Model 360X/372XX(A/B)/373XXA
Vector Network Analyzer
Performance Verification Software

Software User's Guide

Software Revision 1.04

This manual applies to the
WILTRON 360X/372XX(A/B)/373XXA Vector Network Analyzer
Performance Verification Software,
WILTRON Part Number 2300-175, Revision 1.04

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CONTENTS

		Page
Chapter 1	*General Information*	*1*
Chapter 2	*Required Equipment*	*3*
Chapter 3	*Configuring the System*	*5*
Chapter 4	*Running the Program*	*6*
Chapter 5	*In Case of Trouble*	*10*
Appendix A	*Example of Tabular Test Results*	*A1*

Chapter 1
General Information

Contents

Para	Name	Page
1	Introduction	1
2	Format Of The Verification Software Disks	1
3	Capability	1
4	Data Output	1

1 Introduction

This manual supports the WILTRON 2300-175 VNA Performance Verification Software. This software is used with the WILTRON 360X/372XX(A/B)/373XXA Vector Network Analyzer Systems. The manual is organized into five chapters, as shown below.

- *General Information*—provides an overview of the product.
- *Required Equipment*—describes the test equipment, components, hardware and software required to use this product.
- *Configuring the System*—describes how the equipment is setup and interconnected.
- *Running the Program*—provides step-by-step instructions for running the software.
- *In Case of Trouble*—contains troubleshooting suggestions and service information.

2 Format of the Verification Software Disks

The Performance Verification Software is offered on an IBM compatible 1.44MB floppy disk.

3 Capability

This software provides for automating measurements of the test components contained in a WILTRON 3666, 3667, 3668, 3669, or 3669B Verification Kit.

It compares the measurements made on your 360X/372XX(A/B)/373XXA with the test component data provided in each verification kit. This will aid in determining if the measurement values obtained for the components are within the uncertainty limits provided on the data disk packaged with each verification kit.

4 Data Output

The test data and results are output in the form of four files to a directory (C:\verify.vna\data) on your computers hard drive. The default file names, depending on the type of test being performed, are:

20db.dat

40db.dat or 50db.dat

airline.dat

beatty.dat

NOTE:

The Performance Verification Software allows you to rename these files to file names of your choice with default ".dat" extension.

The tabular data in each file is given at discrete frequencies (1.0, 1.5, or 3.0 GHz intervals—depending on the connector type and corresponding frequency range).

Chapter 2
Required Equipment

Contents

Para	Name	Page
5	Introduction	3
6	Computer (System Controller)	3
7	GPIB Interface Card	3
8	Vector Network Analyzer	3
9	Verification Kit	3
10	Printer	3
11	Cables	4

5 Introduction

This section describes the equipment required to use the Performance Verification Software.

6 Computer (System Controller)

You need an IBM AT or compatible computer with 640K of RAM, a hard disk configured as C: drive, a 3.5 inch floppy disk drive, and MS-DOS 3.3 (or higher) Operating System. This computer system is also used as the system controller (see below for GPIB configuration.)

7 GPIB Interface Card

Your computer must have a National Instruments IEEE-488 GPIB Interface Adapter running driver version 2.1 or later. Ensure your GPIB adapter is setup to default configuration as per National's Instructions.

8 Vector Network Analyzer

You need a WILTRON Model 360X/372XX(A/B)/373XXA Vector Network Analyzer System, with the appropriate 3650, 3651, 3652, 3654, or 3654B Calibration Kit. A 360X system consists of a 360/360A/360B VNA, a 360X-Series Test Set, and a Wiltron RF signal source.

The 360X/372XX(A/B)/373XXA Vector Network Analyzer will be referred to as VNA throughout this User's Guide.

9 Verification Kit

You need a WILTRON 3666, 3667, 3668, 3669, or 3669B Verification Kit, with data disk.

10 **Printer**

A printer is not required since the verification results and data will be stored in four files on your computer's hard disk drive (C:). These files are saved in ASCII format for easy viewing and printing later if desired.

11 **Cables**

You need a GPIB cable (Wiltron PN: 2100-2) and a two-foot RF Test Port Cable (WILTRON PN: 3670A50-2, 3670K50-2, 3670V50-2, 3671A50-2, 3671K50-2, or 3671V50-2.)

Chapter 3
Configuring the System

Contents

Para	Name	Page
12	Introduction	5
13	Hardware Interconnection	5
14	Software Installation and Configuration	5

12 Introduction

This chapter describes how the various system elements are interconnected and the preliminary steps required for operation of the verification software.

13 Hardware Interconnection

Connect the computer's GPIB port to the VNA system using the GPIB cable.

If the VNA is a 360X Network Analyzer, connect to the GPIB connector labeled "360 GPIB" ***not*** the one labeled "System Bus."

If the VNA is a 372XX(A/B)/373XXA Network Analyzer, connect to the GPIB connector labeled "IEEE 488.2 GPIB" ***not*** the one labeled "Dedicated GPIB."

Connect the two-foot test port cable female end to the VNA Port 2.

Connect a female-female Phase Equal Insertable Adapter from the Calibration Kit to the VNA Port 1. This does not apply to GPC-7 Calibration.

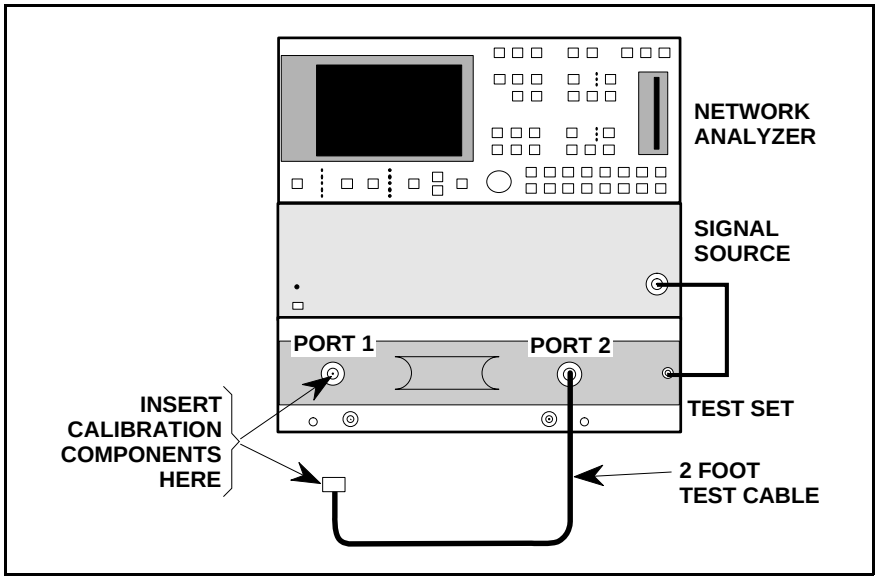

Figure 1. VNA Calibration and Measurement Setup Shown on a 360X VNA.

14 Performance Verification (PV) Software Installation

The installation is very simple with the vinstall program. Just put the disk into a floppy drive, switch to that floppy drive and type vinstall then press the enter key. The install program creates a directory called verify.vna on your computers C: hard disk. Unlike the previous version, the Verification data disk can be in drive A or B. Ensure your GPIB Adapter driver software is installed and tested as per National Instruments Instructions.

NOTE:

The program can be run from a floppy disk as before, however, you must have a directory on the C: hard drive called "VERIFY.VNA\DATA".

Chapter 4
Running the Program

Contents

Para	Name	Page
15	Introduction	6
16	Starting The Program	6
17	Entering System Data And Calibration	7
18	Measuring the Verification Devices	8

15 Introduction

The Performance Verification software runs in DOS text mode as described below.

16 Starting the Program

With the equipment and software configured as described in Chapter 3 Section 14, turn on your computer and allow it to boot up to the DOS prompt (C:\).

At the DOS prompt, Type :

vnaveri

Press: <ENTER> to invoke the performance verification program.

If you are going to run the Verification program from a floppy without installing the software do the following :

after your computer boots up switch to the c drive

type mkdir verify.vna then press the enter key

type mkdir verify.vna\data then press the enter key

put the verification software disk in the floppy drive of your choice, switch to that floppy drive an

Type :

vnaveri.exe

Press: <ENTER> to invoke the performance verification program.

The following message will be displayed on the computer screen:

WILTRON VNA VERIFICATION SOFTWARE

* * VERSION 1.04 * *

Press any key to continue.

At this point you can install the 3.5-inch data disk from the Verification Kit into an available floppy drive and leave it in for the duration of the Performance Verification.

Entering System Data and Calibration

The program now prompts you to enter or confirm the following data:

- The VNA's GPIB Address. The default Wiltron address is 6
- The VNA's Family (360X, 272XX[A or B], 373XXA)

If a 360X was selected you will be prompted to see if option 5 is installed.

- Start Frequency
- Verification Kit Type
- Stop Frequency
- Verify the calibration kit coefficients have been loaded into the VNA system.

To do this:

a. Insert the data disk from your WILTRON *Calibration* Kit (not the verification kit) in the Network Analyzer's disk drive.

b. Press the UTILITY MENU key on the front panel of the network analyzer. (The Utility Menu is displayed on the network analyzer's display screen.)

c. Select CALIBRATION COMPONENT UTILITIES on the Utility Menu and press <ENTER>. (The Calibration Component Utilities Menu is displayed.)

d. Select INSTALL CALIBRATION COMPONENT INFORMATION FROM DISK on the Calibration Component Utility Menu and press <ENTER>. (Loading of the calibration kit coefficients from the data disk begins.)

When the calibration kit coefficients have been loaded into the VNA system, press any key on the computer keyboard to continue.

The program automatically sets up the proper frequency points for your measurement based upon your responses to the earlier program prompts. The program then automatically sets up the VNA so that you can manually perform a full, 12-term calibration of the VNA system. Using the two-foot test cable, set up the VNA system for calibration as shown in Figure 1 (chapter 3 section 13).

- Perform the full, 12-term calibration

Follow the prompts presented on the network analyzer's display screen and using the calibration components from your WILTRON Calibration Kit.

Completion of the calibration is indicated by the lighting of the "FULL 12-TERM" CALIBRATION LED indicator on the 360X VNA and the "APPLY CAL" LED indicator only on the 372XX(A/B)/373XXA VNA front panel.

Press any key on the computer keyboard to continue the verification program.

- Enter the Letter of the floppy drive the Verification Data Disk is in

Next, the program prompts you to enter header information for the data printouts, as follows:

- VNA Serial Number (found on the Network Analyzer's rear panel).
- Verification Kit Serial Number (found on the label on the side of the verification kit wooden box).
- Date (dd/MONTH/yy format). For example, if the date is September 1, 1993 then enter 01/SEPT/93.
- Operator's Name (up to 12 characters long-no spaces).

Enter the information as it is requested, pressing <ENTER> after each entry.

18

Measuring the Verification Devices

The program now presents the following menu on the computer screen:

(1) Measure 20 dB Attenuator
(2) Measure 40 or 50 dB Attenuator
(3) Measure Beatty Standard
(4) Measure Airline
(5) Restart Program
(6) Exit

Enter the number corresponding to the action you wish to take.

At this point you can begin measuring your verification kit devices. As you select a verification device, the program prompts you to enter the serial number of the device and to orient the device with the label facing the user. Such orientation places port 1 on your left. It is at this measurement point that the device is installed and measured on the VNA.

The computer will now read data from the Verification Kit data disk installed in the floppy drive you entered earlier. The verification software then automatically measures the device with the VNA and compares the measured data with the data stored on the Verification Kit data disk. The results and measurement data is stored to data files on the hard drive directory C:\VERIFY.VNA\DATA (see Section 1-4, Data Output for file names.) The data on each file will contain an asterisk (*) next to measurement data that is not within the specified limits.

The above steps can be repeated for each of the three remaining devices in the verification kit: the 40/50 dB Attenuator, the Beatty standard, and the air line.

NOTE:

The software will write the data to the file name you choose, or the default file names in Section 1-4. If these files already exist, they will be overwritten. Rename the files if you do not wish them overwritten with the new data.

To exit the program, enter 6 at the main menu.

To view or print the data files, simply use any text editor. You can also view the data files using the batch file called veridata.bat included on your Performance Verification Software distribution disk.

Chapter 5
In Case of Trouble

Contents

Para	Name	Page
19	Difficulty Running the Program	10
20	Difficulty Meeting System Specifications	10

19 Difficulty Running the Program

If you have difficulty getting the program to run properly:

a. Check your GPIB interconnection.

b. Check cables and addresses, ensure that the GPIB-PC directory is present on the boot drive and contains the GPIB.COM file, and that the CONFIG.SYS file contains the line DEVICE=GPIB.COM.

c. If you are running the program from the hard disk it should be installed with the install program. If you are running from a floppy drive with or without installing the program create a directory on the C: drive called VERIFY.VNA\DATA, change to the floppy drive with the program disk, type VNAVERI.EXE and press the enter key to start the program.

d. Ensure that after starting-up your Performance Verification Software, the Verification Kit data disk is installed in drive A or B (the floppy drive you told the program it was in) and that it contains the following files:

DEV1S11.DAT	DEV3S11.DAT	UNCDEV1.DAT
DEV1S12.DAT	DEV3S12.DAT	UNCDEV2.DAT
DEV1S21.DAT	DEV3S21.DAT	UNCDEV3.DAT
DEV1S22.DAT	DEV3S22.DAT	UNCDEV4.DAT
DEV2S11.DAT	DEV4S11.DAT	VALDEV1.DAT
DEV2S12.DAT	DEV4S12.DAT	VALDEV2.DAT
DEV2S21.DAT	DEV4S21.DAT	VALDEV3.DAT
DEV2S22.DAT	DEV4S22.DAT	VALDEV4.DAT

If, after checking the above, you still have difficulty, contact WILTRON Customer Service at (408) 778-2000 (fax: 408 778 0239) and ask for the Vector Network Analyzer Support Engineer for further assistance.

20 Difficulty Meeting System Specifications

If the verification software appears to run properly but the results are not within the measurement limits associated with the verification kit:

a. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.

b. Ensure that the serial number of the verification kit data disk matches that shown on the verification kit.

c. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, if you require factory assistance.

d. When installing calibration devices, and when measuring verification devices, pay particular attention to proper connector alignment and torque. Torque the connector using the torque wrench supplied with the calibration kit.

If, after following the above steps, you still have difficulty, please contact WILTRON Customer Service at (408) 778-2000 (fax: 408 778 0239) and ask for the Vector Network Analyzer Support Engineer for further assistance.

Appendix A
Example of Tabular Test Results

WILTRON VNA Verification SW Version 1.04

37200 Serial Number: 456001

Verification Kit Model Number: 3667

Verification Kit Serial Number: 89001

Date: 04/01/96

Device Serial Number: 050021

Operator: VnaTester

AIR LINE

——————————————————————————————S12——————————————————————————————-

Freq (GHz)	STD (db)	MEAS (db)	DIFF	UNC (+/-)	STD (DEG)	MEAS (DEG)	DIFF	UNC (+/-)
0.04	0.0013	0.1013	-0.1000	0.1100	-0.9	71.3	-72.2	180.0
1.50	0.0050	2.2862	-2.2812	0.0903	131.8	-173.4	54.9	180.0
3.00	0.0052	0.4899	-0.4847	0.0906	-171.7	-99.0	-72.6	180.0
4.50	0.0045	2.6800	-2.6755	0.0909	-119.0	-110.6	-8.5	180.0
6.00	0.0013	0.4873	-0.4860	0.0912	-79.8	83.3	-163.1	180.0
7.50	0.0033	0.4291	-0.4258	0.0915	130.0	-78.9	151.2	180.0