

'ZPVWOB' PROGRAM

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The ZPVWOB program is used to pilot the Rohde & Schwarz vector analyzer. Associated with a signal generator driven via GPIB, a power divider, a reflection factor measurement bridge or a directional coupler, this set of measuring devices forms a vector network analyzer system with control and reading by computer. The frequency range varies depending on the plugin of the ZPV and on the signal generator, either up to 50 MHz with the E1, 1 GHz with the E2 or up to 2.5 GHz with the E3. The following frequency dependent measurements can be carried out with this system:

- Transfer function (parameter S21) with amplitude and phase
- Reflection factor (parameter S11) with amplitude and phase
(by inverting the test object the parameters S12 and S22 of a four-pole device)
- Impedance of a dual pole device with real and imaginary parts

These measurements are carried out with an error correction of the measurement configuration (frequency response of the generator, loss / phase of the cable, of the directional coupler or properties of the measurement bridge).

- Voltage measurement on channels A and B of the ZPV
- Measurement without correction of the B / A channel ratio with amplitude and phase

In the program, the GPIB address of the ZPV is set to (7)26. The ZPV must therefore be defined with this address.

The following signal generators are also recorded in the program with equally fixed addresses:

Ref. zpvwob	generator model	GPIB address
Nr. 1	R&S – SMPU	(7)15
Nr. 2	R&S – SMLU	(7)14
Nr. 3	R&S - SMX	(7)28
Nr. 4	R&S - SMS	(7)28
Nr. 5	R&S - SWP	(7)25
Nr. 6	HP - 8350 (also HP-8340, HP-8341)	(7)19
Nr. 7	R&S - SML (also R & S-SMT, SMIQ)	(7)25
Nr. 8	HP - 8657 (also HP-8656)	(7)29
Nr. 9	ADRET - A742	(7)26

If additional signal generators or other GPIB addresses are to be used, these inputs must be entered in the subroutine "SUB Wgenerator" of the ZPVWOB program using the text editor of the HBT program.

The original version of the program was written for HP computers of HP-9000 series, it also runs on computers of series 200 and 300 under the operating system HP-BASIC-WS as well as on computers of series 300 and 700 under the HP-UX operating system and HP-BASIC-UX runtime environment.

Likewise, it runs on HP-BASIC-UX TAMS-BASIC on LINUX computers. It can also be used on PCs under the HT-BASIC development and execution environment. This requires a version compiled under HT-BASIC.

The program uses the same file format as the HPGRAFIK and MESSZEIT programs to save the measurement data. Knowing that ZPVWOB has a simplified graphical representation of the measurement results and a simple saving and reading on data, it is recommended to use the HPGRAFIK program for further processing and display of the recorded measurements.

ZPVWOB saves the measurement results in files with an X axis and two Y axes (frequency, amplitude, phase) in binary file format (DATxxx, see manual HPGRAFIK). If these files are loaded with HPGRAFIK, most graphical representations and operations require the Y-axis number. Thus conversions of measurement files can generally only be performed with files having a single Y-axis, so that in these cases the amplitude and the phase must be recorded separately in HPGRAFIK.

The HPGRAFIK manual and other textual help describe the installation of the program packages and the operation of the keyboard / screen on the basis of the HP-200/300 computer which are to be followed for the installation of zpvwob.

How the program works

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The program 'ZPVWOB' is started with the following keyboard command:

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LOAD "/ MESSPROGRAMME / ZPVWOB" then 'RUN'  
or  
LOAD "/ MESSPROGRAMME / ZPVWOB", 1
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or on HP-9000 computers with SRM networking

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LOAD "/ MESSPROGRAMME / ZPVWOB: REMOTE" and 'RUN'  
or  
LOAD "/ MESSPROGRAMME / ZPVWOB: REMOTE", 1
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The request to print the program description is disabled in the HTB version. A menu for selecting the mass storage for the measurement data then appears. The first line (Mass :) should only be filled in for HP-9000 computers, in the HTB version, it is empty.

The directory in which the measurement data must be stored (for example C: / USERS or D: \ USERS \ ZPV_DATEN) is specified in the second line accessible with the vertical cursor key. A memory unit different from that indicated in \ MESSPROGRAMME can be specified there.

File directories identified with forward slash and backslash are treated the same way (HP-9000 computers use a UNIX file system). The menu is closed with the <f8> key (OK).

Next, the type of measurement is requested. Usually, we stay with the selection '(0) allgemeine Messung = general measure)'. If you select "(5) Wobbelmessung = sweep measurement", data such as start and stop frequency, step size, level, etc. are to be entered in the launch menu. The request ends with <RETURN> or <f8> (ENDE).

The main menu (Haupt-Menu) then appears.

Haupt-Menu = Main menu

- 0) End of program
- 1) Transmission level (S21) lin / Phase
- 2) Transmission level (S21) log / Phase
- 3) Reflection level (S11) lin / phase
- 4) Reflection level (S11) log / phase
- 5) Impedance (Z) Real / imaginary part
- 6) Channel A voltage measurement
- 7) Channel B voltage measurement
- 8) B / A channel ratio without correction, lin / phase
- 9) B / A channel ratio without correction, log / phase
- 10) Calibration menu
- 11) Display the last measurement
- 12) Reading the stored data
- 13) Configuration
- 14) Restore default settings
- 15) Selection of the table of contents of the data

The desired menu item is selected either by entering its number or by moving the light bar with the vertical cursor keys and validated by a <RETURN>.

After choosing in the main menu the type of measurement, a new menu appears with 10 parameters to complete (selection of the line with the vertical cursor keys):

- 1) Selection of the signal generator by entering its number or by selection with the keys <f2> and <f3>
- 2) Selection of the wobulation mode (linear or logarithmic)
Enter LIN or LOG or use the <f2> and <f3> keys
- 3) - 5) Frequency of start and stop, and frequency step
- 6) Signal generator level in dBm
- 7) - 9) Length compensation parameters
- 10) Plugin type fitted to the ZPV (ZPV_E1 / E2 / E3)

The menu is closed with the <f8> key (OK). The selected measurement then starts.

Transmission measurements (items 1) and 2) from the main menu)

The calibration of the transmission measurements (items 1) and 2)) is a simple (one-Point) calibration. For this instead of connecting the object to be measured between the power divider and channel B of the ZPV, it is necessary to establish a direct connection between channels A and B (following the request of the computer: (DURCHVERBINDEN = CONNECT), then continue with <RETURN>, the selected frequency range is then scanned (without display) and the measurements are saved in the ZPV.

The computer then requests to reconnect the object to be measured between the power divider and channel B of the ZPV (MESSOBJEKT ANSCHLIESSEN = CONNECT OBJECT), then validate with <RETURN>. The frequency range is scanned again and the measurements (frequency, amplitude, phase) are displayed on the screen.

Reflection and impedance measurements (items 3, 4, 5) from the main menu)

A three-point calibration is performed for reflection and impedance measurements using either a reflection factor measurement bridge or a directional coupler. The input of the bridge or the directional coupler is connected to the power divider, the output at channel B of the ZPV. The 3 calibration charges are connected successively to the connection intended for the object to be measured.

- short circuit
- Resistance to termination (generally a load of 50 ohms)
- Open circuit

The selected frequency range is scanned (without display) and the calibration values are saved. The object to be tested is then connected, and the measurement redone, the measurements (frequency, amplitude, phase) then being displayed on the screen. For item 4), the amplitude is displayed linearly on the screen and converted only to logarithmic values (dB) in the graphical representation.

Measures without correction (items 6, 7, 8, 9))

For uncorrected voltage and ratio measurements between channels B and A, frequency scanning is performed with display on the screen.

Query after end of measurements (1) - (9)

At the end of the scan, it is asked whether the result should be displayed graphically (Graphik J / N? = Graph Y / N?). If the answer is YES (Y), the choice of display between amplitude (choice = 1) and phase (choice = 2) is requested. The graphics are displayed in the same way as in the HPGRAFIK program (see the HPGRAFIK manual). The display request is maintained until NO (N) is entered. Then asked if the measurement should be saved. The storage procedure is the same as that of the HPGRAFIK program (see manual HPGRAFIK). The file name begins with DAT followed by a decimal number.

If the measurement is not saved, it will remain in the working memory of the computer until a new measurement is started and can be displayed and saved again in the main menu (item 11)).

It is then asked whether another measurement should be made with the same settings and the same calibration. In this case, the measurement object can be connected directly. Otherwise, we return to the main menu.

Calibration menu (item 10))

In this menu, a transmission and reflection calibration can be performed, which can then be used for measurements without recalibration.

Display last measurement (item 11))

As long as no new measurement is started, the last measurement remains in the working memory and can be displayed graphically and saved again.

Reading recorded data (item 12))

An already saved measurement file can be reloaded into main memory and displayed. The associated steps correspond to those of HPGRAFIK, however no other operation can be performed on the file. Only HPGRAFIK will allow you to perform other operations.

Restore configuration (item 13)) and standard parameters (item 14))

These menu items are not used in the HTB version of ZPVWOB.

Data table of contents selection (item 15))

The menu for selecting the mass storage for the measurements is displayed again. The first line (Mass :) should only be filled in for HP-9000 computers, in the HTB version, it is empty.

The directory in which the measurement data should be stored (for example C: / USERS or D: \ USERS \ ZPV_DATEN) is specified in the second line accessible using the cursor down key. A reader different from that proposed can then be specified. File directories starting with a forward slash or backslash are treated identically (HP-9000 computers use a UNIX file system). The menu is closed with the <f8> key (OK).