R&S®RT-ZF20
Power Deskew Fixture
User Manual

1800.0040.02 ─ 04

ROHDE&SCHWARZ

Test & Measurement

User Manual

This manual describes the following R&S®RT-ZF models:

- R&S®RT-ZF20 (1800.0004.01)

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The following abbreviations are used in this manual: R&S®RT-ZF20 is abbreviated as R&S RT-ZF20.

Contents

1 Product Description

1.1 Key Features

The R&S RT-ZF20 power deskew fixture is a tool to align the time delay (skew) of any combination of Rohde & Schwarz voltage and current probes. The fixture can be used with any oscilloscope.

The R&S RT-ZF20 generates pulses with different transit times, voltage swings and current swings that can be tapped at various probe connectors. To align two probes, the delay time of the measurement channels is adjusted until the pulses coincide on the oscilloscope display.

Additionally, the fixture can be used for a functional check of the rise time of Rohde & Schwarz current probes.

1.2 Usage Information

Applied test requirements are:

- Radiated emission limits for group I, class B equipment
- Immunity test requirements for basic environment (EN 61326-1 table 2)

NOTICE

EMC measures

Do not use USB cables exceeding 3 m in length.

To ensure sufficient cable quality, use USB 2.0 cable order number 6145.1492.00, which has a USB-B connector with ferrite.

NOTICE

Electrostatic discharge

The EUT includes components sensitive to electrostatic discharge. An ESD label is assigned to the EUT.

Do not touch the circuits on the bottom of the R&S RT-ZF20 to avoid damage of electronic components.

⚠ CAUTION

Risk of injury caused by pointed object

The pins of the deskew fixture are extremely pointed and can easily penetrate clothes and the skin. Therefore, handle the deskew fixture with great care.

When transporting the deskew fixture, always use the box supplied with the product.

⚠ CAUTION

Risk of injury and instrument damage

The deskew fixture and the probes must be used in an appropriate manner to prevent electric shock, fire, personal injury, or damage. Read and observe the "Basic Safety Instructions" at the beginning of this manual. Read also the user manuals provided with the probes and observe the instructions in these manuals. Notice that the data sheet may specify additional operating conditions.

1.3 Unpacking the Product

The following items are included in the delivery:

- R&S RT-ZF20 power deskew fixture
- USB power cord
- User manual
- Carrying case

1.3.1 Inspecting the Contents

- Inspect the package for damage.
  Keep a damaged package and the cushioning material until the contents have been checked for completeness and the device has been tested.
  If the packaging material shows any signs of stress, notify the carrier as well as your Rohde & Schwarz service center. Keep the package and cushioning material for inspection.
- Inspect the product.
  If there is any damage or defect, or if the R&S RT-ZF20 power deskew fixture does not operate properly, notify your Rohde & Schwarz service center.
- Inspect the accessories.
  If the contents are incomplete or damaged, notify your Rohde & Schwarz service center.

1.4 Description of the Power Deskew Fixture

1.4.1 Board Description

The R&S RT-ZF20 has three sections, see Figure 1-1:

- Power section
  - USB connector for power supply
  - Status LED: a green light indicates that power is on
- Small loop section
  - Small cutout for clamping R&S RT-ZC20 current probes. Arrows indicate the direction of the current.
  - Pin header to connect R&S RT-ZD and R&S RT-ZS active probes (#1). The alignment pulse is applied to pins marked with a ⎍ symbol. Pins marked with a ⊥ symbol connect to GND.
  - Two clamp-on connectors to connect probes with hooks (#2, #3). The alignment pulse is applied to red connectors (⎍ symbol), black ones (⊥ symbol) connect to GND.

- Large loop section
  - Large cutout for clamping R&S RT-ZC10 current probes. Arrows indicate the direction of the current.
  - Pin header to connect R&S RT-ZD and R&S RT-ZS active probes (#4). The alignment pulse is applied to pins marked with a ⎍ symbol. Pins marked with a ⊥ symbol connect to GND.
  - Two clamp-on connectors to connect probes with hooks (#5. #6). The alignment pulse is applied to red connectors (⎍ symbol), black ones (⊥ symbol) connect to GND.

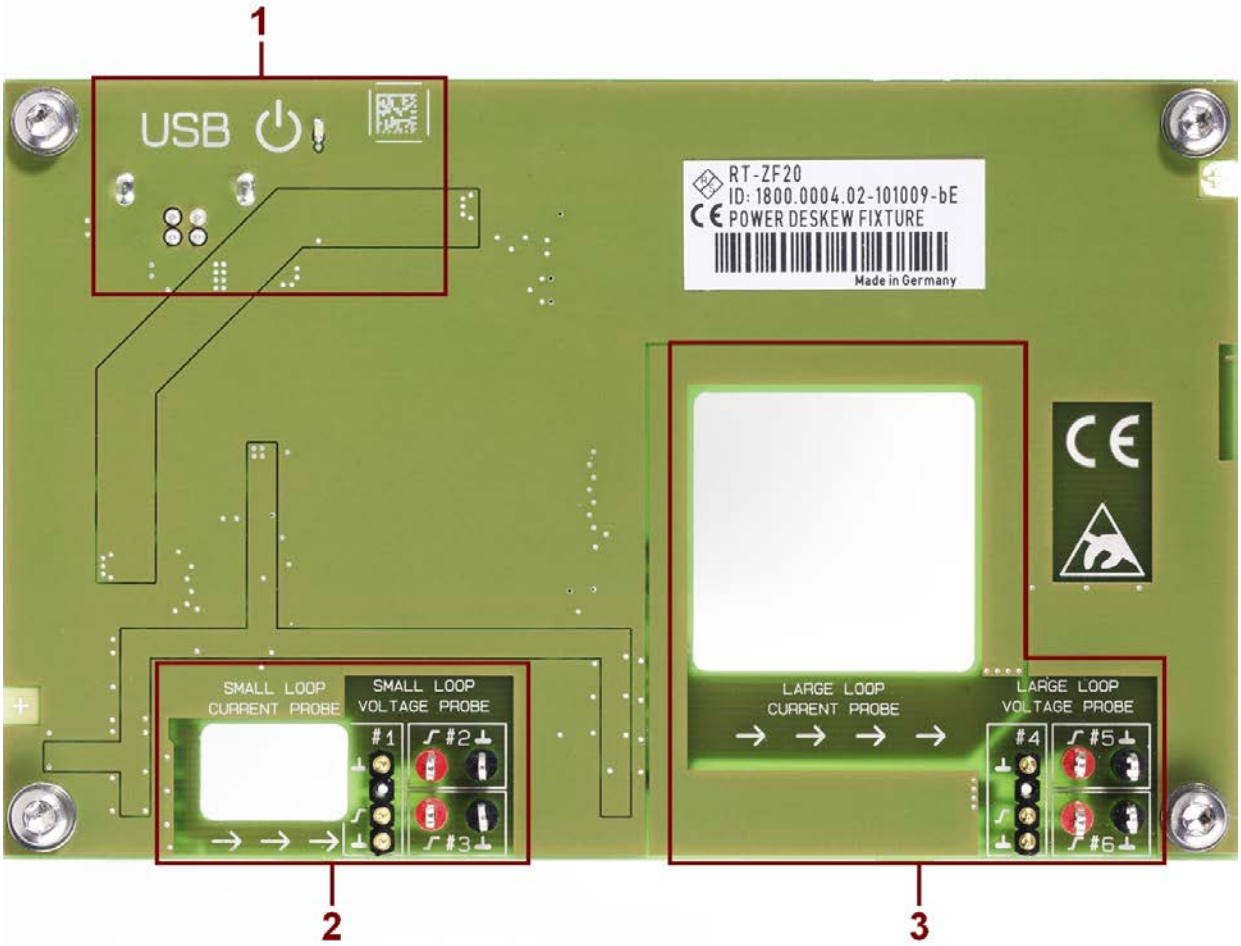


Figure 1-1: R&S RT-ZF20 power deskew fixture

1 = Power section with USB connector
2 = Small loop section to connect R&S RT-ZC20
3 = Large loop section to connect R&S RT-ZC10

1.4.2 Operating Principle

The fixture generates a continuous pulse sequence in the small loop and large loop sections. The pulses in both sections alternate with one another. The time delay between the pulses is around 35 ms and the pulse width is around 10 µs.

As shown in Figure 1-2, the falling edges are much steeper than the rising edges in both sections. The edges in the small loop section are much steeper than the edges in the large loop section.

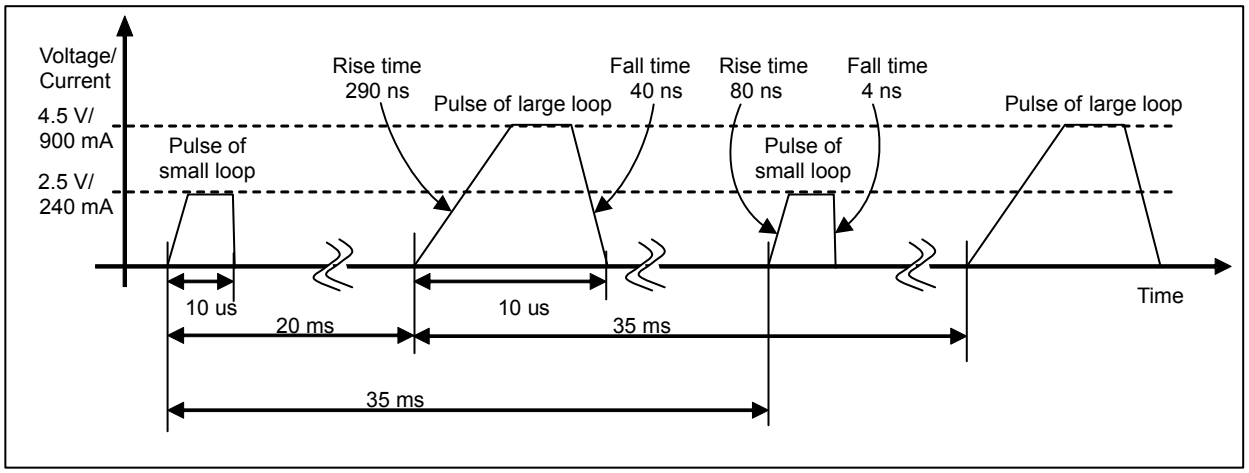


Figure 1-2: Timing and voltage/current swing of pulses of both loops

The Figure 1-2 also shows the voltage and current swings of both sections. The large loop current swing is the sum of multiple windings integrated in the printed circuit board. The different transit times, voltage and current swings allow to deskew a wide variety of probes independently of their bandwidths and sensitivities.

2 Using the Power Deskew Fixture

2.1 Connecting the Power

The USB connector is used for powering only. The fixture cannot be controlled as a USB device.

► Connect the USB cable to the USB connector of the fixture and to a free USB connector of any USB host, e.g. R&S oscilloscope, computer or USB hub.

The green LED lights up, and the fixture starts pulsing.

2.2 Connecting Probes to R&S Oscilloscopes

1. To connect a R&S RT-ZC10 or R&S RT-ZC20 current probe to the oscilloscope, e.g. to CH1 input, connect and configure the probe as described in the probe's user manual.
2. Set the vertical scale for the input channel of the current probe, e.g. CH1:
   - Large loop, R&S RT-ZC10: 200 mA/div
   - Small loop, R&S RT-ZC20: 50 mA/div
3. To connect a voltage probe to another channel, e.g. to CH2 input:
   - If the probe has a read-out pin or an R&S probe box, the channel is configured automatically.
   - If you use an R&S RT-ZD01 probe, configure the probe as described in the probe's user manual.

4. Set the vertical scale for the input channel of the voltage probe, e.g. CH2:
   - Large loop: 1 V/div
   - Small loop: 500 mV/div
5. Set the horizontal scale (see Table 2-1):
   - Large loop: 100 ns/div (for probes <20 MHz)
   - Small loop, rising edge: 20 ns/div (for probes <200 MHz)
   - Small loop, falling edge: 1 ns/div (for fast probes)
6. Set up the trigger:
   a) Source = channel of the voltage probe, e.g. CH2
   b) Trigger type = Edge
   c) Slope = Rising or falling edge, see Table 2-1
   d) Level = 1 V

2.3 Connecting Probes to the Fixture

Both probes have to be connected to the same loop using the accessories required for the measurement application.

NOTICE

Basic connection rules

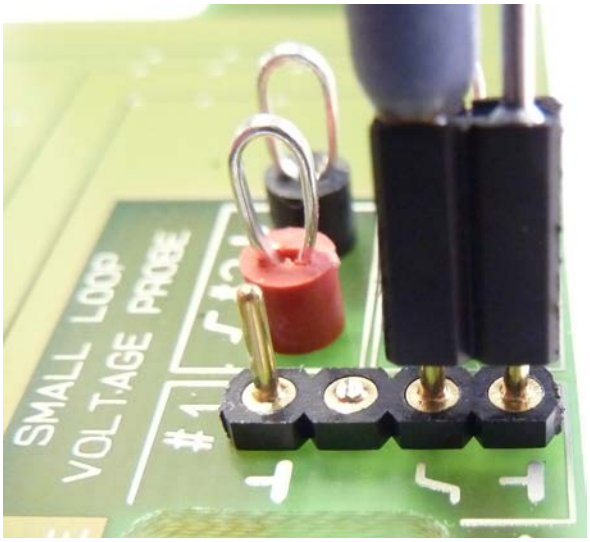
Deskew only probes connected to the same section. Never deskew a probe connected to the large loop section and a probe connected to the small loop section.

To achieve accurate measurement results, you have to ensure identical conditions for deskewing and measurement. Use the accessories required for the measurement application also for deskewing the probe.

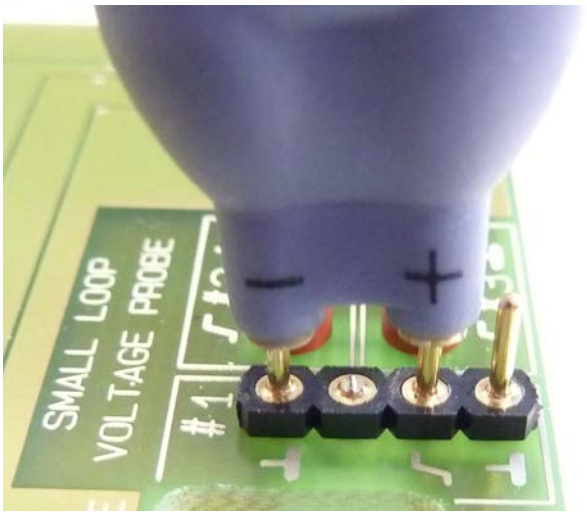
If you use probes with a compensation trimmer, e.g., R&S RT-ZP or R&S RT-ZH models, make sure to compensate the probe before deskewing.

1. If you use a R&S RT-ZC10/20 current probe, connect a R&S RT-ZC20 to the small loop, or a R&S RT-ZC10 to the large loop cutout.
2. If you use a Rohde & Schwarz active single-ended voltage probe, e.g. R&S RT-ZS10/10E/20/30/60 or R&S RT-ZZ80:

a) Using the square pin adapter, connect the signal socket to the pulse pin ⎍.
b) Using the square pin adapter, connect the ground socket to the ground pin ⊥.



3. If you use a Rohde & Schwarz differential voltage probe, e.g. R&S RT-ZD20/30/40:
   a) Connect the positive socket to the pulse pin ⎍ directly or using the square pin adapter.
   b) Connect the negative socket to the ground pin ⊥ directly or using the square pin adapter.



Note: The R&S RT-ZD40 cannot be connected directly. Use the square pin adapter to connect this probe.

4. If you use a high voltage probe, e.g. R&S RT-ZH10/11, R&S RT-ZD01, or a passive single ended probe, e.g. R&S RT-ZP10:
   a) Clamp the signal hook/positive hook to the red pulse clamp-on connector.
   b) Clamp the ground hook/negative hook to the black ground clamp-on connector.

To deskew multiple current probes, use a voltage probe as reference and align each current probe with the reference voltage probe.

Figure 2-1: R&S RT-ZC10 and R&S RT-ZD30 differential probe at large loop

2.4 Deskewing Probes

Deskewing means to align the edges of two waveforms output by two different probes. Therefore, skew offset is set to one of the used input channels. Use the following transition depending on the probe with the smallest bandwidth.

Table 2-1: Transition and probe dependencies

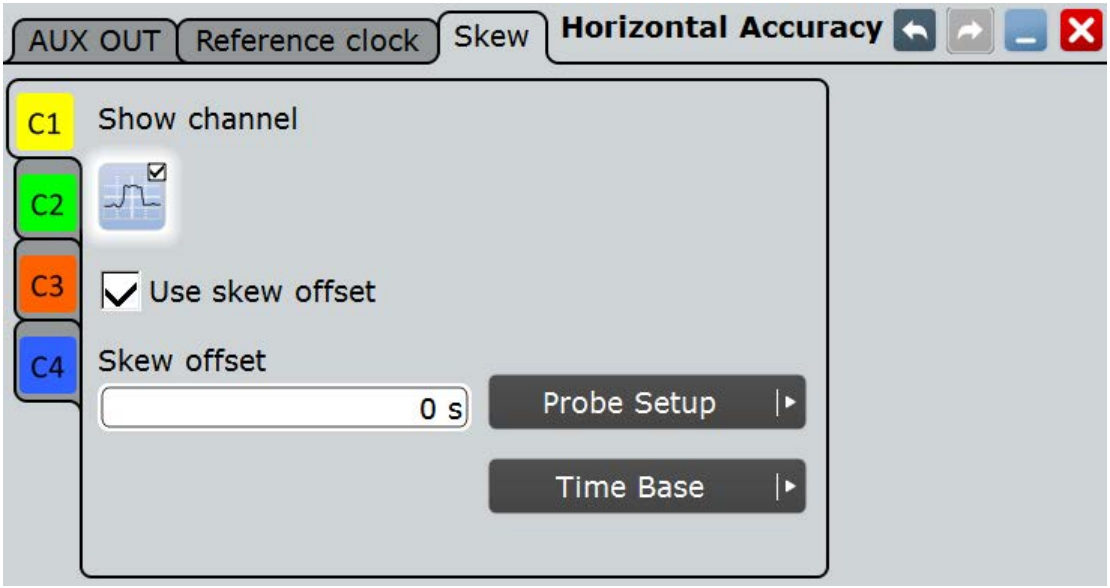
Probe	Transition
R&S RT-ZC10 Any other probe with bandwidth <20 MHz Faster probe with 20 MHz bandwidth filter	Large loop Rising edge
R&S RT-ZC20 or R&S RT-ZD01 Any other probe with bandwidth <200 MHz Faster probe with 200 MHz bandwidth filter	Small loop Rising edge
Other probes	Small loop Falling edge

Figure 2-2: Deskewing

Left = no skew offset, time delay between waveforms
Right = skew offset set, aligned waveforms

Deskewing with R&S RTO

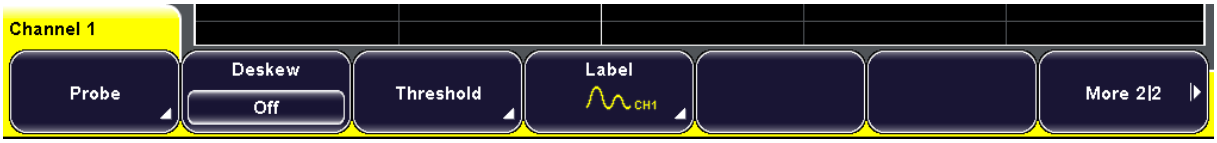
1. On the "Vertical" menu, tap "Probe Setup".
2. Tap the "Deskew" button.
3. Tap "Skew offset".



4. Using the NAVIGATION knob or the on-screen keypad, adjust the value until both waveforms are aligned.

Deskewing with R&S RTM

1. Press the CH1 key.
2. If the first menu page is shown, press "More 1|2".
3. Press "Deskew."



4. Turn the NAVIGATION knob to adjust the value until both waveforms are aligned.

2.5 Additional Features

Besides deskewing two Rohde & Schwarz probes, the R&S RT-ZF20 can be used for a functional check of the rise time of Rohde & Schwarz current probes.

1. Connect a R&S RT-ZC10 to the large loop or a R&S RT-ZC20 to the small loop as describe in Chapter 2.2, "Connecting Probes to R&S Oscilloscopes", on page 10.

2. Adjust the trigger to the falling edge.
3. Enable a fall time measurement for the channel connected to the current probe.
4. Set the relative reference levels to "20/50/80".

   The measured fall time should be around 5 ns for R&S RT-ZC20 and around 50 ns for R&S RT-ZC10.

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