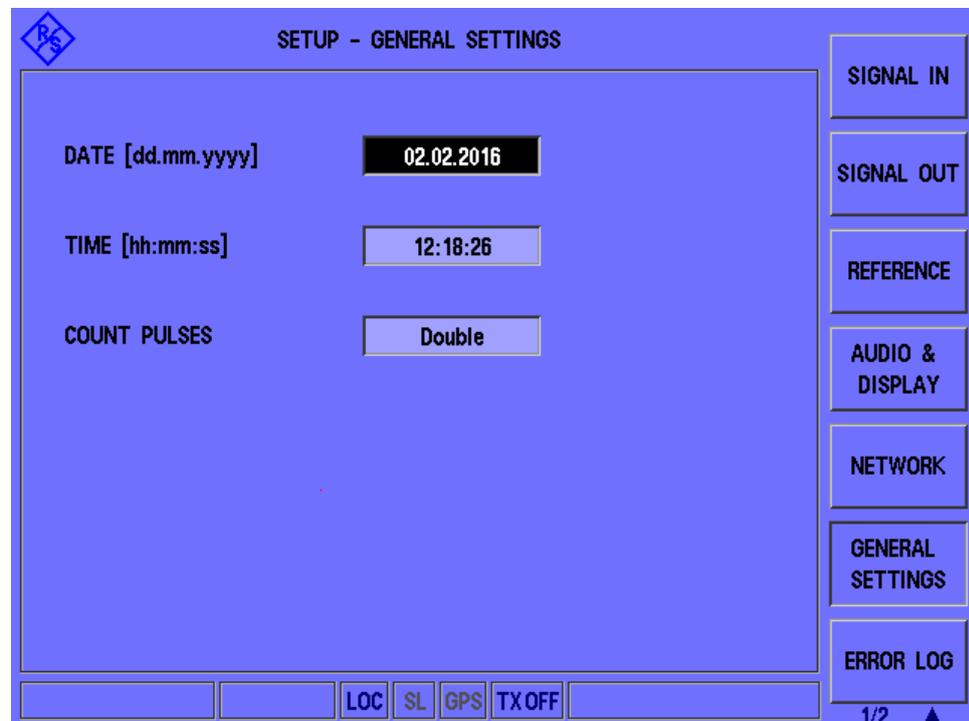
Date
Sets the date of the internal clock in the format `dd.mm.yyyy`.

Time
Sets the time of the internal clock in the format `hh:mm:ss`.

Count Pulses
Determines whether the R&S EDS300 counts single or double pulses (pulse pairs) in the measured signal.

"Double"   Only double pulses are counted, that is: two identical pulses sent with the required pulse spacing.

"Single"   Each detected pulse is counted individually.

Remote command:
`SETUP:COUNT_PULSES` on page 117

9.2 Setting up a network (LAN) connection

The R&S EDS300 is equipped with a network interface and can be connected to an Ethernet LAN (local area network). The interface can be used, for example:

● To transfer data between a controlling device and the test device, e.g. to run a remote control program.
   See Chapter 11, "Remote commands for DME/Pulse analysis", on page 109

● To establish a VNC connection to the R&S EDS300 and control it manually, but from a remote PC.

Permanent vs dynamic IP addresses

Depending on the network capacities, the TCP/IP address information for the instrument can be obtained in different ways.

● If the network supports dynamic TCP/IP configuration using the Dynamic Host Configuration Protocol (DHCP), all address information can be assigned automatically.

● If the network does not support DHCP, or if the instrument is set to use alternate TCP/IP configuration, the addresses must be set manually.

By default, the instrument is configured to use dynamic TCP/IP configuration and obtain all address information automatically. Thus, it is safe to establish a physical connection to the LAN without any previous instrument configuration.

NOTICE

Risk of network errors

Connection errors can affect the entire network. If your network does not support DHCP, or if you choose to disable dynamic TCP/IP configuration, you must assign valid address information *before* connecting the instrument to the LAN.

Contact your network administrator to obtain a valid IP address and subnet mask for the R&S EDS300 and the IP address for the local default gateway.

If the instrument is configured to use dynamic TCP/IP configuration, but no DHCP server is available, the boot process on the R&S EDS300 takes longer.

IP address vs host name

In a LAN that uses a DNS (Domain Name System) server, each PC or instrument in the LAN can be accessed via an unambiguous host name instead of the IP address. The DNS server translates the host name to the IP address. Using host names is especially useful when a DHCP server is used, as a new IP address can be assigned each time the instrument is restarted.

Each instrument is delivered with an assigned host name (`eds300`), but you can change this name.

9.2.1 Network settings

Access: [Setup] > "Network"

To operate the R&S EDS300 in a network, the following settings must be configured.

TCP/IP DHCP

If the network supports dynamic TCP/IP configuration using the Dynamic Host Configuration Protocol (DHCP), all address information can be assigned automatically. In this case, the TCP/IP parameters are not editable. The currently assigned TCP/IP Address and TCP/IP Netmask are indicated next to the "TCP/IP DHCP" setting.

If the network does not support DHCP, the addresses must be set manually.

By default, the instrument is configured to use dynamic TCP/IP configuration and obtain all address information automatically. Thus, it is safe to establish a physical connection to the LAN without any previous instrument configuration.

TCP/IP Address

Unique address of the instrument in the network. The currently assigned IP address and submask are indicated next to the setting.

The IP address consists of four number blocks separated by dots. Each block contains values between 0 and 255.

See also

TCP/IP Netmask

The subnet mask consists of four number blocks separated by dots. Each block contains values between 0 and 255.

TCP/IP Gateway
The gateway consists of four number blocks separated by dots. Each block contains values between 0 and 255.

Hostname
Unique instrument name in the network, as an alternative to the unique IP address. Each instrument is delivered with an assigned host name (`eds300`), but this name can be changed.

See also "IP address vs host name" on page 87.

9.2.2 How to configure the network (LAN) connection

To use the R&S EDS300 in a network, connect the instrument to the network by its LAN connector (see Chapter 4.2.2.7, "LAN interface", on page 28). Then configure the instrument-specific network connection settings.

1. Press the [SETUP] key.

2. Select the "Network" softkey.

3. If necessary, disable the use of the Dynamic Host Configuration Protocol (DHCP) by toggling the "TCP/IP DHCP" setting.
    Contact your network administrator to obtain a valid IP address and subnet mask for the R&S EDS300 and the IP address for the local default gateway.

4. Enter the "TCP/IP Address", for example *192.0.2.0*.

5. Enter the subnet mask ("TCP/IP Netmask"), for example *255.255.255.0*.

6. Enter the "TCP/IP Gateway", for example *192.0.1.1*.

7. Change the "Hostname" of the R&S EDS300.

9.2.3 How to set up a remote connection

To establish a connection to the R&S EDS300 from a control PC for remote operation, you require a computer networking service such as the free tools *netcat* or *PuTTY*.

Using such a network client, send the following command to the R&S EDS300, for example:

```
netcat <EDST300 IP_address> 8009
```

Once the connection has been established, you can send any of the commands described in Remote commands for DME/Pulse analysis to control the R&S EDS300.

ⓘ Only one remote connection at a time is possible; a second connection request overrides and terminates the first.

9.3 Obtaining system information

Information on the current system configuration and system messages are available on the R&S EDS300. This information is particularly useful if errors occur or you require help with the instrument from Rohde & Schwarz.

9.3.1 Error log

Access: [Setup] > "Error Log"

The last 100 instrument status messages or errors displayed in the status bar during operation of the R&S EDS300 are also stored in an error log file on the instrument (see also Chapter 4.3.4, "Error and status messages", on page 34). Thus, if problems occur, you can check the error log for irregular behavior or failures.
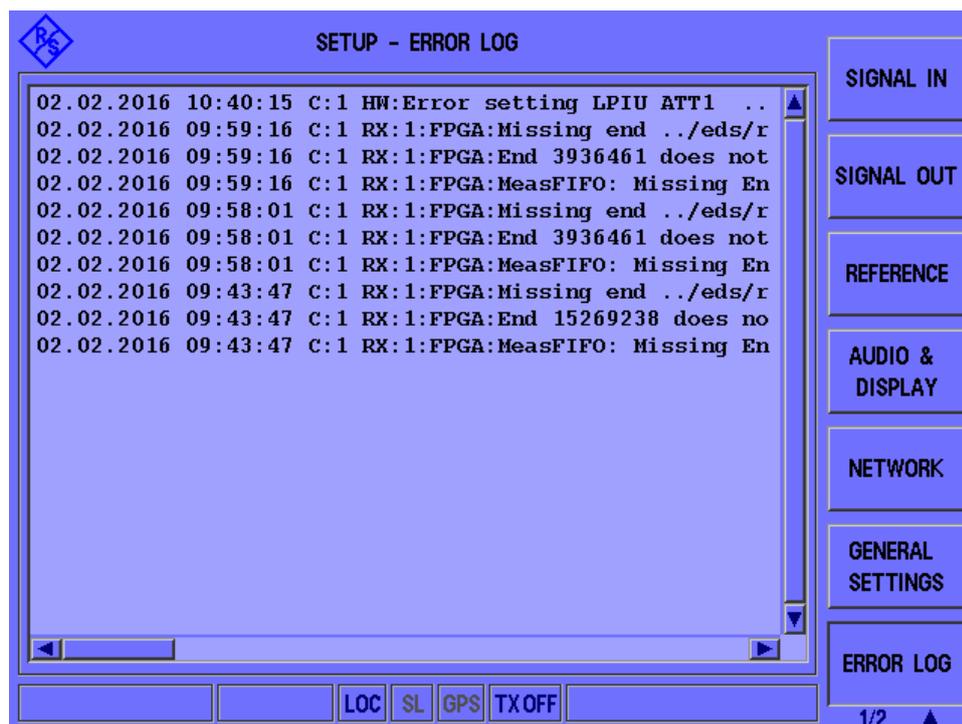
To clear the error log

You can clear the error log, but beware that all entries are deleted irrevocably.

► While the error log is displayed, press the [ESC] key.

9.3.2 Installed hardware and software

Access: [Setup] > "More Softkeys" > "Inventory"

The hardware and software inventory list provides information on the hardware version of the instrument (integrated modules, options etc.) and on the currently installed software versions. Additionally installed software options are provided in the "Options" list.

For each piece of hardware, the identification number, serial number and revision are provided in the inventory list. For each software item, the installed version number is provided.

Figure 9-1: Example of an inventory list for an R&S EDS300

If you detect that the latest software version is not yet installed, simply insert a USB storage device with the latest version in the R&S EDS300 and press the [ENTER] key. If a software installation file is found on the USB device, a software update is automatically started (after confirmation). See Chapter 9.4, "Updating the software", on page 95 for details.

Remote commands:

GETHWINVENTORY on page 113

VER? on page 115

LPIU_FPGA_VER? on page 114

MAIN_BOARD_CPLD_VER? on page 115

MAIN_BOARD_FPGA_VER? on page 115

RX_BOARD_FPGA_VER? on page 115

9.3.3 Installed options

Access: [Setup] > "More Softkeys" > "Options"

For each possible option, the instrument indicates whether it is "available" or "not available".

To install further options, see Chapter 9.5, "Activating additional options", on page 96.

Remote commands:

GETOPTIONS on page 114

9.3.4 Hardware status overview

Access: [Setup] > "More Softkeys" > "Hardware Status 1"

The hardware status overview provides information on the current operating status of the individual hardware components in the R&S EDS300, such as test voltages and temperatures.

Test voltages

The test voltages are measured continuously, internally, and checked against defined limit values. If one of the test voltages exceeds the tolerance for more than 10 s, the following measures are taken by the R&S EDS300:

- An error message is created in the error log (see Chapter 9.3.1, "Error log", on page 90).
- The measured test voltage is indicated in red (see Table 9-1).
- "UNCAL" is displayed in the measurement window to indicate that the measured values can be invalid.
- The "Overall Status" in the hardware status overview is indicated as "NOK" (not OK).

As soon as the test voltage returns to the allowed range, the "Overall Status" returns to "OK". The "UNCAL" display, however, remains until the R&S EDS300 is switched off.

Test voltages are color-coded:

Table 9-1: Test voltage color-coding

Color	Meaning
black	ok
red	error, the "UNCAL" message is displayed at the top of the window
blue	irrelevant for R&S EDS300 operating status

Hardware Status Display

The first overview ("Hardware Status 1") provides information on the mainboard, the power supply and the antenna distributing unit (DU board).

The "Overall Status" indicates whether the instrument as a whole is operating correctly - at a glance.

Figure 9-2: Hardware status for the mainboard, the power supply and the antenna distributing unit (DU board) - page 1

The second overview ("Hardware Status 2") provides information on the integrated receiver modules.

Figure 9-3: Hardware status for the integrated receiver modules (page 2)

Remote command:

GETHWSTATUS on page 114

GETUNCAL on page 114

TEMP? on page 115

9.4 Updating the software

Access: [Setup] > "More Softkeys" > "Inventory"

Software updates and the Release Notes describing the improvements and modifications for the R&S EDS300 are provided on the Internet at:

http://www.rohde-schwarz.com/firmware/eds300

To update the software version

1. Store the software version to a USB storage device.

2. On the R&S EDS300, press the [SETUP] key.

3.

Press the "More softkeys" key.

4. Press the "Inventory" softkey.

5. Insert the USB storage device with the software in one of the USB connectors on the R&S EDS300.

   The R&S EDS300 automatically searches the USB device for new software. The update file has the extension `.eds` and must be located in the main directory of the USB device. The search can take a few seconds.

6. When the software has been found, press the [ENTER] key to confirm the message to install the software.

   The software installation is started.

   Note: Never remove the USB device or switch off the instrument during a software update. Otherwise, an undefined software state can be the result.
   If the USB device is removed during update, an error message is displayed ("Cannot unpack update"). Press the [ESC] key to acknowledge and close the message. The update is interrupted, and the instrument can be operated again.

7. When the installation is complete, a message is displayed prompting you to restart the instrument. Press [Enter] to confirm and close the message.

8. Remove the USB device from the instrument.

9. Press the [Power ON/OFF] key twice to restart the instrument and activate the new software.

9.5 Activating additional options

Access: [Setup] > "More Softkeys" > "Options"

For all purchased R&S EDS300 options, a license key is provided by Rohde & Schwarz. To activate the options on the instrument, enter the number of the license key in the software.

To activate the license key

1. Press the [Setup] key.

2.

   Press the "More softkeys" key.

3. Press the "Options" softkey to display an overview of all available R&S EDS300 options.

4. Press the [Enter] button to open an input edit field for "Key".

5. Enter the license key number as provided by Rohde & Schwarz.

(Note: the license key consists of 18 numbers, separated by commas)

6. Press [Enter] to confirm the entry.

    If the key is valid, the purchased options are enabled and identified as "available" in the overview.
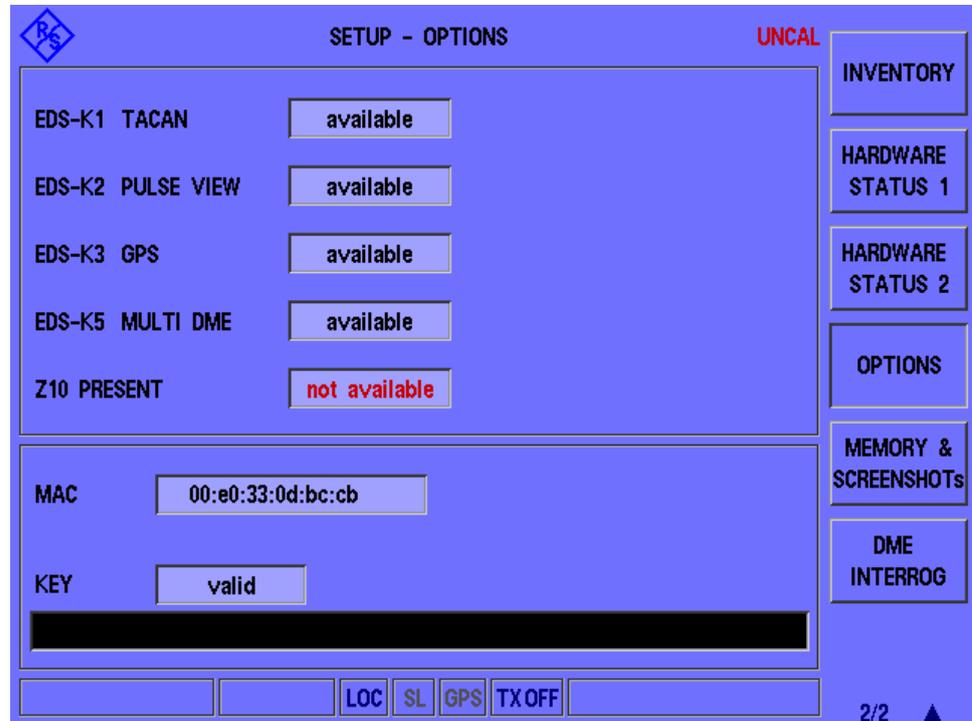
Figure 9-4: Available R&S EDS300 options

If the key is not valid, the entered number is displayed in red.

Figure 9-5: Invalid option key

Correct the number and try again.

9.6 Configuring the display and audio output

Some general settings are available for the display and audio output in the "Audio & Display" window, which is available from the [Setup] softkey menu.
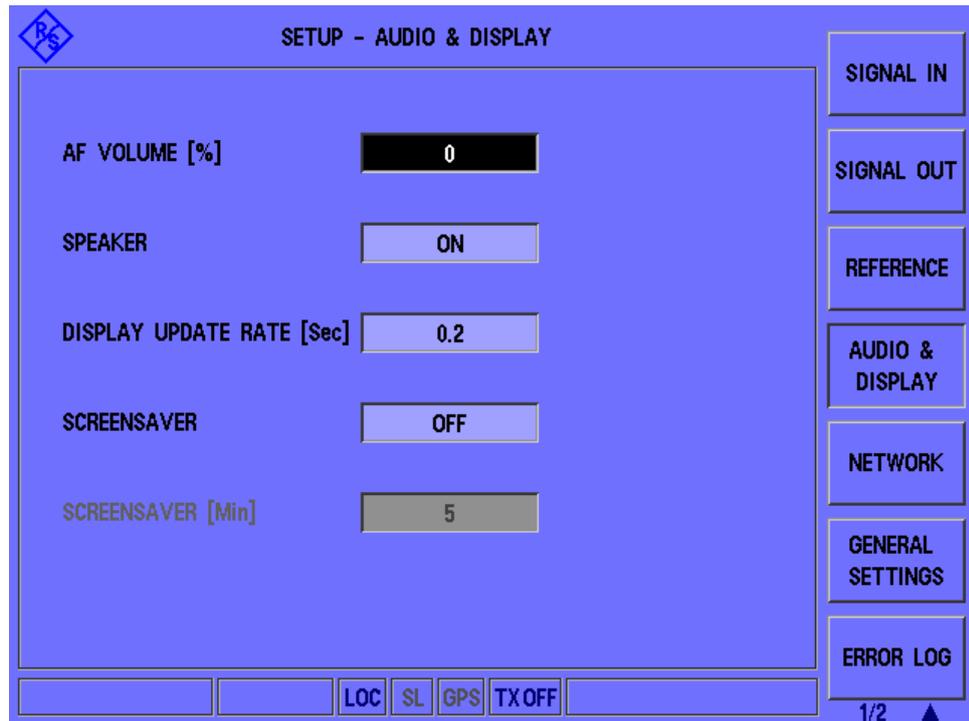
9.6.1 Audio and display settings

AF Volume
Defines the volume of the AF output at the loudspeaker or headphones connector as a percentage (0 % to 100 %).

Remote command:
SETUP:AF_VOLUME on page 116

Speaker
Enables or disables AF output at the loudspeaker on the rear panel of the R&S EDS300.

Remote command:
SETUP:ANALOG_OUT_MODE on page 119

Display Update Rate
Defines the rate at which the display is updated to show new measurement results. Define a value between 0.1 seconds and 2 seconds.

A short update span allows you to trace rapid value changes, while a longer span improves the measurement performance.

Note, however, that if you reduce the update rate below the defined measurement time (see"Measurement Time" on page 68), performance is not increased further. In this case, the same values are displayed for several updates until a new value is measured.

Remote command:
SETUP:DISPLAY_UPDATE_MS on page 117

Screensaver

Activates or deactivates a **screensaver** for the display. Specify a duration between 1 minute and 60 minutes after which the screen saver is activated.

If no interaction is performed on the R&S EDS300 for the specified duration, the background light of the display is temporarily switched off to protect the screen and save power. A running measurement and data logging continues as usual.

To switch the light back on, press any key or turn the rotary knob on the R&S EDS300.

Note: Do **not** press the [Power On/Off] switch. Turning off the instrument results in a data loss if a measurement was running.

[VOL]

The [VOL] key on the front panel of the R&S EDS300 changes the volume setting for the AF output quickly during regular operation. When you press the key, the volume setting is temporarily displayed as a bar graph in the status bar of the display. Turn the rotary knob to change the volume and confirm the setting by pressing the [ENTER] key or the rotary knob. As soon as the setting has been confirmed, the original status bar display is restored.

Remote command:
SETUP:AF_VOLUME on page 116

9.6.2 How to configure audio output

To configure audio output

1. Press the [SETUP] key.

2. Press the "Audio & Display" softkey.

3. To enable or disable AF output at the loudspeaker, toggle the "Speaker" setting. To change the volume of the AF output at the loudspeaker or headphones, select the "AF Volume" field and do one of the following:

   - Turn the rotary knob.
   - Press the Up arrow or Down arrow keys.
   - Enter a percentage value between 0 and 100.

4. Press [Enter] to confirm the entry.

VOL key

To change the volume setting for the loudspeaker quickly during regular operation of the R&S EDS300, press the [VOL] key on the front panel. The volume setting is temporarily displayed as a bar graph in the status bar of the display. Turn the rotary knob to change the volume and confirm the setting by pressing the [ENTER] key or the rotary knob. When the setting has been confirmed, the original status bar display is restored.

10 How to perform measurements and analyze pulses with the R&S EDS300

The following step-by-step instructions demonstrate how to perform the most important tasks on the R&S EDS300, in particular configuring and performing DME/TACAN measurements and analyzing pulses.

10.1 How to configure signal input and output

The R&S EDS300 can analyze signals received by its "RF IN" interface. It can also provide output to other interfaces.

To configure the input signal for analysis

1. Press the [SETUP] key.

2. Select the "Signal In" softkey.

3. Select the input signal for the first receiver board ("RX Board 1"), that is, which connector provides the input signal.

   a) Select "RF 1 IN" or "RF 2 IN".
   b) Confirm the setting by pressing the [ENTER] key or the rotary knob.
   c) Make sure that the signal provider is connected to the corresponding connector on the front panel of the R&S EDS300.

4. Optionally, if a second receiver board is installed on the instrument (requires R&S EDS-B1), select the input signal for "RX Board 2". The same signals are available as for the first receiver board.

   Note: In Multi-DME mode, the same input signal is used for both receiver boards; thus, only the "RX Board 1" setting is available.

To receive GPS data

Prerequisite:

Option R&S EDS-K3 is installed.

The GPS receiver is connected to the RS232 interface on the rear panel of the R&S EDS300.

1. Press the [GPS] key.

2. Select the "Baudrate" softkey.

3. Define the signalling rate for the GPS signal.

4. Confirm the setting by pressing the [ENTER] key or the rotary knob.

5. Optionally, switch time synchronization to NMEA messages or PPS pulses:

   a) Select the "SYNC" softkey to toggle between the available settings.
   b) Confirm the setting by pressing the [ENTER] key or the rotary knob.

To configure the use of an external reference frequency on the R&S EDS300

1. Connect a device that provides the external reference frequency to the [REF 10 MHz IN/OUT] connector on the rear panel of the R&S EDS300.

2. Press the [SETUP] key.

3. Select the "Reference" softkey.

4. Select the reference "Source: Extern".

   If an external reference source is found, "Ext.Reference: Present" is indicated.

5. Confirm the setting by pressing the [ENTER] key or the rotary knob.

   The R&S EDS300 uses the external frequency from the connected device as a reference.

To provide the internal reference frequency on the R&S EDS300 as output

1. Press the [SETUP] key.

2. Select the "Reference" softkey.

3. Select the reference "Source: Intern".

   "Ext.Reference: Output" is indicated.

4. Confirm the setting by pressing the [ENTER] key or the rotary knob.

5. Connect a device to the [REF 10 MHz IN/OUT] connector on the rear panel of the R&S EDS300.

   The R&S EDS300 provides its internal 10 MHz reference signal as output at the [REF 10 MHz IN/OUT] connector.

10.2 How to perform a distance measurement

The following step-by-step instructions demonstrate how to perform a basic distance measurement with the R&S EDS300.

1. Select [DME] to display the "DME/TACAN" view.

2. Select the channel to measure (see Chapter B, "DME channel frequency list", on page 166) by doing one of the following:

- Select [CHAN] and enter the channel number.
- Select [FREQ] and enter the channel frequency.

3. Select "Meas Time" and define how long to acquire data for a single evaluation during averaging.

10.3 How to analyze interrogator pulses

The following step-by-step instructions demonstrate how to perform basic pulse analysis on interrogator pulses with the R&S EDS300.

1. Select [DME] to display the "DME/TACAN" view.

2. Select the channel to measure (see Chapter B, "DME channel frequency list", on page 166) by doing one of the following:

   - Select [CHAN] and enter the channel number.
   - Select [FREQ] and enter the channel frequency.

3. Select the "RX Mode": "Interrog.".

   The receive frequency ("RX.F") is set to the defined transmission frequency ("TX.F").

4. If the results are not reasonable or the measurement is unstable, adapt the interrogator settings as described in Chapter 10.4, "How to set up the R&S EDS300 interrogator", on page 103.

10.4 How to set up the R&S EDS300 interrogator

The following step-by-step instructions demonstrate how to set up the R&S EDS300 to send interrogator pulses and evaluate them.

1. Select [Setup].

2. Select "More softkeys", then "DME Interrog.".

3. Define the number of pulses to calculate the reply efficiency time for.
   The larger the value, the more stable and accurate the results, but the weaker the performance of the interrogator.

4. Define the minimum reply efficiency (in percent) after which the interrogator switches between tracking, memory and search modes.
   The smaller the value, the quicker the interrogator reaches the track mode, but also the quicker it returns to the memory mode.
   The larger the value, the more stable and accurate the results, but the weaker the performance of the interrogator.

5. If necessary, define an offset to the delay between the transmission of the request pulse and the reply pulse to compensate for delay times caused by cable lengths, for example.

6. Select the unit for the distance results.

7. Select [DME] to start the distance measurement.

8. Select "TX" (ON) to activate transmission of the interrogator signals.

   The transmission frequency ("TX.F") is set to the defined receiver frequency ("RX.F") + 63 MHz. The transmission pulse code is set to the same as the receiver pulse code ("P.Code")

9. If necessary, select "PRR Search" or "PRR Track" (in the second softkey menu) to change the pulse repetition rate for the interrogator's search or track modes.

10. If necessary, select "TX P. Width" or "TX Level" (in the second softkey menu) to change the interrogator pulse width or the pulse power level, respectively.

    The R&S EDS300 now acts and behaves like the on-board interrogator of a normal plane, sending interrogator pulses at the defined pulse rate.
    Now you can perform a distance measurement as described in Chapter 10.2, "How to perform a distance measurement", on page 102 to analyze the interrogator pulses or the reply pulses from the ground station.

10.5 How to analyze pulses graphically

The following step-by-step instructions demonstrate how to analyze pulses, for example from a DME or TACAN signal, or sent by the interrogator, using the graphical display of the R&S EDS300.

1. Select [Pulse].

2. Select [CHAN] and select the channel to measure (see Chapter B, "DME channel frequency list", on page 166).

3. Select [FREQ] and select the frequency to measure (see Chapter B, "DME channel frequency list", on page 166).

   The measured signal power is displayed over time. The pulse parameters for the measured signal are automatically calculated and displayed.

4. Select "Time/Div" and define the time range to be displayed in each division (1/10 of the width) of the x-axis.

5. Select "Unit" to change the unit of the power axis.

6. Select "mV/Div" and define the power range to be displayed in each division (1/10 of the height) of the y-axis.

7. Select "Max.Lev" and define the maximum power level for the y-axis.

8. To analyze the pulse characteristics over an average of several measured pulses, select "TRACE": "AVRG" and define the number of pulses to average ("AVRG").

9. To analyze wide pulses, select "Bandwidth": "Wide", otherwise they can be cut off or distorted.
   To analyze narrow pulses, select "Bandwidth": "Narrow", otherwise adjacent pulses or signal effects outside the pulse can be included.

10. To trigger measurements only if specific conditions are fulfilled, select the "TRIG.MODE": "Normal" and define the trigger source and, if necessary, the level.
    To analyze interrogator signals, select the trigger source "Interrog". In this case, a measurement is triggered each time the R&S EDS300 interrogator transmits a pulse. Thus, you can analyze the interrogator and reply pulses in the same diagram.

11. To trigger only on valid pulse pairs (double pulses), select "TRG. Double": "ON".

12. To analyze the signal immediately before the trigger event, define a negative trigger delay.

13. To determine the power level at a specific time in the measurement, set a marker in the diagram.

To set a marker in the diagram

1. Select [MARKER].

2. Select "Marker 1".

3. Define the time for which you want to determine the measured power level.

   The power level for the marker is displayed above the diagram ("Mark1").

10.6 How to set up the R&S EDS300 for TACAN measurements

The following step-by-step instructions demonstrate how to set up the R&S EDS300 to measure and analyze pulses from TACAN signals.

1. Switch off the R&S EDS300.

2. Connect the USB stick that contains the TACAN option to one of the USB ports of the R&S EDS300.

3. Switch on the R&S EDS300.

   After booting, the DME / TACAN mode is active.

4. Continue as described in Chapter 10.2, "How to perform a distance measurement", on page 102.

   In addition to the DME pulse results, the bearing of the plane is displayed, and details on the MRB and ARB signal components. Furthermore, the ground station's ID pulses can be analyzed in detail.
   Select "View" to scroll through the available results.

10.7 How to save and load measurement settings

Instrument settings can be saved to a file and loaded again later, so that you can repeat the measurement with the same settings. Default factory settings can also be restored to the instrument at any time.

To restore factory default settings

1. Press the [Preset] key on the front panel of the R&S EDS300.

2. Select the "Factory Preset" softkey.

3. Confirm the message.

   All instrument and measurement settings - except for the IP address and host name - are replaced by the default factory settings.

To store the current measurement settings

1. Press the [Preset] key on the front panel of the R&S EDS300.

2. Select the "Select" softkey.

   The number of the currently selected User Preset is indicated on the softkey. By default, the User Preset number 1 is selected.

3. If necessary, select a different User Preset using the Up and Down arrow keys or the rotary knob.

4. Press [Enter] to confirm the entry.

   The selected User Preset number is indicated on the "Select" softkey.

5. Select the "Save" softkey.

   The file name currently used by the User Preset is displayed.

6. If necessary, change the file name to store the selected User Preset.

7. Press [Enter] to confirm the entry.

8. Press [Enter] to confirm the security message.

   The current measurement settings are stored, together with the current date and time.

To recall stored measurement settings

1. Press the [Preset] key on the front panel of the R&S EDS300.

2. Select the "Select" softkey.

    The number of the currently selected User Preset is indicated on the softkey. By default, the User Preset number 1 is selected.

3. If necessary, select a different User Preset using the Up and Down arrow keys or the rotary knob.

4. Press [Enter] to confirm the entry.

    The selected User Preset number is indicated on the "Select" softkey.

5. Select the "Recall" softkey.

6. Press [Enter] to confirm the security message.

    The current measurement settings are overwritten by the settings stored in the selected User Preset.

To rename stored measurement settings files

When measurement settings are stored to the selected User Preset, you can define a name to distinguish the individual User Presets. The name assigned to a User Preset can be changed anytime.

1. Press the [Preset] key on the front panel of the R&S EDS300.

2. Select the "Select" softkey.

    The number of the currently selected User Preset is indicated on the softkey. By default, the User Preset number 1 is selected.

3. If necessary, select a different User Preset using the Up and Down arrow keys or the rotary knob.

4. Press [Enter] to confirm the entry.

    The selected User Preset number is indicated on the "Select" softkey.

5. Select the "Rename" softkey.

6. Change the name of the selected User Preset.

7. Press [Enter] to confirm the entry.

    The User Preset is indicated by its new name in the "Preset" window.

To delete stored measurement settings

When a User Preset is stored, a file is created or an existing file with the same file name is overwritten. The file name assigned to a User Preset can be changed anytime.

1. Press the [Preset] key on the front panel of the R&S EDS300.

2. Select the "Select" softkey.

The number of the currently selected User Preset is indicated on the softkey. By default, the User Preset number 1 is selected.

3. If necessary, select a different User Preset using the Up and Down arrow keys or the rotary knob.

4. Press [Enter] to confirm the entry.

The selected User Preset number is indicated on the "Select" softkey.

5. Select the "Delete" softkey.

6. Press [Enter] to confirm the message.

The settings and the name assigned to the selected User Preset are deleted.

11 Remote commands for DME/Pulse analysis

The following commands are required to perform DME/ pulse analysis with the
R&S EDS300 in a remote environment. It is assumed that the R&S EDS300 has
already been set up for remote operation in a network as described in Chapter 9.2,
"Setting up a network (LAN) connection", on page 86.

ⓘ **Conventions used in remote command descriptions**

Note the following conventions used in the remote command descriptions:

- **Command and parameter syntax**
  All commands and parameters described here are case-**insensitive**.
- **Command usage**
  If not specified otherwise, commands can be used both for setting and for querying
  parameters.
  If a command can be used for setting or querying only, or if it initiates an event, the
  usage is stated explicitly.
- **Parameter usage**
  If not specified otherwise, a parameter can be used to set a value and it is the
  result of a query.
  Parameters required only for setting are indicated as **Setting parameters**.
  Parameters required only to refine a query are indicated as **Query parameters**.
  Parameters that are only returned as the result of a query are indicated as **Return
  values**.
- **<RX> prefix**
  If an optional second receiver board is available, the <RX> prefix defines which
  receiver board the command is addressed to (RX1, RX2).
  If no prefix is provided, the currently active receiver board is addressed (see SETRX
  on page 129 and RX? on page 128).
- **Default value (*RST)**
  The *RST value indicates the default value used in the factory preset state.
- **Default unit**
  The unit used for numeric values if no other unit is provided with the parameter.
- **Manual operation**
  If the result of a remote command can also be achieved in manual operation, a link
  to the description is inserted.

The following tasks are described here:

11.1 Configuring remote operation

The R&S EDS300 can be operated in the following modes:

- **Local** mode: manual operation using the graphical user interface directly at the instrument is available; remote commands can also be executed

- **Remote** mode: remote operation by sending commands from a remote control PC only; manual operation directly at the instrument is not possible, except for the [LOCAL] key to switch back to manual operation

- **Exclusive remote** mode: remote operation by sending commands from a remote control PC only; gui on the instrument is locked, including the [LOCAL] key; return to manual operation only via remote command

HELP? <Command>

Returns information on the selected command.

Query parameters:

<Command>   <Command_Name> | ALL

                                   <Command_Name>
                                   Returns information on the specified command, for example concerning parameters or return values.
                                   A list of commands is provided at the end of the document.

                                   ALL
                                   Returns information on all available remote commands.

Return values:

<Information>   string

Example: `HELP REMOTELOCK`
                                   Queries information on the `REMOTELOCK` command.

Usage: Query only

KEY <KeyCode>

Sends the specified key code as a remote command. Note that this command only works in local mode. If necessary, use the `LOCAL` key first to switch to local mode.

Parameters:

<KeyCode>   PRESET | CAL | VOL | SAVE | MEM | LOCAL | SETUP | SK1 | SK2 | SK3 | SK4 | SK5 | SK6 | SK7 | MORE | DME | PULSE | SSR | MODE | CHAN | FREQ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | POINT | MINUS | GHZ | MHZ | KHZ | HZ | ESCCANCEL | ENTER | BACK | START | STOP | MARKER | GPS | RX1_4 | SEQ | WHLEFT | WHRIGHT | WHPUSH | LEFT | RIGHT | UP | DOWN | FIELDL | FIELDR | MARK | DIRECTORY

For a description of the keys see also Chapter 4.2.1, "Front panel view", on page 20. Only the keys that are not self-explanatory are described here.

MARK
(Checkmark) Restart FPGA

DIRECTORY
Create screenshot.

WHLEFT
Turn rotary knob left.

WHRIGHT
Turn rotary knob right.

WHPUSH
Press rotary knob.

SAVE | MEM | SSR | GPS | RX1_4 | SEQ | FIELDL | FIELDR
Currently no function assigned

Return values:

<SettingResult>   **READY**
Command was successfully sent.

ERROR
An error occurred; command was not successful.

Example: LOCAL
KEY 'DIRECTORY'

Usage: Setting only

Manual operation: See "Creating a screenshot" on page 82

LOCAL

Switches back to local operation of the R&S EDS300. The graphical user interface of the R&S EDS300 becomes available again.

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Usage: Setting only

REMOTELOCK?
REMOTELOCK <State>

Queries or defines the state of the remote lock.

Parameters:

<State>   ON | OFF

ON

Remote lock is set; no local operation by keyboard is possible. The "LOCAL" button on the R&S EDS300 has no effect. To enable local operation again, release the remote lock (using `REMOTELOCK OFF`.

OFF

Releases the remote lock; local operation is enabled again.

*RST: OFF

Return values:

<SettingResult>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

11.2 Obtaining instrument information

---

*IDN?

Returns the instrument identification

Return values:

<ID>	Rohde&Schwarz,<device type>,<serial number>,<firmware version> [TACAN] Note: TACAN is displayed only if the TACAN option R&S EDS300-K1 is available on the instrument.
Example:	`*IDN?`
Example:	`Rohde&Schwarz, EDST300, 1234546/02.00, 01.55t` `TACAN`
Usage:	Query only

CLEARERRORLOG

This command clears the error log.

Return values:

<State>	**READY.** The command was executed successfully.

GETERRORLOG

This command retrieves error log entries.

Return values:
<Error-Log>

GETHWINVENTORY

Queries the hardware modules installed in the R&S EDS300.

Return values:
<HWModules>   string

Example:	`GETHWINVENTORY`
	`//Result:`
	`//EDS300K:5202.7006K02,999999,01.00`
	`//EDST300:5202.7006.02,101325,02.00`
	`//MAINBOARD:5202.7035.02,999999,06.00`
	`//EDS_DU:5202.7058.02,101343,05.00`
	`//RX_BOARD:5202.7012.02,100874,05.03`
	`//...`
	`//LOW_POWER_INTERROGATOR_UNIT:`
	`5202.8602.02,100786,03.00`
	`//POWERSUPPLY:5202.7070.02,101470,02.01`
	`//...`
	`//READY.`

GETHWSTATUS

Queries the status of the hardware modules inside the R&S EDS300.

Return values:

<HWStatus>　　　　　OK | NOK

NOK
An error has occurred for at least one hardware element.

Example:　　　　　GETHWSTATUS
//Result:
//OK

GETOPTIONS

Queries the options installed on the R&S EDS300.

Return values:

<Options>　　　　　　string

Example:　　　　　GETOPTIONS
//Result:
//EDS-K1 TACAN; EDS-K2 PULSEVIEW; EDS-Z10 CAL;

GETUNCAL

Queries the UNCAL status of the R&S EDS300.

Return values:

<CalState>　　　　　CAL | UNCAL

CAL
Status of R&S EDS300 operation ok

UNCAL
Serious errors have occurred during operation.

Example:　　　　　GETUNCAL
//Result:
//CAL

LINUX_VER?

Queries the Linux operating system version of the R&S EDS300.

Return values:

<Version>　　　　　string

Usage:　　　　　Query only

LPIU_FPGA_VER?

Queries the LPIU board FPGA-Software version

Return values:

<Version>   string

Usage: Query only

MAIN_BOARD_CPLD_VER?

Queries the main board CPLD-Software version

Return values:

<Version>   string

Usage: Query only

MAIN_BOARD_FPGA_VER?

Queries the main board FPGA-Software version

Return values:

<Version>   string

Usage: Query only

RX_BOARD_FPGA_VER?

Queries the FPGA software version of the RX board

Return values:

<Version>   string

Usage: Query only

TEMP?

Queries the temperature of all internal built-in temperature sensors

Return values:

<Temp>

Usage: Query only

VER?

Queries the currently installed software version

Return values:

<Version>   string

Usage: Query only

11.3 General instrument setup

*RST
FACTORY_PRESET

Executes the factory preset

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Usage: Setting only

Manual operation: See "Factory Preset" on page 80

SETUP:AF_VOLUME?
SETUP:AF_VOLUME

Queries or defines the audio volume

Parameters:

SetAudio   <volume in percent>

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "AF Volume" on page 98
See "[VOL]" on page 99

SETUP:COUNT_PULSES?
SETUP:COUNT_PULSES <PulseType>

Determines whether the R&S EDS300 counts single or double pulses (pulse pairs) in the measured signal.

Parameters:

<PulseType>　　　　　　**DOUBLE**
　　　　　　　　　　　　　Only double pulses are counted, that is: two identical pulses sent with the required pulse spacing.

　　　　　　　　　　　　　SINGLE
　　　　　　　　　　　　　Each detected pulse is counted individually.

Manual operation:　　See "Count Pulses" on page 86

SETUP:DISPLAY_UPDATE_MS?
SETUP:DISPLAY_UPDATE_MS

Queries or defines the display update rate, that is: the rate at which the display is updated to show new measurement results.

Parameters:

SetDisplInt　　　　　　<time>

　　　　　　　　　　　　　Range:　　　0.1 ms to 2.0 ms
　　　　　　　　　　　　　Default unit: ms

Return values:

<SettingResult>　　　　**READY**
　　　　　　　　　　　　　Setting was successfully applied.

　　　　　　　　　　　　　ERROR
　　　　　　　　　　　　　An error occurred; setting was not successful.

Manual operation:　　See "Display Update Rate" on page 98

SETUP:MORSEMOST <Threshold>

Defines the threshold for the morse code power. If the power level sinks below this value, the morse decoder returns the most probable code.

Parameters:

<Threshold>　　　　　　numeric value

　　　　　　　　　　　　　Range:　　　-140 to +20
　　　　　　　　　　　　　*RST:　　　　-70
　　　　　　　　　　　　　Default unit: dBm

SETUP:SPEAKER?
SETUP:SPEAKER

Queries or defines the speaker mode

Parameters:

SwitchSpek   ON | OFF

Return values:

<SettingResult>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

11.4 Configuring signal input and output

GPSBAUDRATE?
GPSBAUDRATE <BaudRate>
SETGPSBAUD <BaudRate>

Defines and queries the currently used baud rate (or *signalling rate*) for the GPS signal.

Parameters:

<BaudRate>   4800 | 9600 | 19200 | 38400 | 57600 | 115200

Default unit: Bd

Manual operation: See "Baud Rate" on page 65

GETGPSSYNC
SETGPSSYNC <SyncMethod>

Defines or queries the method of time synchronization.

Parameters:

<SyncMethod>   **MESSAGE**
                       Time synchronization on incoming messages

                       PPS
                       Time synchronization on PPS pulses

Manual operation: See "Sync" on page 65

SETUP:ANALOG_OUT_MODE?
SETUP:ANALOG_OUT_MODE <Output>

Queries or defines the type of analog signal to be provided at the [ANALOG OUTPUT] connector on the rear panel of the R&S EDS300.

Parameters:

<Output>   **RX_DEMOD**
                       The demodulated baseband signal is output.

                       DET ENVELOPE
                       The peak detector envelope of the pulse signal is output.

                       DET_ID
                       The audio signal (detector envelope) of the ID is output (at 1350 Hz, audible Morse code).

                       DET_15HZ
                       The 15 Hz component in the peak detector envelope of the pulse signal is output.
                       Only available for TACAN analysis

                       DET_135HZ
                       The 135 Hz component in the peak detector envelope of the pulse signal is output.
                       Only available for TACAN analysis

Return values:

<SettingResult>   **READY**
                       Setting was successfully applied.

                       ERROR
                       An error occurred; setting was not successful.

Manual operation: See "Analog Out" on page 59
                       See "Speaker" on page 98

SETUP:EXT_ATTENUATION_TYPE?
SETUP:EXT_ATTENUATION_TYPE <Type>

Activates or deactivates external attenuation.

Parameters:

<Type>   **NONE**
                             No external attenuation is applied.

                             FIXED
                             A fixed attenuation is applied to the RF input from the receiver board (see SETUP:RF2_EXTATTENUATION on page 120). You can define a different attenuation level for each RF input connector.

Manual operation: See "External Attenuation" on page 58

SETUP:RF1_EXTATTENUATION?
SETUP:RF1_EXTATTENUATION <Attenuation>
SETUP:RF2_EXTATTENUATION?
SETUP:RF2_EXTATTENUATION <Attenuation>

Defines the fixed power level by which the signal at the RF input 1 or 2 is attenuated during the measurement (for SETUP:EXT_ATTENUATION_TYPE Fixed).

Parameters:

<Attenuation>   numeric value in dB

                             Range: -10 to +99

Manual operation: See "Fixed External Attenuation for RF Input 1/2" on page 58

<RX>:SETUP:INPUT?
<RX>:SETUP:INPUT <InputSource>

Queries or defines the input source of the specified RX board

Parameters:

<InputSource>   **INPUT_RF1**
                             RF input from the "RF 1 IN" connector on the front panel of the R&S EDS300

                             INPUT_RF2
                             RF input from the "RF 2 IN" connector on the front panel of the R&S EDS300

                             INPUT_BBAND
                             Analog input from the [ANALOG IN] connector on the rear panel of the R&S EDS300

                             *RST: INPUT_RF1

Return values:

<SettingResult>   **READY**
                             Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Usage: Setting only

Manual operation: See "Input for RX Board 1" on page 57

SETUP:REFERENCE:EXTREFERENCE?

Queries the usage and state of a reference frequency at the [REF 10 MHz IN/OUT] connector of the R&S EDS300.

Return values:
<State>   **Present**
A 10 MHz reference signal is provided by an external device at the [REF 10 MHz IN/OUT] connector of the R&S EDS300.

Not present
No reference signal is available at the [REF 10 MHz IN/OUT] connector of the R&S EDS300. The internal 10 MHz reference signal is used for measurement with the R&S EDS300.

Output
The internal 10 MHz reference signal of the R&S EDS300 is pro-vided as output to a device at the [REF 10 MHz IN/OUT] con-nector (for SETUP:REFERENCE:SOURCE INTERN).

*RST: Output

Usage: Query only

Manual operation: See "Ext. Reference" on page 61

SETUP:REFERENCE:SOURCE?
SETUP:REFERENCE:SOURCE <RefSource>

Queries or defines whether the [REF 10 MHz IN/OUT] connector on the rear panel of the R&S EDS300 is used for input or output.

Parameters:
<RefSource>   **Intern**
The internal reference frequency of the R&S EDS300 is provi-ded as output to a device at the [REF 10 MHz IN/OUT] connec-tor.

Extern
The R&S EDS300 uses the external reference frequency provi-ded by another device at the [REF 10 MHz IN/OUT] connector.
Tip: The SETUP:REFERENCE:EXTREFERENCE? command queries the availability of a reference signal at the connector.

Return values:
<SettingResult>   **READY**
Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Source" on page 60

SETUP:TRIGGER_OUT_MODE?
SETUP:TRIGGER_OUT_MODE <OutputTrig>

Queries or defines the type of trigger signal to be provided at the [TRIGGER OUTPUT] connector on the rear panel of the R&S EDS300.

Parameters:

<OutputTrig>   **PULSE_TRIGGER**

For each measured DME pulse, a square pulse with the same pulse width is output synchronously.

PULSE_DECODED

For each measured DME pulse *pair* with the correct pulse code (=pulse spacing), a square pulse with a 1 µs pulse width is output.

INTERROG_TRIGGER

For each transmitted interrogator pulse pair, a square pulse with a 1 µs pulse width is output.

ID_CODE

A high signal is output during the ID transmission.

MRB_TRGGER

For each decoded MRB (main reference burst), a square pulse with a 1 µs pulse width is output.
Only available for TACAN analysis

ARB_TRIGGER

For each decoded ARB (auxiliary reference burst), a square pulse with a 1 µs pulse width is output.
Only available for TACAN analysis

MDME_SLOT

Each time the channel is switched, a square pulse with a 1 µs pulse width is output.
Only available for Multi-DME analysis

*RST: PULSE_TRIGGER

Return values:

<SettingResult>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Trigger Out Mode" on page 59

11.5 Configuring measurements

11.5.1 Configuring the measurement mode

<RX>:MEASMODE?

Queries the current measuring mode

Return values:

<Mode>   **MODE_DMETAC**
                          DME/TACAN measurement mode, see Chapter 6.1, "DME and
                          TACAN measurement mode", on page 38

                          MODE_PULSE
                          Pulse analysis mode, see Chapter 6.3, "Graphical pulse analy-
                          sis", on page 48

Usage: Query only

<RX>:MEASMODE_DME

Switches to the DME measurement mode (standard distance measurement, see Chap-
ter 6.1, "DME and TACAN measurement mode", on page 38). Numeric signal parame-
ters for a specific interrogator or transponder channel are determined. Simultaneous
data logging of the measurement results is available.

Return values:

<SettingResult>   **READY**
                          Setting was successfully applied.

                          ERROR
                          An error occurred; setting was not successful.

Usage: Setting only

<RX>:MEASMODE_MDME

Switches on the MDME measurement mode. Uses both RX boards. Requires MDME
option.

For details see Chapter 6.2, "Multi-DME measurements", on page 47.

Return values:

<SettingResult> **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Usage: Setting only

<RX>:MEASMODE_PULSE

Switches to pulse analysis mode (see Chapter 6.3, "Graphical pulse analysis", on page 48). Provides power levels at a specific interrogator or transponder channel frequency in a power vs. time diagram. Additional signal parameters are not determined; data logging is not available.

Return values:

<SettingResult> **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Usage: Setting only

11.5.2 DME measurements

\<RX>:DME:ATTMODE?
\<RX>:DME:ATTMODE \<Mode>

This command defines the attenuation mode. The query returns the mode that was actually used for the current measurement.

The attenuation mode defines the sensitivity of the receiver board by selecting a different signal path for each mode (see Figure 5-1).

The following attenuation modes are provided (for DME and Pulse view measurements only):

Parameters:

\<Mode>

        LOW_NOISE
        Provides a high sensitivity;

        NORM
        Provides a normal sensitivity;

        LOW_DIST
        Provides a low sensitivity

        AUTO
        The signal attenuation is selected automatically according to the signal strength in each slot (for DME measurements) or the user-defined power range (Pulse analysis).

        *RST: AUTO

Return values:

\<SettingResult>

        READY
        Setting was successfully applied.

        ERROR
        An error occurred; setting was not successful.

Example: `RX1:DME:ATTMODE LOW_DIST`

Manual operation: See "Att.Mode" on page 68
                        See "Att.Mode" on page 73

\<RX>:DME:FREQ?
\<RX>:DME:FREQ \<RXFreq>

Queries or defines the receiver (RX) frequency of the DME channel to be measured.

A DME channel is uniquely identified by its channel number (+extension) and its receive frequency. Thus, if the receiver (RX) frequency is set to a different value, the channel number is automatically adapted according to the ICAO frequency list (see Chapter B, "DME channel frequency list", on page 166).

Parameters:

<RXFreq>　　　　　　　　numeric value

　　　　　　　　　　　　Range:　　　960 MHz to 1215 MHz
　　　　　　　　　　　　*RST:　　　　962.0 MHz
　　　　　　　　　　　　Default unit: MHz

Return values:

<SettingResult>　　　　**READY**
　　　　　　　　　　　　Setting was successfully applied.

　　　　　　　　　　　　ERROR
　　　　　　　　　　　　An error occurred; setting was not successful.

Manual operation:　　See "Changing the receiver (RX) frequency" on page 67

<RX>:DME:MEASTIME?
<RX>:DME:MEASTIME <Duration>

Queries or defines the time span in which the results are averaged. Each measurement is performed 130 times per second. For the minimum measurement time of 7 ms, only one measurement is performed, and no averaging takes place.

Parameters:

<Duration>　　　　　　numeric value

　　　　　　　　　　　　Range:　　　7 ms to 10000 ms
　　　　　　　　　　　　*RST:　　　　500 ms
　　　　　　　　　　　　Default unit: ms

Return values:

<SettingResult>　　　　**READY**
　　　　　　　　　　　　Setting was successfully applied.

　　　　　　　　　　　　ERROR
　　　　　　　　　　　　An error occurred; setting was not successful.

Manual operation:　　See "Measurement Time" on page 68

<RX>:DME:DEMOD_BW?
<RX>:DME:DEMOD_BW <Bandwidth>

Queries or defines the bandwidth of the digital filter used for DME measurement.

Parameters:

<Bandwidth>　　　　　　**NAR**
　　　　　　　　　　　　Narrow filter for narrow pulses. Adjacent pulses or signal effects outside the pulse are not measured. Wider pulses can be distorted or cut off. Measurement time increases.

WIDE

Wide filter for wider pulses; entire pulse is measured without distortions. Adjacent pulses or signal effects outside the pulse are possibly included.

Return values:

<SettingResult>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Demodulation bandwidth Demod BW" on page 70

<RX>:DME:RFCH?
<RX>:DME:RFCH <ChanNo>,<ChanExt>

Queries or defines the receiver (RX) channel for pulse detection. When defining the channel, the extension can also be provided.

A DME channel is uniquely identified by its channel number (+extension) and its receive frequency. Thus, if the receiver (RX) channel is set to a different number, the frequency is automatically adapted according to the ICAO frequency list (see Chapter B, "DME channel frequency list", on page 166).

Parameters:

<ChanNo>   integer

Channel number

Range: 1 to 126

Setting parameters:

<ChanExt>   X | Y

Channel extension

Return values:

<SettingResult>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Example: `DME:RFCH 2,Y`
`DME:RFCH?`
Result:
`002`

Manual operation: See "Changing the receiver (RX) channel number" on page 66

<RX>:DME:RF_BW?
<RX>:DME:RF_BW <Bandwidth>

Queries or defines the RF bandwidth of the receiver (IF2 bandwidth) for DME measurements. The demodulation bandwidth is not affected.

Parameters:

<Bandwidth> **500K**
500 kHz bandwidth

10M
10 MHz bandwidth

Return values:

<SettingResult> **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "RF bandwidth (RF BW)" on page 70

<RX>:DME:RXMODE?
<RX>:DME:RXMODE <SignalType>

Queries or defines the signal to be received and analyzed by the R&S EDS300, depending on the measurement task.

Parameters:

<SignalType> **REPLY**
The signal transmitted by the DME ground station is measured.

INTERROG
A signal on the interrogator frequency is measured. In this case, the RX frequency is set to the transmit frequency (see Table 6-1).

*RST: REPLY

Return values:

<SettingResult> **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Receiver (RX) Mode" on page 69

RX?

Queries the active receiver board number (only useful if optional second receiver board is installed).

Tip: to change the active receiver board use `SETRX`.

Return values:

<Board> RX:1 | RX:2

Usage: Query only

SETRX <BoardNo>

Activates a receiver board for measurement (useful only if optional second receiver board is installed). Only one board at a time can be active.

Parameters:
<BoardNo>   1 | 2

Return values:
<SettingResult>   **READY**
                     Setting was successfully applied.

                     ERROR
                     An error occurred; setting was not successful.

Usage: Setting only

Manual operation: See "Input for RX Board 1" on page 57
                      See "Input from (optional) RX Board 2" on page 57

<RX>:DME:TRIG_IN_COUNT? <TrigCount>

Number of measured trigger events on external trigger input. Only single pulses are counted.

Parameters:
<TrigCount>   numeric value

                     Number of pulses per capture time (1/s)
                     If no trigger is counted: 0

Usage: Query only

<RX>:DME:TRIG_IN_PERIOD? <Interval>

Interval in which trigger events are detected in external trigger input.

Parameters:
<Interval>   numeric value

                     Interval in ms
                     If no trigger events are detected: inf

Usage: Query only

<RX>:DME:TXFREQ?
<RX>:DME:TXFREQ <TXFreq>

Queries or defines the interrogator frequency (see Table 6-1).

Parameters:

<TXFreq>   numeric value

Range: 960 MHz to 1215 MHz
*RST: 1025 MHz
Default unit: MHz

Return values:

<SettingResult>   **READY**
Setting was successfully applied.
ERROR
An error occurred; setting was not successful.

Manual operation: See "Interrogator Transmission (TX) frequency" on page 68

<RX>:DST:TX_PCODE <InterrogPCode>

Defines the time between the 2 pulses of a DME double pulse code.

Parameters:

<InterrogPCode>   numeric value

Pulse code (spacing) of the interrogator pulses

Range: 11 to 42
Default unit: µs

Usage: Setting only

Manual operation: See "TX Pulse Code (P.Code)" on page 68

<RX>:DST:TXPULSE_WIDTH?
<RX>:DST:TXPULSE_WIDTH <PWidth>

Defines or queries the width of the pulses the R&S EDS300 interrogator transmits to
the ground station.

Parameters:

<PWidth>   numeric value

Width in µs

Range: 0.8 to 4.5

Return values:

<State>   **READY.**
The command was executed successfully.

Example: DST:TXPULSE_WIDTH?
//Result: 3.5
DST:TXPULSE_WIDTH 4.2
//Result: READY.
DST:TXPULSE_WIDTH?
//Result: 4.2

Manual operation: See "Interrogator Transmission (TX) Pulse Width" on page 69

11.5.3 DME interrogator

<RX>:DST:DELAY_OFFSET?
<RX>:DST:DELAY_OFFSET <Offset>

Defines an offset to the delay between the transmission of the request pulse and the reply pulse.

This setting is useful to compensate for delay times caused by cable lengths, for example.

Parameters:

<Offset>   numeric value

                            Offset in µs

                            Range: -100 to +100

Return values:

<State>   **READY.**
                            The command was executed successfully.

Manual operation: See "Delay Offset" on page 63

<RX>:DST:MEM_TIME?
<RX>:DST:MEM_TIME <TrackTime>

Defines or queries the maximum time that the interrogator remains in memory mode. After this time, the next search mode is triggered. Define a period that is at least long enough to finalize ID transmission.

Parameters:

<TrackTime>	numeric value
	Period in s
	Range: 0.1 to 50

Return values:

<State>	**READY.**
	The command was executed successfully.

Manual operation: See "Memory Time (Tracking)" on page 62

<RX>:DST:MIN_REPLY_EFF?
<RX>:DST:MIN_REPLY_EFF <Value>

Defines or queries the minimum reply efficiency after which the interrogator switches between tracking, memory and search modes (see Chapter 5.1, "Evaluating DME signals", on page 35).

Smaller values are better for difficult receiving conditions.

Parameters:

<Value>	numeric value
	Reply efficiency in percent
	Range: 20 to 99

Return values:

<State>	**READY.**
	The command was executed successfully.

Manual operation: See "Min. Reply Effic. (Tracking)" on page 62

<RX>:DST:PRED_TYPE <Algorithm>

Defines the type of algorithm used to calculate the expected reply pulse.

During the search on a DME ground station, the time of arrival for the reply pulse is calculated from the relative speed between the DME ground station and the interrogator.

Parameters:

<Algorithm>	**LINEAR**
	The time delay for the subsequent pulse is derived linearly from the previously measured delay.
	STATIC
	The relative speed is assumed to be zero; the time delay for the subsequent pulse is thus calculated from the mean value of previous time delays. This setting is meant for fixed monitoring stations.

Manual operation: See "Type of Prediction" on page 62

<RX>:DST:PRR?
<RX>:DST:PRR <SearchPRR>, <TrackPRR>

Defines or queries the pulse repetition rate (PRR) for the interrogator's search and track modes.

Note that if SETEXPERT on page 135 is disabled, a maximum of 150 pulses per second are possible for both parameters; see Chapter 7.1.4, "Configuring DME interrogator signals", on page 61.)

Parameters:
<SearchPRR>   integer

                     Range: 5 to 6000

<TrackPRR>   integer

                     Range: 5 to 6000

Return values:
<SettingResult>   **READY**
                     Setting was successfully applied.

                     ERROR
                     An error occurred; setting was not successful.

Example: DST:PRR 100,10

Usage: Setting only

Manual operation: See "PRR for Search Mode" on page 70
                     See "PRR for Track Mode" on page 70

<RX>:DST:PULSE_SHAPE <Shape>

Defines the shape of the transmitted (TX) interrogator pulse, if enabled.

Parameters:
<Shape>   **DME**
                     G auss pulse with a rise and fall time of 2.5 µs

                     TAC
                     Asymmetric Gauss pulse with a rise time of 2.0 µs and a fall time of 2.7 µs
                     Only available for TACAN measurements, requires option R&S EDS300-K1.

Manual operation: See "TX Pulse Shape" on page 63

<RX>:DST:SPULSES?
<RX>:DST:SPULSES <NoPulses>

Defines or queries the number of pulses for which the reply efficiency is calculated during search mode.

The larger the value, the more stable and accurate the results, but the weaker the performance of the interrogator.

Parameters:

<NoPulses>	integer

Range: 50 to 1000
*RST: 250

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Search Pulses" on page 62

<RX>:DST:TPULSES?
<RX>:DST:TPULSES <NoPulses>

Defines or queries the number of pulses for which the reply efficiency is calculated during track mode.

The larger the value, the more stable and accurate the results, but the weaker the performance of the interrogator.

Parameters:

<NoPulses>	integer

Range: 25 to 100
*RST: 50

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Track Pulses" on page 62

<RX>:DST:TXON?
<RX>:DST:TXON <State>

Queries or defines the state of the interrogator. If activated, the R&S EDS300 transmits interrogator pulses to the ground station with the specified pulse repetition rate (see PRR for Search Mode/ PRR for Track Mode.

Parameters:

<State>	ON | OFF

ON

OFF

*RST: OFF

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Transmitter (TX) State" on page 68

<RX>:DST:TXPOWER <Power>

Defines the level at which the R&S EDS300 high-power interrogator transmits pulses to the ground station.

For low-power units, the power is fixed at 20 W (43 dBm).

Parameters:

<Power>   100W | 250W | 500W

                          Power in W

Return values:

<SettingResult>   **READY**
                          Setting was successfully applied.

                          ERROR
                          An error occurred; setting was not successful.

SET_ICAO_OVR <State>
SETEXPERT <State>

Enables or disables expert features which override the maximum pulse rates defined by the ICAO.

Setting parameters:

<State>   ON | OFF

                          ON
                          Pulse rates of up to 6000 pulses per second are available

                          OFF
                          A maximum of 150 pulses per second are allowed for the first 30 seconds, then only 30 pulses per second are allowed.

                          *RST: OFF

Return values:

<SettingResult>   **READY**
                          Setting was successfully applied.

                          ERROR
                          An error occurred; setting was not successful.

Usage: Setting only

Manual operation: See "ICAO Override" on page 63

11.5.4 Pulse analysis

ⓘ The following commands are only available in Pulse mode, see `<RX>:MEASMODE_PULSE` on page 124.

<RX>:PULSEVIEW:AVRG?
<RX>:PULSEVIEW:AVRG <NoPulses>

Queries or defines the number of pulses used as a basis for averaged results (see
`<RX>:PULSEVIEW:TRACE` on page 138).

Parameters:

<NoPulses>   integer

Range: 1 to 100

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Example: `PULSEVIEW:AVRG 10`

Manual operation: See "Average Count (AVRG)" on page 73

<RX>:PULSEVIEW:BW?
<RX>:PULSEVIEW:BW <Bandwidth>

Queries or defines the bandwidth of the digital filter used during pulse measurement.

Parameters:

<Bandwidth>   **NAR**
Narrow filter (0.5 MHz)
Suppresses adjacent channels, distorts the pulse shape for
wider pulses.

WIDE
Wide filter (10 MHz)
For wider pulses. Entire pulse is measured without distortions.
Adjacent pulses or signal effects outside the pulse possibly
included.

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Demodulation bandwidth (Demod BW)" on page 75

<RX>:PULSEVIEW:TIMEDIV?
<RX>:PULSEVIEW:TIMEDIV <Time>

Queries or defines the time per division, that is: the scaling of the x-axis, which consists of 10 divisions

Parameters:

<Time>   0.5 | 1 | 2 | 5 | 10 | 20 | 50

Default unit: µs

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "X-axis Scaling (Time/Div)" on page 72

<RX>:PULSEVIEW:TRACE?
<RX>:PULSEVIEW:TRACE <Mode>

Queries or defines the trace mode, that is: the update mode for subsequent pulses (or pulse pairs)

Parameters:

<Mode>   CLRWR | AVRG | MAXHOLD

CLRWR
Clear/write: the pulse (pair) is overwritten by each new pulse (pair).

AVRG
The average is formed over several measurements. How many measurements are averaged is defined by the <RX>:PULSEVIEW:AVRG command.
As soon as the required number of pulses have been acquired, the display is updated after each sweep, averaging the specified number of previous pulses.

MAXHOLD
The maximum value is determined over all previously measured pulses (pairs) and displayed. The R&S EDS300 saves each trace point in the trace memory only if the new value is greater than the previous one.

*RST: CLRWR

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Trace Mode" on page 73

<RX>:PULSEVIEW:TRIGDELAY?
<RX>:PULSEVIEW:TRIGDELAY <Time>

Queries or defines the trigger delay.

The valid delay times depend on the x-axis scaling (see `<RX>:PULSEVIEW:`
`TIMEDIV?` on page 138). A delay outside the displayed time range is not possible.

Parameters:
<Time>   time

                          Range: -20 us (for 0.5 us per div) to 320 us (for 50 us per
                                        div)
                          Default unit: µs

Return values:
<SettingResult>   **READY**
                          Setting was successfully applied.

                          ERROR
                          An error occurred; setting was not successful.

Manual operation: See "Trigger Delay" on page 76

<RX>:PULSEVIEW:TRIGDOUBLE?
<RX>:PULSEVIEW:TRIGDOUBLE <State>

Queries or defines the behavior of the R&S EDS300 after a single trigger.

Parameters:
<State>   ON | OFF

                          ON
                          Triggering only occurs when a double pulse, that is: a pulse pair
                          is detected. Single pulses are not displayed or evaluated.

                          OFF
                          Each individual pulse that fulfills the trigger conditions is dis-
                          played and evaluated.

                          *RST: OFF

Return values:
<SettingResult>   **READY**
                          Setting was successfully applied.

                          ERROR
                          An error occurred; setting was not successful.

Manual operation: See "Trigger Double" on page 76

<RX>:PULSEVIEW:TRIGLEVRF_MV?
<RX>:PULSEVIEW:TRIGLEVRF_MV <Level>

Queries or defines the RF trigger level. The valid value range depends on the selected y-axis unit for the power axis (see<RX>:PULSEVIEW:UNIT on page 142).

- V: 0 µV to 2 V
- W: 0 mW to 80 mW
- dBm: -121 dBm to 19 dBm

Parameters:

<Level>	numeric value

Return values:

<SettingResult>	**READY** Setting was successfully applied. **ERROR** An error occurred; setting was not successful.
Example:	PULSEVIEW:UNIT V PULSEVIEW:TRIGLEVRF_MV 1V
Manual operation:	See "Trigger Level" on page 76

<RX>:PULSEVIEW:TRIGMODE?
<RX>:PULSEVIEW:TRIGMODE <Mode>

Queries or defines the trigger mode which determines the behavior of the instrument if no trigger occurs.

Parameters:

<Mode>	NORMAL	SINGLE	AUTO **AUTO** The instrument triggers automatically after a time interval if the trigger conditions are not fulfilled. If a real trigger occurs, a new measurement is started immediately. This mode helps you see the waveform even before the trigger conditions are set correctly. The waveform on the screen is not synchronized, and successive waveforms are not triggered at the same point of the waveform. The time interval depends on the time base settings. **NORMAL** The instrument acquires a waveform only if a trigger occurs, that is, if all trigger conditions are fulfilled. If no trigger occurs, no waveform is acquired and the last acquired waveform is displayed. If no waveform was captured before, none is displayed. When no trigger has been found for longer than one second, a message box appears that shows the time elapsed since the last trigger.

SINGLE
The instrument performs a single sweep when you select the
[ENTER] key and the trigger conditions are fulfilled. Each new
sweep must be started manually.

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Trigger Mode" on page 75

<RX>:PULSEVIEW:TRIGSLOPE?
<RX>:PULSEVIEW:TRIGSLOPE <Slope>

Queries or defines the trigger slope.

Parameters:

<Slope>   **POS**
Triggering occurs when the signal rises to the trigger level (posi-
tive slope).

NEG
Triggering occurs when the signal falls down to the trigger level
(negative slope).

Return values:

<SettingResult>   **READY**
Setting was successfully applied.

ERROR
An error occurred; setting was not successful.

Manual operation: See "Trigger Slope" on page 75

<RX>:PULSEVIEW:TRIGSOURCE?
<RX>:PULSEVIEW:TRIGSOURCE <Source>

Queries or defines the trigger source.

Parameters:

<Source>   **LEVEL**
The measured input signal

EXTERN
An external trigger signal provided by a device connected to the
[trigger in] connector on the rear panel of the R&S EDS300

INTERROG
The pulses sent by the R&S EDS300 interrogator

TAC_MRB
The TACAN main reference burst (if available)

TAC_ARB
The TACAN auxiliary reference burst (if available)

DME_PULSE

A detected DME double pulse

Return values:

\<SettingResult\>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Trigger Source" on page 76

\<RX\>:PULSEVIEW:UNIT?
\<RX\>:PULSEVIEW:UNIT \<Unit\>

Queries or defines the unit for power values in the Pulse view.

Parameters:

\<Unit\>   DBM | MW | UW | NW | PW | V | MV | UV

DBM
dBm

MW
mW

UW
µW

NW
nW

PW
pW

V
Volt

MV
mV

UV
µV

Return values:

\<SettingResult\>   **READY**

Setting was successfully applied.

ERROR

An error occurred; setting was not successful.

Manual operation: See "Y-axis Unit" on page 72

\<RX\>:PULSEVIEW:YSCALE_DB_DIV?
\<RX\>:PULSEVIEW:YSCALE_DB_DIV \<Scaling\>

Power range in dB per division; defines the scaling of the y-axis, which consists of 10 divisions.

Parameters:

<Scaling>   1 | 2 | 3 | 5 | 10

Return values:

<SettingResult>   **READY**
                                 Setting was successfully applied.
                                 ERROR
                                 An error occurred; setting was not successful.

Manual operation: See "Y-axis Scaling (<Unit>/Div)" on page 72

<RX>:PULSEVIEW:YSCALE_MV_DIV?
<RX>:PULSEVIEW:YSCALE_MV_DIV <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

Parameters:

<Scaling>   0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 3 | 5 | 10 | 20 | 30 | 50 | 100
                                 Default unit: mV

Return values:

<SettingResult>   **READY**
                                 Setting was successfully applied.
                                 ERROR
                                 An error occurred; setting was not successful.

Example: ```
                                 PULSEVIEW:UNIT MV
                                 //Result: READY.
                                 PULSEVIEW:YSCALE_MV_DIV 2
                                 //Result: READY.
                                 PULSEVIEW:YSCALE_MAXLEV_MV 20
                                 //Result: READY.
                                 ```

**Manual operation:**           See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_MW_DIV?**
**<RX>:PULSEVIEW:YSCALE_MW_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

<Scaling>                         0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 3 | 5 | 10 | 20
                                 Default unit: mW

**Return values:**

<SettingResult>                 **READY**
                                 Setting was successfully applied.
                                 **ERROR**
                                 An error occurred; setting was not successful.

**Example:**
```
PULSEVIEW:UNIT MW
//Result: READY.
PULSEVIEW:YSCALE_MW_DIV 0:5
//Result: READY.
PULSEVIEW:YSCALE_MAXLEV_MW 5
//Result: READY.
```

**Manual operation:** See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_NW_DIV?**
**<RX>:PULSEVIEW:YSCALE_NW_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

<Scaling>      0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 3 | 5 | 10 | 20 | 30 | 50 | 100

Default unit: nW

**Return values:**

<SettingResult>   **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:** See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_PW_DIV?**
**<RX>:PULSEVIEW:YSCALE_PW_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

<Scaling>      0.1 | 0.2 | 0.3 | 0.5 | 1 | 2 | 3 | 5 | 10 | 20 | 30 | 50 | 100

Default unit: pW

**Return values:**

<SettingResult>   **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:** See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_UV_DIV?**
**<RX>:PULSEVIEW:YSCALE_UV_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

| | |
|---|---|
| <Scaling> | 1 \| 2 \| 3 \| 5 \| 10 \| 20 \| 30 \| 50 \| 100 |
| | Default unit: µV |

**Return values:**

<SettingResult>    **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_UW_DIV?**
**<RX>:PULSEVIEW:YSCALE_UW_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

| | |
|---|---|
| <Scaling> | 0.1 \| 0.2 \| 0.3 \| 0.5 \| 1 \| 2 \| 3 \| 5 \| 10 \| 20 \| 30 \| 50 \| 100 |
| | Default unit: µW |

**Return values:**

<SettingResult>    **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Scaling (<Unit>/Div)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_V_DIV?**
**<RX>:PULSEVIEW:YSCALE_V_DIV** <Scaling>

Power range per division; defines the scaling of the y-axis, which consists of 10 divisions.

**Parameters:**

| | |
|---|---|
| <Scaling> | 0.1 \| 0.2 \| 0.3 \| 0.5 \| 1 |
| | Default unit: V |

**Return values:**

<SettingResult>    **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Scaling (<Unit>/Div)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_DBM?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_DBM** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

<Range>                     Range:        -70  to  +30
                            Default unit: dBm

**Return values:**

<SettingResult>             **READY**
                            Setting was successfully applied.

                            **ERROR**
                            An error occurred; setting was not successful.

**Manual operation:**       See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_MW?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_MW** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

<Range>                     Range:        1.0  to  200
                            Default unit: mW

**Return values:**

<SettingResult>             **READY**
                            Setting was successfully applied.

                            **ERROR**
                            An error occurred; setting was not successful.

**Manual operation:**       See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_UW?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_UW** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

<Range>                     Range:        1.0  to  1000
                            Default unit: µW

**Return values:**

<SettingResult>             **READY**
                            Setting was successfully applied.

                            **ERROR**
                            An error occurred; setting was not successful.

**Manual operation:**       See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_NW?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_NW** <Range>

The maximum power level on the y-axis.

**Parameters:**

<Range>                  Range:         1.0  to  1000
                         Default unit: nW

**Return values:**

<SettingResult>          **READY**
                         Setting was successfully applied.

                         **ERROR**
                         An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_PW?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_PW** <Range>

The maximum power level on the y-axis.

**Parameters:**

<Range>                  Range:         1.0  to  1000
                         Default unit: pW

**Return values:**

<SettingResult>          **READY**
                         Setting was successfully applied.

                         **ERROR**
                         An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_V?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_V** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

<Range>                  Range:         1.0  to  10.0
                         Default unit: V

**Return values:**

<SettingResult>          **READY**
                         Setting was successfully applied.

                         **ERROR**
                         An error occurred; setting was not successful.

**Manual operation:**    See "Y-axis Range (Max. Lev)" on page 72

**<RX>:PULSEVIEW:YSCALE_MAXLEV_MV?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_MV** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

| | | |
|---|---|---|
| <Range> | Range: | 1.0 to 1000 |
| | Default unit: mV | |

**Return values:**

<SettingResult>　　**READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:**　　See "Y-axis Range (Max. Lev)" on page 72

---

**<RX>:PULSEVIEW:YSCALE_MAXLEV_UV?**
**<RX>:PULSEVIEW:YSCALE_MAXLEV_UV** <Scaling>

The maximum power level on the y-axis.

**Parameters:**

| | | |
|---|---|---|
| <Range> | Range: | 10 to 1000 |
| | Default unit: µV | |

**Return values:**

<SettingResult>　　**READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Manual operation:**　　See "Y-axis Range (Max. Lev)" on page 72

## 11.5.5 Multi-DME measurements

Useful commands for retrieving results described elsewhere:

- <RX>:MDME:STREAMCFG on page 150
- <RX>:MDMEDATA? on page 150

**Remote commands exclusive to Multi-DME measurements**

---

**<RX>:MDME:ATTMODE**

Set the MDME attenuation mode

**Parameters:**

MultiDMEMode          LOW_NOISE | NORM | LOW_DIST | AUTO

**Return values:**

\<SettingResult\>        **READY**
                     Setting was successfully applied.

                     **ERROR**
                     An error occurred; setting was not successful.

**Usage:**            Setting only

---

**\<RX\>:MDME:AVRG**

Activation / deactivation of the average function.

**Parameters:**

ActDeactAverage       ON | OFF

**Return values:**

\<SettingResult\>        **READY**
                     Setting was successfully applied.

                     **ERROR**
                     An error occurred; setting was not successful.

**Usage:**            Setting only

---

**\<RX\>:MDME:CH**

Configure one Multi-DME Slot.

**Parameters:**

ConfigMultiSlot       Slot 1..10 Channel Nr X/Y TX enable ONOFF

**Return values:**

\<SettingResult\>        **READY**
                     Setting was successfully applied.

                     **ERROR**
                     An error occurred; setting was not successful.

**Usage:**            Setting only

## 11.6  Retrieving results

### 11.6.1 Streaming measurement results

These results can also be stored to a connected USB memory device, simultaneously to the running measurement. In this case, data is stored continuously for all measurements that are performed after logging is started and until it is stopped. For details see Chapter 8.2, "Logging measurement data", on page 81.

---

**<RX>:MDMEDATA?**

Queries a single dataset of one slot in MDME mode.

**Parameters:**
| | |
|---|---|
| DatasetSlot | Dataset definition Slot 1 ... 10 |

**Return values:**
| | |
|---|---|
| Result | string |

**Usage:** Query only

---

**<RX>:MDME:STREAMCFG**

Select MDME Slots for streaming; Only selected slots are streamed out

**Parameters:**
| | |
|---|---|
| MultiDMESlots | Slots 1..10, separated by ; (default:1;2;3;4;5;6; 7;8;9;10) |

**Return values:**
| | |
|---|---|
| <SettingResult> | **READY** |
| | Setting was successfully applied. |
| | **ERROR** |
| | An error occurred; setting was not successful. |

**Usage:** Setting only

---

**<RX>:MEASDATA?** <ListType>

This command returns the contents of one line in the logged data as a comma-separated list.

For details on the returned values, see the Chapter C, "Format description of DME measurement data", on page 182.

**Setting parameters:**

<ListType>　　　　　　　FULL | FULL2 | FULL3 | SHORT | DST | TAC3 | TAC2 | TAC

For a description of the list types, see Table C-1.

*RST:　　　FULL3

**Usage:**　　　　　　　Query only

---

**<RX>:MEASDEF?** <ListType>

This command returns the description of the contents of one line in the streamed data. The result can be used as a header row for a result table, for example.

For details on the returned values, see the Chapter C, "Format description of DME measurement data", on page 182.

**Setting parameters:**

<ListType>　　　　　　　FULL | FULL2 | FULL3 | SHORT | DST | TAC3 | TAC2 | TAC

For a description of the list types, see Table C-1.

*RST:　　　FULL3

**Return values:**

Result　　　　　　　　　<{string}>

**Example:**　　　　　　MEASDEF? FULL3

Returns the header row for a complete table of streamed data.

**Usage:**　　　　　　　Query only

---

**SETUSBLOGTIME** <Interval>

Set the minimum time interval between 2 measurements logged on USB.

**Parameters:**

<Interval>　　　　　　　numeric value

Interval in ms

Range:　　　0　to　3600000

**Example:**　　　　　　Set the log interval to once per second.

SETUSBLOGTIME 1000

//Result: READY.

**Manual operation:**　　See "[START]" on page 81

---

**SETUSBLOGMODE** <Mode>

Defines how often a new log file is created.

**Parameters:**

<Mode>　　　　　　　　**SINGLE**

All log data is saved in a single file.

**HOUR**

A new file is created every hour.

**DAY**
A new file is created every day.

**Manual operation:**    See "[START]" on page 81

---

**SETSTREAMTRG** <TriggerType>

Determines when a line of the data stream is triggered.

Only for single DME.

**Parameters:**

<TriggerType>          MEAS | PULSE | BOTH

**MEAS**
Data stream is initiated by a measurement.
The data is output in equidistant time intervals, depending on the measurement time (see also Chapter 8.2, "Logging measurement data", on page 81).

**PULSE**
Data stream is initiated by an outgoing interrogator pulse (status flag P, see Chapter C, "Format description of DME measurement data", on page 182). The data is output in intervals equivalent to the TX pulse rate.

**BOTH**
Both a measurement and an interrogator pulse initiate a data stream. The data is not necessarily output in regular intervals, depending on when pulses occur in relation to the measurement time.

*RST:          BOTH

**Return values:**

<SettingResult>        **READY**
Setting was successfully applied.

**ERROR**
An error occurred; setting was not successful.

**Usage:**              Setting only

---

**<RX>:STOPSTREAM**

This command stops the data stream.

**Return values:**

<EventResult>          **READY**
Command was executed successfully.

**ERROR**
An error occurred; command was not successful.

**Usage:**              Event

**Manual operation:**    See "[STOP]" on page 81

**<RX>:STREAM** <ListType>

This command enables the R&S EDS300 to start sending a data stream to the remote control device as soon as the trigger event occurs (see `SETSTREAMTRG` on page 152). The data stream contains the results of the specified channel and time slots. The data stream continues until the `<RX>:STOPSTREAM` command is executed.

Which parameters are contained in which list type is indicated in detail in Chapter C, "Format description of DME measurement data", on page 182.

**Setting parameters:**

<ListType>        FULL | FULL2 | FULL3 | SHORT | DST | TAC3 | TAC2 | TAC

                  For a description of the list type, see Table C-1.

                  *RST:       FULL3

**Usage:**        Event

**Manual operation:**        See "[START]" on page 81

## 11.6.2 DME measurements

Useful commands for retrieving results described elsewhere:

- Chapter 11.5.3, "DME interrogator", on page 131

**Remote commands exclusive to retrieving results:**

**<RX>:DST:REPEFF?**

Queries the current reply efficiency in %.

**Return values:**

<Result>        numeric value

                  Default unit: %

**Usage:**        Query only

**Manual operation:**        See "REPLY EFFIC. [%]" on page 43

**<RX>:DST:SOT?**

Queries the search or track status. For details see Chapter 5.1, "Evaluating DME signals", on page 35.

**Return values:**

Result       SEARCH | TRACK | MEMORY | INACTIVE

**Usage:**      Query only

**Manual operation:**  See "SEARCH/TRACK" on page 43

---

**<RX>:DME:AVRGLEVEL?**

Returns the average measured level of the received signal

**Return values:**

<Result>     Default unit: dBm

**Usage:**      Query only

**Manual operation:**  See "AVRG.LEVEL [dBm]" on page 41

---

**<RX>:DME:CARRIER_F_DELTA?**

Returns the measured carrier frequency deviation relative to the defined channel frequency

**Return values:**

<Result>     Default unit: kHz

**Usage:**      Query only

**Manual operation:**  See "CARRIER FREQ DELTA [kHz]" on page 42

---

**<RX>:DME:ID_CODE?**

Returns the Morse-decoded ID.

**Return values:**

<Result>

**Usage:**      Query only

**Manual operation:**  See "ID-CODE" on page 42

---

**<RX>:DME:ID_PRR?**

Returns the pulse repetition rate during ID transmissions

**Return values:**

<Result>     Default unit: 1/s

**Usage:**      Query only

**Manual operation:**  See "ID PRR [1/s]" on page 42

**<RX>:DME:ID_SEQLEN?**

Returns the length of an individual ID sequence.

**Return values:**

<Result>                Length in ms

**Usage:**                Query only

---

**<RX>:DME:PEAKLEVEL?**

Returns the peak measured level of the received signal

**Return values:**

<Result>                Default unit: dBm

**Usage:**                Query only

**Manual operation:**       See "PEAKLEVEL [dBm]/[W]" on page 41

---

**<RX>:DME:PULSE_REPT_RATE?**

Returns the measured pulse repetition rate of the DME signal, i.e. number of interrogator/reply pulse (pairs) per second

**Return values:**

<Result>                Default unit: 1/s

**Usage:**                Query only

**Manual operation:**       See "PULSE REPETITION RATE [1/s]" on page 42

---

**<RX>:DME:PULSE_SPACING?**

Returns the measured pulse spacing in us (corresponds to the pulse code as specified in the Chapter B, "DME channel frequency list", on page 166).

**Return values:**

<PCode>              integer

                             Range:      11 to 42
                             Default unit: μs

**Usage:**                Query only

**Manual operation:**       See "PULSE SPACING [μs]" on page 42

---

**<RX>:DME:RFCH_PS?**

Returns the RF channel and the pulse spacing used for the DME measurement (according to the ICAO frequency list, see Chapter B, "DME channel frequency list", on page 166).

**Return values:**

| | |
|---|---|
| <ChannelNo> | integer using 3 digits |
| | Channel number |
| | Range:        000  to  126 |
| <ChannelExt> | X \| Y |
| | Channel extension |
| <ReplyPulseCode> | integer |
| | Pulse code (spacing) of the reply pulses |
| | Range:        11  to  42 |
| | Default unit: µs |
| <InterrogPCode> | Pulse code (spacing) of the interrogator pulses |
| | Range:        11  to  42 |
| | Default unit: µs |

**Example:**    `001Y-30-36`
DME channel 1Y with reply pulse code 30 and interrogator pulse code 36

**Usage:**    Query only

**Manual operation:**    See "Changing the receiver (RX) channel number" on page 66
See "RX Pulse Code (P.Code)" on page 67
See "TX Pulse Code (P.Code)" on page 68

---

**<RX>:DST:DELAY?**

Queries the measured reply pulse delay, that is: the delay time between the interrogator and reply pulse, including the ground station delay (50 µs for X channels / 56 µs for Y channels)

**Return values:**

| | |
|---|---|
| <Result> | numeric value |
| | Default unit: µs |

**Usage:**    Query only

**Manual operation:**    See "DELAY [µs]" on page 43

---

**<RX>:DST:DST?**

Queries the measured distance of the interrogator (aircraft) from the ground station.

**Return values:**

| | |
|---|---|
| <Result> | numeric value |
| | Default unit: m |

**Usage:**    Query only

**Manual operation:**    See "DISTANCE [km]" on page 43
See "DISTANCE [NM]" on page 43

**GETNRPPOW**

Returns the average and peak power levels from a connected power sensor.

**Return values:**

<AvgPower>             Average power

Default unit: dBm

<PeakPower>            Peak power

Default unit: dBm

**Manual operation:**    See "NRP AVRG/NRP PEAK" on page 41

## 11.6.3   TACAN measurements

**<RX>:TACAN:BEARING?**

Direction of the ground station in relation to the R&S EDS300.

**Return values:**

<Result>               Default unit: degrees

**Usage:**              Query only

**Manual operation:**    See "BEARING [°]" on page 42
                         See "BEARING [°]" on page 46

**<RX>:TACAN:FREQ_135HZ?**

Returns the measured frequency of the nominal 135 Hz components

**Return values:**

<Result>               Default unit: Hz

**Usage:**              Query only

**Manual operation:**    See "FREQ 135Hz [Hz]" on page 46

**<RX>:TACAN:FREQ_15HZ?**

Returns the measured frequency of the nominal 15 Hz components

**Return values:**

| | |
|---|---|
| <Result> | Default unit: Hz |
| **Usage:** | Query only |
| **Manual operation:** | See "FREQ 15Hz [Hz]" on page 46 |

---

**<RX>:TACAN:MOD_DEPTH_135HZ?**

Returns the measured modulation depth of the 135 Hz signal

**Return values:**

| | |
|---|---|
| <Result> | Default unit: percent |
| **Usage:** | Query only |
| **Manual operation:** | See "MOD.DEPTH 135Hz [%]" on page 45 |

---

**<RX>:TACAN:MOD_DEPTH_15HZ?**

Returns the measured modulation depth of the 15 Hz signal

**Return values:**

| | |
|---|---|
| <Result> | Default unit: percent |
| **Usage:** | Query only |
| **Manual operation:** | See "MOD.DEPTH 15Hz [%]" on page 45 |

---

**<RX>:TACAN:PHASE_135HZ?**

Returns the measured phase of the 135 Hz components compared to the ARB, divided by 9.

**Return values:**

| | |
|---|---|
| <Result> | Range: 0 to 40 (360/9) <br> Default unit: degrees |
| **Usage:** | Query only |
| **Manual operation:** | See "PHASE 135Hz [°/9]" on page 46 |

---

**<RX>:TACAN:PHASE_15HZ?**

Returns the measured phase of the 15 Hz components compared to the MRB

**Return values:**

| | |
|---|---|
| <Result> | Default unit: degrees |
| **Usage:** | Query only |
| **Manual operation:** | See "PHASE 15Hz [°]" on page 46 |

**<RX>:TACAN:PHASE_SHIFT?**

Returns the measured phase shift between the 15 Hz and 135 Hz components

**Return values:**

<Result>                    Range:       0 to 40
                            Default unit: degrees

**Usage:**                  Query only

**Manual operation:**       See "PHASE SHIFT [°]" on page 46

---

**<RX>:TACAN:SET_DMESCREEN_PAGE** <Page>

Switches the displayed window between the TACAN and DME measurement results.

This command is only available for TACAN measurements.

Note that this command is maintained for compatibility reasons only. Use `<RX>:DME:SET_VIEW` for new remote control programs.

**Parameters:**

<Page>                      **DMESCREENPAGE_DME**
                            DME measurement results

                            **DMESCREENPAGE_TAC1**
                            TACAN measurement results (page 1)
                            (TACAN only, requires option R&S EDS300-K1)

                            **DMESCREENPAGE_TAC2**
                            TACAN measurement results (page 2)

                            **DMESCREENPAGE_MAINT**
                            ID Analysis results

                            (TACAN only, requires option R&S EDS300-K1)

**Return values:**

<SettingResult>             **READY**
                            Setting was successfully applied.

                            **ERROR**
                            An error occurred; setting was not successful.

**Usage:**                  Setting only

---

**<RX>:DME:SET_VIEW** <View>

Switches the displayed window between the different TACAN measurement results as described in Chapter 6, "Measurements and results", on page 38.

This command is only available for TACAN measurements.

**Parameters:**

<View>                      **DME**
                            DME measurement results

**TAC1**

TACAN measurement results (page 1)

(TACAN only, requires option R&S EDS300-K1)

**TAC2**

TACAN measurement results (page 2)

**ID**

ID Analysis results

(TACAN only, requires option R&S EDS300-K1)

**Return values:**

&lt;SettingResult&gt;　　　　**READY**

Setting was successfully applied.

**ERROR**

An error occurred; setting was not successful.

**Usage:**　　　　Setting only

**Manual operation:**　　　See "View" on page 69

## 11.6.4 Pulse analysis results

Pulse mode is meant for graphical analysis; data streaming and data logging is not available. However, the measured power values can be queried remotely.

**&lt;RX&gt;:PULSEVIEW:DATASET?**

Returns the measured power values from the power vs time diagram ("Pulse" view).

**Return values:**

&lt;Result&gt;　　　　comma-separated list of numeric values

The number of values depends on the x-axis scaling (see &lt;RX&gt;:PULSEVIEW:TIMEDIV on page 138) of the diagram:

For scaling between 2 µs/div and the maximum of 50 µs/div, all 2000 internally captured measurement points are returned.

For a scaling of 1 µs/div, only the first 1000 internally captured measurement points are returned.

For a scaling of 0.5 µs/div, only the first 500 internally captured measurement points are returned.

The unit of the power levels is always dBm, regardless of the &lt;RX&gt;:PULSEVIEW:UNIT setting.

&lt;State&gt;　　　　**READY.**

The command was executed successfully.

| **Example:** | `PULSEVIEW:TIMEDIV 2` |
|---|---|
| | Scaling: 2 us/div -> 2000 values |
| | `PULSEVIEW:DATASET?` |
| | Result: |
| | `-54.328,-54.328,-54.328,-54.835,-55.010,` |
| | `-55.559,-56.349,-56.773,-56.993,-57.933,` |
| | `-58.444,-58.987,-59.566,-60.187,-61.579,` |
| | `-61.966,-61.966,-62.370,-63.239,-63.709,` |
| | `-63.709,-64.205,-64.732,-64.732,-64.205,` |
| | `...READY.` |
| **Usage:** | Query only |

---

### <RX>:PULSEVIEW:ANALYSIS?

Returns the analyzed pulse parameter values from the power vs time diagram ("Pulse" view). The values for all parameters are returned as a comma-separated list. For details on the parameters, see Chapter 6.3, "Graphical pulse analysis", on page 48.

**Return values:**

| <State> | **READY.** |
|---|---|
| | The command was executed successfully. |

| **Example:** | `PULSEVIEW:ANALYSIS?` |
|---|---|
| | |
| | `Analysis_OK: true,` |
| | `Pulse1_Risetime_us: 2.000,` |
| | `Pulse1_Widthtime_us: 3.464,` |
| | `Pulse1_Decaytime_us: 1.987,` |
| | `Pulse2_Risetime_us: 1.995,` |
| | `Pulse2_Widthtime_us: 3.466,` |
| | `Pulse2_Decaytime_us: 1.999,` |
| | `Pulse_Spacingtime_us: 11.998,` |
| | `Peak_Variation_dB: -0.023,` |
| | `Peak_1_dBm: -31.164,` |
| | `Peak_2_dBm: -31.140,` |
| | `READY.` |
| **Usage:** | Query only |
| **Manual operation:** | See "Pulse rise time" on page 50 |
| | See "Pulse duration" on page 51 |
| | See "Pulse decay time" on page 52 |
| | See "Pulse spacing" on page 53 |
| | See "Peak variation" on page 54 |
| | See "Mark1" on page 54 |
| | See "Mark2" on page 54 |
| | See "Mrk. max to peak 1" on page 55 |

# 12 Troubleshooting

**Blown fuse**

If the product does not start, a blown fuse in the power supply can be the cause. Contact the Rohde & Schwarz customer service to confirm the fault symptoms. If the power supply has a blown fuse, you must return the product to the Rohde & Schwarz customer service to have the power supply replaced. Follow the instructions from the Rohde & Schwarz customer service.

If you need to transport or ship the product, see Chapter 13.4, "Transporting", on page 163.

## 12.1 Contacting customer support

**Technical support – where and when you need it**

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

**Contact information**

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:



*Figure 12-1: QR code to the Rohde & Schwarz support page*

# 13 Maintenance, storage, transport and disposal

The product does not require regular maintenance. It only requires occasional cleaning. It is however advisable to check the nominal data from time to time.

## 13.1 Cleaning

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Cleaning agents, solvents (thinners, acetone), acids and bases can damage the front panel labeling, plastic parts and display.

## 13.2 Calibration

**Access**: [CAL]

It is recommended that the R&S EDS300 be calibrated once a year by a certified Rohde & Schwarz service technician.

## 13.3 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the specifications document.

## 13.4 Transporting

**Packing**

Use the original packaging material. It consists of antistatic wrap for electrostatic protection and packing material designed for the product.

If you do not have the original packaging, use similar materials that provide the same level of protection. You can also contact your local Rohde & Schwarz service center for advice.

**Securing**

When moving the product in a vehicle or using transporting equipment, make sure that the product is properly secured. Only use items intended for securing objects.

**Transport altitude**

The maximum transport altitude is provided in the data sheet.

## 13.5 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

**Disposing of electrical and electronic equipment**

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.



*Figure 13-1: Labeling in line with EU directive WEEE*

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

# Annex

# A  References

**[1] Convention on International Civil Aviation**

Convention on International Civil Aviation, Volume 1 (Radio Navigation Aids), Sixth Edition of Volume 1 – July 2006; International Civil Aviation Organization Annex 10, Volume I Radio Navigation Aids, ICAO

**Application Notes:**

- Rohde & Schwarz Application Note: 1EF91: Testing of DME/TACAN Ground Stations

# B  DME channel frequency list

The following table indicates the frequencies and pulse codes for the interrogator (DME on-board transmitter) and reply (DME ground station) signals for specific DME channels as defined by the International Civil Aviation Organization (ICAO, see [1]).

A DME channel is uniquely identified by its channel number (+extension) and its receive frequency.

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 1X | 1025 | 12 | - | - | 962 | 12 |
| 1Y | 1025 | 36 | - | - | 1088 | 30 |
| | | | | | | |
| 2X | 1026 | 12 | - | - | 963 | 12 |
| 2Y | 1026 | 36 | - | - | 1089 | 30 |
| | | | | | | |
| 3X | 1027 | 12 | - | - | 964 | 12 |
| 3Y | 1027 | 36 | - | - | 1090 | 30 |
| | | | | | | |
| 4X | 1028 | 12 | - | - | 965 | 12 |
| 4Y | 1028 | 36 | - | - | 1091 | 30 |
| | | | | | | |
| 5X | 1029 | 12 | - | - | 966 | 12 |
| 5Y | 1029 | 36 | - | - | 1092 | 30 |
| | | | | | | |
| 6X | 1030 | 12 | - | - | 967 | 12 |
| 6Y | 1030 | 36 | - | - | 1093 | 30 |
| | | | | | | |
| 7X | 1031 | 12 | - | - | 968 | 12 |
| 7Y | 1031 | 36 | - | - | 1094 | 30 |
| | | | | | | |
| 8X | 1032 | 12 | - | - | 969 | 12 |
| 8Y | 1032 | 36 | - | - | 1095 | 30 |
| | | | | | | |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 9X | 1033 | 12 | - | - | 970 | 12 |
| 9Y | 1033 | 36 | - | - | 1096 | 30 |
| | | | | | | |
| 10X | 1034 | 12 | - | - | 971 | 12 |
| 10Y | 1034 | 36 | - | - | 1097 | 30 |
| | | | | | | |
| 11X | 1035 | 12 | - | - | 972 | 12 |
| 11Y | 1035 | 36 | - | - | 1098 | 30 |
| | | | | | | |
| 12X | 1036 | 12 | - | - | 973 | 12 |
| 12Y | 1036 | 36 | - | - | 1099 | 30 |
| | | | | | | |
| 13X | 1037 | 12 | - | - | 974 | 12 |
| 13Y | 1037 | 36 | - | - | 1100 | 30 |
| | | | | | | |
| 14X | 1038 | 12 | - | - | 975 | 12 |
| 14Y | 1038 | 36 | - | - | 1101 | 30 |
| | | | | | | |
| 15X | 1039 | 12 | - | - | 976 | 12 |
| 15Y | 1039 | 36 | - | - | 1102 | 30 |
| | | | | | | |
| 16X | 1040 | 12 | - | - | 977 | 12 |
| 16Y | 1040 | 36 | - | - | 1103 | 30 |
| | | | | | | |
| 17X | 1041 | 12 | - | - | 978 | 12 |
| 17Y | 1041 | 36 | 36 | 42 | 1104 | 30 |
| 17Z | 1041 | - | 21 | 27 | 1104 | 15 |
| | | | | | | |
| 18X | 1042 | 12 | 12 | 18 | 979 | 12 |
| 18W | 1042 | - | 24 | 30 | 979 | 24 |
| 18Y | 1042 | 36 | 36 | 42 | 1105 | 30 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 18Z | 1042 | - | 21 | 27 | 1105 | 15 |
| | | | | | | |
| 19X | 1043 | 12 | - | - | 980 | 12 |
| 19Y | 1043 | 36 | 36 | 42 | 1106 | 30 |
| 19Z | 1043 | - | 21 | 27 | 1106 | 15 |
| | | | | | | |
| 20X | 1044 | 12 | 12 | 18 | 981 | 12 |
| 20W | 1044 | - | 24 | 30 | 981 | 24 |
| 20Y | 1044 | 36 | 36 | 42 | 1107 | 30 |
| 20Z | 1044 | - | 21 | 27 | 1107 | 15 |
| | | | | | | |
| 21X | 1045 | 12 | - | - | 982 | 12 |
| 21Y | 1045 | 36 | 36 | 42 | 1108 | 30 |
| 21Z | 1045 | - | 21 | 27 | 1108 | 15 |
| | | | | | | |
| 22X | 1046 | 12 | 12 | 18 | 983 | 12 |
| 22W | 1046 | - | 24 | 30 | 983 | 24 |
| 22Y | 1046 | 36 | 36 | 42 | 1109 | 30 |
| 22Z | 1046 | - | 21 | 27 | 1109 | 15 |
| | | | | | | |
| 23X | 1047 | 12 | - | - | 984 | 12 |
| 23Y | 1047 | 36 | 36 | 42 | 1110 | 30 |
| 23Z | 1047 | - | 21 | 27 | 1110 | 15 |
| | | | | | | |
| 24X | 1048 | 12 | 12 | 18 | 985 | 12 |
| 24W | 1048 | - | 24 | 30 | 985 | 24 |
| 24Y | 1048 | 36 | 36 | 42 | 1111 | 30 |
| 24Z | 1048 | - | 21 | 27 | 1111 | 15 |
| 25X | 1049 | 12 | - | - | 986 | 12 |
| 25Y | 1049 | 36 | 36 | 42 | 1112 | 30 |
| 25Z | 1049 | - | 21 | 27 | 1112 | 15 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| | | | | | | |
| 26X | 1050 | 12 | 12 | 18 | 987 | 12 |
| 26W | 1050 | - | 24 | 30 | 987 | 24 |
| 26Y | 1050 | 36 | 36 | 42 | 1113 | 30 |
| 26Z | 1050 | - | 21 | 27 | 1113 | 15 |
| | | | | | | |
| 27X | 1051 | 12 | - | - | 988 | 12 |
| 27Y | 1051 | 36 | 36 | 42 | 1114 | 30 |
| 27Z | 1051 | - | 21 | 27 | 1114 | 15 |
| | | | | | | |
| 28X | 1052 | 12 | 12 | 18 | 989 | 12 |
| 28W | 1052 | - | 24 | 30 | 989 | 24 |
| 28Y | 1052 | 36 | 36 | 42 | 1115 | 30 |
| 28Z | 1052 | - | 21 | 27 | 1115 | 15 |
| | | | | | | |
| 29X | 1053 | 12 | - | - | 990 | 12 |
| 29Y | 1053 | 36 | 36 | 42 | 1116 | 30 |
| 29Z | 1053 | - | 21 | 27 | 1116 | 15 |
| | | | | | | |
| 30X | 1054 | 12 | 12 | 18 | 991 | 12 |
| 30W | 1054 | - | 24 | 30 | 991 | 24 |
| 30Y | 1054 | 36 | 36 | 42 | 1117 | 30 |
| 30Z | 1054 | - | 21 | 27 | 1117 | 15 |
| | | | | | | |
| 31X | 1055 | 12 | - | - | 992 | 12 |
| 31Y | 1055 | 36 | 36 | 42 | 1118 | 30 |
| 31Z | 1055 | - | 21 | 27 | 1118 | 15 |
| | | | | | | |
| 32X | 1056 | 12 | 12 | 18 | 993 | 12 |
| 32W | 1056 | - | 24 | 30 | 993 | 24 |
| 32Y | 1056 | 36 | 36 | 42 | 1119 | 30 |

| DME chan-nel number | Interrogation | | | | Reply | |
| --- | --- | --- | --- | --- | --- | --- |
| | Frequency [MHz] | DME/N [μs] | Initial approach (IA) [μs] | Final approach (FA) [μs] | Frequency [MHz] | Pulse codes [μs] |
| 32Z | 1056 | - | 21 | 27 | 1119 | 15 |
| | | | | | | |
| 33X | 1057 | 12 | - | - | 994 | 12 |
| 33Y | 1057 | 36 | 36 | 42 | 1120 | 30 |
| 33Z | 1057 | - | 21 | 27 | 1120 | 15 |
| | | | | | | |
| 34X | 1058 | 12 | 12 | 18 | 995 | 12 |
| 34W | 1058 | - | 24 | 30 | 995 | 24 |
| 34Y | 1058 | 36 | 36 | 42 | 1121 | 30 |
| 34Z | 1058 | - | 21 | 27 | 1121 | 15 |
| | | | | | | |
| 35X | 1059 | 12 | - | - | 996 | 12 |
| 35Y | 1059 | 36 | 36 | 42 | 1122 | 30 |
| 35Z | 1059 | - | 21 | 27 | 1122 | 15 |
| | | | | | | |
| 36X | 1060 | 12 | 12 | 18 | 997 | 12 |
| 36W | 1060 | - | 24 | 30 | 997 | 24 |
| 36Y | 1060 | 36 | 36 | 42 | 1123 | 30 |
| 36Z | 1060 | - | 21 | 27 | 1123 | 15 |
| | | | | | | |
| 37X | 1061 | 12 | - | - | 998 | 12 |
| 37Y | 1061 | 36 | 36 | 42 | 1124 | 30 |
| 37Z | 1061 | - | 21 | 27 | 1124 | 15 |
| | | | | | | |
| 38X | 1062 | 12 | 12 | 18 | 999 | 12 |
| 38W | 1062 | - | 24 | 30 | 999 | 24 |
| 38Y | 1062 | 36 | 36 | 42 | 1125 | 30 |
| 38Z | 1062 | - | 21 | 27 | 1125 | 15 |
| | | | | | | |
| 39X | 1063 | 12 | - | - | 1000 | 12 |
| 39Y | 1063 | 36 | 36 | 42 | 1126 | 30 |

| | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| DME chan-nel number | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 39Z | 1063 | - | 21 | 27 | 1126 | 15 |
| | | | | | | |
| 40X | 1064 | 12 | 12 | 18 | 1001 | 12 |
| 40W | 1064 | - | 24 | 30 | 1001 | 24 |
| 40Y | 1064 | 36 | 36 | 42 | 1127 | 30 |
| 40Z | 1064 | - | 21 | 27 | 1127 | 15 |
| | | | | | | |
| 41X | 1065 | 12 | - | - | 1002 | 12 |
| 41Y | 1065 | 36 | 36 | 42 | 1128 | 30 |
| 41Z | 1065 | - | 21 | 27 | 1128 | 15 |
| | | | | | | |
| 42X | 1065 | 12 | 12 | 18 | 1003 | 12 |
| 42W | 1066 | - | 24 | 30 | 1003 | 24 |
| 42Y | 1066 | 36 | 36 | 42 | 1129 | 30 |
| 42Y | 1066 | - | 21 | 27 | 1129 | 15 |
| | | | | | | |
| 43X | 1067 | 12 | - | - | 1004 | 12 |
| 43Y | 1067 | 36 | 36 | 42 | 1130 | 30 |
| 43Z | 1067 | - | 21 | 27 | 1130 | 15 |
| 44X | 1068 | 12 | 12 | 18 | 1005 | 12 |
| 44W | 1068 | - | 24 | 30 | 1005 | 24 |
| 44Y | 1068 | 36 | 36 | 42 | 1131 | 30 |
| 44Z | 1068 | - | 21 | 27 | 1131 | 15 |
| | | | | | | |
| 45X | 1069 | 12 | - | - | 1006 | 12 |
| 45Y | 1069 | 36 | 36 | 42 | 1132 | 30 |
| 45Z | 1069 | - | 21 | 27 | 1132 | 15 |
| | | | | | | |
| 46X | 1070 | 12 | 12 | 18 | 1007 | 12 |
| 46W | 1070 | - | 24 | 30 | 1007 | 24 |
| 46Y | 1070 | 36 | 36 | 42 | 1133 | 30 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 46Z | 1070 | - | 21 | 27 | 1133 | 15 |
| | | | | | | |
| 47X | 1071 | 12 | - | - | 1008 | 12 |
| 47Y | 1071 | 36 | 36 | 42 | 1134 | 30 |
| 47Z | 1071 | - | 21 | 27 | 1134 | 15 |
| | | | | | | |
| 48X | 1072 | 12 | 12 | 18 | 1009 | 12 |
| 48W | 1072 | - | 24 | 30 | 1009 | 24 |
| 48Y | 1072 | 36 | 36 | 42 | 1135 | 30 |
| 48Z | 1072 | - | 21 | 27 | 1135 | 15 |
| | | | | | | |
| 49X | 1073 | 12 | - | - | 1010 | 12 |
| 49Y | 1073 | 36 | 36 | 42 | 1136 | 30 |
| 49Z | 1073 | - | 21 | 27 | 1136 | 15 |
| | | | | | | |
| 50X | 1074 | 12 | 12 | 18 | 1011 | 12 |
| 50W | 1074 | - | 24 | 30 | 1011 | 24 |
| 50Y | 1074 | 36 | 36 | 42 | 1137 | 30 |
| 50Z | 1074 | - | 21 | 27 | 1137 | 15 |
| | | | | | | |
| 51X | 1075 | 12 | - | - | 1012 | 12 |
| 51Y | 1075 | 36 | 36 | 42 | 1138 | 30 |
| 51Z | 1075 | - | 21 | 27 | 1138 | 15 |
| | | | | | | |
| 52X | 1076 | 12 | 12 | 18 | 1013 | 12 |
| 52W | 1076 | - | 24 | 30 | 1013 | 24 |
| 52Y | 1076 | 36 | 36 | 42 | 1139 | 30 |
| 52Z | 1076 | - | 21 | 27 | 1139 | 15 |
| | | | | | | |
| 53X | 1077 | 12 | - | - | 1014 | 12 |
| 53Y | 1077 | 36 | 36 | 42 | 1140 | 30 |

| DME channel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 53Z | 1077 | - | 21 | 27 | 1140 | 15 |
| | | | | | | |
| 54X | 1078 | 12 | 12 | 18 | 1015 | 12 |
| 54W | 1078 | - | 24 | 30 | 1015 | 24 |
| 54Y | 1078 | 36 | 36 | 42 | 1141 | 30 |
| 54Z | 1078 | - | 21 | 27 | 1141 | 15 |
| | | | | | | |
| 55X | 1079 | 12 | - | - | 1016 | 12 |
| 55Y | 1079 | 36 | 36 | 42 | 1142 | 30 |
| 55Z | 1079 | - | 21 | 27 | 1142 | 15 |
| | | | | | | |
| 56X | 1080 | 12 | 12 | 18 | 1017 | 12 |
| 56W | 1080 | - | 24 | 30 | 1017 | 24 |
| 56Y | 1080 | 36 | 36 | 42 | 1143 | 30 |
| 56Z | 1080 | - | 21 | 27 | 1143 | 15 |
| | | | | | | |
| 57X | 1081 | 12 | - | - | 1018 | 12 |
| 57Y | 1081 | 36 | - | - | 1144 | 30 |
| | | | | | | |
| 58X | 1082 | 12 | - | - | 1019 | 12 |
| 58Y | 1082 | 36 | - | - | 1145 | 30 |
| | | | | | | |
| 59X | 1083 | 12 | - | - | 1020 | 12 |
| 59Y | 1083 | 36 | - | - | 1146 | 30 |
| | | | | | | |
| 60X | 1084 | 12 | - | - | 1021 | 12 |
| 60Y | 1084 | 36 | - | - | 1147 | 30 |
| | | | | | | |
| 61X | 1085 | 12 | - | - | 1022 | 12 |
| 61Y | 1085 | 36 | - | - | 1148 | 30 |
| | | | | | | |

| DME chan-nel number | Interrogation | | | | Reply | |
| --- | --- | --- | --- | --- | --- | --- |
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 62X | 1086 | 12 | - | - | 1023 | 12 |
| 62Y | 1086 | 36 | - | - | 1149 | 30 |
| | | | | | | |
| 63X | 1087 | 12 | - | - | 1024 | 12 |
| 63Y | 1087 | 36 | - | - | 1150 | 30 |
| | | | | | | |
| 64X | 1088 | 12 | - | - | 1151 | 12 |
| 64Y | 1088 | 36 | - | - | 1025 | 30 |
| | | | | | | |
| 65X | 1089 | 12 | - | - | 1152 | 12 |
| 65Y | 1089 | 36 | - | - | 1026 | 30 |
| | | | | | | |
| 66X | 1090 | 12 | - | - | 1153 | 12 |
| 66Y | 1090 | 36 | - | - | 1027 | 30 |
| | | | | | | |
| 67X | 1091 | 12 | - | - | 1154 | 12 |
| 67Y | 1091 | 36 | - | - | 1028 | 30 |
| | | | | | | |
| 68X | 1092 | 12 | - | - | 1155 | 12 |
| 68Y | 1092 | 36 | - | - | 1029 | 30 |
| | | | | | | |
| 69X | 1093 | 12 | - | - | 1156 | 12 |
| 69Y | 1093 | 36 | - | - | 1030 | 30 |
| | | | | | | |
| 70X | 1094 | 12 | - | - | 1157 | 12 |
| 70Y | 1094 | 36 | - | - | 1031 | 30 |
| | | | | | | |
| 71X | 1095 | 12 | - | - | 1158 | 12 |
| 71Y | 1095 | 36 | - | - | 1032 | 30 |
| | | | | | | |
| 72X | 1096 | 12 | - | - | 1159 | 12 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 72Y | 1096 | 36 | - | - | 1033 | 30 |
| | | | | | | |
| 73X | 1097 | 12 | - | - | 1160 | 12 |
| 73Y | 1097 | 36 | - | - | 1034 | 30 |
| | | | | | | |
| 74X | 1098 | 12 | - | - | 1161 | 12 |
| 74Y | 1098 | 36 | - | - | 1035 | 30 |
| 75X | 1099 | 12 | - | - | 1162 | 12 |
| 75Y | 1099 | 36 | - | - | 1036 | 30 |
| | | | | | | |
| 76X | 1100 | 12 | - | - | 1163 | 12 |
| 76Y | 1100 | 36 | - | - | 1037 | 30 |
| | | | | | | |
| 77X | 1101 | 12 | - | - | 1164 | 12 |
| 77Y | 1101 | 36 | - | - | 1038 | 30 |
| | | | | | | |
| 78X | 1102 | 12 | - | - | 1165 | 12 |
| 78Y | 1102 | 36 | - | - | 1039 | 30 |
| | | | | | | |
| 79X | 1103 | 12 | - | - | 1166 | 12 |
| 79Y | 1103 | 36 | - | - | 1040 | 30 |
| | | | | | | |
| 80X | 1104 | 12 | - | - | 1167 | 12 |
| 80Y | 1104 | 36 | 36 | 42 | 1041 | 30 |
| 80Z | 1104 | - | 21 | 27 | 1041 | 15 |
| | | | | | | |
| 81X | 1105 | 12 | - | - | 1168 | 12 |
| 81Y | 1105 | 36 | 36 | 42 | 1042 | 30 |
| 81Z | 1105 | - | 21 | 27 | 1042 | 15 |
| | | | | | | |
| 82X | 1106 | 12 | - | - | 1169 | 12 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 82Y | 1106 | 36 | 36 | 42 | 1043 | 30 |
| 82Z | 1106 | - | 21 | 27 | 1043 | 15 |
| | | | | | | |
| 83X | 1107 | 12 | - | - | 1170 | 12 |
| 83Y | 1107 | 36 | 36 | 42 | 1044 | 30 |
| 83Z | 1107 | - | 21 | 27 | 1044 | 15 |
| | | | | | | |
| 84X | 1108 | 12 | - | - | 1171 | 12 |
| 84Y | 1108 | 36 | 36 | 42 | 1045 | 30 |
| 84Z | 1108 | - | 21 | 27 | 1045 | 15 |
| | | | | | | |
| 85X | 1109 | 12 | - | - | 1172 | 12 |
| 85Y | 1109 | 36 | 36 | 42 | 1046 | 30 |
| 85Z | 1109 | | 21 | 27 | 1046 | 15 |
| | | | | | | |
| 86X | 1110 | 12 | - | - | 1173 | 12 |
| 86Y | 1110 | 36 | 36 | 42 | 1047 | 30 |
| 86Z | 1110 | - | 21 | 27 | 1047 | 15 |
| | | | | | | |
| 87X | 1111 | 12 | - | - | 1174 | 12 |
| 87Y | 1111 | 36 | 36 | 42 | 1048 | 30 |
| 87Z | 1111 | - | 21 | 27 | 1048 | 15 |
| | | | | | | |
| 88X | 1112 | 12 | - | - | 1175 | 12 |
| 88Y | 1112 | 36 | 36 | 42 | 1049 | 30 |
| 88Z | 1112 | - | 21 | 27 | 1049 | 15 |
| | | | | | | |
| 89X | 1113 | 12 | - | - | 1176 | 12 |
| 89Y | 1113 | 36 | 36 | 42 | 1050 | 30 |
| 89Z | 1113 | - | 21 | 27 | 1050 | 15 |
| | | | | | | |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 90X | 1114 | 12 | - | - | 1177 | 12 |
| 90Y | 1114 | 36 | 36 | 42 | 1051 | 30 |
| 90Z | 1114 | - | 21 | 27 | 1051 | 15 |
| | | | | | | |
| 91X | 1115 | 12 | - | - | 1178 | 12 |
| 91Y | 1115 | 36 | 36 | 42 | 1052 | 30 |
| 91Z | 1115 | - | 21 | 27 | 1052 | 15 |
| | | | | | | |
| 92X | 1116 | 12 | - | - | 1179 | 12 |
| 92Y | 1116 | 36 | 36 | 42 | 1053 | 30 |
| 92Z | 1116 | - | 21 | 27 | 1053 | 15 |
| | | | | | | |
| 93X | 1117 | 12 | - | - | 1180 | 12 |
| 93Y | 1117 | 36 | 36 | 42 | 1054 | 30 |
| 93Z | 1117 | - | 21 | 27 | 1054 | 15 |
| | | | | | | |
| 94X | 1118 | 12 | - | - | 1181 | 12 |
| 94Y | 1118 | 36 | 36 | 42 | 1055 | 30 |
| 94Z | 1118 | - | 21 | 27 | 1055 | 15 |
| | | | | | | |
| 95X | 1119 | 12 | - | - | 1182 | 12 |
| 95Y | 1119 | 36 | 36 | 42 | 1056 | 30 |
| 95Z | 1119 | - | 21 | 27 | 1056 | 15 |
| | | | | | | |
| 96X | 1120 | 12 | - | - | 1183 | 12 |
| 96Y | 1120 | 36 | 36 | 42 | 1057 | 30 |
| 96Z | 1120 | - | 21 | 27 | 1057 | 15 |
| | | | | | | |
| 97X | 1121 | 12 | - | - | 1184 | 12 |
| 97Y | 1121 | 36 | 36 | 42 | 1058 | 30 |
| 97Z | 1121 | - | 21 | 27 | 1058 | 15 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| | | | | | | |
| 98X | 1122 | 12 | - | - | 1185 | 12 |
| 98Y | 1122 | 36 | 36 | 42 | 1059 | 30 |
| 98Z | 1122 | - | 21 | 27 | 1059 | 15 |
| | | | | | | |
| 99X | 1123 | 12 | - | - | 1186 | 12 |
| 99Y | 1123 | 36 | 36 | 42 | 1060 | 30 |
| 99Z | 1123 | - | 21 | 27 | 1060 | 15 |
| | | | | | | |
| 100X | 1124 | 12 | - | - | 1187 | 12 |
| 100Y | 1124 | 36 | 36 | 42 | 1061 | 30 |
| 100Z | 1124 | - | 21 | 27 | 1061 | 15 |
| | | | | | | |
| 101X | 1125 | 12 | - | - | 1188 | 12 |
| 101Y | 1125 | 36 | 36 | 42 | 1062 | 30 |
| 101Z | 1125 | - | 21 | 27 | 1062 | 15 |
| | | | | | | |
| 102X | 1126 | 12 | - | - | 1189 | 12 |
| 102Y | 1126 | 36 | 36 | 42 | 1063 | 30 |
| 102Z | 1126 | - | 21 | 27 | 1063 | 15 |
| | | | | | | |
| 103X | 1127 | 12 | - | - | 1190 | 12 |
| 103Y | 1127 | 36 | 36 | 42 | 1064 | 30 |
| 103Z | 1127 | - | 21 | 27 | 1064 | 15 |
| | | | | | | |
| 104X | 1128 | 12 | - | - | 1191 | 12 |
| 104Y | 1128 | 36 | 36 | 42 | 1065 | 30 |
| 104Z | 1128 | - | 21 | 27 | 1065 | 15 |
| | | | | | | |
| 105X | 1129 | 12 | - | - | 1192 | 12 |
| 105Y | 1129 | 36 | 36 | 42 | 1066 | 30 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 105Z | 1129 | - | 21 | 27 | 1066 | 15 |
| | | | | | | |
| 106X | 1130 | 12 | - | - | 1193 | 12 |
| 106Y | 1130 | 36 | 36 | 42 | 1067 | 30 |
| 106Z | 1130 | - | 21 | 27 | 1067 | 15 |
| | | | | | | |
| 107X | 1131 | 12 | - | - | 1194 | 12 |
| 107Y | 1131 | 36 | 36 | 42 | 1068 | 30 |
| 107Z | 1131 | - | 21 | 27 | 1068 | 15 |
| | | | | | | |
| 108X | 1132 | 12 | - | - | 1195 | 12 |
| 108Y | 1132 | 36 | 36 | 42 | 1069 | 30 |
| 108Z | 1132 | - | 21 | 27 | 1069 | 15 |
| | | | | | | |
| 109X | 1133 | 12 | - | - | 1196 | 12 |
| 109Y | 1133 | 36 | 36 | 42 | 1070 | 30 |
| 109Z | 1133 | - | 21 | 27 | 1070 | 15 |
| | | | | | | |
| 110X | 1134 | 12 | - | - | 1197 | 12 |
| 110Y | 1134 | 36 | 36 | 42 | 1071 | 30 |
| 110Z | 1134 | - | 21 | 27 | 1071 | 15 |
| | | | | | | |
| 111X | 1135 | 12 | - | - | 1198 | 12 |
| 111Y | 1135 | 36 | 36 | 42 | 1072 | 30 |
| 111Z | 1135 | - | 21 | 27 | 1072 | 15 |
| | | | | | | |
| 112X | 1136 | 12 | - | - | 1199 | 12 |
| 112Y | 1136 | 36 | 36 | 42 | 1073 | 30 |
| 112Z | 1136 | - | 21 | 27 | 1073 | 15 |
| | | | | | | |
| 113X | 1137 | 12 | - | - | 1200 | 12 |

| DME chan-nel number | Interrogation | | | | Reply | |
|---|---|---|---|---|---|---|
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 113Y | 1137 | 36 | 36 | 42 | 1074 | 30 |
| 113Z | 1137 | - | 21 | 27 | 1074 | 15 |
| | | | | | | |
| 114X | 1138 | 12 | - | - | 1201 | 12 |
| 114Y | 1138 | 36 | 36 | 42 | 1075 | 30 |
| 114Z | 1138 | - | 21 | 27 | 1075 | 15 |
| | | | | | | |
| 115X | 1139 | 12 | - | - | 1202 | 12 |
| 115Y | 1139 | 36 | 36 | 42 | 1076 | 30 |
| 115Z | 1139 | - | 21 | 27 | 1076 | 15 |
| | | | | | | |
| 116X | 1140 | 12 | - | - | 1203 | 12 |
| 116Y | 1140 | 36 | 36 | 42 | 1077 | 30 |
| 116Z | 1140 | - | 21 | 27 | 1077 | 15 |
| | | | | | | |
| 117X | 1141 | 12 | - | - | 1204 | 12 |
| 117Y | 1141 | 36 | 36 | 42 | 1078 | 30 |
| 117Z | 1141 | - | 21 | 27 | 1078 | 15 |
| | | | | | | |
| 118X | 1142 | 12 | - | - | 1205 | 12 |
| 118Y | 1142 | 36 | 36 | 42 | 1079 | 30 |
| 118Z | 1142 | - | 21 | 27 | 1079 | 15 |
| | | | | | | |
| 119X | 1143 | 12 | - | - | 1206 | 12 |
| 119Y | 1143 | 36 | 36 | 42 | 1080 | 30 |
| 119Z | 1143 | - | 21 | 27 | 1080 | 15 |
| | | | | | | |
| 120X | 1144 | 12 | - | - | 1207 | 12 |
| 120Y | 1144 | 36 | - | - | 1081 | 30 |
| | | | | | | |
| 121X | 1145 | 12 | - | - | 1208 | 12 |

| DME chan-nel number | Interrogation | | | | Reply | |
| --- | --- | --- | --- | --- | --- | --- |
| | Frequency [MHz] | DME/N [µs] | Initial approach (IA) [µs] | Final approach (FA) [µs] | Frequency [MHz] | Pulse codes [µs] |
| 121Y | 1145 | 36 | - | - | 1082 | 30 |
| | | | | | | |
| 122X | 1146 | 12 | - | - | 1209 | 12 |
| 122Y | 1146 | 36 | - | - | 1083 | 30 |
| | | | | | | |
| 123X | 1147 | 12 | - | - | 1210 | 12 |
| 123Y | 1147 | 36 | - | - | 1084 | 30 |
| | | | | | | |
| 124X | 1148 | 12 | - | - | 1211 | 12 |
| 124Y | 1148 | 36 | - | - | 1085 | 30 |
| | | | | | | |
| 125X | 1149 | 12 | - | - | 1212 | 12 |
| 125Y | 1149 | 36 | - | - | 1086 | 30 |
| | | | | | | |
| 126X | 1150 | 12 | - | - | 1213 | 12 |
| 126Y | 1150 | 36 | - | - | 1087 | 30 |

# C Format description of DME measurement data

Which set of parameters are logged is user-definable and can be defined individually for each measurement by selecting the list type. When a list is stored to a file, a header line is automatically included that describes the provided parameters.

The format of the data for each measurement with the same list type is identical, regardless whether a parameter contains data or not (if a parameter value is not available, `nan` is inserted). This allows you to create a table from the exported comma-separated list.

The amount of data in the list depends on the Measurement Time. One row of data is stored for each Measurement Time interval, which means the number of rows is:

*total measurement duration / meastime*

with a maximum of 135 rows per second

**Example:**

For a Measurement Time of 1 s, one row is measured per second of the entire measurement.

For the minimum Measurement Time of 7 ms, 135 rows are measured per second of the entire measurement.

*Table C-1: Parameter set depending on the selected list type*

| List type | Description |
|---|---|
| FULL3 | Complete list of data with all available parameters<br>Used for manual operation; default for remote command; |
| FULL2 | Subset of FULL3, compatible to the FULL2 list type in previous R&S EDS300 DME/Pulse Analyzers; maintained for compatibility reasons only and not described in detail |
| FULL | Subset of FULL3, compatible to the FULL list type in previous R&S EDS300 DME/Pulse Analyzers; maintained for compatibility reasons only and not described in detail: |
| SHORT | Selection of only the most important parameters |
| DST | DME distance measurement parameters |
| TAC3 | Selection of most important general parameters and specific TACAN parameters |
| TAC2 | Subset of TAC3, compatible to the TAC2 list type in previous R&S EDS300 DME/Pulse Analyzers; maintained for compatibility reasons only and not described in detail |
| TAC | Subset of TAC3, compatible to the TAC list type in previous R&S EDS300 DME/Pulse Analyzers; maintained for compatibility reasons only and not described in detail: |

The following overview describes all available parameters and which list type they are included in.

ⓘ If a parameter value is not available, `nan` is inserted.

*Table C-2: Logged parameters and their assignment to list types*

| Parameter | Value range | Description | S H O R T | T A C 3 | F U L L 3 | D S T |
|---|---|---|---|---|---|---|
| Ctr | | Stream Counter. Counts the outgoing stream messages, starting with the STREAM command | X | X | X | X |
| RX | | RX-Board 1 or 2 | X | X | X | - |
| MDME | | MDME Slot<br><br>In Multi-DME configuration each station is assigned to a slot that contains the channel. | X | X | X | X |
| Flags | | This field is always 10 characters long and indicates status bits:<br><br>T: external triggered (future use)<br><br>O: Overload condition<br><br>I: Invalid (future use)<br><br>U: Uncal condition present<br><br>P: This indicates that the dataset is initiated by an interrogator pulse; in this case the dataset time belongs to the time of the outgoing pulse.<br><br>G: Synchronized with GPS<br><br>Dataset time is generated from the PC clock<br><br>D: DME detector active<br><br>S: PPS Sync OK<br><br>X: Outgoing pulse TX<br><br>This reply is not only initiated by an interrogator pulse, the pulse was really transmitted. Might be absent if the TX was suppressed by the suppressor line, or in MDME if the slot is not on TX<br><br>L: Suppressor line activity<br><br>Indicates that there was an event on the suppressor line<br><br>R: Indicates that DME pulses were received in the 4ms response window of this pulse. Only present on P-Messages | X | X | X | X |
| Date | | Date of the dataset<br><br>Example: "19.04.2012" | - | - | X | X |
| Time | | Time of the dataset with ms precision<br><br>Example: "13:17:42.115" | X | X | X | X |
| dTime[ms] | | Time in ms since the DME mode of the EDS was started; this is supposed to be easier to evaluate than<< the "Time" value above. | X | X | X | - |
| *) only available with TACAN measurement option | | | | | | |

| Parameter | Value range | Description | SHORT | TAC3 | FULL3 | DST |
|---|---|---|:---:|:---:|:---:|:---:|
| Freq[MHz] | | The RX frequency setting | X | X | X | X |
| MeasTime[ms] | | Measurement time setting | - | - | X | - |
| AttMode | "LOW_NOISE"," NORM","LOW_DI ST" | Attenuator at time of measurement<br><br>In Attmode "AUTO" this value shows the real hard-ware setting. | - | - | X | - |
| IF2Gain | GAIN0,GAIN15 or GAIN30 | Internal hardware setting. | - | - | X | - |
| PeakLevel[dBm] | | Peaklevel | X | X | X | X |
| AvrgLevel[dBm] | | Average Level | - | - | X | - |
| PulseRepRate[1/ s] | | Pulse Repetition rate.<br><br>This value is updated only 1 / s, so it usually appears the same value is subsequent datasets | X | X | X | - |
| DeltaFreq[kHz] | | Frequency deviation from the channel frequency | - | - | X | X |
| PulseSpacing[us] | | Measured Pulse Spacing in µs | X | X | X | X |
| ID_ON | 1 or 0 | Indicates that an ID transmission is currently active. | - | - | X | X |
| ID_PRR[1/s] | | Pulse repetition rate of ID code.<br><br>Only measured during ID transmission, | - | - | X | - |
| ID_CODE | | Decoded ID code (3 or 4 characters)<br><br>Once the code is decoded it remains visible for at least 60 s | - | - | X | X |
| ID_PERIOD[s] | | Time between the start of 2 ID transmissions | - | - | X | - |
| * Mod15[%] | | TACAN Modulation depth of 15Hz component | - | X | X | - |
| * Mod135[%] | | TACAN Modulation depth of 135Hz component | - | X | X | - |
| * Freq15[Hz] | | Frequency of 15Hz component | - | X | X | - |
| * Freq135[Hz] | | Frequency of 135Hz component | - | X | X | - |
| * Phase15[°] | | Phase of 15Hz component | - | X | X | - |
| * Phase135[°] | | Phase of 135Hz component | - | X | X | - |
| * Bearing[°] | Deg 0 .. 360° | TACAN Bearing in | - | X | X | - |
| * Phaseshift[°] | 0°..40° | Phase shift between 15Hz and 135Hz | - | X | X | - |
| *MRB PRR[1/s] | | Number of MRB pulses per second; for X chan-nels, number of pulse pairs | - | X | X | - |
| *ARB PRR[1/s] | | Number of ARB pulses per second; for X chan-nels, number of pulse pairs | - | X | X | - |
| *) only available with TACAN measurement option | | | | | | |

| Parameter | Value range | Description | S H O R T | T A C 3 | F U L L 3 | D S T |
|---|---|---|:---:|:---:|:---:|:---:|
| *MRB PULSE COUNT | | Number of pulse (pairs) per MRB group | - | X | X | - |
| *ARB PULSE COUNT | | Number of pulse (pairs) per ARB group | - | X | X | - |
| *MRB Spacing[µs] | | Pulse spacing of MRB pulses | - | X | X | - |
| *ARB Spacing[µs] | | Pulse spacing of ARB pulses | - | X | X | - |
| *MRB Peak Space[µs] | | Maximum pulse spacing of MRB pulses | - | X | X | - |
| *ARB Peak Space[µs] | | Maximum pulse spacing of ARB pulses | - | X | X | - |
| Counter [1/s] | | Counter for detected IDs | - | - | X | - |
| dot len[ms] | | Length of time a dot is transmitted in the used Morse code | - | - | X | - |
| dash len[ms] | | Length of time a dash is transmitted in the used Morse code | - | - | X | - |
| gap[ms] | | Length of time that passes between a transmitted dot and a dash in the used Morse code | - | - | X | - |
| letter gap[ms] | | Length of time that passes between two transmitted letters in the used Morse code | - | - | X | - |
| EQ pulse [µs] | | Equalizer pulse time - Delay time of equalizer pulses from the ID pulses during ID transmission | - | X | X | - |
| Delay[µs] | | Delay of reply pulse, including base station delay Example:" 69.982" | - | - | X | - |
| Dist[m] | | Resulting distance in m Example: "2994.4" | X | - | X | X |
| RepEff[%] | | Reply efficiency in percent | X | - | X | X |
| DME Speed[m/s] | | Speed calculated from the preceding pulses; only available with linear prediction, in static prediction the speed is always 0 | - | - | X | X |
| SoT | Possible values are "search", "track" or "memory" | Search or Track | X | - | X | X |
| DstPred[µs] | | In Track or Memory the prediction is calculated to identify the reply to the outgoing pulse | - | - | X | X |
| PredWind.[µs] | | Size of the prediction window | - | - | X | X |
| RX Pulses | | Number of RX pulses detected in analyzed window | - | - | X | X |
| *) only available with TACAN measurement option | | | | | | |

| Parameter | Value range | Description | S H O R T | T A C 3 | F U L L 3 | D S T |
|---|---|---|---|---|---|---|
| Lat. | | GPS Latitude<br><br>All GPS data refer to the time of the dataset | X | X | X | X |
| Long. | | GPS longitude | X | X | X | X |
| Alt.[m] | | GPS altitude | - | - | X | X |
| Speed[km/h] | | GPS speed | - | - | X | X |
| Sats. | | Number of GPS satellites | - | - | X | X |
| GPS fix | "NO GPS"<br>"INVALID"<br>"GPS"<br>"DGPS" ( also used for EGNOS )<br>"GPS Prec."<br>"RTK fix"<br>"RTK float"<br>"estimated"<br>"manual"<br>"simulated" | GPS Status | X | X | X | X |
| *) only available with TACAN measurement option | | | | | | |

**Example:**

The following extract of a sample file shows the data results for a TAC3 list.

```
Ctr,RX,MDME,Flags,Date,Time,dTime[ms],Freq[MHz],MeasTime[ms],AttMode,IF2Gain,
PeakLevel[dBm],AvrgLevel[dBm],PulseRepRate[1/s],DeltaFreq[kHz],PulseSpacing[µs],ID_ON,
ID_PRR[1/s],ID_CODE,ID_PERIOD,Mod15[%],Mod135[%],Freq15[Hz],Freq135[Hz],Phase15[°],
Phase135[°/9],Bearing[°],Phaseshift[°],MRB PRR[1/s],ARB PRR[1/s],MRB COUNT,ARB COUNT,
MRB Spacing[µs],ARB Spacing[µs],MRB Peak Space[µs],ARB Peak Space[µs],Counter [1/s],
dot len[ms],dash len[ms],gap[ms],letter gap[ms],EQ pulse [µs],Delay[µs],Dist[km],
RepEff[%],DME Speed[m/s],SoT,DstPred[µs],PredWind.[µs],RX Pulses,Lat.,Long.,Alt.[m],
Speed[km/h],Sats.,GPS fix,01.62u TACAN (TacDec1.68)
0,1,0,     D   ,26.05.2016,17:02:23.569,1028063,1040.0,7,LOW_NOISE,GAIN24,-93.137,
-112.482,2443.00,-4.776,30.525,0,-nan,TST,-nan,18.11,21.43,15.00,134.99,288.12,16.91,
257.11,31.09,194,1393,13,13,29.929,15.150,30.314,16.200,0.0,125.2,374.4,123.9,374.0,
-nan,-nan,-nan,-nan,-nan,inactive,-nan,-nan,-nan,00° 00.00000000' N,00° 00.00000000' E,
0.00,0.00,0,NO GPS,
0,1,0,     D   ,26.05.2016,17:02:23.576,1028071,1040.0,7,LOW_NOISE,GAIN24,-92.791,
-112.397,2443.00,-6.806,30.143,0,-nan,TST,-nan,17.40,21.38,15.00,135.25,288.12,16.85,
257.11,31.09,194,1393,13,12,29.929,15.100,30.314,16.200,0.0,125.2,374.4,123.9,374.0,
-nan,-nan,-nan,-nan,-nan,inactive,-nan,-nan,-nan,00° 00.00000000' N,00° 00.00000000' E,
0.00,0.00,0,NO GPS,
0,1,0,     D   ,26.05.2016,17:02:23.583,1028078,1040.0,7,LOW_NOISE,GAIN24,-92.432,
-112.306,2443.00,-8.698,30.171,0,-nan,TST,-nan,16.69,21.25,15.00,134.76,288.12,16.93,
257.11,31.09,194,1393,13,13,29.929,15.089,30.314,16.200,0.0,125.2,374.4,123.9,374.0,
-nan,-nan,-nan,-nan,-nan,inactive,-nan,-nan,-nan,00° 00.00000000' N,00° 00.00000000' E,
0.00,0.00,0,NO GPS,
...
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List of commands

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