What's New in this Revision

This help describes version V2.50 of the R&S ZVB firmware. This firmware provides the following new features.

- Wizard for intermodulation distortion measurement and detailed intermodulation distortion **results** (with option R&S ZVA-K4)
- Export of full sets of single-ended S-parameters to **Touchstone** files, irrespective of the balanced port configuration and the measured quantities.
- New **LXI** browser interface
- Extended functionality of **DATA ENTRY** keys (entry of characters).
- Absolute bandpass search (bandpass/bandstop absolute level)
- **Fast power calibration** mode
- Adjustable **Font Size** in diagrams
- **Channel Info** , shows or hides the channel list below the diagrams
- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - New command `SOURce:POWer:CORRection:COLLect[:ACQuire]:DEFault ON | OFF` , enables the analyzer to generate a default source power calibration with no need of using a power meter.

  - New command `CALCulate<Chn>:GDAPerture:SCOunt` , defines the aperture steps for the group delay calculation.

  - New command `CALCulate<Ch>:DATA:ALL?` , return the response values of all traces in the active setup.

  - *Align *RST to User Defined Preset* switch in the *System Config – Preset* tab causes `*RST` and `SYSTem:PRESet` restore the user-defined settings.

  - New command `[SENSe<Ch>:]CORRection:CKIT:LABel` , assigns a label to a user-defined or imported calibration kit.

  - New command `CALCulate<Chn>:DATA:NSWeep:FIRSt?` , reads the sweep results in single sweep mode in ascending order. `CALCulate<Chn>:DATA:NSWeep:COUNt?` returns the number of completed sweeps.

  - New command `SOURce<Ch>:GROup<group_no>:PORTs` defines a port group with an arbitrary, not necessarily continuous port range. `SOURce<Ch>:GROup<group_no>:COUNt` queries the number of port groups.

Product improvements:

- A system error calibration during a power sweep can be started using the `[SENSe<Ch>:]CORRection:COLLect[:ACQuire]:SELected`. Restrictions in earlier firmware versions do not apply any longer.
- Improved automatic full n-port calibration with automatic adjustment of frequency step size during the calibration.

- Equidistant time sweep for the full set of 60001 sweep points.
- The version of the data sheet that corresponds to the current firmware version is displayed in the Info dialog.

To check your R&S ZVB firmware version, click *Help – About Nwa...*

Contents of this help and of your documentation CD-ROM

This help system represents an up-to-date version of the ZVB documentation including all new features of the current firmware version. An updated printable (.pdf) file and CD-ROM is provided for each major (2-digit) firmware version.

New Features in Firmware V2.47 (Compared to V2.46)

Fixed issues:

- In a mixer power calibration , the external power meter is controlled correctly.

New Features in Firmware V2.46 (Compared to V2.45)

- Added emergency power off in single sweep mode by means of command **OUTPut<Ch>[:STATe]** .

New Features in Firmware V2.45 (Compared to V2.40)

- The functionality of this firmware version is identical with the previous firmware version V2.40.

New Features in Firmware V2.40 (Compared to V2.30)

- Extension to the TRL calibration: Calibration with three lines .
- **Renormalization** of port impedances can be based on two alternative waveguide circuit theories.
- The sweep segments for *Segmented Frequency* sweep type can overlap.
- Selectable field separators (semicolon, comma, tabulator, space) for trace export files (**Export Complex Data** , **Export Formatted Data**).

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- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- A default directory 'C:\C:\Rohde&Schwarz\Nwa' can be set using `MMEMory:CDIRectory DEFault` .

- New command `[SENSe<Ch>:]CORRection:CKIT:DELete 'ckit_name>'` , deletes a user-defined or imported cal kit.

- New command `SYSTem:LANGuage` selects the remote language for the analyzer.

Product improvements:

- In the *Port Configuration* dialog the source *Power Result* is always displayed.

New Features in Firmware V2.30 (Compared to V2.21)

- **Ripple limit** test
- **Characterization** of R&S calibration units
- Support of **One Path Two Port** calibration by R&S calibration units
- Directory for *Additionally Available Cal Kits and Conn Types:* Cal kit files will be (re-) loaded automatically every time the NWA application is started *(System Config. –* **General** *)*.
- Possibility to raise the priority of the running NWA application *(System Config. –* **General** *)*.
- Transparent info fields for markers and trace statistics *(System Config. –***General** *).*
- The analyzer supports sweeps with a single sweep point. The maximum **Number of Points** is 60001.
- The NWA application is available for restricted users without administrator rights. Firmware update still requires administrator rights.
- Support of fast power shutdown for each source port from the *Port Configuration* dialog

- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - New command `CALCulate<Ch>:PARameter:DELete:SGRoup` , deletes an S-parameter group

  - New command `SYSTem:COMMunicate:RDEVice:PMETer<pmeter_no>:AZERo` , starts auto zeroing of an exernal power meter.

  - New parameter `SENSe:CORRection:COLLect:DELete ALL` , deletes all system error correction data.

  - New command `MMEMory:STORe:TRACe:CHANnel` , stores the trace data of all data traces in the specified channel to a trace file.

  - New command `SYSTem:COMMunicate:RDEVice:PMETer<pmeter_no>:CONFigure:AUTO [:STATe]` , enables or disables Auto Config NRP-Zxx.

  - New command `CALCulate<Ch>:LIMit:SEGMent:COUNt?` , queries the number of

limit line segments.

- New command **SYSTem:LOGGing:REMote[:STATe]** , enables logging of all remote control commands transferred to the analyzer.

- New commands [SENSe<Ch>:]CORRection:COLLect:AUTO:PORTs:TYPE and [SENSe<Ch>:]CORRection:COLLect:AUTO:TYPE , start an automatic calibration with a specific calibration type.

New Features in Firmware V2.21 (Compared to V2.20)

- New remote control commands, define diagram names (DISPlay:WINDow<Wnd>:NAME '<Name>') return diagram numbers and names (DISPlay:WINDow<Wnd>:CATalog?) and traces in diagrams (DISPlay:WINDow<Wnd>:TRACe<WndTr>:CATalog?).

New Features in Firmware V2.20 (Compared to V2.13)

- Compliance with **LXI** class C
- New source power **calibration parameters** : *Includes Flatness Cal, Includes Reference Receiver Cal*
- Extended harmonic power calibration dialog
- New **Resolution Enhancement Factor** for time domain measurements
- **Automatic calibration** of n > 2 ports with full one-port, separate full two-port and full n-port calibrations possible
- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - New queries for the channel names and number of a particular trace: CONFigure:TRACE:CHANnel:NAME? , CONFigure:TRACE:CHANnel:NAME:ID?
  - Extended preset: SYSTem:FPReset .
  - New statistical parameter GAIN is command CALCulate<Chn>:STATistics:RESult?
  - New command DISPlay[:WINDow<Wnd>]:TRACe:EFEed displays a trace in a diagram area without numbering it.
  - New command DISPlay:CMAP<Element>:TRACe:RGB for trace color definition.
  - New commands for harmonic power calibration

New Features in Firmware V2.13 (Compared to V2.11)

- Support for new front module controller FMR7

New Features in Firmware V2.12 (Compared to V2.11)

Fixed issues:

- Corrected function of the *Measure "a" Waves at* radio buttons in the *Port Configuration* dialog.
- Corrected **marker formats** for complex reference impedance settings

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New Features in Firmware V2.11 (Compared to V2.10)

This firmware version has been released for compatibility with a firmware version for R&S ZVA network analyzers.

New Features in Firmware V2.10 (Compared to V2.02)

- **Automatic calibration** for arbitrary combinations of ports in manual control
- Extended trace statistics: **Gain/Slope/Flatness**
- New commands for trace names and numbers (`CONFigure:TRACe<Trc>:CATalog?` , `CONFigure:TRACe<Trc>:NAME` , `CONFigure:TRACe<Trc>:NAME:ID?`)
- New command `OUTPut[:STATe]` switches internal and external power sources on or off.
- New command for verification of a source power calibration `SOURce<Ch>:POWer<Pt>:CORRection[:ACQuire]:VERification:RESult?`

New Features in Firmware V2.02 (Compared to V2.01)

- New commands to change trace names: `CONFigure:CHANnel<Ch>:TRACe:REName` , `CONFigure:TRACe<Trc>:REName` .

New Features in Firmware V2.01 (Compared to V2.00)

- Keyboard control of *Eval. Range* and *Define Limit Line* dialogs improved.
- Preset performance improved (delay time eliminated).
- Mixer measurements extended to the frequency range <50 MHz.
- Dialog performance improved compared to firmware version V2.00.

Extended Functionality

- The `C:\Program Files\Rohde&Schwarz\Network Analyser\Rsib` directory contains the files needed for remote control via **RSIB protocol** (for programming in C/C++ and Visual Basic).

New Features in Firmware V2.00 (Compared to V1.92)

- Extension of the **Offset** menu: compensation of a frequency-dependent, port-specific loss.

- Selectable reference for stimulus value definitions in the *Port Configuration* dialog (*Stimulus* dialog).
- Selectable reference for power and frequency definitions for mixer measurements.
- Low-frequency extension for TRL calibration with an additional match or sliding match.
- Optional display of **time gate limits** in the diagram area.
- Import of cal kit files (*.prn) generated with the PNA Cal Kit Editor.
- Improved display of hardware **error messages** .

- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - New status registers **STATus:QUEStionable:INTegrity...** monitor hardware failures.
  - Extended command `MMEMory:LOAD:LIMit` , can load limit lines from Touchstone files, assigning a response and stimulus offset.
  - Extended command `MMEMory:STORe:TRACe` , can store traces with various data formats.
  - New command `CALCulate<Chn>:PARameter:DEFine:SGRoup` creates the traces for all S-parameters associated with a group of logical ports. `CALCulate<Chn>:DATA:SGRoup?` returns the results.
  - New command `CALCulate<Chn>:MARKer<Mk>SEARch:BFILter:RESult[:STATe]` to display or hide the results of a bandfilter search.
  - New commands `CALCulate<Chn>:STATistics:MMPTpeak[:STATe]` , `CALCulate<Chn>:STATistics:MSTDev[:STATe]` , `CALCulate<Chn>:STATistics:RMS[:STATe]` , `CALCulate<Chn>:STATistics:EPDelay[:STATe]` to display or hide statistical information about traces.
  - New command `FORMat:DEXPort:SOURce` , defines the format for traces retrieved with the ZVR-compatible command `TRACe[:DATA][:RESPonse][:ALL]?`

New Features in Firmware V1.92 (Compared to V1.91)

- Support of configurable generator **step attenuators** .

Fixed Issues

- Interchanged remote control parameter names for `FORMat:BORDer NORMal | SWAPped` .

New Features in Firmware V1.91 (Compared to V1.90)

- Support of ZVA40 vector network analyzers.
- Extended frequency range of TRL calibration due to a second line standard.

- A tooltip for remote command errors, to be activated in the *GPIB Settings* tab of the **System Configuration** dialog, is available. The tooltip is to provide information that can be useful for program development and optimization; it does not necessarily indicate that a remote control script is faulty or non-executable.
- Extended *GPIB Language* selection in the *GPIB Settings* tab of the **System Configuration** dialog.
- New remote control features

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - Optional trace name parameter (replaces numeric trace suffix) in the `DISPlay:WINDow:SCALE...` commands.

Fixed Issues

- In time domain representation the exported formatted **trace files** contain the actual stimulus (time) values.
- Memory traces can be handled in remote control (e.g. `CALCulate:PARameter...`) without limitation.

New Features in Firmware V1.90 (Compared to V1.86)

- Extensions to the TOSM calibration type: unknown through.
- New **Imbalance** parameter for balanced port configurations.
- Automatic identification of the port assignment between the analyzer and the **calibration unit** . The numbers of the connected ports must no longer match.
- Several calibration units may be USB-connected simultaneously. See also remote control commands `SYSTem:COMMunicate:RDEVice:AKAL:ADDRess...`
- Extended diagram scaling functions: *Max* **and** *Min* .
- **Max Hold** function for the active trace.
- **Global Limit Check** returns the result of a composite limit check (on several traces).
- In the *Presets* tab of the **System Configuration** dialog, it is possible to specify a user-defined preset configuration.
- In the **remote screen** , it is possible to define user-defined softkeys and assign the functionality of function softkeys to them.
- A single menu command **All S-Params** displays all S-parameters.
- Improved calibration wizard for calibrations using a sliding match.
- *New remote control features*

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

  - Export of marker values to an ASCII file (`MMEMory:MARKer<Mk>:STORe`)
  - Optional port restriction parameters in the

    command
  - New parameter `MDATa` for `CALCulate:DATA` to read unformatted data after evaluation of the trace mathematics

- A trace generated with `CALCulate<Ch>:PARameter:SDEFine` automatically becomes the active trace
- The new command `[SENSe<Ch>:]CORRection:COLLect:AUTO:PORTs:CONNection?` queries the port assignment between the analyzer and a calibration unit.
- `SYSTem:KLOCk` locks or unlocks the local controls of the analyzer.
- New command `[SENSe<Ch>:]CORRection:COLLect:SCONnection<port_no>` selects the connector type of the ports using a string variable.
- New command `[SENSe<Ch>:]CORRection:FACTory[:STATe]` enables or disables the factory calibration
- New command `CONFigure:CHANnel<Ch>:NAME:ID? '<Ch_name>'` returns the channel number for a named channel.
- New command `SYSTem:USER:DISPlay:TITLe` changes the title of the remote display.
- Refined calibration unit settings: `SYSTem:COMMunicate:AKAL:CONNection` , `SYSTem:COMMunicate:AKAL:MMEMory[:STATe]` , `MMEMory:AKAL:FACTory:CONVersion` , `[SENSe<Ch>:]CORRection:COLLect:AUTO:CKIT`
- New commands for calibration: `[SENSe<Ch>:]CORRection:DATE?` , `[SENSe<Ch>:]CORRection:DATA:PARameter?` , `[SENSe<Ch>:]CORRection:SSTate?`
- New commands `DISPlay:MENU:KEY:EXECute` and `DISPlay:MENU:KEY:SELect` combine remote and manual control.
- New command `[SENSe<Ch>:]CORRection:CKIT:SELect '<conn_type>', '<ckit_name>'` selects a calibration kit for a connector type with arbitrary name.

New Features in Firmware V1.86 (Compared to V1.85)

- Systematic protection of the analyzer's RF amplifiers against excess input levels. An update to firmware version V1.86 is highly recommended to eliminate any possibility of damaging the instrument hardware.

Improvements in Firmware V1.85 (Compared to V1.83 and V1.84)

- Improvement of the acquisition of system error correction data for ZVB20.

New Features in Firmware V1.83 (Compared to V1.80/V1.82)

- Support of calibration unit **R&S ZV-Z52** (models 72 and 30 for frequencies up to 18 GHz and 24 GHz, respectively).
- Improvement of the power calibration process with active Automatic Level Control (ALC).
- Power calibration data acquired in *Power* sweep mode can be re-used for *Time* and *CW Mode* sweeps (for frequency sweeps this feature was already implemented in firmware V1.80).

- The sweep average *(Average On, Average Factor)* and the *Trigger* settings are also valid for calibration sweeps.

New Features in Firmware V1.80 (Compared to V1.78)

- **New measurement modes:** Harmonic Distortion measurements and Mixer Mode (option ZVB-K3)
- **New calibration type: Power calibration**
- **Support for external test devices:** External **generators** and **power meters** can be controlled via USB, LAN, GPIB bus, or other interface types
- Adaptive Gain Control (AGC) of the receiver
- **Automatic Level Control (ALC)** of the source
- **Low Phase Noise mode**
- Extended bandfilter search mode: *Bandpass Search Ref to Marker*
- Improved access to the time domain and frequency domain stimulus values in the *Transform* –**Time Domain Stimulus Axis** menu.
- **Frequency Step Size** is a setting parameter for frequency sweeps
- **Marker values** can be exported to an ASCII file.
- New remote control command `[SENSe<Ch>:]CORRection:COLLect:METHod?` returns a list of all calibration types for channel <Ch>.
- New remote control commands `[SENSe<Ch>:]`**CORRection:CONNection** and `[SENSe<Ch>:]CORRection:CONNection:DELete` configure and delete user-defined connector types.
- New remote control command `[SENSe<Ch>:]CORRection:CKIT:<std_type>` defines the parameters of arbitrary connector types.
- New remote control commands `SYSTem:SOUNd:ALARm[:STATe]` and `SYSTem:SOUNd:ALARm[:STATe]` switch alarm and status sounds on or off.

Fixed Issues

- Trace mathematics can distinguish between voltages and dimensionless quantities (**Result is Wave Quantity**).
- **Zero Delay at Marker** can now be used for all ports, the arithmetic problems have been solved.

Improvements in Firmware V1.78 (Compared to V1.77)

- Performance improvements for very large numbers of simultaneous channels/traces

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New Features in Firmware V1.77 (Compared to V1.75)

- New calibration standard: **Sliding match** .
- The 7-term calibration types *TOM*, *TRM, TRL, and TNA* can be used for an arbitrary number of ports.
- Two new calibration types : *TSM Enhanced* and *TOM Enhanced.*

- Sweep segment-specific **IF gain** for received waves including Automatic Gain Control (AGC).

New Features in Firmware V1.75 (Compared to V1.70)

- The **channel bits** are switched over without intermediate reset when the measuring channel is changed. The bits always correspond to the current measuring channel.
- During a calibration sweep the channel bits of the calibrated channel are activated (instead of the reset values).
- When a new channel is created, the channel bits automatically take on the values of the previous channel.
- Calibration via remote control works for all channels without restriction.
- Automatic calibration works correctly after a balanced port configuration is configured in the measurement wizard.

New Features in Firmware V1.70 (Compared to V1.62)

- **New measurement: Virtual Transform** (Embedding/deembedding)
- Sweep range can be defined by **Sweep Step Size**
- Alternative conversion of wave quantities in **trace mathematics**
- **Data to Memory** function can be applied to all data traces at once
- New softkey **Recall Last Cal Set**
- Export of **formatted trace** data
- Renormalization of **reference impedances** for the test ports with complex values
- Automatic power reduction for Calibration Unit in the initial tab of the **System Config** dialog
- *GUI improvements*
    - **Paste marker list** for easier data entry in numeric entry bars and dialogs.
    - System files (*.zvx, *.s<n>p, *.csv, *.ck, *.calkit, *.seglist, *.mth, *.limit, *.colorscheme) can be loaded by drag and drop or double-click in the Windows Explorer.
- *New remote control features*

    The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

    - User defined color scheme settings (`DISPlay:CMAP...`).
    - Cal standard data can be loaded from a Touchstone file (`MMEMory:LOAD:CKIT:SDATa...`)
    - New command `SYSTem:ERRor:ALL` reads complete error queue.
    - New command `FORMat:BORDer` controls whether binary data is transferred in normal or swapped byte order.

Fixed Problems in Firmware V1.62 (Compared to V1.61)

- Improved stability of the TNA calibration.
- Corrected TOM, TNA, TRM, TRL error term conversion improves the accuracy of the 7-term calibration types.

New Features in Firmware V1.61 (Compared to V1.60)

- Time domain transform of impedances and admittances corrected.

New Features in Firmware V1.60 (Compared to V1.51)

- **Support for new option: Time Domain** (option R&S ZVAB-K2)
- Handling of software options: Option key entry in **System Config.** menu, option **Info**
- Double-click magnifies diagram areas

Fixed Issues

The limitation concerning the port groups reported for FW V1.50 no longer applies. Port groups can be measured and used simultaneously.

Fixed Problems in Firmware V1.51 (Compared to V1.50)

- Mixed mode parameters corrected.
- Problems with VX11 GPIB bus connection solved.

New Features in Firmware V1.50 (Compared to V1.02)

- **Support for new option: Calibration Unit** (accessory R&S ZV-Z51)
- **New measurement:** x dB **compression point**
- **New calibration types:** TRM , TRL , TNA
- **Arbitrary values** for differential and common mode reference impedances (in Measurement Wizard and Balanced and Measured Ports dialog)
- *GUI improvements*
    - In the *User Interface* tab of the **System Config.** dialog, the *Dialog Transparency* can be varied on a scale between 0% and 100%.
    - *Del Error Log* is no longer an **Info** menu command but only displayed when the error log is viewed.
    - Limits for the marker **search range** , the trace **evaluation range** and the bandfilter search range can be displayed in the diagrams.
    - Incremented **marker range** within sweep range.
- *Miscellaneous*
    - User-defined **color schemes** for the diagram areas and all display elements.
    - Improved *S-Parameter Wizard* (with reference impedance settings for balanced ports, more bandwidths, automatic calibration) and *Calibration Wizard .*
    - In the *User Interface* tab of the **System Config.** dialog, *Keep Measurement*

Data for >Repeat Previous Cal< can be set as a general parameter.

- The added **Redo** function reverses the action of the **Undo** command.
- **Instrument settings** can be changed while a new sweep is being prepared.

- *New remote control features*

  The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features are new or have no equivalent in manual control:

  - Automatic calibration with arbitrary ports and user-supplied cal kit files (`[SENSe<Ch>:]CORRection:COLLect:AUTO`).
  - Lock command execution until an application program run on the analyzer is terminated: `PROGram[:SELected]:WAIT` .

Fixed Bugs

The following bugs came to our attention and have been fixed:

- Setups can be stored to external storage media (USB memory sticks, floppy disks) without restriction.

Limitations

The following features are reported in the data sheet and this help system but not available in the current firmware version:

- Simultaneous measurement of port groups (in dialog Balanced and Measured Ports).