Options and plug-ins
extend the measuring capabilities and application ranges of the ZPV.

Vector measurement

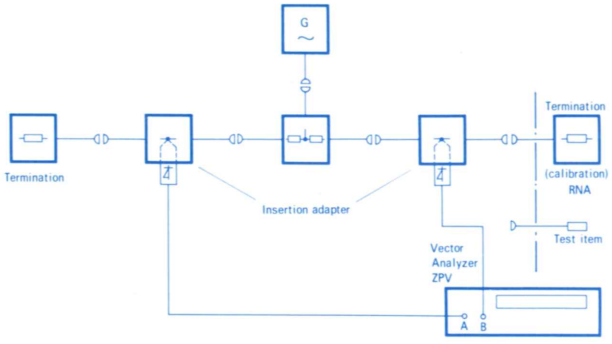
In the **basic ZPV version** the voltages in channels A and B are measured and indicated in absolute mV or dBm values and relative to any presettable reference value in dB. Simultaneously the phase difference between channels A and B is indicated. The voltage ratio between the two channels can be indicated linearly and logarithmically – both in absolute or relative values – or with its real and imaginary components.

Two-port measurement

When using the **s-parameter Option ZPV-B2,** the s parameters, impedance and admittance values can be read out on the digital ZPV display either in cartesian or in polar coordinates. Impedance and admittance are indicated both in absolute values and normalized to the characteristic impedance, the reference being either 50 or 75 Ω. The ZPV permits impedance calculation for test setups using directional couplers and bridges or based on the voltage measurement method. The type used is entered with the aid of a pushbutton.

The s parameters are read out linearly or logarithmically. Direct indication of the VSWR is also possible. The reference plane is defined at the push of a button, the reference phase and amplitude being automatically stored in the ZPV.

For two-ports in the range < 100 MHz the voltage measurement method can be used (see figure below) whereas use of an impedance-match bridge or directional couplers is to be preferred at higher frequencies (> 100 MHz) because of the increased accuracy (see figure to the right). The required accessories must be ordered separately.

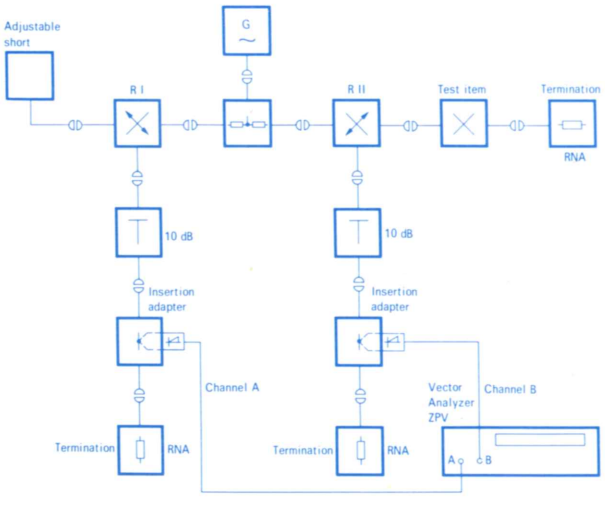


Group-delay measurement

The **Group-delay Option ZPV-B3** permits measurement of group delay and group-delay variation with high resolution (typical 1 ns). To this effect, the ZPV is combined with an FSK generator. Most FM generators are suitable for this purpose. Unmodulable generators can be used if the frequency shift is performed manually or by computer control. However, in this case the test speed is reduced. When using a calibration cable (50 ns), the FM control voltage and thus the frequency shift can be calibrated. To this end a calibration button is provided on the ZPV.

Tuner cassette

The ZPV is of **modular design.** The **Tuner ZPV-E2** covers the frequency range from 100 kHz to 1 GHz. The cassette comes with two probes enabling high-impedance voltage measurement. For checking coaxial systems, insertion adapters are available; they can be combined with the probes and also permit connection of the directional couplers. The **Tuner ZPV-E3** covers the frequency range from 0.3 to 2000 MHz. Its input is equipped with N female connectors; input impedanze 50 Ω (see data sheet 301 701).



Two-port measurement based on the voltage method using Tuner ZPV-E2 (left) and using directional couplers (right)

Automatic network analyzer with calculator control

ZPV + generator

When combining the Vector Analyzer ZPV with a programmable frequency generator and a calculator, a fully automatic network analyzer system is obtained. Various Rohde & Schwarz generators are suitable for this purpose.

For somewhat less stringent frequency-accuracy requirements, the Power Signal Generator SMLU can be used in the range from 25 MHz to 1 GHz. The Decade Frequency Generator SMDS permits precision measurements over the entire ZPV range. Both the normal and the receiver test versions of the Test Assembly for Radio Sets SMPU can also be used to form an automatic network analyzer.

+ calculator

For controlling the ZPV, the Tektronix Graphic Computing System 4051 is ideal; this desktop calculator gives a direct graphic display of the measured values.

+ basic software

For this combination of instruments, Rohde & Schwarz offers an easy-to-handle basic software so that a minimum of time is required to get acquainted with the application of the network analyzer. The preprogrammed measurement and display modes can be called up with code numbers (see page 11). Graphic display in particular shows the efficiency of the basic software: the curves plotted can be made available directly as hardcopy documentation (for examples of programming and graphic display see page 10).

= automatic network analyzer

The resulting automatic network analyzer system (see bottom of page 10) is superior in many respects to the calculator-controlled systems used hitherto: the high intelligence of the ZPV makes operation and programming simple and easy to understand. The test speed, in particular for impedance and admittance measurements, is very high since computing and control are performed to a large extent in the ZPV at optimum speed. Only a minimum of data and control commands has to be transferred between the calculator and the peripherals.

Measurement capabilities using the automatic network analyzer

The automatic network analyzer performs all measurements possible with the ZPV in fully automatic operation. The measurement accuracy of the system corresponds to that of the ZPV. Additional calibration routines for determining and considering the inherent error of the test setup permit a considerable increase of the measurement accuracy. The total measurement time is the sum of the ZPV measuring times and the computing time of the desktop calculator.