Service Manual

Vector Network Analyzers

R&S® ZVT8, R&S® ZVT20

1300.0000.08, 1300.0000.20

Printed in Germany

ROHDE&SCHWARZ
Test and Measurement

1300.0045.82-03

The instrument includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). It includes cryptographic software written by Eric Young (eay@cryptsoft.com) and software written by Tim Hudson (tjh@cryptsoft.com). The verbatim license texts are provided in on the user documentation CD-ROM (included in delivery).

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Procedure in Case of Service and Ordering of Spare Parts

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

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

Shipping the Instrument

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

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

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

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

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

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

Shipping Defective Modules

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

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

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

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

Ordering Spare Parts

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

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

Refurbished Modules

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

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

Taking Back Defective Replaced Modules

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

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

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

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

Table of Contents - Chapter 1 "Performance Test"

1 Performance Test

Preliminary Remarks

- The required characteristics of the network analyzer are checked after a warm-up time of at least 60 minutes; this ensures that the guaranteed data is met.
- The values stated in the following sections are not guaranteed data; only the specifications in the data sheet are binding.
- The values in the data sheet are guaranteed limits. Because of the measurement errors that arise, these limits must be increased to encompass the tolerances of the measuring equipment used for the performance test.
- Entries for the measurement are represented in the following way:

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

  [<SOFTKEY>] Press a softkey, e.g. [MARKER -> PEAK]

  [<**nn unit**>] Enter a value + terminate the entry with a unit, e.g. [**12 kHz**]

  Consecutive entries are separated with a [:], e.g. [**Meas Bandwidth** : 1 kHz]

Test Equipment and Accessories

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
1	Spectrum analyzer	a) Counter mode: Min. resolution: 100 Hz Max. rel. frequency deviation: 10^{-6} b) Linearity Max. departure from linearity (2σ): 0.06 dB c) Frequency response: 50 MHz to 3.6 GHz: < 0.3 dB 3.6 GHz to 8 GHz: < 1.5 dB 8 GHz to 22 GHz: < 2 dB 22 GHz to 40 GHz: < 2.5 dB	R&S FSU 50	1166.1660.50	Frequency uncertainty Harmonics Output linearity Input linearity
2	Power meter	300 kHz to 20 GHz	R&S NRVD	0857.8008.02	Max output power Accuracy of output power Power measurement uncertainty
3	Power sensor	300 kHz to 8 GHz	R&S NRV-Z51	0857.9004.02	Max. output power Accuracy of output power Power measurement uncertainty oR&S ZVT8
3	Power sensor	10 MHz to 20 GHz	R&S NRV-Z52	0857.9204.02	Max. output power Accuracy of output power Power measurement uncertainty on R&S ZVT20
4	Calibration kit	N, 50 Ω. 300 kHz to 8 GHz.	R&S ZV-Z21	1085.7099.02	Input linearity Matching port 1 to port 8 Input noise level on R&S ZVT8
4	Calibration kit	3.5mm, 50 Ω. 10 MHz to 20 GHz.	R&S ZV-Z32	1128.3501.02	Input linearity Matching port 1 to port 6 Input noise level on R&S ZVA20
5	Signal generator	300 kHz to 20 GHz, Power = -40 dBm to 10 dBm	R&S SML01 R&S SMR27 with Option R&S SMR-B15	1090.3000.11 1104.0002.27 1104.4989.02	Power measurement uncertainty
6	Power splitter	N, 50 Ohm, Γ_{eq} < 0.05 (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Power measurement uncertainty on R&S ZVT8
5	Power splitter	3.5mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Power measurement uncertainty on R&S ZVT20
7	Test cable	N(male) – N(male), approx. 1.5 m			Frequency uncertainty Harmonics Matching port 1 to port 8 Power measurement uncertainty Input linearity on R&S ZVT8

Item	Type of equipment	Recommended characteristics or features	Recommended model	R&S Order No.	Application
7	Test cable	Test cable 3.5 mm (m) to 3.5 mm (f).	R&S ZV-Z14	1134.4093.02	Frequency uncertainty Harmonics Matching port 1 to port 6 Power measurement accuray on R&S ZVA20
8	BNC cable	Male – male, approx. 1.5 m			General: Device synchronisation
9	DC power supply	-12 V to +12 V	R&S NGSM 32/10	0192.0810.31	DC meas inputs
10	Multimeter	MU < 0.2%, DC range 1 V, 10 V	R&S URE3	0350.5315.03	DC meas inputs
11	Conn. Cables for DC inputs		R&S ZV-Z71	1164.1005.02	DC meas inputs
12	Monitor				General
13	Keyboard with mouse	USB connector			General

Performance Test

Compare with data sheet
Use a keyboard with mouse and an external monitor for all measurements (see Chapter “Test Equipment“, Item 12 and 13). To show the hardkeys on the screen select **Display \ Display Config \ Hardkey Bar**.

Checking the Frequency Uncertainty

Instrument:	Spectrum analyzer (see Chapter “Test Equipment“, Item1)
	Test cable (see Chapter “Test Equipment“, Item7)
Test setup:	Connect the spectrum analyzer to port 1 (port 2 to port 8)
Spectrum analyzer settings:	- [**PRESET**] - [**FREQ** : **1 GHz**] - [**SPAN** : **100 kHz**] - [**BW** : MANUAL RES BW : **2 kHz**] - [**MARKER** : MARKER MODE : FREQ COUNT] - [**AMPT** : REF LEVEL : **10 dBm**]
R&S® ZVT settings	- Select [**System** : Internal Reference]
	- [**Preset**] - [**Meas** :Wave Quantities: a1 Src Port 1] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **1 GHz**; Power : **0 dBm**] - [**Sweep** : Single : **Restart**]
Measurement:	Read off the frequency indicated by the marker.
	Frequency deviation = marker value – 1 GHz
	Max. frequency deviation ..... see Performance Test Report

Checking the Harmonics

Instrument: Spectrum analyzer (see Chapter "Test Equipment", Item1)

Test cable (see Chapter “Test Equipment", Item7)

Test setup: Connect the spectrum analyzer to port1 (port 2 to port 8)

Spectrum analyzer settings:

Note:
Synchronize the reference oscillators in the spectrum analyzer and in the R&S®ZVT.

- [**PRESET**]
- [**FREQ** : f_{GEN}, 2* f_{GEN}, 3* f_{GEN} *]
- [**SPAN** : ZERO SPAN]
- [**BW** : MANUAL RES BW : **1 kHz**]
- [**MARKER** : DETECTOR : RMS]
- [**AMPT** : REF LEVEL : **10 dBm**]

* For measurement frequencies, see Performance Test Report {fGEN}.

R&S® ZVT settings:

- [**Preset**]
- [**Meas** : Wave Quantities: a1 Src Port 1
  (a2 Src Port 2 to a8 Src Port 8)]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}** ; Power : **8 dBm**]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies, see Performance Test Report {fGEN}.

Measurement: Read off the levels L_{n*fgen} (n = 1, 2, 3) indicated by the spectrum analyzer’s markers.

Calculation:

$$\text{Harmonics} = L_{n*f\,gen} - L_{fgen} - \text{cable loss (in dB)}$$

The cable loss corresponds to the S_{21} of the test cable used between the fundamental and the measured harmonic (S_{21} is negative).

Checking the Maximum Output Power

Instrument:	Power sensor or Power meter with power sensor (see Chapter “Test Equipment“, Item2)
Test setup:	Connect power sensor to port1 (port 2 to port 8)
Power sensor settings:	For measurement frequencies, see Performance Test Report {f_{GEN}*}.
R&S®ZVT settings:	- [**Preset**] - [**Meas** : Wave Quantities: a1 Src Port 1 (a2 Src Port 2 to a8 Src Port 8)] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}** ; Power : **16 dBm**] - [**Sweep** : Single : **Restart**] * For measurement frequencies see the Performance Test Report {f_{GEN}}.
Measurement:	Read off the level indicated by the power meter. Max. power ..... see Performance Test Report

Checking the Accuracy of Output Power

Instrument:	Power sensor or Power meter with power sensor (see Chapter “Test Equipment“, Item2)
Test setup:	Connect the power sensor to port 1 (port 2 to port 8)
Power sensor settings:	For measurement frequencies, see Performance Test Report {f_{GEN}*}.
R&S®ZVT settings:	- [**Preset**] - [**Mode** : ALC : on] - [**Meas** : Wave Quantities: a1 Src Port 1 (a2 Src Port 2, a3 Src Port 3, a8 Src Port 8)] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}** ; Power : **-10 dBm**] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {f_{GEN}}.
Measurement:	Read off the levels indicated by the power sensor Level deviation = L_{SENSOR} – (-10 dBm)

Checking the Output Linearity

Instrument: Spectrum analyzer (see Chapter “Test Equipment“, Item1)

Test cable (see Chapter “Test Equipment“, Item7)

Test setup: Connect the spectrum analyzer to port 1(port 2 to port 8)

Spectrum analyzer settings:

Note:
Synchronize the reference oscillators in the spectrum analyzer and in the R&S®ZVT :

- [**PRESET**]
- [**FREQ** : f_{GEN}*]
- [**SPAN** : ZERO SPAN]
- [**BW** : MANUAL RES BW : **1 kHz**]
- [**MARKER** : DETECTOR : RMS]
- [**AMPT** : REF LEVEL : **5 dBm**]

* For measurement frequencies, see Performance Test Report {fGEN}.

R&S®ZVT settings:

- [**Preset**]
- [**Meas** : Wave Quantities: a1 Src Port 1
  (a2 Src Port 2 to a8 Src Port 8)]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}** ; Power : **{l_{GEN}*}**]
- [**Sweep** : Single : **Restart**]

* For measurement frequencies {fGEN} and levels {l_{GEN}}, see Performance Test Report

Measurement: Read the spectrum analyzer’s marker values (level L) .

Calculation: The measured values are referred to the level at the R&S ZVT setting of-10 dBm.
Calculating the generator level linearity:

Level linearity = L - $L_{@-10dBm}$ – step width (in dB)

Step width = l_{gen} – (-10 dBm) (reference)

Checking the Power Measurement Accuracy

Instrument:

Power sensor or
Power meter with power sensor
(see Chapter “Test Equipment“, Item2)

Signal generator (see Chapter “Test Equipment“, Item5)

Power splitter (see Chapter “Test Equipment“, Item6)

Calibration kit (see Chapter “Test Equipment“, Item4)

Test cable (see Chapter “Test Equipment“, Item7)

Preparation/
test setup:

Connect the signal generator to the power-splitter input using the test cable.

Connect the power sensor to a power-splitter output

Connect the other power-splitter output to port1 (port2 to port 8) using an adapter from the calibration kit

The reference oscillators in the signal generator and in the R&S ZVT must be synchronized.

R&S®ZVT settings:

- [**Preset**]
- [**Meas** : Wave Quantities: b1 Src Port 1
  (b2 Src Port 2 to b4 Src Port 4)]
- [**Power** : RF Off]
- [**Meas Bandwidth** : 100 Hz]
- [**Marker**]
- [**Sweep** : Sweep Type : CW Mode :
  CW Frequency : **{f_{GEN}*}**]
- [**Sweep** : Single : **Restart**]

* For the measurement frequencies, see Performance Test Report {fGEN}.

Measurement:

Signal generator : CW Mode, Frequency: f_{gen}
Signal-generator level: -5 dBm

Adjust the signal-generator level so that the power meter reads 0 dB +/- 0.2 dB

Determine the signal-generator level that gives –10 dBm at the splitter output. This level is required for the following measurement, “Checking Receiver Linearity”.

Read off the power meter display and the ZVT marker values.

Level error = $L_{ZVT} – L_{PS}$

Checking the Input Linearity

Instrument:	Calibration kit (see Chapter “Test Equipment“, Item4)
R&S®ZVT settings:	- [**Preset**] - [**Meas** : Ratios: b1/a1 Src Port 1 (b2/a2 Src Port 2 to b8/a8 Src Port 8)] - [**Meas Bandwidth** : 10 Hz] - [**Marker**] - [**Sweep** : Sweep Type : Power : Start -40dBm : Stop 10dBm : CW Frequency : **{f_{GEN}*}**] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {fGEN}
1. Test setup:	Connect an open male to port 1 (port 2 to port 4)
1. Measurement:	- [**Trace Funct**] - [**Data -> Mem**] - [**Show Mem** : off]
2. Test setup:	Connect a short male to port 1 (port 2 to port 4)
2. Measurement:	- [**Math = Data/Mem** : on] Set **Ref Marker** to -10dBm Select **Delta Mode** Set **Marker1** to -40dBm up to +10dBm by 5dB steps Read off the differences of the Marker Values displayed by the R&S ZVT

Checking the Input Noise Level

Test equipment	Calibration kit (see Chapter “Test Equipment“, Item4)
Test setup:	Connect the Match Male from the calibration kit to port 1 (port 2 to port 8)
R&S®ZVT settings:	- [**Preset**] - [**Meas** : Wave Quantities: b1 Src Port 1 (b2 Src Port 2 to b8 Src Port 8)] - [**Power** : RF Off] - [**Meas Bandwidth** : 10 Hz] - [**Marker**] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}**] - Service Function 1.0.0.1.1 (see chapter 3 ‘Service Functions’, Service Level 2) - [**Measure** : Wave Quantities : More Wave Quantities… : Properties : Detector : **RMS** : Meas. Time: 500ms] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {fGEN}.
Measurement:	Read off the noise level indicated by the markers on the DUT.

Checking the Matching (raw)

Instrument:	Calibration kit (see Chapter “Test Equipment“, Item4)
	Test cable (see Chapter “Test Equipment“, Item7)
R&S®ZVT settings:	- [**Preset**] - [**Power** : 0 dBm]
1. Preparation/ test setup:	Connect the test cable to port 1 on the R&S®ZVT and perform a 1-port calibration at the end of the cable.
	Connect the end of the test cable to port 2 (port 3 to port 8) on the R&S®ZVT.
R&S®ZVT settings:	- [**Meas** : S11] - [**Marker**] - [**Add Channnel + Trace**] - [**Meas** : S22 (S33 to S88)] - [**Power** : -40 dBm] - [**Trace Funct**] - [**Show Data** : off] - [**Trace Select** : Trc 1]
1. Measurement	Read off the network analyzer’s marker values (for marker frequencies see Performance Test Report)
R&S®ZVT settings:	- [**Power** : -40 dBm] - [**Trace Funct**] - [**Show Data** : off] - [**Trace Select** : Trc 2] - [**Trace Funct**] - [**Show Data** : on] - [**Meas** : S22] - [**Marker**]
2. Preparation/ test setup:	Set port 2 power to 0 dBm
	Connect the test cable to port 2 on the R&S®ZVT and perform a 1-port calibration at the end of the cable.
	Connect the end of the test cable to port 1 on the R&S®ZVT.
2. Measurement	Read off the network analyzer’s marker values (for marker frequencies see Performance Test Report)

Checking the Dynamic Range

Note: In case of reflectometer repair (reflectometer, coupler, cables) or reflectometer removing and reinstalling a dynamic range check with 201 points (ZVT8) or 301 points (ZVT20) must be performed (see chapter 3) before this performance test procedure.

Test equipment:	Calibration kit N (see Chapter "Test Equipment", Item4)
Test setup:	Connect Short Male to port1 and port 2 (port 3 to port 8) (use Short Female with Through Male as a second Short Male)
R&S®ZVT settings:	- [**Preset**] - [**Meas** : Ratios : b1/a2 Drive Port 1] - [**Power** : max. spec. power] - [**Meas Bandwidth** : 10 Hz] - [**Marker**] - [**Sweep** : Sweep Type : CW Mode : CW Frequency : **{f_{GEN}*}**] - Service Function 1.0.0.1.1 (see chapter 3 "Service Functions", Service Level 2) - [**Measure** : Wave Quantities : More Wave Quantities… : Properties : Detector : **RMS** : Meas. Time : 500ms] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {fGEN}.
Measurement:	Read off marker value
R&S®ZVT settings:	- [**Meas** : Ratios : b2/a1 Drive Port 1] [**Meas** : Ratios : b3/a1 Drive Port 1] [**Meas** : Ratios : b4/a1 Drive Port 1] [**Meas** : Ratios : b5/a1 Drive Port 1] [**Meas** : Ratios : b6/a1 Drive Port 1] [**Meas** : Ratios : b7/a1 Drive Port 1] [**Meas** : Ratios : b8/a1 Drive Port 1] - [**Sweep** : Single : **Restart**] * For measurement frequencies, see Performance Test Report {fGEN}.
Measurement:	Read off marker value
Calculation:	Dynamic range = Marker value + Power value

Checking the DC Measurement Inputs

Test equipment:	DC Power Supply NGSM 32/10 (see Chapter “Test Equipment“, Item9) Multimeter URE3 (see Chapter “Test Equipment“, Item10) DC cable (see Chapter “Test Equipment“, Item11)
Test setup:	Connect the Power Supply to the Input DC MEAS 1V (DC MEAS 10V) of the ZVT using the DC cable
R&S®ZVT settings:	- [**Preset**] For DC Meas 1 V: - [**Meas** : More : DC Inputs : DC Meas ±1 V] - [**Format** : Real] - [**Scale** : Scale/Div : .25 x1] - [**Marker**] For DC Meas 10 V: - [**Meas** : More : DC Inputs : DC Meas ±10 V] - [**Format** : Real] - [**Scale** : Scale/Div : 2.5 x1] - [**Marker**]
Measurement:	Set Power Supply to DC values U_{DC} using Multimeter URE (DC values see Performance Test Report) and connect it to pos. and neg. input Read off the DC level $U_{DC\ ZVT}$ indicated by the marker.
Calculation:	Deviation = U_{DC} - $U_{DC\ ZVT}$

Performance Test Report

Table 1-1: Performance Test Report

ROHDE & SCHWARZ	Performance Test Report	R&S ZVT Version 08.05.08
Model ZVT Options: Item number: 1300.0000 Serial number Tested by: Date: Signature:		

General: All Tables apply to port1; values for ports 2 to 8 are identical.

Parameter	**Covered on**	**Min. value**	**Actual value**	**Max. value**	**Unit**	**Measurement tolerance**
Frequency deviation @ 1 GHz **With Option R&S ZVAB-B4**	Page 1.4	- 8000 - 100	_____	+ 8000 + 100	Hz	1 Hz

	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ **Harmonics** **Source power:** **ZVT8 +8dBm** **ZVT20 +10 dBm** **Freq. Harmonics**	Page 1.4				dBc	1 dB
50 MHz 100 MHz			_____	-20		
150 MHz			_____	-20		
100 MHz 200 MHz			_____	-20		
300 MHz			_____	-20		
200 MHz 400 MHz			_____	-20		
600 MHz			_____	-20		
500 MHz 1000 MHz			_____	-20		
1500 MHz			_____	-20		
750 MHz 1500 MHz			_____	-20		
2250 MHz			_____	-20		
1 GHz 2 GHz			_____	-20		
3 GHz			_____	-20		
1.5 GHz 3 GHz			_____	-20		
4.5 GHz			_____	-20		
2 GHz 4 GHz			_____	-20		
6 GHz			_____	-20		
2.1 GHz 4.2 GHz			_____	-20		
6.3 GHz			_____	-20		
2.5 GHz 5.0 GHz			_____	-20		
7.5 GHz			_____	-20		
3.0 GHz 6.0 GHz			_____	-20		
9.0 GHz			_____	-20		
3.5 GHz 7 GHz			_____	-20		
10.5 GHz			_____	-20		
4.0 GHz 8.0 GHz			_____	-20		
12.0 GHz			_____	-20		
4.1 GHz 8.2 GHz			_____	-20		
12.3 GHz			_____	-20		
5.0 GHz 10.0 GHz			_____	-20		
15.0 GHz			_____	-20		

Port __ **Harmonics** **Source power:** **ZVT8 +8dBm** **ZVT20 +10 dBm** **Freq. Harmonics**	Page 1.4				dBc	1 dB
5.04 GHz 10.08 GHz			_____	-20		
15.12 GHz			_____	-20		
5.05 GHz 10.10 GHz			_____	-20		
15.15 GHz			_____	-20		
6.0 GHz 12.0 GHz			_____	-20		
18.0 GHz			_____	-20		
6.35 GHz 12.70 GHz			_____	-20		
19.05 GHz			_____	-20		
6.36 GHz 12.72 GHz			_____	-20		
19.08 GHz			_____	-20		
7.0 GHz 14.0 GHz			_____	-20		
21.0 GHz			_____	-20		
8.0 GHz 16.0 GHz			_____	-20		
24.0 GHz			_____	-20		
ZVT20 only:						
9.0 GHz 18.0 GHz			_____	-20		
11.0 GHz 22.0 GHz			_____	-20		

	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port __ **Max. output power**	Page 1.5				dBm	1 dB
Test frequency						
ZVT8 only:						
300 kHz		10	_____			
1 MHz		10	_____			
2 MHz		10	_____			
5 MHz		10	_____			
10 MHz		10	_____			
20 MHz		10	_____			
50 MHz		13	_____			
100 MHz		13	_____			
200 MHz		13	_____			
500 MHz		13	_____			
750 MHz		13	_____			
1.0 GHz		13	_____			
1.5 GHz		13	_____			
2.0 GHz		13	_____			
2.1 GHz		13	_____			
2.5 GHz		13	_____			
3.0 GHz		13	_____			
3.5 GHz		13	_____			
4.0 GHz		13	_____			
4.1 GHz		10	_____			
4.5 GHz		10	_____			
5.0 GHz		10	_____			
5.05 GHz		10	_____			
5.7 GHz		10	_____			
6.0 GHz		10	_____			
6.35 GHz		10	_____			
6.36 GHz		10	_____			
7.0 GHz		10	_____			
7.5 GHz		8	_____			
8.0 GHz		8	_____			
ZVT20 only:						
10 MHz		10	_____			
20 MHz		10	_____			
50 MHz		10	_____			
100 MHz		10	_____			
200 MHz		10	_____			
500 MHz		10	_____			
750 MHz		10	_____			
1.0 GHz		10	_____			
1.5 GHz		10	_____			
2.0 GHz		10	_____			
2.1 GHz		10	_____			
2.5 GHz		10	_____			
3.0 GHz		10	_____			

	Page 1.5				dBm	1 dB
3.5 GHz		10	_____			
4.0 GHz		10	_____			
4.1 GHz		10	_____			
4.5 GHz		10	_____			
5.0 GHz		10	_____			
5.05 GHz		10	_____			
5.7 GHz		10	_____			
6.0 GHz		10	_____			
6.35 GHz		10	_____			
6.36 GHz		10	_____			
7.0 GHz		10	_____			
7.5 GHz		10	_____			
8.0 GHz		10	_____			
8.1 GHz		10	_____			
10.0 GHz		10	_____			
10.1GHz		10	_____			
12.6 GHz		10	_____			
13 GHz		10	_____			
16.0 GHz		5	_____			
16.1 GHz		3	_____			
18.0 GHz		3	_____			
20.0GHz		3	_____			

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Power Uncertainty output power -10 dBm**	Page 1.6				dB	0. dB
Test frequency ***ZVT8 only:***						
300 kHz		– 2	_____	2		
1 MHz		– 2	_____	2		
2 MHz		– 2	_____	2		
5 MHz		– 2	_____	2		
10 MHz		– 2	_____	2		
20 MHz		– 2	_____	2		
50 MHz		– 0.8	_____	0.8		
100 MHz		– 0.8	_____	0.8		
200 MHz		– 0.8	_____	0.8		
ZVT20 only:						
10 MHz		– 3	_____	3		
20 MHz		– 3	_____	3		
50 MHz		– 3	_____	3		
100 MHz		– 3	_____	3		
200 MHz		– 3	_____	3		
ZVT8 and ZVT20:						
500 MHz		– 0.8	_____	0.8		
750 MHz		– 0.8	_____	0.8		
1.0 GHz		– 0.8	_____	0.8		
1.5 GHz		– 0.8	_____	0.8		
2.0 GHz		– 0.8	_____	0.8		
2.1 GHz		– 0.8	_____	0.8		
2.5 GHz		– 0.8	_____	0.8		
3.0 GHz		– 0.8	_____	0.8		
3.5 GHz		– 0.8	_____	0.8		
4.0 GHz		– 0.8	_____	0.8		
4.1 GHz		– 0.8	_____	0.8		
4.5 GHz		– 0.8	_____	0.8		
5.0 GHz		– 0.8	_____	0.8		
5.05 GHz		– 0.8	_____	0.8		
5.7 GHz		– 0.8	_____	0.8		
6.0 GHz		– 0.8	_____	0.8		
6.35 GHz		– 0.8	_____	0.8		
6.36 GHz		– 0.8	_____	0.8		
7.0 GHz		– 0.8	_____	0.8		
7.5 GHz		– 0.8	_____	0.8		
8.0 GHz		– 0.8	_____	0.8		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
ZVT20 only:						
8.1 GHz		– 0.8	_____	0.8		
10.0 GHz		– 0.8	_____	0.8		
10.1 GHz		– 0.8	_____	0.8		
12.6 GHz		– 0.8	_____	0.8		
12.7 GHz		– 0.8	_____	0.8		
16.0 GHz		– 0.8	_____	0.8		
16.1 GHz		– 0.8	_____	0.8		
18.0 GHz		– 0.8	_____	0.8		
20.0 GHz		– 0.8	_____	0.8		

Parameter		Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __		Page 1.7				dB	0.06 dB
Power linearity							
Reference –10 dBm							
Freq.	Level						
50 MHz	20 dB		- 2	_____	2		
	15 dB		- 2	_____	2		
	10 dB		- 2	_____	2		
	5 dB		- 2	_____	2		
	-5 dB		- 2	_____	2		
	-10 dB		- 2	_____	2		
	-15 dB		- 2	_____	2		
	-20 dB		- 2	_____	2		
ZVT8	**-25 dB**		- 2	_____	2		
only	**-30 dB**		- 2	_____	2		
500 MHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		
1 GHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		
2 GHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		

Parameter		Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Power linearity** **Reference –10 dBm**		Page 1.7				dB	0.06 dB
Freq.	Level						
2.1 GHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		
3 GHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		
4 GHz	20 dB		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	**-25 dB**		- 0.8	_____	0.8		
only	**-30 dB**		- 0.8	_____	0.8		
4.1 GHz	*20 dB*		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	***-25 dB***		- 0.8	_____	0.8		
only	***-30 dB***		- 0.8	_____	0.8		

Parameter		Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __		Page 1.7				dB	0.06 dB
Power linearity							
Reference –10 dBm							
Freq.	*Level*						
7 GHz	*20 dB*		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	***-25 dB***		- 0.8	_____	0.8		
only	***-30 dB***		- 0.8	_____	0.8		
ZVT8 only:							
8 GHz	*18 dB*		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
ZVT8	***-25 dB***		- 0.8	_____	0.8		
only	***-30 dB***		- 0.8	_____	0.8		
ZVT20 only:							
9 GHz	*20 dB*		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		
11 GHz	*20 dB*		- 0.8	_____	0.8		
	15 dB		- 0.8	_____	0.8		
	10 dB		- 0.8	_____	0.8		
	5 dB		- 0.8	_____	0.8		
	-5 dB		- 0.8	_____	0.8		
	-10 dB		- 0.8	_____	0.8		
	-15 dB		- 0.8	_____	0.8		
	-20 dB		- 0.8	_____	0.8		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
ZVT20 only:	Page 1.7				dB	0.06 dB
Port . __						
Power linearity						
Reference –10 dBm						
Freq. Level						
13 GHz 20 dB		- 0.8	_____	0.8		
15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
16 GHz 15 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
17 GHz 13 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
19 GHz 13 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		
20 GHz 13 dB		- 0.8	_____	0.8		
10 dB		- 0.8	_____	0.8		
5 dB		- 0.8	_____	0.8		
-5 dB		- 0.8	_____	0.8		
-10 dB		- 0.8	_____	0.8		
-15 dB		- 0.8	_____	0.8		
-20 dB		- 0.8	_____	0.8		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Power measurement uncertainty**	Page 1.8				dB	0.2 dB
10 MHz		- 1	_____	1		
20 MHz		- 1	_____	1		
50 MHz		- 1	_____	1		
100 MHz		- 1	_____	1		
200 MHz		- 1	_____	1		
500 MHz		- 1	_____	1		
750 MHz		- 1	_____	1		
1 GHz		- 1	_____	1		
1.5 GHz		- 1	_____	1		
2 GHz		- 1	_____	1		
2.1 GHz		- 1	_____	1		
2.5 GHz		- 1	_____	1		
3 GHz		- 1	_____	1		
3.5 GHz		- 1	_____	1		
4 GHz		- 1	_____	1		
4.1 GHz		- 1	_____	1		
4.5 GHz		- 1	_____	1		
5.0 GHz		- 1	_____	1		
5.05 GHz		- 1	_____	1		
5.7 GHz		- 1	_____	1		
6.0 GHz		- 1	_____	1		
6.35 GHz		- 1	_____	1		
6.36 GHz		- 1	_____	1		
7.0 GHz		- 1	_____	1		
7.5 GHz		- 1	_____	1		
8.0 GHz		- 1	_____	1		
ZVT20 only:						
9.0 GHz		- 2	_____	2		
11.0 GHz		- 2	_____	2		
13.0 GHz		- 2	_____	2		
15.0 GHz		- 2	_____	2		
17.0 GHz		- 2	_____	2		
19.0 GHz		- 2	_____	2		
20.0 GHz		- 2	_____	2		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Input linearity ZVT8** **Reference –10 dBm**	Page 1.9				dB	0.06 dB
50 MHz 20 dB		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB		- 0.1	_____	0.1		
4 GHz 20 dB		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB		- 0.1	_____	0.1		
4.1 GHz 20 dB		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB		- 0.1	_____	0.1		
6 GHz 20 dB		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB		- 0.1	_____	0.1		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Input linearity ZVT8** **Reference –10 dBm**	Page 1.9				dB	0.06 dB
8 GHz 20 dB		- 0.2	_____	0.2		
15 dB		- 0.2	_____	0.2		
10 dB		- 0.2	_____	0.2		
5 dB		- 0.2	_____	0.2		
-5 dB		- 0.2	_____	0.2		
-10 dB		- 0.2	_____	0.2		
-15 dB		- 0.2	_____	0.2		
-20 dB		- 0.2	_____	0.2		
-25 dB		- 0.2	_____	0.2		
-30 dB		- 0.2	_____	0.2		

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Input linearity ZVT20** **Reference –10 dBm**	Page 1.9				dB	0.06 dB
50 MHz 20 dB		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB		- 0.1	_____	0.1		
700 MHz 20 dB		- 0.1	_____	0.1		
		- 0.1	_____	0.1		
15 dB		- 0.1	_____	0.1		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB						
		- 0.3	_____	0.3		
8 GHz 20 dB		- 0.3	_____	0.3		
15 dB		- 0.3	_____	0.3		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB						
		- 0.3	_____	0.3		
20 GHz 15 dB		- 0.3	_____	0.3		
10 dB		- 0.1	_____	0.1		
5 dB		- 0.1	_____	0.1		
-5 dB		- 0.1	_____	0.1		
-10 dB		- 0.1	_____	0.1		
-15 dB		- 0.1	_____	0.1		
-20 dB		- 0.1	_____	0.1		
-25 dB		- 0.1	_____	0.1		
-30 dB						

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Input noise level**	Page 1.10				dBm	
Test frequency ***ZVT8 only:***						
423.450 kHz			_____	–70		_
1.12345 MHz			_____	–70		_
2.12345 MHz			_____	–70		_
5.12345 MHz			_____	–70		_
ZVT8 (ZVT20):						
10.12345 MHz			_____	–70 (---)		_
20.12345 MHz			_____	–70 (---)		_
50.12345 MHz			_____	–70 (---)		_
100.12345 MHz			_____	–110 (-70)		_
200.12345 MHz			_____	–110 (-70)		_
500.12345 MHz			_____	–110 (-70)		_
750.12345 MHz			_____	–110 (-105)		_
1000.12345 MHz			_____	–110 (-105)		_
1500.12345 MHz			_____	–110 (-105)		_
2000.12345 MHz			_____	–110 (-105)		_
2100.12345 MHz			_____	–110 (-105)		_
2500.12345 MHz			_____	–110 (-105)		_
3000.12345 MHz			_____	–110 (-105)		_
3500.12345 MHz			_____	–110 (-105)		_
3999.87655 MHz			_____	–110 (-105)		_
4100.12345 MHz			_____	–105		_
4500.12345 MHz			_____	–105		_
5000.12345 MHz			_____	–105		_
5050.12345 MHz			_____	–105		_
5700.12345 MHz			_____	–105		_
6000.12345 MHz			_____	–105		_
6350.12345 MHz			_____	–105		_
6360.12345 MHz			_____	–105		_
7000.12345 MHz			_____	–105		_
7500.12345 MHz			_____	–105		_
7999.87655 MHz			_____	–105		_
ZVT20 only:						
9000.12345 MHz			_____	–100		_
11000.12345 MHz			_____	–100		_
13000.12345 MHz			_____	–100		_
15000.12345 MHz			_____	–100		_
17000.12345 MHz			_____	–100		_
19000.12345 MHz			_____	–100		_
19999.87655 MHz			_____	–100		_

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Matching (raw)**	Page 1.11				dB	1 dB
Test frequency						
ZVT8 only:						
300 kHz		16	_____			
1 MHz		16	_____			
2 MHz		16	_____			
5 MHz		16	_____			
ZVT8, (ZVT20):						
10 MHz		16 (10)	_____			
20 MHz		16 (10)	_____			
50 MHz		16 (16)	_____			
100 MHz		16 (16)	_____			
200 MHz		16 (16)	_____			
500 MHz		16 (16)	_____			
750 MHz		16 (16)	_____			
1 GHz		16 (16)	_____			
1.5 GHz		16 (16)	_____			
2 GHz		16 (16)	_____			
2.5 GHz		16 (8)	_____			
3 GHz		16 (8)	_____			
3.5 GHz		16 (8)	_____			
4 GHz		16 (8)	_____			
4.5 GHz		16 (8)	_____			
5 GHz		16 (8)	_____			
5.5 GHz		16 (8)	_____			
6 GHz		16 (8)	_____			
6.5 GHz		16 (8)	_____			
7 GHz		16 (8)	_____			
7.5 GHz		14 (8)	_____			
8 GHz		14 (8)	_____			
ZVT20:						
9.0 GHz		8	_____			
11.0 GHz		8	_____			
13.0 GHz		8	_____			
15.0 GHz		8	_____			
17.0 GHz		8	_____			
19.0 GHz		8	_____			
20.0 GHz		8	_____			

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Dynamic range ZVT8** **Test frequency**	Page 1.12				dB	
300 kHz		80	_____			_
1 MHz		80	_____			_
2 MHz		80	_____			_
5 MHz		100	_____			_
10 MHz		100	_____			_
20 MHz		100	_____			_
50 MHz		100	_____			_
100 MHz		120	_____			_
200 MHz		120	_____			_
500 MHz		120	_____			_
750 MHz		120	_____			_
1 GHz		120	_____			_
1.5 GHz		120	_____			_
2 GHz		120	_____			_
2.1 GHz		120	_____			_
2.5 GHz		120	_____			_
3 GHz		120	_____			_
3.5 GHz		120	_____			_
4 GHz		120	_____			_
4.1 GHz		117	_____			_
4.5 GHz		117	_____			_
5 GHz		117	_____			_
5.05 GHz		117	_____			_
5.7 GHz		117	_____			_
6 GHz		117	_____			_
6.35 GHz		117	_____			_
6.36 GHz		117	_____			_
7 GHz		117	_____			_
7.5 GHz		115	_____			_
8 GHz		108	_____			_

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Port . __ **Dynamic range ZVT20** **Test frequency**	Page 1.12				dB	
10 MHz		80	_____			_
20 MHz		80	_____			_
50 MHz		80	_____			_
100 MHz		100	_____			_
200 MHz		100	_____			_
500 MHz		100	_____			_
700 MHz		120	_____			_
1 GHz		120	_____			_
1.5 GHz		120	_____			_
2 GHz		120	_____			_
2.1 GHz		120	_____			_
2.5 GHz		120	_____			_
3 GHz		120	_____			_
3.5 GHz		120	_____			_
4 GHz		120	_____			_
4.1 GHz		120	_____			_
4.5 GHz		120	_____			_
5 GHz		120	_____			_
5.05 GHz		120	_____			_
5.7 GHz		120	_____			_
6 GHz		120	_____			_
6.35 GHz		120	_____			_
6.36 GHz		120	_____			_
7 GHz		120	_____			_
7.5 GHz		120	_____			_
8 GHz		120	_____			_
9.0 GHz		110	_____			_
11.0 GHz		110	_____			_
13.0 GHz		110	_____			_
15.0 GHz		110	_____			_
16.0 GHz		110	_____			_
19.0 GHz		105	_____			_
20.0 GHz		105	_____			_

Parameter	Covered on	Min. value	Actual value	Max. value	Unit	Measurement tolerance
Accuracy **DC meas 1 V** **Pos. Input** -1000 m V -300 mV -10 mV 10 mV 300 mV 1000 m V **Neg. Input** -1000 m V -300 mV -10 mV 10 mV 300 mV 1000 m V	Page 1.14	 - 27.5 - 10.0 - 2.75 - 2.75 - 10.0 - 27.5 - 27.5 - 10.0 - 2.75 - 2.75 - 10.0 - 27.5	 _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	 + 27.5 + 10.0 + 2.75 + 2.75 + 10.0 + 27.5 + 27.5 + 10.0 + 2.75 + 2.75 + 10.0 + 27.5	mV	1 mV
Accuracy **DC meas 10 V** **Pos. Input** **-**10.0 V -3.0 V -0.1 V 0.1 V 3.0 V 10.0 V **Neg. Input** **-**10.0 V -3.0 V -0.1 V 0.1 V 3.0 V 10.0 V	Page 1.14	 - 0.275 - 0.10 - 0.0275 - 0.0275 - 0.10 - 0.275 - 0.275 - 0.10 - 0.0275 - 0.0275 - 0.10 - 0.275	 _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	 + 0.275 + 0.10 + 0.0275 + 0.0275 + 0.10 + 0.275 + 0.275 + 0.10 + 0.0275 + 0.0275 + 0.10 + 0.275	V	0.01 V

Table of Contents - Chapter 2 "Alignment"

2 Alignment

This chapter describes the alignment of the frequency reference and the recording of correction data after a board has been replaced.

The following manual alignments or corrections can be performed on the R&S ZVT:

- Alignment of the 10-MHz reference oscillator which determines the frequency accuracy of the R&S ZVT
- Recording the correction values for the generators and the receivers which determine the measurement accuracy of the R&S ZVT's absolute values.

By performing the alignment and recording the correction values, it is possible to ensure that the R&S ZVT is meeting its specifications by correcting any deviations.

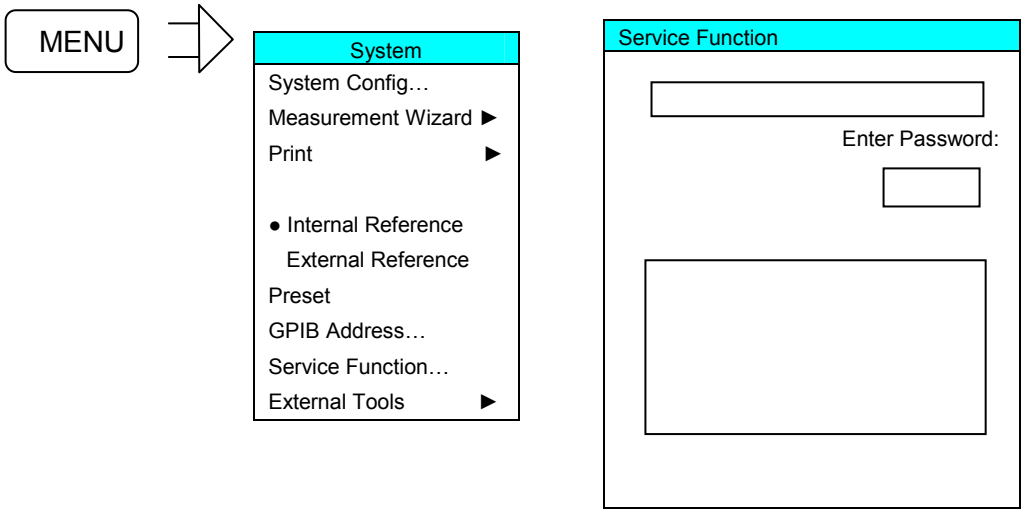
The alignments must be performed within an ambient temperature range of +22 °C to +24 °C after the appropriate warm-up time.

The R&S ZVT meets its specs and is ready for operation when the alignment has been performed and/or correction values have been recorded and a system error calibration carried out.

Service Menu

Access to the board-alignment functions is password-protected to prevent unintentional changes to settings.

Entering the password



- Enter password 30473035.

Caution
The alignment shall be performed only by appropriately trained personnel because any changes made have a profound effect on the measurement accuracy of the instrument

Manual Alignment and Recording Correction Values

In the sequel, the test equipment and the instrument preparations required to manually align the R&S ZVT and each of the alignments are described.

Preliminary remarks

The analyzer must be allowed to warm up for at least 30 minutes before alignment. This is the only way of ensuring that the guaranteed data are met.

Test Equipment

Table 2-1 Test equipment for manually aligning the R&S ZVT

Item	Type of equipment	Recommended specifications	Recommended model	R&S Order No.	Application
1	Spectrum analyzer	Counter mode: Min. resolution: 0.1 Hz Max. rel. frequency deviation: 10^{-9}	R&S FSU 26 w. option R&S FSU-B4	1129.9003.26	Frequency accuracy of the reference oscillator
2	Signal generator	300 kHz to 20 GHz, Power = -40 dBm to 10 dBm	R&S SML01 R&S SMR27 with Option R&S SMR-B15	1090.3000.11 1104.0002.27 1104.4989.02	Recording correction values
3	Power meter	300 kHz to 20 GHz	R&S NRVD	0857.8008.02	Recording correction values
4	Power sensor	300 kHz to 8 GHz	R&S NRV-Z51	0857.9004.02	Recording correction values on R&S ZVT8
4	Power sensor	10 MHz to 20 GHz	R&S NRV-Z52	0857.9204.02	Recording correction values on R&S ZVT20
5	Power splitter	N, 50 Ohm, Γ_{eq} < 0.05 (50 MHz to 8 GHz) Output tracking < 0.15 dB	Weinschel 1870A	-	Recording correction values on R&S ZVT8
5	Power splitter	3.5mm, 50 Ohm, Output tracking < 0.25 dB	Weinschel 1593	-	Recording correction values on R&S ZVT20
6	PC with GPIB-Interface	Pentium, WinXP, WinNT GR AT-GPIB IEEE4888 IF PCI National Instruments	 NI-488 PCI-GPIB	 1072.6101.00	Recording correction values
7	Alignment Software	R&S ZVAB-Service		1302.4460.00	Recording correction values
8	Power supply	2x 0 to 10 V			Aligning the DC inputs
9	DC meter		R&S URE 3	0350.5315.03	Aligning the DC inputs

Item	Type of equipment	Recommended specifications	Recommended model	R&S Order No.	Application
10	Calibration kit	N calibration kit	R&S ZV-Z21	1085.7099.02	Recording correction values on ZVT8
10	Calibration kit	3.5 mm, 50 Ω. 10 MHz to 20 GHz.	R&S ZV-Z32	1128.3501.02	Recording correction values on R&S ZVT20
11	Test cable	Test cable N (m) to N (m).	R&S ZV-Z11	1085.6505.03	Recording correction values on R&S ZVT8
11	Test cable	Test cable 3,5mm (m) to 3.5 mm (f).	R&S ZV-Z14	1134.4093.02	Recording correction values on R&S ZVT20
12	Conn. Cables for DC Inputs	4-pin mini-DIN plug	R&S ZV-Z71	1164.1005.02	Aligning the DC inputs

Aligning the Frequency Accuracy

Test equipment	Spectrum analyzer (section "Test Equipment", item 1): Error <$1x10^{-9}$
Test setup:	Connect the frequency counter to the 10-MHz reference output at the rear of the R&S ZVT.
R&S ZVT settings:	Select internal reference MENU : System: Reference Internal
Spectrum analyzer settings:	Center frequency: 10 MHz Span: 200 Hz
Note:	*Before the following measurement is performed, the R&S ZVT must have been switched on for at least 30 minutes to give the reference oscillator time to warm up.*
Measurement:	Measure the frequency with the frequency counter: Nominal frequency: Model **without** OCXO (Option B4) 10 MHz ± 80 Hz Model **with** OCXO (Option B4) 10 MHz ± 1 Hz

Alignment without Option R&S ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0x000**000**
- Read off the frequency-counter display, e.g. 10.000050 MHz.
- Change the **right-hand segment** (corresponding to bit 0 to bit 11) of the data word - e.g. to 000**400** - instead of 000**000**.
- Read off the frequency counter display again, e.g. 10.000010 MHz.
- Change the right-hand segment of the data word (000**000** to 000**7FF**), until the counter indicates precisely 10.000000 MHz.

Alignment with Option R&S ZVAB-B4:

- Enter Service Function 2.1.1.6.209.0x**800**000.
- Read off the frequency-counter display, e.g. 10.000005 MHz.
- Change the **left-hand segment** (corresponding to bit 12 to bit 23) of the data word - e.g. to **400**000 - instead of **800**000.
- Read off the frequency-counter display again, e.g. 10.000001 MHz.
- Change the left-hand segment of the data word (**000**000 to **800**000), until the counter indicates precisely 10.000000 MHz.

Writing data to the hard disk:

- Change to computer application
- Select path
  C:\Documents and Settings\AllUsers\ApplicationData\Rohde&Schwarz\NWA\data\eeprom\
  FR\config.ini
- Transform data format to decimal
- Write decimal data to [TUNE] 128_PRETUNE = … (without option R&S ZVAB-B4)
  OCXO_TUNE = … (with option R&S ZVAB-B4)

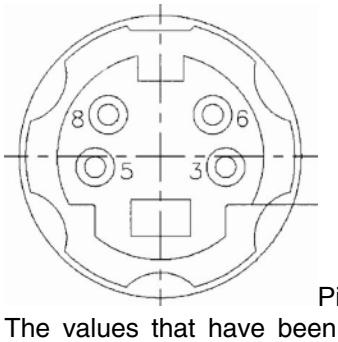
Writing to Eprom:

- Select Service Level 2 (see Service Functions)
- Set Service Function 3.9.0.2

Aligning the DC Inputs

At the outset, ensure that the correction parameters "Multiplier" M and "Offset" F have been preset to M=1 and F=0 for both inputs. This can be done using the Service Functions 3.1.2.5 and 3.1.2.2 which are described below under ***Service Functions***.

Test equipment:	Power supply 2 x 0 to 10 V DC meter (R&S URE)	
Test setup:	DC Meas ± 1 V	DC Meas ± 10 V
	Connect DC voltage + 1 V……pin 6, pin 3 (Gnd) - 1 V……pin 8, pin 5 (Gnd)	Connect DC voltage: + 10 V……pin 6, pin 3 (Gnd) - 10 V……pin 8, pin 5 (Gnd)
	Check voltages with the URE and correct if necessary.	
R&S ZVT settings:	**Measure :** DC Inputs : DC Meas ± 1V	**Measure :** DC Inputs: DC Meas ± 10V
Measurement	Read off the voltages displayed by the R&S ZVT: V1 = positive voltage V2 = negative voltage	
Calculating the corrections: M -> scaling factor F -> offset	M = (V1-V2)/2 F = (V1+V2)/(V1-V2)	M = (V1-V2)/20 F = 10x (V1+V2)/(V1-V2)



Pin assignment for DC MEAS connector

The values that have been obtained in this way are now written to the hard disk using the Service Functions described below and then transferred to the EEprom of network controller1.

Example illustrating DC Meas 1 V:

When +1 V is applied, V 1 = 1.023 V is displayed by the ZVT; when -1 V is applied, V2 = -1.011 V is displayed. The results of the calculation are M = 1.017 and F = 0.0059. The following entries are, therefore, made:

- Select Service Level 2 (see Service Functions).
- Set Service Functions (Writing to the hard disk)

  3.1.2.5.dc_meas_1 V.DcMeasMultiplier.1.017
  3.1.2.5.dc_meas_1 V.DcMeasOffset.0.0059

  etc. for the second measurement input.

- Set Service Function (Writing to the EProm)

  3.1.2.2

When correction value programming for the two DC voltage measurement inputs has been completed, end the NWA application and restart.
Check the alignment by applying the four voltages +1 V, -1 V, +10 V and -10 V and, as a further check, 0 V.

Reading the previous DC values:

- Select **Read** in the Service Function Menu
- Set Service Functions:

  3.1.2.5.dc_meas_1V.DcMeasMultiplier
  3.1.2.5.dc_meas_1V.DcMeasOffset

  3.1.2.5.dc_meas_10V.DcMeasMultiplier
  3.1.2.5.dc_meas_10V.DcMeasOffset

Correction Value Recording and Factory System Error Calibration

Required test equipment (see Table 2-1):

- PC with IEC/IEEE bus interface
- R&S ZVAB service program
- Power meter with power sensor
- Signal generator
- Calibration kit
- N-connector test cable

Installation of the Alignment Program

Install the program by double-clicking the setup.exe file.
If you install the program for the second time the install shield will only remove the old installation. You will have to start the setup.exe again to perform the installation. The tool has been tested with Windows XP and Windows NT. Connect the PC, R&S ZVA, power meter and signal generator via the IEC/IEEE-bus interface.

For a detailed operating description e.g. dealing with

- Configuration of the Program
- Writing Synthesizer Mapping and Shift Data to the Motherboard
- Recording Correction Values
- Factory System Error Calibration

see the "Usermanual.doc" or "Usermanual.pdf" file that comes with the installation packet and is installed in the directory " C:\Program Files\Rohde&Schwarz\ZVAB-Service" on the PC.

Checking the Gauge

It is strongly recommended that every test port of the Vector Network Analyzer is gauged prior to its first use. The gauge must be recalibrated whenever the connector adapter is changed and should be checked regularly, using the gauge block, for correct zero between adapter changes.

Table Connector pin depth tolerances

Connector type	Pin depth / mm	Pos. tolerance / mm	Neg. tolerance / mm
Type N (female)	5.258	+0.000	-0.076
3.5 mm (male)	0.000	+0.076	+0.000

Procedure

1. Ensure the appropriate connector adapter is fitted to the dial gauge.
2. Attach the gauge block to the gauge interface and rotate the dial so that the indication reads zero. Lock the dial in position by tightening the screw on the side of the dial. Disconnect the gauge block.
3. Mate the connector to be measured to the gauge and note the indication.
4. The connector is "in gauge" if the indication lies between the limits set by the connector specification (see Table above). For precision type N and 3.5 mm connectors, the calibrated zero indication on the dial corresponds to one extreme, the other being -76 µm (-0.003 in) (anti-clockwise on the dial). **CAUTION:** Damage to the connector (or the one it is to) may occur if the reading is positive.
5. After use, return the gauge set to its box.

Table of Contents - Chapter 3 "Repairs"

3 Repairs

This chapter describes the R&S ZVT's construction, simple procedures for repairs, troubleshooting and board replacement. A selftest which checks the diagnostic voltages of the board and indicates limit violations is provided for troubleshooting and diagnostics.

Chapter 4 of this service manual describes the installation of options and firmware updates.

Instrument Construction and Function Description

The R&S ZVT's construction is shown schematically by the following block diagrams and the exploded drawings (see also Chapter 5).

The block diagram will help clarify the following function description of the instrument.

See also Chapter 5, Annex and Drawings.

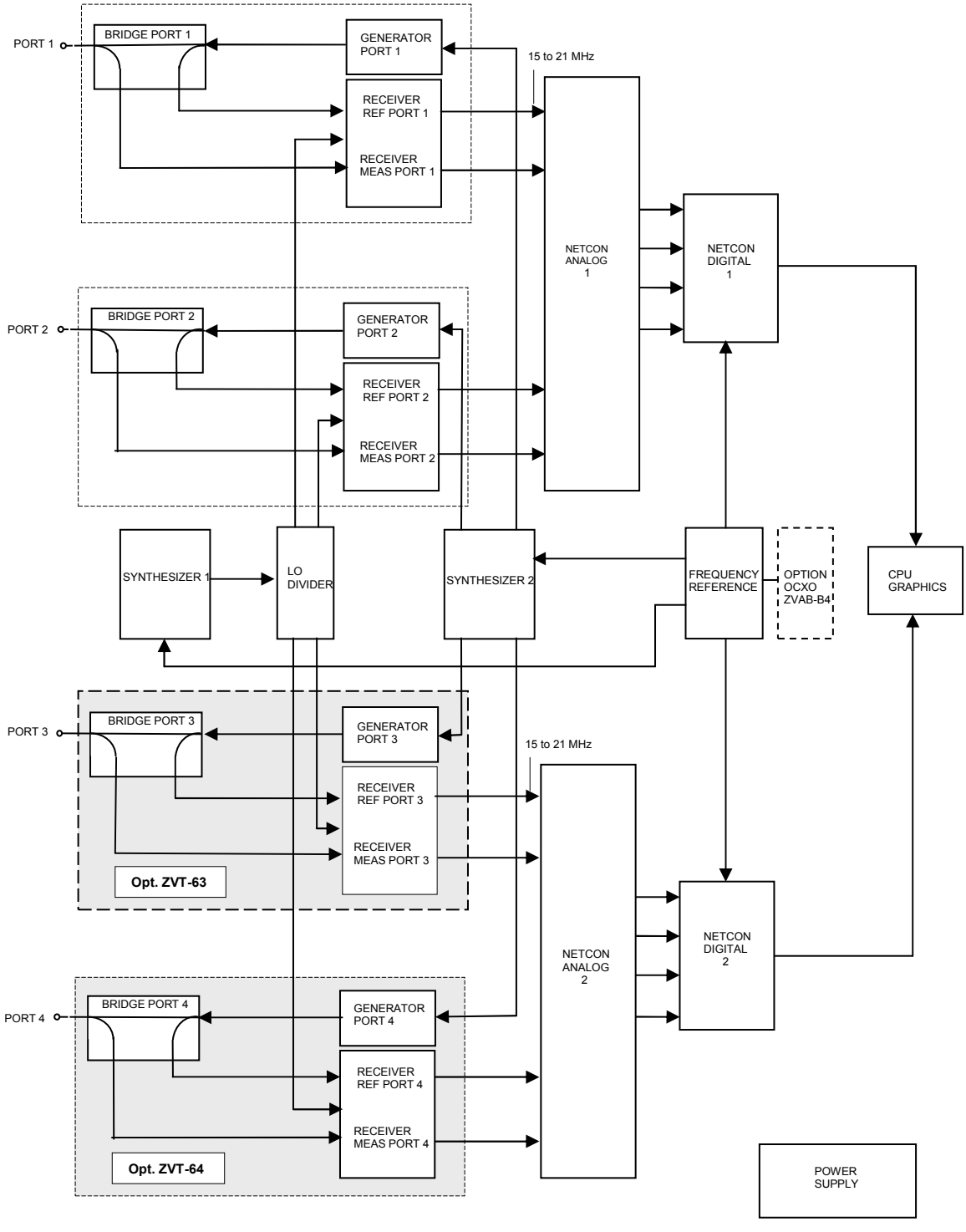


Fig. 3-1 Block diagram of R&S ZVT8 4 ports with LO Divider 1300.2002

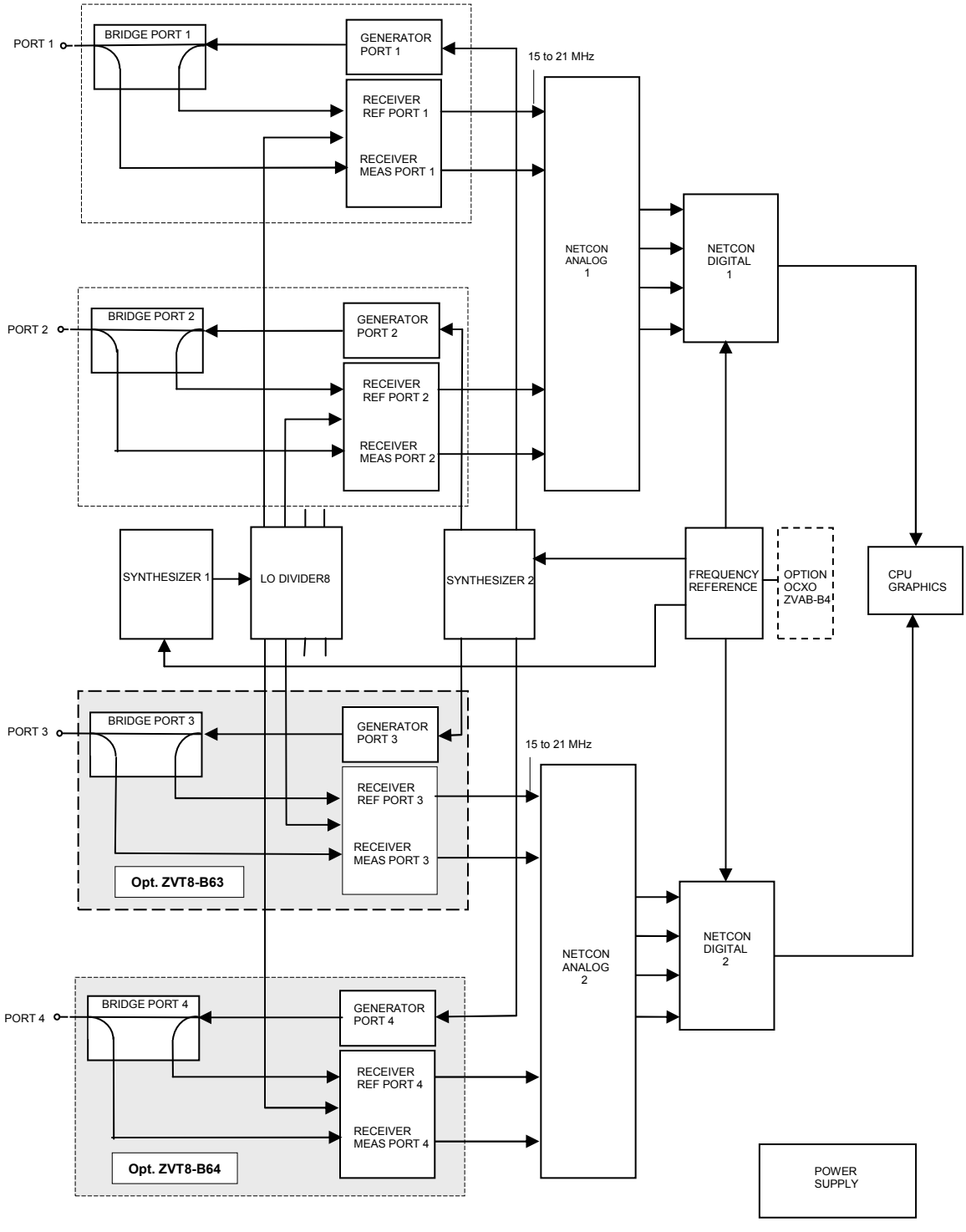


Fig. 3-2 Block diagram of R&S ZVT8 4 ports with LO Divider 8 1302.4060

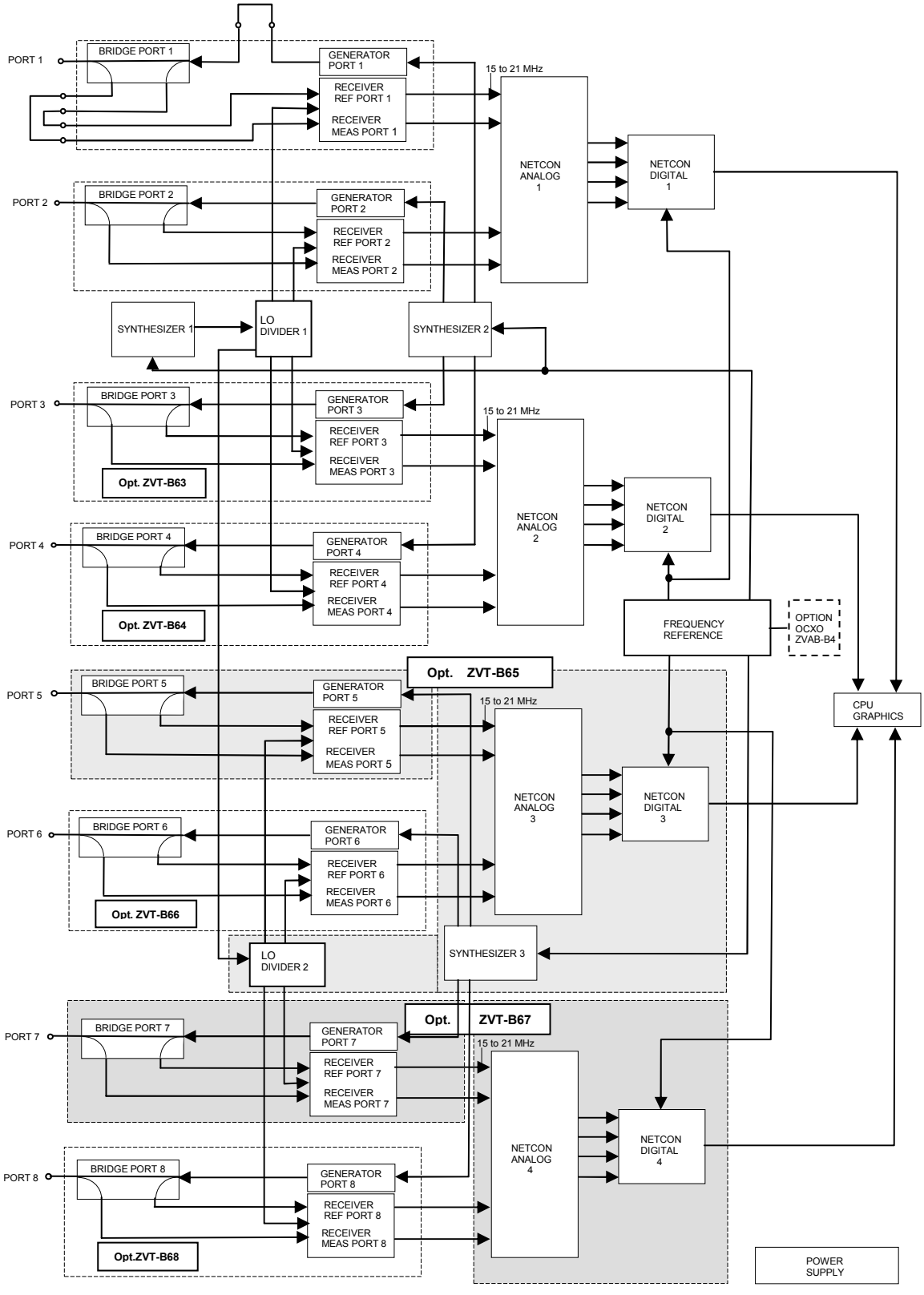


Fig. 3-3 Block diagram of the R&S ZVT8 8 ports with LO Divider 1300.2002

Opt. ZVT8-B16 shown with Port1

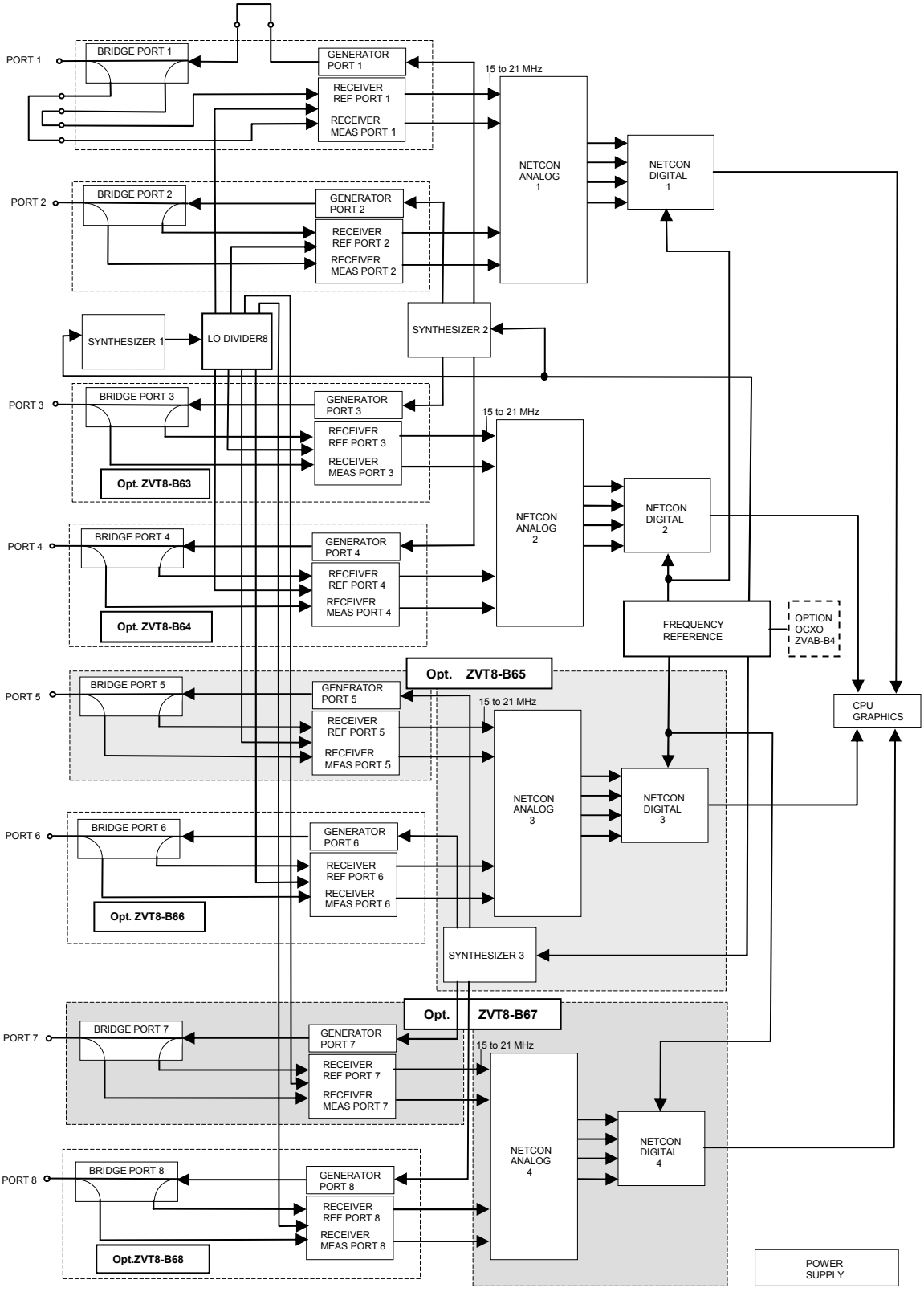


Fig. 3-4 Block diagram of R&S ZVT8 8 ports with LO Divider 8 1302.4060

Opt. ZVT8-B16 shown with Port1

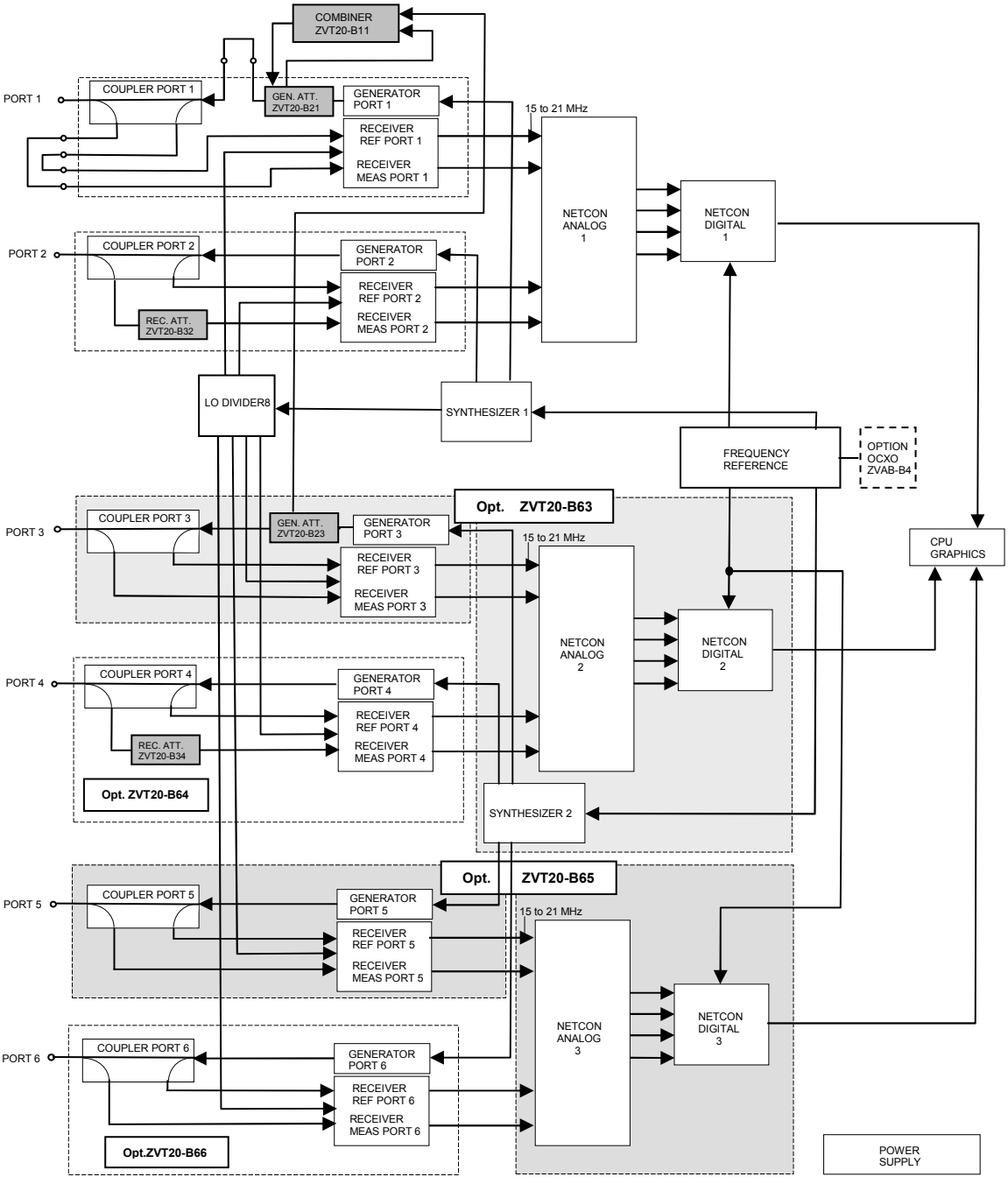


Fig. 3-5 Block diagram of R&S ZVT20 6 ports

Opt. ZVT20-B16 shown with Port1

Description of the Block Diagram

The block diagrams shown in Fig. 3-1 to Fig. 3-5 apply to the R&S ZVT8 4 and 8 ports and to the R&S ZVT20 6 ports.

The R&S ZVT is a vector network analyzer covering 300 kHz to 8 GHz (R&S ZVT8) or 10 MHz to 20 GHz (R&S ZVT20). The instrument is available with two to eight ports (R&S ZVT8) or two to six ports (R&S ZVT20).
The block diagrams shown in Fig. 3-1 and Fig. 3-2 apply to the R&S ZVT8 two-port to R&S ZVT8 four-port with different LO divider boards. R&S ZVT8 with two ports is the basic version. Three-port or four-port versions are created installing options R&S ZVT8-B63 and R&S ZVT8-B64.
The block diagrams shown in Fig. 3-3 and Fig. 3-4 apply to the R&S ZVT8 five-port to eight-port versions with different LO divider boards. Depending on the number of ports, additional reflectometers (option R&S ZVT8-B65 to R&S ZVT8-B68) are installed. Option ZVT8-B65 includes a second source synthesizer and LO divider (only with LO divider 1300.2002) and an additional network controller. Option ZVT-B67 includes a fourth network controller.
The block diagram shown in Fig. 3-5 applies to the R&S ZVT20 two-port to six-port versions. Depending on the number of ports, additional reflectometers (option R&S ZVT20-B63 to R&S ZVT20-B66) are installed. Option R&S ZVT8-B65 includes a second source synthesizer and an additional network controller.

The signals (including the LO signal for the receiver) are generated using two or three synthesizer boards, depending on the number of ports. The signal processing path comprises a reflectometer board, a network controller and a processor section, comprising a Pentium-PC, I/O interface and graphics board. The instrument can be expanded to handle future digital and analog requirements by retrofitting options.

The generator signal on R&S ZVT8 (300 kHz to 8 GHz) is generated on synthesizer board 2, amplified in the generator section of the reflectometer board and then passes via the bridge to the port (port1 to 8) and so to the DUT. The reference signal (Ref1 to 8) is split in the bridge and fed to the receiver section (Receiver Ref1 to 8) on the reflectometer board. The signal reflected or transmitted by the DUT (Meas1 to 8) is fed to the port, coupled out in the bridge unit and fed to the receiver section (Receiver Meas 1 to 8) on the reflectometer board.

The generator signal on R&S ZVT20 (10 MHz to 20 GHz) is generated on synthesizer board 2, frequency multiplied, filtered and amplified in the generator section of the reflectometer board and then passes via the coupler to the port (port1 to 6) and so to the DUT. The reference signal (Ref1 to 6) is split in the coupler and fed to the receiver section (Receiver Ref1 to 6) on the reflectometer board. The signal reflected or transmitted by the DUT (Meas1 to 6) is fed to the port, coupled out in the coupler unit and fed to the receiver section (Receiver Meas 1 to 6) on the reflectometer board.

The internal reference frequencies are generated on the frequency reference board. The 128-MHz reference frequency is generated there as an internal device reference.

The following sections describe the various boards in greater detail.

Reflectometer R&S ZVT8

A reflectometer board comprising a **bridge unit**, a **generator section (Generator)** and a **receiver section (Receiver)** are incorporated in every port (Port1 to 8). These three components are screwed together to form a compact unit.

Bridge unit

The bridge unit is a resistive coupler which is used to separate the signal going to the DUT from the signal coming from the DUT. The reference signal (= measure of the signal to the DUT) is also obtained from the bridge unit. The reference signal provides a reference for relative measurements.

Generator

The generator contains three broadband amplifier stages which boost the signal coming from the synthesizer to a level > 20 dBm. Limiter diodes protect the output stage from ESDs. A total of three adjustable attenuators form the setting element to keep the output level constant and to attenuate it electronically.

Receiver

The receiver section has two channels (measurement channel and reference channel) and uses single conversion. Every channel contains a buffer amplifier, a mixer with LO amplifiers and an IF amplifier. In the mixer, the input signal is directly converted to the IF range, approx 15 to 21 MHz. The inputs are protected by limiter diodes.

Reflectometer Unit R&S ZVT20

A reflectometer unit comprising a **coupler unit**, a **generator section (Generator)** and a **receiver section (Receiver)** are incorporated in every port (Port1 to 6). The Generator and the Receiver are screwed together to form a compact unit.

Coupler unit

The coupler unit contains a bias-T and two directional couplers. One coupler is used to separate the signal going to the DUT from the signal coming from the DUT. The reference signal (= measure of the signal to the DUT) is obtained from the second coupler. The reference signal provides a reference for relative measurements.

Generator

The generator contains a frequency doubler for the range 8 GHz to 16 GHz, a switchable filter unit, a second frequency doubler with filter for the range 16 GHz to 20 GHz and a broadband amplifier for the frequency range 10 MHz to 20 GHz with two adjustable attenuators to keep the output level constant and to attenuate it electronically.

Range	Basic frequency range from synthesizer	Doubler 1	Frequency	Doubler 2	Output frequency
1	10 MHz to 8.0 GHz	---	10 MHz to 8.0 GHz	---	10 MHz to 8.0 GHz
2	4 GHz to 5.05 GHz	x	8.0 GHz to 10.1 GHz	---	8.0 GHz to 10.1 GHz
3	5.05 GHz to 6.35 GHz	x	10.1 GHz to 12.7 GHz	---	10.1 GHz to 12.7 GHz
4	6.35 GHz to 8.0 GHz	x	12.7 GHz to 16.0 GHz	---	12.7 GHz to 16.0 GHz
5	4.0 GHz to 5.0 GHz	x	8.0 GHz to 10.0 GHz	x	16.0 GHz to 20 GHz

Receiver

The receiver section has two channels (measurement channel and reference channel) and uses single conversion. The measurement channel contains a buffer amplifier, two mixers for each of the frequency ranges 10 MHz to 2.5 GHz and 2.5 GHz to 20 GHz, LO amplifiers and an IF amplifier. The reference channel is equal to the measurement channel without the buffer amplifier. In the mixers, the input signal is directly converted to the IF range, approx 15 to 21 MHz. The mixers are used as basic wave mixers in the range 10 MHz to 8 GHz, in the upper range harmonic mixing is used (IF = 3LO – RF).

Each of the reflectometers contains a voltage controlled fan to perform optimum cooling.

Network controller

The network controller comprises two boards, the **netcon analog** and the **netcon digital** which are screwed together to form a single unit. The boards are four-channel – in other words, one network controller is required for two ports (2 measurement channels + 2 reference channels). After A/D conversion, the network controller performs high-speed digital processing on the IF signals from the reflectometers.

Netcon analog

The netcon analog board is a 4-channel IF amplifier with one 14-bit A/D converter per channel. The transmission bandwidth is 13 MHz to 26 MHz. A dither generator is used to linearize the A/D-converter characteristic. The board also accommodates a temperature sensor which is only used for general temperature checks and not to correct measurement results.

Netcon digital

The netcon digital board further processes the digitized raw data from the netcon analog board. Speed considerations mean that digital signal processing is performed in an ASIC which has a clock frequency of 80 MHz.
The main functions on the board are:
Mixing to the baseband
Filter with bandwidths from 1 Hz to 100 kHz in 1/2/5 sequence
Detectors, PCI interface
Setting and routine control
The current measured value (sample), the average, the RMS and the Max can be recorded simultaneously and passed on to the main processor via the PCI-bus. The connection to the PCI-bus is made via the PCINT-FPGA. A further FPGA "FCON" contains the central section of the procedure control from measurement point to measurement point and the trigger control. This FPGA is configured by the main processor.
The A/D converters for ext. DC measurements are also accommodated on the netcon digital board.

Frequency reference

The **frequency reference** board generates the highly stable and spectrally pure clock signals, required by the R&S ZVT, which can be phase-locked to external synchronisation signals.

The various function blocks are:

The 128 MHz VCXO (voltage-controlled crystal oscillator) which generates a stable, low-noise reference frequency for the synthesisers, for the A/D converters and for digital signal processing.

The PLL for phase locking the VCXO signal to an external reference signal or to a 10 MHz OCXO (oven-controlled crystal oscillator) option.

The VCO and PLL which generate the clock for the netcon digital board (locked to the 128 MHz VCXO). The frequency can be varied from 75 MHz to 86 MHz. The VCO frequency is programmable;-the nominal clock frequency is 80 MHz.

A reference frequency of 10 MHz is standard. If the OCXO is fitted, the OCXO signal is brought out at the ZVAB's rear panel (10 MHz REF) so that further instruments can be synchronised.
The free-running VCXO (no OCXO) can be calibrated using a pre-tune voltage.

If no OCXO is fitted, a 10 MHz signal is still output at the instrument's rear panel. It is derived from the 80 MHz signal which is divided down to 10 MHz by the divider for the OCXO.

The following are also accommodated on the board:
- A control-CPLD to act as an interface between the serial bus and the board,
- Register for storing divider values,
- D/A converter for pre-tuning the VCXO and OCXO
- An on-board EEPROM for storing board-specific data
- Selftest facilities

OCXO reference (option B4)

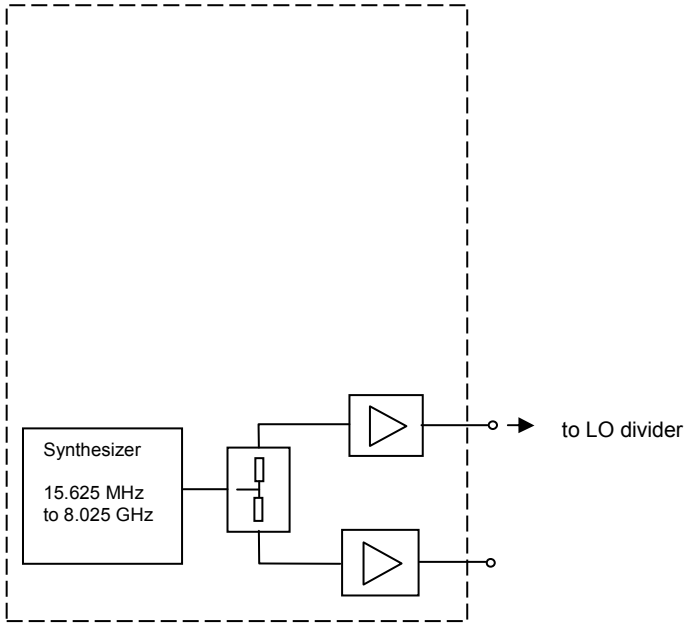
As an option, the frequency reference board can be fitted with an OCXO (oven-controlled crystal oscillator) which considerably improves the phase noise of the reference signal close to the carrier, short-term stability and long-term stability.

Synthesizers

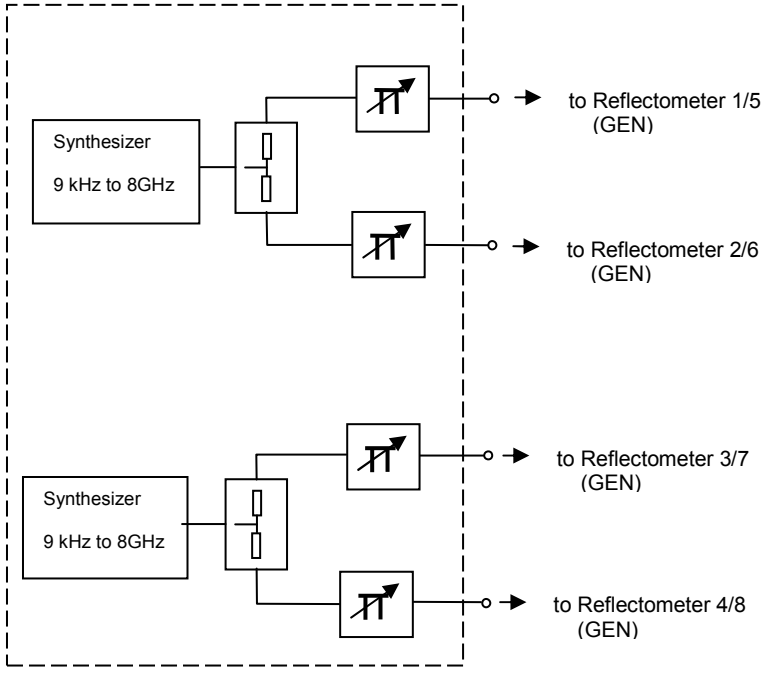
The source signals for the generator signals associated with each port and the LO signal for the mixers on the receiver boards for each of the reflectometers are generated on the synthesizer board. Two individual synthesizers are accommodated on a synthesizer board.

For R&S ZVT8, there are the following two synthesizer models:

Synthesizer-LO

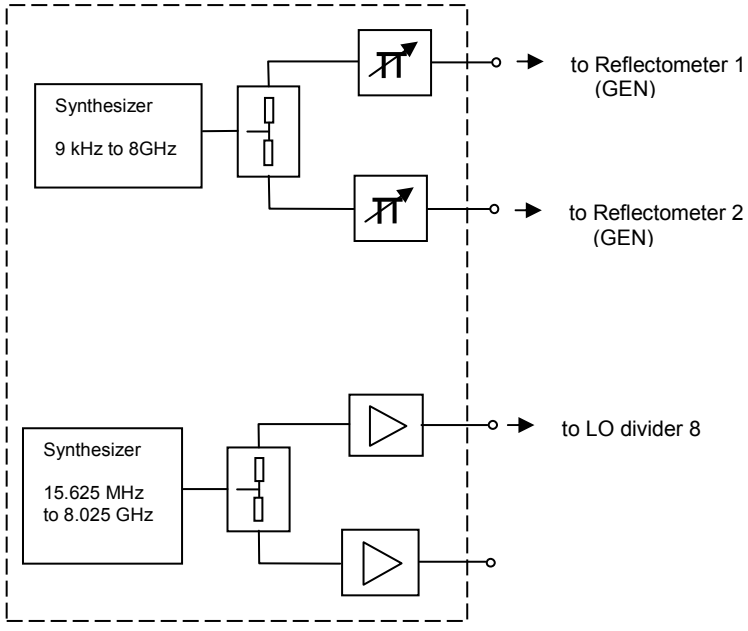


Synthesizer-DS

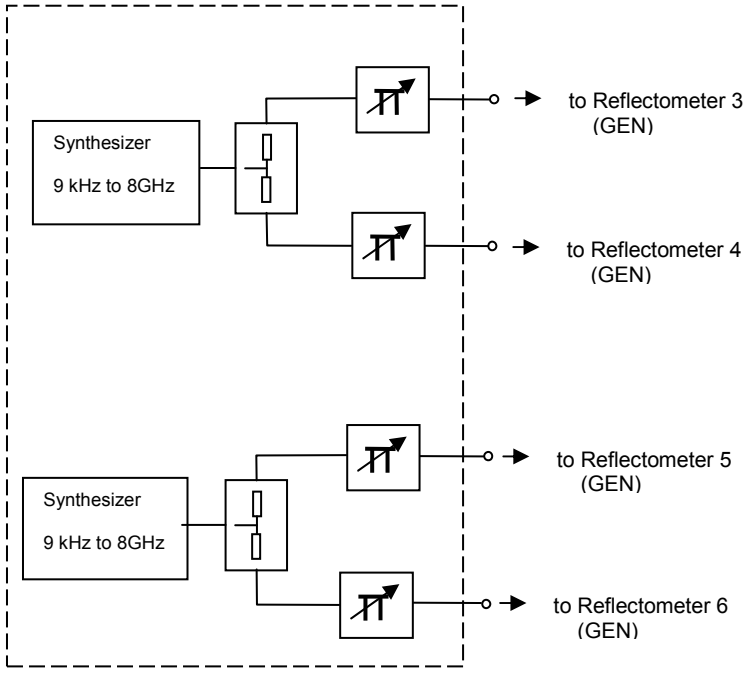


For R&S ZVT20, there are the following two synthesizer models:

Synthesizer-LS (LO + Source)



Synthesizer-DS



LO divider

The LO signal from the synthesizer is distributed via the LO divider board between the receiver boards associated with the reflectometers that have been installed. The divider comprises a resistive power divider and buffer amplifiers in each of the output branches. The buffer amplifiers are used to compensate for the power divider loss and to provide decoupling between the reflectometers (crosstalk).

With LO divider 1300.2002 a maximum of four reflectometers can be supplied with the LO signal in this way. In order to get a LO signal number >4 a second LO divider can be installed.

With LO divider 1302.4060 a maximum of eight reflectometers can be supplied with the LO signal.

Front unit

The front unit comprises a mounting plate on which the flexible switch board, the key pad and the USB board are accommodated.
The front module controller is mounted in the controller tray in the instrument frame.

Keyboard

The keyboard comprises a flexible switch board and a key pad. They make contact whenever a rubber key is pressed. The two LEDs for the status display associated with the Standby/On key (yellow for standby/green for on) are also accommodated on the key pad.
Key detection and LED control are performed via a foil cable connection on the controller board.

Front module controller

The front module controller accommodates all the components that are required on one board - for example, the processor, memory chips (SIMMs), I/O chips (ISA bus), the lithium battery, IEC/IEEE bus controller, two serial interfaces (COM1/2), a parallel interface (LPT), graphics controller, external VGA-monitor graphics interface (Monitor) and a connector for an external keyboard (keyboard PS/2). Also integrated on the controller board are a floppy controller for an external disk drive and an IDE hard-drive controller.
In the case of the FMR6, the LAN interface is also integrated on the controller board.

Hard disk

The hard disk is screwed to the rear of the tray for the front module controller with a holder and connected to the board with a flat cable.

Power supply

The power supply produces all the voltages required to power the R&S ZVT. It can be turned off with a switch on the instrument's rear panel.
The power supply is a primary-switched power supply with power factor correction (PFC) and standby circuit (+12 V standby).

On the secondary side, it outputs DC voltages (+3.4 V, +5.2 V, +6.5 V, +8.25 V, +12.25 V, +12 V standby, -12.25 V).

The control signal RS_PS_ON which is controlled by the front module controller (via the *STANDBY/ON* key at the front of the instrument frame), activates the power supply. In the standby mode, the power supply generates only the 12-V standby voltage to supply a crystal oven and the STANDBY status display on the front panel.

The secondary voltages are open-proof and short-proof to ground and mutually open-proof and short-proof.
A circuit that prevents overheating is also provided. Overheating is indicated to the front module controller via a status signal (*OT*).

Motherboard

The motherboard supplies power to the boards and connects them to the control and data buses. A number of RF connections are also routed via the motherboard.

As well as straight connections, a number of circuits are accommodated on the motherboard:

Motherboard controller (MBCON)
28 V supply
Preamplifier for the DC measurement inputs
Supply voltage fuses
Rear panel interfaces
Fan control

The **MBCON** unit acts as an FSU bus-slave:

- to drive the LEDs (instrument front-panel)
- to drive the fan in five stages
- for two temperature sensors on the motherboard
- for an SPI-EEPROM on the motherboard

In addition to the voltages delivered by the power supply, +28 V is produced from +12 V on the motherboard by means of a boosting switching regulator. This voltage is required to operate the OCXO on the reference board when option B4 is fitted.

Each board has its own fuses for the supply voltages. These fuses are soldered into position on the board.

All external supply voltages (USB etc.) are protected to prevent shorts.

Board Replacement

The following section is a detailed description of board replacement. Chapter 5 tells you how to order spare parts. It contains a list of mechanical parts and their order numbers as well as drawings relating to board replacement.

Note: *The numbers in brackets are the item numbers in the list of mechanical parts in Chapter 5.*

In turn, these item numbers are the same as the item numbers in the drawings relating to board replacements (also in Chapter 5).

The terms "left" and "right" always mean left and right as seen looking at the front of the instrument.

Board Overview

Table 3-1 Overview: Board Replacement

Board	**Measures taken after replacement**		
	Function test	**Alignment** **Recording of correction values** **System error calibration**	**Other**
Front module controller	Check error log		BIOS update
Lithium battery	Check error log		
Hard disk	Check error log	System error calibration	FW update
Flexible switch board (keyboard)/ key pad	Functional test		
Front cover			
USB board	Test with mouse, keyboard		
Power supply	Check error log		
Fan			
Motherboard	Check error log	System error calibration Alignment DC measurement inputs	
Reflectometer	Check error log	Record correction values System error calibration	
Input connector port 1 to 8	Check error log	System error calibration	
Bridge or coupler unit	Check error log	Record correction values System error calibration	
Reflectometer fan	Check error log		
Network controller	Check error log	Record correction values System error calibration Alignment DC measurement inputs	
Synthesizer	Check error log	Record correction values System error calibration	
LO divider	Check error log	Record correction values System error calibration	
Frequency reference	Check error log	Alignment Frequency accuracy	

Replacing Front Module Controller A90

(See Chapter 5, Spare Parts List, Item 580, and drawings 1300.000, 1300.0074)

The front module controller is located behind the front unit.

Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 6 screws from the front handles (410), left and right, and take off the front handles.
- Remove the countersunk screw (315) and pull off the front cover (300) forwards.
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (152, 190) (2 per RM Unit).
- Pull out the front unit together with the keyboard forwards.

CAUTION

The cables to the front module controller are still connected.

Disconnect the cables to the key pad (keyboard) and, if necessary, the network connection on the front module controller.

N.B.: *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

Removing the front module controller

Remove the 10 sems screws (590) in the front module controller and remove the front module controller in the following way (see Fig. 3-2):

Note: *The insertion force for the front module controller on the motherboard is very large. The slot in the bottom of the controller tray is provided to facilitate pushing out the front module controller forwards.*
Using a blunt, flat tool, carefully edge the board forwards.

CAUTION

Do not insert the tool too far into the slot; only apply pressure to the board.
To ease the board out, apply light pressure to each and every slot.
Do not bend the board.

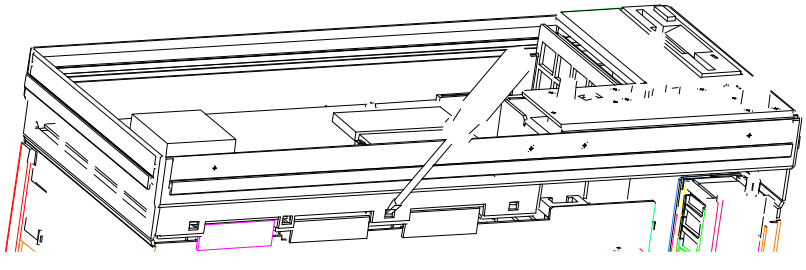


Fig. 3-2 Removing the front module controller

Installing the new front module controller and putting the instrument back together

Carefully insert the new front module controller on the motherboard and screw into place with 10 sems screws (590).

Caution: With type FMR6 1091.2520.00, there is a danger of shorting between board components, tracks and screws (590). Use suitable insulation.

Reconnect the cables to the front module controller, ensuring correct polarity.

Front Module Controller Typ FMR6

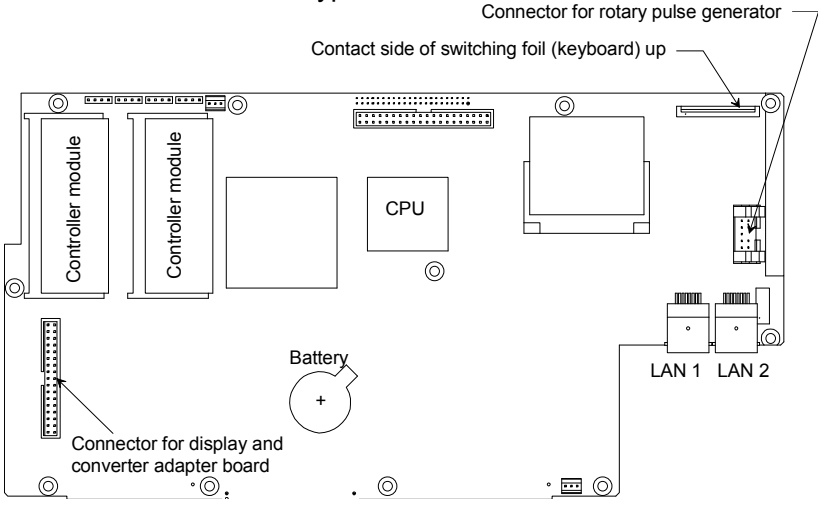


Fig. 3-3 Location of the edge connectors on the front module controller

- Re-insert the front unit into the instrument and secure to the front frame with 4 countersunk screws. (610).
- Fit the following countersunk screws (152, 190) (2 per RM Unit).

CAUTION

Avoid trapping cables and ensure cabling is tidy.

- Replace the front cover (300) and secure with the countersunk screw (315).
- Secure the 2 front handles (410) with the 4 screws.
- Refit the 3.5mm connection cables (only with option R&S ZVT-B16)

Putting into operation

- Connect the mains cable and turn on at the power on switch. The instrument is now in standby mode.
- Connect an USB floppy drive to one of the USB connectors
- Prepare a BIOS disk downloading the required file from **https://gloris.rohdeschwarz.com** (Document link: Firm- \ Software) on a floppy disk.
- Insert the R&S ZVT BIOS disk into the floppy disk drive.

- Turn on the instrument and wait for the first beep. Press the DEL key. The instrument should now display the setup menu.
  - Select Advanced BIOS Features
  - Enter
  - Select First Boot Device
  - Select Floppy using page up/down key
  - Press F10 key (save)
  - Enter
- BIOS has now been programmed.
  Do not turn the instrument off when the program is running.
- Follow the instructions on the screen.
- Select Service Level 2 (see Service Functions).
- Check the protocol file for errors:
  [INFO : Error Log]

Replacing the Lithium Battery on the Front Module Controller

(See Chapter 5, Spare Parts List, Item (582), and drawings 1300.000, 1300.0074*)*

The lithium battery is located on the front module controller behind the front unit.

CAUTION

Do not expose lithium batteries to high temperatures or naked flames.

Keep batteries away from children.

If the battery is not replaced correctly, there is a risk of explosion. Only use R&S-type replacement batteries (See Chapter 5, Spare Parts List, Item 776 for type FMR6).

Lithium batteries are classified as special waste – only use designated containers for disposal.

Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains supply.
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles
- Remove the countersunk screw (315) and pull off the front cover (300) forwards.
- Remove the 2 countersunk screws (610)in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (152, 190) (2 per RM Unit).
- Pull out forwards the front unit together with the keyboard.

CAUTION

The cables to the front module controller are still connected.

Disconnect the cables to the key pad (keyboard) and, if necessary, the network connection on the front module controller.

Note: *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

Removing the lithium battery

- Carefully lift up and pull out the battery.

  Note: *Lithium battery 3.4 V (dia. 20 mm * 3 mm) R&S Item No. 0858.2049.00*

Front Module Controller Typ FMR6

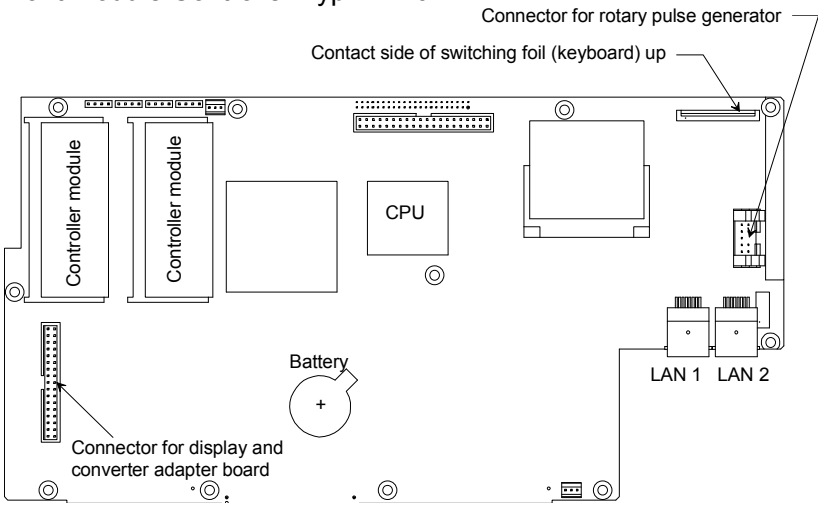


Fig. 3-4 Location of the lithium battery on the front module controller

Installing the new battery and reassembling the instrument

CAUTION

Never short circuit the battery

- Insert the battery under the spring in the holder.

  N.B.: The positive pole of the battery (+) must be uppermost.

- Reinsert the front unit in the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (152, 190) (2 per RM Unit).

CAUTION

Avoid trapping cables and ensure cabling is tidy.

- Replace the front cover (300) and screw in the countersunk screw (315).
- Refit the 2 front handles (410) using 4 screws.
- Refit the 3.5mm connection cables (only with option R&S ZVT-B16)

Putting into operation

- Connect the mains cable and turn on at the power switch. The instrument is now in standby mode.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]

Replacing Hard Disk A60

(See Chapter 5, Spare Parts List, Item 710, and drawings 1300.000, 1300.0074)

The hard disk is located between the controller tray and the boards. The spare disk is delivered with the software pre-installed.

Before removal:

Whenever possible, back up the user data on an external data storage medium.

Opening the instrument and replacing the hard disk

- Turn off the instrument, disconnect from the mains, unscrew the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards
- Lift off the instrument cover (296) at the top after undoing the 37 countersunk screws (297).
- Disconnect the flat cable (715) at the hard disk drive.

  Note: *Do not pull or push on the flat cable – instead, carefully lever out the connector strip with a small screwdriver.*
- Remove the 2 countersunk screws (725) in the hard disk holder (720).
- Remove the hard disk (710) and holder (720).
- Undo the 4 countersunk screws (730), remove the old hard disk and screw the new hard disk to the holder (720).

Installing and putting the new hard disk into operation

- Refit the hard disk and holder into the instrument using 2 countersunk screws (725).

  Note: *The bottom of the holder is inserted into a sheet-metal wall.*
- Connect the flat cable (715) to the hard disk.
- Replace the instrument's top cover (296) and screw back into position with 37 countersunk screws (297).
- Slide on the enclosure (400) and screw the 4 rear-panel feet (460) and the 2 side handles (450) back into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Function)
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Perform the factory system calibration (see **Factory System Error Calibration**)

Replacing Flexible switch board (Keyboard) A16 / Key Pad A15

(See Chapter 5, Spare Parts List, Items 860, 870 and drawings 1300.000, 1300.0097)

The flexible switch board (keyboard) and key pad are located behind the front cover and the keyboard frame

Opening the instrument and removing the front unit

- Turn off the instrument and disconnect from the mains.
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 4 screws in the front handles (410),right and left, and take off the front handles
- Remove the countersunk screw (390) next to the display and pull off the front cover (300) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (152, 190) (2 per RM Unit).
- Pull out the front unit together with the keyboard and place it with the key-side on top of the instrument.

CAUTION

The cables to the front module controller are still connected.

- Disconnect the cables to the key pad (keyboard) and, if necessary, the network connection to the front module controller.

  Note: *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

Removing the flexible switch board (keyboard) / key pad

- Place the front unit with the key-side upwards on a clean surface.
- Undo the 2 countersunk screws (890) and the 2 screws (940).
- The flexible switch board (860) and the key pad (870) can now be replaced.

Installing a new flexible switch board / key pad and reassembling the instrument

- Insert the new flexible switch board (860) into the keyboard frame (800) from behind.

  N.B.: *The positioning pins must be inserted in the holes in the keyboard frame.*

- Place the new key pad (870) on the rear of the flexible switch board (860).

  Note: Position the key pad *so that the pins on the flexible switch board pass through the holes in the key pad.*

- Put the mounting plate (880) in position and screw back together again with 2 countersunk screws (890).
- Refit the 2 screws (940).
- Place the front unit with the key-side on top of the instrument so that the cables can be connected to the front module controller
- Reconnect the cables to the front module controller, ensuring correct polarity.

Front Module Controller Typ FMR6

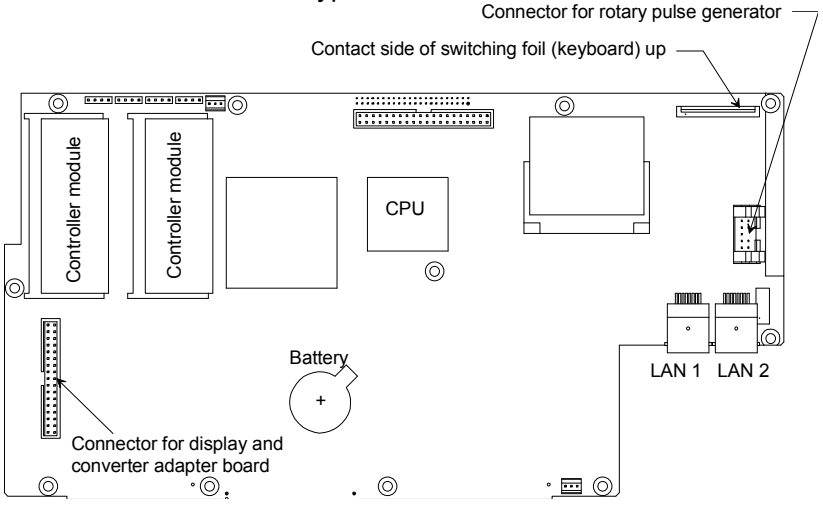


Fig. 3-5 Location of the edge contacts on the front module controller

- Reinsert the front unit into the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (152, 190)(2 per RM Unit).

CAUTION

Avoid trapping cables and ensure cabling is tidy.

- Replace the front cover (300) and secure with the countersunk screw (315).
- Refit the 2 front handles (410) using 4 screws.
- Refit the 3.5mm connection cables (only with option R&S ZVT-B16)
- Connect the mains cable, turn on at the mains switch and press the ON key.

Replacing the Front Cover

(See Chapter 5, Spare Parts List, Item 300, and drawing 1300.0000)

The front cover is the outermost front panel with lettering.

- Turn off the instrument and disconnect from the mains.
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles
- Remove the countersunk screw (315) and pull off the front cover (300) forwards
- Fit the new front cover and reassemble the instrument by reversing the disassembly procedure.
- Connect the mains cable, turn on at the mains switch and press the ON key.

Replacing USB Board A40

(See Chapter 5, Spare Parts List, Item 1050 and drawings 1300.000, 1300.0097)

The USB board is located behind the front cover and the keyboard frame.

Opening the instrument and removing the USB-board

- Turn off the instrument and disconnect from the mains.
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles
- Remove the countersunk screw (315) and pull off the front cover (300) forwards.
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (152, 190) (2 per RM Unit).
- Pull out the front unit together with keyboard and display (601, 621, 631, 641, 650, 660) forwards and place it with the key-side on the top of the instrument
- Pull out the front unit together with the keyboard forwards and place it with the key side on top of the instrument.
- Remove the 2 screws (1070), disconnect the cable and remove the USB board (1050).

Fitting the USB board and reassembling the instrument

- Install the new USB board by reversing the removal procedure, replace all screws and connect and install the relevant cables (drawing 1300.0097).
- Insert the front unit back into the instrument and secure to the front frame with 4 countersunk screws (610).
- Refit the countersunk screws (152, 190)(2 per RM UNit).
- Replace the front cover (300) and secure with the countersunk screw (315).
- Refit the 2 front handles (410) using 4 screws.
- Refit the 3.5mm connection cables (only with option R&S ZVT-B16)
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check the USB board: Connect the mouse or keyboard and perform a function check.

Replacing Power Supply A20

(See Chapter 5, Spare Parts List, Items 790 and drawings 1300.000, 1300.0074)

The power supply is installed at the rear of the instrument frame.

Removing the power supply

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) towards the rear.
- Remove the 2 countersunk screws (796) in the top of the instrument and the 8 sems screws (795) in the rear panel of the power supply.
- Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
- On the left-hand side of the power supply, pull off the protective conductor cable and fuse board (735) to the left.
- On the right-hand side of the power supply, remove the plug-on connections to the motherboard.
- Remove the power supply unit.
- Remove the 4 screws (793) and washers (792) and remove the power supply (790) from the power supply plate (791).

Installing the new power supply

- Fit the new power supply by reversing the removal procedure.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors
  [INFO : Error Log]

Replacing Fuse board A21

(See Chapter 5, Spare Parts List, Item 735, and drawings 1300.000, 1300.0074)

The fuse board is installed on the left-hand side of the power supply.

Removing the power supply and the fuse board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the 2 countersunk screws (796) in the top of the instrument and the 8 sems screws. (795) in the rear panel of the power supply.
- Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
- On the left-hand side of the power supply, pull off the fuse board (735) to the left.
- Disconnect the two mains cables from the fuse board.

Fitting the new fuse board and the power supply

- Connect the mains cables to the fuse board and refit the fuse board to the power supply.
- Secure the anti-touch guard (736) with screw (737).
- Reinstall the power supply by reversing the removal procedure.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors
  [INFO : Error Log]

Replacing a Fan

(See Chapter 5, Spare Parts List, Items 50 and 60 and drawing 1300.000)

The fans are located behind the right-hand side panel (three pieces).

Opening the instrument

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.

Replacing one of the three fans:

- Lift off the top instrument cover (296) after undoing the 37 countersunk screws (297).
- Disconnect the fan cable on the motherboard X35, X36 and X37 (FAN).
- Remove fan by undoing the 4 fan screws .

Fitting a new fan

- Install the fan using the 4 fan screws.

  N.B.: *The arrows on the fan show the installation position. The fan blows air into the instrument. Route the fan cable so that it cannot get caught in the fan.*
- Reinsert the fan plate with the 3 fans on it into the instrument.
- Connect the fan cabling on the motherboard X35, X36 and X37 (FAN).

Reassembling the instrument

- Refit the top instrument cover (296) with 37 countersunk screws (297).
- Refit the bottom instrument cover (298) with 18 countersunk screws (299).
- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check that all fans are operating correctly (fans should blow air into the instrument).
- Turn off the instrument and disconnect the mains cabling again.
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable, turn on at the mains switch and press the ON key.

Replacing Motherboard A10

(See Chapter 5, Spare Parts List, Item 510 and drawings 1300.000, 1300.0074, 1300.1512)

The motherboard is located on the base of the instrument.

N.B.: *The motherboard can only be replaced at R&S service centers.*

Opening the instrument and removing the motherboard

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Lift off the top instrument cover (296) after undoing the 37 countersunk screws (297).
- Extract the top boards: Use ejector lever for the synthesizer and network controller, hold the frequency reference by the enclosure.
- Remove the power supply (790).
    - Remove the 2 countersunk screws (796) in the top of the instrument and the 8 sems screws (795) in the rear panel of the power supply.
    - Pull out the power supply unit a little at the rear of the instrument, remove screw (737) and anti-touch guard (736).
    - On the left-hand side of the power supply, pull off the protective conductor cable and the fuse board (735) to the left.
    - On the right-hand side of the power supply, pull off the plug-in connections to the motherboard.
    - Remove the power supply unit.
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles.
- Remove the countersunk screw (315) and pull off the front cover (300) forwards
- Remove the 2 countersunk screws (610) in the top of the front frame and the 2 in the bottom.
- Remove the countersunk screws (152, 190) (2 per RM Unit).
- Pull out the front unit together with the keyboard forwards.

CAUTION

The cables to the front module controller are still connected.

- Disconnect the cables to the key pad (keyboard) and, if necessary, the network connection to the front module controller.

Note: *When disconnecting cables, be especially careful with the cable to the keyboard. It is a foil cable and can only be removed when the locking device on the foil-cable connector is released.*

- Remove the front module controller (for instructions see “Replacing Front Module Controller A90“)

- Place the instrument on its top and remove the instrument's bottom cover (298) by undoing the 18 countersunk screws (299).
- Undo the RF cabling from the reflectometers to the LO divider(s) (128, 150) and to the motherboard.
- Release the 50-pin flat cable and disconnect from the reflectometers
- Remove screws (151, 180) and take out the reflectometers.
- Undo RF cabling at the LO divider(s) (128).
- Disconnect the 12-pin flat cable(s) from the LO divider(s)
- Remove screws (126,127) and take out the LO divider together with plate (125)

Undo the screws holding the connectors on the rear panel:

- The 6 hexagonal nuts and washers for the BNC connectors.
- 2 hexagonal bolts (530, 540) each for the monitor interface and the user-control interface.
- 2 hexagonal screws (550) each for the USB interface and in the dummy panel (555).

- Remove the 2 screws (141) each for the left and right side panels and the 2 screws (142) in the center and take out the motherboard rail (140).
- Disconnect any cabling still on the motherboard (fan, IEC-bus, etc.).
- Remove the 23 screws (520, 521) holding the motherboard (520) and take out the motherboard.

Installing the motherboard and reassembling the instrument

N.B.: ***The motherboard is the passport of the instrument and unique for every unit.***
The Eprom on the new motherboard contains the serial No. of the instrument.
Pre-configured motherboards are not available.

- Install the new motherboard by reversing the removal procedure.
  N.B.: *Install the motherboard carefully to prevent any damage to components.*
  Lettering indicates where cables are to be connected.
- Reinstall the front module controller, front unit, power supply, boards and cables, instrument covers, enclosure and rear-panel feet by reversing the disassembly procedure.
- Connect the mains cable, turn on at the mains switch and press the ON key.
- For writing motherboard data to the EPROM please contact the service center in Munich.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Align the DC inputs (see **Aligning the DC Inputs**)
- Write synthesizer mapping and shift data to the motherboard EPROM (see **Correction Value Recording**)

Replacing a Reflectometer RM8 A510 to 580

(See Chapter 5, drawings 1300.0000, 1300.1512)

The reflectometers are located under the motherboard.

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles.
- Remove the countersunk screw (315) and pull off the front cover (300) forwards
- Remove the bottom instrument cover (298) after undoing the 18 countersunk screws (299).

Reflectometer A510 to A540 (port1 to port4):

- First remove the reflectometer A550 (or A560, A570, A580).
- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 2 screws (152, 190) in the front of the instrument next to the port connector.
- Disconnect the source cable, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Remove the 2 screws (151) at the end of the reflectometer and take out the reflectometer

Reflectometer A550 to A580:

- Remove 3.5mm connection cables (only with option R&S ZVT-B16)
- Remove the 2 screws (190) in the front of the instrument next to the port connector.
- Disconnect the source cable, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Remove the 2 screws (180) at the end of the reflectometer and take out the reflectometer

Installing the board and reassembling the instrument

- Insert the new board into the instrument and reconnect any cables that have been disconnected

  N.B.: *Use the lettering on the motherboard as an aid.*
- Screw in the 2 screws (152, 190) in the front of the instrument next to the port connector.
- Screw in the 2 screws (151, 180) in the end of the reflectometer.
- Replace the front cover (300) and secure with the countersunk screw (315).
- Refit the 2 front handles (410) using 4 screws.
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).

- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing the Inner Conductor of a Port Connector (R&S ZVT8 only)

(See Chapter 5, Spare Parts List, Item 110, and drawings 1300.0000, 1145.3593)

Opening the instrument and removing the reflectometer

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).
- Remove the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).

Replacing the inner conductor

- Unscrew the N outer conductor with a spanner (narrow, SW 14mm) and take out inner conductor unit.

  N.B.: *Ensure that the centring disk (135) is also removed.*
- Carefully insert the new inner conductor in the bridge unit enclosure and screw back the N outer-conductor (lock with Loctite 262, mount with torque 3.5 Nm).

Reassembling the instrument

- Refit the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode.
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Bridge Unit (R&S ZVT8 only)

(See Chapter 5, Spare Parts List, Item 100 and drawings 1300.0000, 1300.0600)

Opening the instrument and removing the reflectometer

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).
- Remove the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).

Removing the bridge unit

- Loosen the MEAS, REF and GEN cables (310, 320, 300) at both ends and disconnect at the bridge unit.

  N.B.: *When loosening support the cable with a 7mm spanner!*
- Remove the 3 screws (160) and carefully pull the bridge unit off the reflectometer.
- Remove the 2 screws (240) and remove the plate (230).

Fitting the new bridge unit

- Secure plate (230) to the new bridge unit using the 2 screws (240).
- Carefully place the bridge unit on the reflectometer and secure with 3 screws (160).
- Screw the MEAS- REF and GEN cables (310, 320, 300) to the bridge unit, and then tighten at both ends.

  N.B.: *When tightening support the cable with a 7 mm spanner.*

Reassembling the instrument

- Refit the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing a Reflectometer RM20 A510 to 560

(See Chapter 5, drawings 1300.000, 1300.1612)

The boards are located under the motherboard.

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the 4 screws in the front handles (410), right and left, and take off the front handles.
- Remove the countersunk screw (315) and pull off the front cover (300) forwards
- Remove the bottom instrument cover (298) after undoing the 18 countersunk screws (299).

Reflectometer A530, A540, A560 (port3, port4, port6):

- Remove 3.5 mm connection cables (only with option R&S ZVT-B16)
- Disconnect the source cable, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Remove the 4 screws (3132) and the 2 screws (3133) in the front of the instrument next to the port connector.
- Remove the 5 screws (3131) and take out the reflectometer

Reflectometer A510, A520, A550 (port1, port2, port5):

- First remove the reflectometers A530, A540, A560 (only with option R&S ZVT20-B63, -B64, -B66).
- Remove support plate (3140) and/or support plate (3142)
- Remove 3.5 mm connection cables (only with option R&S ZVT-B16)
- Disconnect the source cable, the LO cable, the two IF cables and the 50-pin control cable from the reflectometer.
- Remove the 4 screws (3132) and the 2 screws (3133) in the front of the instrument next to the port connector.
- Remove the 5 screws (3131) and take out the reflectometer

Installing the board and reassembling the instrument

- Insert the new board into the instrument and reconnect any cables that have been disconnected

  N.B.: *Use the lettering on the motherboard as an aid.*
- Screw in the 6 screws (3132, 3133) in the front of the instrument next to the port connector.
- Screw in the 5 screws (3131).
- Refit support plates (3140, 3142) and reflectometers A530, A540, A560 (only with option R&S ZVT20-B63, -B64, -B66).
- Fit the instrument base cover (298) and secure with 18 countersunk screws (299).

- Replace the front cover (300) and secure with the countersunk screw (315).
- Refit the 2 front handles (410) using 4 screws.
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record the generator and receiver correction data (see **Recording Correction Values**).
- Perform the factory system error calibration (see **Factory System Error Calibration**).

Replacing the Coupler (R&S ZVT20 only)

(See Chapter 5, drawing 1300.000, 1300.1612, 1305.4184)

Opening the instrument and removing the coupler

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument base cover (298) after undoing the 18 countersunk screws (299).
- Remove reflectometers and supportplates, if necessary (see **Replacing a Reflectometer RM20 A510 to A560**)
- Disconnect the 3 RF cables and the bias cable from the coupler
- Remove the 2 screws (450).
- Unscrew the coupler from the PC3.5 adaptor (150) and take out the coupler.

Fitting the new coupler unit and reassembling the instrument

- Insert the coupler into the instrument and screw with PC3.5 adaptor (150).
- Screw in the 2 screws (450).
- Reconnect the 3 RF cables and the bias cable.
- Refit reflectometers and supportplates, if necessary (see **Replacing a Reflectometer RM20 A510 to A560**)
- Fit the instrument base cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record generator and receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing the Reflectometer Fan (R&S ZVT8 only)

(See Chapter 5, Spare Parts List and drawings 1300.0000, 1300.0600)

Opening the instrument and removing the reflectometer

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).

Replacing the fan (RM8 with plastic funnel)

- Remove the reflectometer port5, port6, port7 or port8, if necessary (see **Replacing a Reflectometer RM8 A510 to A580**).
- Disconnect the fan cable at the reflectometer.
- Pull the fan from the funnel plastic.
- Insert the new fan (cable outlet to the outside) and push it on the funnel plastic.
- Refit the reflectometer port5, port6, port7 or port8, if necessary (see **Replacing a Reflectometer RM8 A510 to A580**).

Replacing the fan (RM8 with aluminum funnel)

- Remove the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).
- Disconnect the fan cable at the reflectometer.
- Undo the 4 holding screws and remove the fan.
- Insert the new fan (cable outlet to the outside).
- Screw back the 4 screws and washers.
- Refit the reflectometer (see **Replacing a Reflectometer RM8 A510 to A580**).

Reassembling the instrument

- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check that the fan is operating.
- Turn off the instrument again and disconnect from the mains.
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Reconnect the mains cable and turn on at the mains switch. The instrument is now in the standby mode.

Replacing the Reflectometer Fan (R&S ZVT20 only)

(See Chapter 5, Spare Parts List and drawings 1300.0000, 1300.0600)

Opening the instrument and removing the reflectometer

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).

Replacing the fan

- Disconnect the fan cable at the reflectometer.
- Undo the 3 holding screws and remove the fan unit (66).
- Insert the new fan unit (66).
- Screw back the 3 screws.

Reassembling the instrument

- Connect the mains cable, turn on at the mains switch and press the ON key.
- Check that the fan is operating.
- Turn off the instrument again and disconnect from the mains.
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Reconnect the mains cable and turn on at the mains switch. The instrument is now in the standby mode.

Replacing Network Controller Board A110, A120, A130, A140

(See Chapter 5, Spare Parts List, Item 100 and drawing 1300.0000)

The board is in the upper section of the instrument.

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the 37 countersunk screws (297).
- Extract the network controller using the ejector lever

Fitting the board and reassembling the instrument

- Fit the new board in the instrument.
- Refit the top instrument cover (296) with 37 countersunk screws (297).
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record the receiver correction data (see **Recording Correction Values**).
- Perform factory system error calibration (see **Factory System Error Calibration**).
- Align the DC inputs (see **Aligning the DC Inputs**).

Replacing Synthesizer Board A160, A170, A180

(See Chapter 5, Spare Parts List, Items 110, 115, 120 and drawing 1300.0000)

The board is located in the upper section of the instrument.

N.B.: *Synthesizers with part numbers 1145.xxxx or 1300.xxxx are no longer available. In case of a defect please contact the Central Service in Munich.*

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the 37 countersunk screws (297).
- Extract the synthesizer with the ejector lever.

Installing the board and reassembling the instrument

- Insert the new board into the instrument.
- Refit the instrument top cover (296) securing with the 37 countersunk screws (297).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Write synthesizer mapping and shift data to the motherboard EPROM (see **Correction Value Recording**)
- Record the generator and receiver correction data (see **Correction Value Recording**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing LO Divider A600, A610 (1300.2002.03)

(See Chapter 5, Spare Parts List, Item 128, 150 and drawing 1300.0000)

The board is located under the motherboard.

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).
- Disconnect the RF cables and the 12 pin control cable from the LO divider.
- Remove the 2 screws and remove the LO divider.

Installing the board and reassembling the instrument

- Insert the new board into the instrument and secure with 2 screws.
- Reconnect the RF cables and the 12 pin control cable.
- Fit the instrument bottom cover (298) and secure with 18 countersunk screws (299).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record the receiver correction data (see **Recording Correction Data**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing LO Divider8 Board A190 (1302.4060.02/20)

(See Chapter 5, Spare Parts List, Item 128 and drawing 1300.0000)

The board is in the upper section of the instrument.

Opening the instrument and removing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the 37 countersunk screws (297).
- Extract the network controller using the ejector lever

Fitting the board and reassembling the instrument

- Fit the new board in the instrument.
- Refit the top instrument cover (296) with 37 countersunk screws (297).
- Slide the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]
- Record the receiver correction data (see **Recording Correction Values**).
- Perform factory system error calibration (see **Factory System Error Calibration**).

Replacing Frequency Reference Board A100

(See Chapter 5, Spare Parts List, Item 120 and drawings 1300.0000, 1164.1770)

Opening the instrument and replacing the board

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Lift off the instrument top cover (296) after undoing the 37 countersunk screws (297).
- Extract the frequency reference board (120).

Installing the board and reassembling the instrument

- Insert the new board into the instrument
- Refit the instrument top cover (296) with the 37 countersunk screws (297).
- Push the enclosure (400) back on and screw the 4 rear-panel feet (460) and the 2 side handles (450) and the 2 side handles (450) into position.
- Connect the mains cable and turn on at the mains switch. The instrument is now in the standby mode
- Select Service Level 2 (see Service Functions).
- When the instrument has been started, check the protocol file for errors:
  [INFO : Error Log]

Troubleshooting

The instructions in this manual describe troubleshooting down to the board level. Any defective boards can then be replaced and the instrument put back into operation. A selftest which checks the board diagnostic voltages and displays limit violations is provided to facilitate troubleshooting and diagnosis.

We recommend that you return your instrument to the technical specialists at an R&S service facility for board replacement and any further repairs that may be needed (see the address list at the beginning of this manual).

Warning

Do not insert or remove boards that are still live

Avoid causing shorts when measuring voltages

The R&S ZVT has the following facilities to simplify diagnosis:

- Selftest
- Service functions

N.B. *The first thing to do if you encounter any problems is to check if any connection (cables, edge connectors etc.) are damaged or even incorrectly inserted.*

Test Equipment and Accessories

Item.	Instrument type	Recommended features	Recommended model	R&S Order No.	Qty.
1	DC meter		URE	0350.5315.02	1
2	Power supply	0 to 10 V			
3	Spectrum analyzer	Frequency range 0 to 20 GHz	FSEB 20	1066.3010.26	1
4	Adapter cable	1 m long SMP male to SMA male	-	1129.8259.00	1
5	Adapter cable	0.5 m long SMP male to SMP male	-	1129.8265.00	1
6	SMA cable	0.5 m long SMA male to SMA male	-	1142.5895.00	2
7	SMA cable	1 m long SMA male to SMA male	-	1142.5889.00	2
8	BNC cable	1 m to 2 m long BNC male to BNC male	-	e.g. 1100.8850.00	1
9	Adapter	SMA female to N male	-	4012.5837.00	2
10	Adapter	N male to BNC female	-	0118.2812.00	1
11	Termination	SMA termination. 50 Ω male	-	0249.7823.00	3
12	SMP adapter	SMP female to SMP female	-	1093.6869.00	1
13	Adapter board	Extension 150 mm high, 48 pins, 2 mm pitch	-	1100.3542.02	1
14	Conn. Cables for DC Inputs	4-pin mini-DIN plug	ZV-Z71	1164.1005.02	1

Item.	Instrument type	Recommended features	Recommended model	R&S Order No.	Qty.
15	Monitor				1
16	Keyboard with mouse	USB connector			1

Note: *Use a keyboard with mouse and an external monitor (see Chapter -Test Equipment-, Items 12 and 13). To show the hardkeys on the screen select* ***Display \ Display Config \ Hardkey Bar****.*

Troubleshooting - Power-up Problems

- **Fault: It is not possible to turn on the R&S ZVT.**

Action	Cause of fault / remedy
Check mains switch on the rear panel ⇓ Check LED is yellow (standby) ⇓	Mains switch OFF: Turn on at mains switch. LED does not come on: ➢ Measure voltage at X92.C23 (Front module controller): Nom. value: +13.5 V ± 1V Nom. value reached: Fault in key pad or controller. No voltage: Power supply defective or short to12 V standby.
Turn on instrument. Check LED is green ⇓	LED does not come on: ➢ Measure the PWR-ON signal at power supply X92.B24: < 1V for ON Voltage > 1V: Key pad or controller defective.

- **Fault: Fan not working.**

Action	Cause of fault / remedy
Check voltage at connector: X35, X36, X37, X38 pin 3: nom. value 12V ⇓ Select Service Function Set Service Level 1 Set Service Function 2.5.0.11.1.5 (max. fan speed) Check voltage at connector: X35, X36, X37, X38 pin 3: nom. value 0.9V	If no voltage can be measured the fan fuse may be defective (F1)

Troubleshooting Boot Problems

- **Fault: R&S ZVT does not start the measurement application.**

The first action the R&S ZVT performs after power-up is booting BIOS for the processor. When the processor has been successfully initialised, the Windows XP start-up procedure begins. Then, the measurement application is loaded as an autostart program.

If there are errors during the boot phase, messages indicate possible defects.

The message “No System Disk or Disk error…” indicates that the hard disk data is corrupt. If this is the case, replace the hard disk.

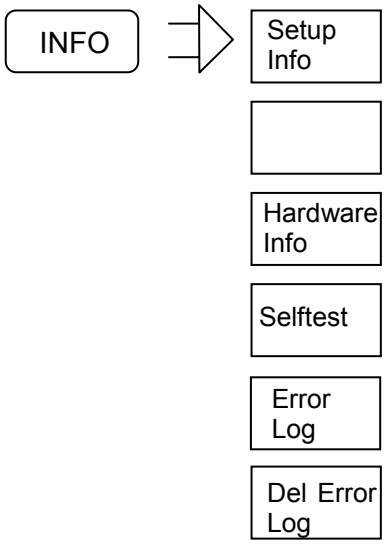
If the operating system on the hard disk has been corrupted and so cannot be loaded correctly, Windows XP outputs a “blue screen”.
This screen summarizes all the key information about the internal status of the processor.

Troubleshooting - Boot Error

If the message below appears on the screen when the boot procedure has been completed,

Warning: Boot error occurred. For details browse Error Log file.

the cause of the error can be found in the Error-Log file.



Press the *Error Log* softkey.

The results are displayed on the screen.

Cause of error: Data cannot be read from one or more boards.

When the instrument is booted, all the calibration data that is required must be written to the processor's RAM.
When the NWA application is started, the entry on the hard disk is compared with the Eprom data on the board. If the data matches, the data is loaded from the hard disk into RAM. If there is not a match, the Eprom data is written to the hard disk and then loaded into RAM.
If the data at the specified address cannot be read, a check is made in Config.ini to check if the board in question should be present. If so, the board is simulated (i.e. if this board is present and is functioning physically, the instrument will function) and an entry is made in the ErrorLog file.
If a board must always be physically present, (frequency reference, synthesizer1, NetworkControler1, reflectometer1, reflectometer2), an error message is output.

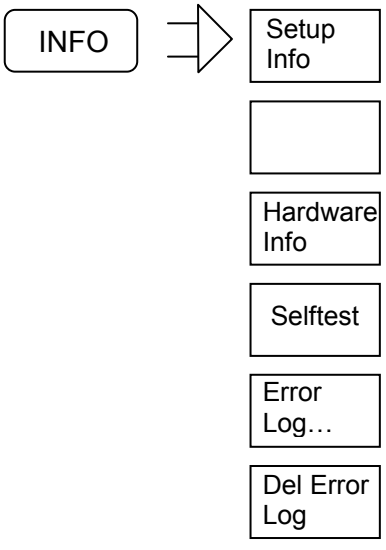
See: Troubleshooting with the Selftest

Troubleshooting with the Selftest

The selftest is used to check supply voltages to the boards, including voltages generated on the boards themselves. On the frequency reference board, two clock signals (128 MHz and ADC-CLK) are also measured.

Starting the selftest:

- Select Service Level 2 (see Service Functions) – this means that the temperature sensor readings are displayed and tighter voltage tolerances used.
- Call the selftest in the INFO menu:



Start the selftest with the *Selftest* softkey.

The selftest results are displayed on the screen.

In the selftest result-table, an abbreviation is used for every board designation:

Fr	Frequency reference
Nd1 to Nd4	Network controller1 to 4, digital section
Sy1 to Sy3/DDSCON	Synthesizer1 to 3
Rm1 to Rm8	Reflectometer port1 to port8

Total selftest status: user mode ---PASSED---

Instrument Type: R&S ZVT8 with 4 Ports
Part Number: 1300.0000k10
Product ID: 01.00
Serial Number: 100124
IP Addresses
IP Address: 0.0.0.0&nbs; Subnet Mask: 0.0.0.0
IP Address: 0.0.0.0 Subnet Mask: 0.0.0.0
IP Address: 127.0.0.1 (Localhost) Subnet Mask: 255.0.0.0
SyMapping: R&S ZVT8_P4
LO Divider: is active

Date: 05/28/04
Time: 14:52:57

Voltages Fr

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.550V	1.950V	1.756V	PASSED
+5V_A SUPPLY	1.400V	1.800V	1.560V	PASSED
+5V_REF	1.400V	1.800V	1.560V	PASSED
+12V_STB	1.900V	2.300V	2.112V	PASSED
128_VCXO	0.800V	4.000V	2.696V	PASSED
ADC_CLK	0.800V	4.000V	2.060V	PASSED
-10V_A SUPPLY	1.900V	2.300V	2.128V	PASSED
-5V_A SUPPLY	2.100V	2.500V	2.264V	PASSED

Voltages Nd1

Test description	Min	Max	Result	State
+5VA_ADC	2.250V	2.750V	2.488V	PASSED
+2.5VD_MDD1	1.125V	1.375V	1.264V	PASSED
+2.5VD_MDD2	1.125V	1.375V	1.264V	PASSED
+1.5VD_FCON	0.675V	0.825V	0.752V	PASSED
-5VA_ADC	2.250V	2.750V	2.464V	PASSED
DGND1	0.000V	0.200V	0.000V	PASSED
DGND2	0.000V	0.200V	0.000V	PASSED
AGND	0.000V	0.200V	0.000V	PASSED

Voltages Nd2

Test description	Min	Max	Result	State
+5VA_ADC	2.250V	2.750V	2.484V	PASSED
+2.5VD_MDD1	1.125V	1.375V	1.260V	PASSED
+2.5VD_MDD2	1.125V	1.375V	1.260V	PASSED
+1.5VD_FCON	0.675V	0.825V	0.752V	PASSED
-5VA_ADC	2.250V	2.750V	2.460V	PASSED
DGND1	0.000V	0.200V	0.000V	PASSED
DGND2	0.000V	0.200V	0.000V	PASSED
AGND	0.000V	0.200V	0.000V	PASSED

Voltages Sy1\DDSCON

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.500V	2.000V	1.752V	PASSED
+5V_A SUPPLY	1.300V	1.800V	1.560V	PASSED
+5V_REF	1.300V	1.800V	1.568V	PASSED
+7V_A SUPPLY	1.400V	1.900V	1.628V	PASSED

Voltages Sy2\DDSCON

Test description	Min	Max	Result	State
+10V_A SUPPLY	1.500V	2.000V	1.752V	PASSED
+5V_A SUPPLY	1.300V	1.800V	1.560V	PASSED
+5V_REF	1.300V	1.800V	1.564V	PASSED
+7V_A SUPPLY	1.400V	1.900V	1.616V	PASSED

Voltages Rm1

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.496V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.564V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.564V	PASSED
+12V FAN	2.000V	2.600V	2.216V	PASSED
+12V SUPPLY	2.000V	2.600V	2.204V	PASSED
-12V SUPPLY	1.600V	2.000V	1.796V	PASSED

Voltages Rm2

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED

GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.500V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.576V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.592V	PASSED
+12V FAN	2.000V	2.600V	2.204V	PASSED
+12V SUPPLY	2.000V	2.600V	2.204V	PASSED
-12V SUPPLY	1.600V	2.000V	1.796V	PASSED

Voltages Rm3

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.500V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.584V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.600V	PASSED
+12V FAN	2.000V	2.600V	2.196V	PASSED
+12V SUPPLY	2.000V	2.600V	2.220V	PASSED
-12V SUPPLY	1.600V	2.000V	1.800V	PASSED

Voltages Rm4

Test description	Min	Max	Result	State
GND	0.000V	0.200V	0.000V	PASSED
GND	0.000V	0.200V	0.000V	PASSED
+5V SUPPLY	2.300V	2.700V	2.492V	PASSED
+10.5VA SUPPLY	2.300V	2.800V	2.604V	PASSED
+10.5VB SUPPLY	2.300V	2.800V	2.568V	PASSED
+12V FAN	2.000V	2.600V	2.216V	PASSED
+12V SUPPLY	2.000V	2.600V	2.136V	PASSED
-12V SUPPLY	1.600V	2.000V	1.804V	PASSED

Voltages Fr
Voltages Nd1
Voltages Nd2
Voltages Sy1\DDSCON
Voltages Sy2\DDSCON
Voltages Rm1
Voltages Rm2
Voltages Rm3
Voltages Rm4
Home

Interpreting the Results of the Selftest

Negative voltages are transformed into positive voltages by means of a positive voltage and a resistor network because the A/D converters that are used can handle only positive voltages. This is why an acceptable negative voltage may elicit a FAIL because the associated positive voltage is out of tolerance.

The voltages supplied by the power supply are not checked directly. The failure of a power supply voltage can, however, be deduced from FAILs of certain voltages on several boards. The following Table shows how the board-oriented voltages checked during the selftest are derived from the power supply voltages.

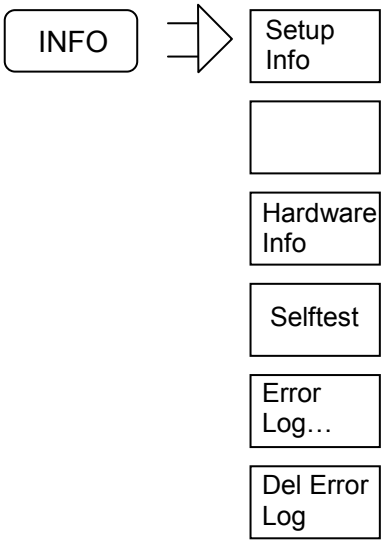
Power supply	+3.4 V	+5.2 V	+6.5 V	+8.25 V	+12.25 V	-6.5 V	-12.25 V
Fr			+5V_A +5V_REF		+10V_A +12V_STB	-5V_A	-10V_A
Nd	+2.5VD_MDD1 +2.5VD_MDD2 +1.5VD_FCON		+5VA_ADC			-5VA_ADC	
Sy			+5V_A +5V_REF		+7V_A +10V_A		
Rm			+5V		+10.5VA +10.5VB +12V +12V FAN		-12V

If the voltages listed in a column are all FAIL, the corresponding power supply voltage has failed or is out-of-tolerance. The power supply must then be replaced.
On the motherboard, there is a separate fuse for each board and for each of the power supply voltages used on the board. If a FAIL message is output, the first action to take is to check the fuse. The LO divider board must be removed before the fuses on the motherboard can be checked (See Chapter Board Replacement).

If an internal board voltage is out-of-tolerance, even though the power supply voltages used on the board are OK, the board must be replaced.

Checking the Temperature Sensors

Select Service Level 2 (see Service Functions).



When the *Hardware Info* softkey is pressed information about the installed hardware, the results of temperature measurements and … are displayed.

Temperature Info

Current Temperature Readings

Component	Sensor	Temperature	Sensor	Temperature	Sensor	Temperature
Motherboard	Near NC:	33.75°C	Near SY:	34.75°C	Near PS:	38.50°C
Netcon 1	Analog:	40.25°C	Digital:	49.75°C		
Netcon 2	Analog:	-----	Digital:	-----		
Reflectometer 1	Generator:	38.50°C				
Reflectometer 2	Generator:	36.00°C				
Reflectometer 3	Generator:	38.25°C				
Reflectometer 4	Generator:	39.25°C				

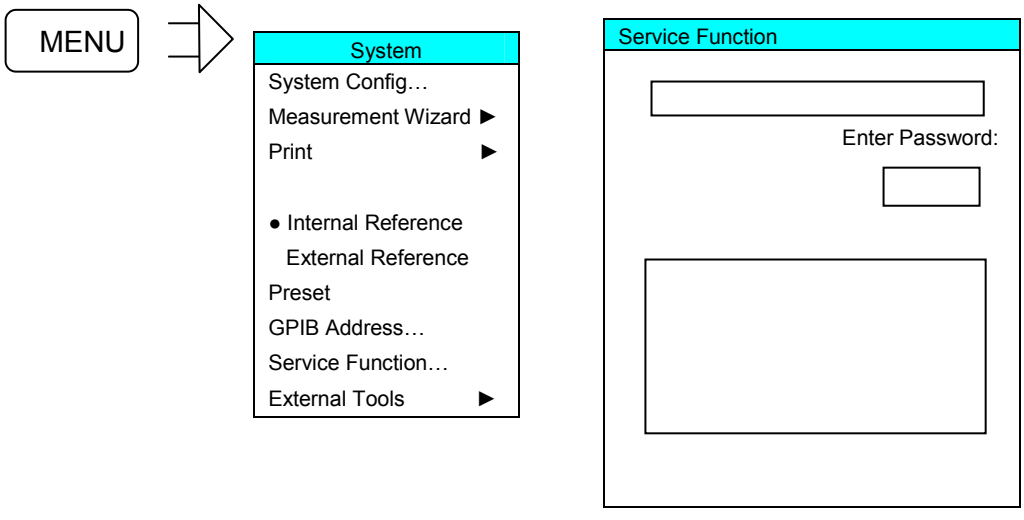
Highly elevated temperature values indicate a fan failure.

Service Functions

The service functions allow you to examine particular circuit sections on specific boards or to make well-defined settings that would normally change automatically according to the state of the instrument (e.g. the IF). There are a number of service functions which, if used incorrectly, could cause the instrument to malfunction. Usually, these functions are disabled. They are enabled only after a code number (PASSWORD) has been entered.

There are three different service levels:

Service level	Password
0	No password necessary
1	894129
2	30473035



Service Function Structure

Group . Main ID . Sub ID . Function . Address . Data

Group	Applies to
1	API
2	HW (boards)

Boards Main ID	Boards Sub ID
0: All boards	0
1: Network controller1	0: All board 1: PCI 2: ND 3: NA
2: Network controller2	
5: Motherboard	0:
9: Frequency reference	0:
11: Synthesizer1	0: All board 1: SY1 2: SY2 3: SY3 4: SY4
12: Synthesizer2	
21: Reflectometer1	0: all board 1: GEN 2: REC
22: Reflectometer 2	
23: Reflectometer 3	
24: Reflectometer 4	

Group 1:
General Functions

Functions	**Service function**	**Data**	**Serv. Lev.**
Enables/disables the peak detector and RMS detector independently of the model	1.0.0.1.X	0 → Use disabled 1 → Use enabled	2
Enable/disables the arbitrary mode settings in the port configuration (e.g. LowNoise/ LowDistortion) independently of the model	1.0.0.5.X	0 → Use disabled 1 → Use enabled	2
Activates or deactivates the setting of measured values to default values when status messages are issued due to HW faults	1.1.0.2.X	0 → Deactivate default values 1 → Activate default values	0
Activates or deactivates factory calibration for the active setup	1.1.0.3.X	0 → Deactivate factory calibration 1 → Activate factory calibration	0

Group 2:
General Functions

Functions	Service function	**Data**	**Serv. Lev.**
Suppress error-message box	2.0.0.0.X	X=0 → MSG box is output (default state) X=1 → MSG box is suppressed (error is nevertheless entered in the log file)	1
Selftest all boards	2.0.0.5.0.0		0, 1 or 2

Network controller

Functions	Service function	**Data**	**Serv. lev.**
ND1:Read Temp (addr.:68)	2.1.2.3		1
ND2:Read Temp (addr.:68)	2.2.2.3		1
ND[1..2] Selftest	2.[1-2].2.5.0.0		0, 1 or 2
NA1:Read Temp (addr.:69)	2.1.3.3		1
NA2:Read Temp (addr.:69)	2.2.3.3		1

Motherboard

Functions	Service function	**Data**	**Serv. lev.**
MB: Fan manual	2.5.0.11.1.X	X= 0 to 5	1
MB: Fan automatic	2.5.0.11.0		1
MB:Read Temp Front (NC) (addr.:205)	2.5.0.3.1		1
MB: Read Temp Rear (SY) (addr.: 204)	2.5.0.3.2		1
MB: Read Temp Back (PS) (addr.: 202)	2.5.0.3.3		1

Frequency reference

Functions	Service function	**Data**	**Serv.lev.**
FR Selftest	2.9.0.5.0.0		0, 1 or 2

Reflectometers

Functions	Service function	**Data**	**Serv.lev.**
RM[1-4]: Fan manual	2.[21-24].0.11.X	X = 1 to 5	1
RM[1-4]:Fan automatic	2.[21-24].0.11.0		1
RM[1-4]: Read Temp Gen	2.[21-24].1.3		1
RM[1-4]: Read Temp Rec	2.[21-24].2.3		1
RM[1-4]: Selftest	2.[21-24].0.5.X	X = 0 to 4	1
RM[1-4]: Read OVL	2.[21-24].0.12		1
RM[1-4]: OVL Reset	2.[21-24].0.13		1
RM[1-4] Generator Selftest	2.[21-24].1.5.0.0		0, 1 or 2
RM[1-4]: IF shift	2.[21-24].2.18.ZF	IF in Hz 0 = IF via shift table	0

Determining which Boards are defective

The table below lists boards that are probably defective based on the faults that occurred during the performance test.

		Defective board	
Problem with:		**Probable**	**Also possible**
Frequency accuracy		Frequency reference	
SSB phase-noise	Only one port All ports	R&S ZVT8: Synthesizer2, Synthesizer3 R&S ZVT20: Synthesizer1, Synthesizer2 Frequency reference	
Level accuracy [1]	Only one port port1 to port4 port5 to port8	Reflectometer associated with defective port Synthesizer2 Synthesizer3	
Max. output level	Only one port port1, port2 port3, port4 port5, port6 port7, port8	Reflectometer associated with defective port R&S ZVT8: Synthesizer2 R&S ZVT20: Synthesizer1 Synthesizer2 R&S ZVT8: Synthesizer3 R&S ZVT20: Synthesizer2 Only R&S ZVT8: Synthesizer3	
Absolute accuracy wave quantity a [1]		Reflectometer associated with defective port	
Level linearity [1]		Reflectometer associated with defective port	
Harmonic ratio		Reflectometer associated with defective port	R&S ZVT8: Synth.2, Synth.3 R&S ZVT20: Synth.1, Synth.2
Spurious suppression		R&S ZVT8: Synthesizer2, Synthesizer3 R&S ZVT20: Synthesizer1, Synthesizer2	
Matching portx		Bridge unit (ZVT8) or coupler unit (ZVT20) of reflectometer associated with the defective port	
Directivity portx		Bridge unit (ZVT8) or coupler unit (ZVT20) of reflectometer associated with the defective port	
Receiver absolute accuracy [1]	port1, 2 port3, 4 port5, 6 port7, 8 All ports	Reflectometer associated with defective port Reflectometer associated with defective port Reflectometer associated with defective port Refl. associated with defective port (ZVT8 only) Synthesizer1	Network controller1 Network controller2 Network controller3 Netw. cntr.4 (ZVT8 only) Frequency reference
Receiver linearity for high levels Portx	port1 to 4 port5 to 8 all ports	Reflectometer associated with defective port LO divider1 or LO divider8 LO divider2 or LO divider8 Synthesizer1	
Receiver linearity for low levels	port1, 2 port3, 4 port5, 6 port7, 8	Network controller1 Network controller2 Network controller3 Network controller4 (ZVT8 only)	
Receiver noise level portx		Reflectometer associated with defective port	Synthesizer1
Dynamic range portx		Reflectometer associated with defective port	Synthesizer1
DC measurement input1V		Motherboard	Network controller1
DC measurement input 10V		Motherboard	Network controller1
Frequency reference input/output		Frequency reference	

[1] Correction values should be recorded (see **Recording Correction Values**) when the fault verified during the performance test is small.

A board test should be performed before the board that has been deduced to be defective is replaced.

Board Test

When boards are being tested, internal sources are used whenever possible. This means that it is always assumed that the downstream board in the signal path is OK. If a clear fault is not present, the order of the board tests given below should always be followed.

The inputs and outputs of the boards to be tested can be accessed via cables in the lower section of the instrument (except the frequency reference board).

Opening the instrument

(See Chapter 5, drawing1300.0000)

- Turn off the instrument and disconnect from the mains, screw off the 4 rear-panel feet (460) and four screws (455), remove the two side handles (450) and pull off the enclosure (400) backwards.
- Remove the instrument bottom cover (298) after undoing the 18 countersunk screws (299).

Only when testing the frequency reference board:

- Lift off the instrument top cover (296) after undoing the 37 countersunk screws (297).

Testing the frequency reference board

(see **Test Equipment**)

- Remove the board from the instrument.
- Reinsert board and extension card.
- Connect the output to be tested to the spectrum analyzer using an adapter cable and adapter SMA-N.
- Set the frequencies listed in the table.
- Check signals according to following table.

Signal	Connector	Frequency	Nom. level	Setting
NA1_AD_CLK	X103	80 MHz	10 dBm ±1dB	
NA2_AD_CLK	X104	80 MHz	10 dBm ±1dB	
SY1_REF	X105	128 MHz	10 dBm ±1dB	
SY2_REF	X106	128 MHz	10 dBm ±1dB	
REF_10_OUTIN	X107	10 MHz	6 dBm ±1dB	Menu/System/Internal Reference

The board must be replaced if the signal is more than 2 dB below the stated nominal level.

- Connect the frequency reference output of the spectrum analyzer to X107 (REF_10_OUTIN) using an adapter cable and adapter SMA-N.
- Connect X105 or X106 (SY1_REF or. SY2_REF) to the spectrum analyzer using an adapter cable and adapter SMA-N.
- The 128 MHz signal's frequency must precisely equal its nominal frequency.

If the frequency differs in any way (e.g. 128.001 MHz), replace the board.

Testing the Synthesizer Board

N.B.: *Synthesizers with part numbers 1145.xxxx or 1300.xxxx are no longer available. In case of a defect please contact the Central Service in Munich.*

R&S ZVT8: Synthesizer2 or Synthesizer3
R&S ZVT20: Synthesizer1 or Synthesizer2

- Disconnect source cable at the reflectometer (1 to 8, depending on which synthesizer section is to be tested).
- Connect the end of the source cable to the spectrum analyzer input via an adapter cable and adapter SMA-N.

N.B.: Bend the source cable as little as possible*, if necessary secure adapter cable with adhesive tape.*

- Set the frequencies listed in the table on the R&S ZVT and check the values.
  [**Sweep** : Sweep Type : CW Mode : CW Frequency : **…Hz**]
  [**Sweep** : Single : **Restart**]

Synthesizer 1145.xxxx or 1300.xxxx

Frequency (ZVT setting)	**Level**	**2nd harmonic**	**3rd harmonic**
300 kHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
100 MHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
1 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
2 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
3 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
4 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
6 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc
8 GHz	0 dBm ±3 dB	< -28 dBc	< -28 dBc

Synthesizer-LS 1305.5300.20

Source

Frequency (ZVT setting)	**Source Level** (Mod. 02)	**2nd harmonic**	**3rd harmonic**
300 kHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
100 MHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
1 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
2 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
3 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
4 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
6 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc
8 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc

Synthesizer-DS 1302.5180.xx

R&S ZVT8: Source 1 to 4 (set port1 to 4 active)
Source 5 to 8 (set port5 to 8 active)

R&S ZVT20: Source 3 to 6 (set port3 to 6 active)

Frequency (ZVT setting)	**Source Level**	**2nd harmonic**	**3rd harmonic**
300 kHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
100 MHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
1 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
2 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
3 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
4 GHz	+3 dBm to -5 dBm	< -27 dBc	< -30 dBc
6 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc
8 GHz	+3 dBm to -7 dBm	< -27 dBc	< -30 dBc

Isolation of source switch
R&S ZVT frequency 8 GHz

Port no.	**Port setting**	**Source output Synthesizer2**	**Isolation**
1 (3 with ZVT20)	Port1 (3) inactive Port2 (4) active	X165 X166	-90 dBc ±5 dB
2 (4 with ZVT20)	Port1 (3) active Port2 (4) inactive	X165 X166	 -90 dBc ±5 dB
3 (5 with ZVT20)	Port3 (5) inactive Port4 (6) active	X168 X169	-90 dBc ±5 dB
4 (6 with ZVT20)	Port3 (5) active Port4 (6) inactive	X168 X169	 -90 dBc ±5 dB

R&S ZVT8 only:

Port no.	**Port setting**	**Source output Synthesizer3**	**Isolation**
5	Port5 inactive Port6 active	X165 X166	-90 dBc ±5 dB
6	Port5 active Port6 inactive	X165 X166	 -90 dBc ±5 dB
7	Port7 inactive Port8 active	X168 X169	-90 dBc ±5 dB
8	Port7 active Port8 inactive	X168 X169	 -90 dBc ±5 dB

The cable loss must also be taken into account at the stated levels. For the specified cable it is 0.25 dB/GHz (0.5 m) 0.5 dB/GHz (1 m).

The board must be replaced if the level is more than 2 dB below the specified value or the other values are more than 2 dB above their specified value.

Synthesizer1

With LO divider 1300.2002:

- Disconnect cable from LO divider.
- Connect the output to be tested to the spectrum analyzer using an adapter cable and adapter SMA-N.
- Set the frequencies listed in the table above on the R&S ZVT and check the values.

With LO divider 1302.4060:

- Remove LO divider board.
- Connect X1951 in the motherboard to the spectrum analyzer using an adapter cable and adapter SMA-N.
- Set the frequencies listed in the table above on the R&S ZVT and check the values.

Synthesizer-LO 1302.4248.02 (R&S ZVT8 only)

Frequency (ZVT setting)	**Local Level (**Mod. 02, Mod. 03)	**2nd harmonic**	**3rd harmonic**
300 kHz	+2 dBm to -15 dBm	< -5 dBc	< +3 dBc
100 MHz	+2 dBm to -15 dBm	< -5 dBc	< -5 dBc
1 GHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
2 GHz	+2 dBm to -4 dBm	< -5 dBc	< -5 dBc
3 GHz	+2 dBm to -1.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	+2 dBm to -1.5 dBm	< -5 dBc	< -14 dBc
4 GHz	+2 dBm to -1.5 dBm	< -5 dBc	< -30 dBc
5 GHz	+2 dBm to -1.5 dBm	< -5 dBc	< -30 dBc
6 GHz	+2 dBm to -4 dBm	< -5 dBc	< -30 dBc
7 GHz	+3 dBm to -4 dBm	< -5 dBc	< -30 dBc
8 GHz	+3 dBm to -4 dBm	< -5 dBc	< -30 dBc

Synthesizer-LS 1305.5300.20 (R&S ZVT20 only)

Local

Frequency (ZVT setting)	**Local Level (**Mod. 02, Mod. 03)	**2nd harmonic**	**3rd harmonic**
300 kHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
100 MHz	-3 dBm to -20 dBm	< -5 dBc	< +2 dBc
1 GHz	-3 dBm to -9dBm	< -5 dBc	< -5 dBc
2 GHz	-3 dBm to -9dBm	< -5 dBc	< -5 dBc
3 GHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
3.8 GHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
4 GHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
5 GHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
6 GHz	-3 dBm to -6.5 dBm	< -5 dBc	< -5 dBc
7 GHz	-3 dBm to -10 dBm	< -5 dBc	-----
8 GHz	-3 dBm to -10 dBm	< -5 dBc	-----

Testing the Reflectometer RM8

Generator levels

It is assumed that the synthesizer section (synthesizer2 or synthesizer3) associated with the reflectometer to be tested is OK.

- Loosen cable W514 (GEN -> Bridge unit) at both ends and screw off at the generator output GEN.

  Note: *When loosening, support the cable with a 7mm spanner*
- Connect the generator output to the spectrum analyzer using the SMA cables and adapter SMA-N.
- Set the power to 8 dBm
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies listed in the table.

Frequency	**Level**	**2nd harmonic**	**3rd harmonic**
300 kHz	16 dBm	---	---
50 MHz	16 dBm	< - 21 dBc	< - 21 dBc
1 GHz	16 dBm	< - 21 dBc	< - 21 dBc
3 GHz	16 dBm	< - 21 dBc	< - 21 dBc
6 GHz	16 dBm	< - 21 dBc	---
8 GHz	16 dBm	< - 21 dBc	---

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

The RM Subunit must be replaced if the level is more than 2 dB below the specified value or the other values are more than 2 dB above their specified value.

Receiver levels

The following is assumed:

- The LO synthesizer section (synthesizer1) associated with the reflectometer to be tested is OK.
- The network controller associated with the reflectometer to be tested is OK.
- One reflectometer in the instrument is functioning.

➢ Loosen cable W515 (Bridge unit -> MEAS) and cable W518 (Bridge unit -> REF) at both ends and screw off at the MEAS and REF receiver inputs.

N.B.: *When loosening, support the cable with a 7mm spanner*

Connect the receiver input (MEAS or REF) to a functioning instrument port using an adapter cable and adapter SMA-N.

➢ Set the R&S ZVT to the CW sweep mode.

➢ Set the frequencies and output levels for the port used for the measurement as indicated in the table and read off the level for the receiver to be tested (wave quantity ax or bx).

Frequency	Output level	Displayed level ax or bx
300 kHz	-20 dBm	0 dBm
50 MHz	-20 dBm	0 dBm
1 GHz	-20 dBm	0 dBm
3 GHz	-20 dBm	0 dBm
6 GHz	-20 dBm	0 dBm
8 GHz	-20 dBm	0 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are more than 3 dB below the levels and ratios list in the table, the RM Subunit must be replaced.

Bridge unit levels

The following is assumed:

- One reflectometer in the instrument is OK.

Method 1:

The generator section of the associated reflectometer is OK (output level at the port meets specifications).

- Loosen cable W515 (Bridge unit -> MEAS) and cable W518 (Bridge unit -> REF) at both ends and disconnect at the bridge unit.

  N.B.: *When loosening, support the cable with a 7mm spanner*
- Connect the bridge unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable and adapter SMA-N. Terminate the bridge unit output that is not used with an SMA termination.
- Screw a SHORT from the N calibration kit to the port connector.
- Set the frequencies and levels listed in the table for the reflectometer associated with the bridge unit (port) and measure the level (wave quantity bx) at the port used for the measurement.

Frequency	Level	Output level MEAS	Output level REF
300 kHz	0 dBm	-18 dBm	-32 dBm
50 MHz	0 dBm	-18 dBm	-32 dBm
1 GHz	0 dBm	-18 dBm	-32 dBm
3 GHz	0 dBm	-18 dBm	-32 dBm
6 GHz	0 dBm	-18 dBm	-32 dBm
8 GHz	0 dBm	-18 dBm	-32 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are more than 2 dB below the levels in the table, the bridge unit must be replaced.

Method 2:

The receive section of the associated reflectometer is OK.

- Loosen cable W514 (GEN -> Bridge unit) at both ends and screw off at the bridge unit.

  N.B.: *When loosening, support the cable with a 7mm spanner*
- Connect the bridge input (connector. W514) to a functioning port using the SMA cable and SMA-N adapter.
- Screw a SHORT from the N calibration kit to the port connector.
- Set the frequencies and levels listed in the table at the port used for the measurement and measure the level (wave quantity ax or bx) at the reflectometer associated with the bridge unit (port).

Frequency	Level	Output level MEAS	Output level REF
300 kHz	8 dBm	-18 dBm	-32 dBm
50 MHz	8 dBm	-18 dBm	-32 dBm
1 GHz	8 dBm	-18 dBm	-32 dBm
3 GHz	8 dBm	-18 dBm	-32 dBm
6 GHz	8 dBm	-18 dBm	-32 dBm
8 GHz	8 dBm	-18 dBm	-32 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are more than 2 dB below the levels given in the table, the bridge unit must be replaced.

Bridge Directivity

The following is assumed:

- The generator and receiver sections of the reflectometer associated with the bridge unit are OK.

- Screw the SHORT from an N calibration kit to the port connector.
- Perform a sweep from 300 kHz to 8 GHz, measure S11, save measured values (Data -> Mem : Math = Data/Mem).
- Screw the MATCH from the N calibration kit to the port connector.
- The trace gives the directivity.

Frequency range	Directivity
300 kHz to 50 MHz	< -10 dB
50 MHz to 8 GHz	< -16 dB

If the measured values are greater than the values stated in the table, the bridge unit must be replaced.

Bridge unit: Port Matching

It is assumed that there is a functioning reflectometer in the instrument.

- Loosen cables W514 (GEN -> Bridge unit), W515 (Bridge unit -> MEAS) and W518 (Bridge unit -> REF) at both ends and unscrew at the bridge unit.

  N.B.: *When loosening, support the cable with a 7mm spanner*
- Terminate the bridge unit input and bridge unit outputs with 3 SMA terminations.
- Connect N test cable to a functioning instrument port and perform a 1-port calibration at the end of the cable.
- Connect the end of the test cable to the port of the bridge unit under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
300 kHz to 2 GHz	-12 dB
2 GHz to 8 GHz	-18 dB

If the values in the table are exceeded, the bridge unit must be replaced.

Testing the Reflectometer RM20

Generator levels

It is assumed that the synthesizer section (source section of synthesizer1 or synthesizer2) associated with the reflectometer to be tested is OK.

- Loosen cable W514 (GEN -> coupler unit) at both ends and screw off at the generator output GEN.
- Connect the generator output to the spectrum analyzer using the SMA cable ().
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies listed in the table.
- Set the power listed in the table.

Frequency	Set power to	Level on GEN output	2nd harmonic	3rd harmonic
10 MHz	10 dBm	13.0 dBm	---	---
100 MHz	10 dBm	13.0 dBm	< - 21 dBc	< - 21 dBc
1 GHz	10 dBm	13.2 dBm	< - 21 dBc	< - 21 dBc
4 GHz	10 dBm	13.7 dBm	< - 21 dBc	< - 21 dBc
8 GHz	10 dBm	14.3 dBm	< - 21 dBc	< - 21 dBc
9 GHz	10 dBm	14.5 dBm	< - 21 dBc	---
12 GHz	10 dBm	15.0 dBm	---	---
15 GHz	5 dBm	7.5 dBm	---	---
18 GHz	5 dBm	8.0 dBm	---	---
20 GHz	5 dBm	8.3 dBm	---	---

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

Receiver levels

The following is assumed:

- The LO synthesizer section (synthesizer1 mod. 20, synthesizer2) associated with the reflectometer to be tested is OK.
- The network controller associated with the reflectometer to be tested is OK.
- One reflectometer in the instrument is functioning.

- Loosen cable W515 (coupler unit -> MEAS) and cable W518 (coupler unit -> REF) at both ends and screw off at the MEAS and REF receiver inputs.
- Connect the receiver input (MEAS or REF) to a functioning instrument port using an adapter cable.
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies and output levels for the port used for the measurement as indicated in the table and read off the level for the receiver to be tested (wave quantity ax or bx).

Frequency	Output level	Displayed level ax or bx
10 MHz	-30 dBm	+20 dBm ± 3 dB
100 MHz	-30 dBm	+5 dBm ± 3 dB
1 GHz	-20 dBm	-5 dBm ± 3 dB
2.5 GHz	-20 dBm	-10 dBm ± 3 dB
3 GHz	-20 dBm	-10 dBm ± 3 dB
8 GHz	-20 dBm	-10 dBm ± 3 dB
9 GHz	-20 dBm	-10 dBm ± 3 dB
12 GHz	-20 dBm	-10 dBm ± 3 dB
15 GHz	-20 dBm	-8 dBm ± 4 dB
18 GHz	-20 dBm	-8 dBm ± 4 dB
20 GHz	-20 dBm	-8 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or. 0.5 dB/GHz (1 m).

If the measured values are more than 2 dB below the levels list in the table, the board must be replaced.

Coupler unit levels

The following is assumed:

- One reflectometer in the instrument is OK.

Method 1:

The generator section of the associated reflectometer is OK (output level at the port meets specifications).

- Loosen cable W515 (coupler unit -> MEAS) and cable W518 (coupler unit -> REF) at both ends and disconnect at the bridge unit.
- Connect the coupler unit output (MEAS = connector W515 or REF = connector W518) to a functioning port using the SMA cable and adapter SMA-N to a functioning port. Terminate the coüpler unit output that is not used with an SMA termination.
- Screw a SHORT from the calibration kit to the port connector.
- Set the frequencies and levels listed in the table for the reflectometer associated with the coupler unit (port) and measure the level (wave quantity bx) at the port used for the measurement.

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-50 dBm ± 3 dB	-47 dBm ± 3 dB
100 MHz	0 dBm	-35 dBm ± 3 dB	-32 dBm ± 3 dB
1 GHz	0 dBm	-15 dBm ± 3 dB	-11 dBm ± 3 dB
2 GHz	0 dBm	-10 dBm ± 3 dB	-4.7 dBm ± 3 dB
8 GHz	0 dBm	-10 dBm ± 3 dB	-3.7 dBm ± 3 dB
12 GHz	0 dBm	-10 dBm ± 3 dB	-3 dBm ± 3 dB
16 GHz	0 dBm	-12 dBm ± 4 dB	-2.3 dBm ± 4 dB
20 GHz	0 dBm	-12 dBm ± 4 dB	-1.7 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 2 dB below the levels in the table, the coupler unit must be replaced.

Method 2:

The receiver section of the associated reflectometer is OK.

- Loosen cable W514 (GEN -> coupler unit) at both ends and screw off at the coupler unit.
- Connect the coupler input (connector. W514) to a functioning port using the SMA cable.
- Screw a SHORT from the calibration kit to the port connector.
- Set the frequencies and levels listed in the table at the port used for the measurement and measure the level (wave quantity ax or bx) at the reflectometer associated with the coupler unit (port).

Frequency	Level	Output level MEAS	Output level REF
10 MHz	0 dBm	-53 dBm ± 3 dB	-50 dBm ± 3 dB
100 MHz	0 dBm	-38 dBm ± 3 dB	-35 dBm ± 3 dB
1 GHz	0 dBm	-18.2 dBm ± 3 dB	-15 dBm ± 3 dB
2 GHz	0 dBm	-13.3 dBm ± 3 dB	-8 dBm ± 3 dB
8 GHz	0 dBm	-14.3 dBm ± 3 dB	-8 dBm ± 3 dB
12 GHz	0 dBm	-15 dBm ± 3 dB	-3 dBm ± 3 dB
16 GHz	0 dBm	-17.7 dBm ± 4 dB	-8 dBm ± 4 dB
20 GHz	0 dBm	-18.3 dBm ± 4 dB	-8 dBm ± 4 dB

With the stated levels, the cable loss must still be taken into account. For the specified cable it is 0.25 dB/GHz.

If the measured values are more than 2 dB below the levels given in the table, the coupler unit must be replaced.

Coupler Directivity

The following is assumed:

- The generator and receiver sections of the reflectometer associated with the coupler unit are OK.

- Screw the SHORT from the calibration kit to the port connector.
- Perform a sweep from 10 MHz to 20 GHz, measure S11, save measured values (Data -> Mem : Math = Data/Mem).
- Screw the MATCH from the calibration kit to the port connector.
- The trace gives the directivity.

Frequency range	Directivity
10 MHz to 12 GHz	< -15 dB
12 GHz to 20 GHz	< -10 dB

If the measured values are greater than the values stated in the table, the coupler unit must be replaced.

Coupler unit: Port Matching

It is assumed that there is a functioning reflectometer in the instrument.

- Loosen cables W514 (GEN -> coupler unit), W515 (coupler unit -> MEAS) and W518 (coupler unit -> REF) at both ends and unscrew at the coupler unit.
- Terminate the coupler unit input and coupler unit outputs with 3 SMA terminations.
- Connect test cable to a functioning instrument port and perform a 1-port calibration at the end of the cable.
- Connect the end of the test cable to the port of the coupler unit under test and display the Sxx magnitude on the screen.

Frequency range	Sxx dB
10 MHz to 12 GHz	< -14 dB
12 GHz to 20 GHz	< -10 dB

If the values in the table are exceeded, the coupler must be replaced.

Testing the LO Divider Board

R&S ZVT8 with LO divider 1300.2002:

It is assumed that the LO-synthesizer is OK.

- Disconnect cable W666, W669, W676, W679, W686, W689, W696 or W699 depending on which LO-branch is being tested.
- Connect the output under test (X6, X7, X8 or X9) to the spectrum analyzer using the adapter cable and SMA-N adapter.
- Enter service- function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies listed in the table.

Frequency R&S ZVT	**Frequency spec.** = Frq ZVT + IF	**Level***
300 kHz	17.812345 MHz	-5 dBm to +5 dBm
50 MHz	67.512345 MHz	-5 dBm to +5 dBm
1 GHz	1.017512345 GHz	-5 dBm to +5 dBm
3 GHz	3.017512345 GHz	-5 dBm to +5 dBm
6 GHz	6.017512345 GHz	-5 dBm to +5 dBm
8 GHz	8.017512345 GHz	-5 dBm to +5 dBm

* *For actual values please contact service center in Munich.*

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.5 dB/GHz (1 m).

If the measured values are below the levels in the table, the board must be replaced.

R&S ZVT8 with LO divider 1302.4060:

It is assumed that the LO synthesizer is OK.

- Disconnect cable W666, W669, W676, W679, W686, W689, W696 or W699, depending on which LO-branch is being tested.
- Connect the end of the cable to the spectrum analyzer using the adapter cable.
- Enter service- function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies listed in the table.

Frequency ZVT	**Frequency spec.** = Frq ZVT + IF	**Level**
300 kHz (ZVT8 only)	17.812345 MHz	-5 dBm to +1 dBm
10 MHz	27.512345 MHz	-5 dBm to +1 dBm

50 MHz	67.512345 MHz	-5 dBm to +1 dBm
1 GHz	1.017512345 GHz	-3 dBm to +5 dBm
3 GHz	3.017512345 GHz	-1 dBm to+ 5 dBm
6 GHz	6.017512345 GHz	-2 dBm to +4 dBm
8 GHz	8.017512345 GHz	-2 dBm to +4 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are not within the level range in the table, the board must be replaced.

R&S ZVT20:

It is assumed that the LO section of the LS synthesizer is OK.

- Disconnect cable W612, W622, W632, W642, W652 or W662, depending on which LO-branch is being tested.
- Connect the end of the cable to the spectrum analyzer using the adapter cable.
- Enter service- function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Set the R&S ZVT to the CW sweep mode.
- Set the frequencies listed in the table.

Frequency R&S ZVT	**Frequency spec.** = Frq ZVT + IF	**Level**
300 kHz (ZVT8 only)	17.812345 MHz	-10 dBm to -4 dBm
10 MHz	27.512345 MHz	-10 dBm to -4 dBm
50 MHz	67.512345 MHz	-10 dBm to -4 dBm
1 GHz	1.017512345 GHz	-8 dBm to 0 dBm
3 GHz	3.017512345 GHz	-6 dBm to 0 dBm
6 GHz	6.017512345 GHz	-7 dBm to -1 dBm
8 GHz	8.017512345 GHz	-7 dBm to -1 dBm

With the stated levels, the cable loss must still be taken into account. For the specified cable, it is 0.25 dB/GHz (0.5 m) or 0.5 dB/GHz (1 m).

If the measured values are not within the level range in the table, the board must be replaced.

Testing the Network Controller Board

Testing the IF inputs

It is assumed that there is one functioning reflectometer in the instrument.

- Disconnect the IF-MEAS and IF-REF cable from each of the reflectometers.
- Connect the input to be tested at the end of the appropriate IF cable (W116, W117, W118, W119, or W126, W127, W128, W129, or W136, W137, W138, W139, or W146, W147, W148, W149) to a functioning port using the adapter cable and SMA-N adapter .
- Set the R&S ZVT to CW sweep mode, CENTER 17.512345 MHz.
- Setting at the port used for the measurement: POWER -10 dBm, Meas S11
- Setting at the port associated with the network controller under test: WAVE QUANTITY ax or bx.
- Enter service function 2.21.2.18.17512345 (IF = 17.512345 MHz).
- Disable level corrections with SF 2. [21..28].2.15.1

If the level displayed on the R&S ZVT's screen is not within the range -4 dBm ± 2 dB, the board must be replaced.

Testing the Motherboard

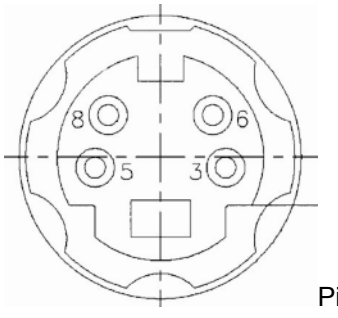
28 V supply

Using a multimeter, measure the voltage at X 100.B5 (wrt ground).
Permissible deviation: ± 0.5 V

Preamplifier for DC measurement inputs

Apply the DC voltages listed in the table using the 4-pin Mini-DIN connector at the DC measurement input.
Measure the DC voltage with a multimeter.

Input	Voltage at	Gnd	APPLIED VOLTAGE	Measurement at	Rated value
DC MEAS -1 V to +1 V	8	3, 5, 6	- 1 V	X 141.B10	2.33 V
DC MEAS -1 V to +1 V	6	3, 5, 8	+ 1 V	X 141.B11	2.33 V
DC MEAS -10 V to +10 V	8	3, 5, 6	- 10 V	X 141.D10	2.33 V
DC MEAS -10 V to +10 V	6	3, 5, 8	+ 10 V	X 141.D11	2.33 V



Pin assignment DC MEAS connector

If the measured value is more than 10% above or more than 10% below the stated nominal value, the motherboard must be replaced.

Table of Contents- Chapter 4 "Software Update / Installation of Options"

4 Software Update / Installation of Options

Chapter 4 provides information on updating software, restoring the operating system installation and installing options. Descriptions accompanying the software update or the options can be included in this folder as part of Chapter 4.

Installing new R&S ZVT Software

The instrument firmware can be downloaded from the R&S website (www.rohde-schwarz.com). This is a Microsoft Installation file (.MSI). The file name is ZVAB_XX_YY.MSI for a released version and ZVAB_XX_YY_BETAZZ.MSI for a test version. This file must be made available to the instrument via a suitable medium (Memory Stick, USB CD-ROM drive network or Remote Desktop. The instrument firmware is installed when you double click on the file. The instrument is ready for operation after you switch off and then switch back on again.

Installing Options

The following options can be fitted to the R&S ZVT:

Oven Quartz (OCXO)	R&S ZVAB-B4	1164.1757.02
Time Domain	R&S ZVAB-K2	1164.1657.02
Frequency Conversion	R&S ZVA-K4	1164.1863.02
True Differential Mode (for the R&S®ZVT8 only)	R&S ZVA-K7	1164.1540.02
Pulsed Measurements	R&S ZVA-K7	1164.1511.02
5 MHz Receiver Bandwidth	R&S ZVA-K17	1164.1070.02
Specific Options for R&S ZVT8 only:		
Direct Gen/Rec Access for PORT1 to PORT 8[1]	R&S ZVT8-B16	1300.1706.11-18
Additional PORT 3	R&S ZVT8-B63	1300.1506.03
Additional PORT 4[2]	R&S ZVT8-B64	1300.1506.04
Additional PORT 5[2]	R&S ZVT8-B65	1300.1506.05
Additional PORT 6[2]	R&S ZVT8-B66	1300.1506.06
Additional PORT 7[2]	R&S ZVT8-B67	1300.1506.07
Additional PORT 8[2]	R&S ZVT8-B68	1300.1506.08
Specific Options for R&S ZVT20 only:		
Combiner[3]	R&S ZVT20-B11	1300.1658.02
Direct Gen/Rec Access for PORT1 to PORT 6[1]	R&S ZVT20-B16	1300.1635.11-16
Generator Step Attenuator for Port 1	R&S ZVT20-B21	1300.1558.02
Generator Step Attenuator for Port 3[1]	R&S ZVT20-B23	1300.1564.02
Receiver Step Attenuator for Port 2	R&S ZVT20-B32	1300.1570.02
Receiver Step Attenuator for Port 4[1]	R&S ZVT20-B34	1300.1587.02
Additional PORT 3	R&S ZVT20-B63	1300.1606.03
Additional PORT 4[2]	R&S ZVT20-B64	1300.1606.04
Additional PORT 5[2]	R&S ZVT20-B65	1300.1606.05
Additional PORT 6[2]	R&S ZVT20-B66	1300.1606.06

[1] Requires the matching additional PORT option.
[2] Requires all additional PORT options with lower port numbers.
[3] Requires generator step attenuators for PORT 1 and Port 3.

Install according to the instructions that are supplied with the option.
These installation instructions can be appended to this chapter.

The OCXO option is permanently integrated on the frequency reference board (mod. 03, mod. 05) and, as a rule, it is specified when the instrument is ordered. When it is retrofitted, the frequency reference board must be replaced (replace mod. 02 or mod. 04 with mod. 05).

Installing hardware options:

CAUTION

Before installing the options, disconnect the mains cable.

Observe the safety instructions at the beginning of this manual.

The boards in the instrument are electrostatically sensitive devices (ESD). The appropriate handling instructions for these devices must be observed (ESD workstation).

- Turn off the instrument and disconnect the mains cable.
- Unscrew the 4 back-panel feet (460) and pull off the enclosure (400) towards the rear.
- Follow the **replacement instructions in Chapter 3**
- When installation has been completed, push the enclosure back into position and refit the back-panel feet.

CAUTION

When replacing the enclosure, ensure that no cables are damaged or pulled out:

- Connect the mains cable and turn on the instrument.

Contents - Chapter 5 "Documents"

Figures

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Tables

5 Documents

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

Spare Parts

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

CAUTION **Risk of shock hazard and instrument damage**

When replacing a module please note the safety instructions and the repair instructions given in chapter 3 and at the beginning of this service manual

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

Available Power Cables

Table 5-1 List of power cables available

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

ROHDE&SCHWARZ

Spare Parts List

Mechanical Drawings

List of R&S ZVT parts including spare parts

The R&S ZVT is constructed in accordance with R&S Design 2000.

Rackmount: 6E 1/1 T450

Overall dimensions: B x H x T: 426,7 x 309,9 x 517,00

Accessories: 19"-Adapter ZZA-511, Destignation 1096.3302.00

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

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

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
Drawing 1300.0000.01 (R&S ZVT Network Analyzer)					
10	ZM FUNDAMENTAL UNIT R&S ZVT8 Model 08	1300.0074.08	1		
20	ZM FUNDAMENTAL UNIT ZVT20 Model 20	1300.0074.20	1		
50	ZM FAN ZVT	1300.1970.00	3	E1 E2 E3	x
66	MZ FAN UNIT Model 20	1305.4161.00	2		x
67	VS 6900/ISR-M2.5X6-A2 Model 20	1096.4838.00	6		
100	ZE NETWORK CONTROLLER Model 08	1145.3635.04	2	A140 A130	x
101	ZE NETWORK CONTROLLER Model 20	1145.3635.04	1	A140	x
105	MZ AIR COVER ZVT	1300.0639.00	1		
110	EE SYNTHESIZER-DS Model 08	1302.5180.02	1	A170	x
115	EE SYNTHESIZER-LO Model 08	1302.4248.02	1	A160	x
116	EE SYNTHESIZER-LS Model 20 in place of 1302.4025.20 from 04/2008	1305.5300.20	1	A160	x
119	ED LO DIVIDER 8 Model 20	1302.4060.20	1	A 190	x
120	EE FREQ. REFERENCE	1145.3835.04	1	A100	x
122	DZ FLAT CABLE HOLDER 25/13	0099.7825.00	1		
128	ED LO DIVIDER 8	1302.4060.02	1	A190	x

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
	Model 08				
133	HEX 14 NUT ½ -28UNEF	3583.1561.00	2		
134	SERRATED LOCKWASHER	3583.1578.00	2		
135	ED PORT BIAS	1145.3935.03	1	A18	
136	MP CAP RD11	0570.5187.00	6		
137	MP CAP RD12.7	0344.4591.00	6		
140	MZ MOTHERB. RAIL R&S ZVT Model 08	1300.0568.00	1		
141	VS 965/ISR-M2.5X6-A4-PA Model 08	1148.3288.00	4		
142	VS 6900/ISR-M2.5X8-A2 Model 08	0041.1653.00	2		
143	MZ SUPPORT PLATE RM20 Model 20	1305.4061.00	1		
144	MZ SUPPORT PLATE RM20 Model 20	1305.4103.00	1		
145	MZ SUPPORT PLATE RM20 Model 20	1305.4090.00	1		
146	VS6900/ISR-M2.5X6-A2 Model 20	1148.3059.00	13		
147	VS6900/ISR-M2.5X8-A2 Model 20	0041.1653.00	3		
149	INSULATION FOIL	1305.3142.00	1		
150	ZM RM UNIT R&S ZVT 8GHz Model 08	1302.5173.02	2	A510 A520	
151	VS 6900/ISR-M2.5X6-A2 Model 08	1148.3059.00	4		
152	VS 965/ISR-M2.5X6-A4-PA Model 08	1148.3288.00	8		
155	COVER	0009.9181.00	2		
156	ZM RM UNIT ZVT 20 GHZ	1305.4184.20	2	A510 A520	
157	VS 6900/ISR-M2.5X6-A2 Model 20	1148.3059.00	10		
158	VS 965/ISR-M3X16-A4-PA Model 20	1300.0868.00	8		
159	VS 965/ISR-M2.5X6-A4-PA Model 20	1148.3288.00	4		

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
160	ZM CABLE SET R&S ZVT Model 08	1300.1029.08	1		
170	ZM CABLE SET R&S ZVT20 Model 20	1300.1029.20	1		
180	TERMINATION 50 OHM	0249.7823.00	2	R260 R261	
260	MZ REAR PLATE	1145.1903.00	1		
265	VS 6900/ISR-M2.5X6-A2	1148.3059.00	5		
270	2XRJ45 COUPLER JACK STRAIGHT	1093.9122.00	2	X241 X242	x
272	SILICONE CORD RD4X8MM	1130.0164.00	2		
275	DG CABLE 2XRJ45 ST/ST 8P	0041.9283.00	2	W241 W242	
280	DY IEC-BUS CABLE W21	1300.0539.00	1	W21	
282	VS DIN125-A3.2-A4	0082.4670.00	2		
284	VS DIN137-A3-A2	0005.0296.00	2		
286	VS DIN934-M3-A4	0016.4398.00	2		
288	MP COVER 25-PIN SUB-D	1093.9000.00	1		
289	MP CAP RD11.1/9.9	0009.9217.00	1		
290	MP COVER FOR IEC/IEEE BUS	0852.0450.00	1		
291	MP COVER 30X20 BLACK Model 08	1093.9051.00	6		
292	MP COVER 33X68 BLACK Model 08	1300.0597.00	8		
295	MZ BOTTOM COVER R&S ZVA	1145.1955.00	1		
296	MZ TOP COVER R&S ZVT	1300.0580.00	1		
297	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	37		
299	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	18		
300	KB FRONT COVER R&S ZVT8 Model 08	1300.0180.00	1		x
310	KB FRONT COVER R&S ZVT20 Model 20	1300.0200.00	1		x
315	VS DIN965-M1.6X3-A4	0078.3795.00	1		
400	KR BW2 CASING 6E1/1T450 R&S ZVT	1305.3459.00	1		x
405	KR HOLDING HOOK	1096.4796.00	3		x

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
410	KR BW2 FRONT HANDLE 6E	1096.1500.00	2		x
420	VS SCREW M4X14-ISR	1096.4896.00	6		
430	KR BW2 INSTRUMENT FOOT	1096.2506.00	4		x
440	KR BW2 MOUNTING FOOT	1096.2529.00	2		x
450	KR BW2 SIDE CARRYING HANDLET450	1096.2670.00	2		x
455	VS 965/ISR-M4X12-A4-PA	1148.2830.00	4		
460	KR BW2 REAR PANEL FOOT 50MM	1096.2487.00	4		x
470	OS BW2 LABEL REAR PANEL FOOT	1096.2435.00	1		
471	FJ CAP Model 08	0092.6375.00	2		
475	ADHESIVE FOIL 33X68 SW	1300.0597.00	10		
480	ZB ACCESS. R&S ZVT8/20	1300.0039.00	1		
Drawing 1300.0074.01 (Base Unit ZVT)					
500	ZM METAL FRAME R&S ZVT	1300.0080.00	1		
510	ED MOTHERBOARD R&S ZVT Model 08	1305.3107.02	1	A10	x
511	ED MOTHERBOARD ZVT Model 20	1305.3107.02	1	A10	x
520	VS 6900/ISR-M2.5X6-A2	1148.3059.00	21		
521	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
530	FM LOCKING SCREW H=4.5	1093.9180.00	2		
540	FM LOCKING SCREW M3	0009.6501.00	2		
550	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
551	EMC GASKET	1300.1806.00	2		
552	SERRATED LOCKWASHER	3583.1578.00	3		
553	HEX 14 NUT ½-28UNEF	3583.1561.00	3		
555	MZ CASCADE PLATE	1145.4690.00	1		
560	COVER PLATE DIGI.INT	1302.4377.00	1		
565	VS 965/ISR-M2.5X16-A4-PA	1148.3313.00	2		
580	GR FRONTMOD. CONTROLLER 7/3 Model 08	1091.3104.00	1	A90	x

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
581	GR FRONTMOD. CONTROLLER 7/3 Model 20	1091.3104.00	1	A90	x
582	LITHIUM BATTERY CR2032	0858.2049.00	1		x
585	HS BIOS R&S ZVT	1300.1758.00	1		
590	VS 6900/ISR-M2.5X6-A2	1148.3059.00	10		
595	DF CABLE 4X2 AND SHIELDING 380	2085.4350.00	1	W12	
596	DZ FEED-THROUGH RD8XRD14X8	0062.1146.00	1		
597	DZ HOLDER	0794.5214.00	1		
600	ZM FRONT UNIT R&S ZVT8 Model 08	1300.0097.08	1	A1	
604	ZM FRONT UNIT ZVT20 Model 20	1300.0097.20	1	A1	
610	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	4		
710	ZE HD WITH FIRMWARE R&S ZVAB Model 08	1145.1178.03	1	A60	x
711	ZE HD WITH FIRMWARE ZVAB Model 20	1145.1178.03	1	A60	x
715	DY SATA DATACABLE 265 Model 08	1091.3440.00	1	W11	x
716	DY SATA DATACABLE 265 Model 20	1091.3440.00	1	W11	x
717	DY SATA POWERCABLE 265	1091.3427.00	1	W13	x
720	MZ DISK MOUNT	1093.4837.00	1		
725	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
730	VS 965/ISR-M3X5-A4-PA	1148.2775.00	4		
735	ED AC FUSE BOARD	1145.3906.02	1	A21	x
736	MZ PROTECTION COVER	1300.0845.00	1		
737	VS 7985/ISR-M3X10-A4-PA	1148.2623.00	1		
738	OS LABEL 25MM HIGH-VOLTAGE FLASH	0042.5169.00	1		
740	DX POWER SUPPLY CABLE 2X6	1300.2448.00	1	W20	x
742	DY CABLE FOR ZVT POWER SUPPLY	1300.0768.00	1	W21	
745	DX POWER SUPPLY CABLE 4P	1300.1941.00	1	W22	
750	DX POWER SUPPLY CABLE 8P	1300.1987.00	1	W24	

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
755	DX POWER SUPPLY CABLE 10P	1300.1993.00	1	W25	
756	VS DIN137-A3-A2	0005.0296.00	8		
757	VS DIN137-A4-A2	0005.0315.00	6		
760	FN POWERFILTER WITH SWITCH	1145.5067.00	1	X200	x
765	VS 965/ISR-M3X8-A4-PA	1148.2798.00	2		
770	ZE POWER UNIT ZVAB	1145.3893.00	1	W200	
771	DZ GROMMET 7X12X16	0099.3520.00	1		
772	VS SCREW	1096.4838.00	2		
775	DX PE CABLE	1090.3881.00	1	W201	
776	DZ CABLE TIE RD32BR3.4 Model 08	0367.8393.00	2		
777	DZ CABLE TIE RD32BR3.4 Model 20	0367.8393.00	5		
788	OS LABEL 25MM HIGH-VOLTAGE FLASH	0042.5169.00	1		
789	MZ PROTECTION COVER ZVT Model 08	1300.1487.00	1		
790	GJ SWITCHING POWER SUPPLY AC90-264V	1300.2490.00	1	A20	x
791	MZ POWER SUPPLY PLATE ZVB	1145.2468.00	1		
792	VS DIN433-4.3-A4	0082.4586.00	4		
793	VS 7985/ISR-M4X8-A4-PA	1148.2652.00	4		
795	VS 6900/ISR-M2.5X6-A2	1148.3059.00	8		
796	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
797	IMAGE SOFTWARE	0048.7540.00	1		
798	HS WINDOES YP EMBEDDED	1099.8570.00	1		
799	OS BARCODE LABEL FOR PCB	0071.7714.00	1		
DRAWING 1300.0097.01 (Front Unit)					
800	MZ MOUNTING THROUGH R&S ZVT	1300.0168.00	1		
805	MZ MOUNTING THROUGH R&S ZVT20	1305.4178.00	1		
855	MM PROTECTIVE COLLAR 9.6 X 13.9	0852.1234.00	1		
860	SB PUSH-BUTTON BOARD	1300.1370.00	1	A16	

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
870	SB FLEX. SWITCHBOARD R&S ZVT	1300.0122.00	1	A15	
880	MZ SUPPORT PLATE R&S ZVT	1300.0139.00	1		
890	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
900	MB PUSH BUTTON 4.5	1145.2116.00	1		
910	VS DIN6797-A3.2-A2	0016.2820.00	1		
920	VS DIN934-M3-A4	0016.4398.00	1		
930	VS DIN9021-B2.7-A4	0031.5179.00	2		
940	VS 6900/ISR-M2.5X5-A2	0041.1630.00	2		
1050	ED USB-BOARD Model 08	1145.3207.02	1	A40	x
1051	ED USB-BOARD Model 20	1145.3207.02	1	A40	x
1070	VS 965/ISR-M2.5X5-A4-PA	1148.2752.00	2		
Drawing 1300.0600.01 (RM UNIT R&S ZVT 8 GHZ 1302.5173.02)					
100	ZE RM8 BR UNIT	1145.3593.02	1	A505	x
160	VS 965/ISR-M2.5X8-A4-PA	1148.3294.00	3		
170	MB FUNNEL PLASTIC	1302.5244.00	1		
180	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
190	ZE FAN 40x40x10	1145.4590.00	1	E500	x
230	ZN SMA SUPPORT PLATE R&S ZVT	1302.4854.00	1		
240	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
250	OS LABEL RM8	1145.4548.00	1		
300	DW CABLE W514 GEN	1145.2616.00	1	W514	
310	DW CABLE W515 MEAS	1145.2622.00	1	W515	
320	DW CABLE W518 REF	1145.3012.00	1	W518	
330	FJ TERMINATION 50O HM	0249.7823.00	1		
510	ZM RM SUBUNIT R&S ZVAB 4/8GHz	1302.4990.08	1		x
Drawing 1145.3593.01 (BR UNIT)					
100	MB N OUTER CONDUCTOR	1045.8888.00	1	X2	
110	ZM INNER CONDUCTOR UNIT	1302.5067.00	1		x

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
Drawing 1305.4184.01 (RM UNIT R&S ZVT 20GHZ)					
20	MN COVER A SIDE RM20	1305.4032.00	1		
40	MZ SMA SUPPORT BRACKET	1305.4155.00	1		
50	MZ VENTILATION PLATE	1305.4049.00	1		
60	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	7		
150	FJ ADAPTOR PC3.5	1127.9493.00	1	X2	x
200	ZE COUPLER 24	1162.0701.02	1	A501	x
300	MZ COUPLER BRACKET ZVT	1305.4149.00	1		x
350	MZ DISTANCE PLATE RM24	1145.4490.00	1		
400	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
450	VS 6900/ISR-M2.5X20-A4	5302.0431.00	2		
500	ZE REFLECTOMETER 20 UNIT	1145.4277.03	1	A500	x
600	DW CABLE W514 GEN	1305.4110.00	1	W514	x
700	DW CABLE W515 MEAS	1305.4126.00	1	W515	x
800	DW CABLE W518 REF	1305.4132.00	1	W518	x
900	DV CABLE W541	1145.4931.00	1	W541	
Drawing 1164.1770.00 (Option ZVAB-B4 1164.1757.02)					
120	EE FREQ. REFERENCE	1145.3835.05	1	A100	x
296	MZ INSTRUMENT COVER ZVT	1145.1849.00	1		
298	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	33		
400	KR BW2 CASING 5E1/1T350N-ZV	1145.1826.00	1		
405	KR HOLDING HOOK	1096.4796.00	1		
460	KR BW2 REAR PANEL FOOT 50MM	1096.2493.00	4		
Drawing 1300.1512.00 (Option ZVT8-B6x 1300.1506.03 to 1300.1506.18)					
1100	ZE NETWORK CONTROLLER Model 05 07 15 17	1145.3635.04	1	A110 A120	x
1120	EE SYNTHESIZER DS Model 05 15	1302.5180.02	1	A180	x
1150	ED LO DIVIDER Model 05	1300.2002.04	1	A610	x
1160	DY LO-DIV CABLE 420	1300.2083.00	1	W41	

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
1162	MZ LOCKING PLATE Model 05	1302.4483.00	1		
1165	ED PORT BIAS Model 03 05 07 13 15 17	1145.3935.03	1	A16 A17 A19	x
1166	FJ HEX 14 NUT ½-28UNEF	3583.1561.00	2		
1167	FJ SERRATED LOCKWASHER Model 03 05 07 13 15 17 for A16 A17 A19	3583.1578.00	2		
1170	ZM RM UNIT R&S ZVT 8 GHz	1302.5173.02	1	A530 A540 A550 A560 A570 A580	
1175	MZ RM8 HOLDING R&S ZVT Model 05 06 07 08 15 16 17 18	1300.0616.00	1		
1177	VS 965/ISR-M2.5X6-A4-PA Model 05 06 07 08 15 16 17 18	1148.3288.00	4		
1180	VS 6900/ISR-M2.5X6-A2	1148.3059.00	2		
1190	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	4		
1195	VS 965/ISR-M2.5X6-A4-PA Model 05 06 07 08 15 16 17 18	1148.3288.00	2		
1200	DY CABLE 50POL. Model03 04 13 14	1145.5144.00	1	W530 W540	
1210	DY FLACHBANDKABEL 50POL. Model 05 06 07 08 15 16 17 18	1145.4977.00	1	W550 W560 W570 W580	
1300	DW RF CABLE W676/A530 R&S ZVT Model 03	1300.1306.00	1	W676	x
1301	DW RF CABLE W676/A530 LOCAL Model 13	1305.3271.00	1	W676	x
1310	DW RF CABLE W175/A530 R&S ZVT Model 13	1305.3265.00	1	W175	x
1311	DW RF CABLE W175/A530 SOURCE Model 03	1300.1164.00	1	W175	x
1320	DV RF CABLE W137/A530 Model 03 13	1145.2868.00	1	W137	
1330	DV RF CABLE W136/A530 Model 03 13	1145.2851.00	1	W136	
1400	DW RF CABLE W679/A540 R&S ZVT Model 04	1300.1312.00	1	W679	x
1401	DW RF CABLE W679/A540 LOCAL Model 14	1305.3294.00	1	W679	x
1410	DW RF CABLE W176/A540 R&S ZVT Model 04	1300.5144.00	1	W176	x

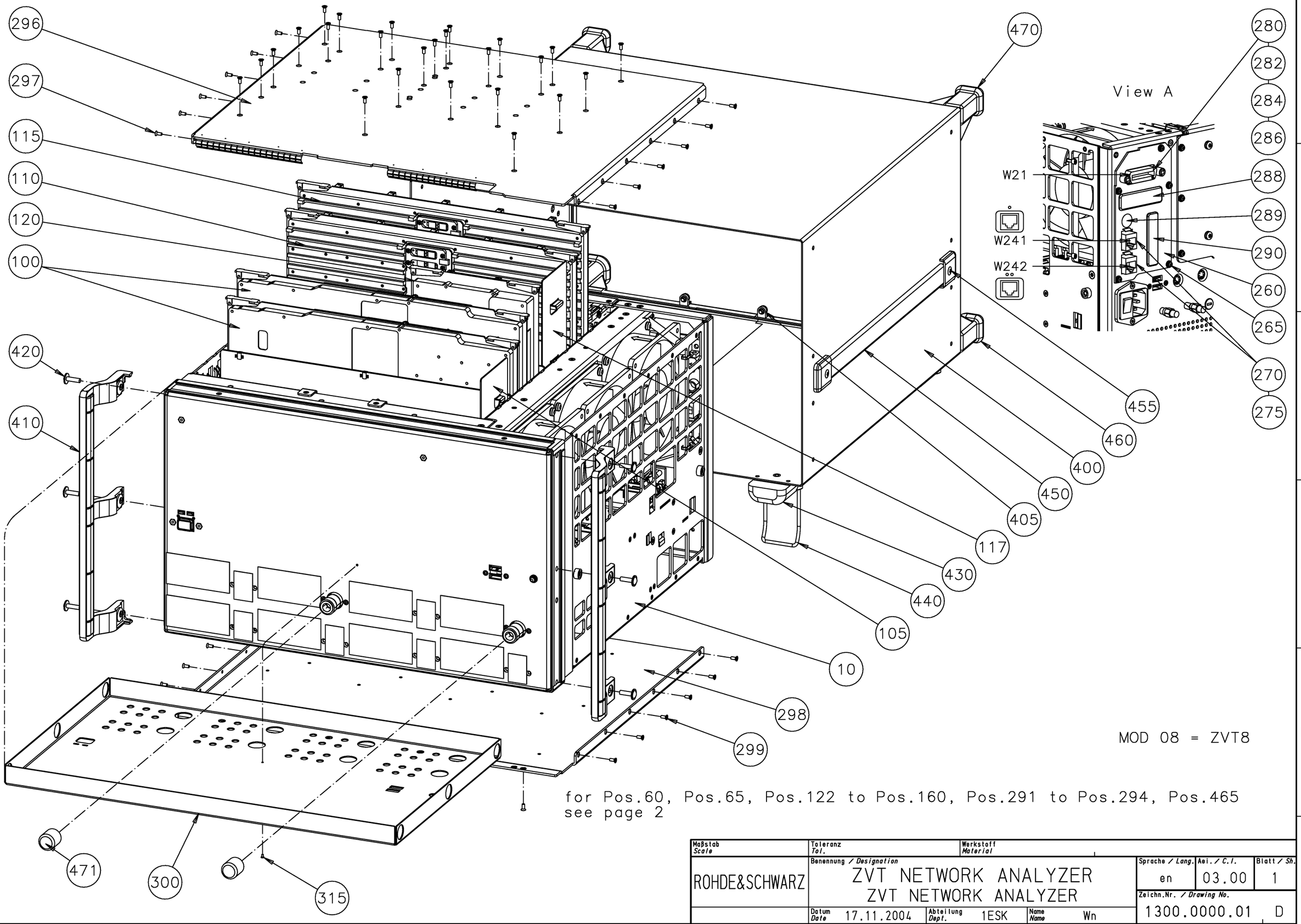
Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
1411	DW RF CABLE W176/A540 SOURC Model 14	1305.3288.00	1	W176	x
1420	DV RF CABLE W138/A540 Model 04 14	1145.2745.00	1	W138	
1430	DV RF CABLE W139/A540 Model 04 14	1145.2739.00	1	W139	
1500	DW RF CABLE W686/A550 ZVT Model 05	1300.1329.00	1	W686	x
1501	DW RF CABLE W686/A550 LOCAL Model 15	1305.3313.00	1	W686	x
1510	DW RF CABLE W186/A550 ZVT Model 05	1302.5150.00	1	W186	x
1511	DW RF CABLE W186/A550 SOURCE Model 15	1305.3307.00	1	W186	x
1520	DV RF CABLE W126/A550 Model 05 15	1300.2177.00	1	W126	
1530	DV RF CABLE W127/A550 Model 05 15	1300.2219.00	1	W127	
1550	DW RF CABLE W601 Model 05	1300.1258.00	1	W601	x
1560	DW RF CABLE W262 LO OUT Model 05	1300.1264.00	1	W262	x
1600	DW RF CABLE W689/A560 ZVT Model 06	1300.1335.00	1	W689	x
1601	DW RF CABLE W689/A560 LOCAL Model 16	1305.3336.00	1	W689	x
1610	DW RF CABLE W189/A560 ZVT Model 06	1300.1235.00	1	W189	x
1611	DW RF CABLE W189/A560 SOURCE Model 16	1305.3320.00	1	W189	x
1620	DV RF CABLE W129/A560 Model 06 16	1300.2183.00	1	W129	
1630	DV RF CABLE W128/A560 Model 06 16	1300.2225.00	1	W128	
1700	DW HF CABLE W696/A570 ZVT Model 07	1300.1341.00	1	W696	x
1701	DW HF CABLE W696/A570 LOCAL Model 17	13053359.00	1	W696	x
1710	DW HF CABLE W185/A570 ZVT Model 07	1300.1206.00	1	W185	x

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
1711	DW HF CABLE W185/A570 SOURCE Model 17	1305.3342.00	1	W185	x
1720	DV HF CABLE W116/A570 Model 07 17	1300.2190.00	1	W116	
1730	DV HF CABLE W117/A570 Model 07 17	1300.2231.00	1	W117	
1800	DW RF CABLE W699/A580 ZVT Model 08	1300.1358.00	1	W699	x
1801	DW RF CABLE W699/A580 LOCAL Model 18	1305.3371.00	1	W699	x
1810	DW RF CABLE W186/A580 ZVT Model 08	1300.1229.00	1	W186	x
1811	DW RF CABLE W186/A580 SOURCE Model 18	1305.3365.00	1	W186	x
1820	DV RF CABLE W119/A580 Model 08 18	1300.2202.00	1	W119	
1830	DV RF CABLE W118/A580 Model 08 18	1300.2248.00	1	W118	
1840	FJ CAP	0092.6375.00	1		
1900	PD INSTALLATION INSTRUCT. ZVT8-B6x Model 03 04 05 06 07 08	1300.1512.00	1		
1910	PD INSTALLATION INSTRUCT. ZVT8-B6x Model 13 14 15 16 17 18	1305.4649.00	1		
Drawing 1300.1712.00 (Option R&S ZVT8-B16 1300.1706.11-18)					
2020	DW RF CABLE W501 REF IN	1300.0774.00	1	W501	
2030	DW RF CABLE W503 REF OUT	1300.0780.00	1	W503	
2040	DW RF CABLE W504 MEAS IN	1300.0797.00	1	W504	
2050	DW RF CABLE W505 MEAS OUT	1300.0800.00	1	W505	
2060	DW RF CABLE W534 SRC IN	1300.0816.00	1	W534	
2070	DW RF CABLE W535 SRC OUT	1300.0822.00	1	W535	
2080	DW CABLE EXT. 3.6	1300.1729.00	3		
2090	PD INSTALLATION INSTRUCTION R&S ZVT-B16	1300.1712.00	1		
Drawing 1300.1641.00 (Option ZVT20-B16 1300.1635.11-16)					
3020	DW RF CABLE W501 REF IN	1305.4332.00	1	W501	
3030	DW RF CABLE W503 REF OUT	1305.4349.00	1	W503	

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
3040	DW RF CABLE W504 MEAS IN	1305.4355.00	1	W504	
3041	DW RF CABLE W603 MEAS IN with option ZVT20-B32/34	1305.4390.00	1	W603	
3050	DW RF CABLE W505 MEAS OUT	1305.4361.00	1	W505	
3060	DW RF CABLE W534 SRC IN	1305.4378.00	1	W534	
3070	DW RF CABLE W535 SRC OUT	1305.4384.00	1	W535	
3080	DW CABLE EXT. 3.6	1300.1729.00	3		
3090	PD INSTALLATION INSTRUCTION ZVT20-B16	1300.1641.00	1		
Drawing 1300.1612.00 (Option ZVT20-B6x 1300.1606.03 to 1300.1606.06)					
3100	ZE NETWORK CONTROLLER Model 03 05	1145.3635.04	1	A120 A130	x
3110	EE SYNTHESIZER DS Model 03	1302.5180.02	1	A170	x
3120	ED PORT BIAS Model 03 05	1145.3935.03	1	A16 A17	x
3121	FJ HEX 14 NUT ½-28UNEF Model 03 05 for A16 A17	3583.1561.00	2		
3122	FJ SERRATED LOCKWASHER Model 03 05 for A16 A17	3583.1578.00	2		
3130	ZM RM UNIT ZVT 20GHz	1305.4184.20	1	A530 A540 A550 A560	x
3131	VS 6900/ISR-M2.5X6-A2	1148.3059.00	5		
3132	VS 965/ISR-M3X16-A4-PA	1300.0868.00	4		
3133	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
3140	MZ SUPPORT PLATE RM20 Model 03	1305.4084.00	1		
3141	VS 6900/ISR-M2.5X6-A2	1148.3059.00	7		
3142	MZ SUPPORT PLATE RM20 Model 04	1305.4061.00	1		
3143	VS 7895/ISR-M2.5X6-A4-PA Model 04	1143.5630.00	6		
3144	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	3		
3150	MZ FAN UNIT Model 05	1305.4161.00			

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
3163	DY CABLE W530 Model 03	1305.4755.00	1	W530	
3164	DY CABLE W540 Model 04	1305.4761.00	1	W540	
3165	DY CABLE W530 Model 05	1305.4778.00	1	W550	
3166	DY CABLE W540 Model 06	1305.4784.00	1	W560	
3170	DW RF CABLE W631 SOURCE Model 03	1305.4255.00	1	W676	x
3180	DW RF CABLE W632 LOCAL Model 03	1305.4261.00	1	W632	x
3190	DW RF CABLE W641 SOURCE Model 04	1305.4278.00	1	W641	x
3200	DW RF CABLE W642 LOCAL Model 04	1305.4284.00	1	W642	x
3210	DV RF CABLE W651 SOURCE Model 05	1305.4290.00	1	W651	x
3220	DV RF CABLE W652 LOCAL Model 05	1305.4303.00	1	W652	x
3230	DW RF CABLE W661 SOURCE Model 06	1305.4310.00	1	W661	x
3240	DW RF CABLE W662 LOCAL Model 06	1305.4326.00	1	W662	x
3250	DW RF CABLE W136/A530 Model 03	1305.4510.00	1	W136	
3251	DW RF CABLE W137/A530 Model 03	1305.4526.00	1	W137	
3252	DW RF CABLE W139/A540 SOURC Model 04	1305.4532.00	1	W139	
3253	DV RF CABLE W138/A540 Model 04	1305.4549.00	1	W138	
3254	DV RF CABLE W126/A550 Model 05	1305.4555.00	1	W126	
3255	DW RF CABLE W127/A550 Model 05	1305.4561.00	1	W127	
3256	DW RF CABLE W129/A560 LOCAL Model 15	1305.4578.00	1	W129	
3257	DW RF CABLE W128/A560 R&S ZVT Model 05	1305.4584.00	1	W128	

Position	Destignation	Stock No.	Number	Electrical Destignation	Recommended Spare parts
3490	PD INSTALL. INSTRUCT. ZVT20-B6x	1300.1612.00	1		
Drawing 1300.1593.00 (Option R&S ZVT20-B21 1300.1558.02 and R&S ZVT20-B23 1300.1564.02)					
3500	ATTENUATOR 70DB 20GHZ	1170.0071.00	1	A585	x
3502	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
3710	RF CABLE W512 ATT GEN	1305.6006.00	1	W512	x
3720	RF CABLE W536 SRC	1305.6012.00	1	W536	x
3730	ATT-CTRL CABLE 90	1164.0244.00	1	W550	x
3740	RF CABLE W513 SRC OUT	1305.6029.00	1	W513	x
3750	TERMINATION 50 OHM	0249.7823.00	2	R585 R586	
3780	INSTALL. INSTRUCT. R&S ZVT20-B21, -B23, -B32, -B34	1300.1593.00	1		
Drawing 1300.1593.00 (Option R&S ZVT20-B32 1300.1570.02 and R&S ZVT20-B34 1300.1587.02)					
3600	ATTENUATOR REC24	1046.5082.05	1	A585	x
3602	VS 965/ISR-M2.5X6-A4-PA	1148.3288.00	2		
3610	RF CABLE W601 MEAS	1305.4190.00	1	W601	x
3620	RF CABLE W602 MEAS	1305.4203.00	1	W602	x
3630	ATT-CTRL CABLE 90	1164.0244.00	1	W550	x
3640	RF CABLE W603 MEAS IN	1305.4390.00	1	W603	x
3680	INSTALL. INSTRUCT. R&S ZVT20-B21, -B23, -B32, -B34	1300.1593.00	1		
Drawing 1300.1664.00 (Option R&S ZVT20-B11 1300.1606.03 to 1300.1658.02)					
3700	2 WAY POWER SPLITTER/COMBINER	3584.5002.00	1	A590	
3710	COMBINATION SREW	0048.8218.00	2		
3720	RF CABLE W591 IN PORT1	1305.6035.00	1	W591	
3730	RF CABLE W592 OUT PORT1	1305.6041.00	1	W592	
3740	RF CABLE W593 OUT PORT3	1305.6058.00	1	W593	
3780	INSTALL. INSTRUCTION R&S ZVT20-B11	1300.1664.00	1		

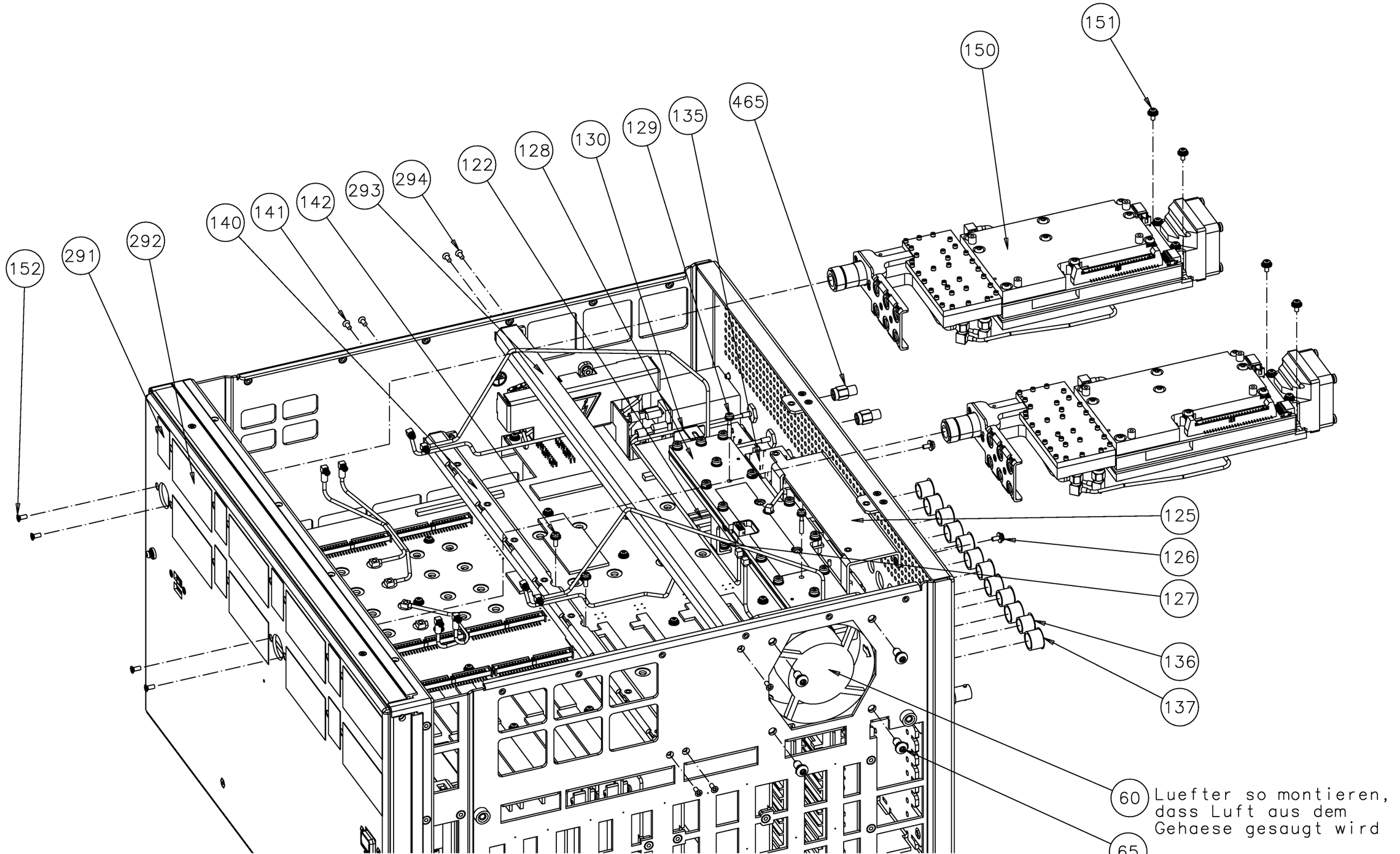


MOD 08 = ZVT8

for Pos.60, Pos.65, Pos.122 to Pos.160, Pos.291 to Pos.294, Pos.465
see page 2

Projektions-methode
Projection Method

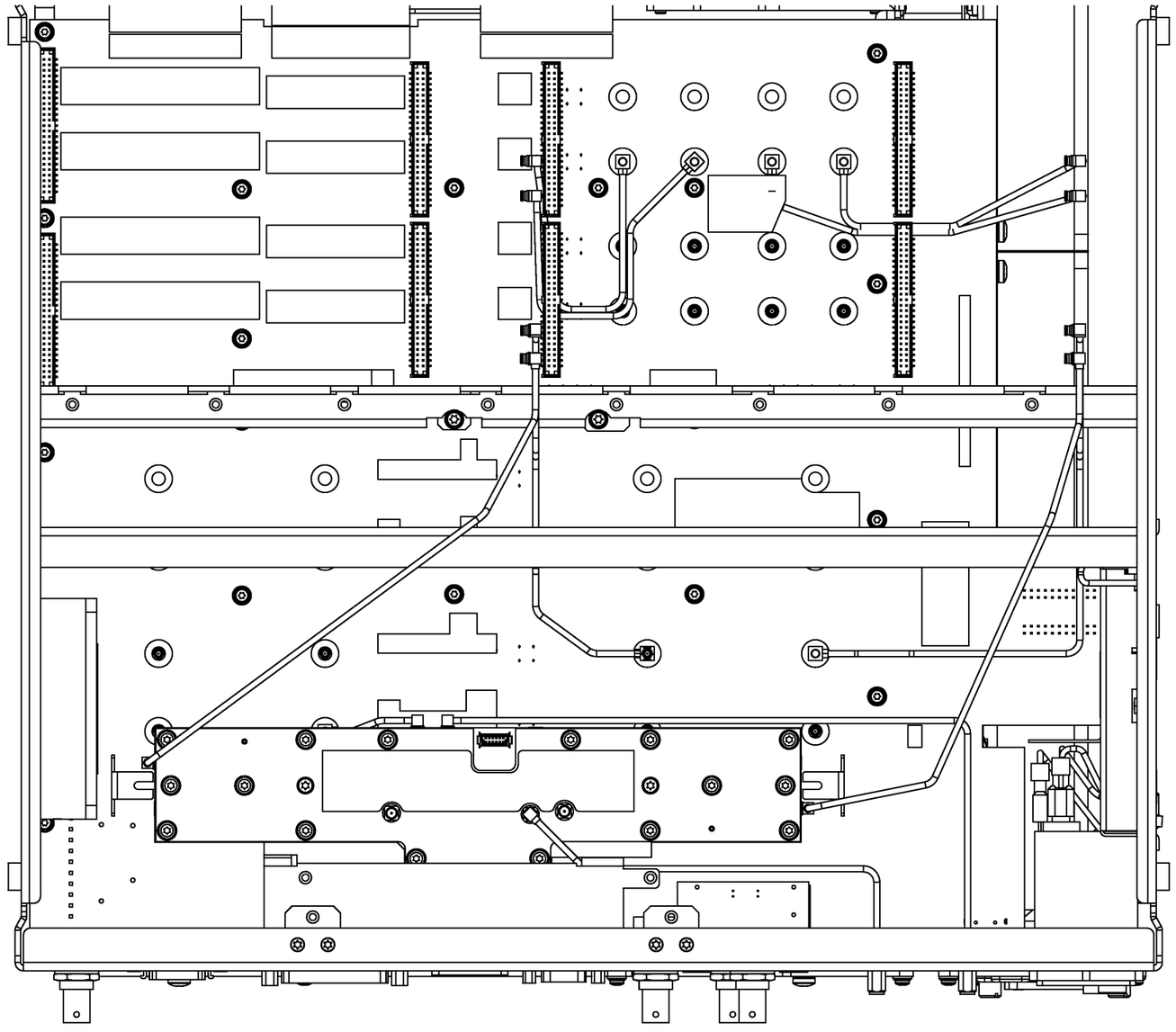
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*		
ROHDE&SCHWARZ	Benennung / *Designation* ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER		Sprache / *Lang.*: en	Aei. / *C.I.*: 03.00	Blatt / *Sh.*: 1
	Datum *Date*: 17.11.2004	Abteilung *Dept.*: 1ESK	Name *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1300.0000.01	D



160 see connector designation of cables and motherboard for cable mounting

Projektions-methode
Projection Method

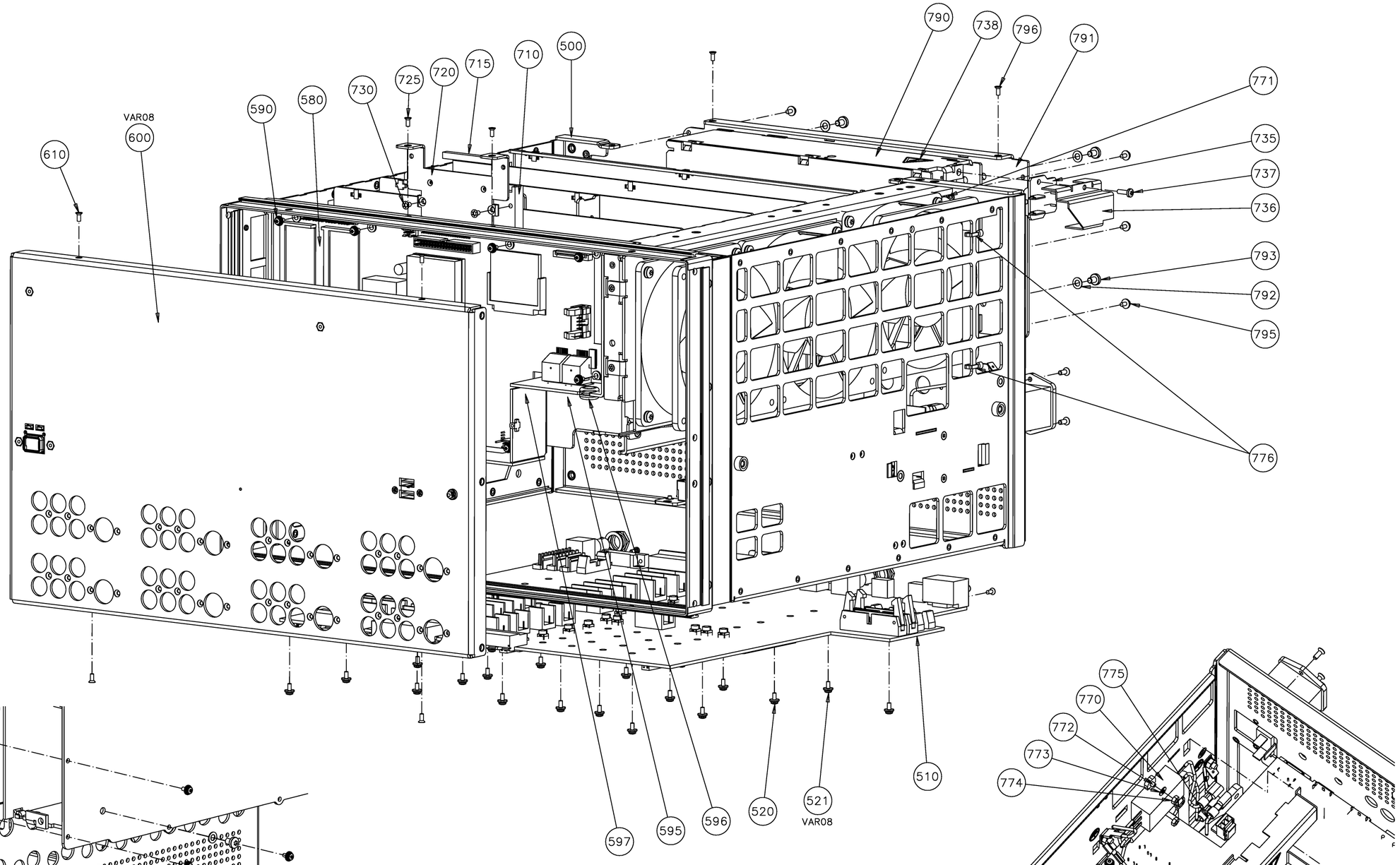
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Sprache / *Lang.*: en	Aei. / *C.I.*: 04.00	Blatt / *Sh.*: 2
	Datum *Date*: 2005-03-10	Abteilung *Dept.*: 1ESK	Name *Name*: HG	Zeichn.Nr. / *Drawing No.*: 1300.0000.01		D

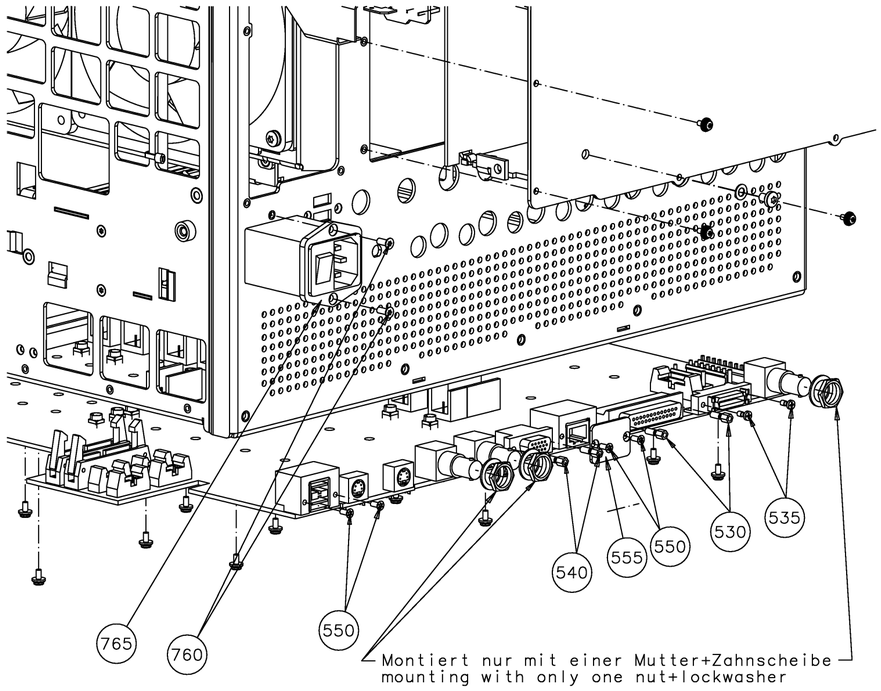


Projektions-methode

Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Sprache / *Lang.*: en	Aei. / *C.I.*: 02.00	Blatt / *Sh.*: 3
	Datum *Date*: 22.10.2004	Abteilung *Dept.*: 1ESK	Name *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1300.0000.01		D





Pos. 740, 742, 745, 750, 755, 756, 757
siehe Seite 2/see page 2

Variantenerklaerung/Versions
VAR08 = ZVT8

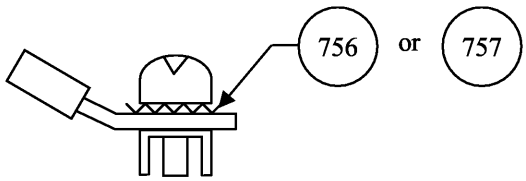
Projektions-methode
Projection Method

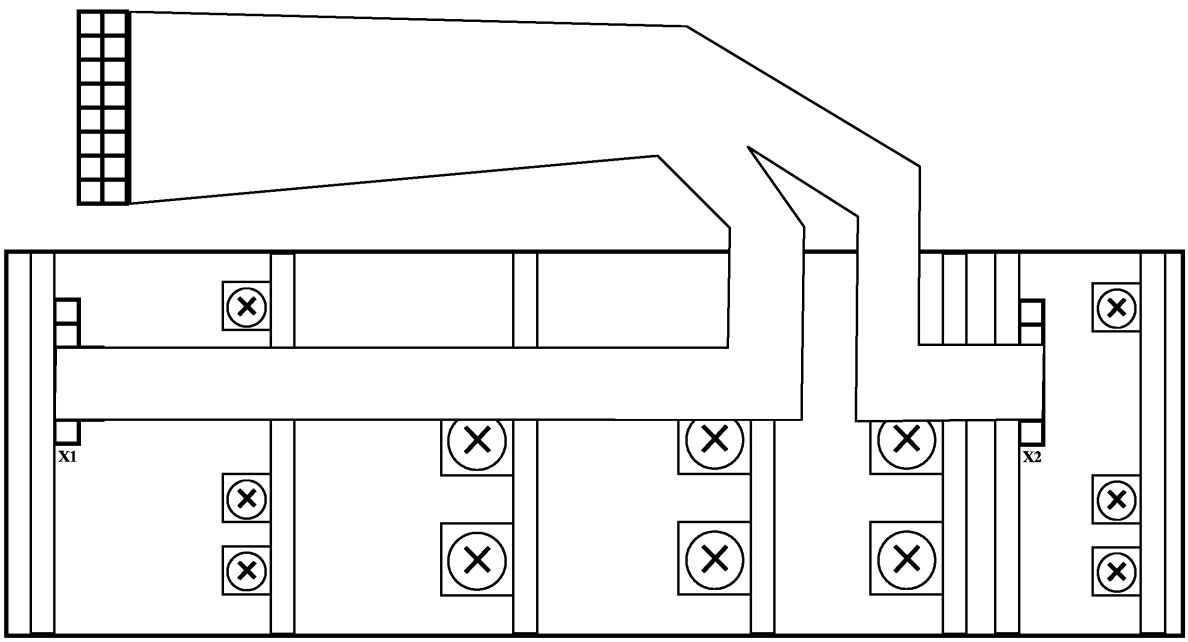
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation*: Grundeinheit ZVT / Fundament. Unit ZVT			Sprache / *Lang.*: de en	Aen. / *C.I.*: 02.00
				Blatt / *Sh.*: 1	
	Datum *Date*: 02.11.2004	Abteilung *Dept.*: 1ESK	Name *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1300.0074.01	D

Verdrahtungsplan Netzteil
wire connections for power supply

Pos. 750		Pos. 745		Pos. 755		Pos. 740		Pos. 750	
W24 (Cable 8p)		W22 (Cable 4p)		W25 (Cable 10p)		W20 (Cable 2x6p)		W24 (Cable 8p)	
		12V		6,5V		3,4V			
+	+8V (orange)							+	+5V (red)
-	GND(+8V) (black)							-	GND(+5V) (black)
Pos. 755								Pos. 755	
W25 (Cable 10p)								W25 (Cable 10p)	
+	GND(-12V) (black)	+	+12V (red)	+	+6V (red)	+	+3,3V (red)	+	GND(-6V) (black)
-	-12V (blue)	-	GND(+12V) (black)	-	GND(+6V) (black)	-	GND(+3,3V) (black)	-	-6V (orange)

Connection for upper table:

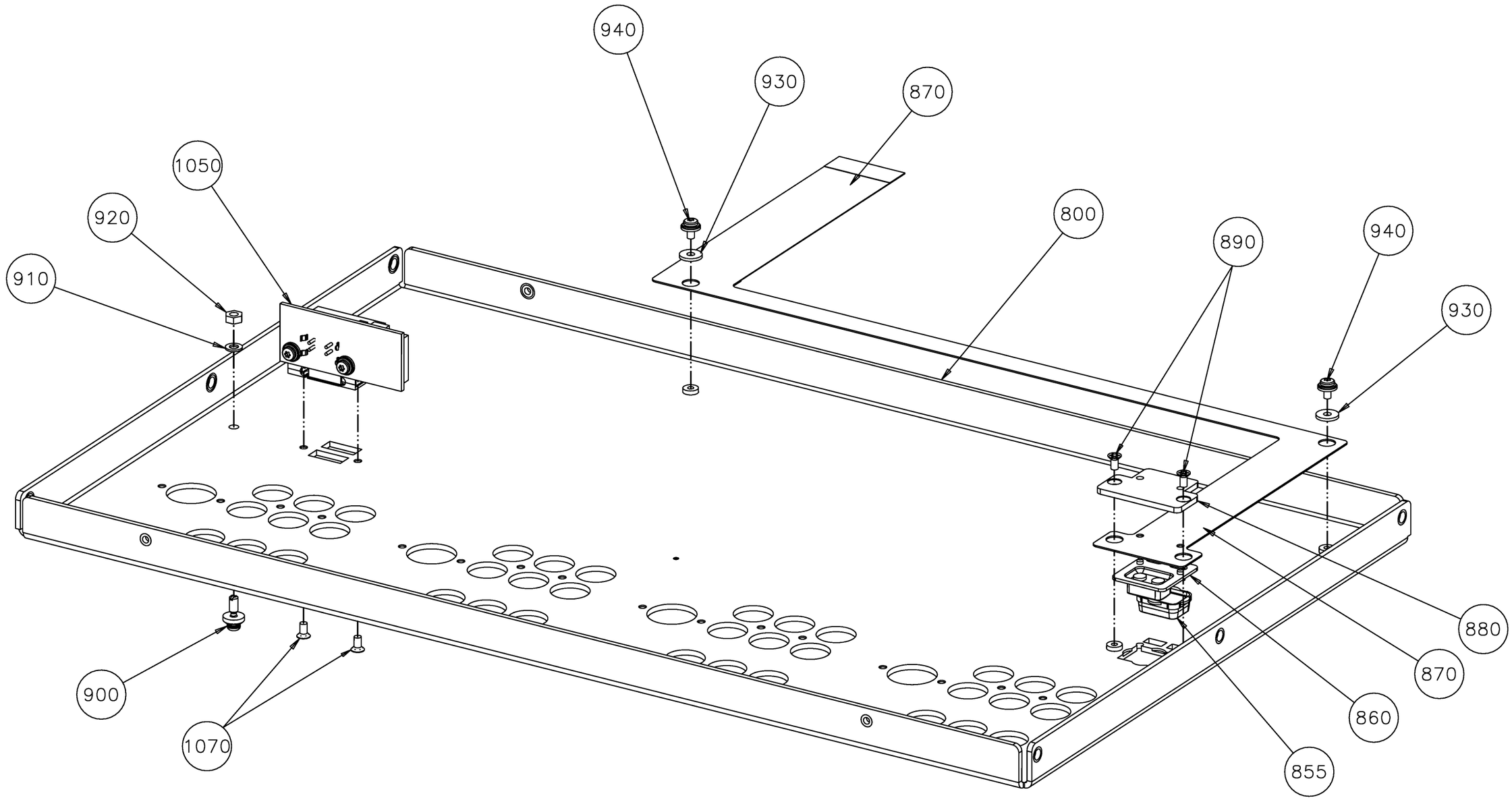




Maßstab: / *Scale:*	Toleranz: / *Tol.:*	Rauht.: /*Roughn.:*	Kanten: / *Edges:*	Werkstoff: / *Material:*	Werknormen: / *Company Standards:*

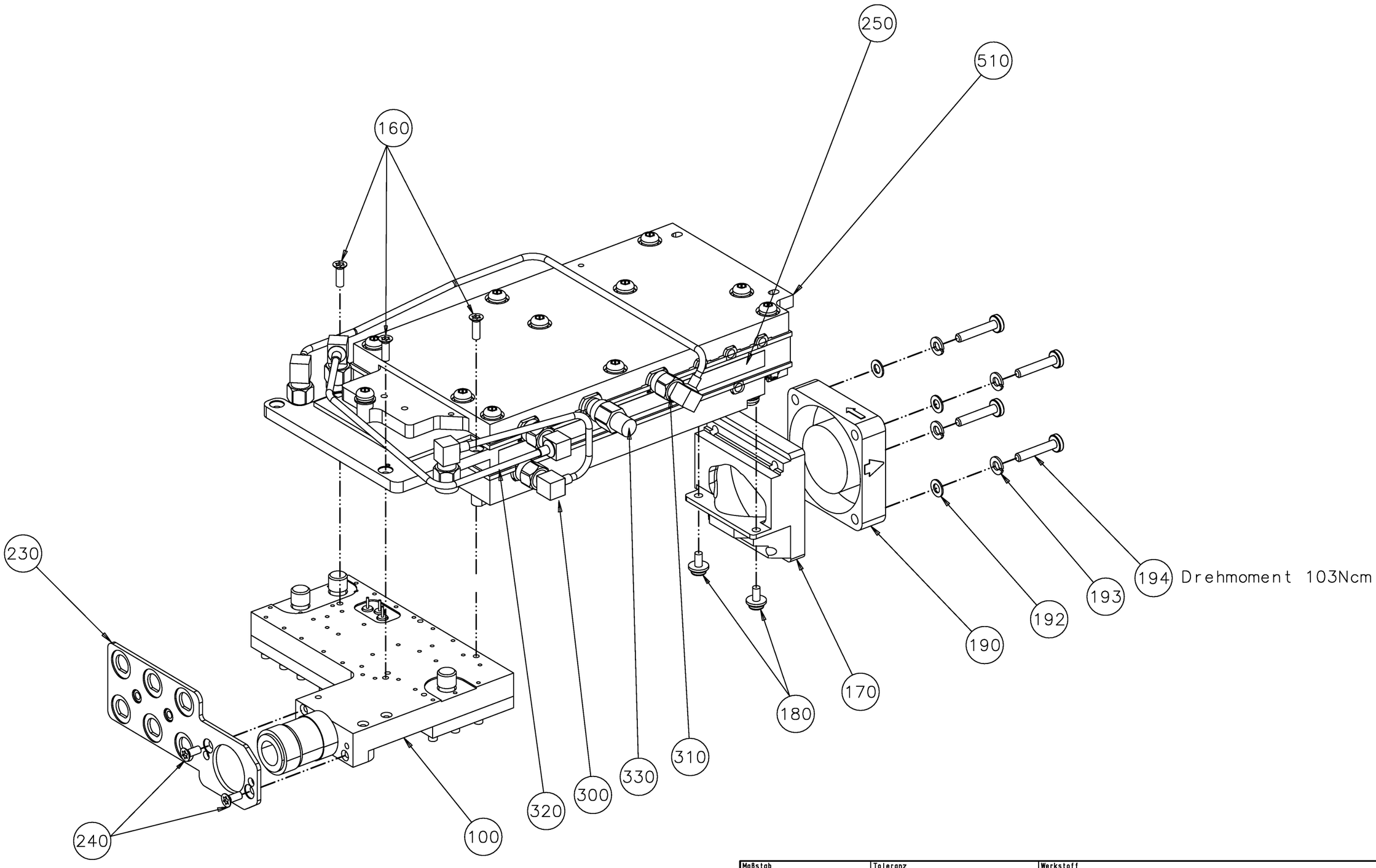
ROHDE&SCHWARZ	Benennung: *Designation:* Grundeinheit ZVT Fundamental Unit	Sprache: / *Lang.:* de en	Aei: / *C.I.:* 02.00	Blatt: / *Sh.:* 2
Typ: *Type:* ZVT	Datum: *Date:* 14.01.05 / Abteilung: *Dept.:* 1ESK / Name: *Name:* HG	Zeichn. Nr.: / *Drawing Nr.:* 1300.0074.01		
1. Z.: *used in:*				

VAR08 Ausführung ZVT8
MOD08 Version ZVT8



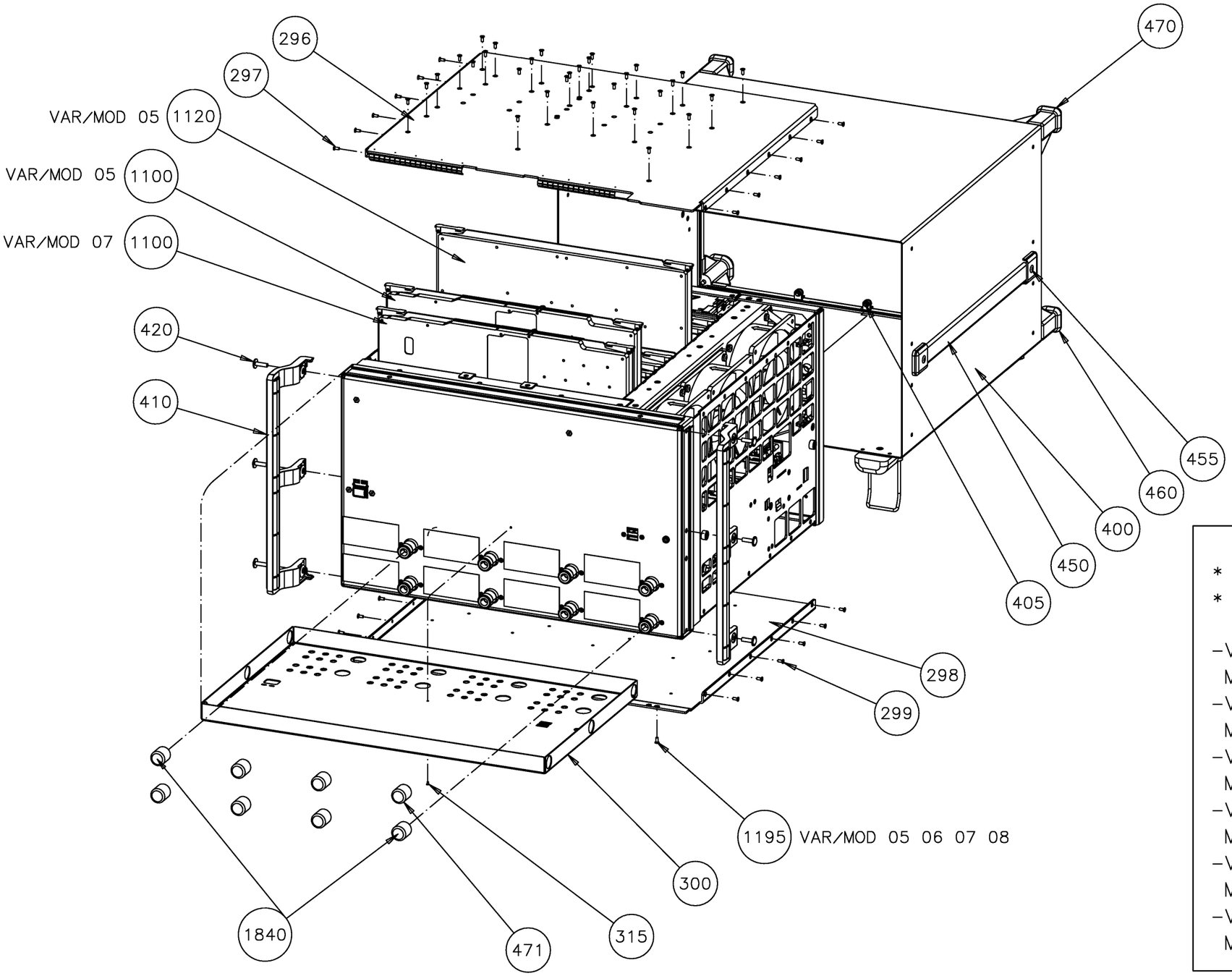
Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation*: FRONTEINHEIT ZVT8 / FRONT Unit ZVT8	Sprache / *Lang.*: de en; Aei. / *C.I.*: 02.00; Blatt / *Sh.*: 1	
	Datum *Date*: 02.11.2004; Abteilung *Dept.*: 1ESK; Name *Name*: Wn	Zeichn.Nr. / *Drawing No.*: 1300.0097.01	D



Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* RM UNIT ZVT 8GHz RM UNIT ZVT 8GHz			Sprache / *Lang.* de en	Aei. / *C.I.* 03.00	Blatt / *Sh.* 1
	Datum *Date* 25.10.2004	Abteilung *Dept.* 1ESK	Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1300.0600.01		D

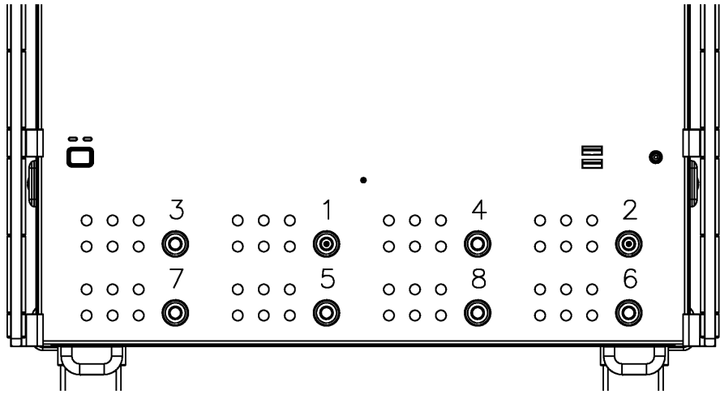


* VARIANTENERKLAERUNG
* EXPLANATION OF MODELS

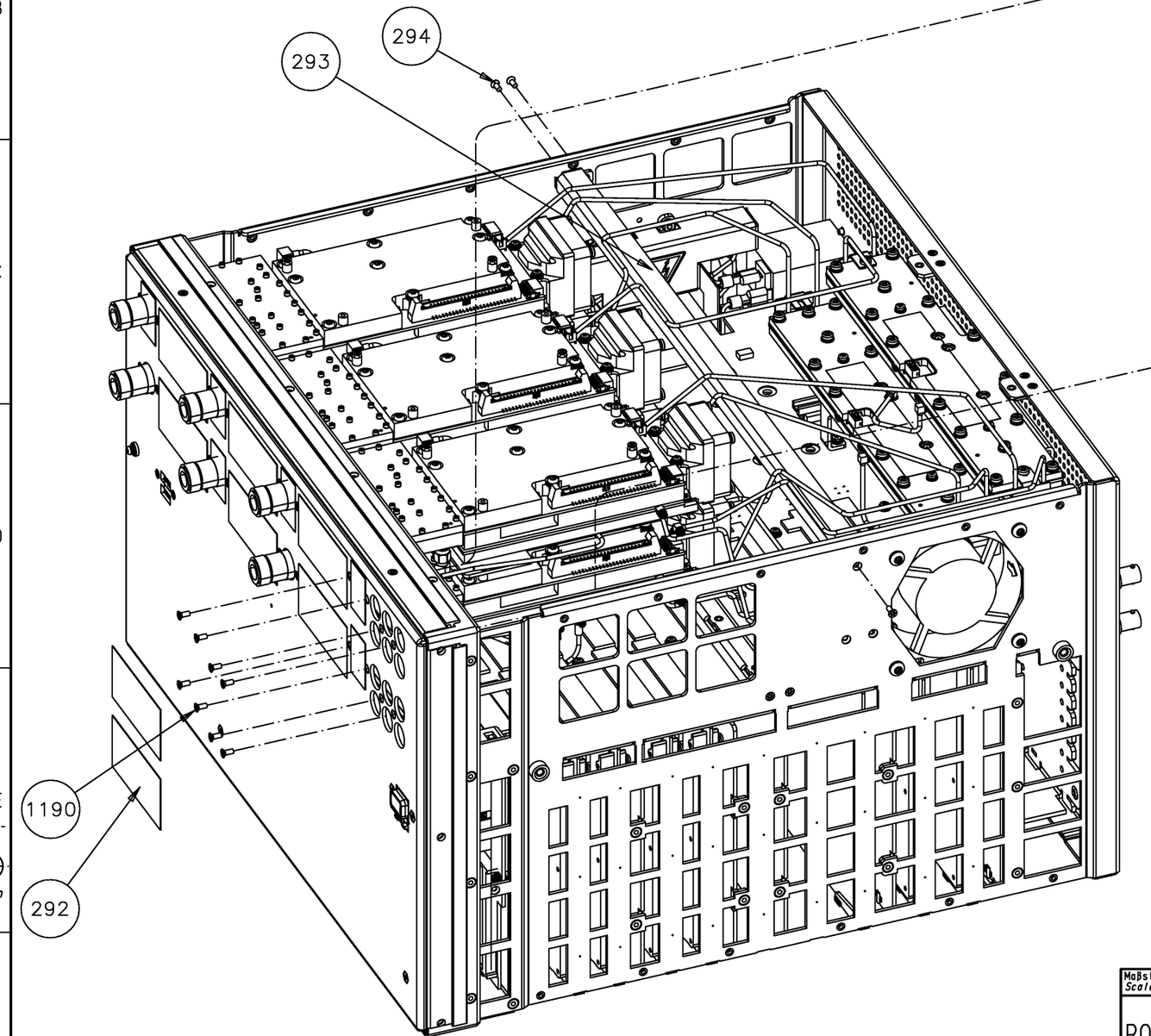
-VAR03=TOR-ERWEITERUNG 3
MOD03=PORT-EXTENSION 3
-VAR04=TOR-ERWEITERUNG 4
MOD04=PORT-EXTENSION 4
-VAR05=TOR-ERWEITERUNG 5
MOD05=PORT-EXTENSION 5
-VAR06=TOR-ERWEITERUNG 6
MOD06=PORT-EXTENSION 6
-VAR07=TOR-ERWEITERUNG 7
MOD07=PORT-EXTENSION 7
-VAR08=TOR-ERWEITERUNG 8
MOD08=PORT-EXTENSION 8

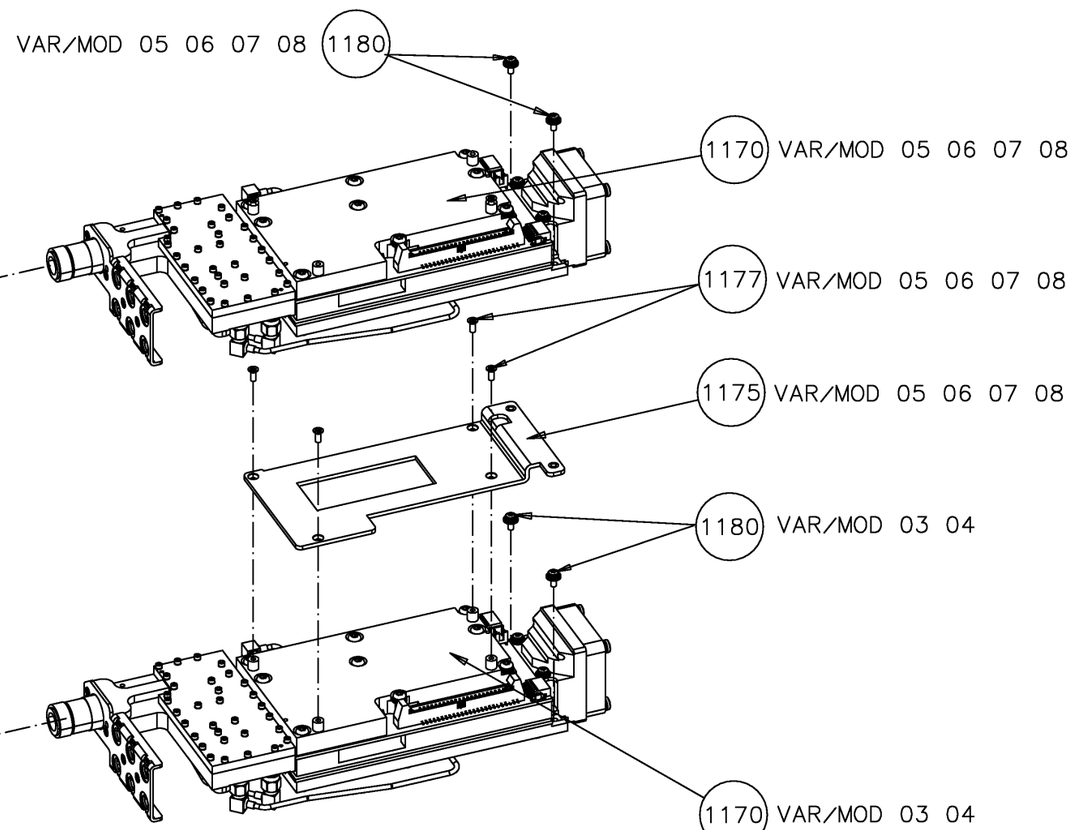
Projektions-methode
Projection Method

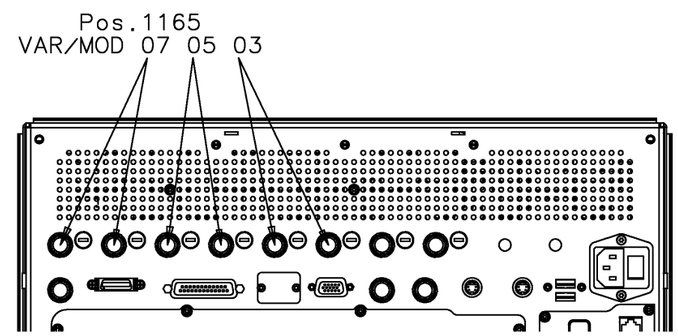
Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANW. ZVT-B6 INST INSTRUCT. ZVT-B6*			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 1
ZVT-B6	Datum *Date* 2005-11-09	Abteilung *Dept.* 1ESK	Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1300.1512.00		D



Montage/Demontage von Baugruppe 1170
Installing/uninstalling of Unit 1170

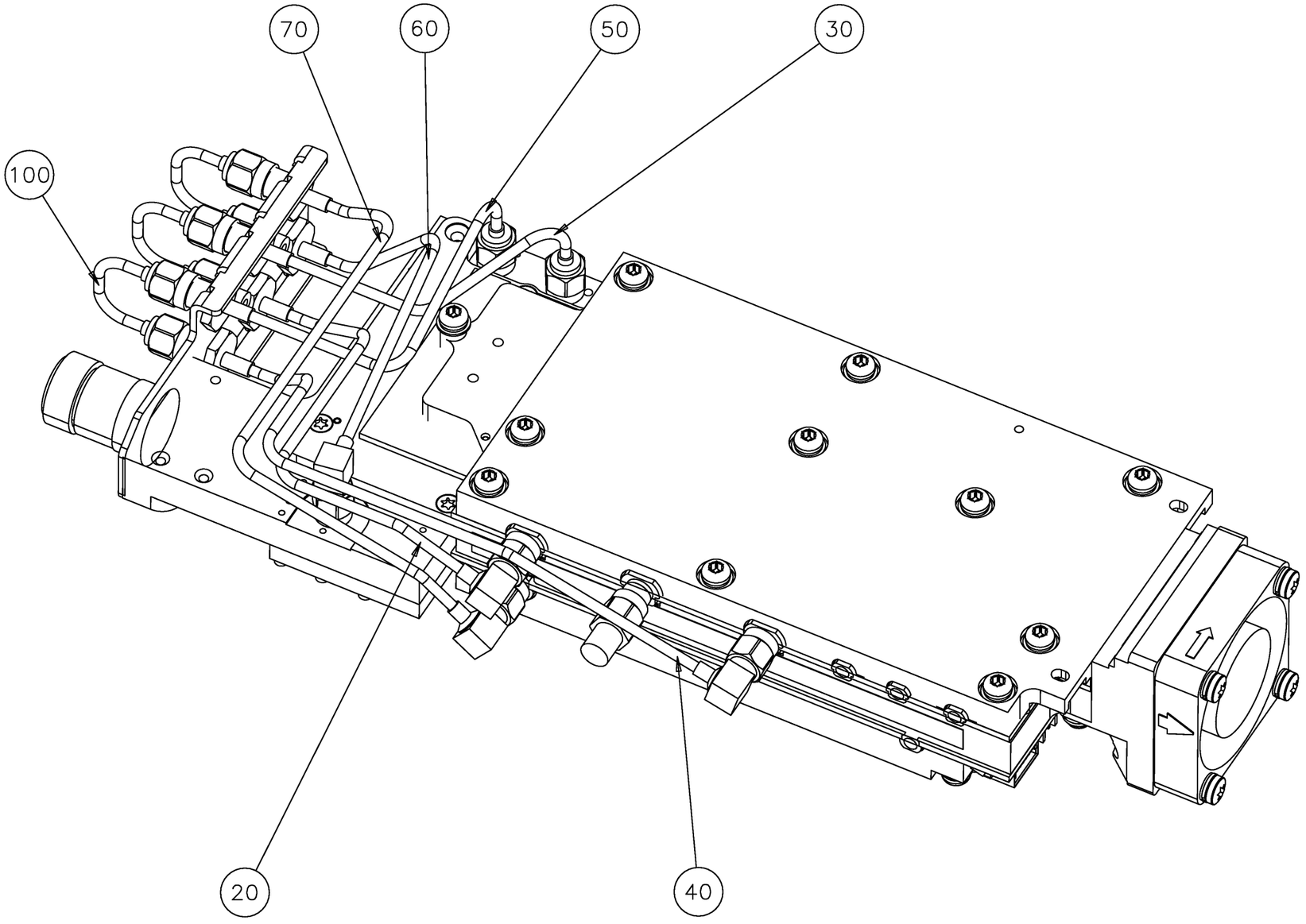






Projektions-methode
Projection Method

Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANW. ZVT-B6 INST INSTRUCT. ZVT-B6*			Sprache / *Lang.* de en	Aei. / *C.I.* 02.00	Blatt / *Sh.* 2
ZVT-B6	Datum *Date* 2005-11-09	Abteilung *Dept.* 1ESK	Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1300.1512.00		D

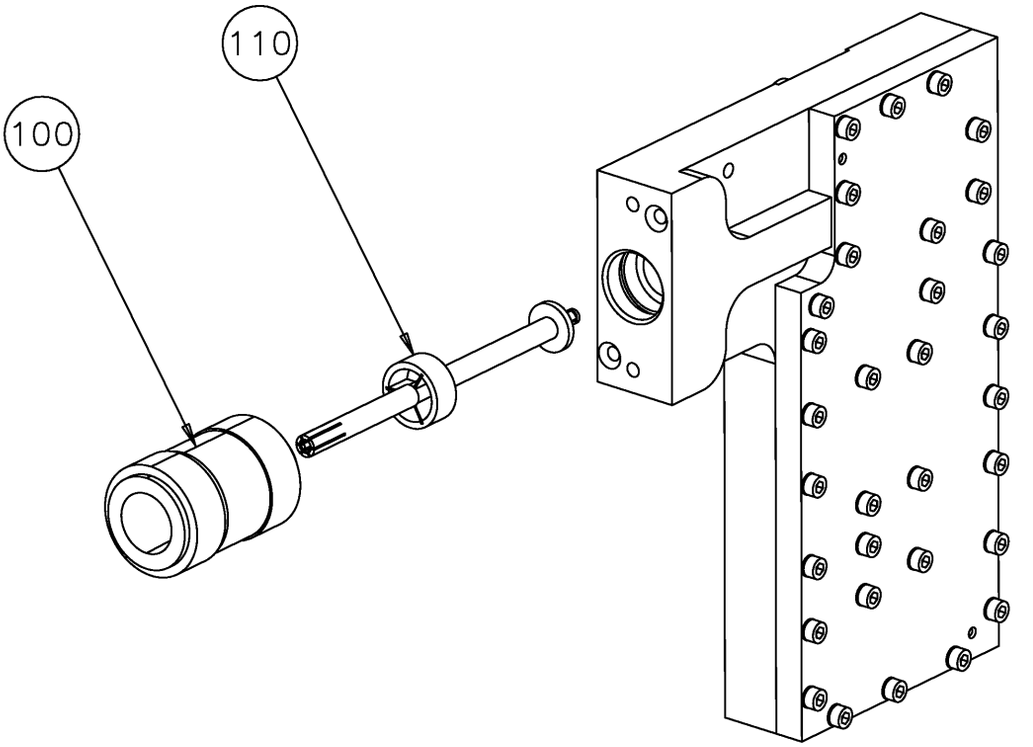


VARIANTENERKLAERUNG
EXPLANATION OF MODELS

-VAR11=TOR 1
MOD11=PORT 1
-VAR12=TOR 2
MOD12=PORT 2
-VAR13=TOR 3
MOD13=PORT 3
-VAR14=TOR 4
MOD14=PORT 4
-VAR15=TOR 5
MOD15=PORT 5
-VAR16=TOR 6
MOD16=PORT 6
-VAR17=TOR 7
MOD17=PORT 7
-VAR18=TOR 8
MOD18=PORT 8

Projektions-methode
Projection Method

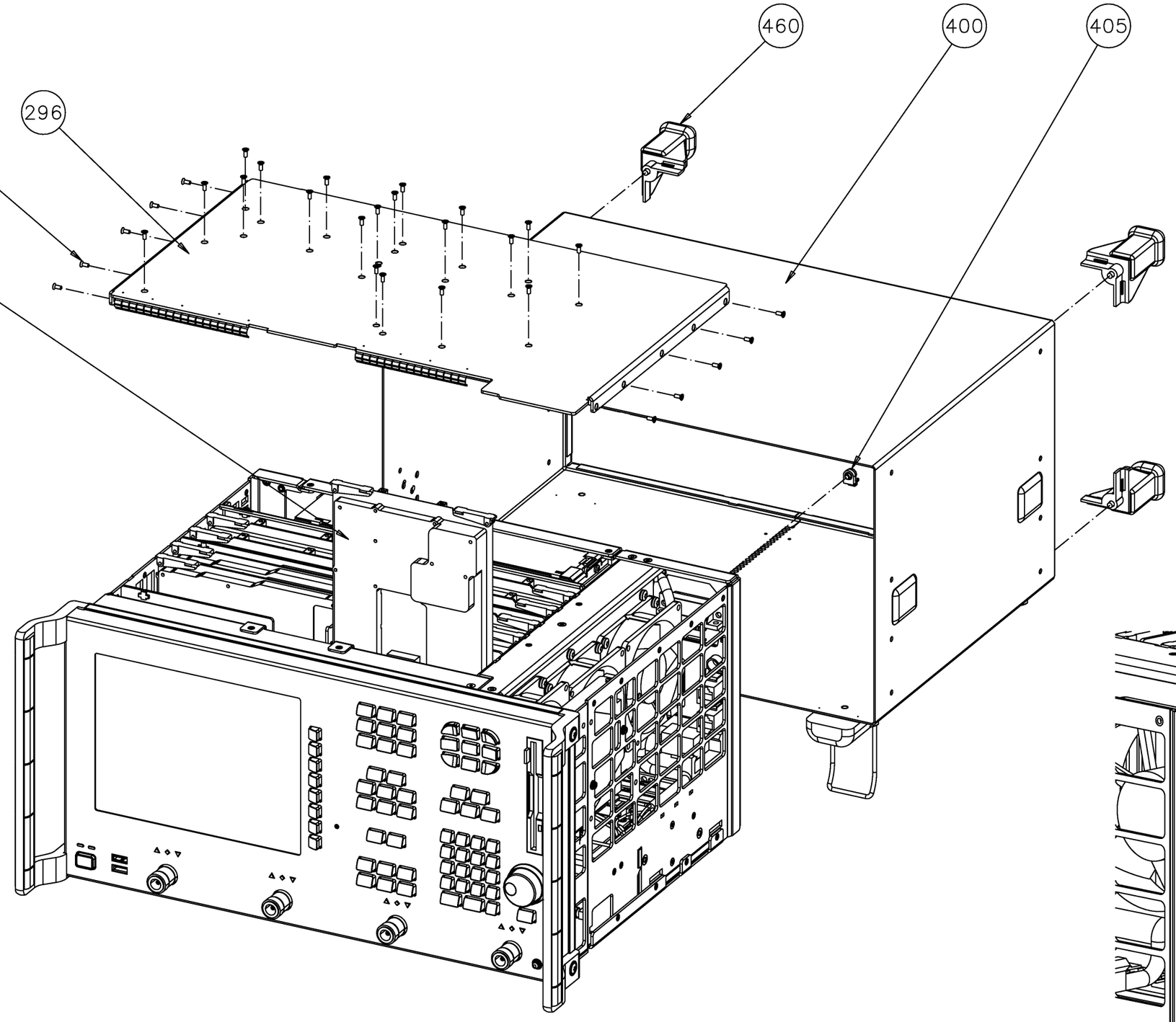
Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*			
ROHDE&SCHWARZ	Benennung / *Designation* EINBAUANW. ZVT-B16 INST INSTRUCT. ZVT-B16			Sprache / *Lang.* de en	Aei. / *C.I.* 01.00	Blatt / *Sh.* 2
ZVT-B16	Datum *Date* 2005-08-16	Abteilung *Dept.* 1ESK	Name *Name* PA	Zeichn.Nr. / *Drawing No.* 1300.1712.00		D

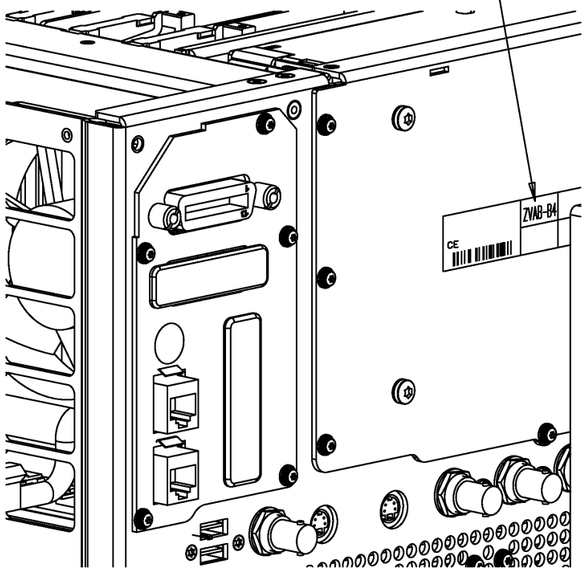


Projektions-methode
Projection Method

Maßstab *Scale* 1:1	Toleranz *Tol.*	Werkstoff *Material*	
ROHDE&SCHWARZ	Benennung / *Designation* RM8 BR UNIT RM8 BR UNIT	Sprache / *Lang.* de en	Aei. / *C.I.* 02.00 / Blatt / *Sh.* 3
	Datum *Date* 08.07.2004 / Abteilung *Dept.* 1ESK / Name *Name* Wn	Zeichn.Nr. / *Drawing No.* 1145.3593.01 D	

Projektions-methode
Projection Method





Maßstab *Scale*	Toleranz *Tol.*	Werkstoff *Material*			
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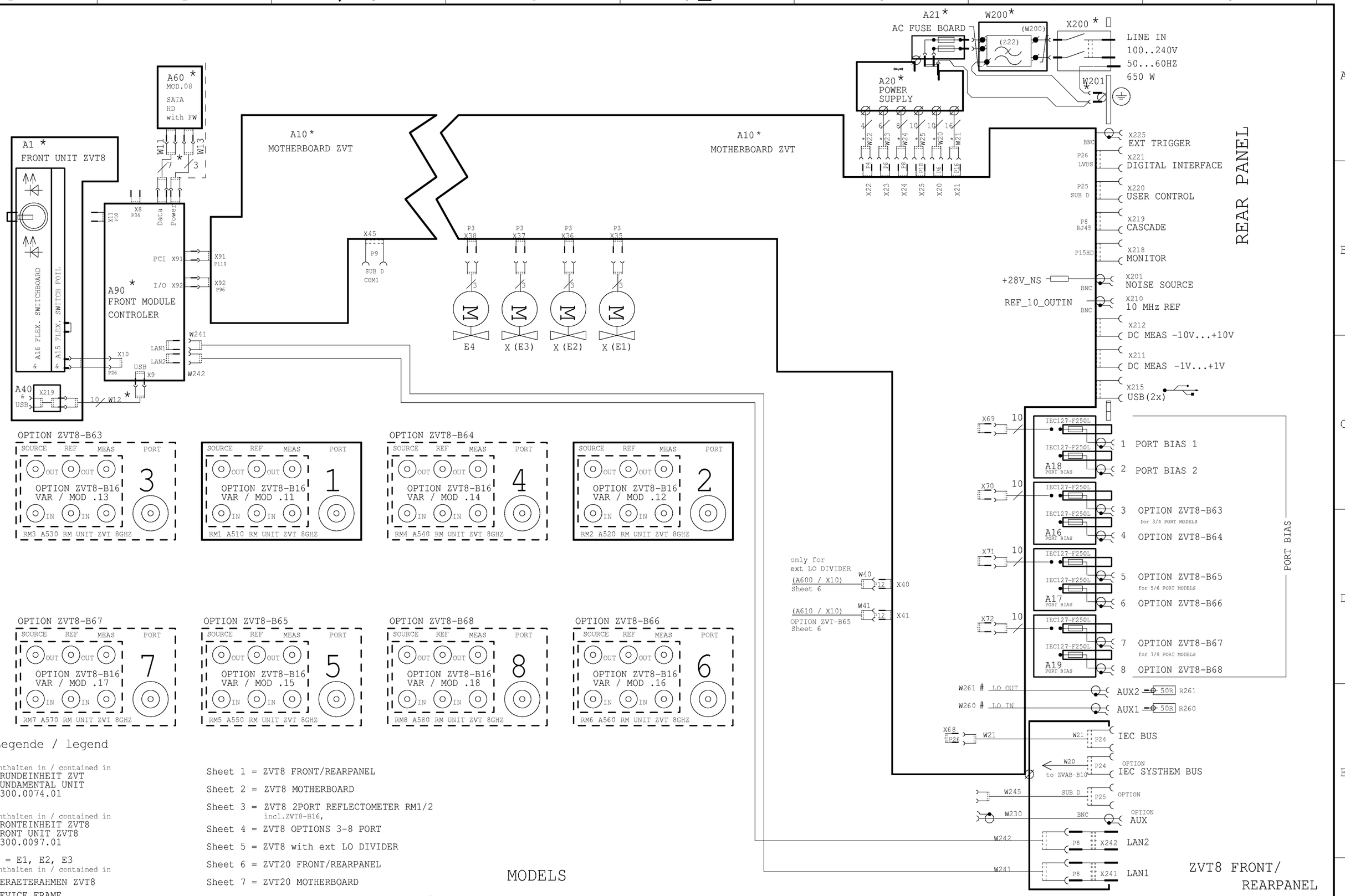
	Datum *Date* 04.05.2004	Abteilung *Dept.* 1ESK	Name *Name* FR	Zeichn.Nr. / *Drawing No.* 1164.1770.00		D

ROHDE&SCHWARZ

Block Circuit Diagram



Legende / legend

*
enthalten in / contained in
GRUNDEINHEIT ZVT
FUNDAMENTAL UNIT
1300.0074.01

&
enthalten in / contained in
FRONTEINHEIT ZVT8
FRONT UNIT ZVT8
1300.0097.01

X = E1, E2, E3
enthalten in / contained in
GERAETERAHMEN ZVT8
DEVICE FRAME
1300.0080.00

#
enthalten in / contained in
KABELSATZ ZVT
CABLEASSEMBLY ZVT
1300.1029.01

Sheet 1 = ZVT8 FRONT/REARPANEL
Sheet 2 = ZVT8 MOTHERBOARD
Sheet 3 = ZVT8 2PORT REFLECTOMETER RM1/2
incl.ZVT8-B16,
Sheet 4 = ZVT8 OPTIONS 3-8 PORT
Sheet 5 = ZVT8 with ext LO DIVIDER
Sheet 6 = ZVT20 FRONT/REARPANEL
Sheet 7 = ZVT20 MOTHERBOARD
Sheet 8 = ZVT20 2PORT REFLECTOMETER RM1/2
incl.ZVT20-B16,-B21, -B32, -B11
Sheet 9 = ZVT20 OPTIONS 3-6 PORT

MODELS

1300.0000.08 ZVT8

1300.0000.20 ZVT20

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER		Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 1 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S	

A100
FREQUENCY REFERENCE

OPTION ZVT8-B67

A110
NETWORK CONTROLLER (4)
A141 NETCON DIGITAL
A142 NETCON ANALOG

OPTION ZVT8-B65

A120
NETWORK CONTROLLER (3)
A141 NETCON DIGITAL
A142 NETCON ANALOG

A130
NETWORK CONTROLLER (2)
A141 NETCON DIGITAL
A142 NETCON ANALOG

A140
NETWORK CONTROLLER (1)
A141 NETCON DIGITAL
A142 NETCON ANALOG

OPTION
A150
PCI

A10
MOTHERBOARD

REARPANEL
FR_REF_10_OUT/IN
X210 10 MHz REF BNC
W260 LO_EXT
LO_IN R260 50R
W261 LO_OUT
LO_OUT R261 50R
PROG X5

A190 LO DIVIDER 8

A180
SYNTH-DS MOD.02 ZVT8
OPTION ZVT8-B65

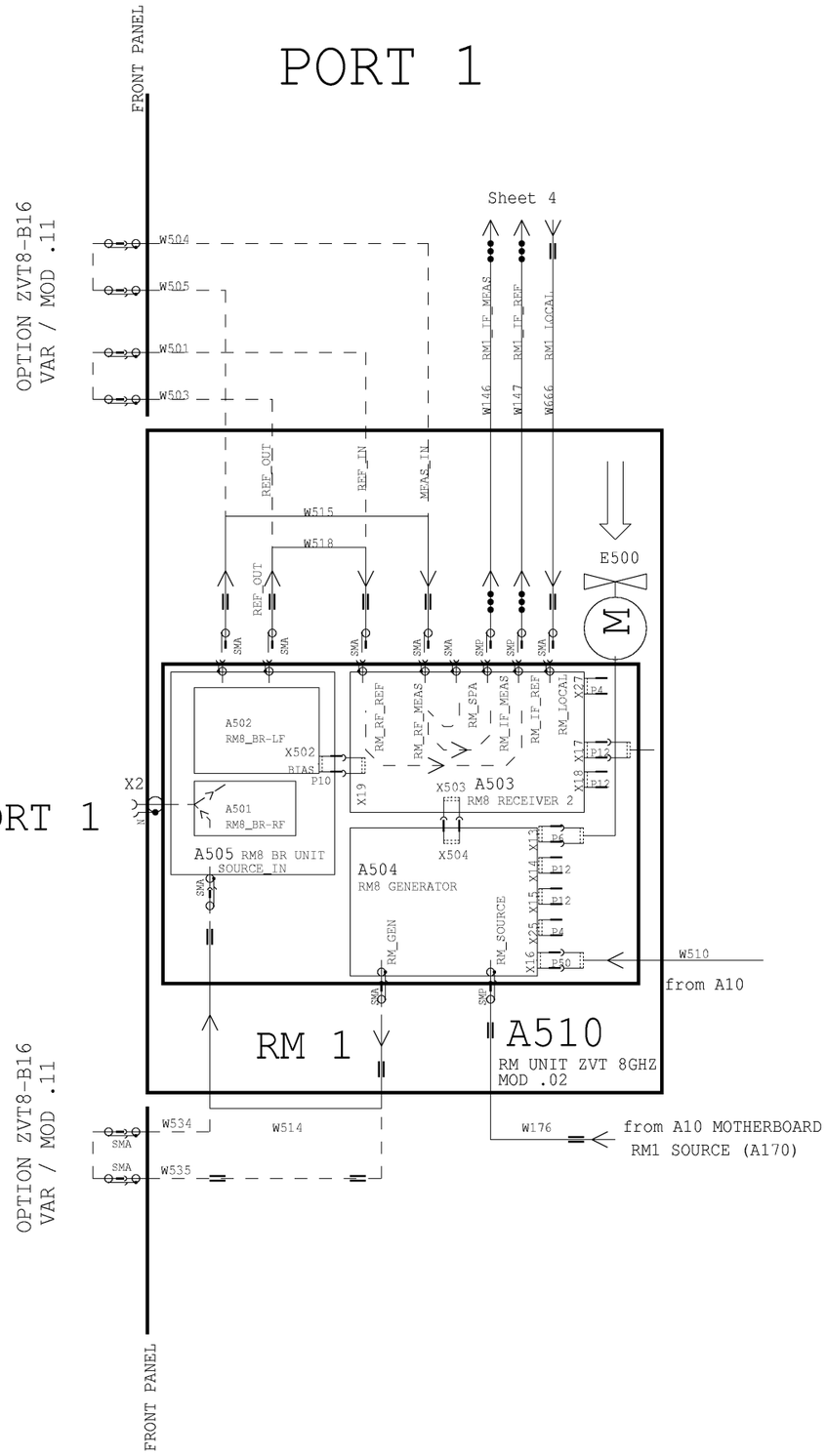
A170
SYNTH-DS MOD.02 ZVT8

A160
SYNTH-LO MOD.02 ZVT8

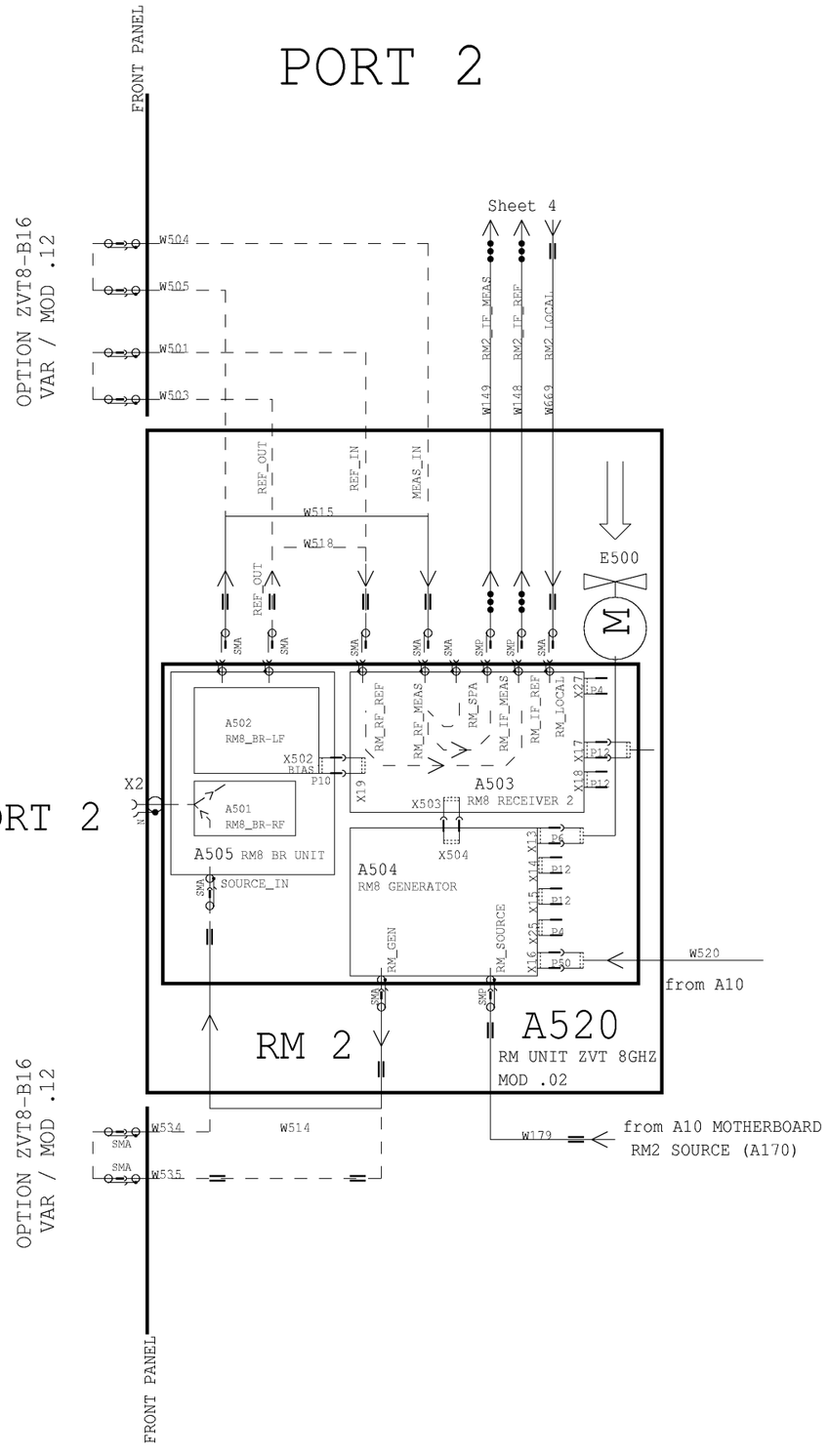
ZVT8 MOTHERBOARD

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 2 +
ZVT	Datum: Date: 07/12/19 · Abteilung: Dept.: 1ESK · Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		

PORT 1



PORT 2



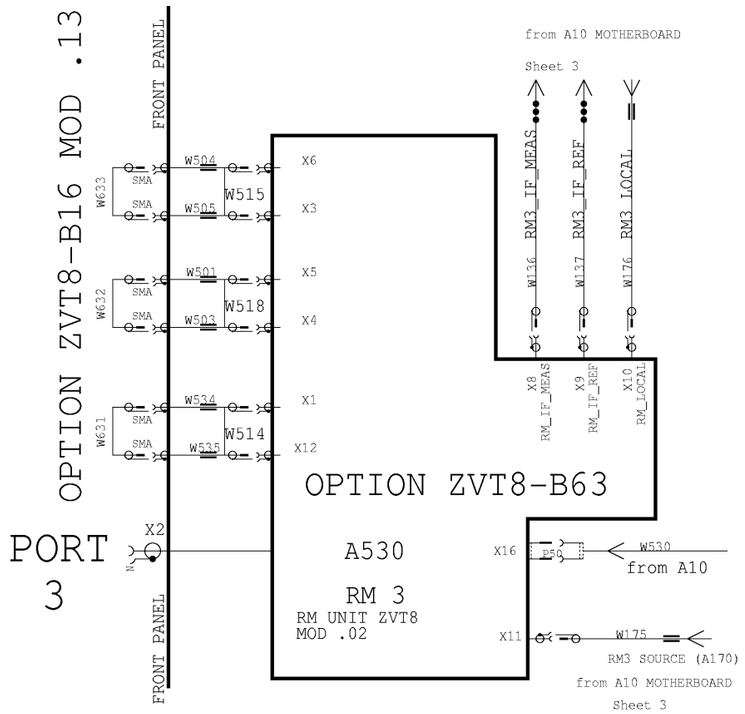
Legende / legend

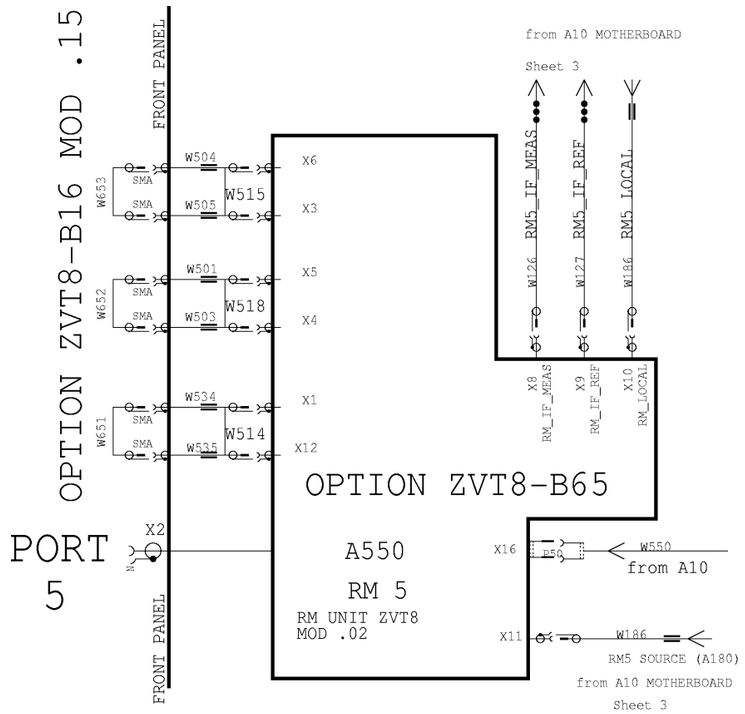
RM n = REFLECTOMETER n
semi rigid cable
flex koax cable

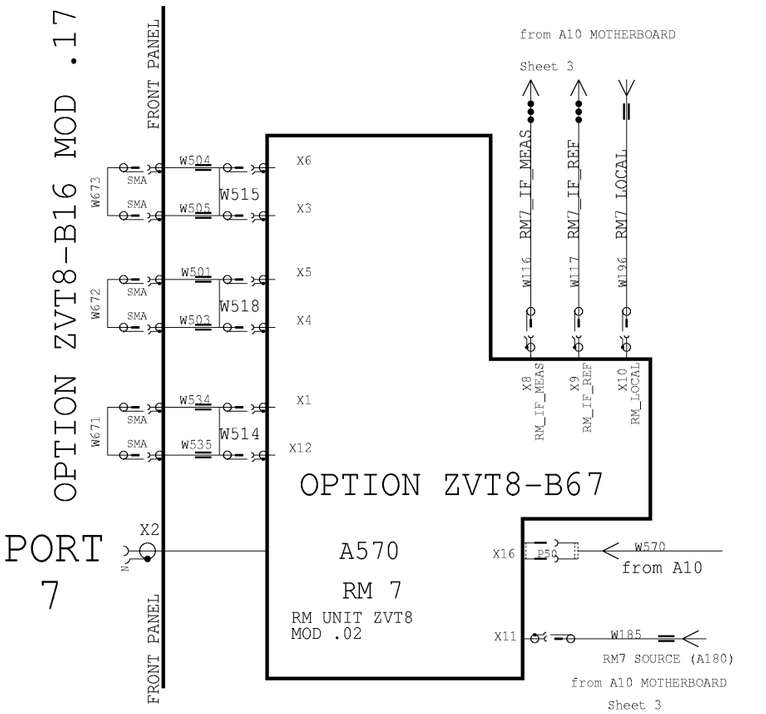
Cables to RM 1 - 2
enthalten in / contained in
KABELSATZ ZVT/SET OF CABLE ZVT
1300.1029.08

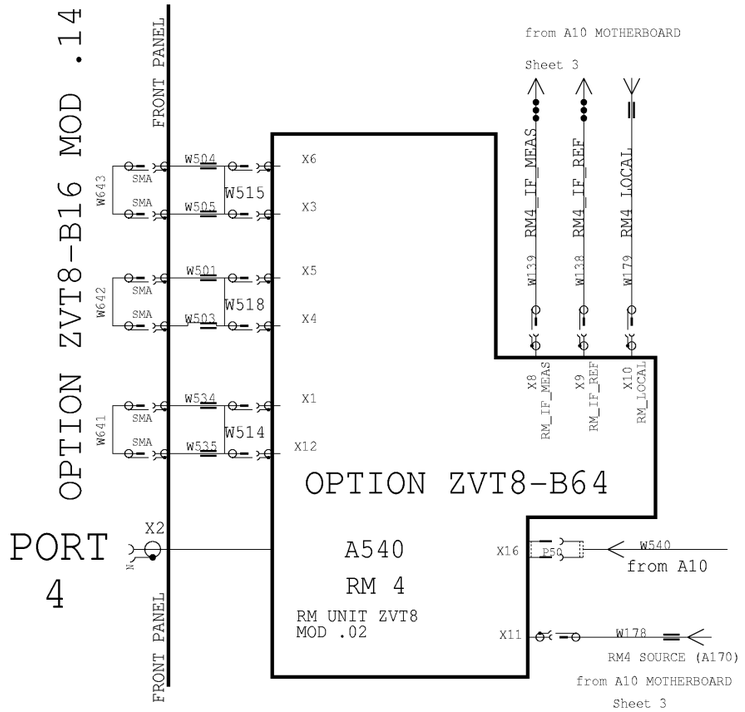
ZVT8 2PORT REFLEKTOMETER RM1/2

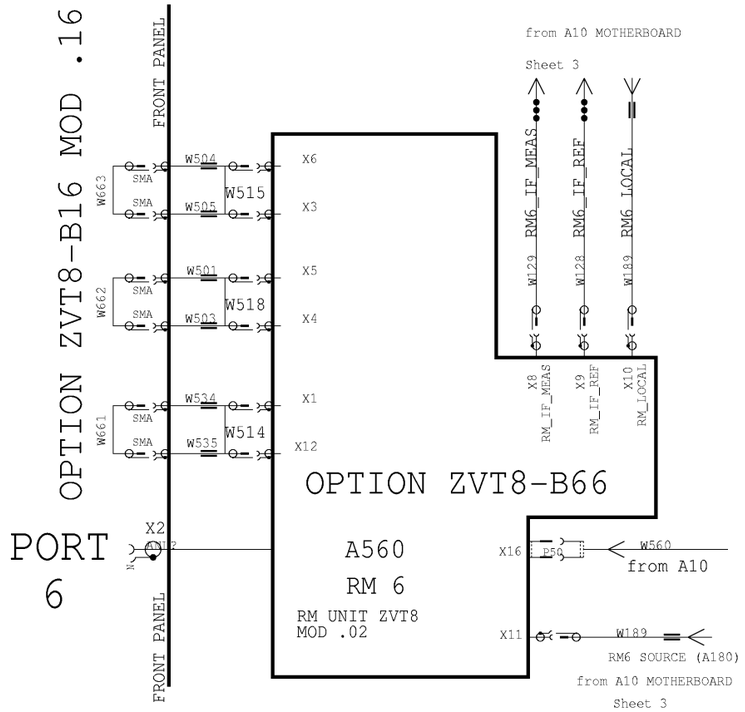
ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 3 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		

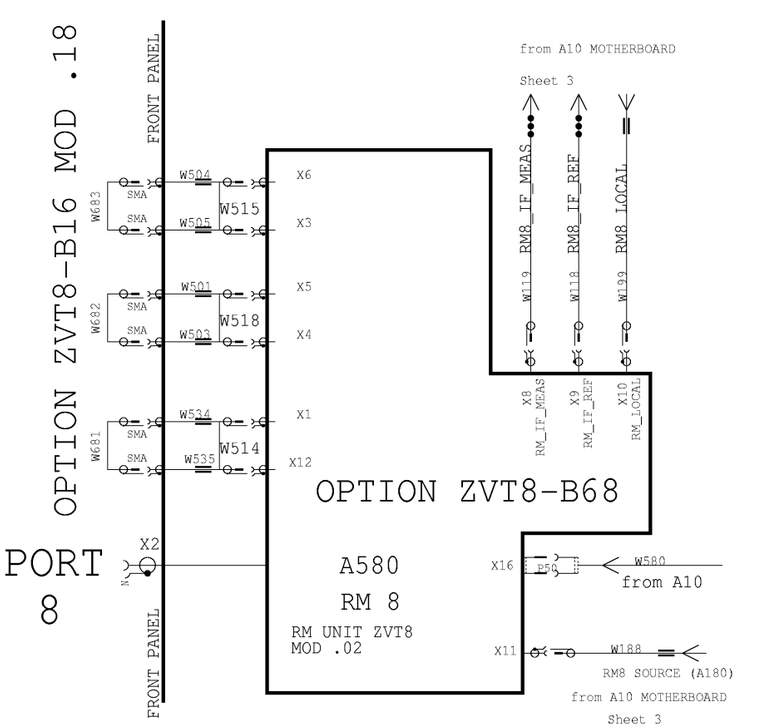












Legende / legend

RM n = REFLECTOMETER n

—═— semi rigid cable

—••• flex koax cable

Cables to RM 3 - 8
enthalten in / contained in
ZVT-B* ADD TESTPORT
1300.1506.01

ZVT8 OPTIONS 3-8PORT

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER		Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 4 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S	

OPTION ZVT8-B67

OPTION ZVT8-B65

A100
FREQUENCY REFERENCE

A110
NETWORK CONTROLLER (4)

A120
NETWORK CONTROLLER (3)

A130
NETWORK CONTROLLER (2)

A140
NETWORK CONTROLLER (1)

OPTION
A150
PCI

A141
NETCON DIGITAL

A142 NETCON ANALOG

X100 P48 TEST
X110 P110
X120 P110
X130 P110
X140 P110
X150 P110

A10
MOTHERBOARD

REARPANEL
10 MHz
REF
X210
BNC

PROG
X5
P6

X190

A180
SYNTH-DS MOD.02 ZVT8
OPTION ZVT8-B65

A170
SYNTH-DS MOD.02 ZVT8

A160
SYNTH-LO MOD.02 ZVT8

A600
LO DIVIDER

OPTION ZVT8-B65
A610
LO DIVIDER

REAR PANEL
LO IN

REAR PANEL
LO OUT
LO OUT

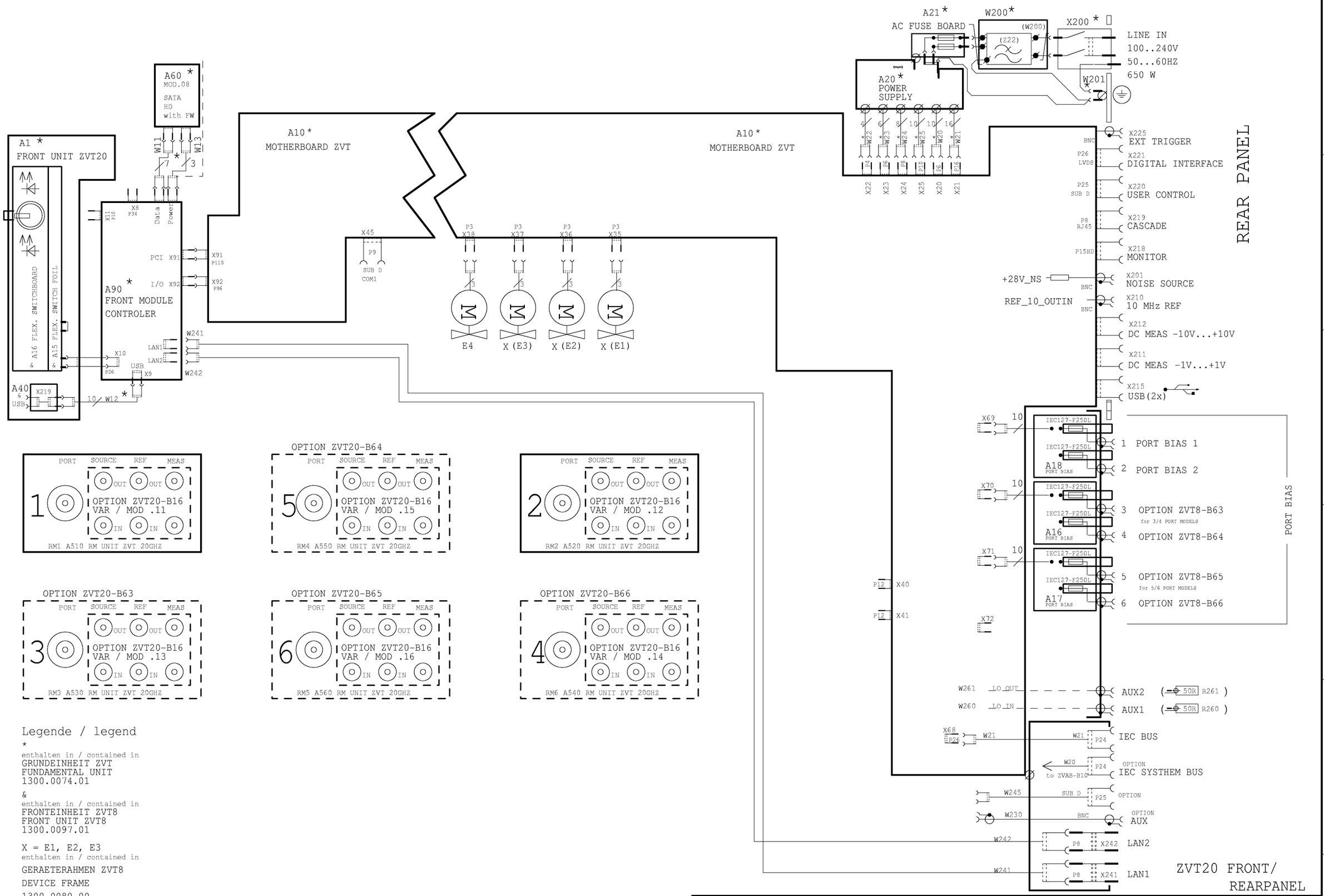
ZVT8 with ext LO DIVIDER

Legende / legend

semi rigid cable

flex koax cable

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 5 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		



Legende / legend

*
enthalten in / contained in
GRUNDEINHEIT ZVT
FUNDAMENTAL UNIT
1300.0074.01

&
enthalten in / contained in
FRONTEINHEIT ZVT8
FRONT UNIT ZVT8
1300.0097.01

X = E1, E2, E3
enthalten in / contained in
GERAETERAHMEN ZVT8
DEVICE FRAME
1300.0080.00

#
enthalten in / contained in
KABELSATZ ZVT
CABLEASSEMBLY ZVT
1300.1029.01

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER	Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 6 +
ZVT	Datum: Date: 07/12/19 · Abteilung: Dept.: 1ESK · Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		

A100
FREQUENCY REFERENCE

OPTION ZVT20-B65(66)
A120
NETWORK CONTROLLER (3)
A141
NETCON DIGITAL
A142 NETCON ANALOG

OPTION ZVT20-B63(64)
A130
NETWORK CONTROLLER (2)
A141
NETCON DIGITAL
A142 NETCON ANALOG

A140
NETWORK CONTROLLER (1)
A141
NETCON DIGITAL
A142 NETCON ANALOG

OPTION
A150
PCI

A10
MOTHERBOARD

REARPANEL
10 MHz REF
BNC

A190 LO DIVIDER 8 MOD.20

A170
SYNTH-DS MOD.02
OPTION ZVT20-B63

A160
SYNTH-LS MOD.20

PROG

ZVT20 MOTHERBOARD

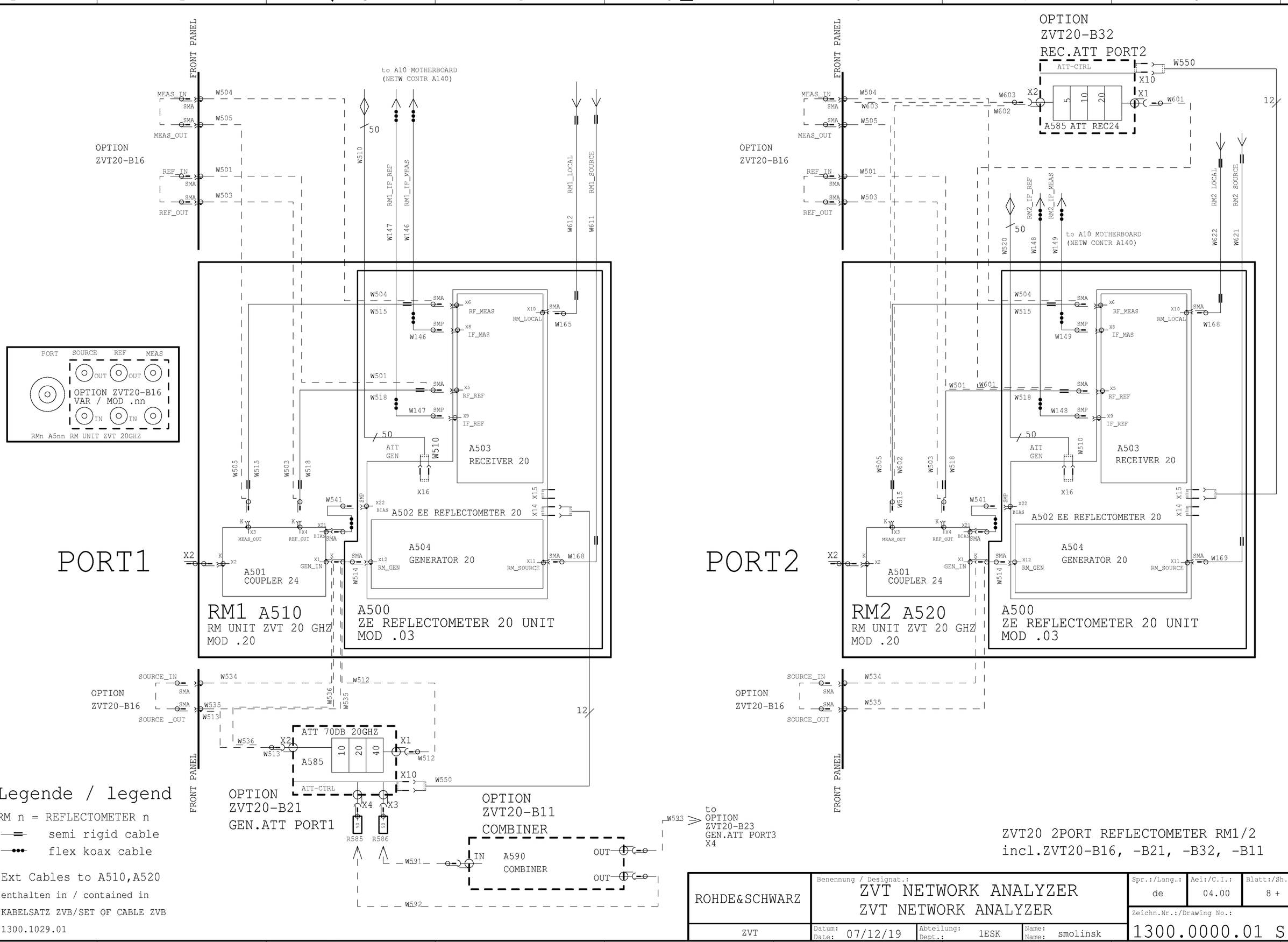
Bindende Angaben ueber Varianten, Trimmwerte, Bauteile und nicht bestueckte Bauteile siehe ST.

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

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

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

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 7 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		



Legende / legend

RM n = REFLECTOMETER n

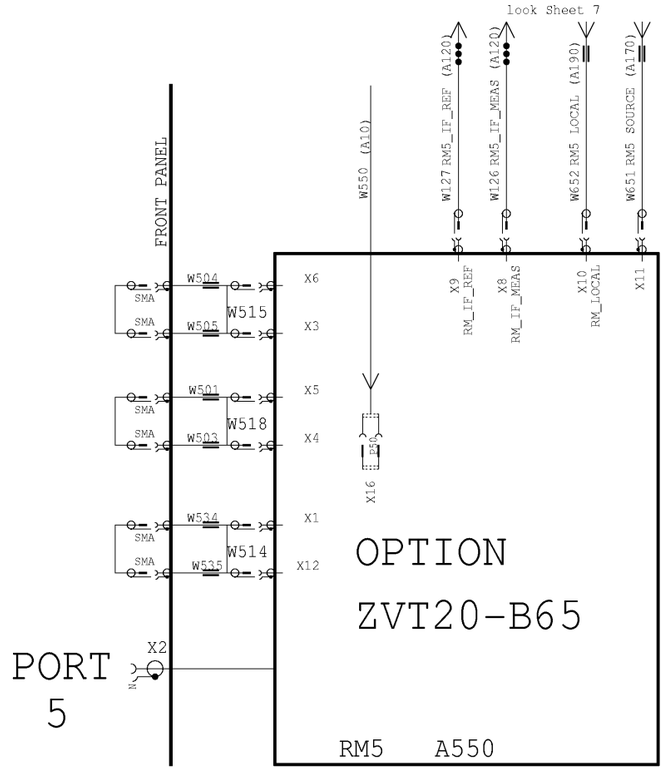
semi rigid cable

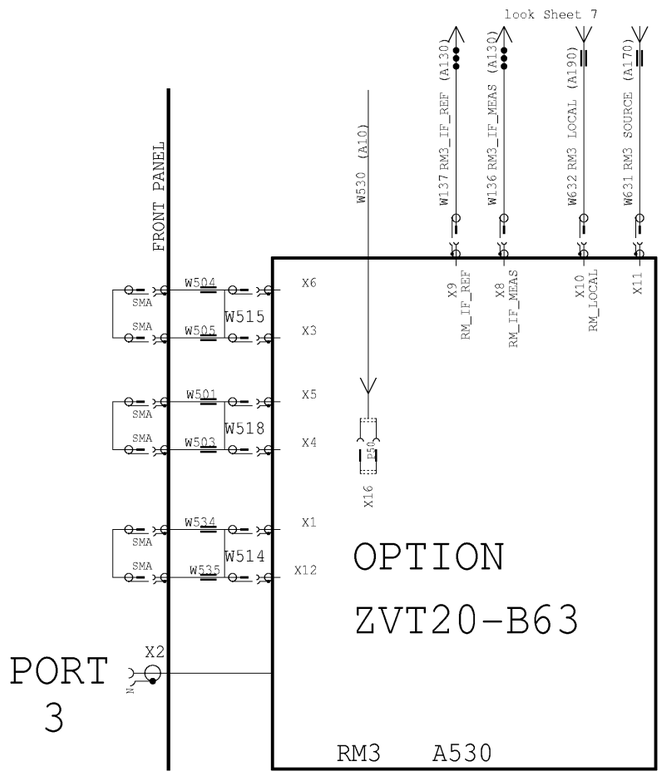
flex koax cable

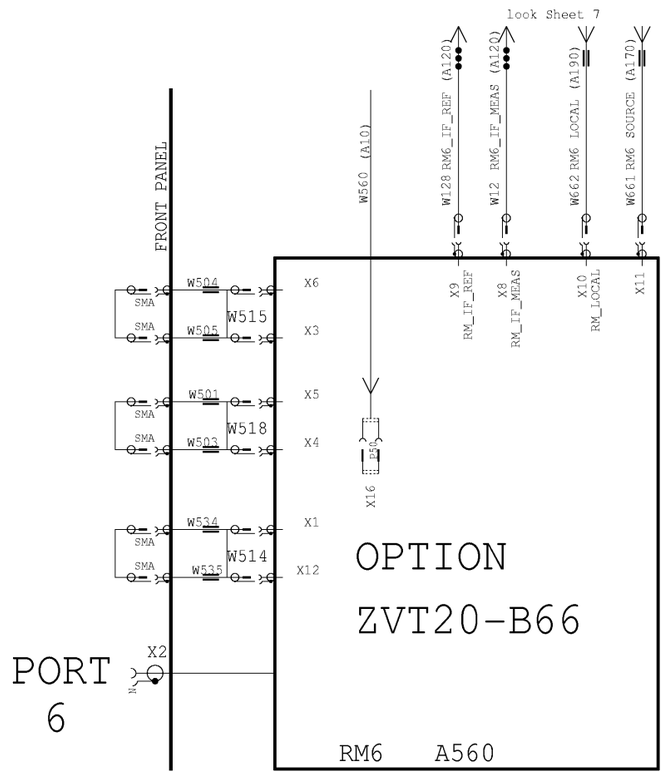
Ext Cables to A510,A520
enthalten in / contained in
KABELSATZ ZVB/SET OF CABLE ZVB
1300.1029.01

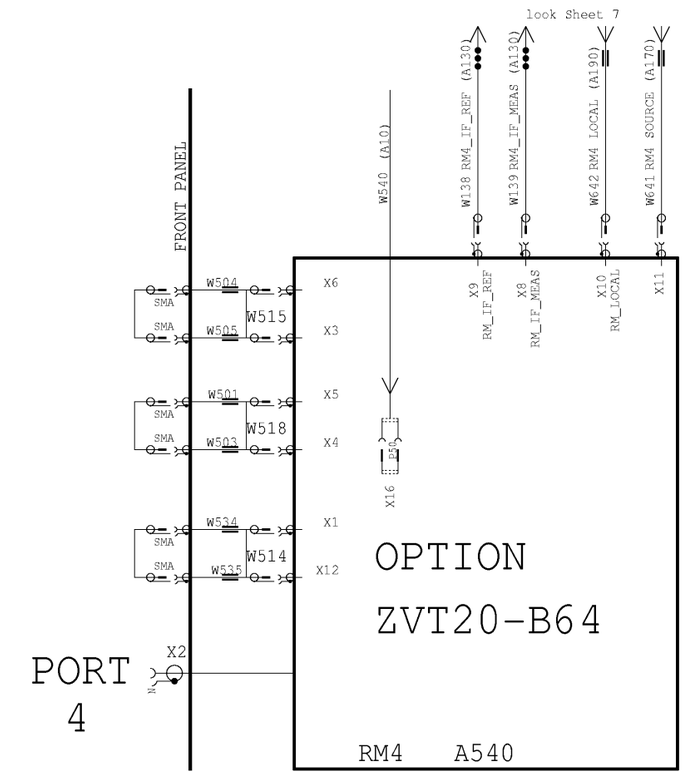
ZVT20 2PORT REFLECTOMETER RM1/2
incl.ZVT20-B16, -B21, -B32, -B11

ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 8 +
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		









ROHDE&SCHWARZ	Benennung / Designat.: ZVT NETWORK ANALYZER ZVT NETWORK ANALYZER			Spr.:/Lang.: de	Aei:/C.I.: 04.00	Blatt:/Sh.: 9 -
ZVT	Datum: Date: 07/12/19	Abteilung: Dept.: 1ESK	Name: Name: smolinsk	Zeichn.Nr.:/Drawing No.: 1300.0000.01 S		