

3656B W1 Calibration/Verification Kit and 2300-584-R System Performance Verification Software

VectorStar™ ME7838A Modular Broadband VNA System with
3743A mm-Wave Modules

VectorStar™ ME7838E Modular Broadband VNA System with
3743E mm-Wave Module

VectorStar™ ME7838A4 Modular Broadband VNA System with
3743A mm-Wave Modules

VectorStar™ ME7838E4 Modular Broadband VNA System with
3743E mm-Wave Modules

VectorStar™ ME7828A Standard Broadband VNA System

Lightning™ ME7808A/B/C Broadband VNA System



Anritsu

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Chapter 1 — 3656B W1

Calibration/Verification Kit Overview

1-1 Introduction

This manual provides description and maintenance instructions for the Model 3656B W1 (1 mm) Calibration and Verification Kit and describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) for the VectorStar ME7838A Series Modular BB/mm-VNA System, ME7838E Modular BB/mm-Wave VNA Measurement System, VectorStar ME7838A4 Modular BB/mm-Wave VNA Measurement System, VectorStar ME7838E4 Modular BB/mm-Wave VNA Measurement System, VectorStar ME7828A Standard BB/mm-Wave VNA Measurement System, and the Lightning ME7808A/B/C Broadband/Millimeter-Wave VNA Measurement Systems. The 3656B calibration kit can also be used with other VNA systems (including the ME7838D and ME7838D4) with appropriate adapters to the 1 mm connector interface. The verification processes only apply to the systems enumerated above.

This chapter provides an illustration and description of the kit components. General connector care instructions applicable to all calibration kits are provided in [Chapter 9, “Maintenance”](#).

Operation and use of the 3656B W1 (1 mm) Calibration/Verification Kit is documented in procedures in the VectorStar Operation Manual and Measurement Guide.

Note	The components in this kit are of the highest quality and accuracy. All components are NIST (National Institute of Standards and Technology) traceable.
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1-2 Description

The W1 calibration kit allows you to calibrate the performance of the following systems:

- VectorStar ME7838A Series Modular BB/mm-VNA System
- VectorStar ME7838E Series Modular BB/mm-VNA System
- VectorStar ME7838A4 Series Modular BB/mm-VNA System
- VectorStar ME7838E4 Series Modular BB/mm-VNA System
- VectorStar ME7828A Series Standard BB/mm-VNA System
- Lightning ME7808A/B/C BB/mm-Wave VNA System

The components in this kit provide the basis for issuing a calibration certification label.

1-3 Required Equipment

This section describes the recommended equipment for installing and running the 2300-584-R software.

GPIB Controller PC Operating System

Make sure that the following minimum requirements are met before installing and using the software:

- Intel® Pentium® III with 1 GB RAM or Intel® Pentium® IV with 512 MB RAM, or equivalent
 - Intel® Pentium® IV with a minimum of 1 GB RAM
- Windows XP SP2, Windows 7
 - This application has not been tested on Microsoft® Windows Vista®.
- 20 MB hard-disk free space
- National Instruments® PCI-GPIB Controller and associated drivers installed

- Display resolution 1024 × 768 and a CD-ROM drive or USB port

Note This program may not function on versions of Microsoft Windows that use 4-byte character sets.

Verification Software Overview

The Anritsu 2300-584-R Broadband Measurement System Performance Verification Software is provided on a USB memory device. The verification software provides for automating measurements of the test components contained in the Anritsu Model 3656B Calibration/Verification Kit.

The software compares the measurements of NIST traceable standards made with your instrument to the standard's test data provided on the verification kit's floppy disk. This aids in determining if the measurement values are consistent with system specifications.

Data Output

The test data and results are output in the form of four files to a directory (X:\installed directory) on your computer's hard drive. The default file names, depending on the type of test being performed, are:

- Matched Thru Low.dat
- Mismatched Thru Low.dat
- Matched Thru High.dat
- Mismatched Thru High.dat

Note This performance verification software allows you to rename these files using the default **.dat** extension. The tabular data in each file is given at discrete frequencies at 1 GHz intervals, along with separate start and stop frequencies if the start and stop frequencies do not fall on 1 GHz spacing. The test results can be viewed or printed from the **Main Menu** window.

GPIB Interface Card and Cable

Depending upon the Operating System and hardware used to perform the verification, there are different requirements for the GPIB hardware configurations. This software supports the following GPIB interfaces:

- National Instruments Model PCMCIA-GPIB (Driver Software Versions 1.2 and above)
- National Instruments Model PCI-GPIB (Driver Software Version 1.2 and above)

Regardless of which GPIB hardware and software is used, the GPIB card must be configured as "GPIB0." You also need a GPIB cable to interface the PC to the broadband measurement system (Anritsu PN: 2100-2).

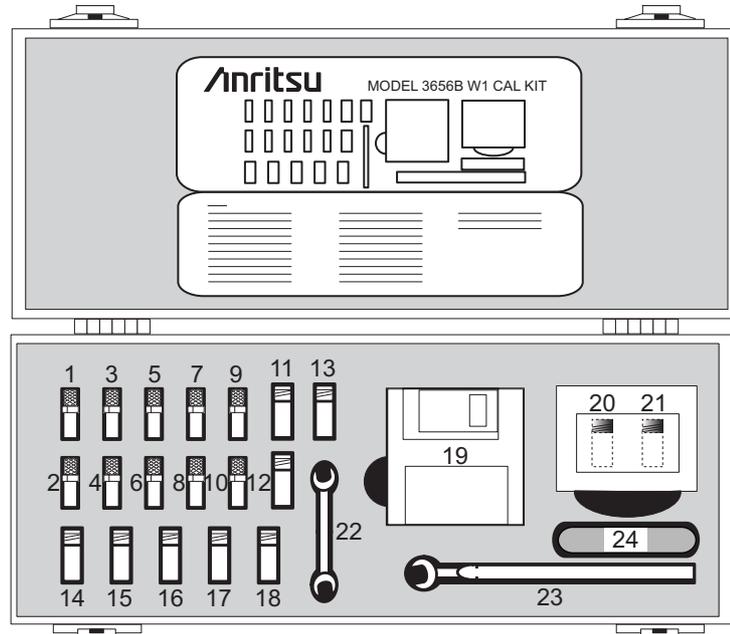
Printer

A printer is not required for operation because the verification results and data are stored in four files on the computer hard disk drive. These files are saved in ASCII format for easy viewing and printing at a later time.

Note The descriptive screenshots which appear in this manual may appear slightly different depending on the Windows operating system used and the VectorStar system under test.

1-4 Model 3656B W1 (1 mm) Calibration/Verification Kit

The 3656B W1 (1 mm) Calibration/Verification Kit is shown in [Figure 1-1](#) with the listed components. The -3 option on this calibration kit will add .s1p files describing the calibration standards onto the USB memory device. This is in addition to the polynomial models (.ccf file format) supplied with the base 3656B calibration kit.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Male Broadband Termination – 28W50 2. Female Broadband Termination – 28WF50 3. Male Open – 24W50 4. Female Open (1.930 mm) – 24WF50 5. Male Offset Short 1 (2.02 mm) – 23W50-1 6. Female Offset Short 1 (2.02 mm) – 23WF50-1 7. Male Offset Short 2 (2.65 mm) – 23W50-2 8. Female Offset Short 2 (2.65 mm) – 23WF50-2 9. Male Offset Short 3 (3.180 mm) – 23W50-3 10. Female Offset Short 3 (3.180 mm) – 23WF50-3 11. Male-Male Adapter – 33WW50 12. Male-Female Adapter – 33WWF50 13. Female-Female Adapter – 33WFWF50 14. Fixed Male SC Connector – 33WSC50 15. Fixed Female SC Connector – 33WFSC50 16. Interchangeable Slider, SC Connectors <ul style="list-style-type: none"> • 60939 (M) • 60943 (F) 17. Locking Keys, SC Connectors – 61265 18. Pin Exchange Tool – 01-402 | <ol style="list-style-type: none"> 19. Two 3.5 inch floppy diskettes for use with the Lightning 37000 Series VNAs containing: <ul style="list-style-type: none"> • W1 Component Coefficient Data • W1 Component Verification Data • The 3.5 inch floppy disks are labeled with the Serial Number of the Calibration/Verification Kit 20. Stepped Impedance Mismatch Thru Line Verification Device inside plastic box – 18WWF50-1B 21. 50 Ohm Matched Thru Line Verification Device inside plastic box – 18WWF50-1 22. 6–7 mm End Wrench – 01-505 23. 6 mm Torque Wrench – 01-504 24. USB Memory Device for VectorStar MS4640A/B Series VNAs containing the following: <ul style="list-style-type: none"> • W1 Component Coefficient Data for VectorStar • W1 Component Verification Data for VectorStar • 2300-584-R System Performance Verification (PVS) Software • 3656B W1 (1 mm) Calibration/Verification Kit and System Performance Verification Software User Guide – 10410-00286 (this document) • The USB memory device is labeled with the Serial Number of the Calibration/Verification Kit |
|---|--|

Figure 1-1. 3656B W1 (1 mm) Calibration/Verification Kit Components

1-5 Related Documentation

For more information on VNA systems, calibration/verification kits, and other supporting accessories, refer to the Anritsu web site: <http://www.anritsu.com> or the VectorStar product page:

<http://www.anritsu.com/en-us/products-solutions/products/ms4640b-series.aspx>

This and other VectorStar manuals are available for download as a PDF file.

Product Information, Compliance, and Safety

Refer to the VectorStar Product Information, Compliance, and Safety (PICS) – 10100-00063 for applicable product information, compliance statements, and safety information, including links to applicable product web pages.

Chapter 2 — Using the 2300-584-R Software with the ME7838A

2-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) with the VectorStar ME7838A Modular BB/mm-Wave VNA Measurement System. The ME7838A is based on the VectorStar MS4647A/B Vector Network Analyzer running VectorStar Application Version 1.5.0 or higher and equipped with Option 08x.

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired.
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2-2 Required Equipment

Required VectorStar ME7838A Broadband System, 70 kHz to 110 GHz Instruments and Components

The VectorStar ME7838A Broadband/Millimeter Wave Measurement System consists of:

- VectorStar MS4647A/B VNA, 10 MHz to 70 GHz, V Connectors, equipped with Option 08x
- 3739A/B/C Broadband Test Set
- Two (2) 3743A Millimeter-Wave (mm-Wave) Modules, 70 GHz to 110 GHz.
- Necessary rear panel interconnect cables between the test set and the VNA.
- Necessary front panel interconnect cables between the test set and the VNA
- Necessary interconnect cables to the 3743A mm-Wave Modules.

2-3 Configuring the Hardware

This section describes how the various system elements are interconnected and describes the preliminary steps required for operation of the verification software. See [“Required VectorStar ME7838A Broadband System, 70 kHz to 110 GHz Instruments and Components”](#) on page 2-1 above for a complete equipment list.

1. Ensure that the VNA system is set to “Broadband”.
2. To verify the setting, from the right side MAIN menu, select the broadband test set button:
 - MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Test Set) or BB/mmWave (3739 Test Set)
3. Select the Broadband Receiver Configuration.
4. Connect a GPIB cable between the PC Controller and the VNA Rear Panel GPIB port labeled IEEE 488.2 GPIB.

Caution	Do not connect the cable to the VNA Rear Panel GPIB port labeled Dedicated GPIB .
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2-4 W1 Verification Application Installation

Prior to installation of the W1 Application, the National Instruments GPIB card and drivers must be installed in the Windows PC.

This needs to be done only once per PC Controller. The software is contained on the USB memory device supplied with each Verification Kit.

In order to correctly install the PVS application, the user (logged in) must have Administrative rights on the Windows PC Controller.

- Note** The PVS application is installed onto the PC Controller on an all-user basis.
If your organization does not allow for all-user installations, consult your internal PC and network support group on how to best proceed.

1. Prior to installation of the 2300-584-R PVS, the National Instruments GPIB card and its drivers must be installed in the PC Controller.
2. Turn off all other running applications on the PC Controller.
3. Insert the USB Memory Device into the USB slot.
4. Open Windows Explorer, browse to the USB Drive, and double click on **Startup.htm**.

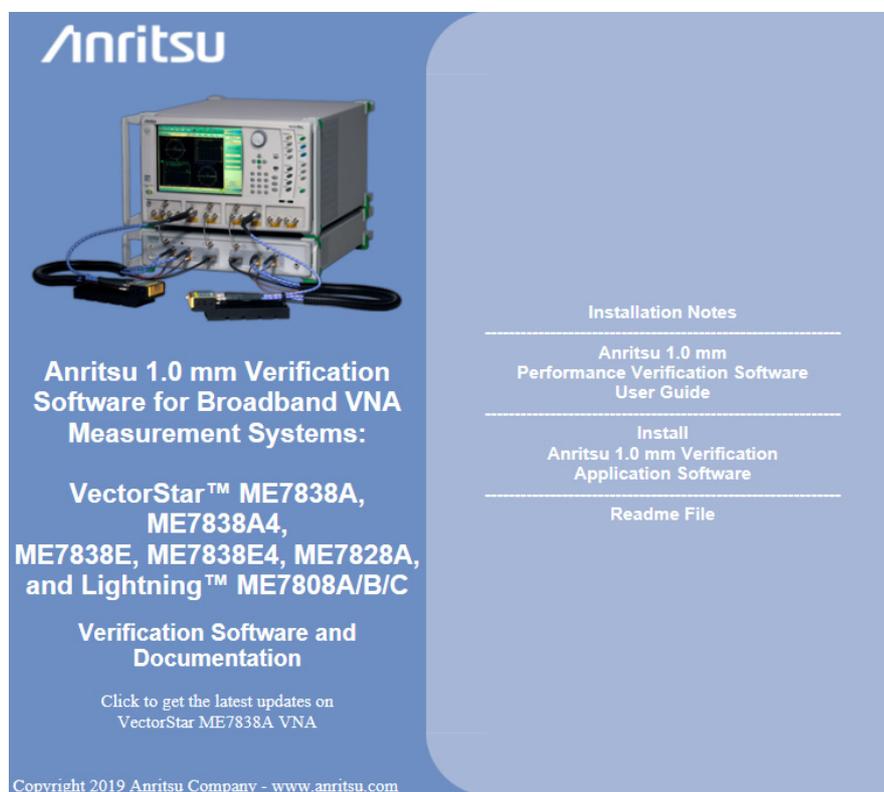


Figure 2-1. PVS Installation and Documentation Screen

5. On the navigation page, click the Install Anritsu 1.0 mm Verification Application Software link.
6. The first of several installation dialog boxes appears.

7. Click Run on the two security dialog boxes (Figure 2-2 on page 2-3).

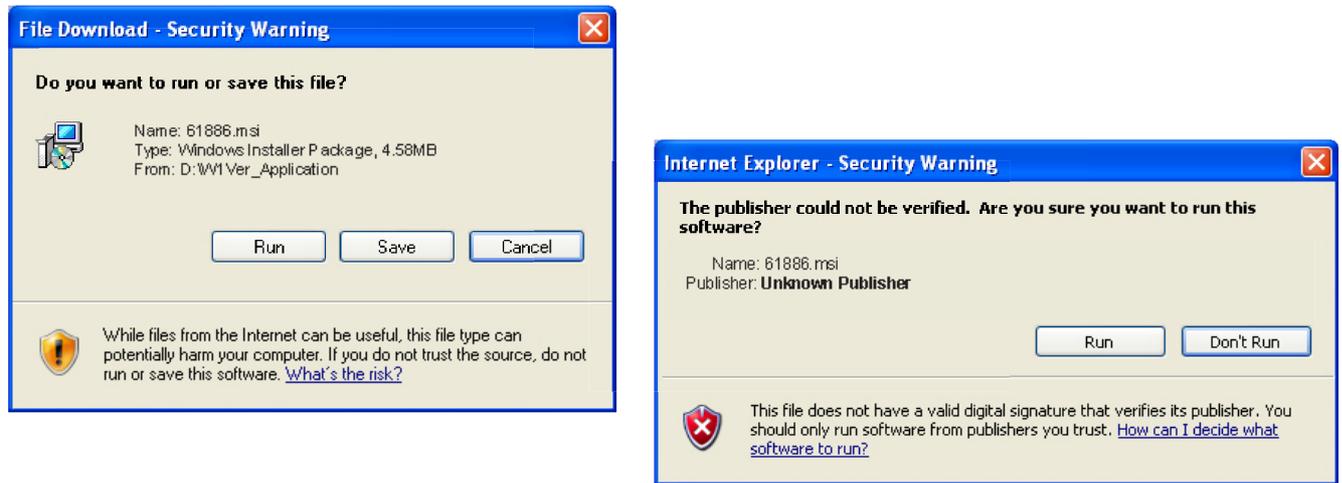


Figure 2-2. Installation Security Dialog Boxes – Click Run on each

8. If either of the two dialog boxes shown in Figure 2-3 appear that display Error 1321 or Error 1931, follow these instructions:

- Error 1321 – Select Exit Installation and make sure you have Administrator privileges on the PC Controller.
- For Error 1931 – Select OK to bypass the error message and continue the installation.

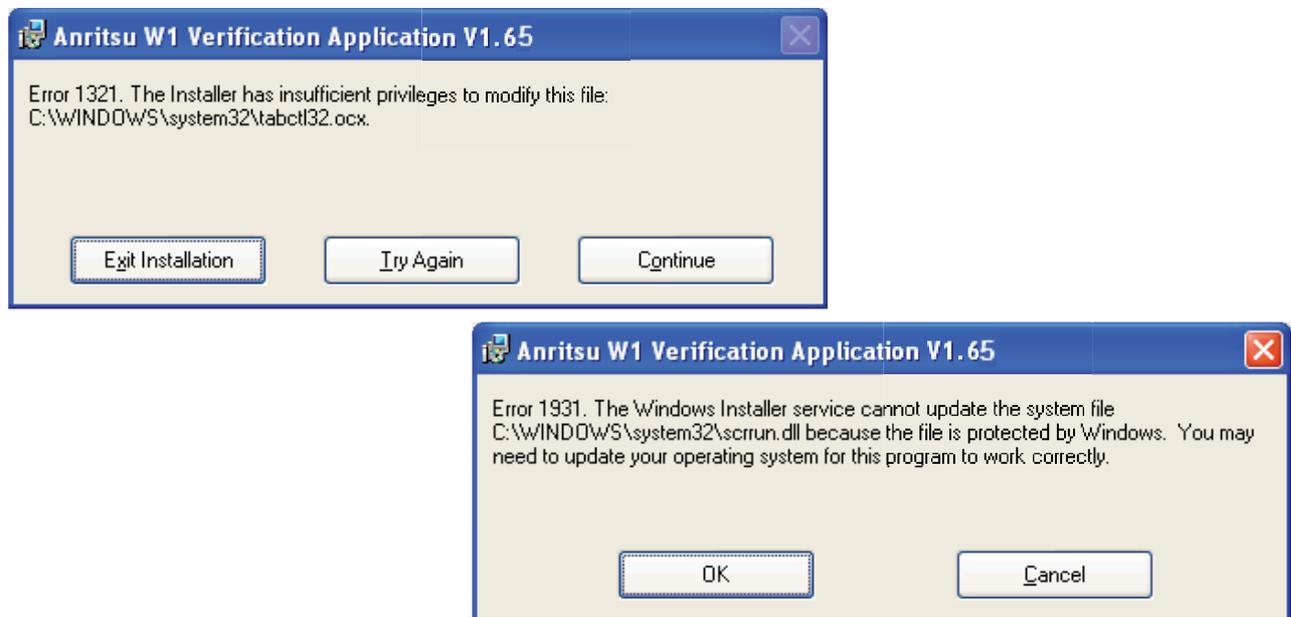


Figure 2-3. Installation Error 1321 and Error 1931 Dialog Boxes

9. Two installation wizard setup dialog boxes appear in sequence. Click Next to proceed through each dialog box. The final dialog box shows an installation progress bar.

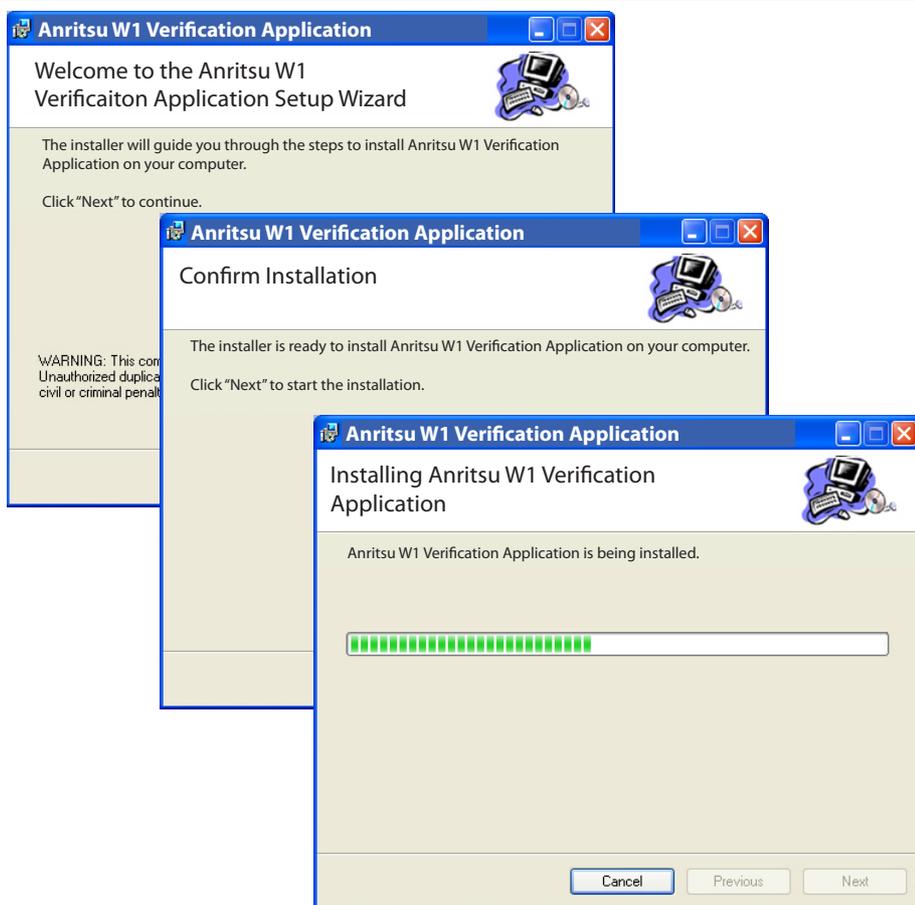


Figure 2-4. Installation Confirmation and Progress Dialog Boxes – Click Next on each

10. When the installation progress bar shows complete, click **Next**. The final Application Information dialog box appears. Click **Next**, and the Installation Complete dialog box appears.

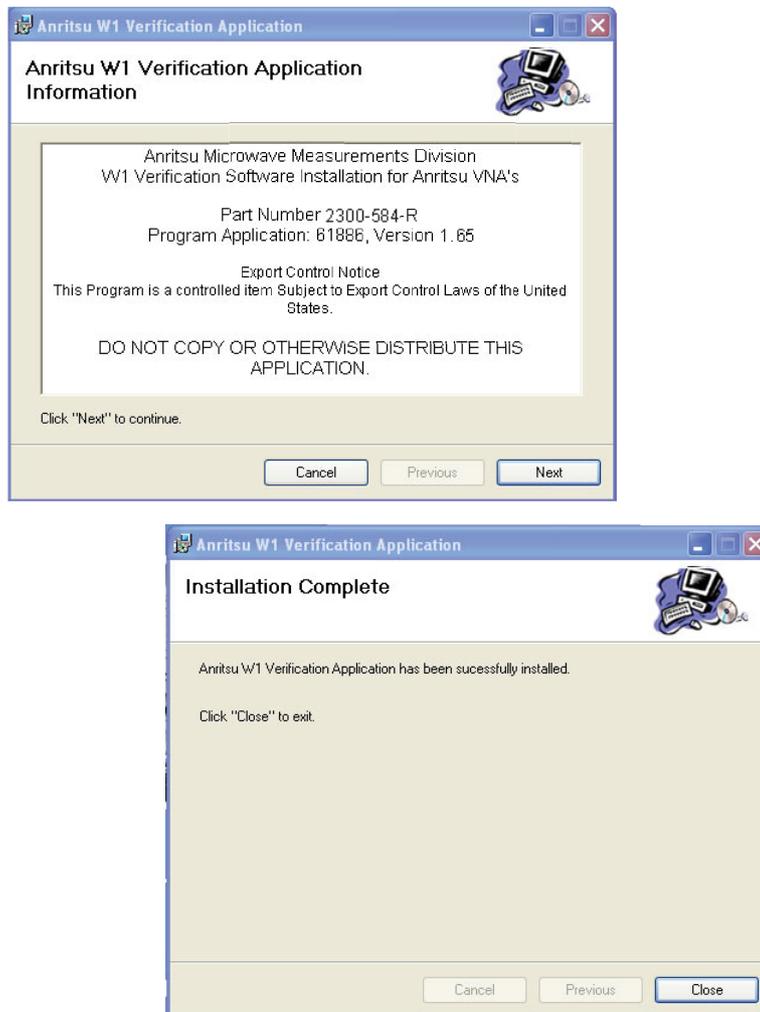


Figure 2-5. Final Application Information and Installation Complete Dialog Boxes

11. The installer adds all required files and makes the necessary registry updates on the PC Controller. When done, the navigation page ([Figure 2-1](#)) reappears.
12. If desired, open the **User Guide** (this document) and save and/or print a copy.
13. The PVS application is available either the **Start** or **Program** menu of the PC Controller.

2-5 Running the Verification Software

After the VNA and PC have been configured as described above, you are ready to run the program and perform the calibration/verification. Make sure you have the following information available:

- Serial number of the 3656B W1 Calibration/Verification Kit
- Serial number of the 3739A/B/C Broadband/Millimeter Wave Test Set
- Model number and serial number of the Port 1 BB/mm Module
- Model number and serial number of the Port 2 BB/mm Module

Procedure

1. With the equipment and software configured as described in “Configuring the Hardware” on page 2-1, turn on the computer and allow it to start Windows.
2. Locate the Anritsu W1 Verification icon (shown below) on the desktop and double-click it.



3. The program displays an About dialog box with version information. Click OK to continue.

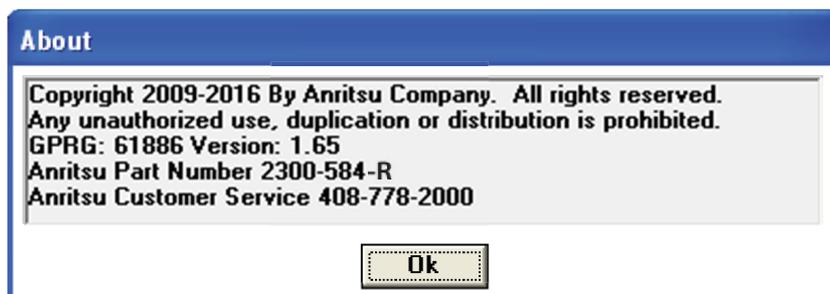


Figure 2-6. About Dialog

4. The Test Operator Name dialog box appears. Enter a user name or other identification.

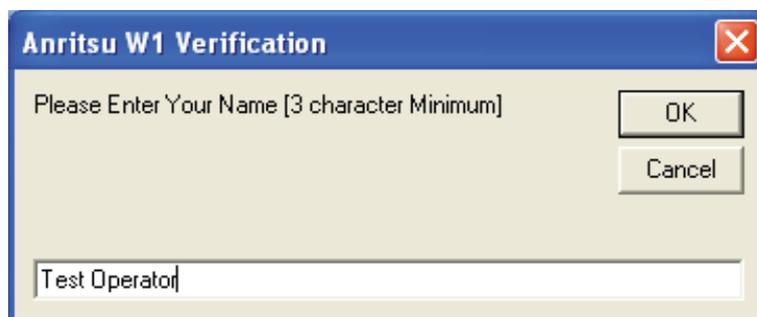


Figure 2-7. Name Dialog

5. Click OK to continue. The program searches for a compatible VNA on the GPIB. When the VNA is found, a confirmation dialog box appears.

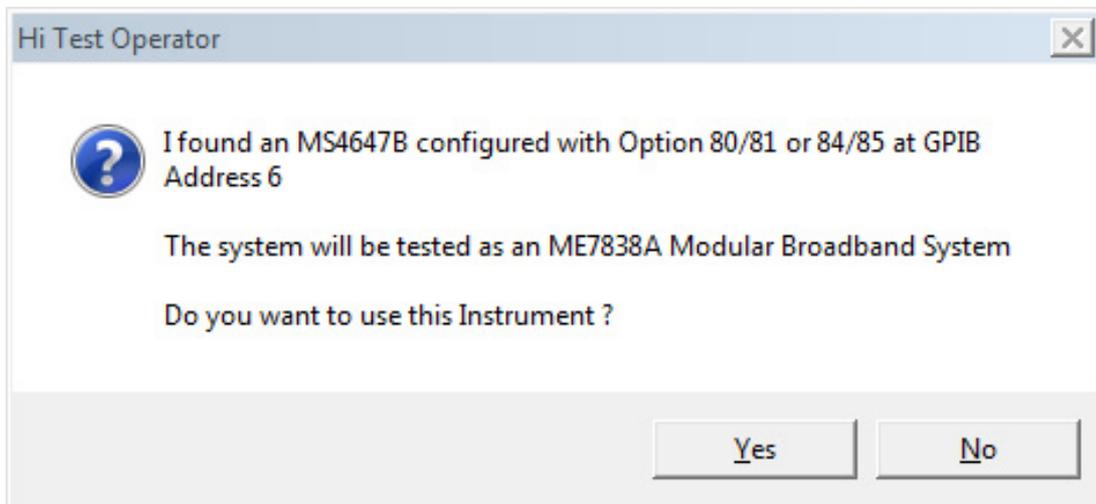


Figure 2-8. Found Instrument Dialog

6. Click Yes to continue, or click No to search for another VNA.

Note If your system is configured with a Lightning 37000 series VNA, refer to [Chapter 7, "2300-584-R Software with the Lightning ME7808A/B/C"](#).

7. If Yes is clicked above, the program searches for the BB/mm Modules and, when found, requests the model number and the serial number of the test set and each module.

Enter Port 1 BB/mm-Wave Module Information

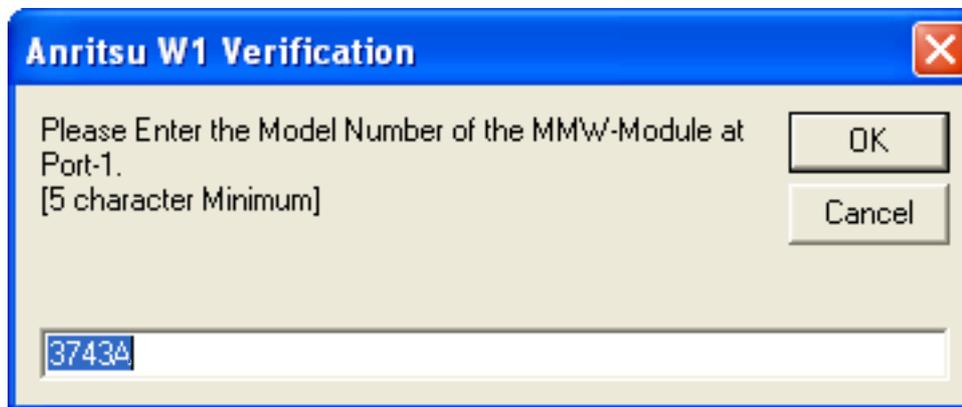


Figure 2-9. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Model Number

8. Enter the Port 1 BB/mm-Wave Module model number and click OK.

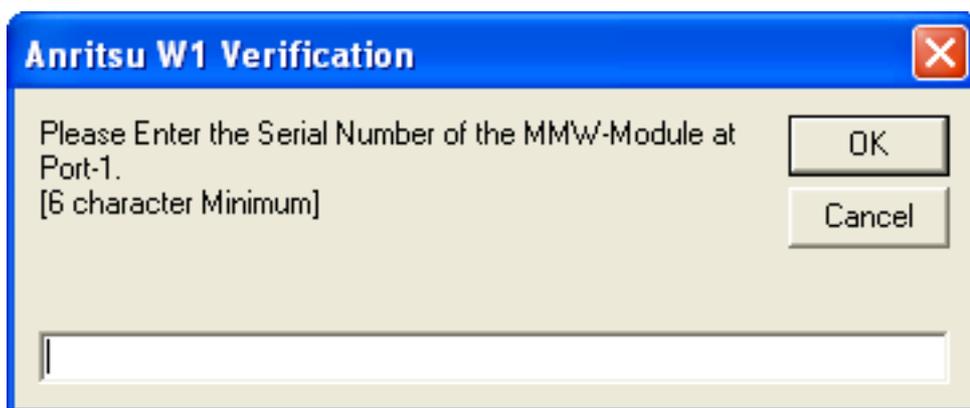


Figure 2-10. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Serial Number

Enter Port 2 BB/mm-Wave Module Information

9. Enter the Port 2 BB/mm-Wave Module model number and click OK.

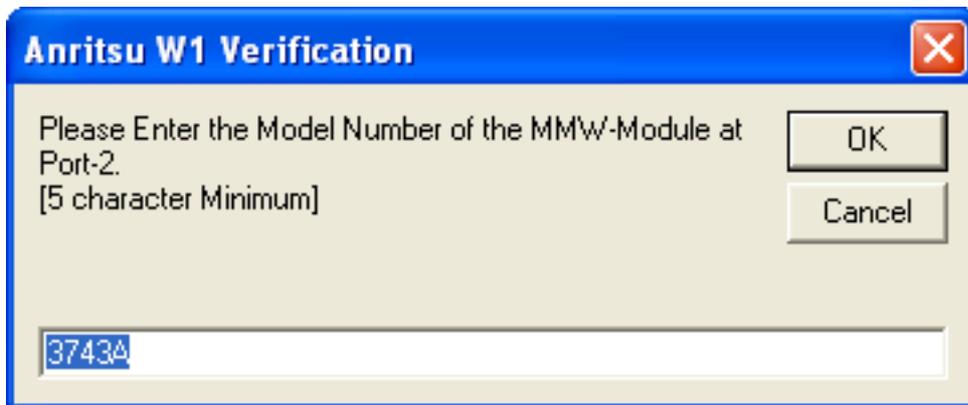


Figure 2-11. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Model Number

10. Enter the Port 2 BB/mm-Wave Module model number and click OK.

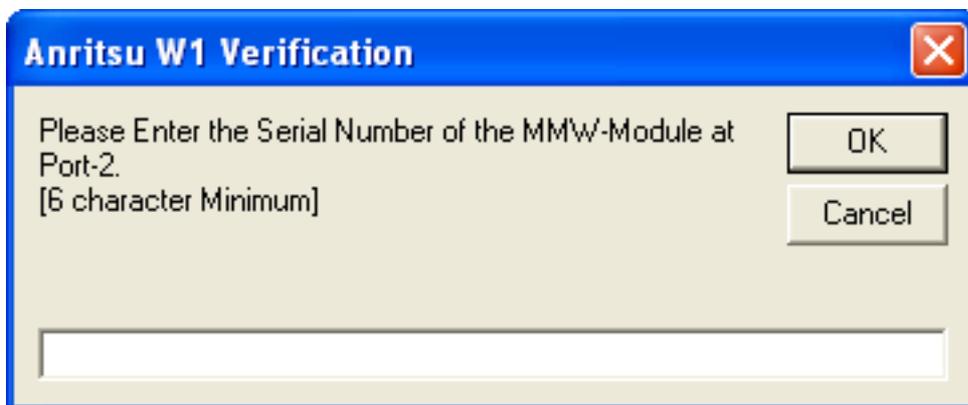


Figure 2-12. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Serial Number

Enter Test Set Information

11. Enter the Test Set model number and click OK.

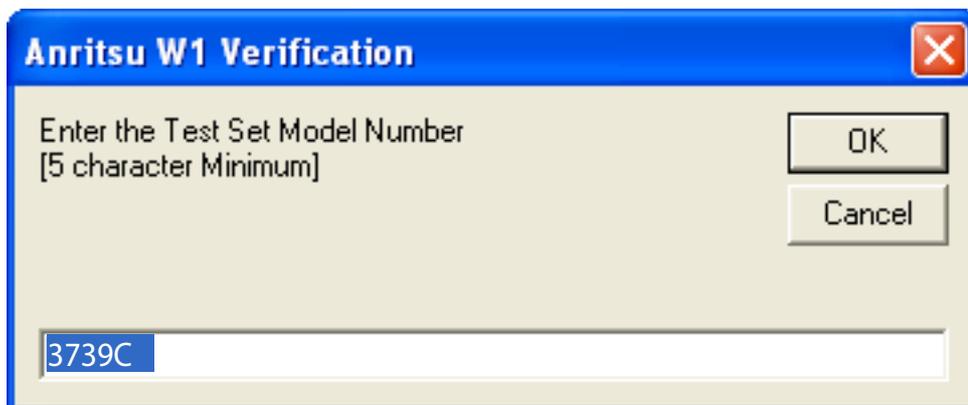


Figure 2-13. Anritsu W1 Verification Dialog – Test Set – Model Number

12. Enter the Test Set serial number found on the rear panel and click OK.

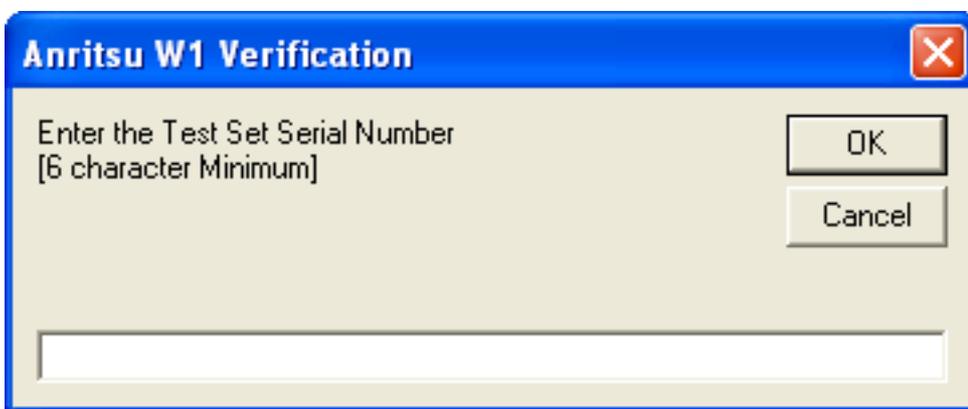


Figure 2-14. Anritsu W1 Verification Dialog – Test Set – Serial Number

13. The program execution continues to the following [Section 2-6, “Application Interface – Setup Menu Tab”](#) on page 2-11.

2-6 Application Interface – Setup Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections:

- The Setup Menu tab is described in this section.
- The Main Menu tab display is described in [Section 2-9, “Application Interface – Main Menu Tab” on page 2-24.](#)
- The Serial Number Info tab is described in [Section 2-10, “Application Interface – Serial Number Tabs” on page 2-28.](#)

Procedure

The following procedure continues the program setup from the previous section:

1. In the Calibration Kit Type area, select W Coax.
2. In the Serial Number (5 Digits) area, enter the serial number for the 3656B Calibration/Verification Kit. At least five (5) digits are required.
3. In the Load Cal-Kit Coefficients to VNA area, select Yes.

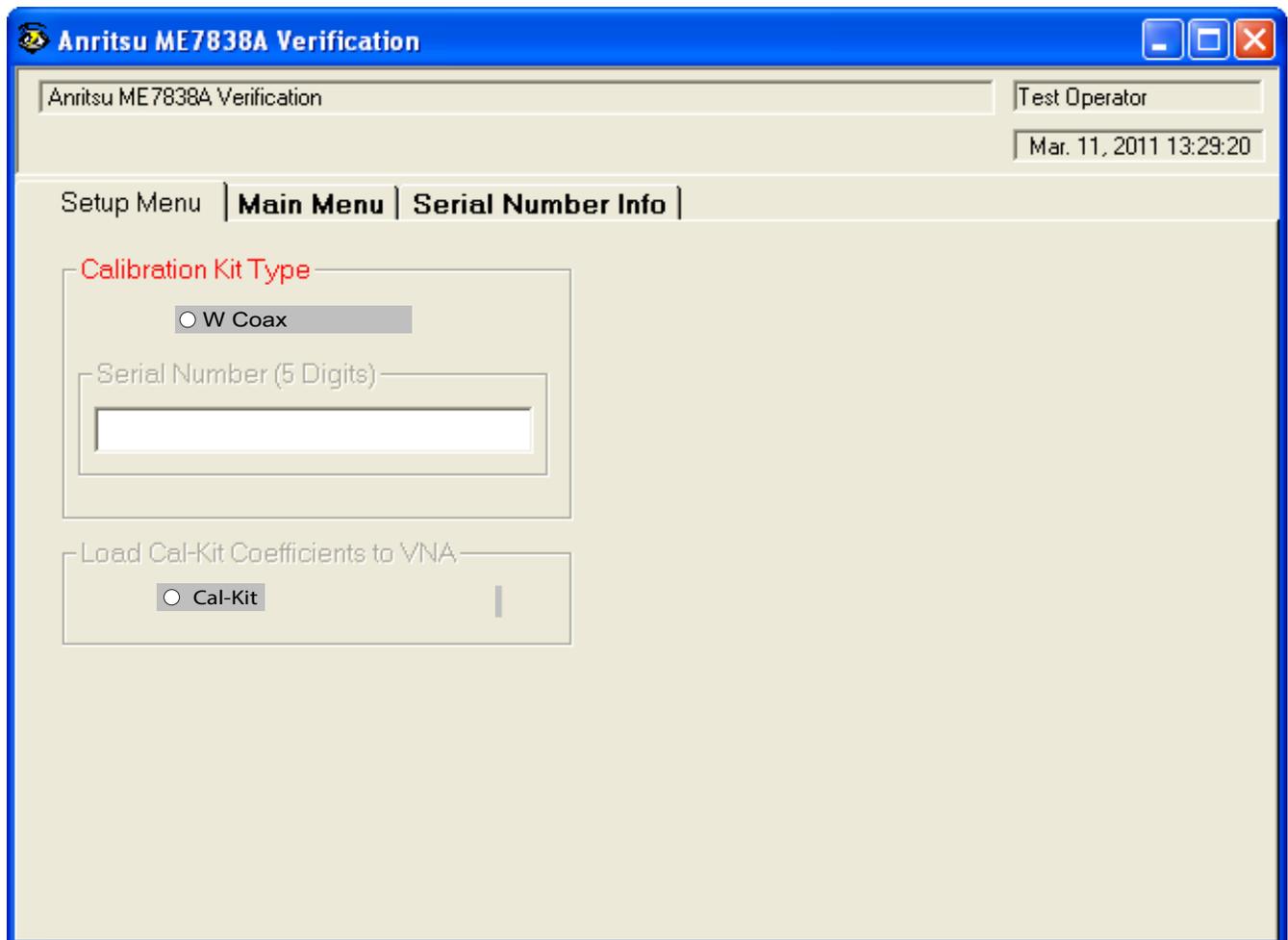


Figure 2-15. ME7838A Application Interface – Setup Menu Tab

4. The Install Calibration-Kit Coefficients to the VNA dialog box appears.

5. Follow the dialog box instructions for installing the 3656B calibration coefficients into the VNA, then click OK.

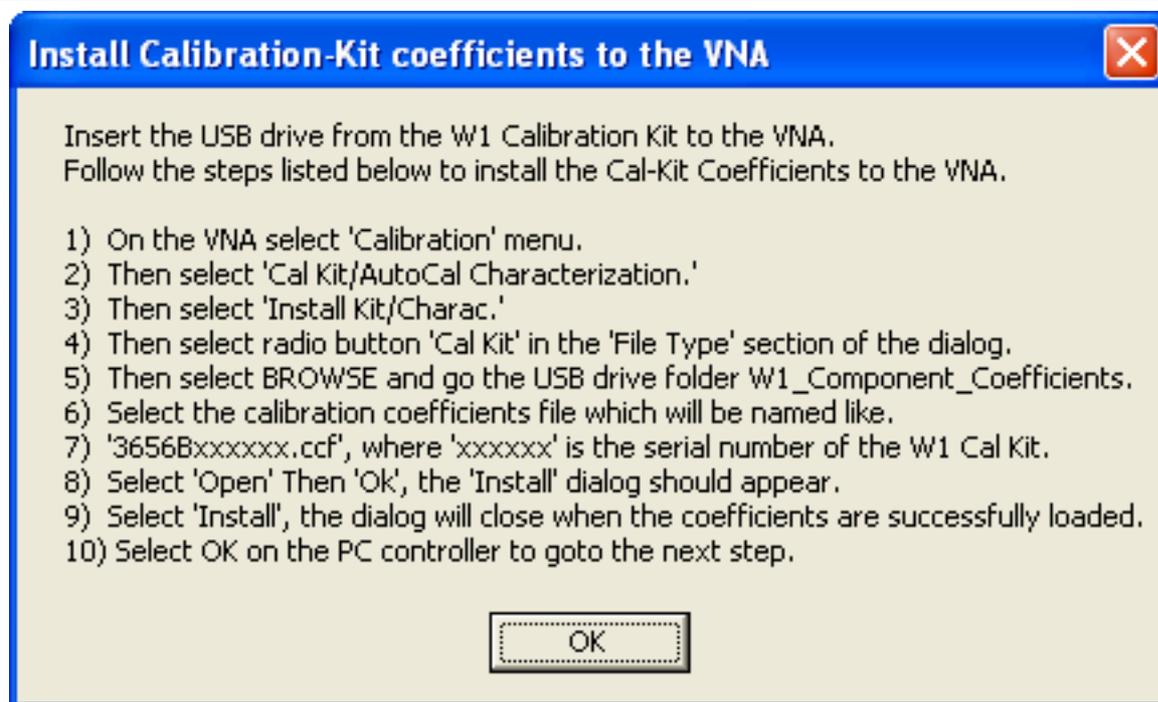


Figure 2-16. Install Calibration Kit Coefficients Dialog

6. The VNA displays an acknowledgment dialog box when the file load is complete, indicating that 10 files were loaded. After the VNA has loaded the 10 Calibration coefficient files, select OK on the PC application. The application will then prompt you to remove the USB drive from the VNA and install the USB drive to the PC.



Figure 2-17. Install USB Drive in PC Dialog

- The Application Interface dialog box reappears displaying the Setup Menu tab and Frequency Range area. In the Frequency Range area, select either the low range (40 MHz to 65 GHz) or the high range (65 GHz to 110 GHz). For purposes of this document, the low band is done first. The range that is not selected is calibrated during the Restart Procedure described in [Section 2-14 “Restart for Alternate Frequency Band”](#) on page 2-34. After selecting the frequency range, click OK. The Verification Kit Information area appears.

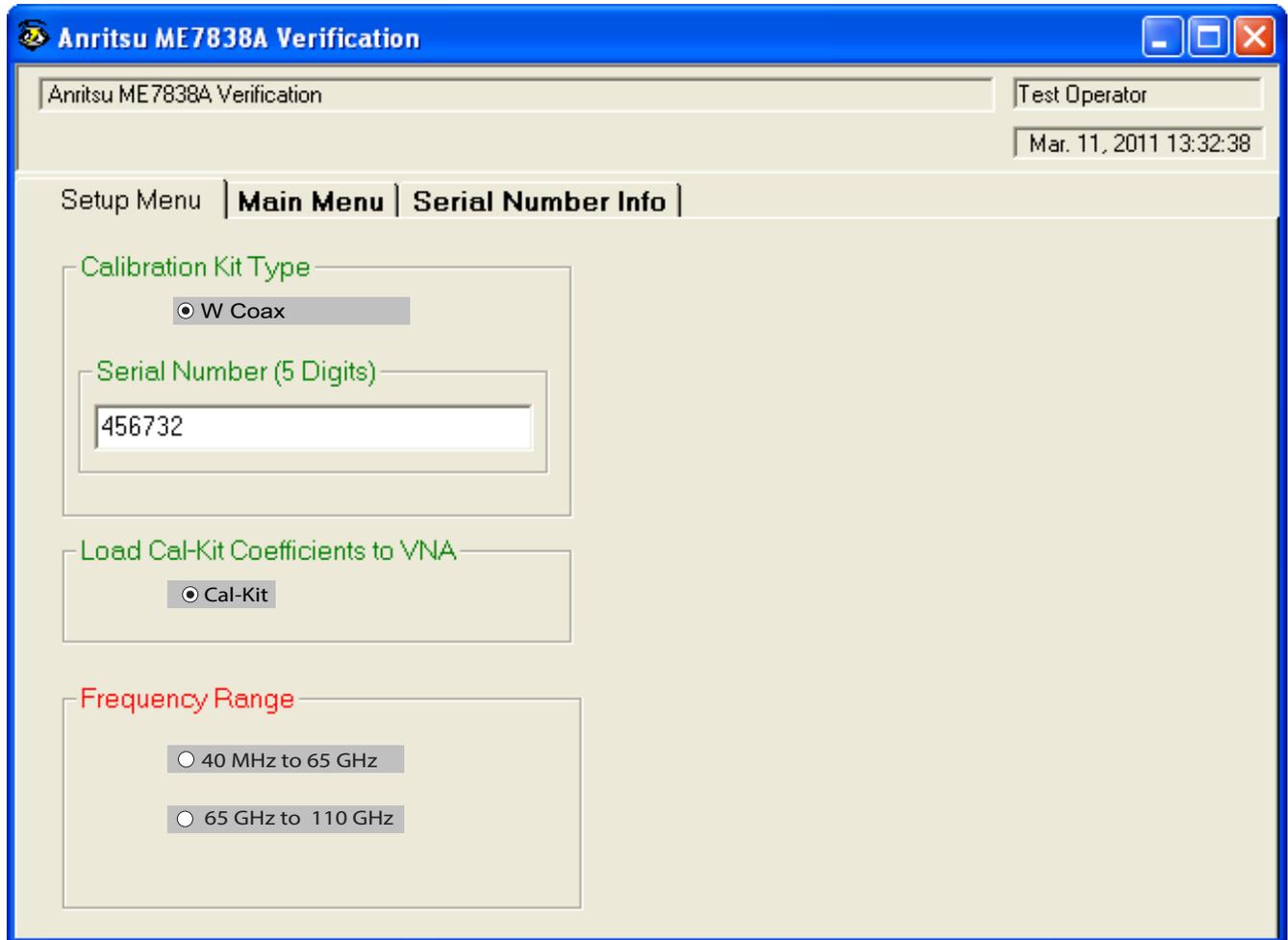


Figure 2-18. ME7838A Application Interface – Setup Menu Tab

8. Select the W Coax type, and then the Verification Kit Serial Number (usually the same as the Calibration Kit). When the Serial Number is complete, the Locate USB Drive Kit Data on PC area appears.

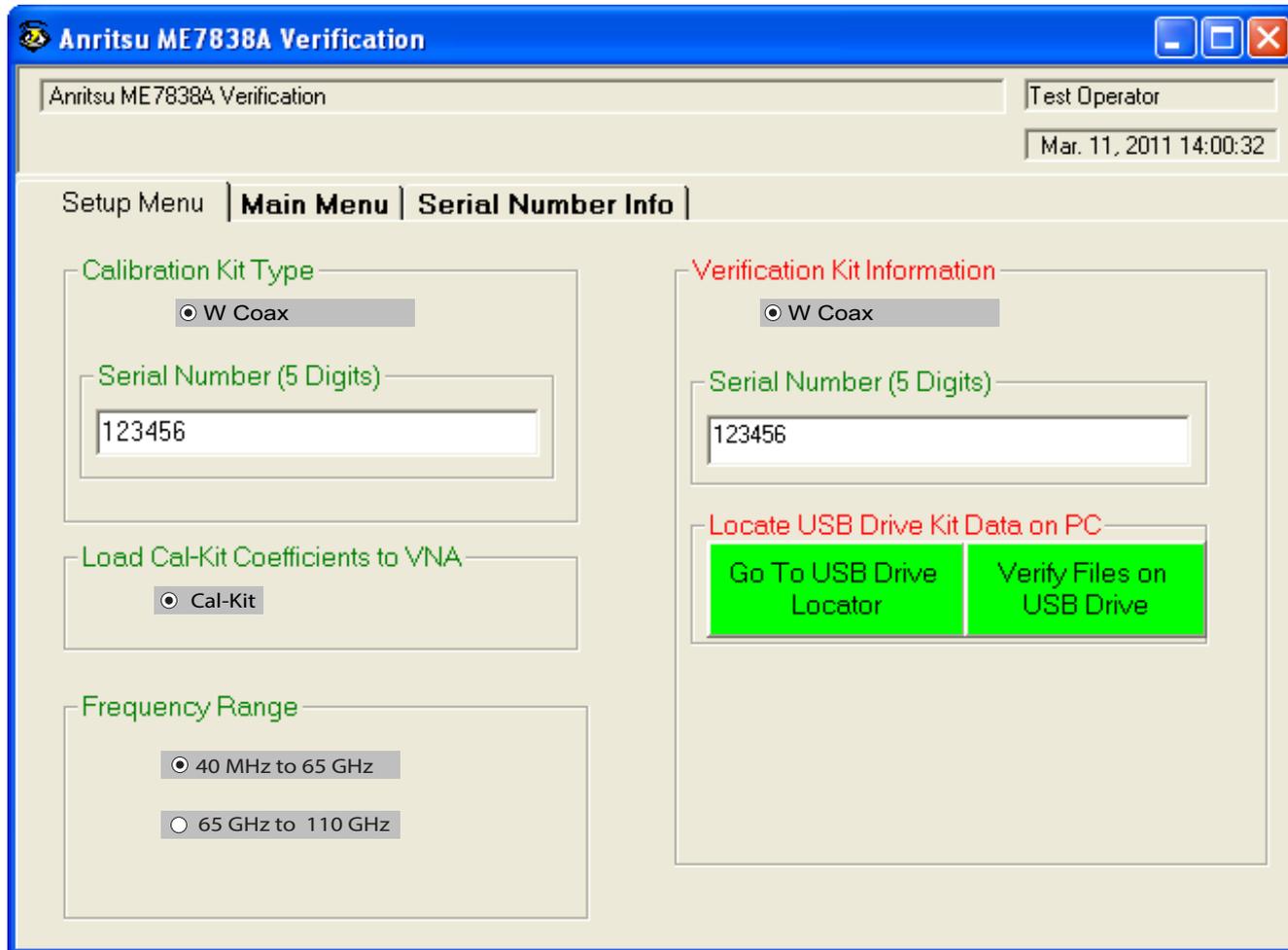


Figure 2-19. ME7838A Application Interface – Setup Menu Tab

9. In the Locate USB Drive Kit Data on PC area, click the Go To USB Drive Locator button.

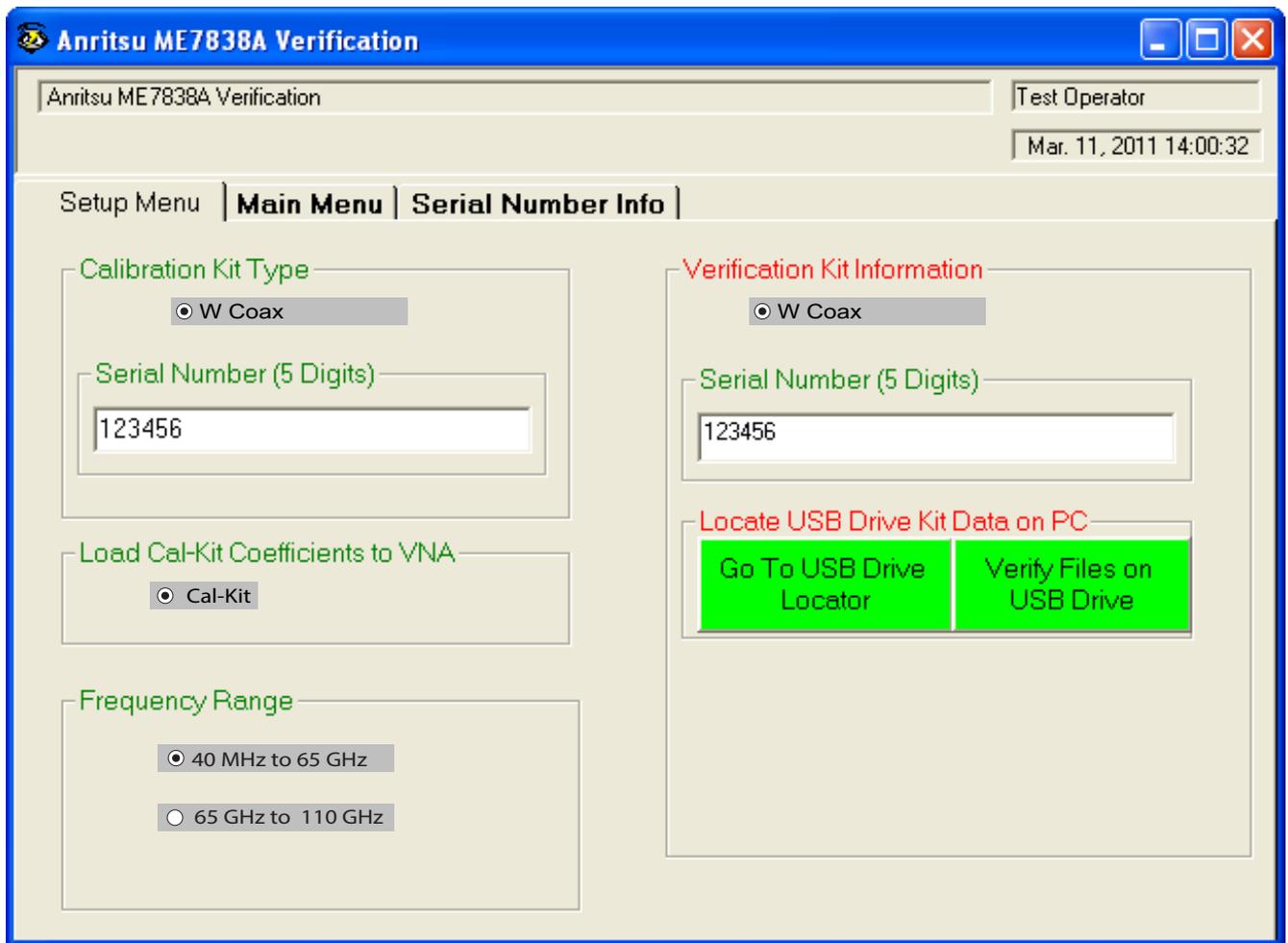


Figure 2-20. ME7838A Application Interface – Setup Menu Tab

10. When the Auto Find Verification Kit Data dialog box first appears, the Verification Kit Data Path text field is blank. Click the Auto-Find USB Drive Verification Kit Data button. The application automatically locates the verification kit data on the USB drive and displays the path in the Verification Kit Data Path text field.

In rare instances, due to PC/USB configurations, the Auto-find function may not be able to locate the verification data on the USB drive. In this case, you may need to use the Manually Locate Verification Data Kit button. This utility allows you to manually select the path where the verification kit data is located. The data path will be on the USB drive shipped with the verification kit. On most PC's, this will be the E, F, or G drive assignments. Navigate to the verification kit data in the file-path location shown in the example below (for this example, the USB drive was at E:\):

```
E:\W1_Verification_Data\W1_3656B_XXXXXX
```

(where XXXXXX is the serial number of the Kit)

Within each data set on the USB, there is a file named EnableKit.dat. Double click that file to identify the file. This builds the path for the verification kit data and returns back to the Find Verification Kit Data on the removable USB drive. Once the data is found, the Verification Kit Data Path information appears in the text field. Click Next > to return to the Application Interface dialog box.

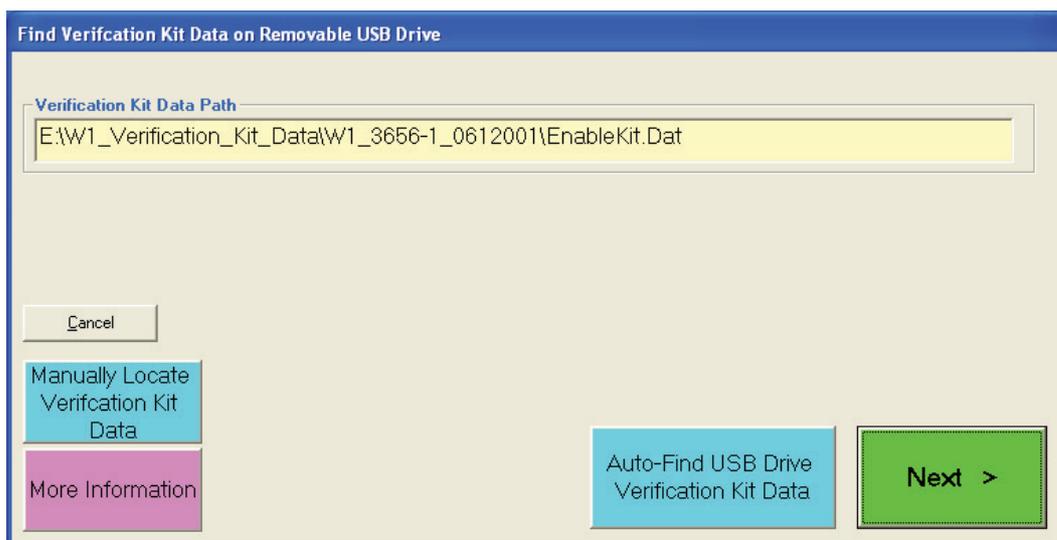


Figure 2-21. USB Drive Locator Dialog

11. Click Verify Files on USB Drive. The application checks the files on the USB drive to verify that all files are present and that each has the proper number of data points.

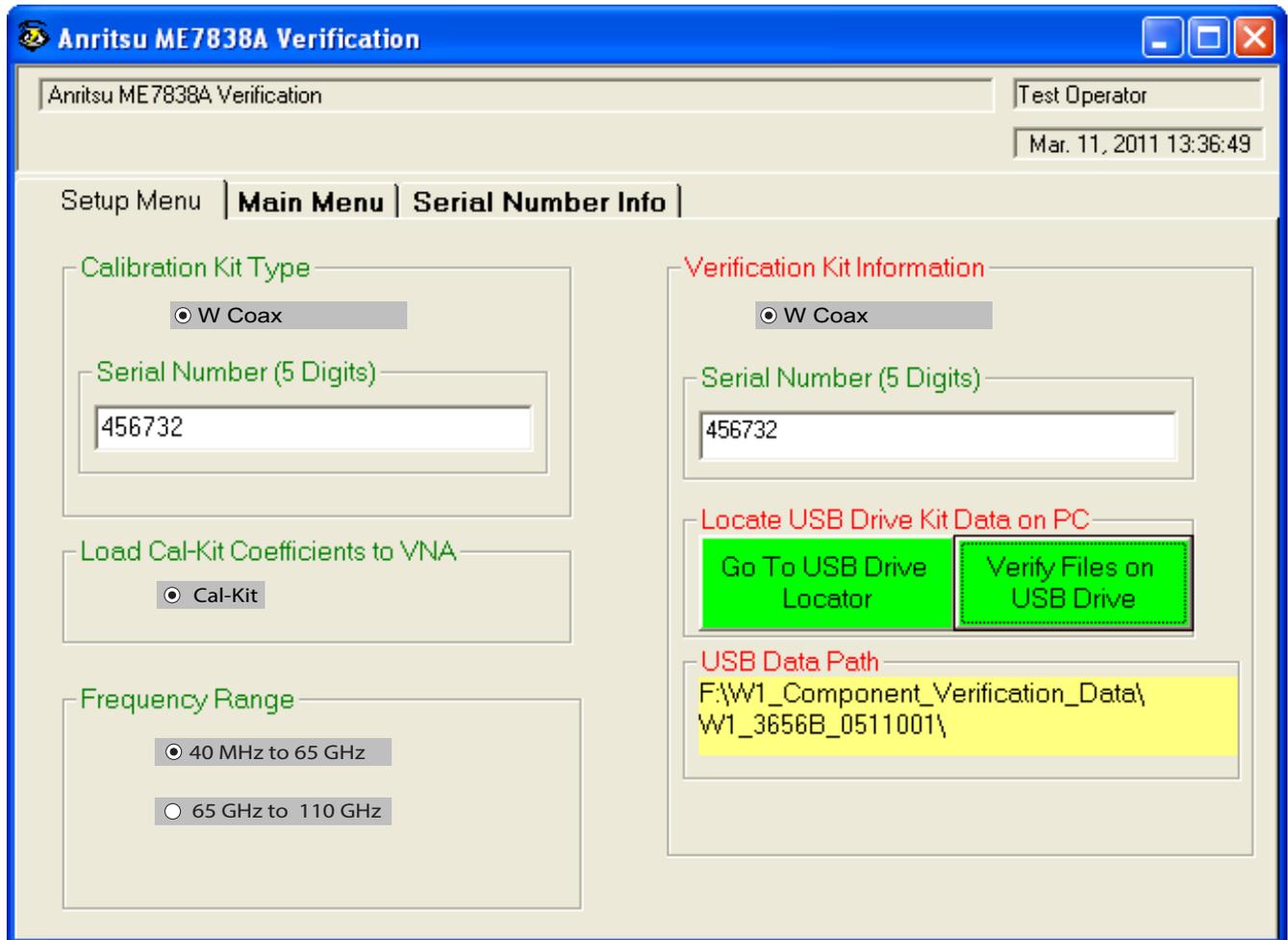


Figure 2-22. ME7838A Application Interface – Setup Menu Tab

12. When all information is entered and you are ready to start, click the Setup Calibration of VNA button.

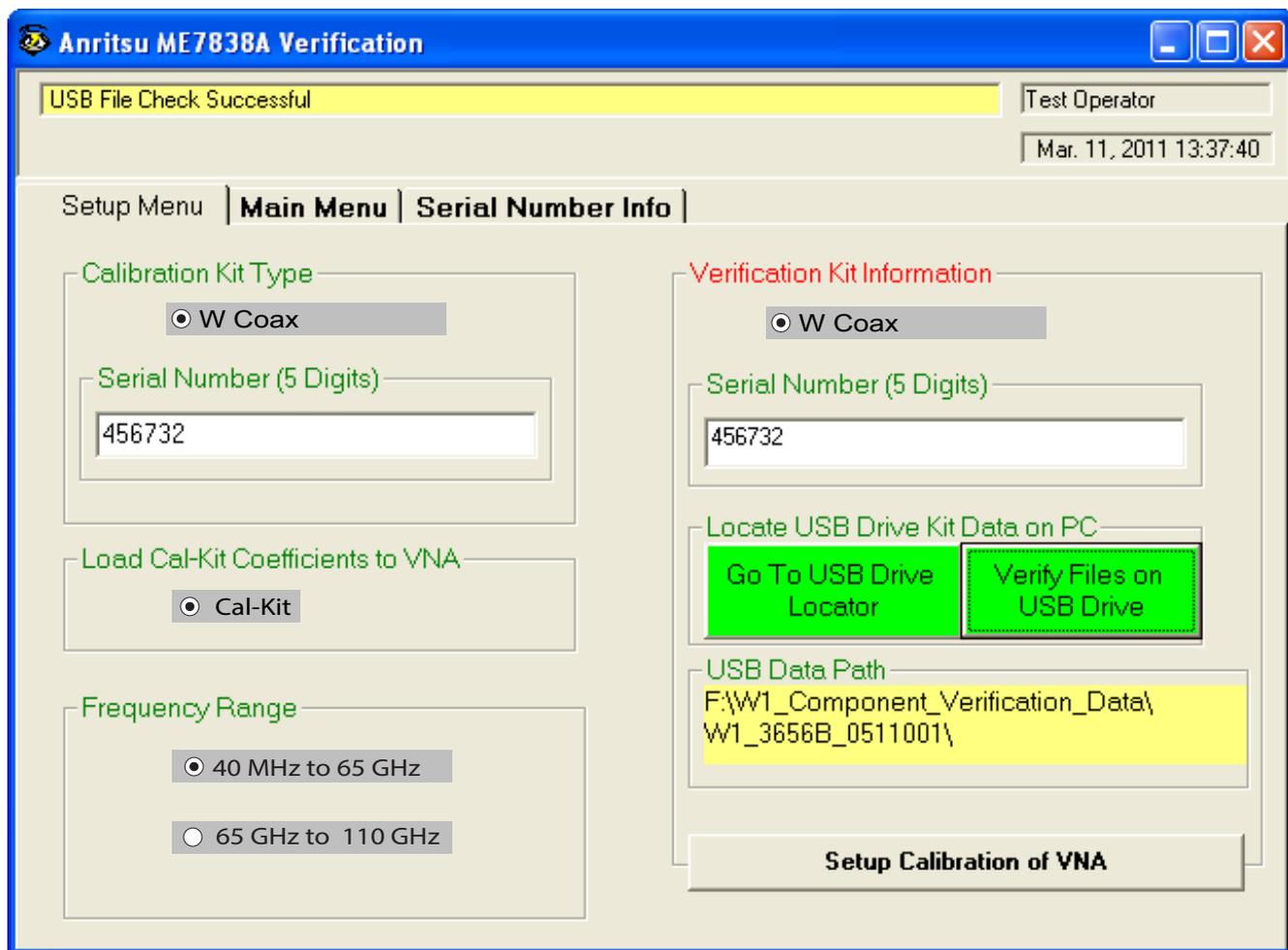


Figure 2-23. ME7838A Application Interface – Setup Menu Tab

13. The program execution continues in either [Section 2-7, “Low-Band Calibration”](#) on page 2-19 or [Section 2-8, “High-Band Calibration”](#) on page 2-21 depending on the previous band selection.

2-7 Low-Band Calibration

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 2-8 “High-Band Calibration” on page 2-21](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

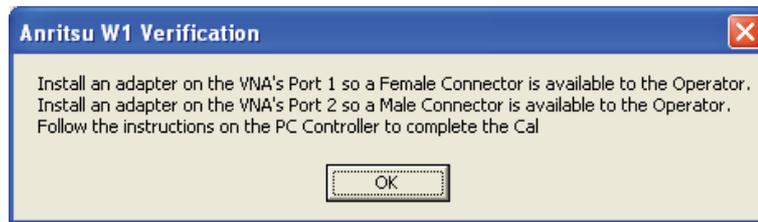


Figure 2-24. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-25. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 1.
 - b. Connect the Female Broadband Load Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-26. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 1.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-27. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 1.
 - b. Connect the Female Open to VNA Port 2.
 - c. When ready to proceed, click OK.

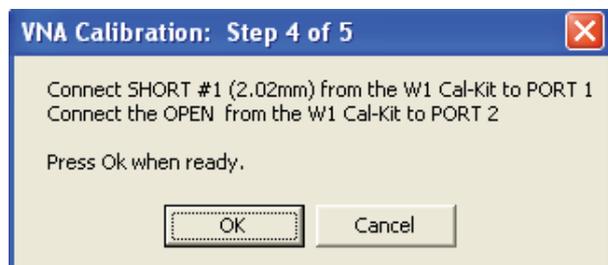


Figure 2-28. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 1 and Port 2, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 2-29. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24.

2-8 High-Band Calibration

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 2-7 “Low-Band Calibration”](#) on page 2-19, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

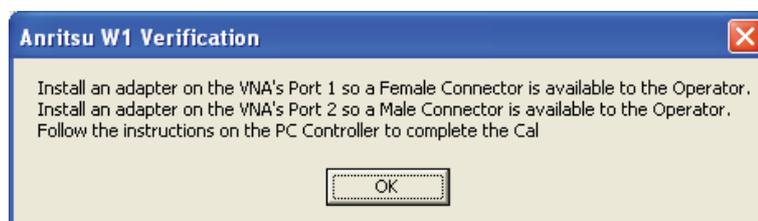


Figure 2-30. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-31. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 1.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-32. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 1.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 2-33. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 1.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 2.
 - c. When ready to proceed, click OK.

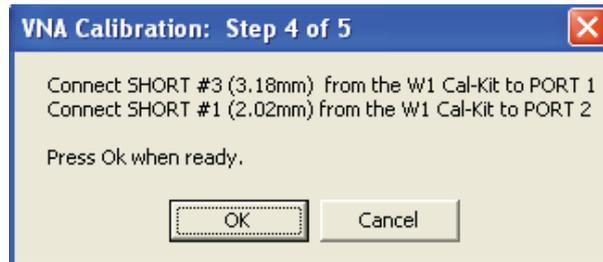


Figure 2-34. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 1 and Port 2.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 2-35. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24.

2-9 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections below.

- The Setup Menu tab is described in [Section 2-6, “Application Interface – Setup Menu Tab”](#) on page 2-11.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 2-36, “ME7838A Application Interface – Main Menu Tab”](#) on page 2-24
- The Serial Number tab is described in [Section 2-10, “Application Interface – Serial Number Tabs”](#) on page 2-28.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

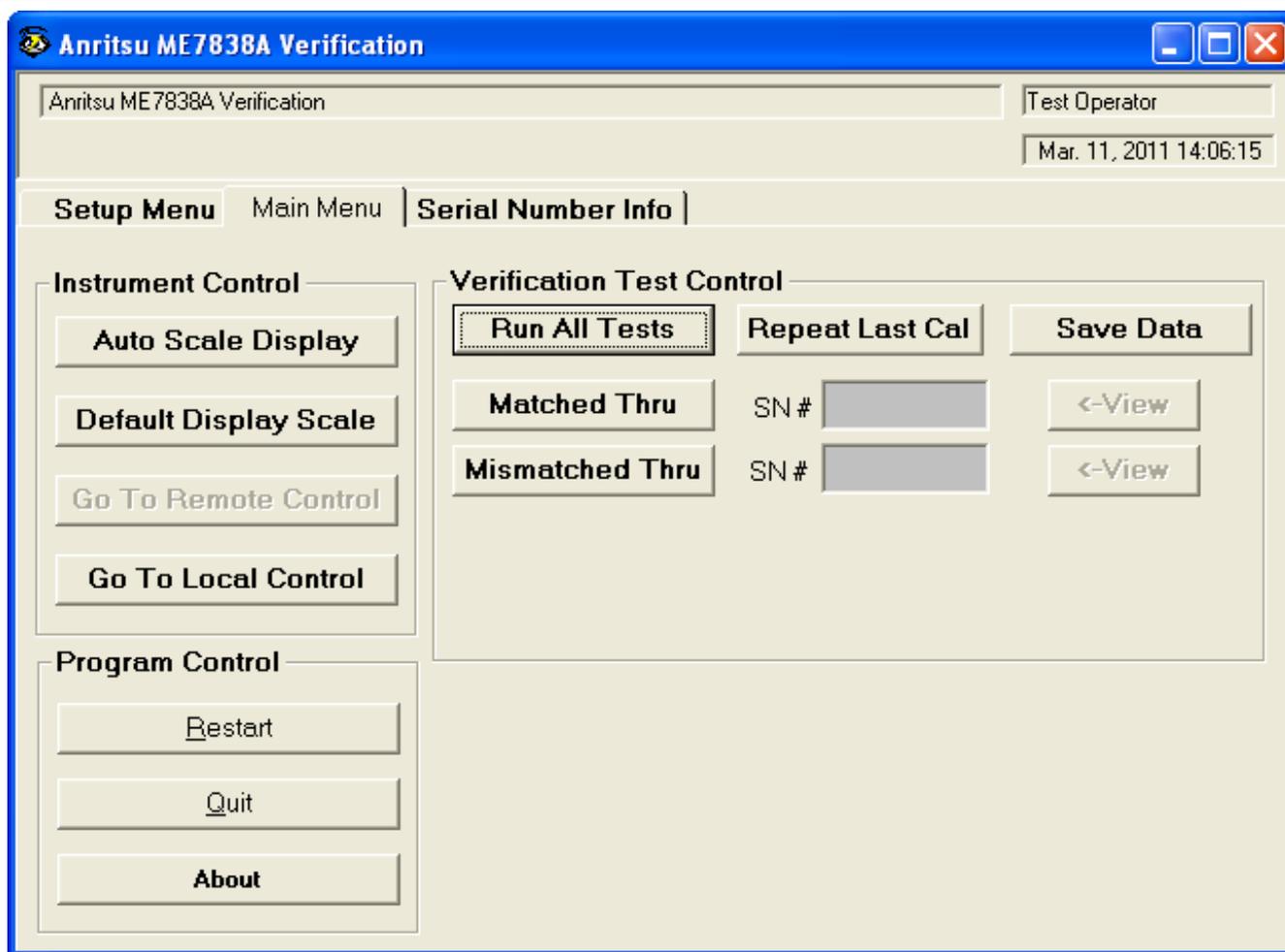


Figure 2-36. ME7838A Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S21 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S12 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S11 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S22 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 2-37](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

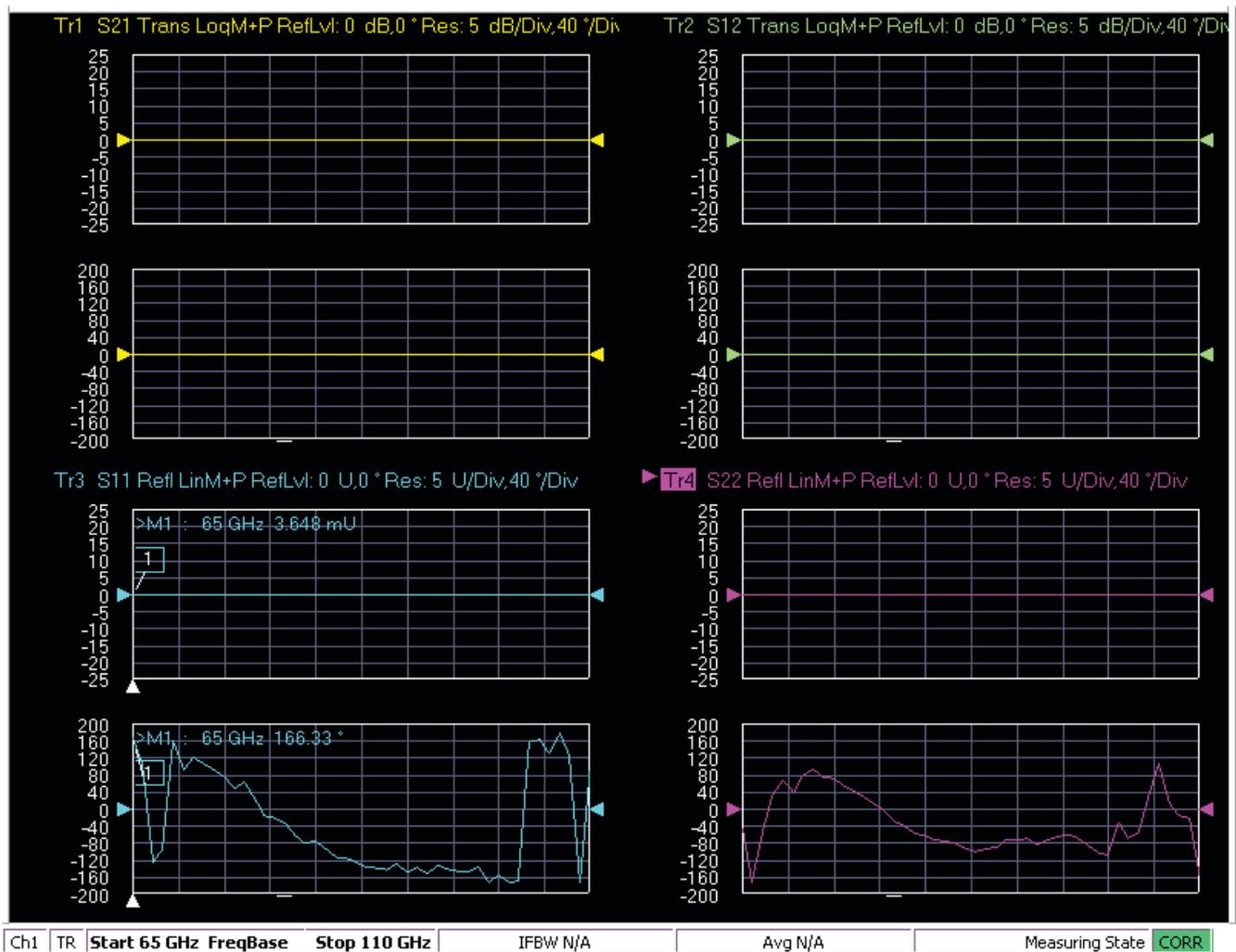


Figure 2-37. MS4640A/B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the Go to Local Control button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution	Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.
----------------	--

Restart Button

The Restart button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting Yes causes the program to return to the program initialization stage.

Usually, this button is used to test for second frequency band and program execution continues in [Section 2-14 “Restart for Alternate Frequency Band” on page 2-34](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting Quit brings up a confirmation dialog box shown in [Figure 2-38](#). Selecting Yes exits the program; selecting No returns you to the previous screen.

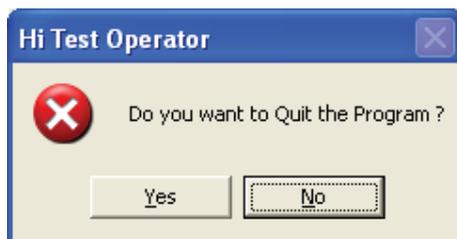


Figure 2-38. Confirmation Dialog

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 2-11 “Matched Thru Tests” on page 2-29](#) and then continues with [Section 2-12 “Mismatched Thru Tests” on page 2-31](#). When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 2-36, “ME7838A Application Interface – Main Menu Tab” on page 2-24](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 2-36, “ME7838A Application Interface – Main Menu Tab” on page 2-24.](#)

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmdcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 2-13 “Saving Verification Data” on page 2-34.](#)

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC hard drive at C:\mmdcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 2-11 “Matched Thru Tests” on page 2-29.](#) When the tests are completed, the program returns to the Main Menu tab shown in [Section 2-9 “Application Interface – Main Menu Tab” on page 2-24.](#)

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 2-12 “Mismatched Thru Tests” on page 2-31.](#) When the tests are completed, the program returns to the Main Menu tab shown in [Figure 2-36, “ME7838A Application Interface – Main Menu Tab” on page 2-24.](#)

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

2-10 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

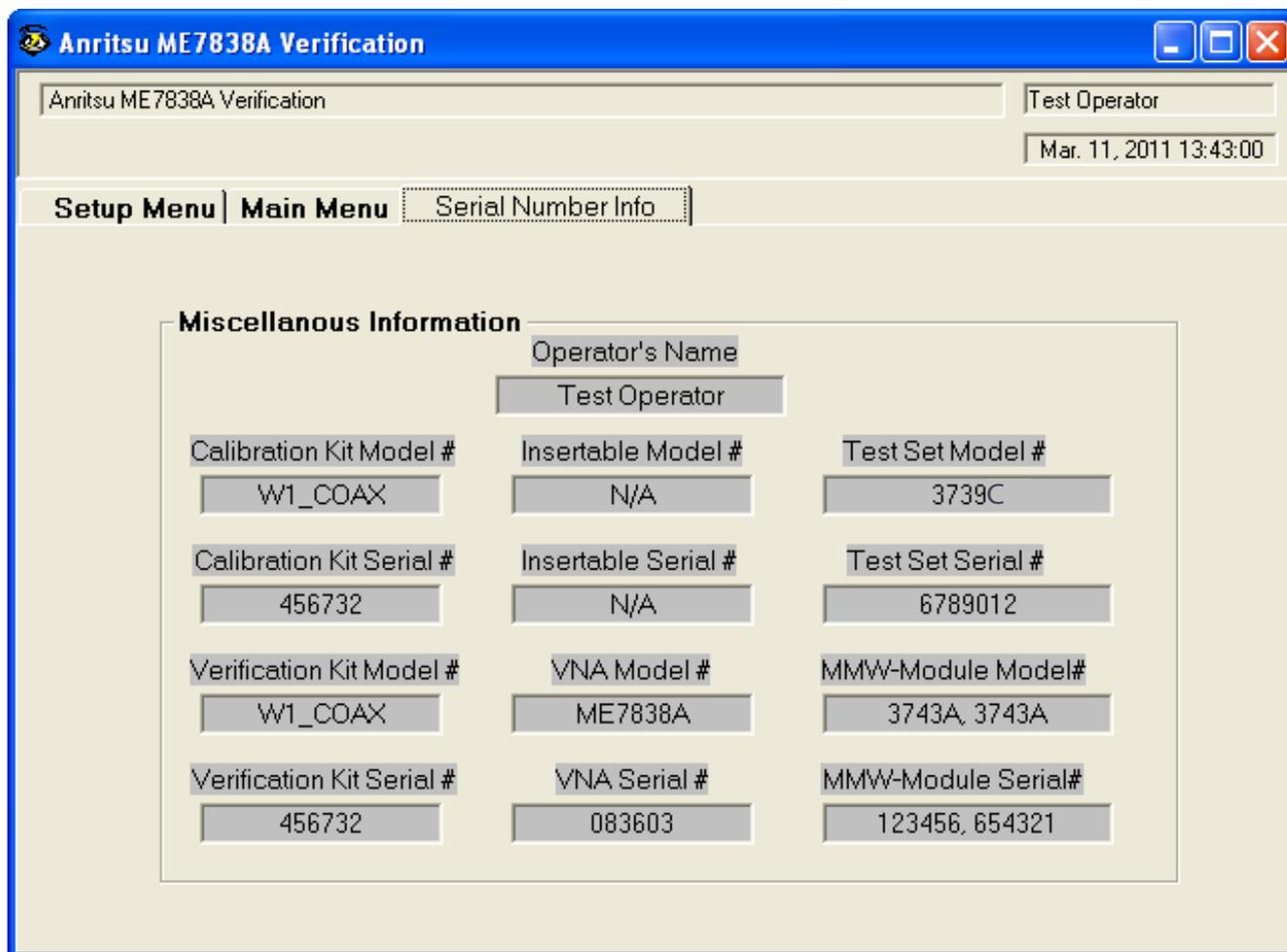


Figure 2-39. ME7838A Application Interface – Serial Number Tab

2-11 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 2-12 “Mismatched Thru Tests” on page 2-31](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 2-9 “Application Interface – Main Menu Tab” on page 2-24](#).

Note

The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

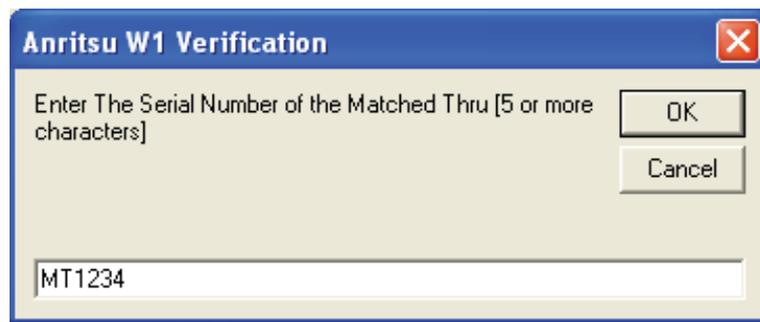


Figure 2-40. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

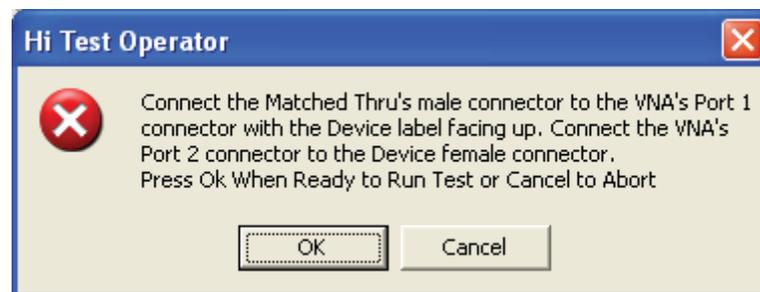


Figure 2-41. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 1 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 2.

7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

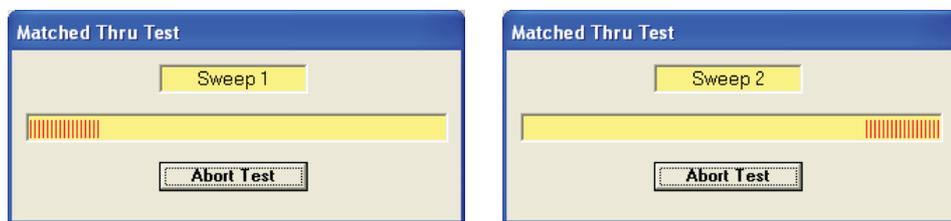


Figure 2-42. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

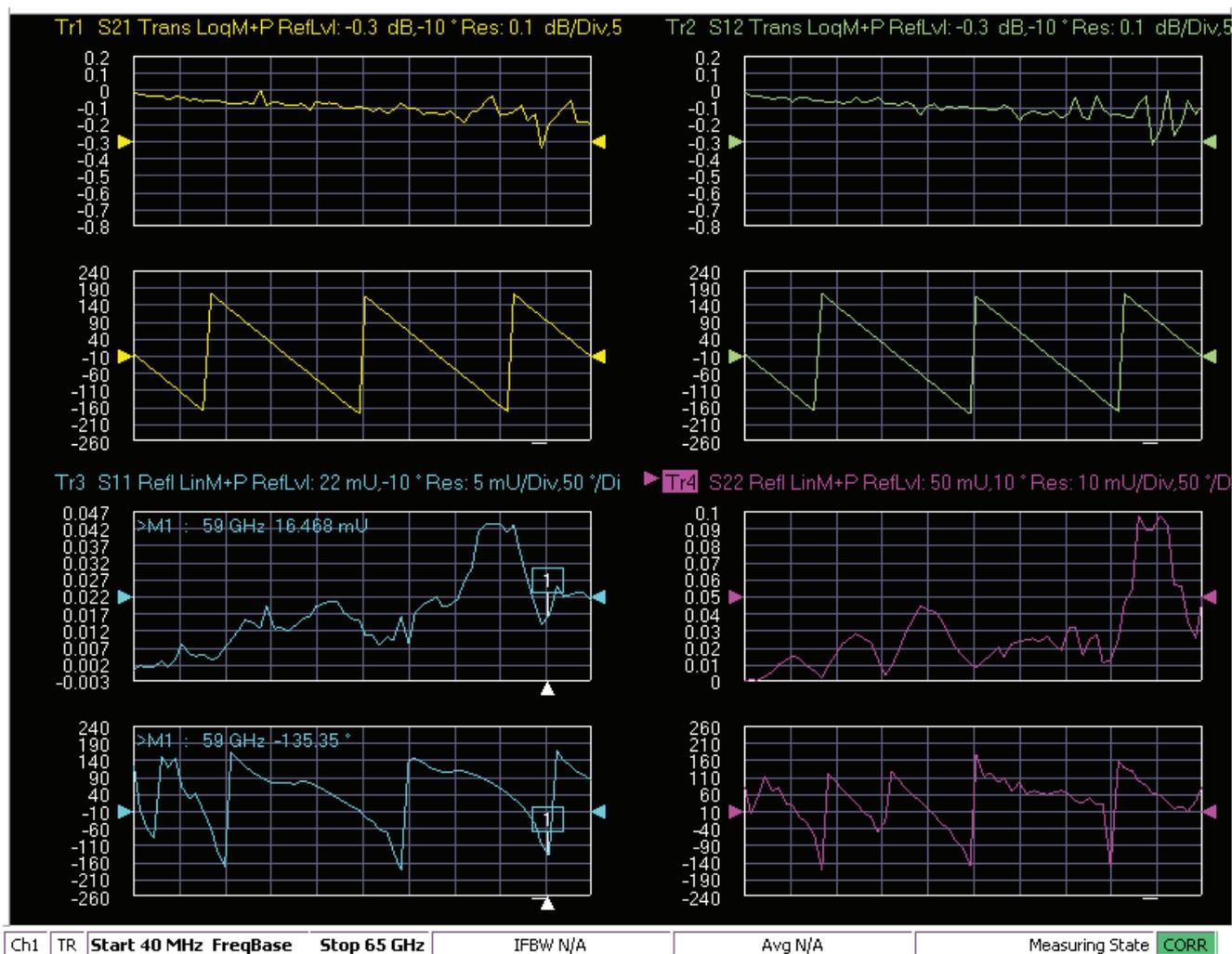


Figure 2-43. MS4640A/B Series VNA, Typical Matched Thru Data in Low Band

Upper-left quadrant= S21 – Forward Transmission
 Upper-right quadrant= S12 – Reverse Transmission
 Lower-left quadrant= S11 – Forward Reflection
 Lower-right quadrant= S22 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “[Application Interface – Main Menu Tab](#)” on page 2-24. The dialog box is shown in [Figure 2-36](#), “[ME7838A Application Interface – Main Menu Tab](#)” on page 2-24.
10. If the Run All Tests button was selected, the program execution continues with the following [Section 2-12](#), “[Mismatched Thru Tests](#)”.

2-12 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in [Section 2-11 “Matched Thru Tests”](#) on page 2-29) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24.

Note The verification devices must be connected to the **W1 Connector Coupler Ports** and not to the **VNA Ports**. Use the torque wrench supplied with the verification kit when tightening the device connections.

The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24.

The dialog box is shown in [Figure 2-36](#), “[ME7838A Application Interface – Main Menu Tab](#)” on page 2-24.

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in [Section 2-11 “Matched Thru Tests”](#) on page 2-29) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.



Figure 2-44. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

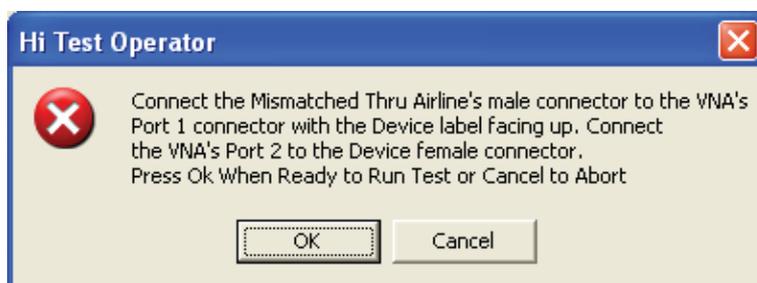


Figure 2-45. Instruction Dialog

4. Connect the Mismatched Thru Airline male connector to VNA Port 1 with the device label facing up.
5. Connect the Mismatched Thru Airline female connector to VNA Port 2.
6. When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

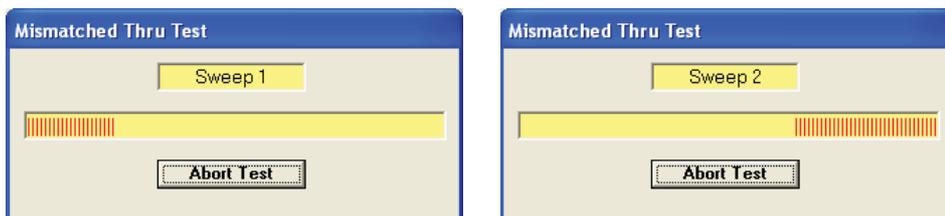


Figure 2-46. Status Dialogs

- When the test completes, the program returns to the main menu described [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24, and the display should look similar to [Figure 2-47](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

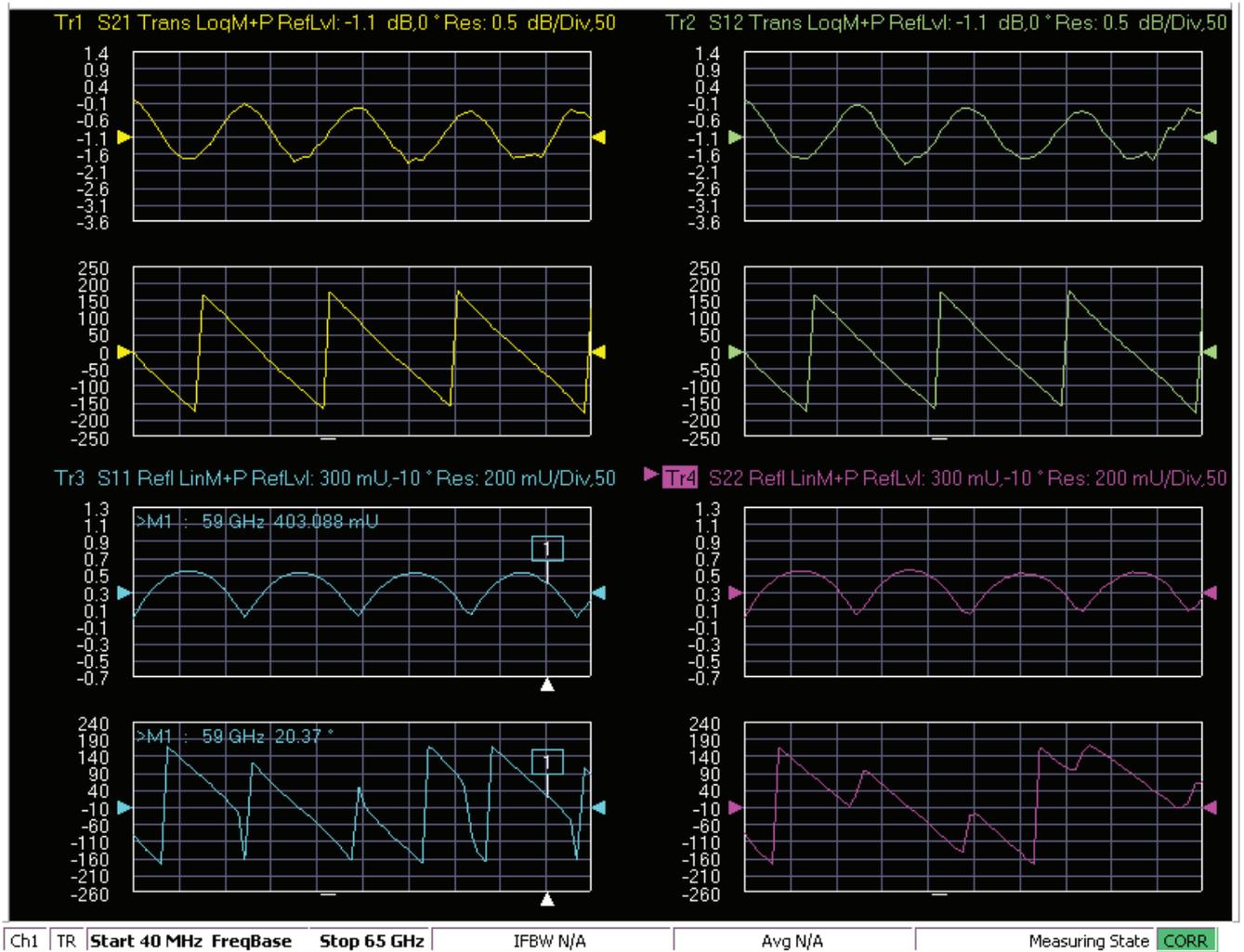


Figure 2-47. MS4640A/B Series VNA, Typical Mismatched Thru Data in Low Band

2-13 Saving Verification Data

If the Save Data button on the Main Menu tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 2-9 “Application Interface – Main Menu Tab”](#) on page 2-24.

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru Low.dat
- C:\mmdcsvc\Data\Mismatched Thru Low.dat
- C:\mmdcsvc\Data\Matched Thru High.dat
- C:\mmdcsvc\Data\Mismatched Thru High.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

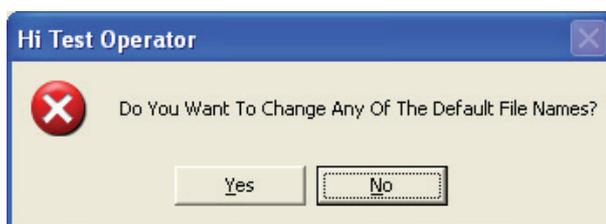


Figure 2-48. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.



Figure 2-49. Information Dialog

2-14 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 2-9, "Application Interface – Main Menu Tab"](#) on page 2-24.
3. The Choose The Restart Method dialog box appears as shown below in [Figure 2-50](#).

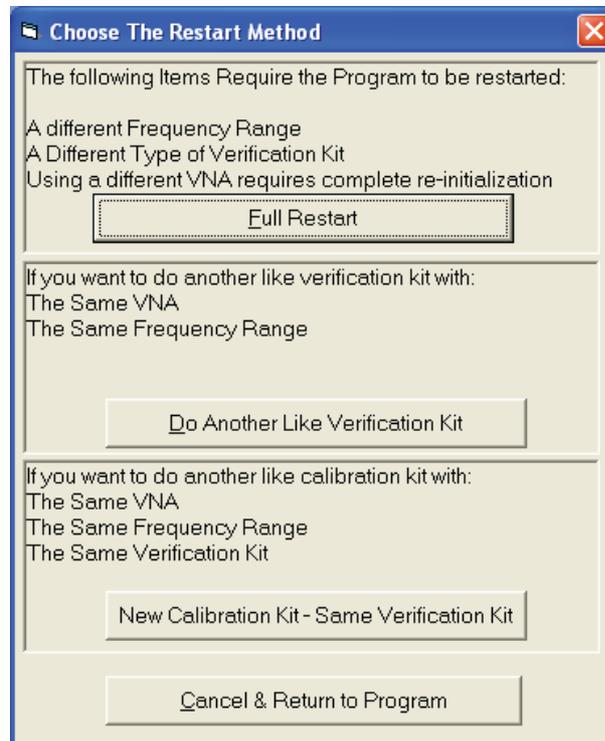


Figure 2-50. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as the procedures described previously starting in [Section 2-5, "Running the Verification Software"](#), [Step 5](#) on page 2-7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK when ready to proceed to the next step.
 6. Enter the GPIB Board 0.
 7. Enter the GPIB Address 6.
 8. Enter the Test Set Serial Number.
 9. Enter the User Name.
 10. Enter the Cal Kit Type selection.
 11. Enter the Cal Kit Serial Number selection.
 12. Enter the Load Cal Kit Disk from VNA Floppy selection.
 13. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.

14. Enter the Verification Kit Type selection.
15. Enter the Verification Kit Serial Number selection.
16. Click the Go to USB Drive Locator button.
17. Click the Verify Files on USB Drive button.
18. Complete the calibration and verification of the devices for the second frequency range.
19. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
20. This series of automated tests has verified that the VectorStar ME7838A Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
21. The program returns to the main menu described in [Section 2-9, “Application Interface – Main Menu Tab” on page 2-24](#).

2-15 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed using the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting the performance verification software, the verification kit data USB memory device is installed in the correct USB port and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit USB drive matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, and in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu customer service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 3 — Using the 2300-584-R Software with the ME7838E

3-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) with the VectorStar ME7838E Modular BB/mm-Wave VNA Measurement System. The ME7838E is based on the VectorStar MS4647B Vector Network Analyzer equipped with Option 08x.

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired.
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3-2 Required Equipment

Required VectorStar ME7838E Broadband System, 70 kHz to 110 GHz Instruments and Components

The VectorStar ME7838E Broadband/Millimeter Wave Measurement System consists of:

- VectorStar MS4647B VNA, 70 kHz to 70 GHz, V Connectors, equipped with Option 08x
- 3739C Broadband Test Set
- Two (2) 3743E Millimeter-Wave (mm-Wave) Modules, 70 GHz to 110 GHz.
- Necessary rear panel interconnect cables between the test set and the VNA.
- Necessary front panel interconnect cables between the test set and the VNA
- Necessary interconnect cables to the 3743E mm-Wave Modules.

3-3 Configuring the Hardware

This section describes how the various system elements are interconnected and describes the preliminary steps required for operation of the verification software. See [“Required VectorStar ME7838E Broadband System, 70 kHz to 110 GHz Instruments and Components”](#) on page 3-1 for a complete equipment list.

1. Ensure that the VNA system is set to “Broadband”.
2. To verify the setting, from the right side MAIN menu, select the broadband test set button:
 - MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Test Set) or BB/mmWave (3739 Test Set)
3. Select the Broadband Receiver Configuration.
4. Connect a GPIB cable between the PC Controller and the VNA Rear Panel GPIB port labeled IEEE 488.2 GPIB.

Caution	Do not connect the cable to the VNA Rear Panel GPIB port labeled Dedicated GPIB .
----------------	--

3-4 W1 Verification Application Installation

Prior to installation of the W1 Application, the National Instruments GPIB card and drivers must be installed in the Windows PC.

This needs to be done only once per PC Controller. The software is contained on the Disk supplied with each Verification Kit.

In order to correctly install the PVS application, the user (logged in) must have Administrative rights on the Windows PC Controller.

- Note** The PVS application is installed onto the PC Controller on an all-user basis.
If your organization does not allow for all-user installations, consult your internal PC and network support group on how to best proceed.

1. Prior to installation of the 2300-584-R PVS, the National Instruments GPIB card and its drivers must be installed in the PC Controller.
2. Turn off all other running applications on the PC Controller.
3. Insert the USB Memory Device into the USB slot.
4. Open Windows Explorer, browse to the USB Drive, and double click on **Startup.htm**.

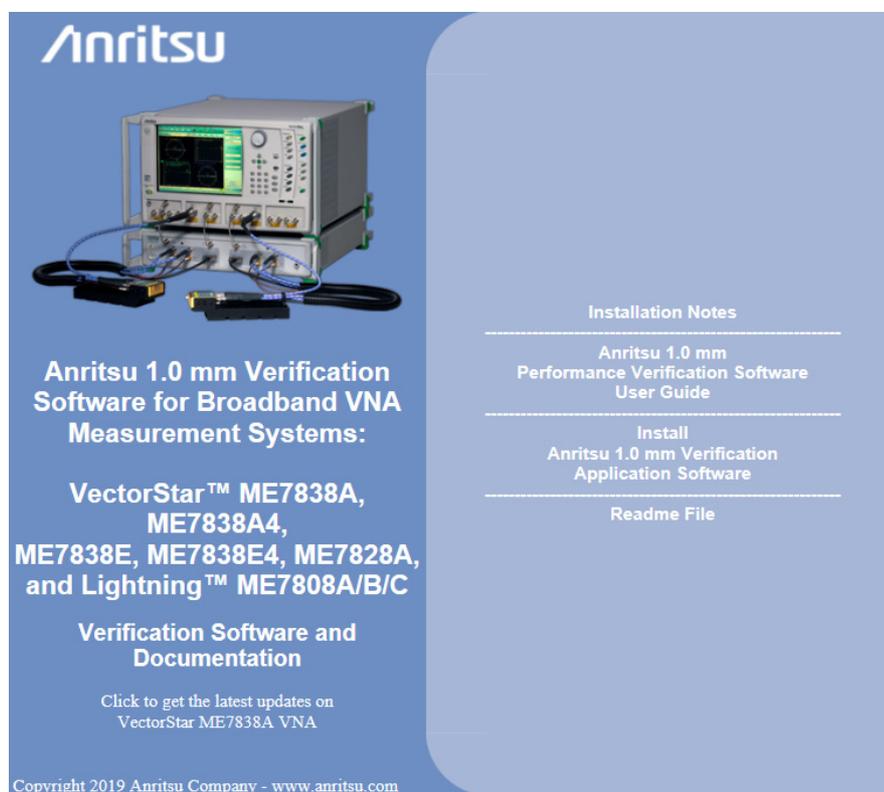


Figure 3-1. PVS Installation and Documentation Screen

5. On the navigation page, click the **Install Anritsu 1.0 mm Verification Application Software** link.
6. The first of several installation dialog boxes appears

7. Click Run on the two security dialog boxes.

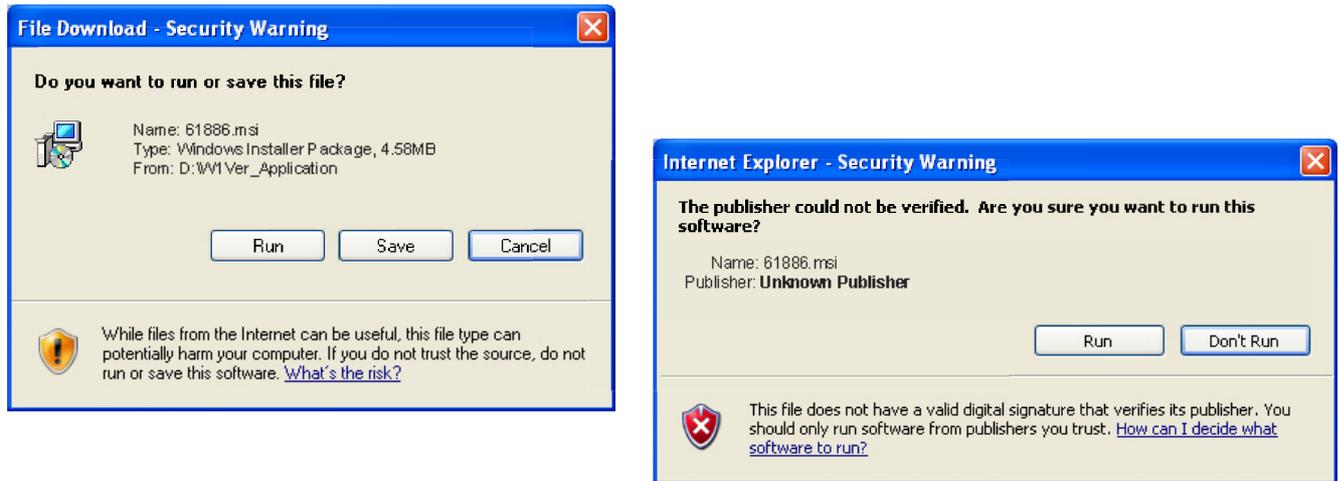


Figure 3-2. Installation Security Dialog Boxes – Click Run on each

8. If either of the two dialog boxes shown in [Figure 3-3](#) appear that display Error 1321 or Error 1931, follow these instructions:

- Error 1321 – Select Exit Installation and make sure you have Administrator privileges on the PC Controller.
- For Error 1931 – Select OK to bypass the error message and continue the installation.

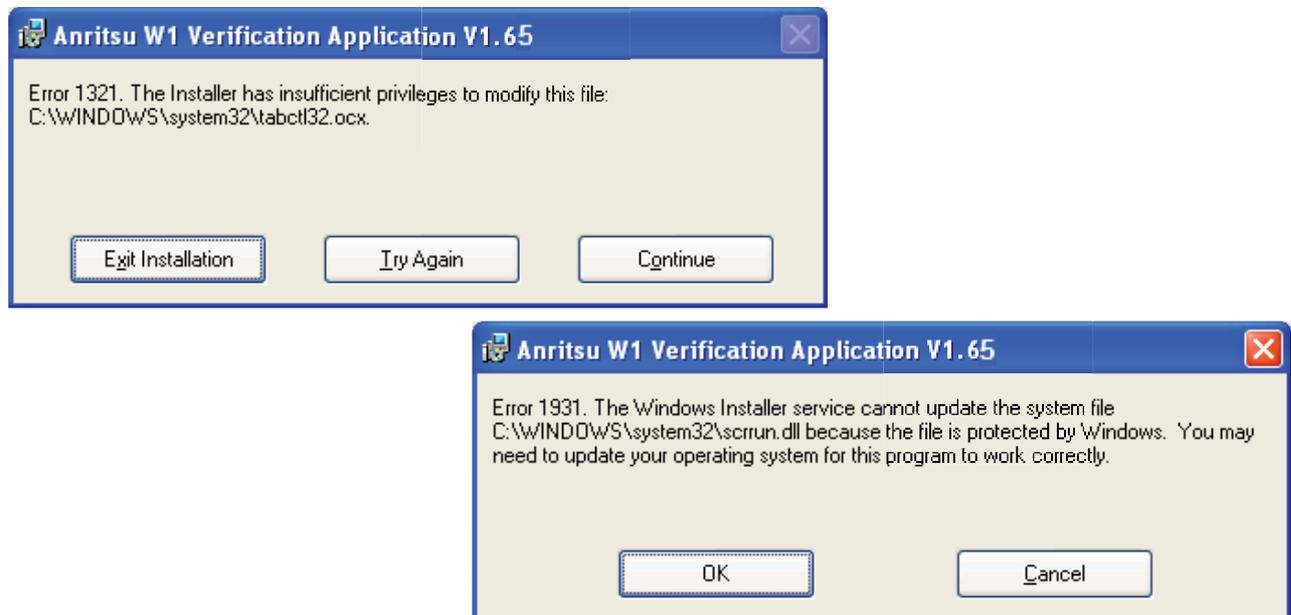


Figure 3-3. Installation Error 1321 and Error 1931 Dialog Boxes

9. Two installation wizard setup dialog boxes appear in sequence. Click Next to proceed through each dialog box. The final dialog box shows an installation progress bar.

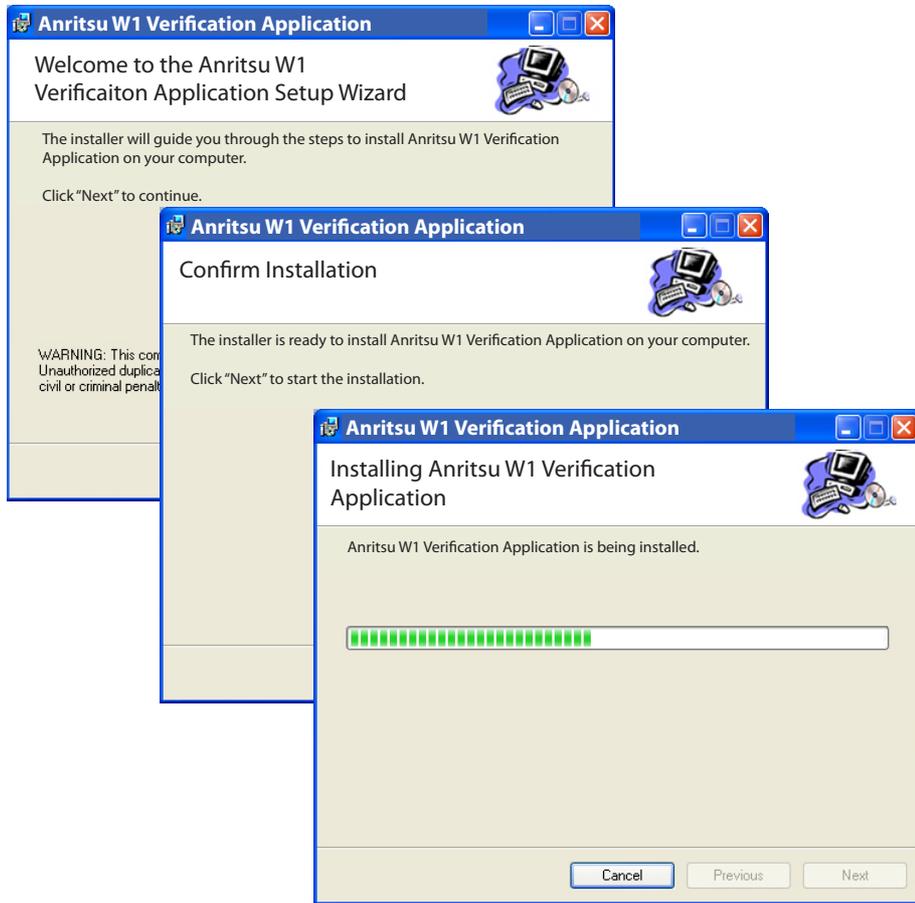


Figure 3-4. Installation Confirmation and Progress Dialog Boxes – Click Next on each

10. When the installation progress bar shows complete, click **Next**. The final Application Information dialog box appears. Click **Next**, and the Installation Complete dialog box appears.

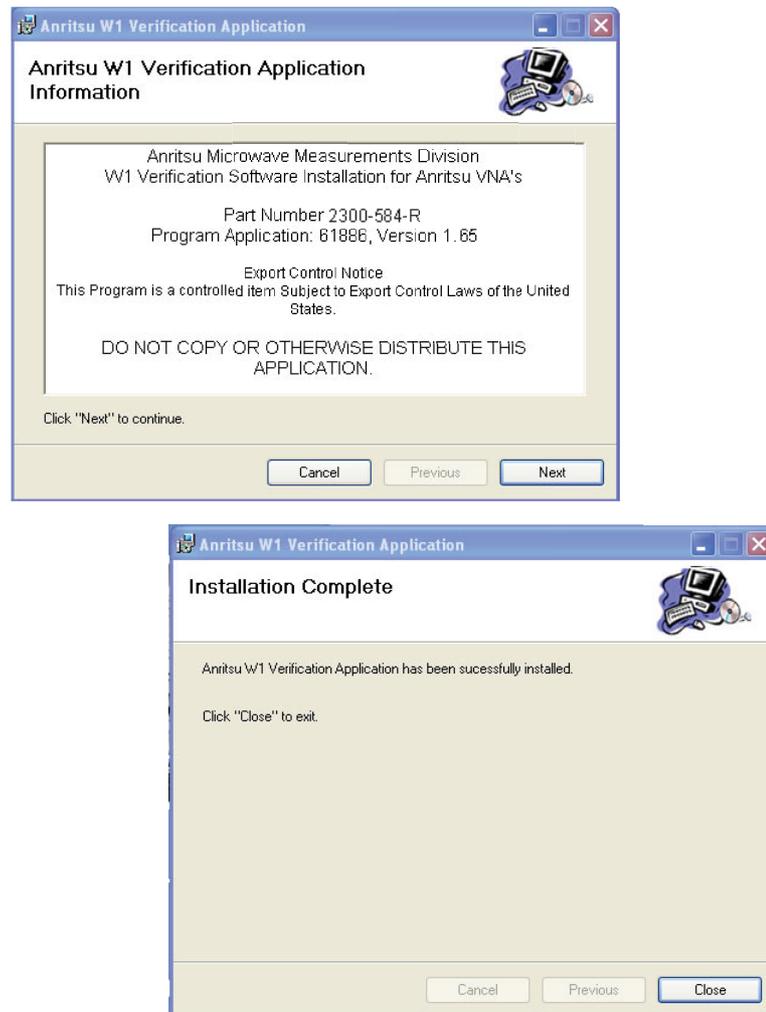


Figure 3-5. Final Application Information and Installation Complete Dialog Boxes

11. The installer adds all required files and makes the necessary registry updates on the PC Controller. When done, the navigation page (Figure 3-1) reappears.
12. If desired, open the **User Guide** (this document) and the **Quick Start Guide** and save and/or print a copy.
13. The PVS application is available either the **Start** or **Program** menu of the PC Controller.

3-5 Running the Verification Software

After the VNA and PC have been configured as described above, you are ready to run the program and perform the calibration/verification. Make sure you have the following information available:

- Serial number of the 3656B W1 Calibration/Verification Kit
- Serial number of the 3739A/B/C Broadband/Millimeter Wave Test Set
- Model number and serial number of the Port 1 BB/mm Module
- Model number and serial number of the Port 2 BB/mm Module

Procedure

1. With the equipment and software configured as described in [“Configuring the Hardware” on page 3-1](#), turn on the computer and allow it to start Windows.
2. Locate the Anritsu W1 Verification icon (shown below) on the desktop and double-click it.



3. The program displays an About dialog box with version information. Click OK to continue.

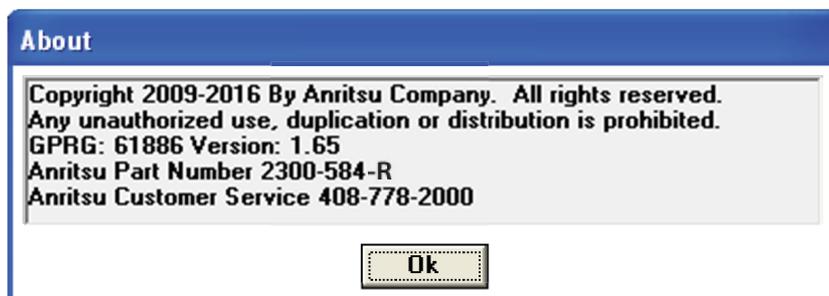


Figure 3-6. About Dialog

4. The Test Operator Name dialog box appears. Enter a user name or other identification.

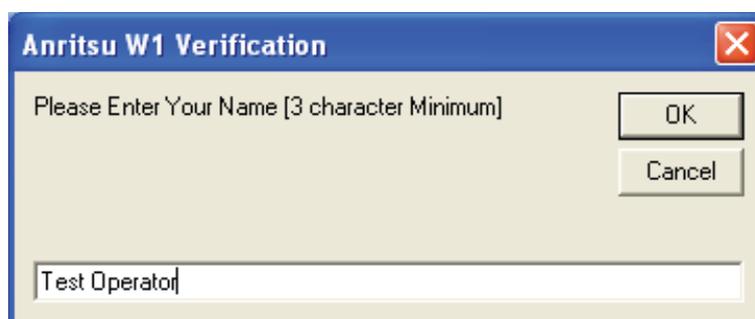


Figure 3-7. Name Dialog

5. Click OK to continue. The program searches for a compatible VNA on the GPIB. When the VNA is found, a confirmation dialog box appears.

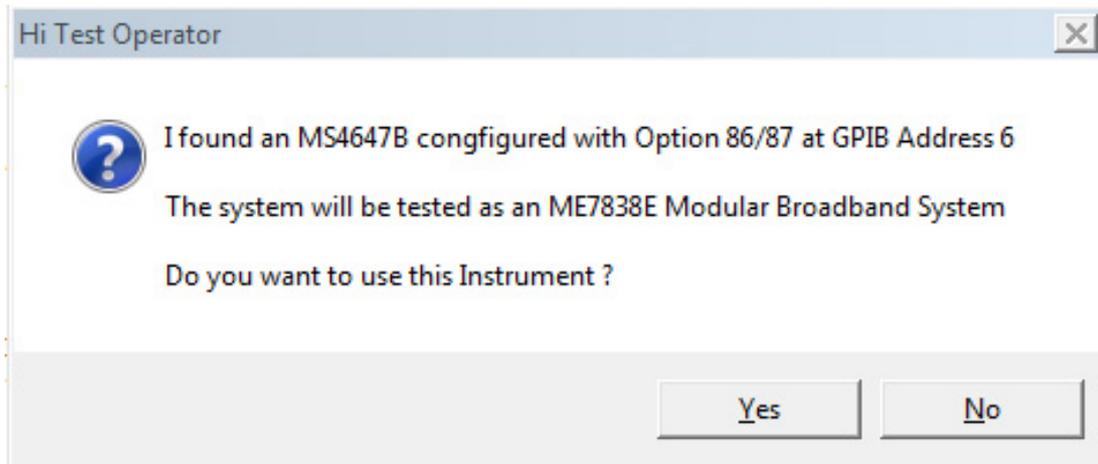


Figure 3-8. Found Instrument Dialog

6. Click Yes to continue, or click No to search for another VNA.

Note If your system is configured with a Lightning 37000 series VNA, refer to [Chapter 7, "2300-584-R Software with the Lightning ME7808A/B/C"](#).

7. If Yes is clicked above, the program searches for the BB/mm Modules and, when found, requests the model number and the serial number of the test set and each module.

Enter Port 1 BB/mm-Wave Module Information

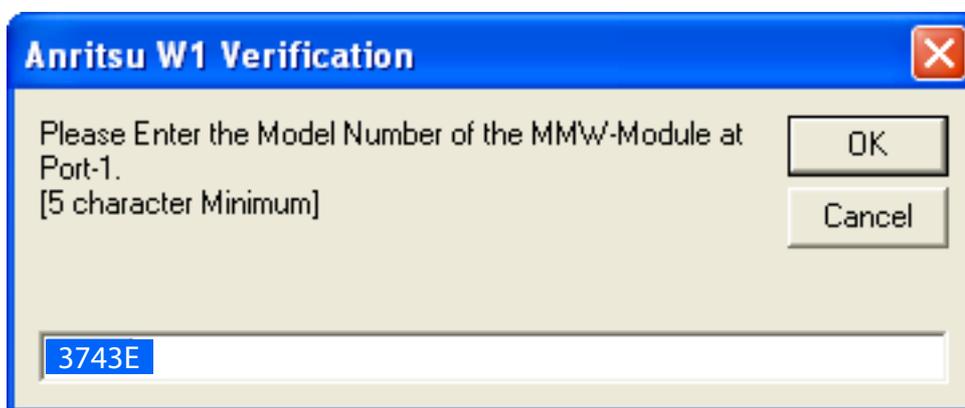


Figure 3-9. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Model Number

8. Enter the Port 1 BB/mm-Wave Module model number and click OK.

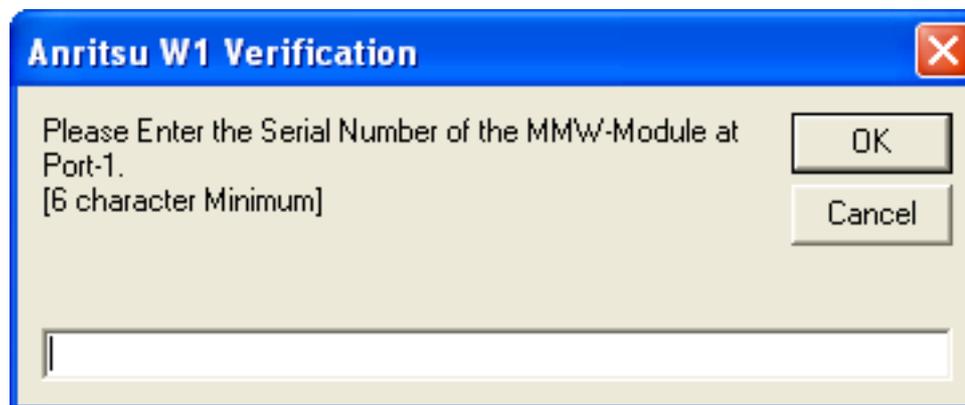


Figure 3-10. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Serial Number

Enter Port 2 BB/mm-Wave Module Information

9. Enter the Port 2 BB/mm-Wave Module model number and click OK.

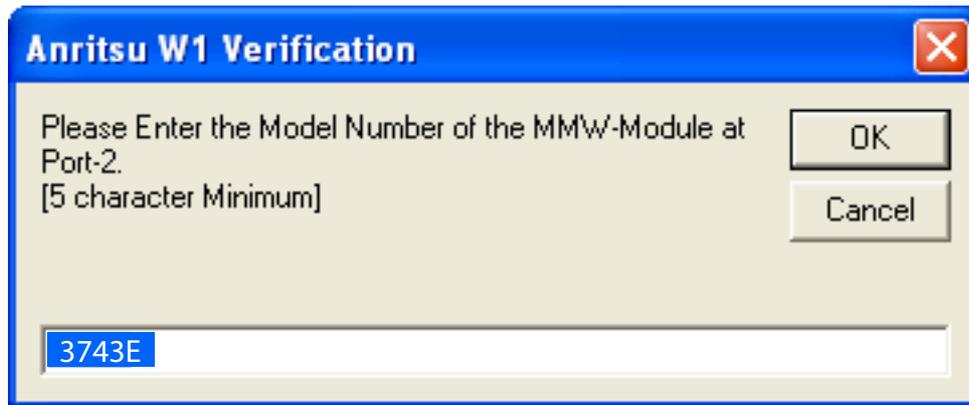


Figure 3-11. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Model Number

10. Enter the Port 2 BB/mm-Wave Module model number and click OK.

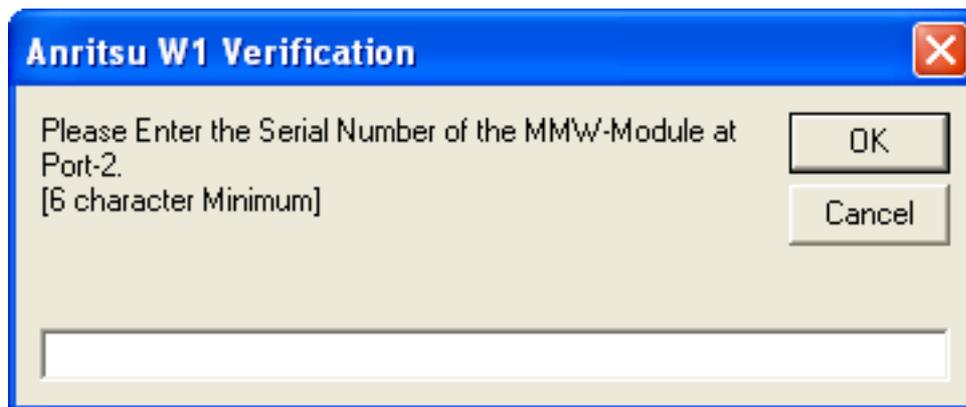


Figure 3-12. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Serial Number

Enter Test Set Information

11. Enter the Test Set model number and click OK.

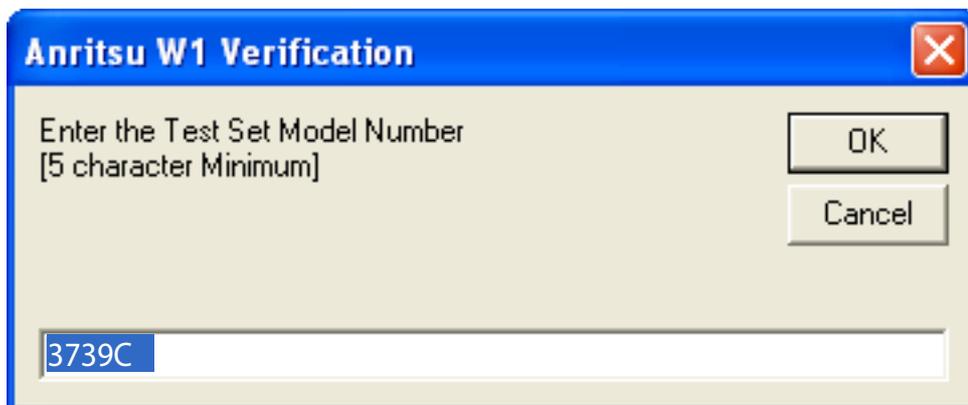


Figure 3-13. Anritsu W1 Verification Dialog – Test Set – Model Number

12. Enter the Test Set serial number found on the rear panel and click OK.

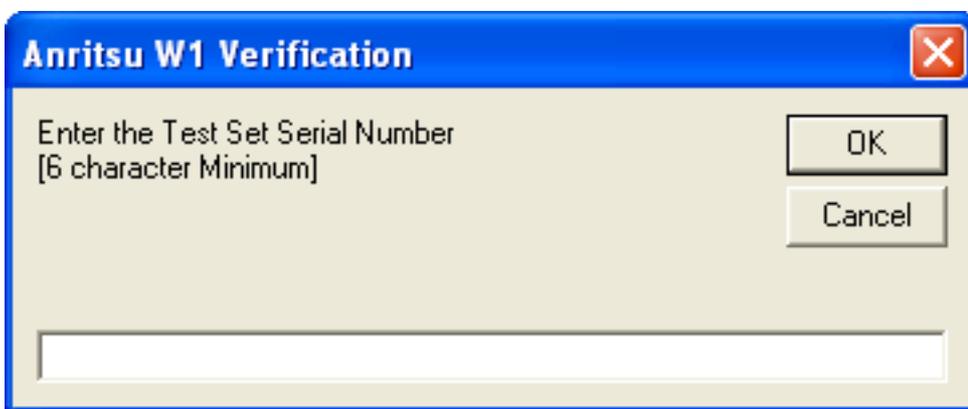


Figure 3-14. Anritsu W1 Verification Dialog – Test Set – Serial Number

13. The program execution continues to the following [Section 3-6, “Application Interface – Setup Menu Tab”](#) on page 3-11.

3-6 Application Interface – Setup Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections:

- The Setup Menu tab is described in this section.
- The Main Menu tab display is described in [Section 3-9, “Application Interface – Main Menu Tab” on page 3-23](#).
- The Serial Number Info tab is described in [Section 3-10, “Application Interface – Serial Number Tabs” on page 3-27](#).

Procedure

The following procedure continues the program setup from the previous section:

1. In the Calibration Kit Type area, select W Coax.
2. In the Serial Number (5 Digits) area, enter the serial number for the 3656B Calibration/Verification Kit. At least five (5) digits are required.
3. In the Load Cal-Kit Coefficients to VNA area, select Yes.

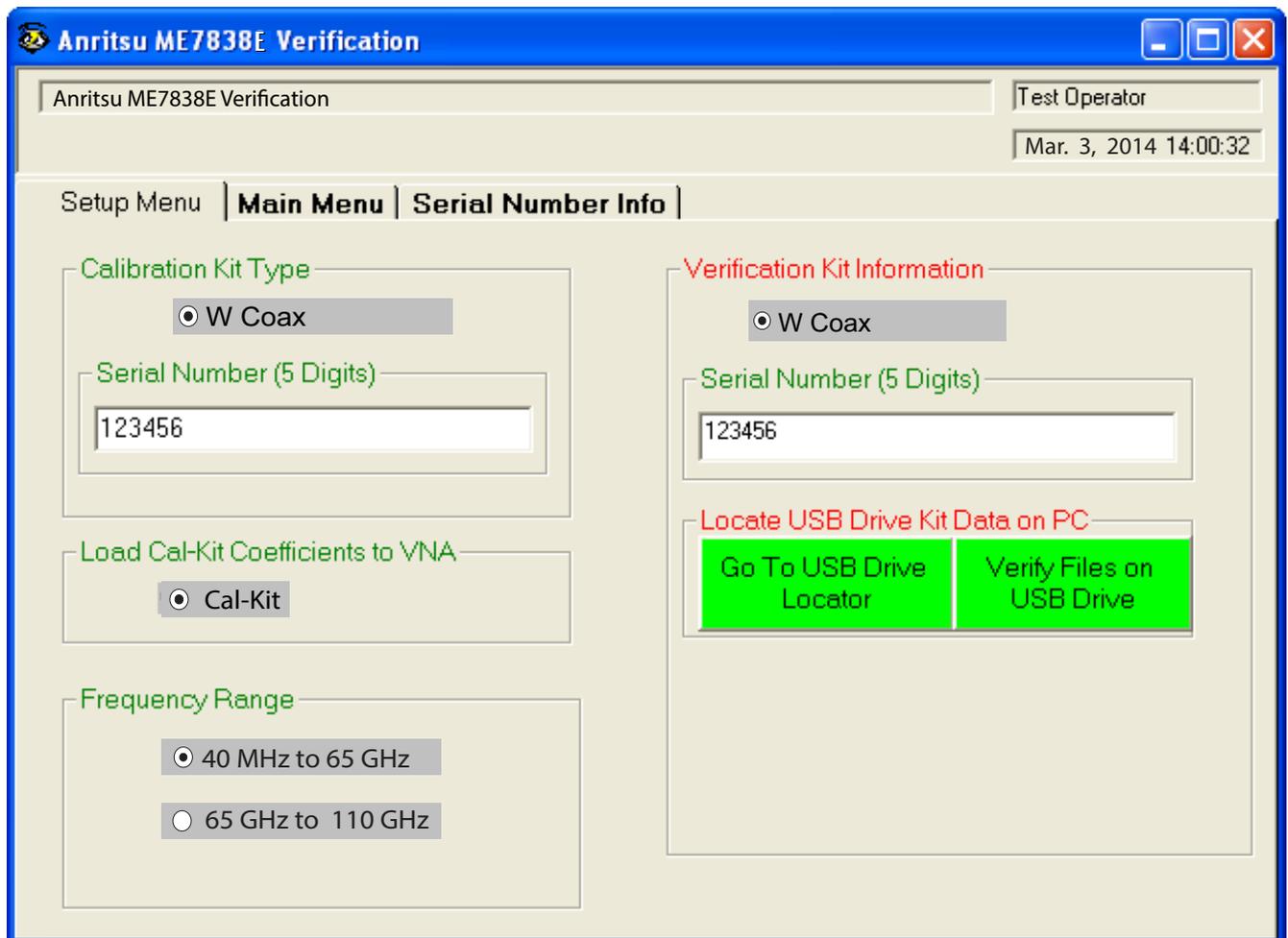


Figure 3-15. ME7838E Application Interface – Setup Menu Tab

4. The Install Calibration-Kit Coefficients to the VNA dialog box appears.

5. Follow the dialog box instructions for installing the 3656B calibration coefficients into the VNA, then click OK.

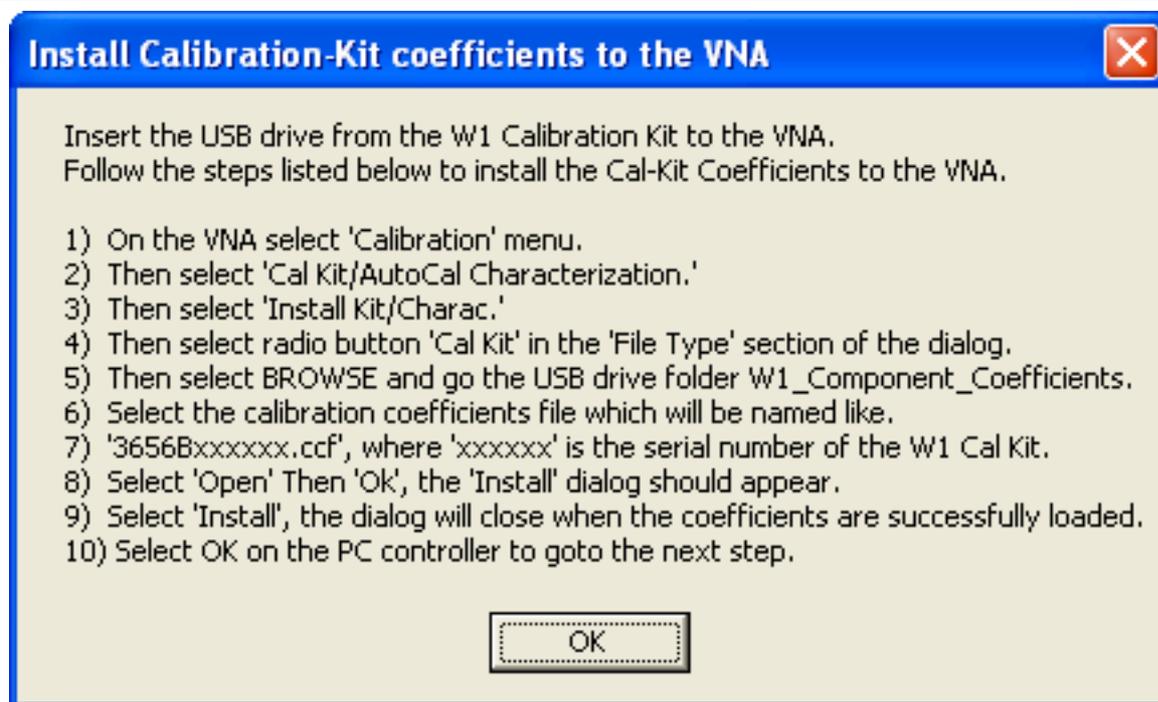


Figure 3-16. Install Calibration Kit Coefficients Dialog

6. The VNA displays an acknowledgment dialog box when the file load is complete, indicating that 10 files were loaded. After the VNA has loaded the 10 Calibration coefficient files, select OK on the PC application. The application will then prompt you to remove the USB drive from the VNA and install the USB drive to the PC.



Figure 3-17. Install USB Drive in PC Dialog

- The Application Interface dialog box reappears displaying the Setup Menu tab and Frequency Range area. In the Frequency Range area, select either the low range (40 MHz to 65 GHz) or the high range (65 GHz to 110 GHz). For purposes of this document, the low band is done first. The range that is not selected is calibrated during the Restart Procedure described in [Section 3-14 “Restart for Alternate Frequency Band”](#) on page 3-33. After selecting the frequency range, click OK. The Verification Kit Information area appears.

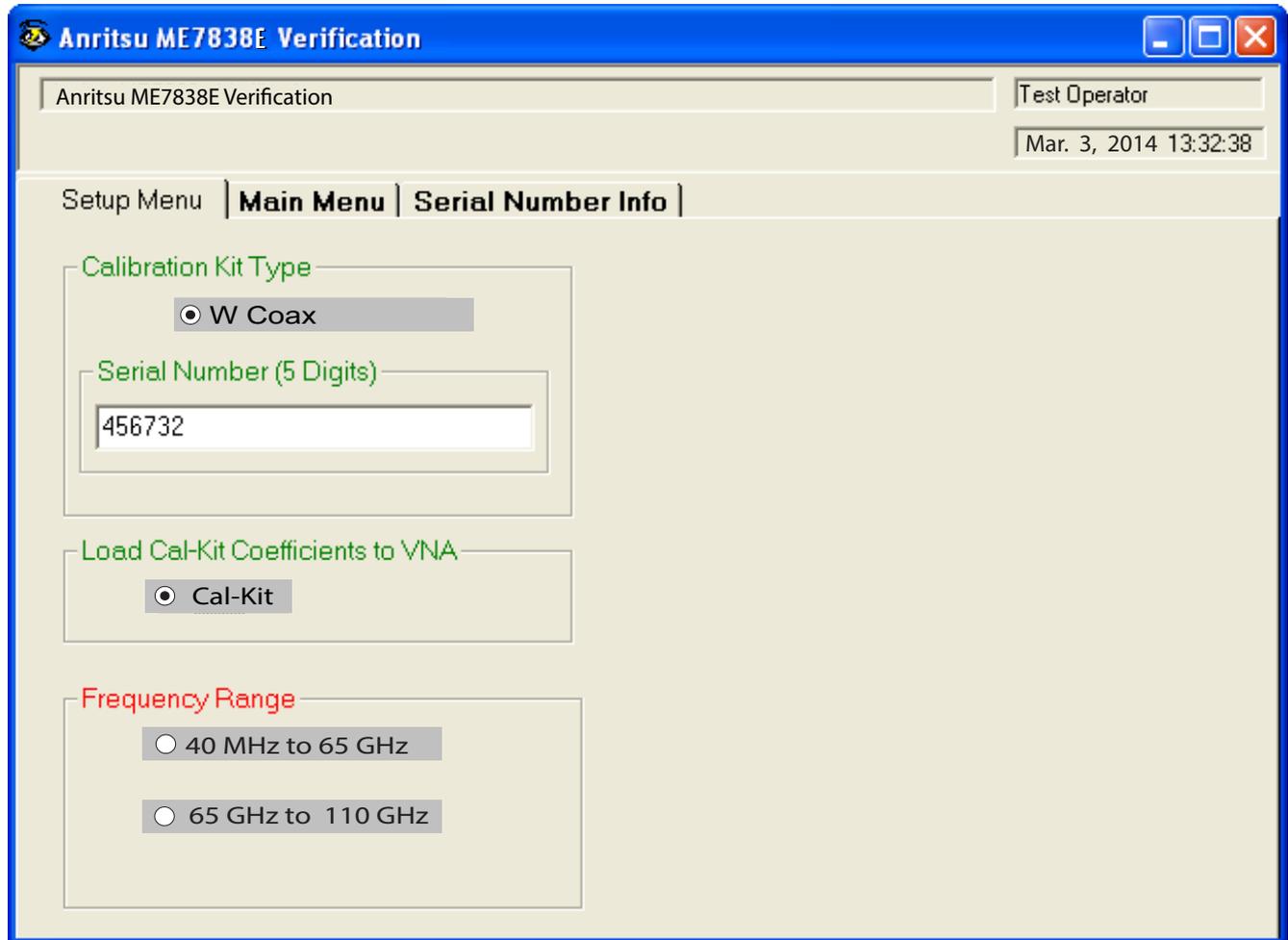


Figure 3-18. ME7838E Application Interface – Setup Menu Tab

8. Select the W Coax type, and then the Verification Kit Serial Number (usually the same as the Calibration Kit). When the Serial Number is complete, the Locate USB Drive Kit Data on PC area appears.

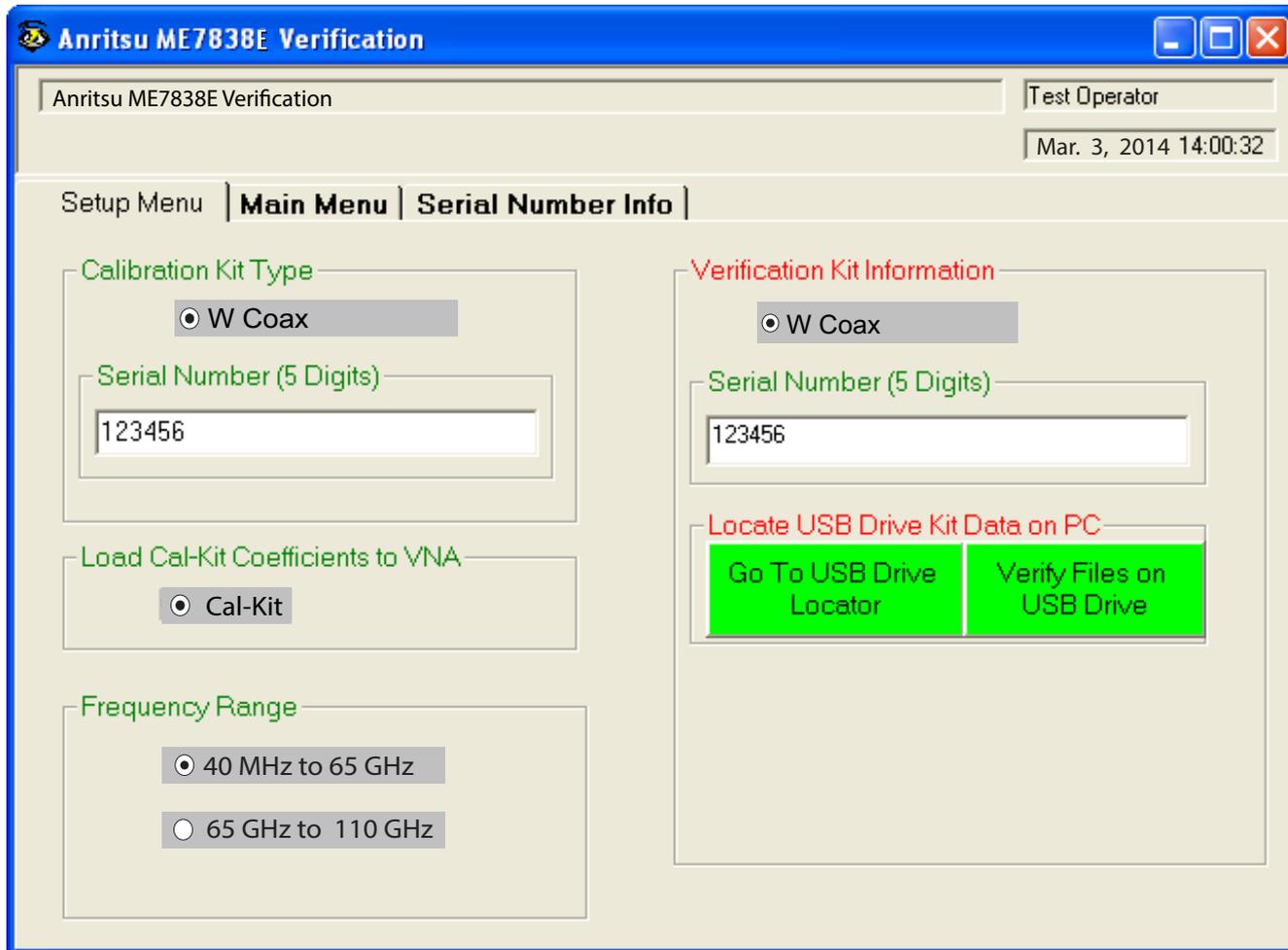


Figure 3-19. ME7838E Application Interface – Setup Menu Tab

9. In [Figure 3-19](#), find the Locate the USB Drive Kit Data on PC area and click the Go To USB Drive Locator button.

- When the Auto Find Verification Kit Data dialog box first appears, see [Figure 3-20](#), the Verification Kit Data Path text field is blank. Click the Auto-Find USB Drive Verification Kit Data button. The application automatically locates the verification kit data on the USB drive and displays the path in the Verification Kit Data Path text field.

In rare instances, due to PC/USB configurations, the Auto-find function may not be able to locate the verification data on the USB drive. In this case, you may need to use the Manually Locate Verification Data Kit button. This utility allows you to manually select the path where the verification kit data is located. The data path will be on the USB drive shipped with the verification kit. On most PC's, this will be the E, F, or G drive assignments. Navigate to the verification kit data in the file-path location shown in the example below (for this example, the USB drive was at E:\):

```
E:\W1_Verification_Data\W1_3656B_XXXXXX
```

(where XXXXXX is the serial number of the Kit)

Within each data set on the USB, there is a file named `EnableKit.dat`. Double click that file to identify the file. This builds the path for the verification kit data and returns back to the Find Verification Kit Data on the removable USB drive. Once the data is found, the Verification Kit Data Path information appears in the text field. Click `Next >` to return to the Application Interface dialog box.

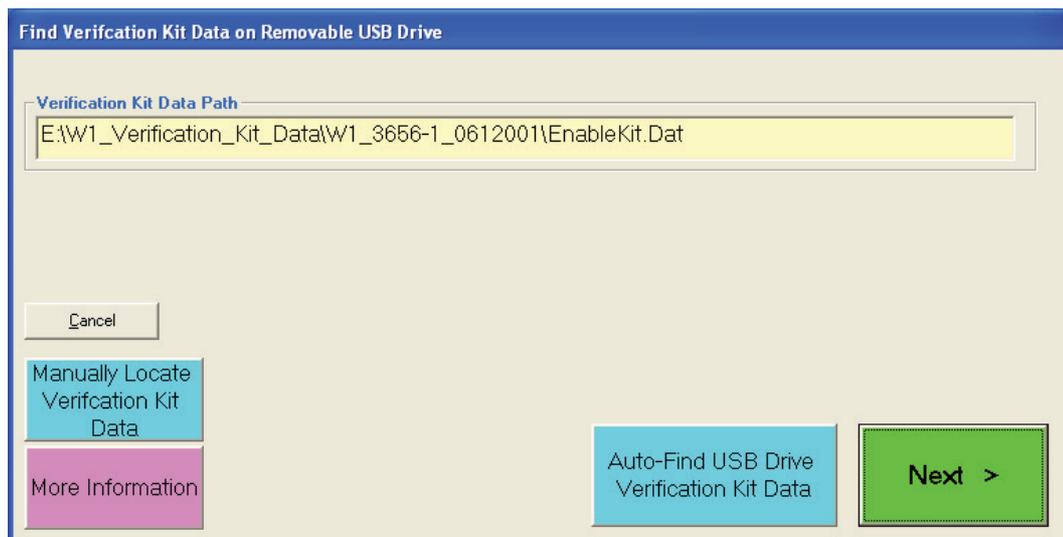


Figure 3-20. USB Drive Locator Dialog

11. Click Verify Files on USB Drive. The application checks the files on the USB drive to verify that all files are present and that each has the proper number of data points.

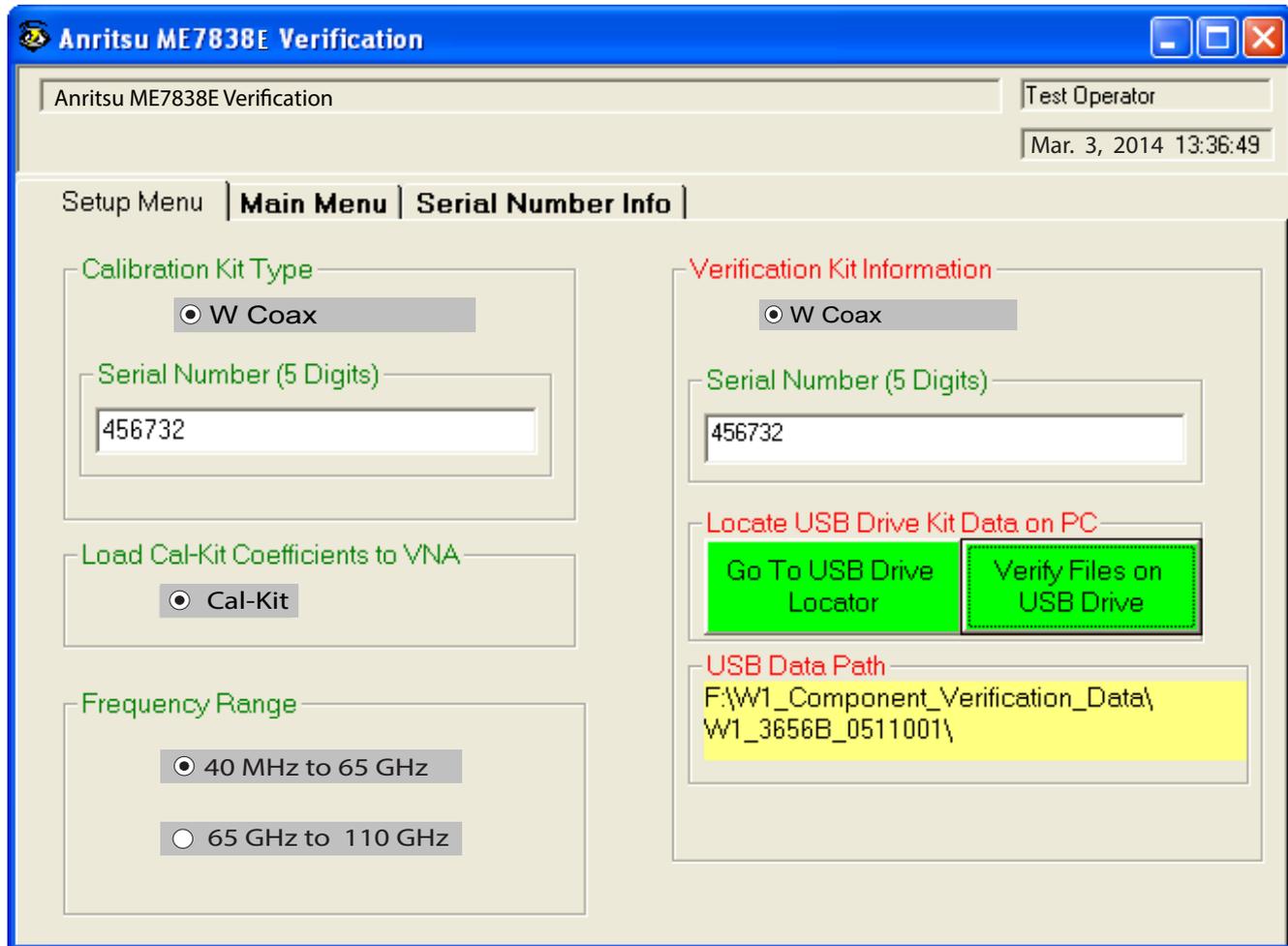


Figure 3-21. ME7838E Application Interface – Setup Menu Tab

- When all information is entered and you are ready to start, click the Setup Calibration of VNA button.

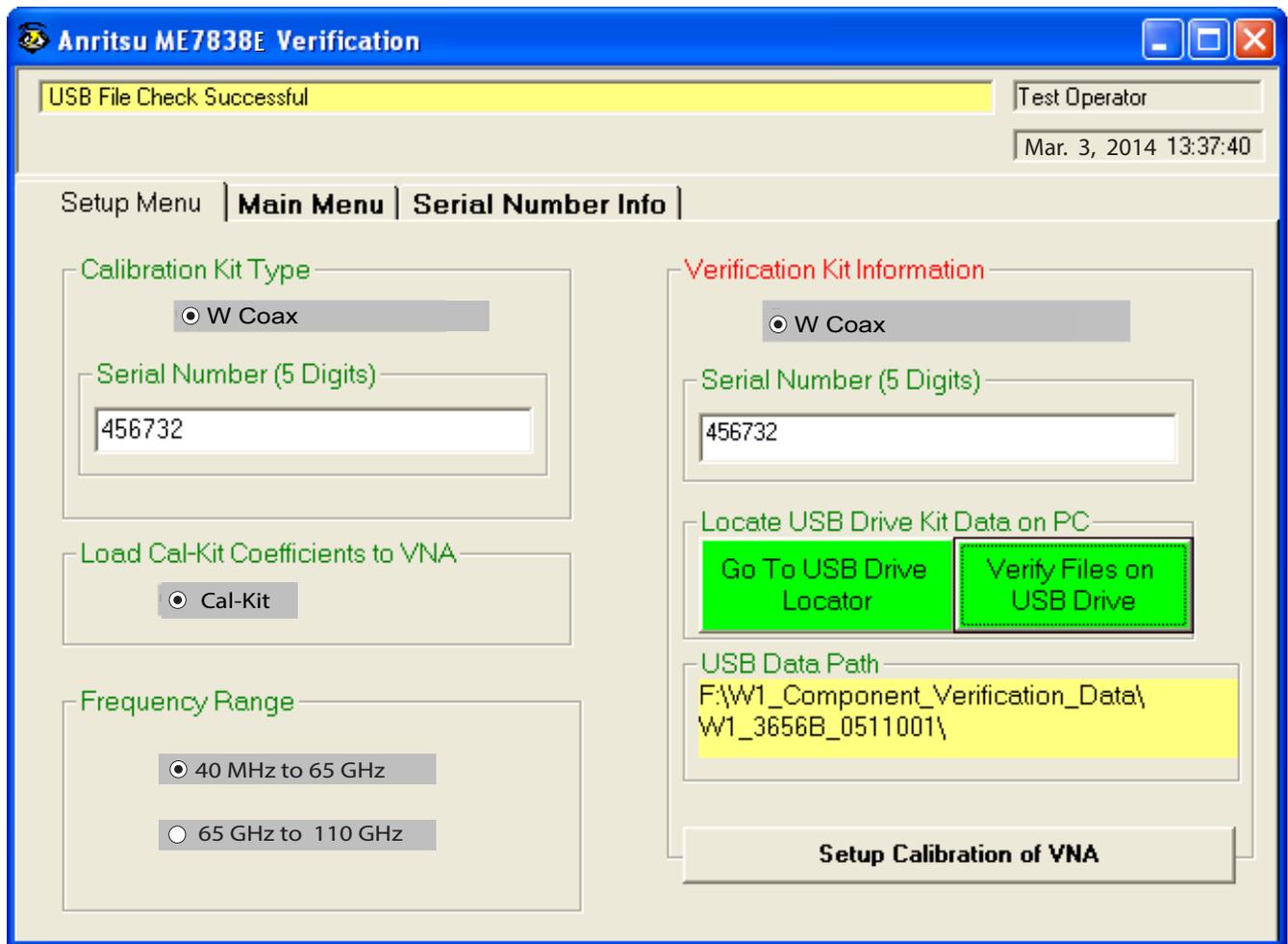


Figure 3-22. ME7838E Application Interface – Setup Menu Tab

- The program execution continues in either [Section 3-7, “Low-Band Calibration”](#) on page 3-18 or [Section 3-8, “High-Band Calibration”](#) on page 3-20 depending on the previous band selection.

3-7 Low-Band Calibration

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 3-8 “High-Band Calibration” on page 3-20](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

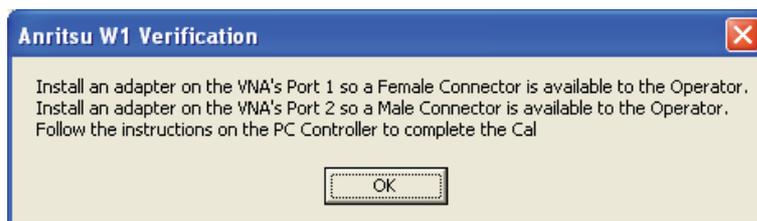


Figure 3-23. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.

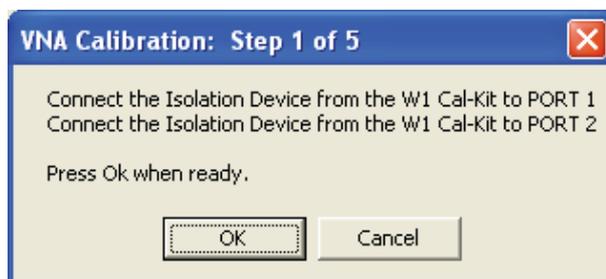


Figure 3-24. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 1.
 - b. Connect the Female Broadband Load Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 3-25. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 1.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 2.
 - c. When ready to proceed, click OK.

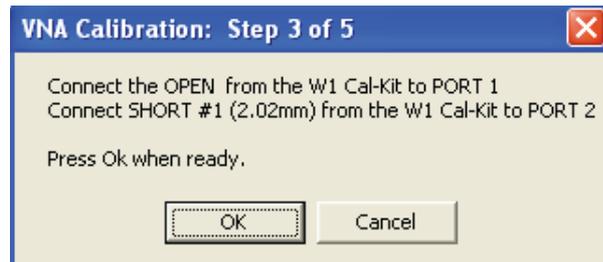


Figure 3-26. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 1.
 - b. Connect the Female Open to VNA Port 2.
 - c. When ready to proceed, click OK.

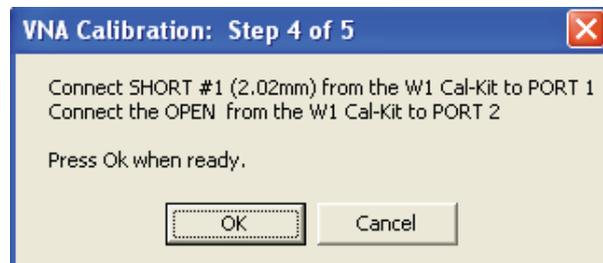


Figure 3-27. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 1 and Port 2, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 3-28. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 3-9 “Application Interface – Main Menu Tab”](#) on page 3-23.

3-8 High-Band Calibration

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 3-7 “Low-Band Calibration”](#) on page 3-18, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.



Figure 3-29. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 3-30. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 1.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 3-31. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 1.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 3-32. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 1.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 3-33. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 1 and Port 2.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 3-34. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 3-9 “Application Interface – Main Menu Tab”](#) on page 3-23.

3-9 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections below.

- The Setup Menu tab is described in [Section 3-6, “Application Interface – Setup Menu Tab”](#) on page 3-11.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 3-35](#)
- The Serial Number tab is described in [Section 3-10, “Application Interface – Serial Number Tabs”](#) on page 3-27.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

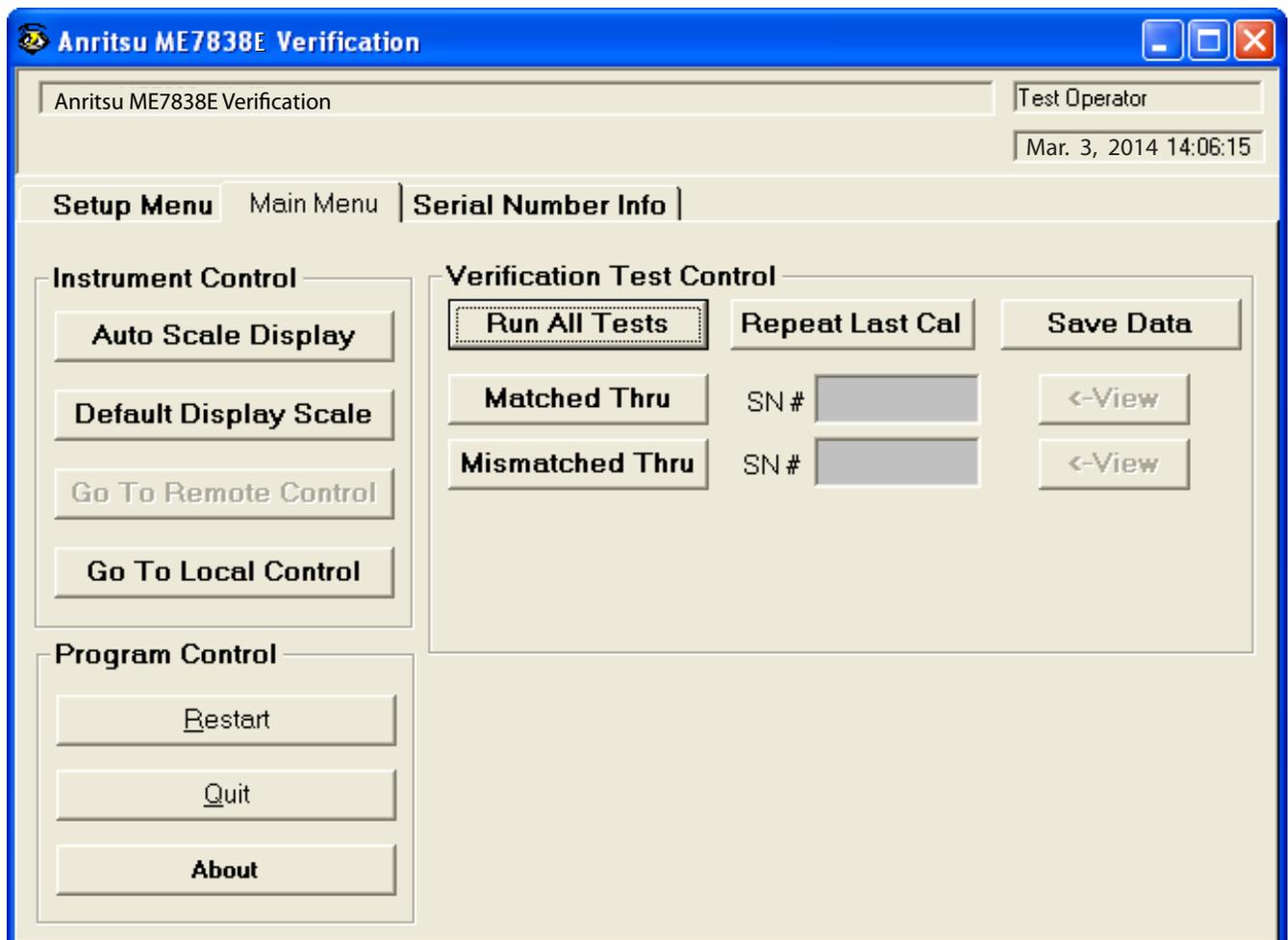


Figure 3-35. ME7838E Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S21 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S12 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S11 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S22 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 3-36](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

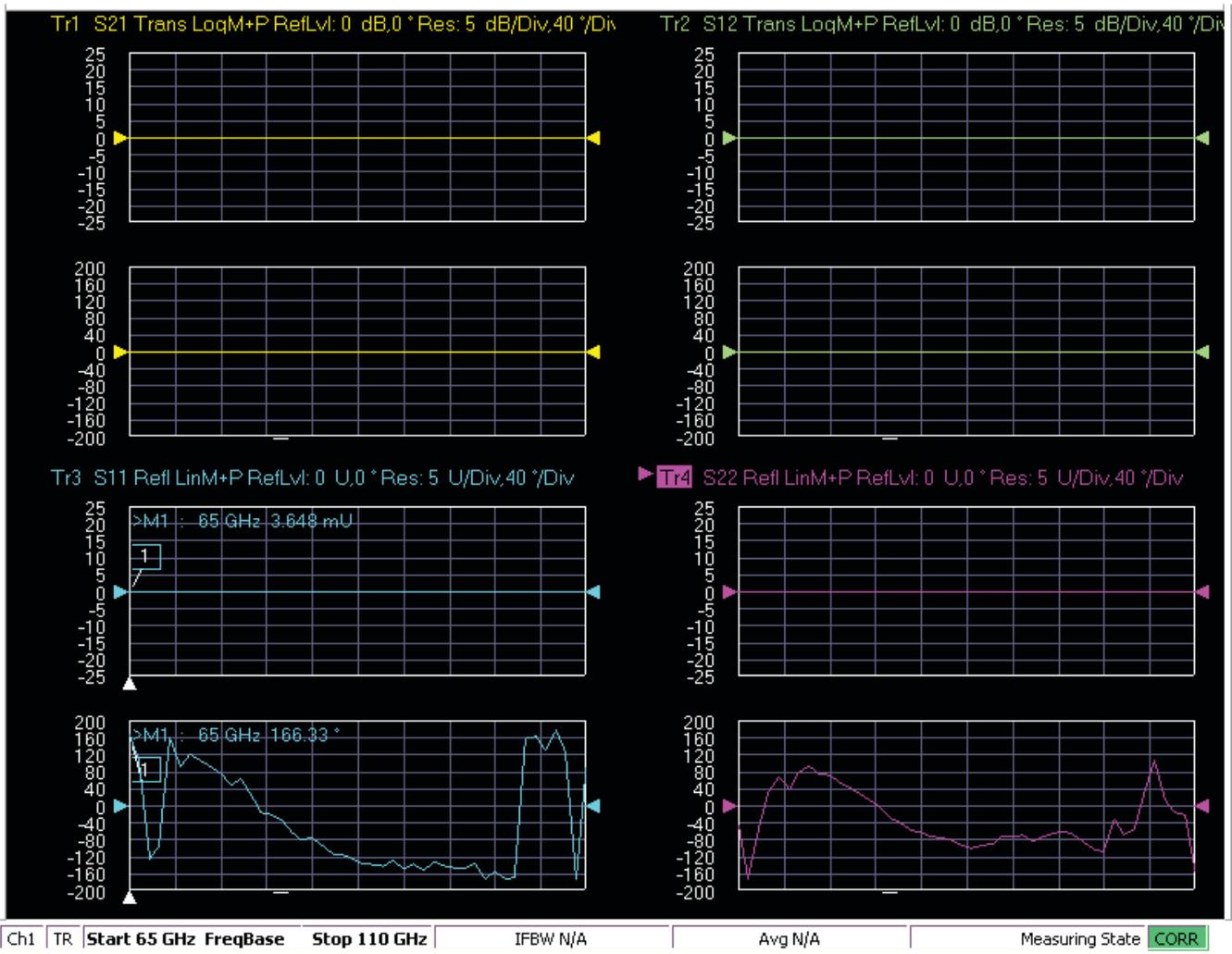


Figure 3-36. MS4640B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the **Go to Local Control** button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution	Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.
----------------	--

Restart Button

The **Restart** button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting **Yes** causes the program to return to the program initialization stage.

Usually, this button is used to test for second frequency band and program execution continues in [Section 3-14 “Restart for Alternate Frequency Band” on page 3-33](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting **Quit** brings up a confirmation dialog box shown in [Figure 3-37](#). Selecting **Yes** exits the program; selecting **No** returns you to the previous screen.

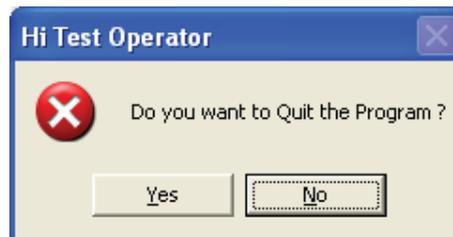


Figure 3-37. Confirmation Dialog

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 3-11 “Matched Thru Tests” on page 3-28](#) and then continues with [Section 3-12 “Mismatched Thru Tests” on page 3-30](#). When both tests are completed, program execution returns to the **Main Menu tab** shown in [Figure 3-35, “ME7838E Application Interface – Main Menu Tab” on page 3-23](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 3-35, “ME7838E Application Interface – Main Menu Tab” on page 3-23](#).

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 3-13 “Saving Verification Data” on page 3-33](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at C:\mmcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 3-11 “Matched Thru Tests” on page 3-28](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 3-9 “Application Interface – Main Menu Tab” on page 3-23](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 3-12 “Mismatched Thru Tests” on page 3-30](#). When the tests are completed, the program returns to the Main Menu tab shown in [Figure 3-35, “ME7838E Application Interface – Main Menu Tab” on page 3-23](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

3-10 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

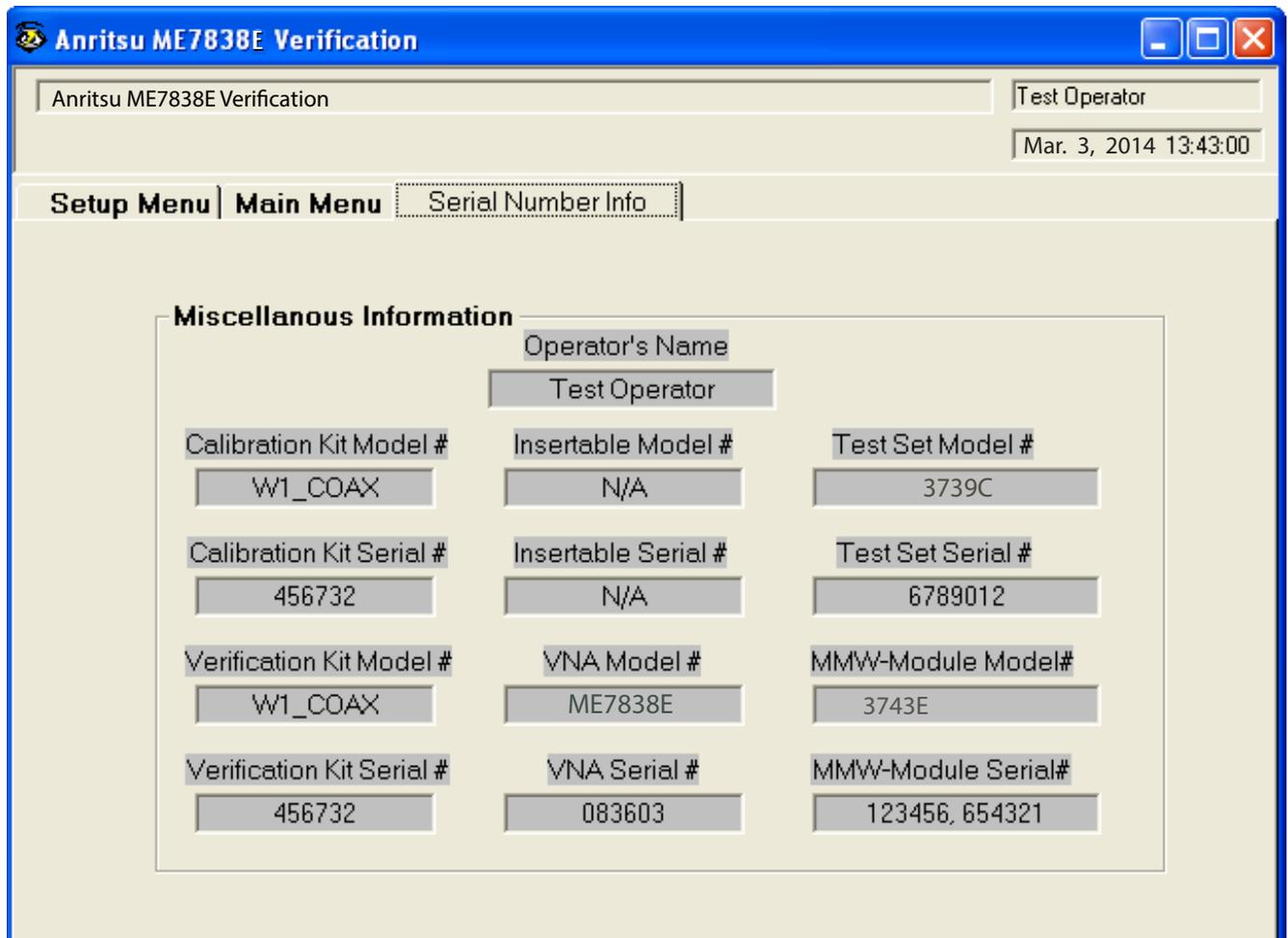


Figure 3-38. ME7838E Application Interface – Serial Number Tab

3-11 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 3-12 “Mismatched Thru Tests” on page 3-30](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 3-9 “Application Interface – Main Menu Tab” on page 3-23](#).

Note The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

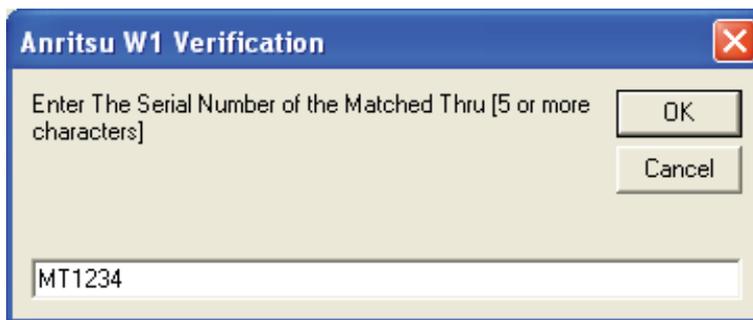


Figure 3-39. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.



Figure 3-40. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 1 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 2.

- When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

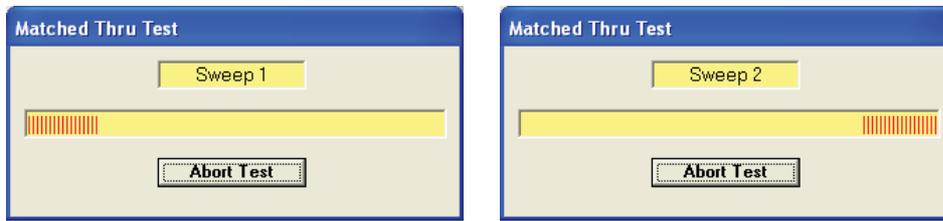


Figure 3-41. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

- When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

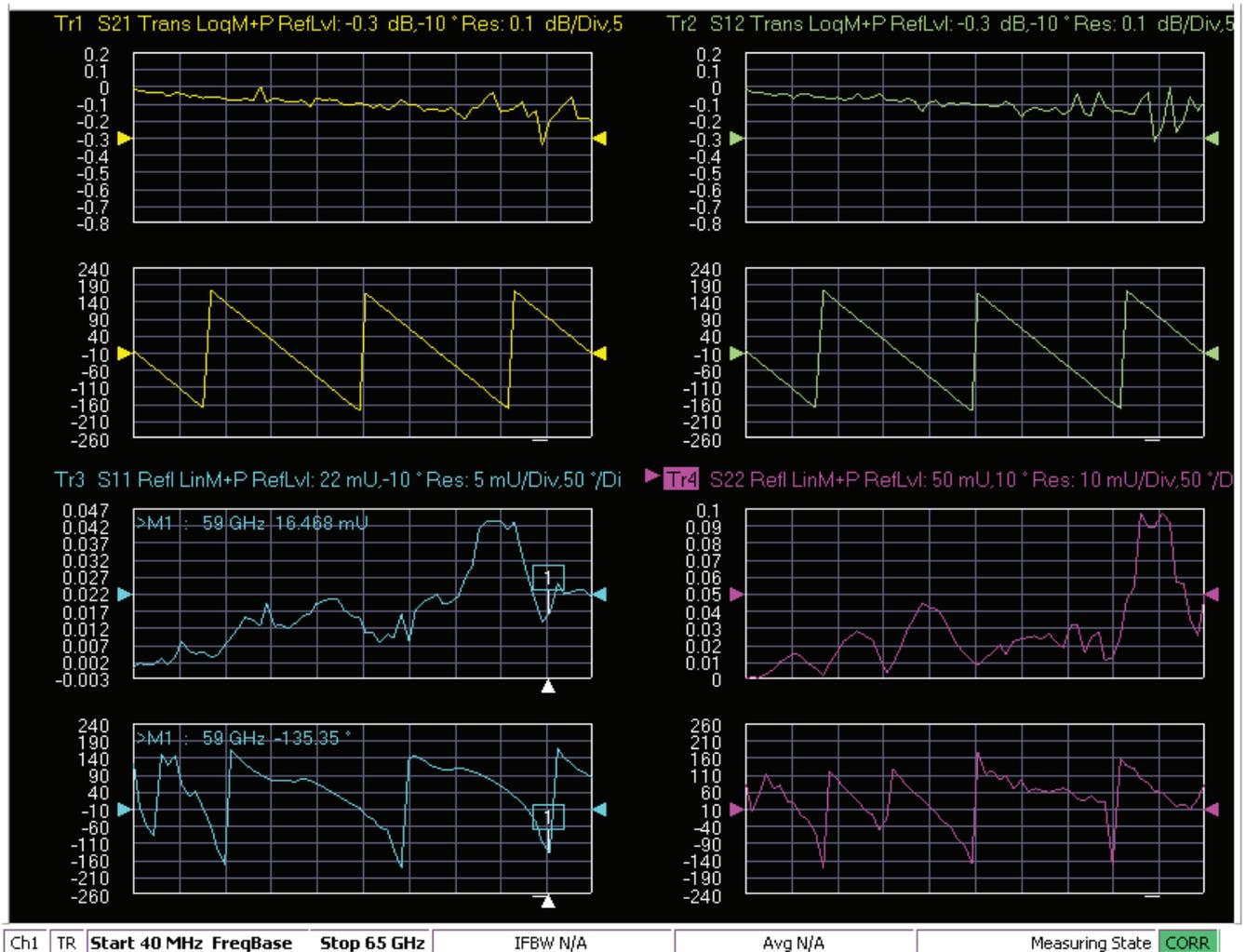


Figure 3-42. MS4640B Series VNA, Typical Matched Thru Data in Low Band
 Upper-left quadrant= S21 – Forward Transmission
 Upper-right quadrant= S12 – Reverse Transmission
 Lower-left quadrant= S11 – Forward Reflection
 Lower-right quadrant= S22 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “Application Interface – Main Menu Tab” on page 3-23. The dialog box is shown in Figure 3-35, “ME7838E Application Interface – Main Menu Tab” on page 3-23.
10. If the Run All Tests button was selected, the program execution continues with the following Section 3-12, “Mismatched Thru Tests”.

3-12 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in Section 3-11 “Matched Thru Tests” on page 3-28) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described Section 3-9 “Application Interface – Main Menu Tab” on page 3-23.

Note	The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports . Use the torque wrench supplied with the verification kit when tightening the device connections.
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The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in Section 3-9 “Application Interface – Main Menu Tab” on page 3-23.

The dialog box is shown in Figure 3-35, “ME7838E Application Interface – Main Menu Tab” on page 3-23.

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in Section 3-11 “Matched Thru Tests” on page 3-28) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.

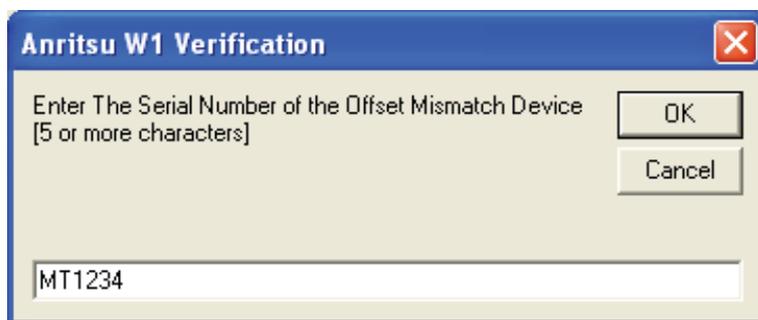


Figure 3-43. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note	The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.
-------------	--

- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

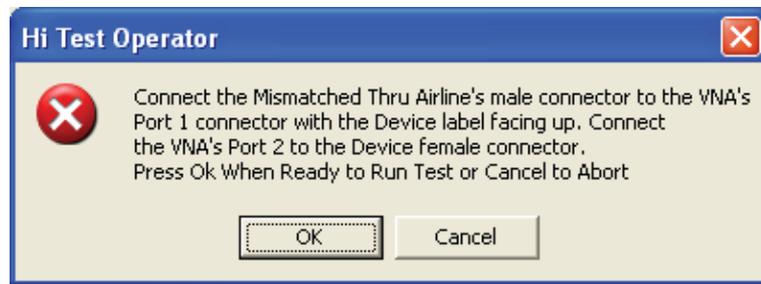


Figure 3-44. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 1 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 2.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

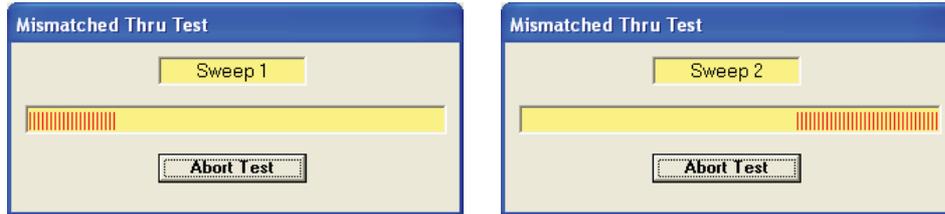


Figure 3-45. Status Dialogs

- When the test completes, the program returns to the main menu described [Section 3-9 “Application Interface – Main Menu Tab”](#) on page 3-23, and the display should look similar to [Figure 3-46](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

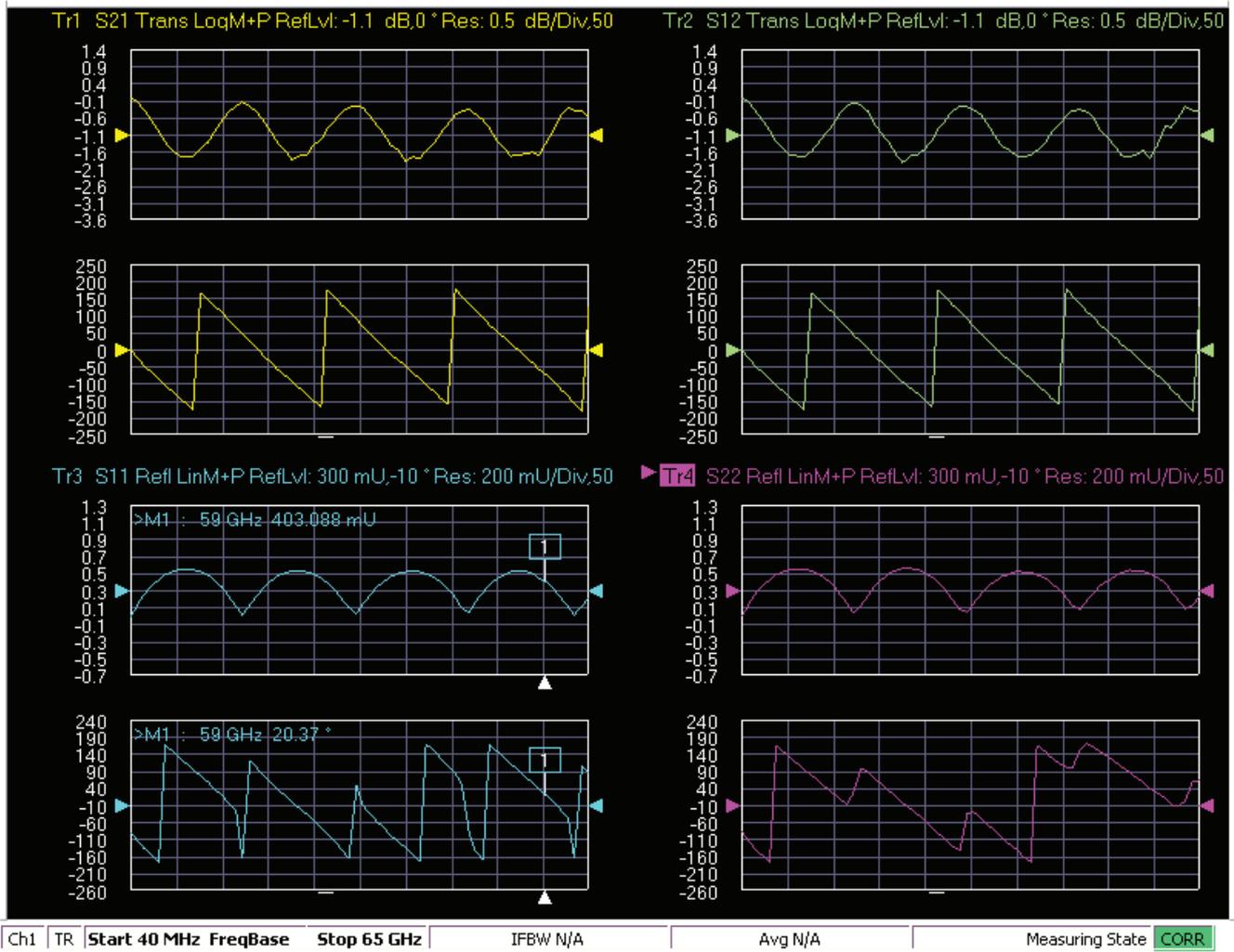


Figure 3-46. MS4640B Series VNA, Typical Mismatched Thru Data in Low Band

3-13 Saving Verification Data

If the Save Data button on the Main Menu tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 3-9 “Application Interface – Main Menu Tab” on page 3-23](#).

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru Low.dat
- C:\mmdcsvc\Data\Mismatched Thru Low.dat
- C:\mmdcsvc\Data\Matched Thru High.dat
- C:\mmdcsvc\Data\Mismatched Thru High.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

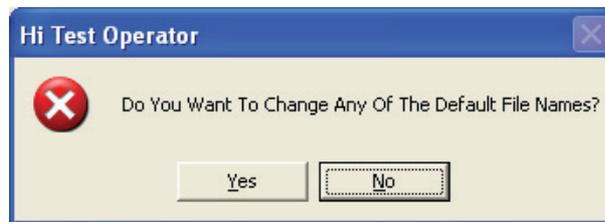


Figure 3-47. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.



Figure 3-48. Information Dialog

3-14 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 3-9, “Application Interface – Main Menu Tab”](#) on page 3-23.
3. The Choose The Restart Method dialog box appears as shown in [Figure 3-49](#).

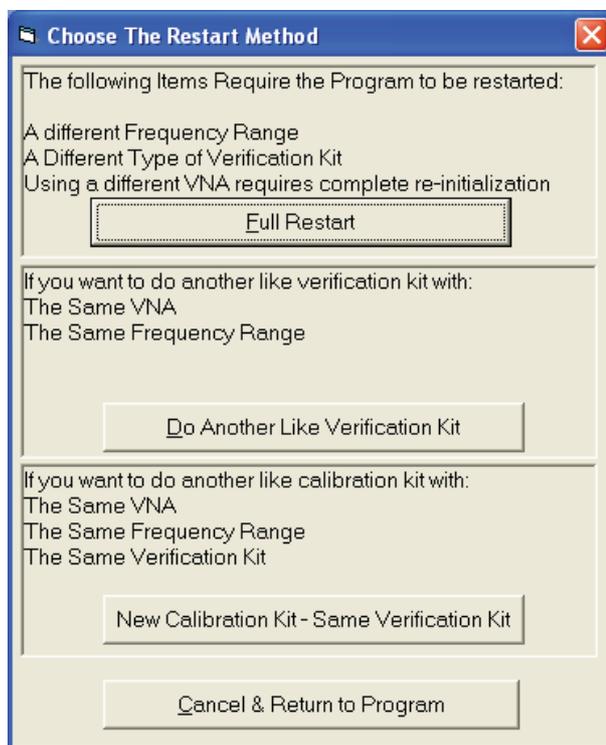


Figure 3-49. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as the procedures described previously starting in [Section 3-5, “Running the Verification Software”, Step 5](#) on page 3-7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK when ready to proceed to the next step.
6. Enter the GPIB Board 0.
7. Enter the GPIB Address 6.
8. Enter the Test Set Serial Number.
9. Enter the User Name.
10. Enter the Cal Kit Type selection.
11. Enter the Cal Kit Serial Number selection.
12. Enter the Load Cal Kit Disk from VNA Floppy selection.
13. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.

14. Enter the Verification Kit Type selection.
15. Enter the Verification Kit Serial Number selection.
16. Click the Go to USB Drive Locator button.
17. Click the Verify Files on USB Drive button.
18. Complete the calibration and verification of the devices for the second frequency range.
19. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
20. This series of automated tests has verified that the VectorStar ME7838E Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
21. The program returns to the main menu described in [Section 3-9, “Application Interface – Main Menu Tab” on page 3-23](#).

3-15 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed using the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting the performance verification software, the verification kit data USB memory device is installed in the correct USB port and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit USB drive matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, and in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu customer service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 4 — Using the 2300-584-R Software with the ME7838A4

4-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) with the VectorStar ME7838A4 Modular BB/mm-Wave VNA Measurement System. The ME7838A4 is based on the VectorStar MS4647B Vector Network Analyzer running VectorStar Application Version 1.5.0 or higher and equipped with Option 08x.

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired.
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4-2 Required Equipment

Required VectorStar ME7838A4 Broadband System, 70 kHz to 110 GHz Instruments and Components

The VectorStar ME7838A4 Broadband/Millimeter Wave Measurement System consists of:

- VectorStar MS4647B VNA, 70 kHz to 70 GHz, V Connectors, equipped with Option 08x
- MN4697C 4-port Test Set
- 3736B Master Test Set
- 3739C Broadband Test Set
- Four (4) 3743A Millimeter-Wave (mm-Wave) Modules, 70 GHz to 110 GHz.
- Necessary rear panel interconnect cables between the test set and the VNA.
- Necessary front panel interconnect cables between the test set and the VNA
- Necessary interconnect cables to the 3743A mm-Wave Modules.

4-3 Configuring the Hardware

This section describes how the various system elements are interconnected and describes the preliminary steps required for operation of the verification software. See [“Required VectorStar ME7838A4 Broadband System, 70 kHz to 110 GHz Instruments and Components” on page 4-1](#) for a complete equipment list.

1. Ensure that the VNA system is set to “Broadband”.
2. To verify the setting, from the right side MAIN menu, select the broadband test set button:
 - MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Test Set) or BB/mmWave (3739 Test Set)
3. Select the Broadband Receiver Configuration.
4. Connect a GPIB cable between the PC Controller and the VNA Rear Panel GPIB port labeled IEEE 488.2 GPIB.

Caution	Do not connect the cable to the VNA Rear Panel GPIB port labeled Dedicated GPIB .
----------------	--

4-4 W1 Verification Application Installation

Prior to installation of the W1 Application, the National Instruments GPIB card and drivers must be installed in the Windows PC.

This needs to be done only once per PC Controller. The software is contained on the Disk supplied with each Verification Kit.

In order to correctly install the PVS application, the user (logged in) must have Administrative rights on the Windows PC Controller.

- Note** The PVS application is installed onto the PC Controller on an all-user basis.
If your organization does not allow for all-user installations, consult your internal PC and network support group on how to best proceed.

1. Prior to installation of the 2300-584-R PVS, the National Instruments GPIB card and its drivers must be installed in the PC Controller.
2. Turn off all other running applications on the PC Controller.
3. Insert the USB Memory Device into the USB slot.
4. Open Windows Explorer, browse to the USB Drive, and double click on **Startup.htm**.

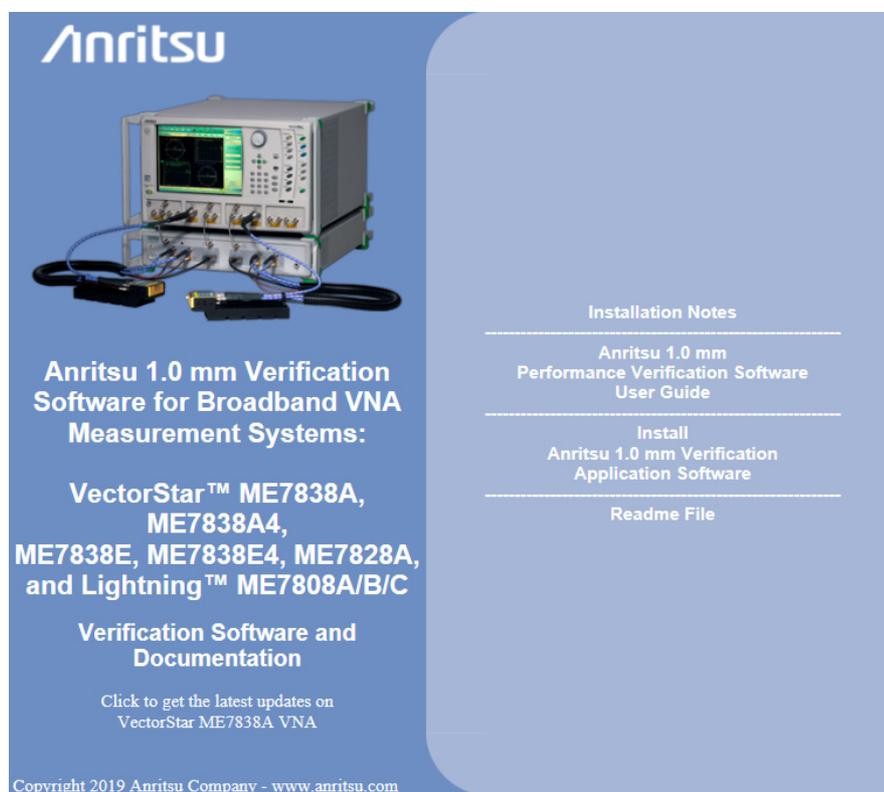


Figure 4-1. PVS Installation and Documentation Screen

5. On the navigation page, click the Install Anritsu 1.0 mm Verification Application Software link.
6. The first of several installation dialog boxes appears

7. Click Run on the two security dialog boxes.

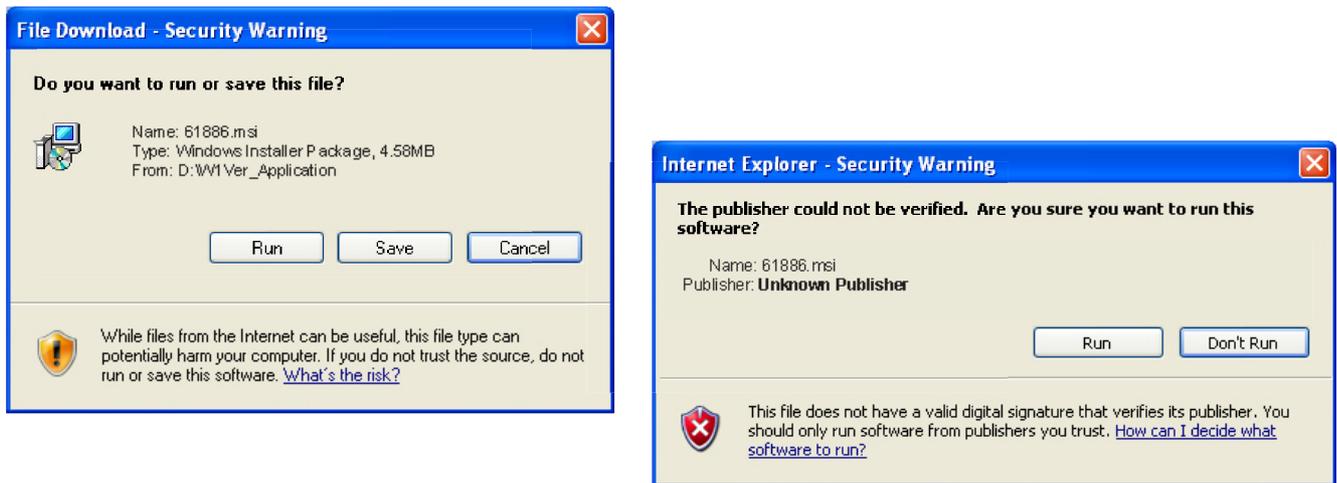


Figure 4-2. Installation Security Dialog Boxes – Click Run on each

8. If either of the two dialog boxes shown in [Figure 4-3](#) appear that display Error 1321 or Error 1931, follow these instructions:

- Error 1321 – Select Exit Installation and make sure you have Administrator privileges on the PC Controller.
- For Error 1931 – Select OK to bypass the error message and continue the installation.

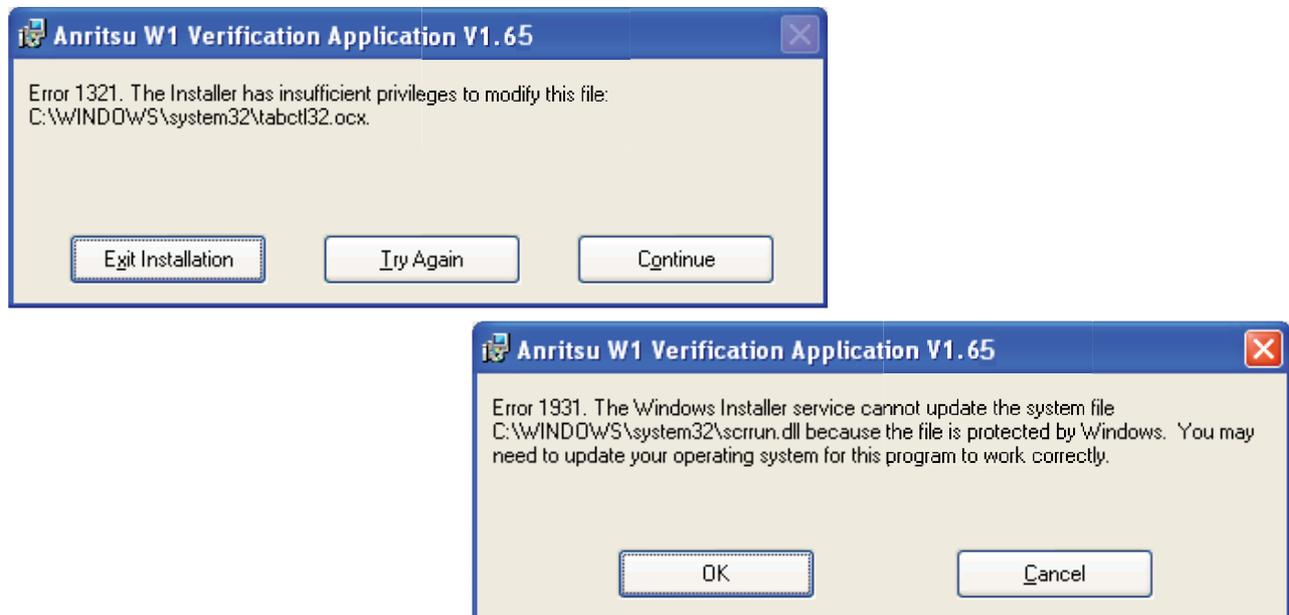


Figure 4-3. Installation Error 1321 and Error 1931 Dialog Boxes

9. Two installation wizard setup dialog boxes appear in sequence. Click Next to proceed through each dialog box. The final dialog box shows an installation progress bar.

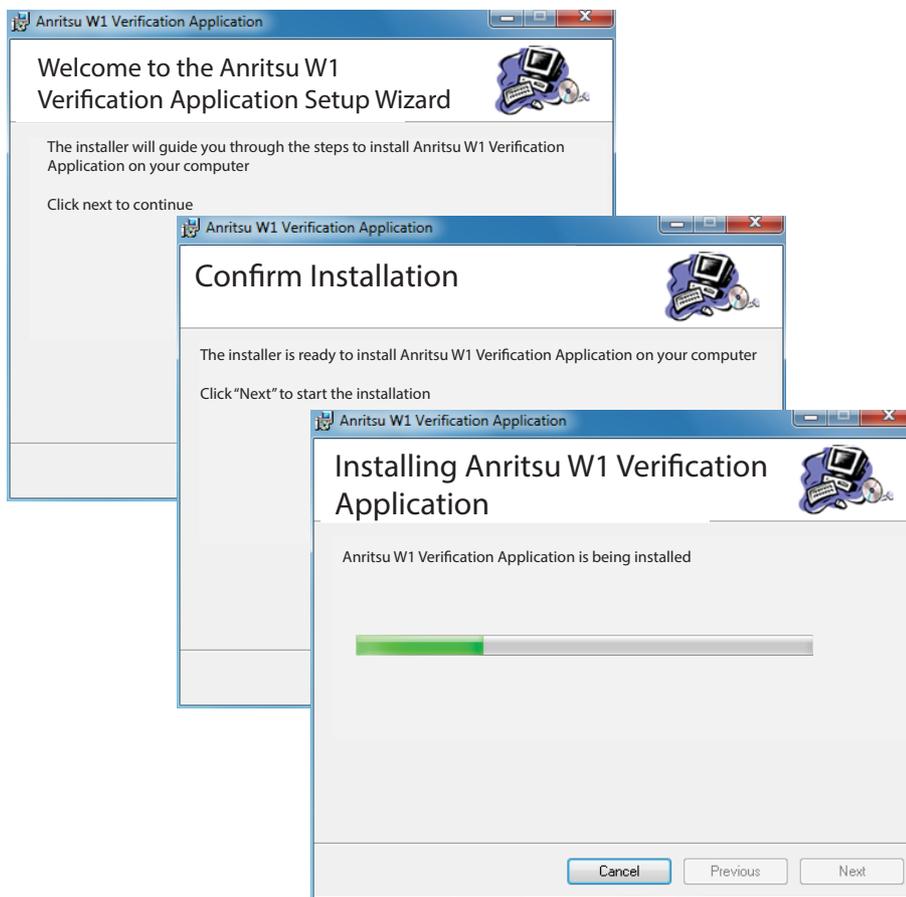


Figure 4-4. Installation Confirmation and Progress Dialog Boxes – Click Next on each

- When the installation progress bar shows complete, click **Next**. The final Application Information dialog box appears. Click **Next**, and the Installation Complete dialog box appears.

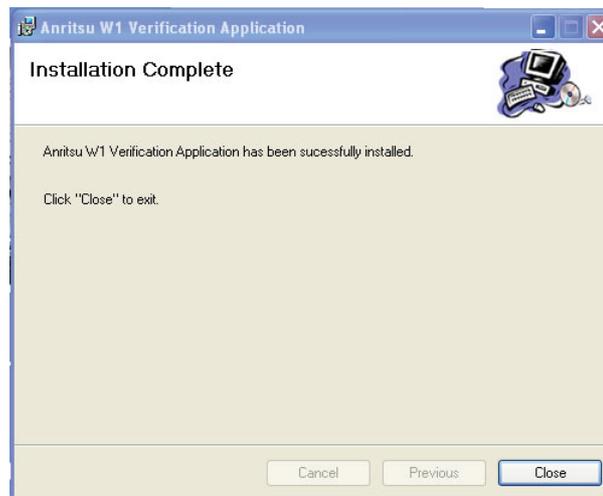
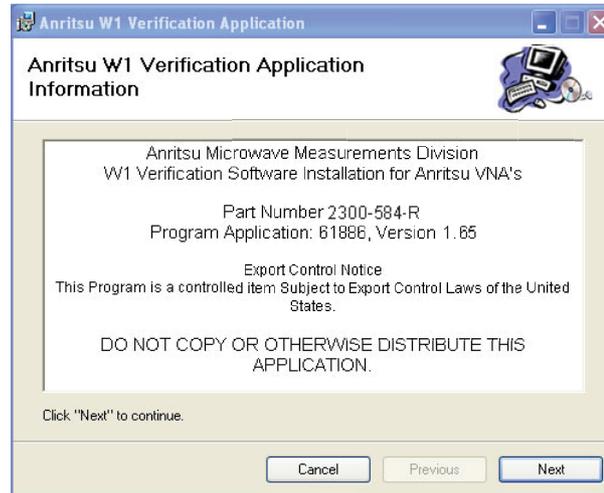


Figure 4-5. Final Application Information and Installation Complete Dialog Boxes

- The installer adds all required files and makes the necessary registry updates on the PC Controller. When done, the navigation page ([Figure 4-1](#)) reappears.
- If desired, open the **User Guide** (this document) and the **Quick Start Guide** and save and/or print a copy.
- The PVS application is available either the **Start** or **Program** menu of the PC Controller.

4-5 Running the Verification Software

After the VNA and PC have been configured as described above, you are ready to run the program and perform the calibration/verification. Make sure you have the following information available:

- Serial number of the 3656B W1 Calibration/Verification Kit
- Serial number of the 3739C Broadband/Millimeter Wave Test Set
- Serial Number of the 3736B Master Test Set
- MN469xC 4-port Test Set
- Model number and serial number of the Port 1 and Port 2 BB/mm Module
- Model number and serial number of the Port 3 and Port 4 BB/mm Module

Procedure

1. With the equipment and software configured as described in “[Configuring the Hardware](#)” on page 4-1, turn on the computer and allow it to start Windows.
2. Locate the Anritsu W1 Verification icon (shown below) on the desktop and double-click it.



3. The program displays an About dialog box with version information. Click OK to continue.

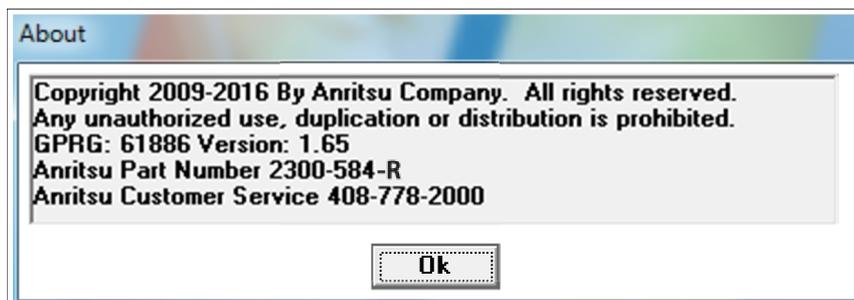


Figure 4-6. About Dialog

4. The Test Operator Name dialog box appears. Enter a user name or other identification.

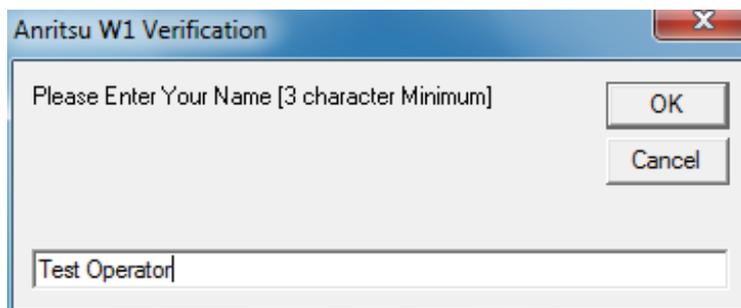


Figure 4-7. Name Dialog

- Click OK to continue. The program searches for the GPIB Board in the PC Controller that is set to GPIB Address 6 and displays a confirmation dialog.

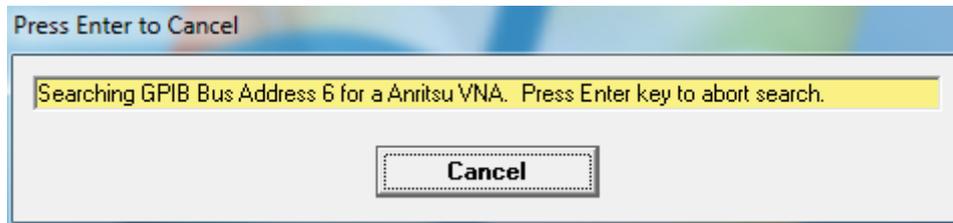


Figure 4-8. GPIB Board Dialog

- Click Yes to continue. Click No to search for another GPIB Board.
- If Yes was clicked, the program searches for a compatible VNA on the GPIB. When the VNA is found, a confirmation dialog box appears.

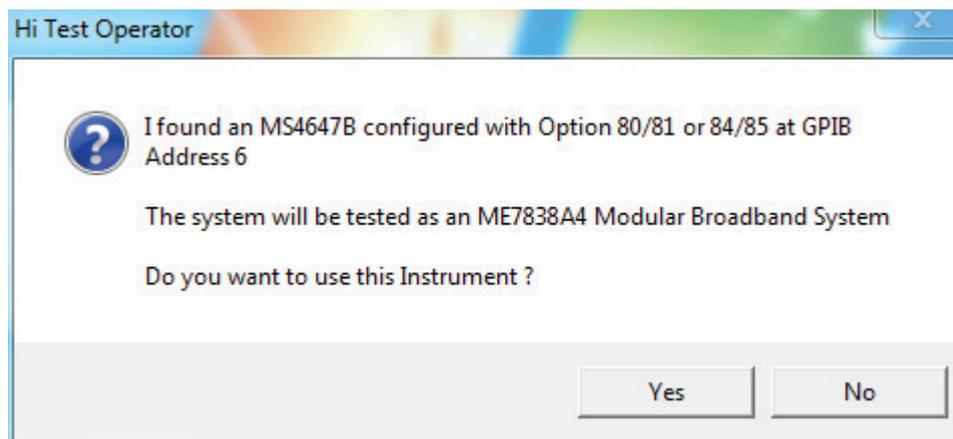


Figure 4-9. Found Instrument Dialog

- Click Yes to continue, or click No to search for another VNA.

Note If your system is configured with a Lightning 37000 series VNA, refer to [Chapter 7, “2300-584-R Software with the Lightning ME7808A/B/C”](#).

- If Yes is clicked above, the program searches for the BB/mm Modules and, when found, requests the model number and the serial number of the test set and each module.

10. The ME7838A4 is a 4-port system. The calibration and verification testing can be performed on only two ports at a time. At the prompt below, select to test either Port 1 and Port 2, or test Port 3 and Port 4. If testing Port 3 and Port 4 is requested, select **Yes**. If testing port 1 and 2 is requested, select **No**.

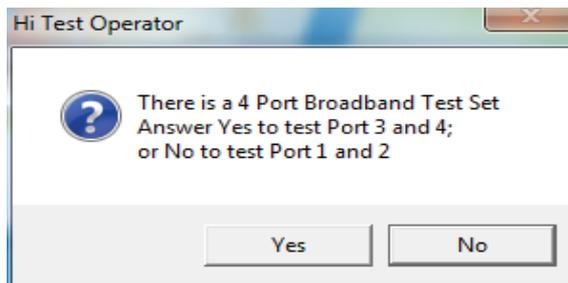


Figure 4-10. Port Test Selection Dialog

Enter Port 1 BB/mm-Wave Module Information

11. Enter the Port 1 BB/mm-Wave Module model number and click OK.

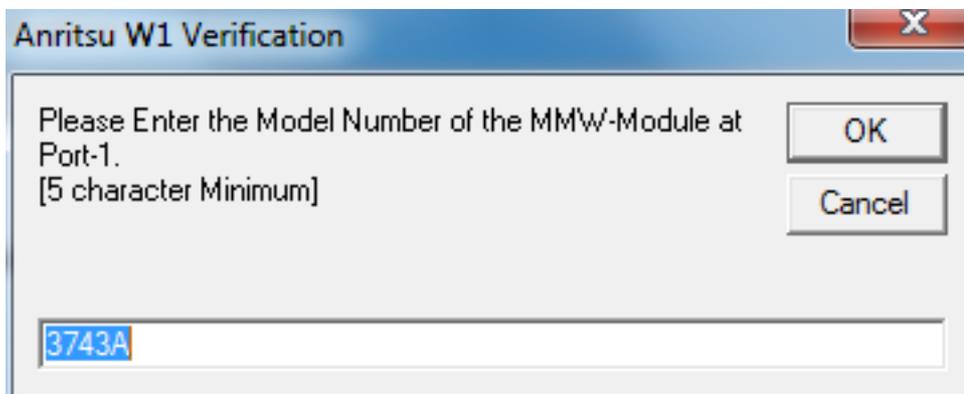


Figure 4-11. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Model Number

12. Enter the Port 1 BB/mm-Wave Module serial number and click OK.

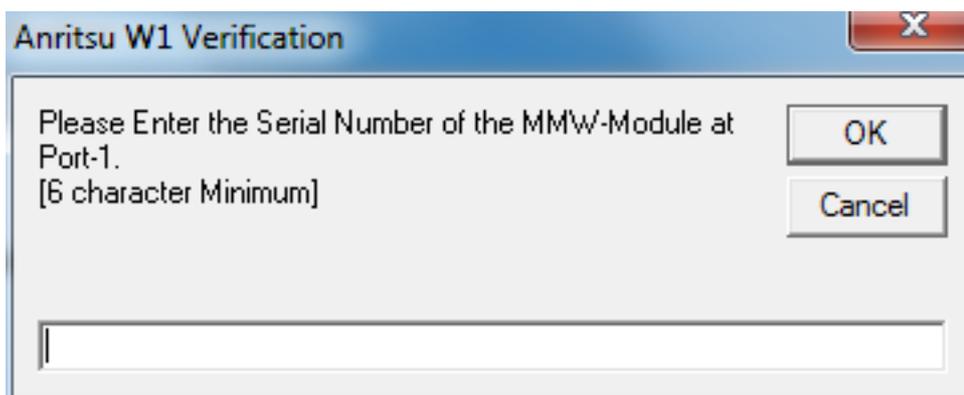


Figure 4-12. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Serial Number

Enter Port 2 BB/mm-Wave Module Information

13. Enter the Port 2 BB/mm-Wave Module model number and click OK.

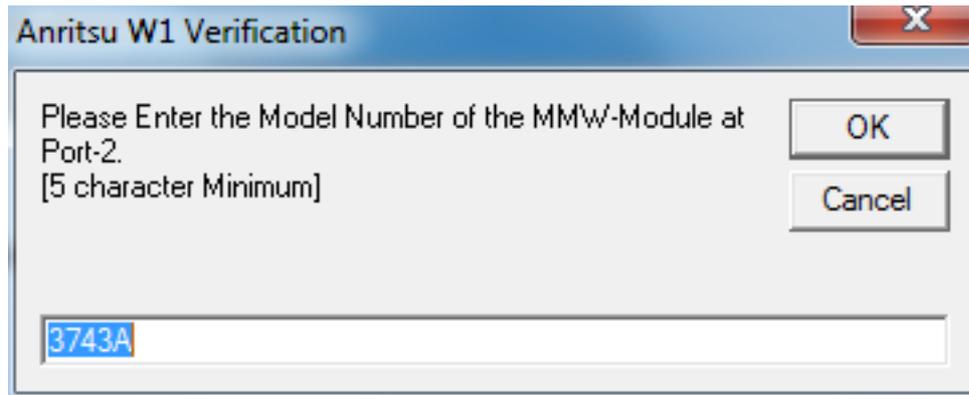


Figure 4-13. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Model Number

14. Enter the Port 2 BB/mm-Wave Module serial number and click OK.

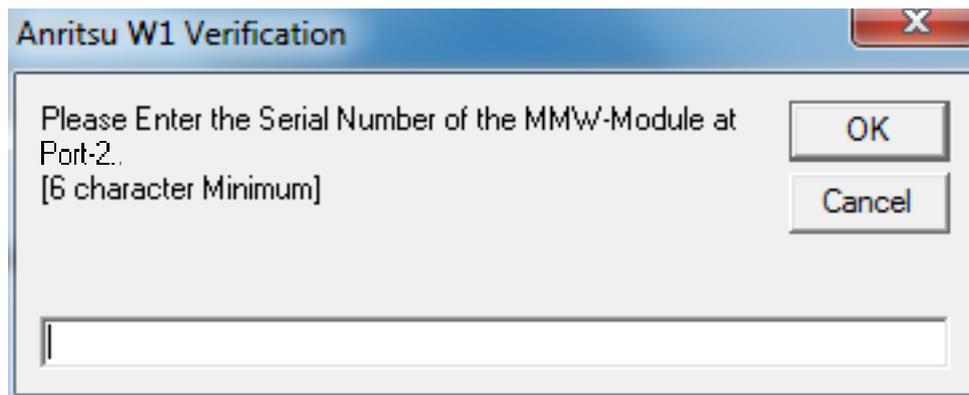


Figure 4-14. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Serial Number

Enter Port 3 BB/mm-Wave Module Information

15. Enter the Port 3 BB/mm-Wave Module model number and click OK.

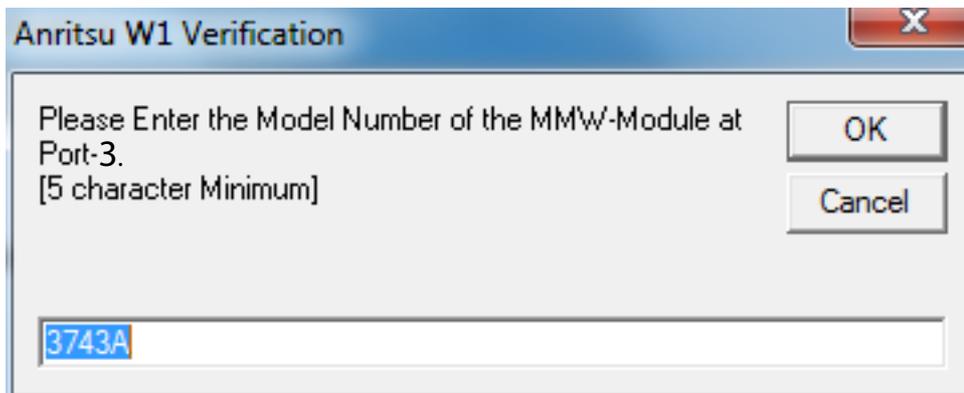


Figure 4-15. Anritsu W1 Verification Dialog – Port 3 BB/mm-Wave Module – Model Number

16. Enter the Port 3 BB/mm-Wave Module serial number and click OK.

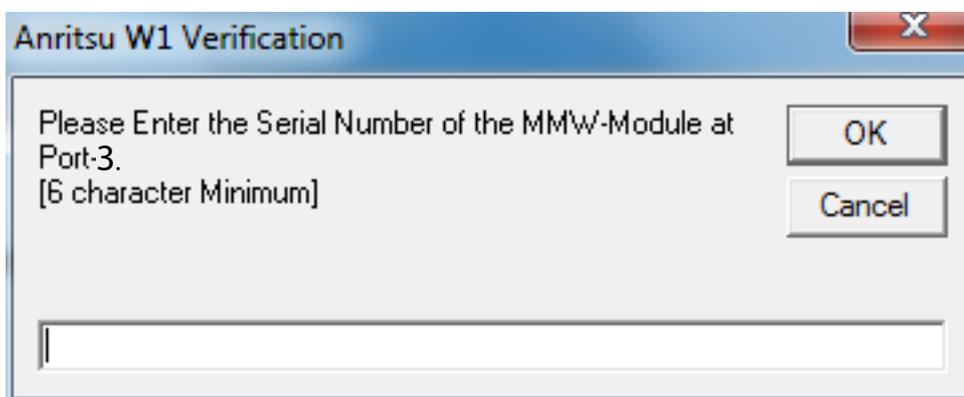


Figure 4-16. Anritsu W1 Verification Dialog – Port 3 BB/mm-Wave Module – Serial Number

Enter Port 4 BB/mm-Wave Module Information

17. Enter the Port 4 BB/mm-Wave Module model number and click OK.

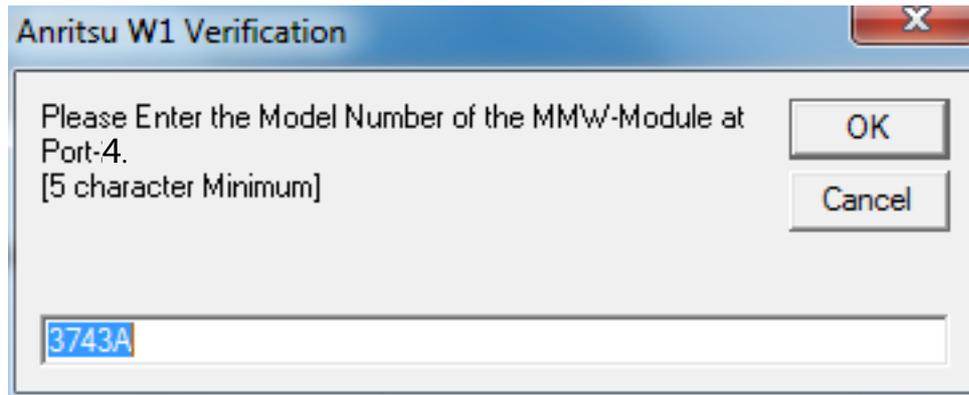


Figure 4-17. Anritsu W1 Verification Dialog – Port 4 BB/mm-Wave Module – Model Number

18. Enter the Port 4 BB/mm-Wave Module serial number and click OK.

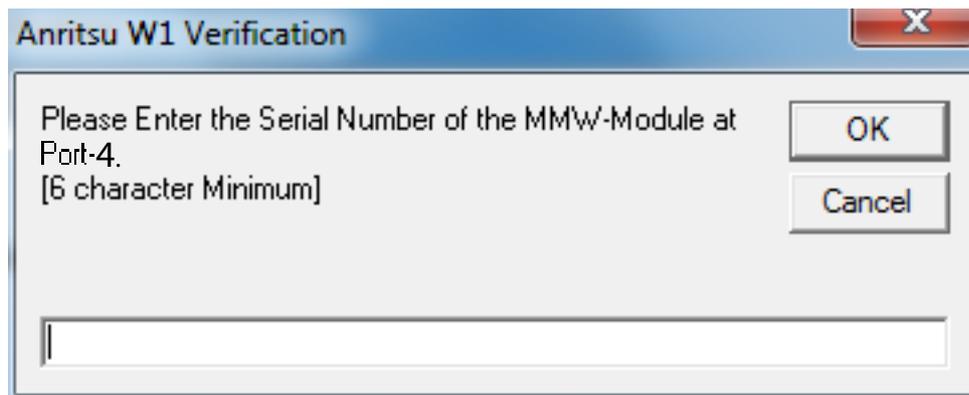


Figure 4-18. Anritsu W1 Verification Dialog – Port 4 BB/mm-Wave Module – Serial Number

Enter Port 1 and Port 2 Test Set Information

19. Enter the Test Set model number and click OK.

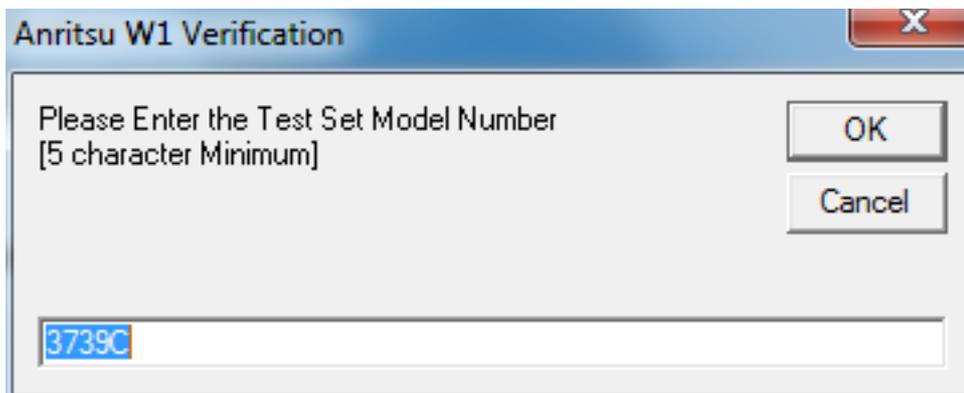


Figure 4-19. Anritsu W1 Verification Dialog – Test Set – Model Number

20. Enter the Test Set serial number found on the rear panel and click OK.

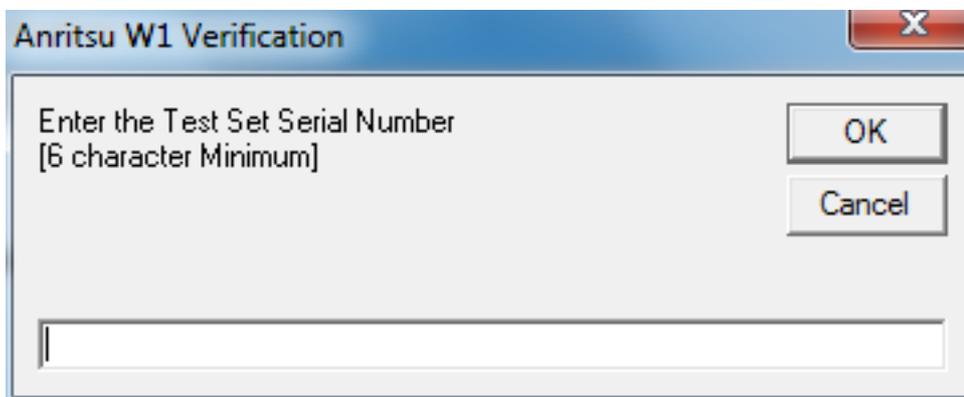


Figure 4-20. Anritsu W1 Verification Dialog – Test Set – Serial Number

21. The program execution continues to the following [Section](#) , “Enter Port 3 and Port 4 Test Set Information” on page 4-13.

Enter Port 3 and Port 4 Test Set Information

22. Enter the Test Set model number and click OK.

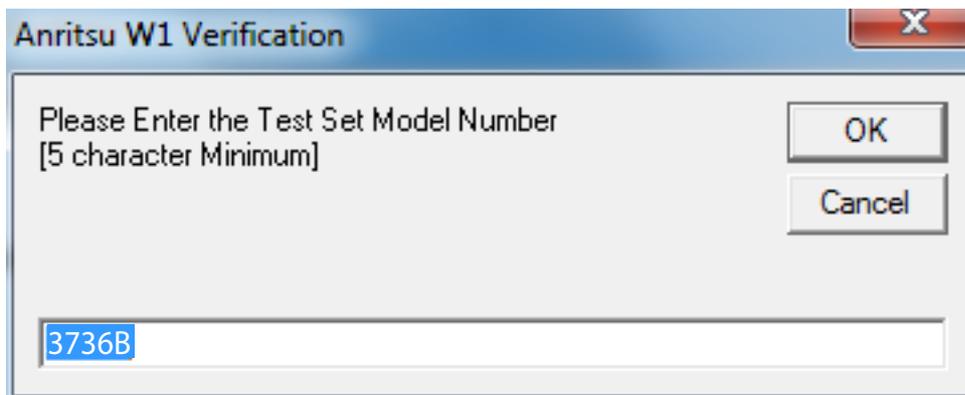


Figure 4-21. Anritsu W1 Verification Dialog – Test Set – Model Number

23. Enter the Test Set serial number found on the rear panel and click OK.

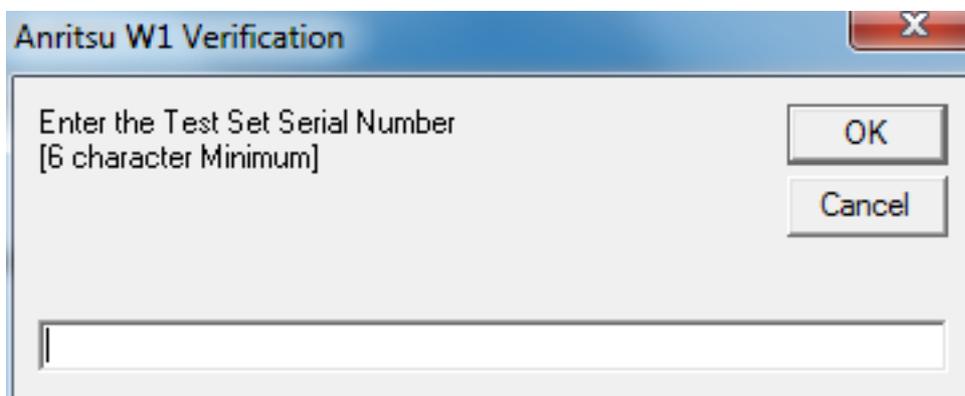


Figure 4-22. Anritsu W1 Verification Dialog – Test Set – Serial Number

The program execution continues to the following [Section 4-6, "Application Interface – Setup Menu Tab"](#) on page 4-14.

4-6 Application Interface – Setup Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections:

- The Setup Menu tab is described in this section.
- The Main Menu tab display is described in [Section 4-9, “Application Interface – Main Menu Tab”](#) on page 4-27.
- The Serial Number Info tab is described in [Section 4-10, “Application Interface – Serial Number Tabs”](#) on page 4-31.

Procedure

The following procedure continues the program setup from the previous section:

1. In the Calibration Kit Type area, select W Coax.
2. In the Serial Number (5 Digits) area, enter the serial number for the 3656B Calibration/Verification Kit. At least five (5) digits are required.
3. In the Load Cal-Kit Coefficients to VNA area, select Yes.

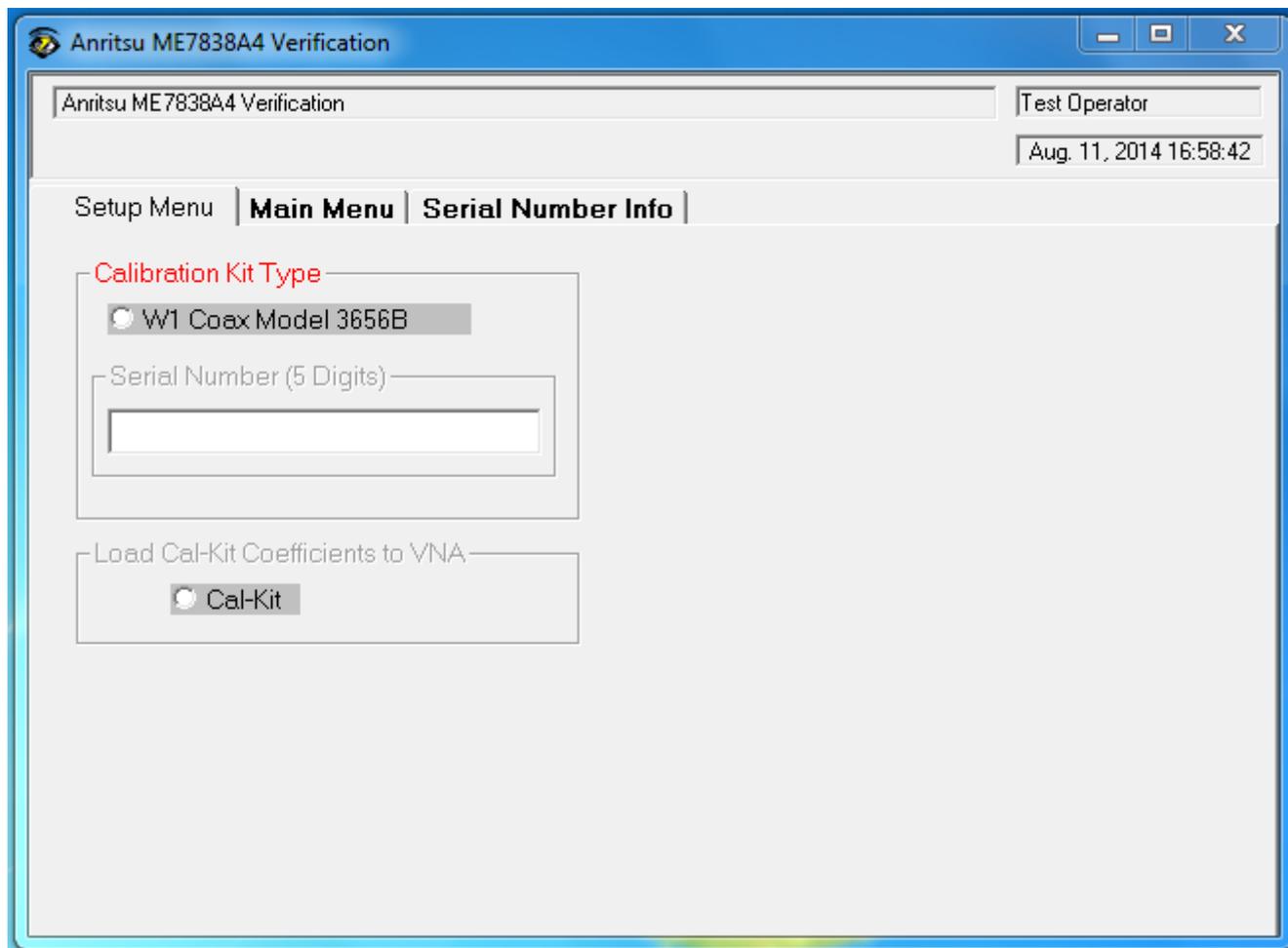


Figure 4-23. ME7838A4 Application Interface – Setup Menu Tab

4. The Install Calibration-Kit Coefficients to the VNA dialog box appears.

5. Follow the dialog box instructions for installing the 3656B calibration coefficients into the VNA, then click OK.

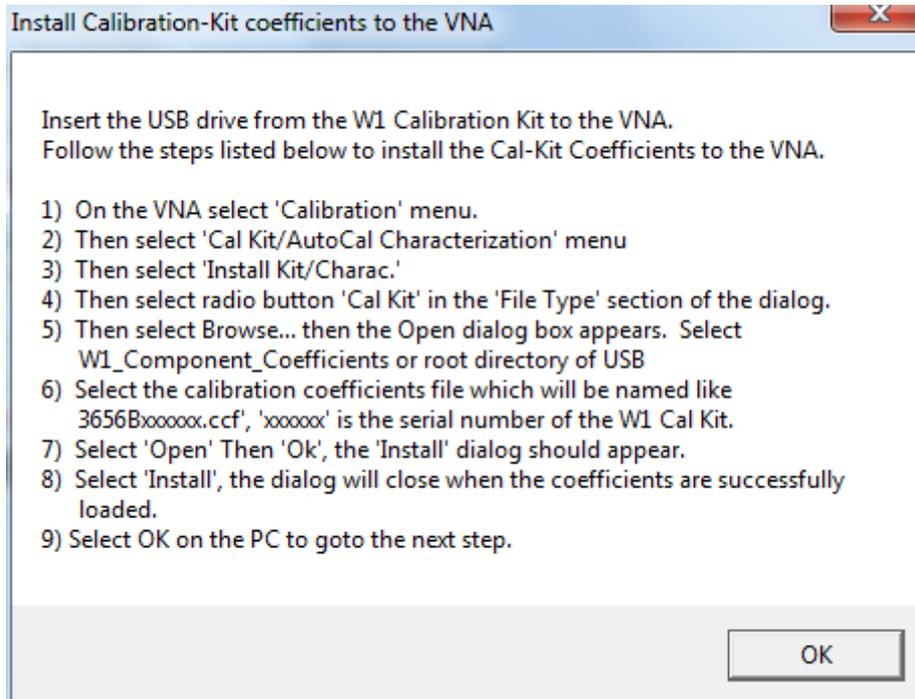


Figure 4-24. Install Calibration Kit Coefficients Dialog

6. The VNA displays an acknowledgment dialog box when the file load is complete, indicating that 10 files were loaded. After the VNA has loaded the 10 Calibration coefficient files, select OK on the PC application. The application will then prompt you to remove the USB drive from the VNA and install the USB drive to the PC.



Figure 4-25. Install USB Drive in PC Dialog

7. The Application Interface dialog box reappears displaying the Setup Menu tab and Frequency Range area. In the Frequency Range area, select either the low range (40 MHz to 65 GHz) or the high range (65 GHz to 110 GHz). For purposes of this document, the low band is done first. The range that is not selected is calibrated during the Restart Procedure described in [Section 4-14 “Restart for Alternate Frequency Band”](#) on page 4-39. After selecting the frequency range, click OK. The Verification Kit Information area appears.

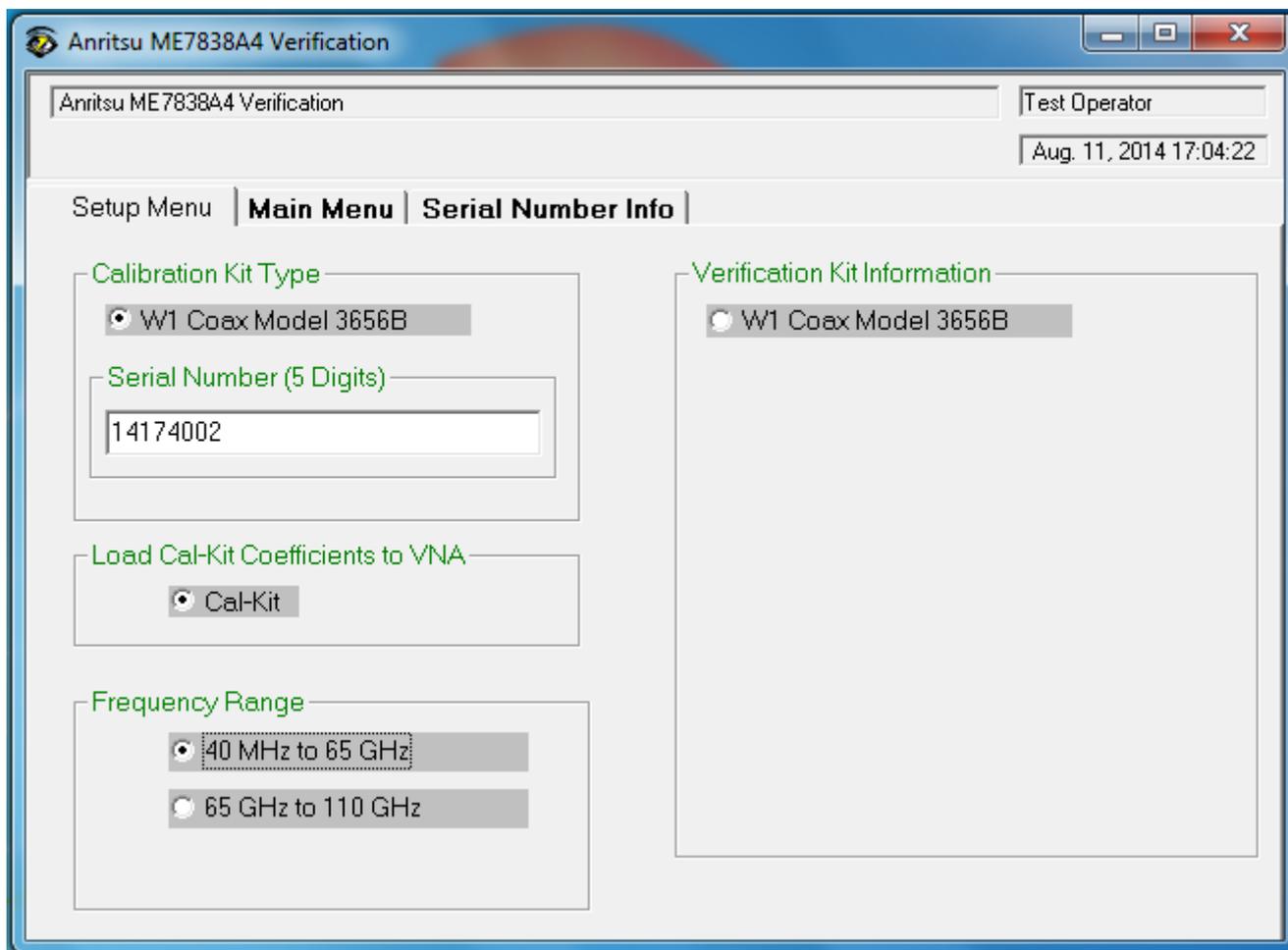


Figure 4-26. ME7838A4 Application Interface – Setup Menu Tab

8. Select the W1 Coax type, and then the Verification Kit Serial Number (usually the same as the Calibration Kit). When the Serial Number is complete, the Locate USB Drive Kit Data on PC area appears.

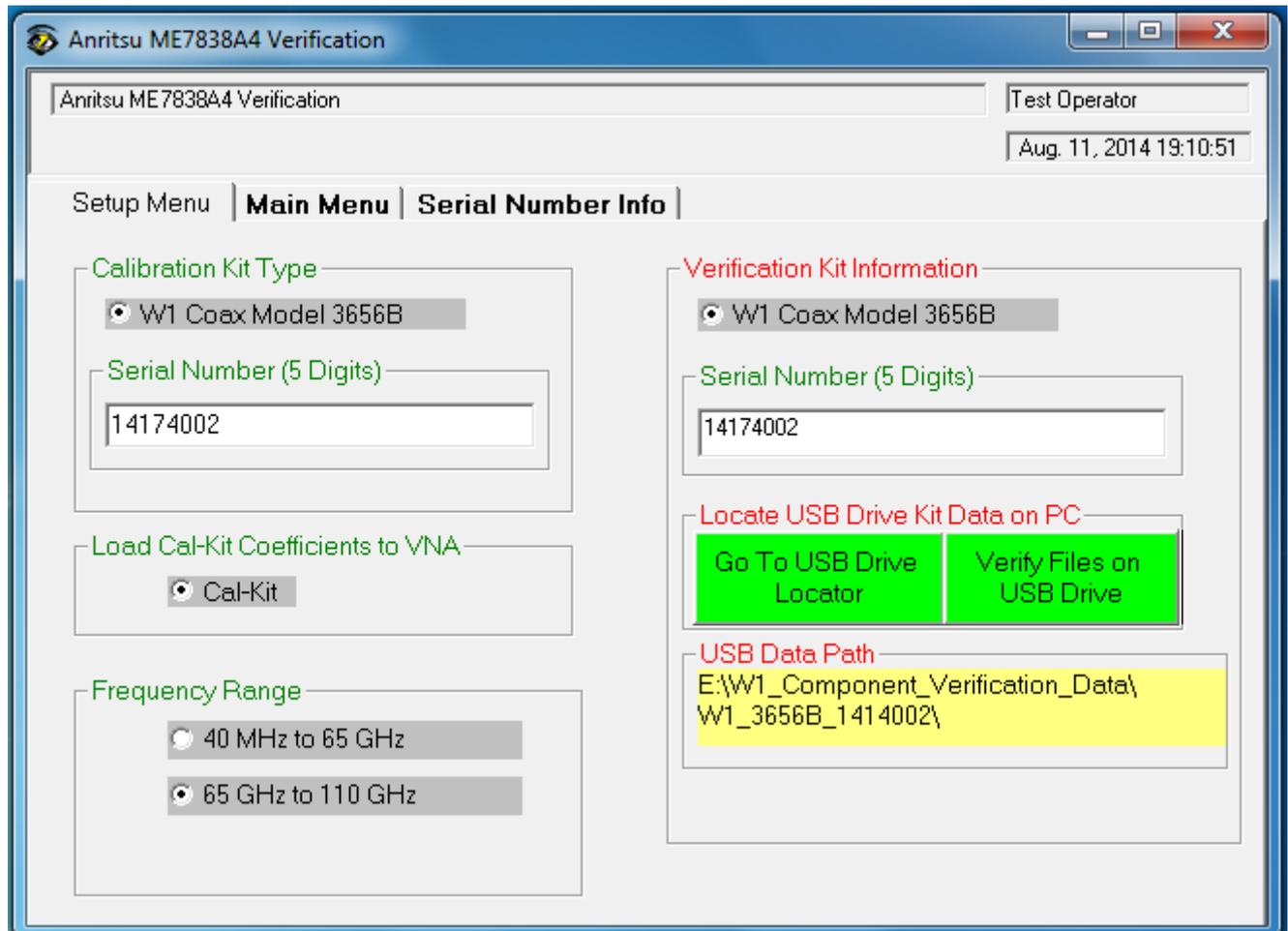


Figure 4-27. ME7838A4 Application Interface – Setup Menu Tab

9. In [Figure 4-27](#) find the Locate USB Drive Kit Data on PC area, click the Go To USB Drive Locator button.

- When the Auto Find Verification Kit Data dialog box first appears in [Figure 4-28](#), the Verification Kit Data Path text field is blank. Click the Auto-Locate USB Drive Verification Kit Data on PC button. The application automatically locates the verification kit data on the USB drive and displays the path in the Verification Kit Data Path text field.

In rare instances, due to PC/USB configurations, the Auto-find function may not be able to locate the verification data on the USB drive. In this case, you may need to use the Manually Locate Verification Data Kit button. This utility allows you to manually select the path where the verification kit data is located. The data path will be on the USB drive shipped with the verification kit. On most PC's, this will be the E, F, or G drive assignments. Navigate to the verification kit data in the file-path location shown in the example below (for this example, the USB drive was at E:\):

```
E:\W1_Verification_Data\W1_3656B_XXXXXX
```

(where xxxxxx is the serial number of the Kit)

Within each data set on the USB, there is a file named EnableKit.dat. Double click that file to identify the file. This builds the path for the verification kit data and returns back to the Find Verification Kit Data on the removable USB drive. Once the data is found, the Verification Kit Data Path information appears in the text field. Click Next > to return to the Application Interface dialog box.

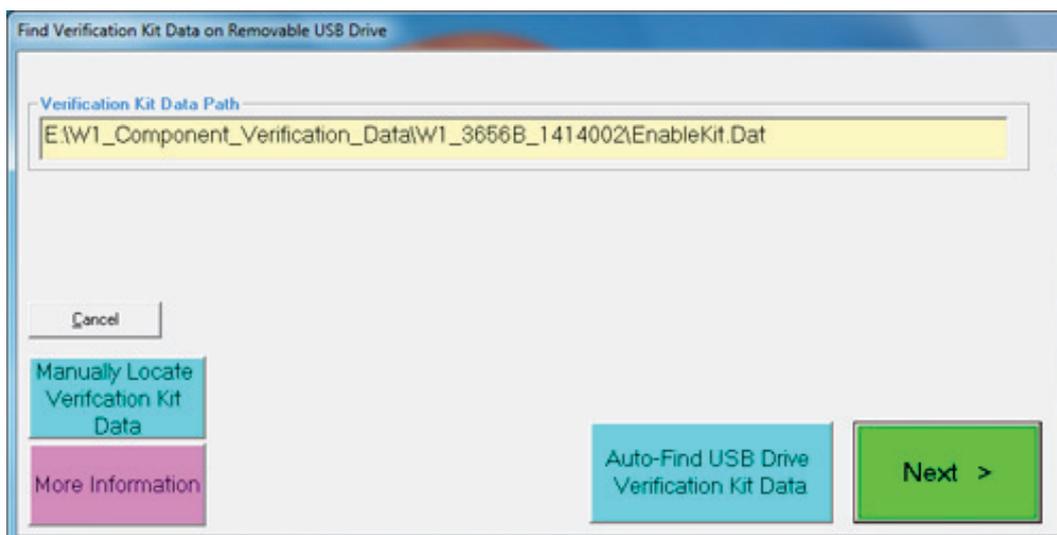


Figure 4-28. USB Drive Locator Dialog

11. Click Verify Files on USB Drive. The application checks the files on the USB drive to verify that all files are present and that each has the proper number of data points.

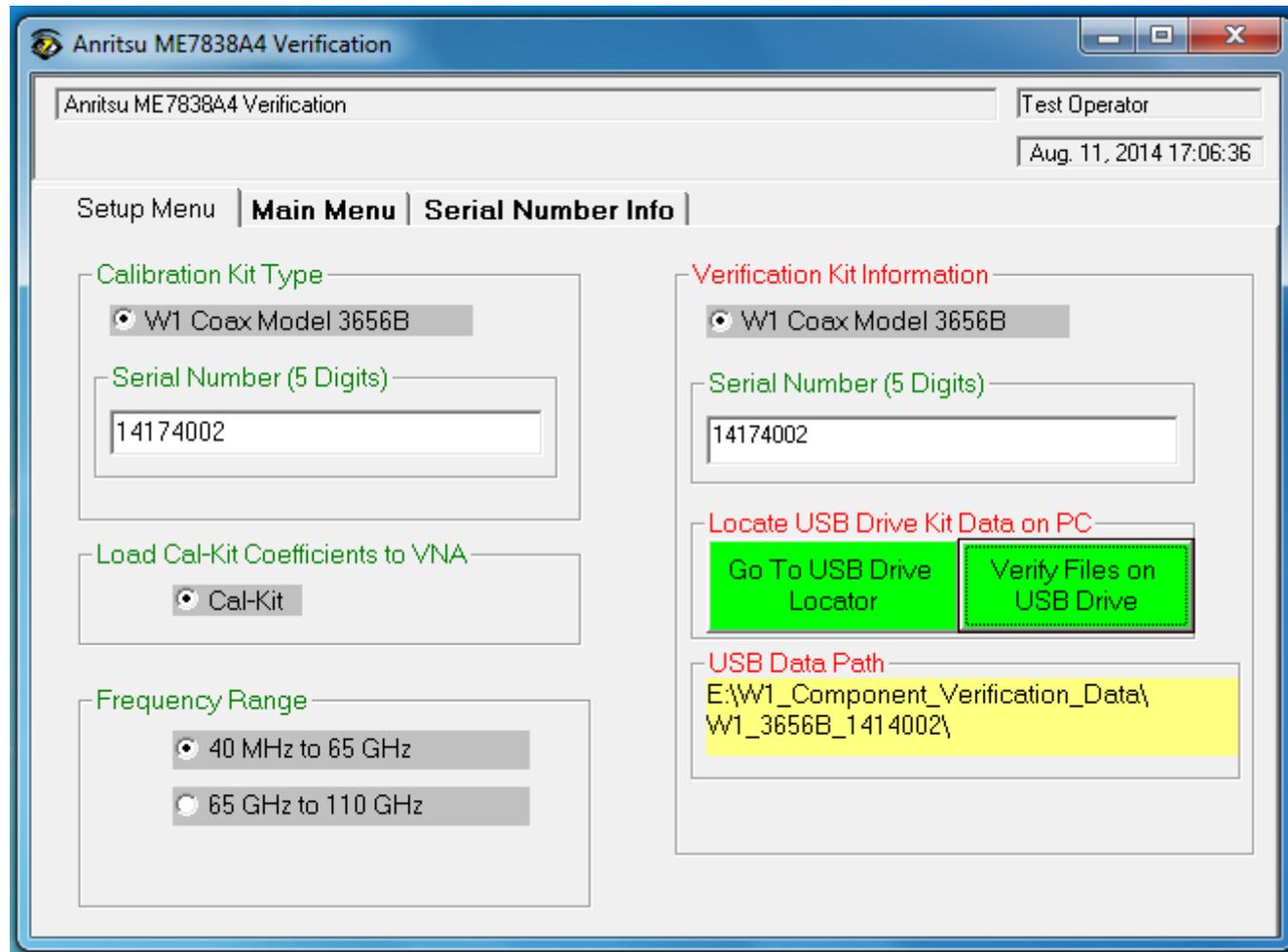


Figure 4-29. ME7838A4 Application Interface – Setup Menu Tab

12. When all information is entered and you are ready to start, click the Setup Calibration of VNA button.

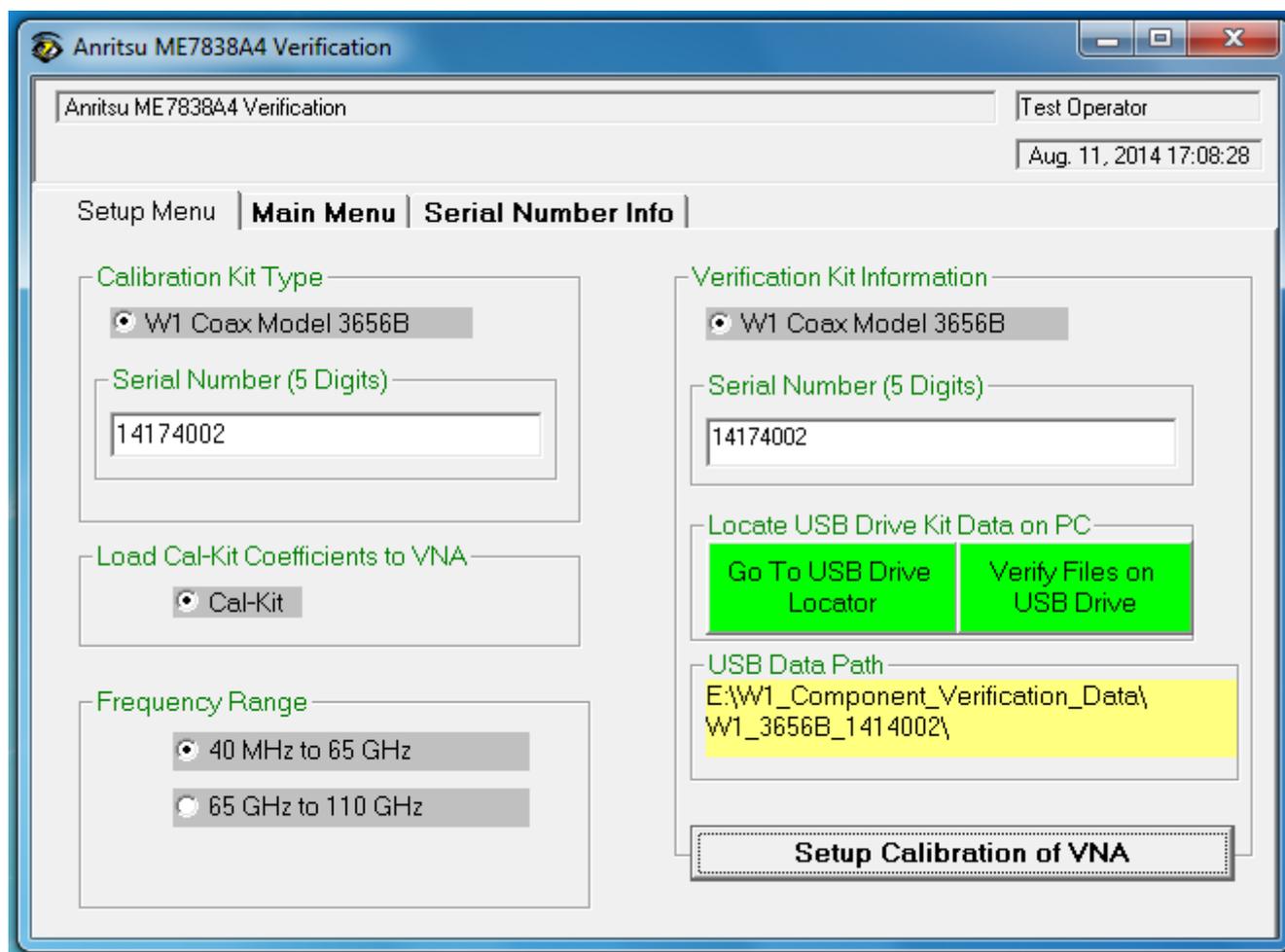


Figure 4-30. ME7838A4 Application Interface – Setup Menu Tab

13. The ME7838A4 system is a 4-port system which requires a low-band calibration and a high-band calibration to be performed on only two ports at a time. The program execution for port 1 and port 2 continues in either [Section 4-7, “Low-Band Calibration Port 1 – Port 2” on page 4-21](#) or [Section 4-8, “High-Band Calibration Port 1 – Port 2” on page 4-24](#). The program execution for port 3 and port 4 continues in either [Section 4-15, “Low-Band Calibration Port 3 – Port 4” on page 4-41](#) or [Section 4-16, “High-Band Calibration Port 3 – Port 4” on page 4-44](#).

4-7 Low-Band Calibration Port 1 – Port 2

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 4-8 “High-Band Calibration Port 1 – Port 2” on page 4-24](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

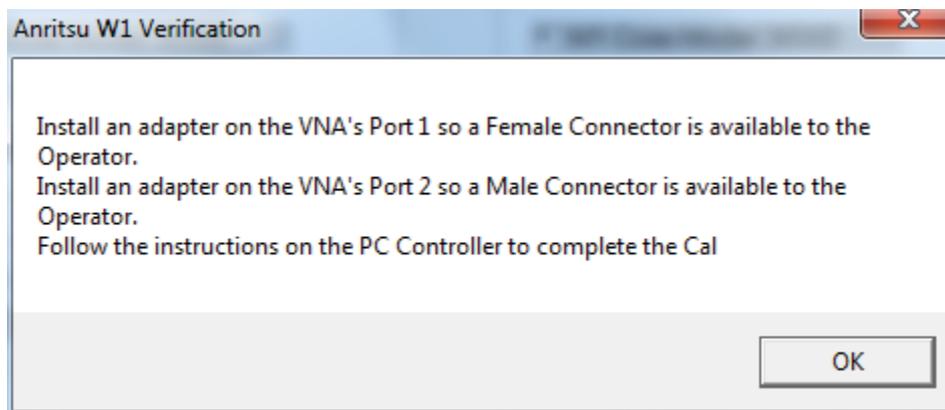


Figure 4-31. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.

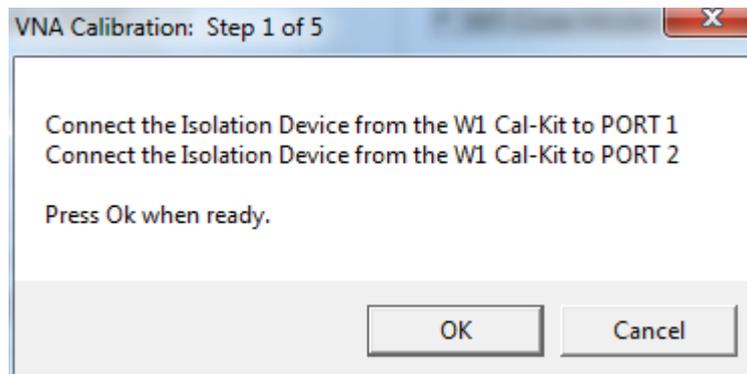


Figure 4-32. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 1.
 - b. Connect the Female Broadband Load Device to VNA Port 2.
 - c. When ready to proceed, click OK.

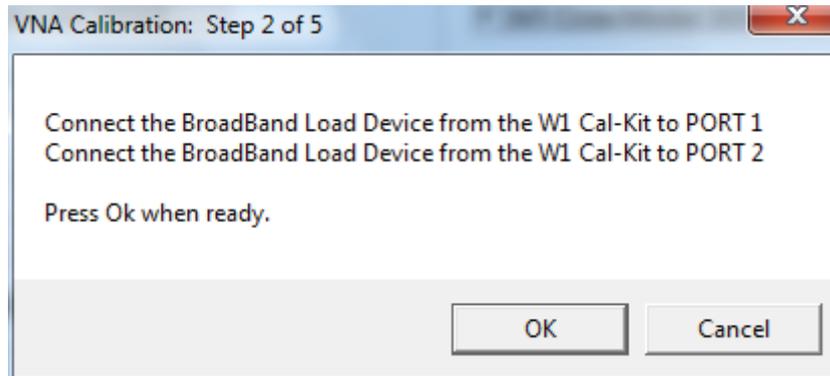


Figure 4-33. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 1.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 2.
 - c. When ready to proceed, click OK.

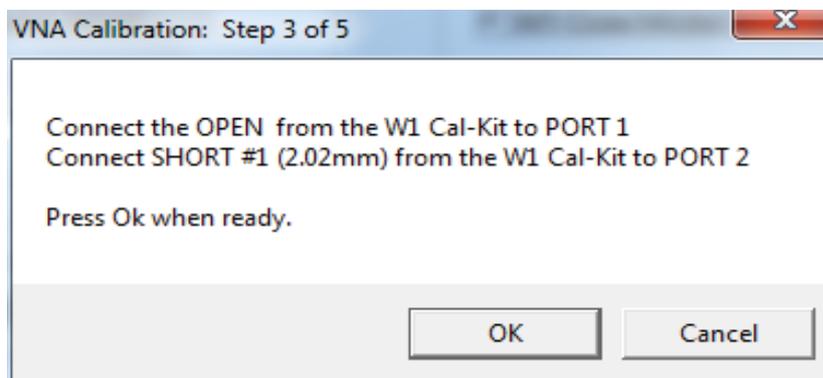


Figure 4-34. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 1.
 - b. Connect the Female Open to VNA Port 2.

- c. When ready to proceed, click OK.

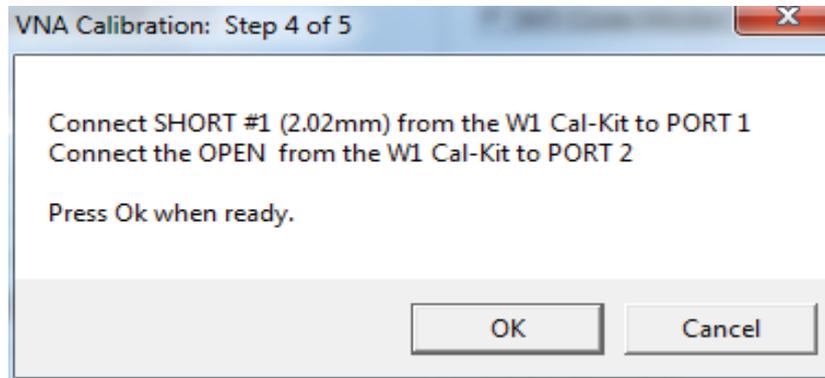


Figure 4-35. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 1 and Port 2, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.

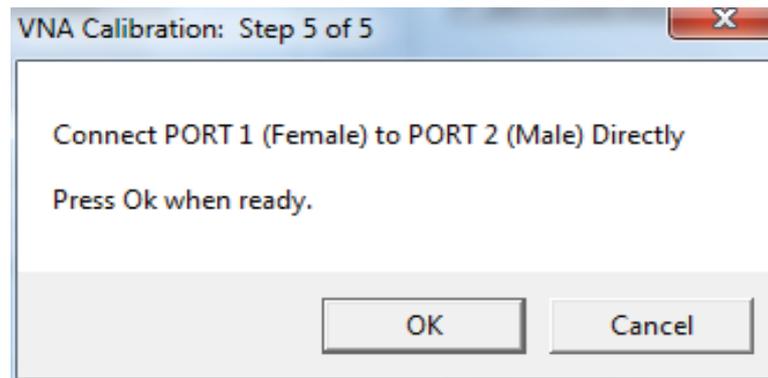


Figure 4-36. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 4-9 “Application Interface – Main Menu Tab”](#) on page 4-27.

4-8 High-Band Calibration Port 1 – Port 2

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 4-7 “Low-Band Calibration Port 1 – Port 2” on page 4-21](#), the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

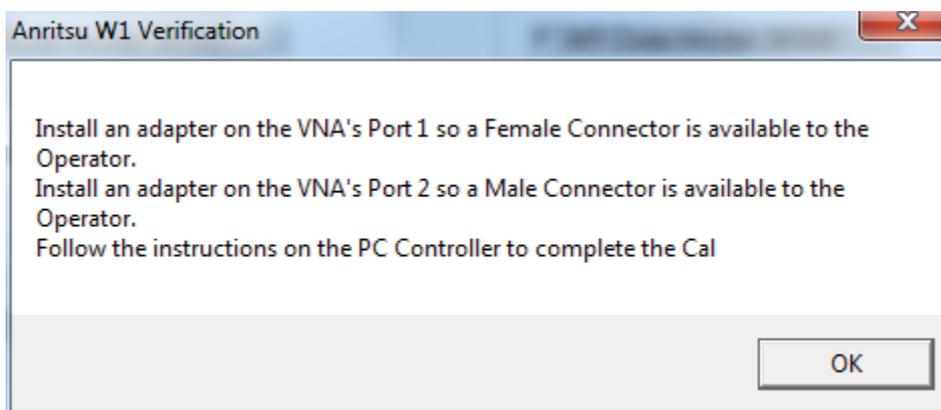


Figure 4-37. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.

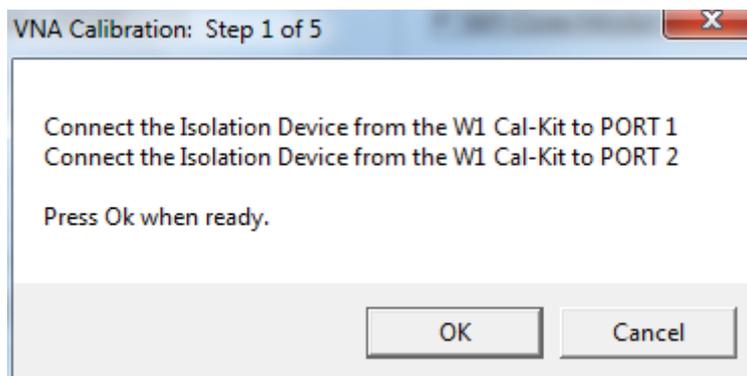


Figure 4-38. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 1.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 2.
 - c. When ready to proceed, click OK.

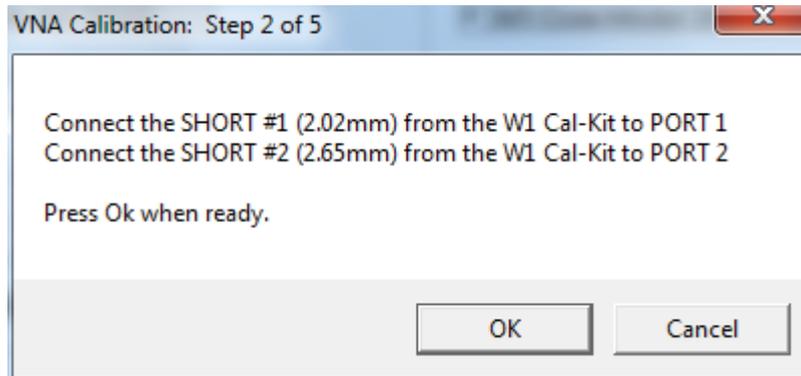


Figure 4-39. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 1.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 2.
 - c. When ready to proceed, click OK.

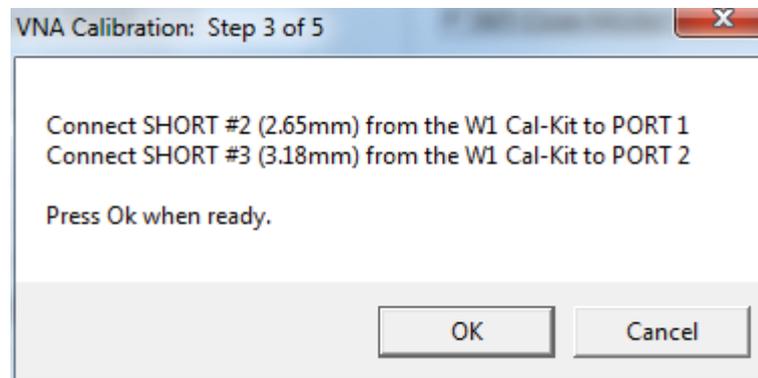


Figure 4-40. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 1.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 2.
 - c. When ready to proceed, click OK.

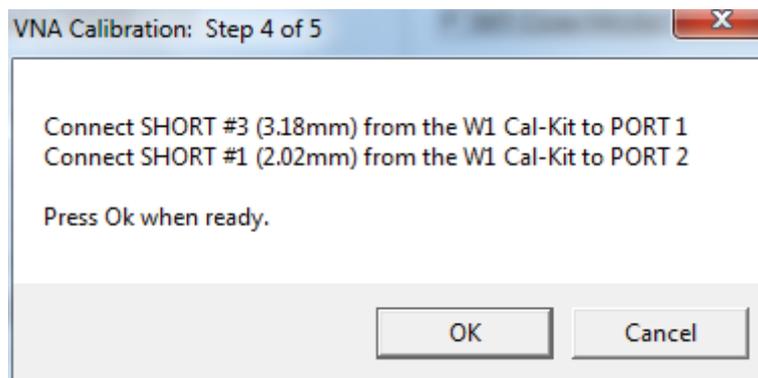


Figure 4-41. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 1 and Port 2.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.

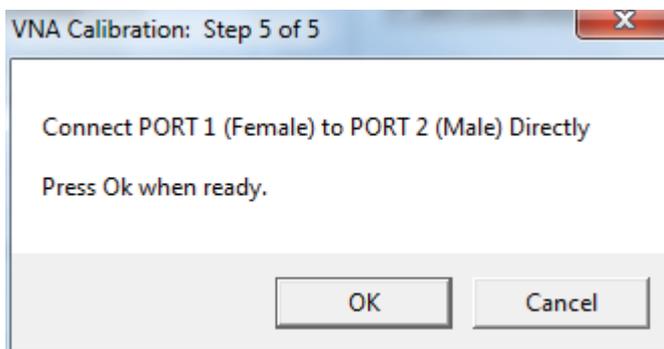


Figure 4-42. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 4-9 “Application Interface – Main Menu Tab”](#) on page 4-27.

4-9 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections below.

- The Setup Menu tab is described in [Section 4-6, “Application Interface – Setup Menu Tab”](#) on page 4-14.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 4-43](#)
- The Serial Number tab is described in [Section 4-10, “Application Interface – Serial Number Tabs”](#) on page 4-31.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

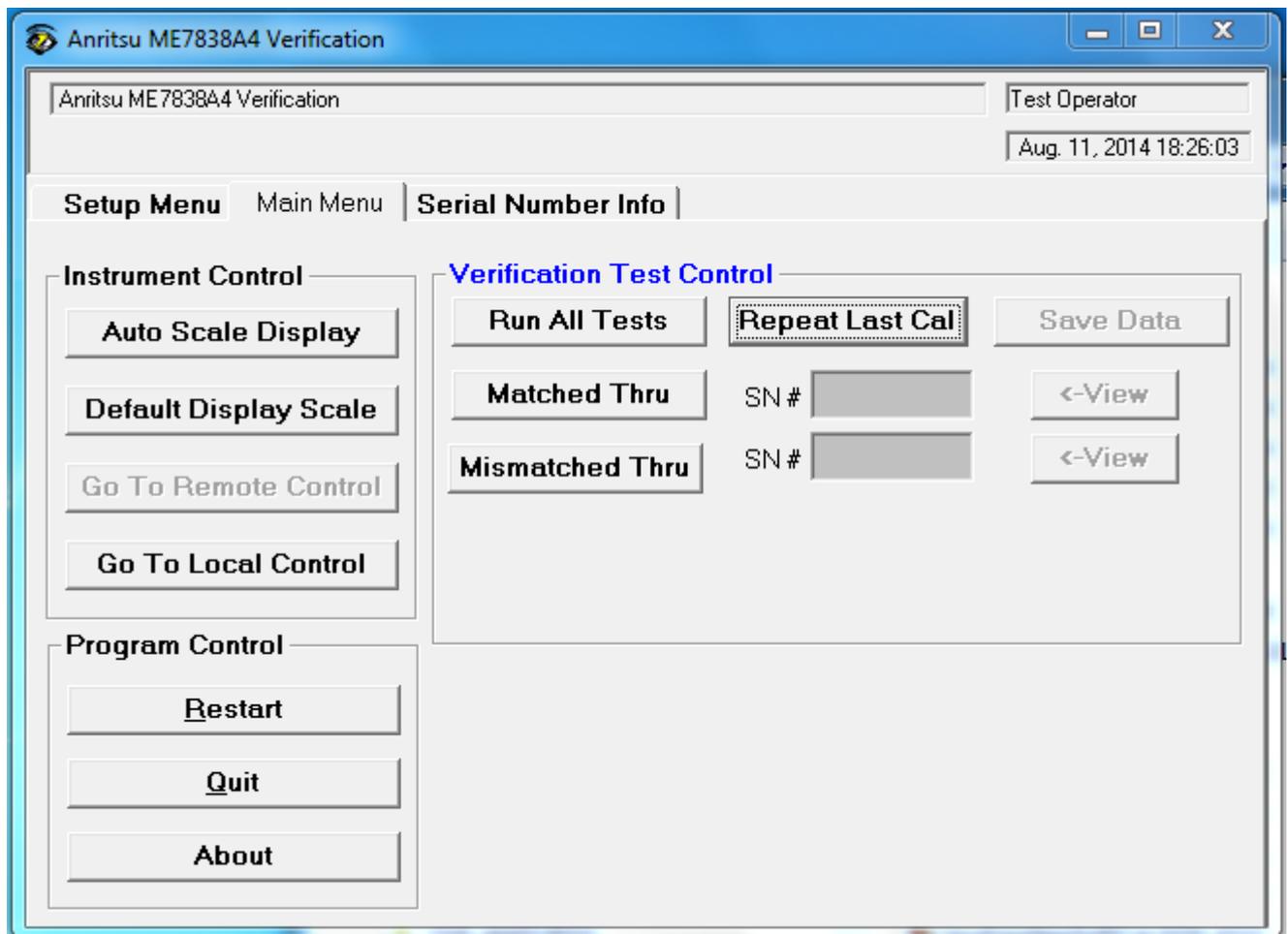


Figure 4-43. ME7838A4 Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S21 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S12 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S11 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S22 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 4-44](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

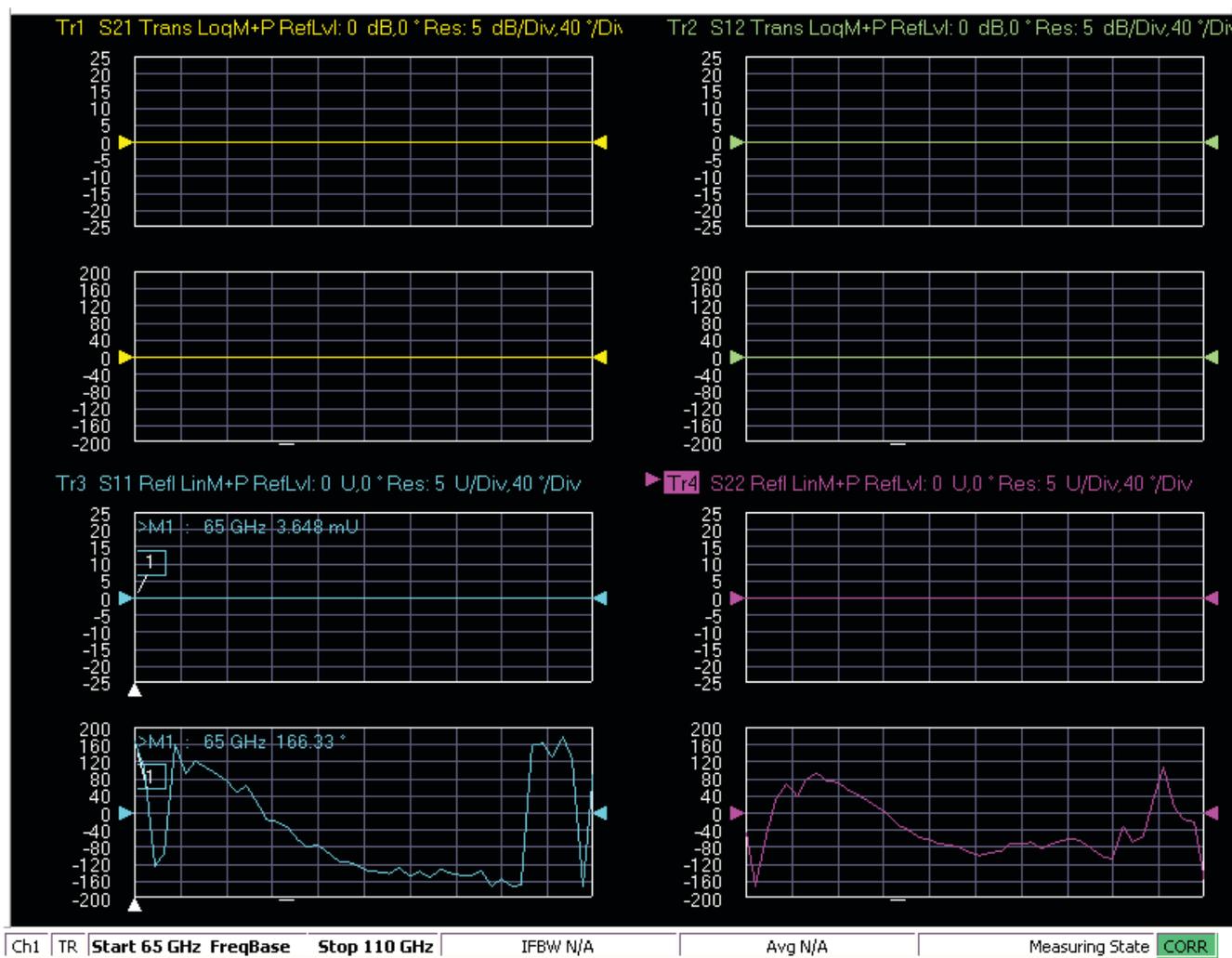


Figure 4-44. MS4640B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the **Go to Local Control** button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

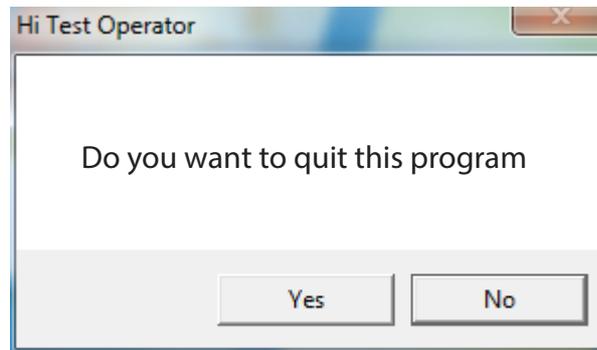
Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution	Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.
----------------	--

Restart Button

The **Restart** button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting **Yes** causes the program to return to the program initialization stage.



Usually, this button is used to test for second frequency band and program execution continues in [Section 4-14 “Restart for Alternate Frequency Band”](#) on page 4-39 and the Choose The Restart Method dialog box appears.

Quit Button

Selecting **Quit** brings up a confirmation dialog box. Selecting **Yes** exits the program; selecting **No** returns you to the previous screen.

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 4-11 “Matched Thru Tests”](#) on page 4-32 and then continues with [Section 4-12 “Mismatched Thru Tests”](#) on page 4-34. When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 4-43](#) on page 4-27.

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 4-43 on page 4-27](#).

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 4-13 “Saving Verification Data” on page 4-38](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at C:\mmcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 4-11 “Matched Thru Tests” on page 4-32](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 4-9 “Application Interface – Main Menu Tab” on page 4-27](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 4-12 “Mismatched Thru Tests” on page 4-34](#). When the tests are completed, the program returns to the Main Menu tab shown in [Table 4-43 on page 4-27](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

4-10 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

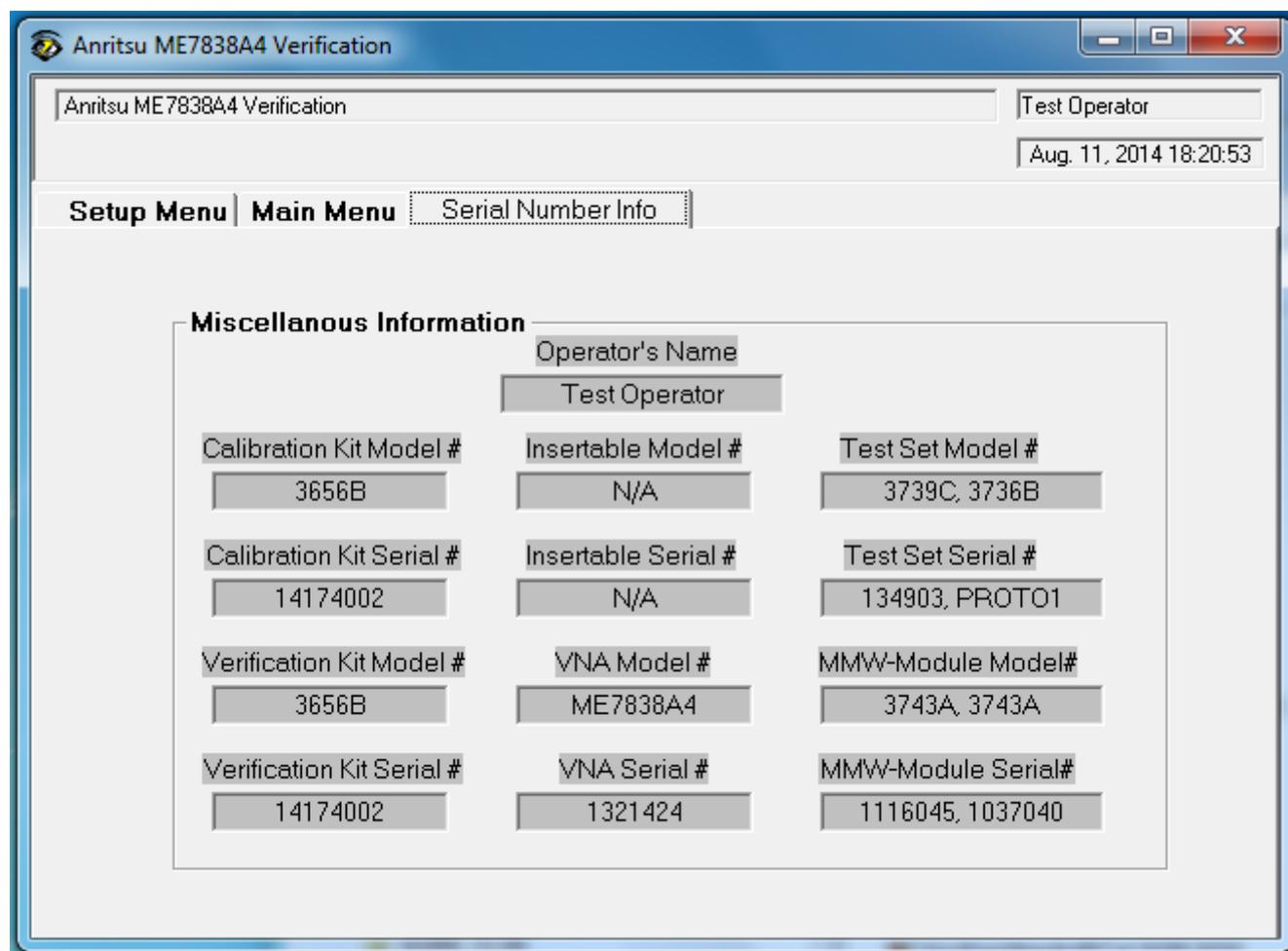


Figure 4-45. ME7838A4 Application Interface – Serial Number Tab

4-11 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 4-12 “Mismatched Thru Tests” on page 4-34](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 4-9 “Application Interface – Main Menu Tab” on page 4-27](#).

Note The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

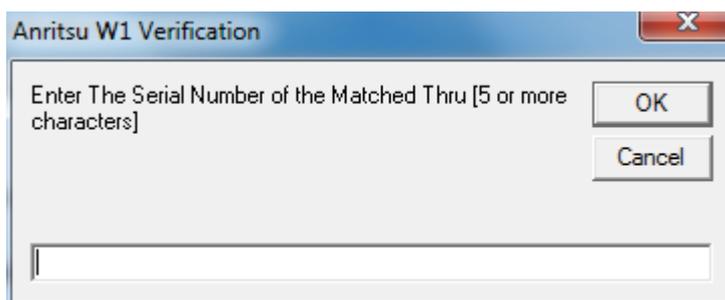


Figure 4-46. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

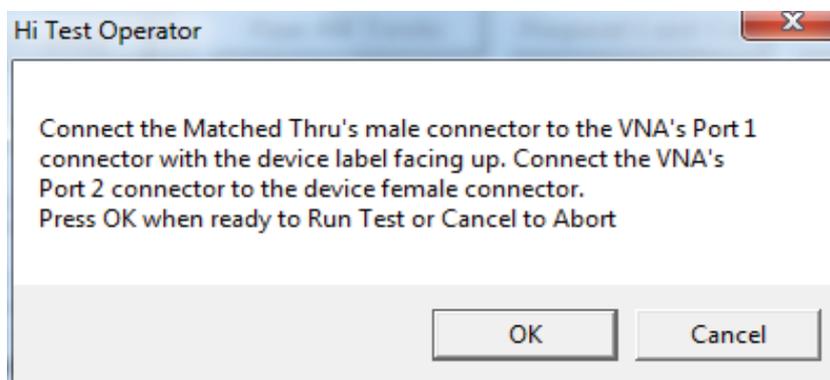


Figure 4-47. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 1 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 2.
7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

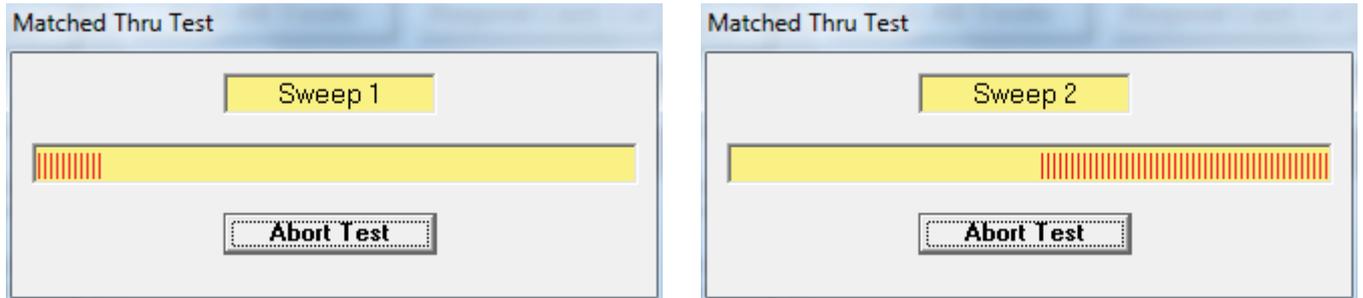


Figure 4-48. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

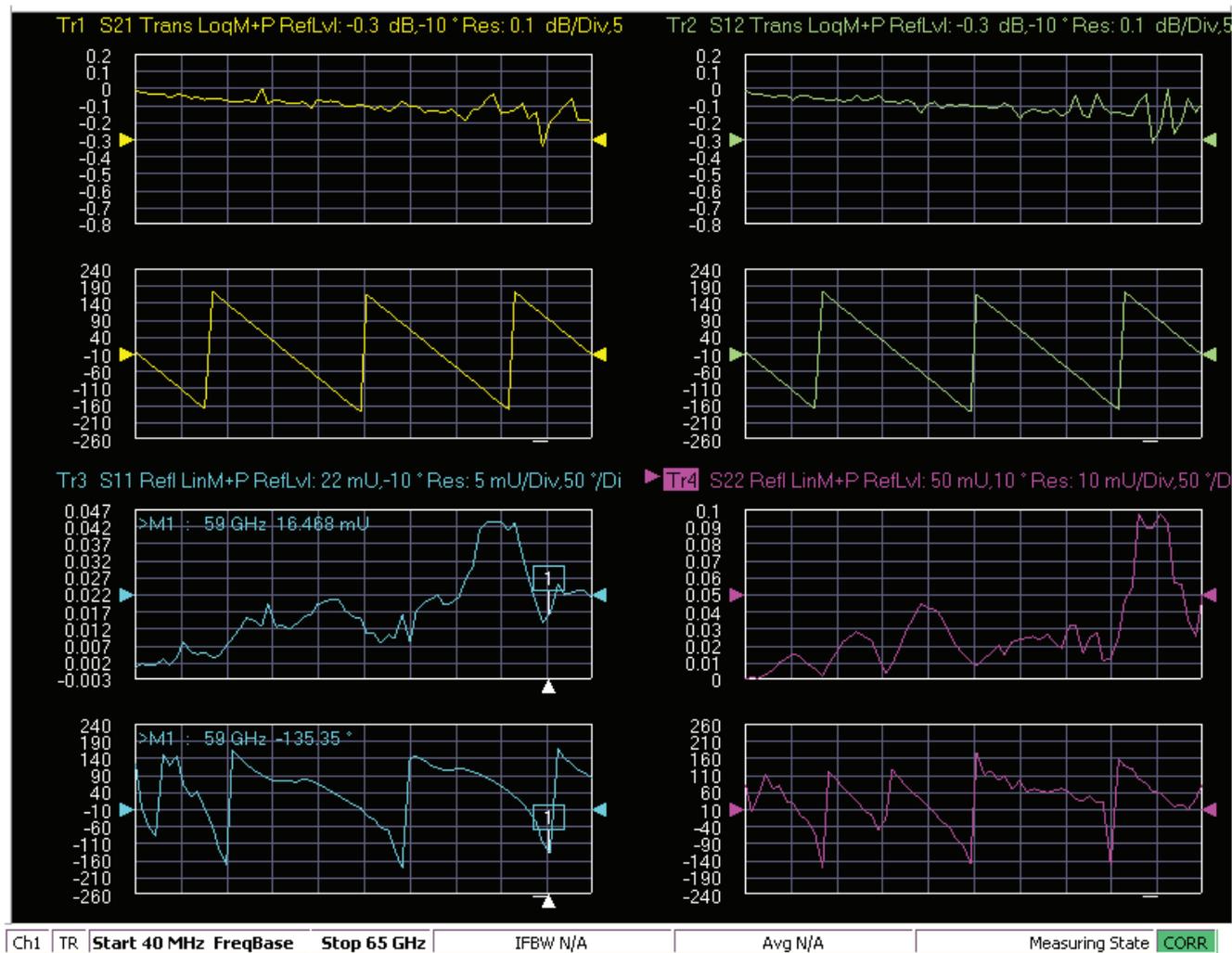


Figure 4-49. MS4640B Series VNA, Typical Matched Thru Data in Low Band

Upper-left quadrant= S21 – Forward Transmission
 Upper-right quadrant= S12 – Reverse Transmission
 Lower-left quadrant= S11 – Forward Reflection
 Lower-right quadrant= S22 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “[Application Interface – Main Menu Tab](#)” on page 4-27. The dialog box is shown in [Figure 4-43](#), “[ME7838A4 Application Interface – Main Menu Tab](#)” on page 4-27.
10. If the Run All Tests button was selected, the program execution continues with the following [Section 4-12](#), “[Mismatched Thru Tests](#)”.

4-12 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in [Section 4-11](#) “[Matched Thru Tests](#)” on page 4-32) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 4-9 “Application Interface – Main Menu Tab” on page 4-27](#).

Note The verification devices must be connected to the **W1 Connector Coupler Ports** and not to the **VNA Ports**. Use the torque wrench supplied with the verification kit when tightening the device connections.

The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in [Section 4-9 “Application Interface – Main Menu Tab” on page 4-27](#).

The dialog box is shown in [Figure 4-43, “ME7838A4 Application Interface – Main Menu Tab” on page 4-27](#).

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in [Section 4-11 “Matched Thru Tests” on page 4-32](#)) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.

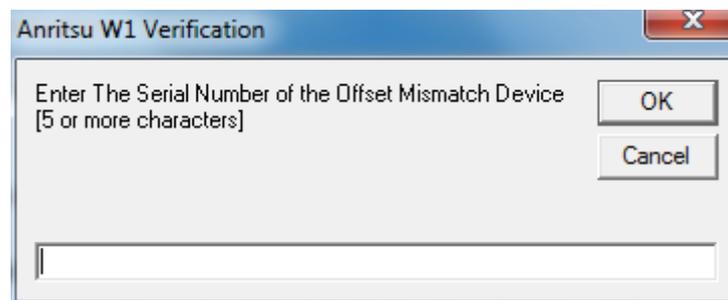


Figure 4-50. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

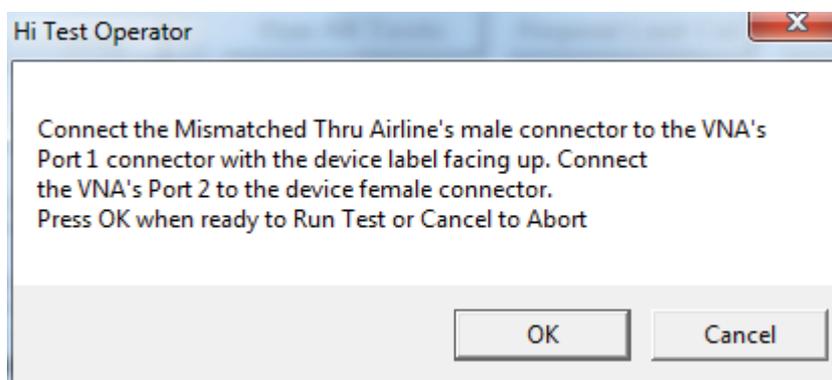


Figure 4-51. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 1 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 2.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

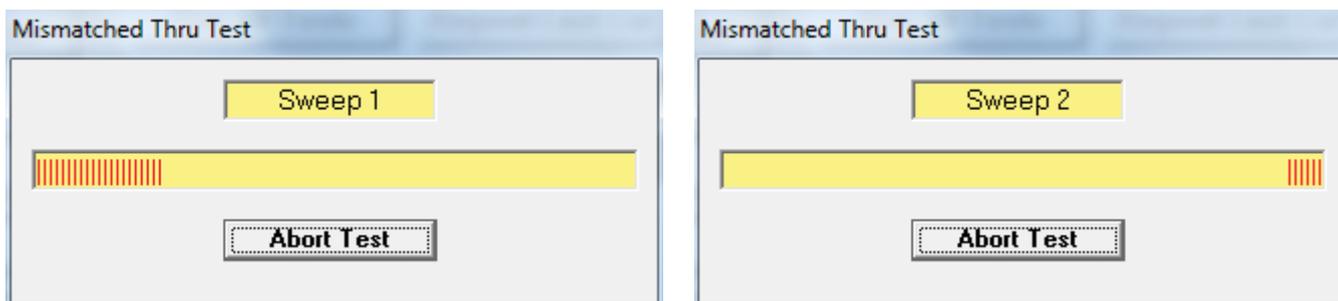


Figure 4-52. Status Dialogs

- When the test completes, the program returns to the main menu described [Section 4-9 “Application Interface – Main Menu Tab”](#) on page 4-27, and the display should look similar to [Figure 4-53](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

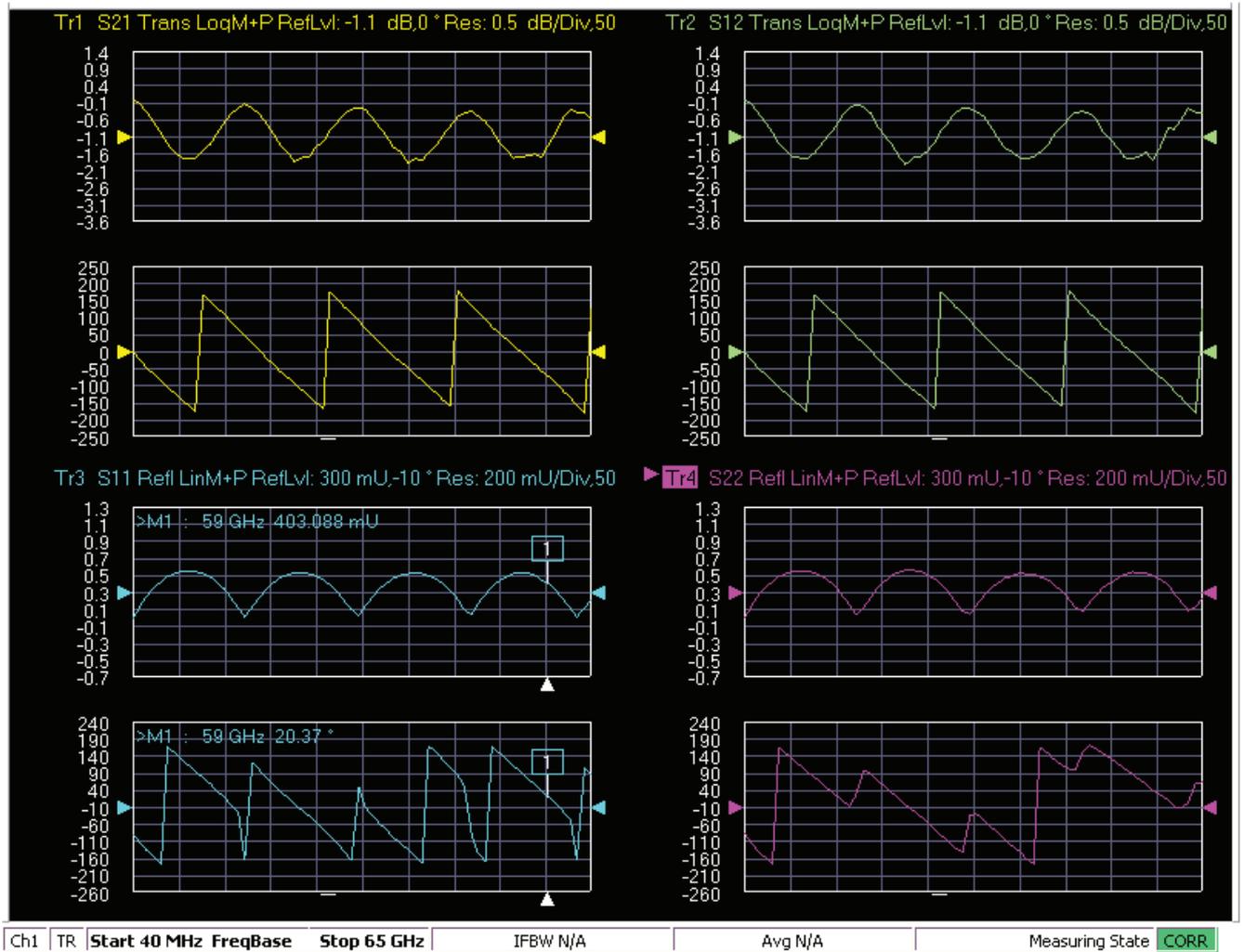


Figure 4-53. MS4640B Series VNA, Typical Mismatched Thru Data in Low Band

4-13 Saving Verification Data

If the **Save Data** button on the **Main Menu** tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 4-9 “Application Interface – Main Menu Tab”](#) on page 4-27.

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru Low.dat
- C:\mmdcsvc\Data\Mismatched Thru Low.dat
- C:\mmdcsvc\Data\Matched Thru High.dat
- C:\mmdcsvc\Data\Mismatched Thru High.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

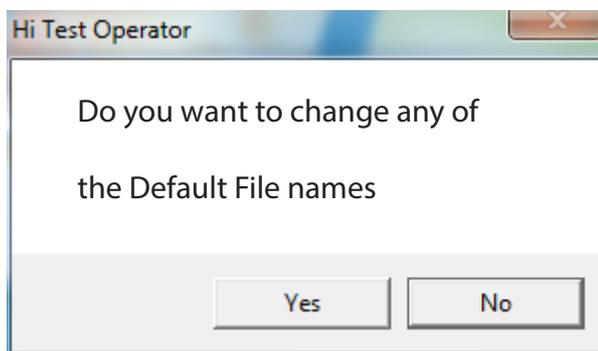


Figure 4-54. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.

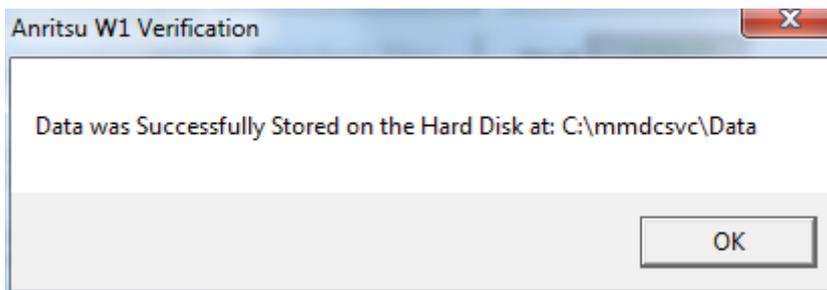


Figure 4-55. Information Dialog

4-14 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 4-9, "Application Interface – Main Menu Tab"](#) on page 4-27.
3. The Choose The Restart Method dialog box appears as shown below in [Figure 4-56](#).

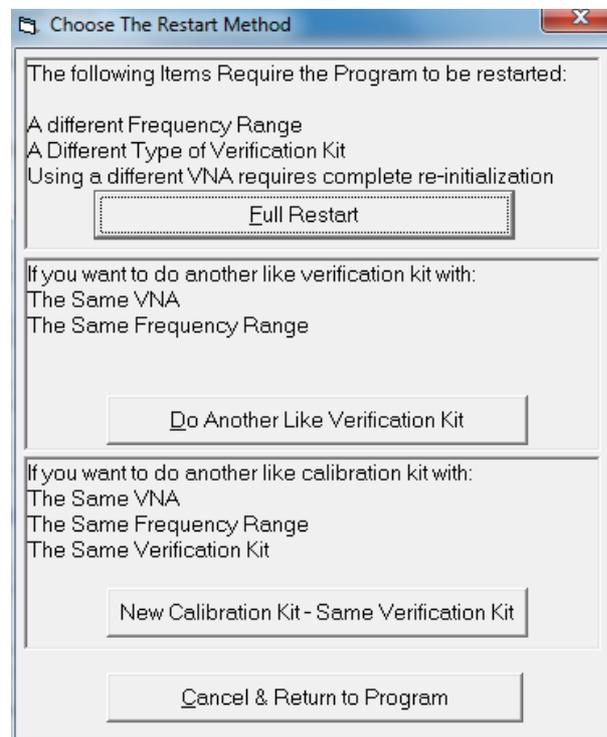


Figure 4-56. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as the procedures described previously starting in [Section 4-5, "Running the Verification Software"](#), [Step 7](#) on page 4-7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK when ready to proceed to the next step.
6. Enter the GPIB Board 0 and then the GPIB Address 6.
7. Enter the Test Set Serial Number.
8. Enter the User Name.
9. Enter the Cal Kit Type selection.
10. Enter the Cal Kit Serial Number selection.
11. Enter the Load Cal Kit Disk.

12. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.
13. Enter the Verification Kit Type selection.
14. Enter the Verification Kit Serial Number selection.
15. Click the Go to USB Drive Locator button.
16. Click the Verify Files on USB Drive button.
17. Complete the calibration and verification of the devices for the second frequency range.
18. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
19. This series of automated tests has verified that the VectorStar ME7838A4 Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
20. The program returns to the main menu described in [Section 4-9, “Application Interface – Main Menu Tab” on page 4-27](#).

4-15 Low-Band Calibration Port 3 – Port 4

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 4-16 “High-Band Calibration Port 3 – Port 4” on page 4-44](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 3 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 4 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

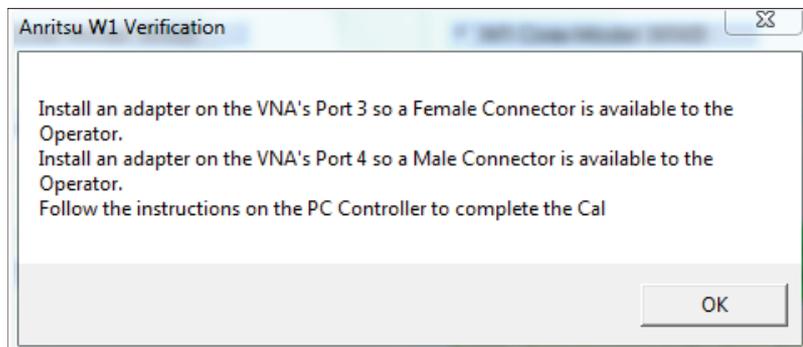


Figure 4-57. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 3.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 4.
 - c. When ready to proceed, click OK.

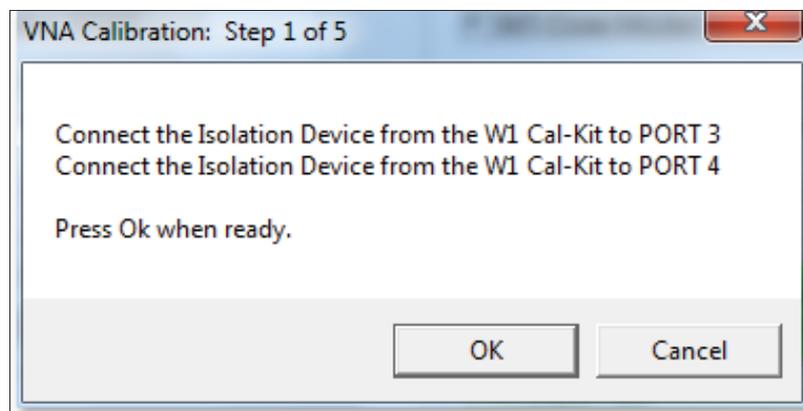


Figure 4-58. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 3.
 - b. Connect the Female Broadband Load Device to VNA Port 4.
 - c. When ready to proceed, click OK.

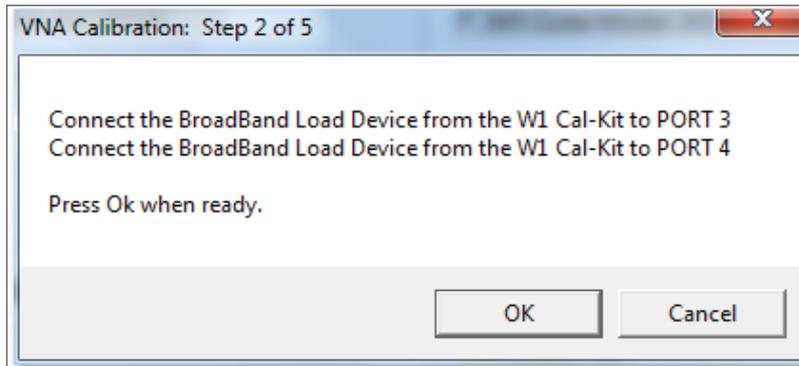


Figure 4-59. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 3.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 4.
 - c. When ready to proceed, click OK.

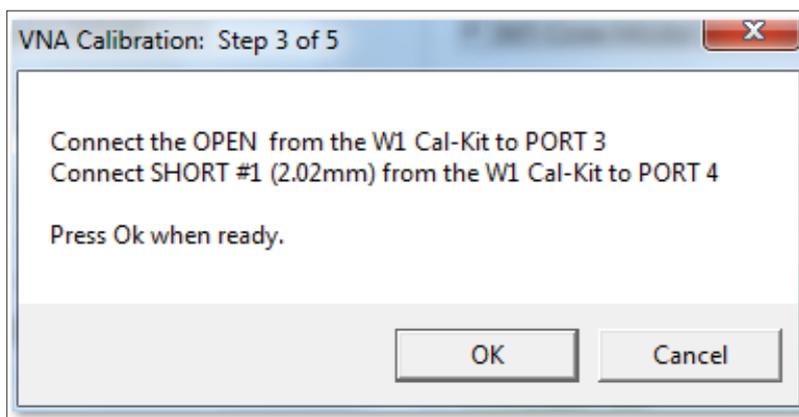


Figure 4-60. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 3.
 - b. Connect the Female Open to VNA Port 4.
 - c. When ready to proceed, click OK.

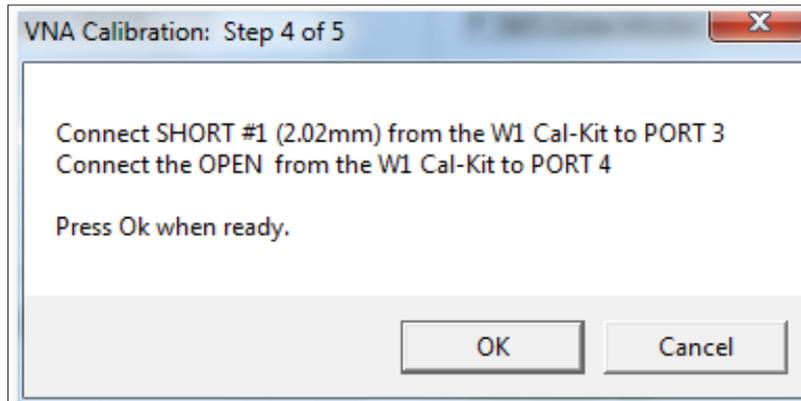


Figure 4-61. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 3 and Port 4, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 3 (Female) to VNA Port 4 (Male) directly.
 - c. When ready to proceed, click OK.

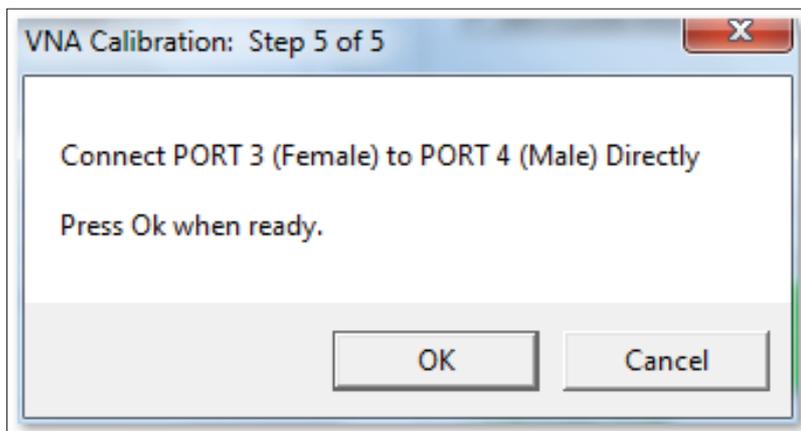


Figure 4-62. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 4-17 “Application Interface – Main Menu Tab”](#) on page 4-47.

4-16 High-Band Calibration Port 3 – Port 4

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 4-15 “Low-Band Calibration Port 3 – Port 4” on page 4-41](#), the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 3 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 4 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

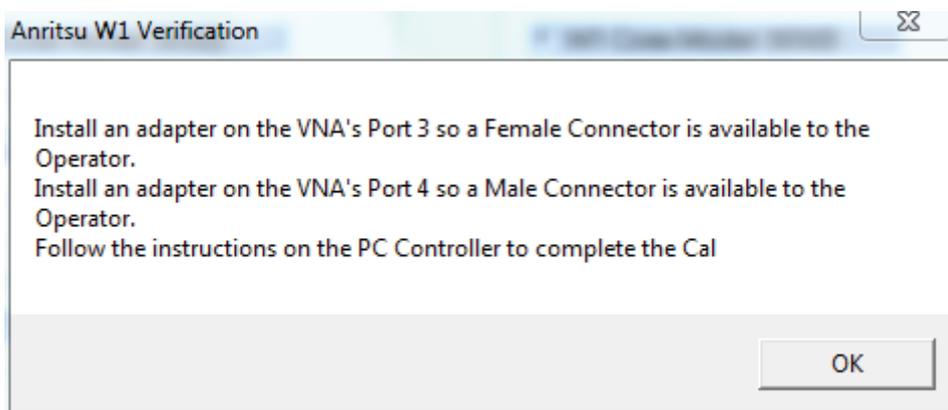


Figure 4-63. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 3.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 4.
 - c. When ready to proceed, click OK.

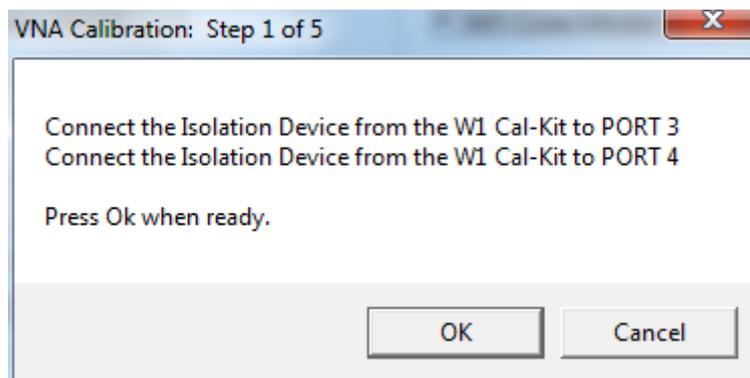


Figure 4-64. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 3.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 4.
 - c. When ready to proceed, click OK.

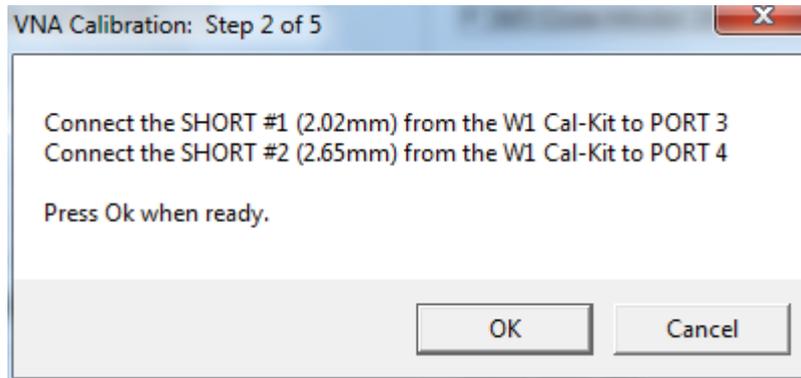


Figure 4-65. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 3.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 4.
 - c. When ready to proceed, click OK.

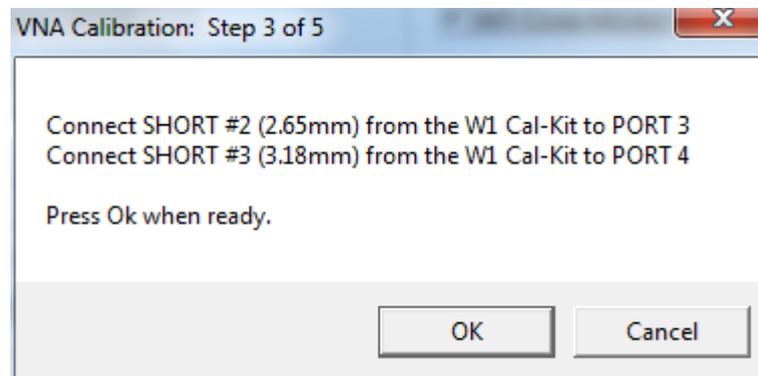


Figure 4-66. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 3.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 4.
 - c. When ready to proceed, click OK.

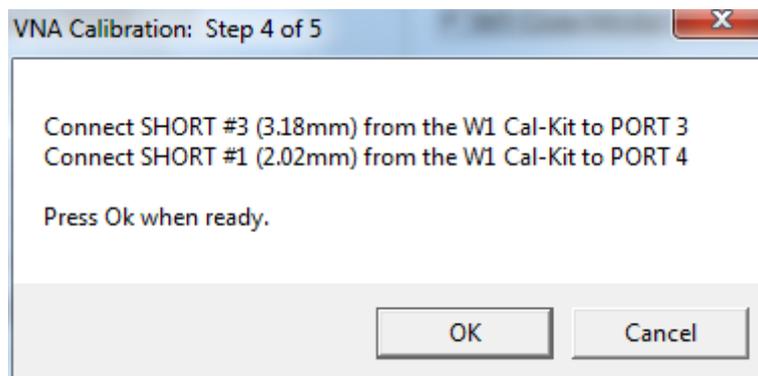


Figure 4-67. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 3 and Port 4.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 3 (Female) to VNA Port 4 (Male) directly.
 - c. When ready to proceed, click OK.

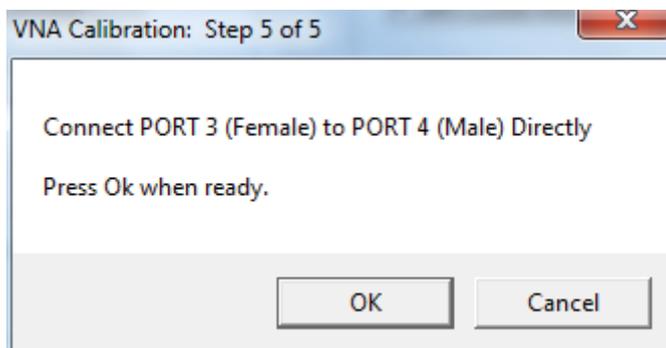


Figure 4-68. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 4-17 “Application Interface – Main Menu Tab”](#) on page 4-47.

4-17 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections.

- The Setup Menu tab is described in [Section 4-6, “Application Interface – Setup Menu Tab”](#) on page 4-14.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 4-43](#)
- The Serial Number tab is described in [Section 4-18, “Application Interface – Serial Number Tabs”](#) on page 4-52.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

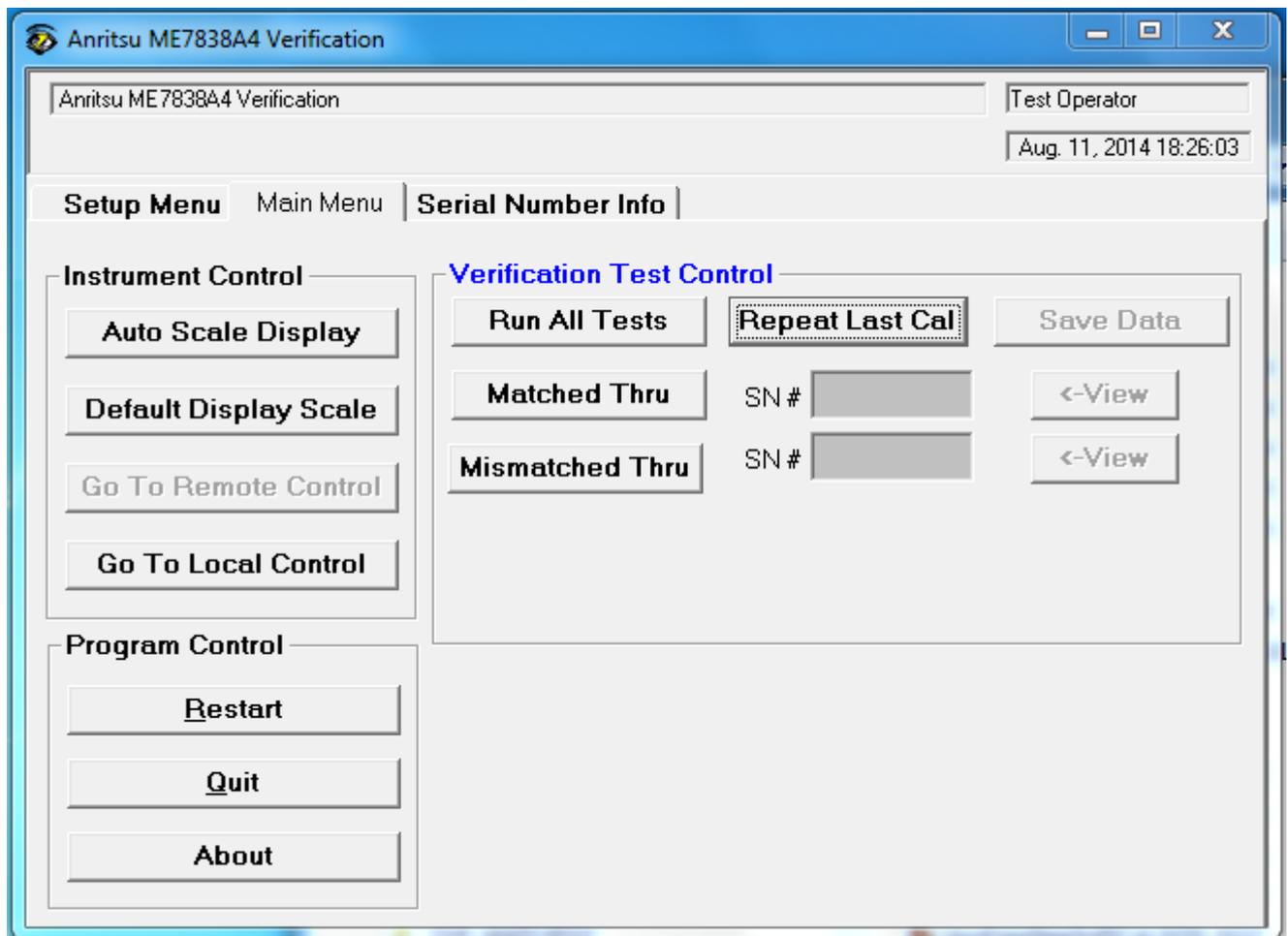


Figure 4-69. ME7838A4 Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S43 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S34 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S33 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S44 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 4-70](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

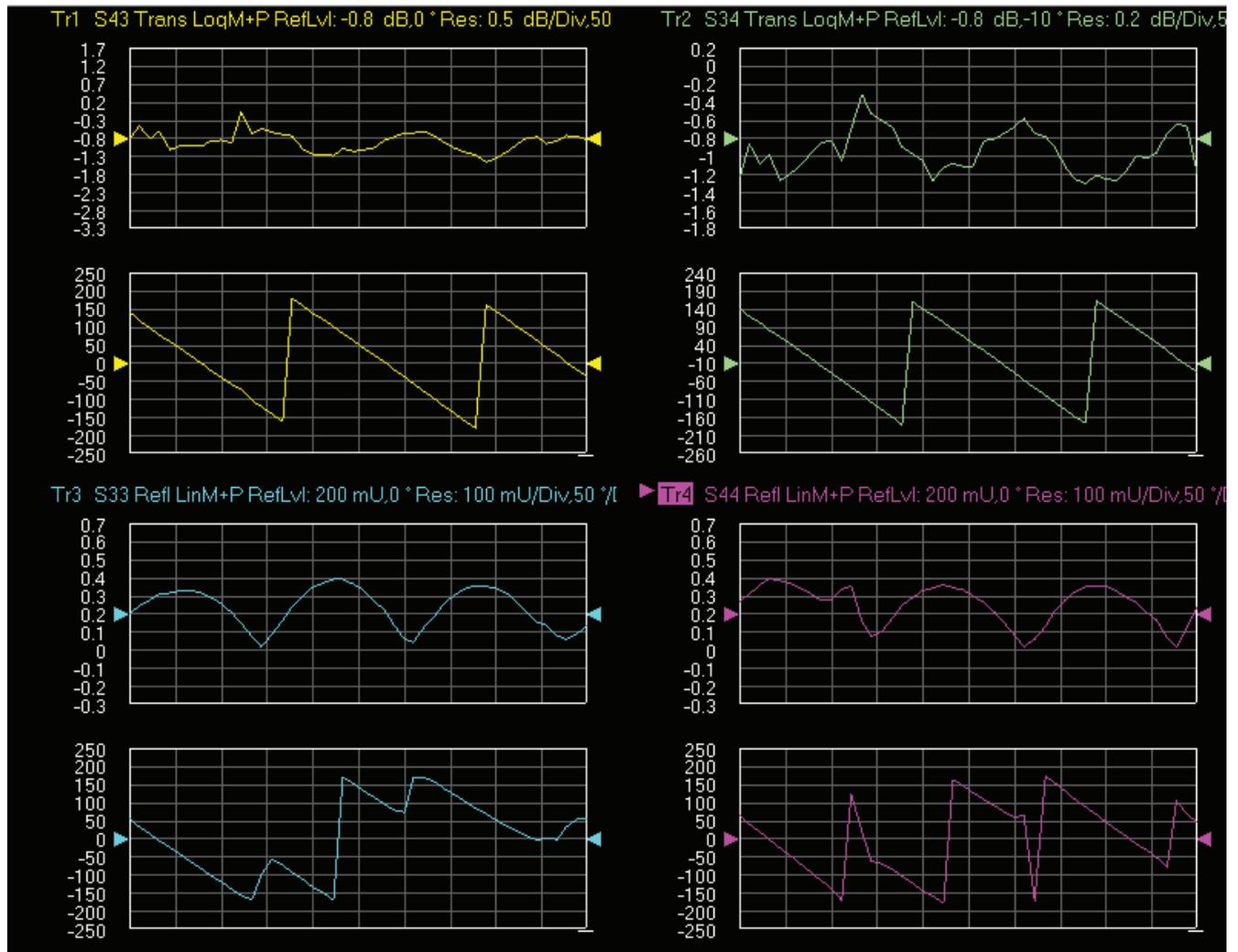


Figure 4-70. MS4640B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the **Go to Local Control** button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.

Restart Button

The Restart button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting Yes causes the program to return to the program initialization stage.

Usually, this button is used to test for second frequency band and program execution continues in [Section 4-22 “Restart for Alternate Frequency Band” on page 4-60](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting Quit brings up a confirmation dialog box shown in [Figure 4-71](#). Selecting Yes exits the program; selecting No returns you to the previous screen.

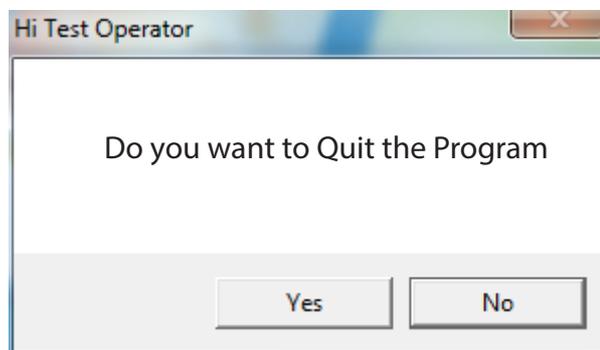


Figure 4-71. Confirmation Dialog

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 4-19 “Matched Thru Tests” on page 4-53](#) and then continues with [Section 4-20 “Mismatched Thru Tests” on page 4-56](#). When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 4-72 on page 4-52](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 4-69 on page 4-47](#).

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 4-21 “Saving Verification Data” on page 4-59](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at C:\mmcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 4-19 “Matched Thru Tests” on page 4-53](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 4-17 “Application Interface – Main Menu Tab” on page 4-47](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 4-20 “Mismatched Thru Tests” on page 4-56](#). When the tests are completed, the program returns to the Main Menu tab shown in [Table 4-72 on page 4-52](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

4-18 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

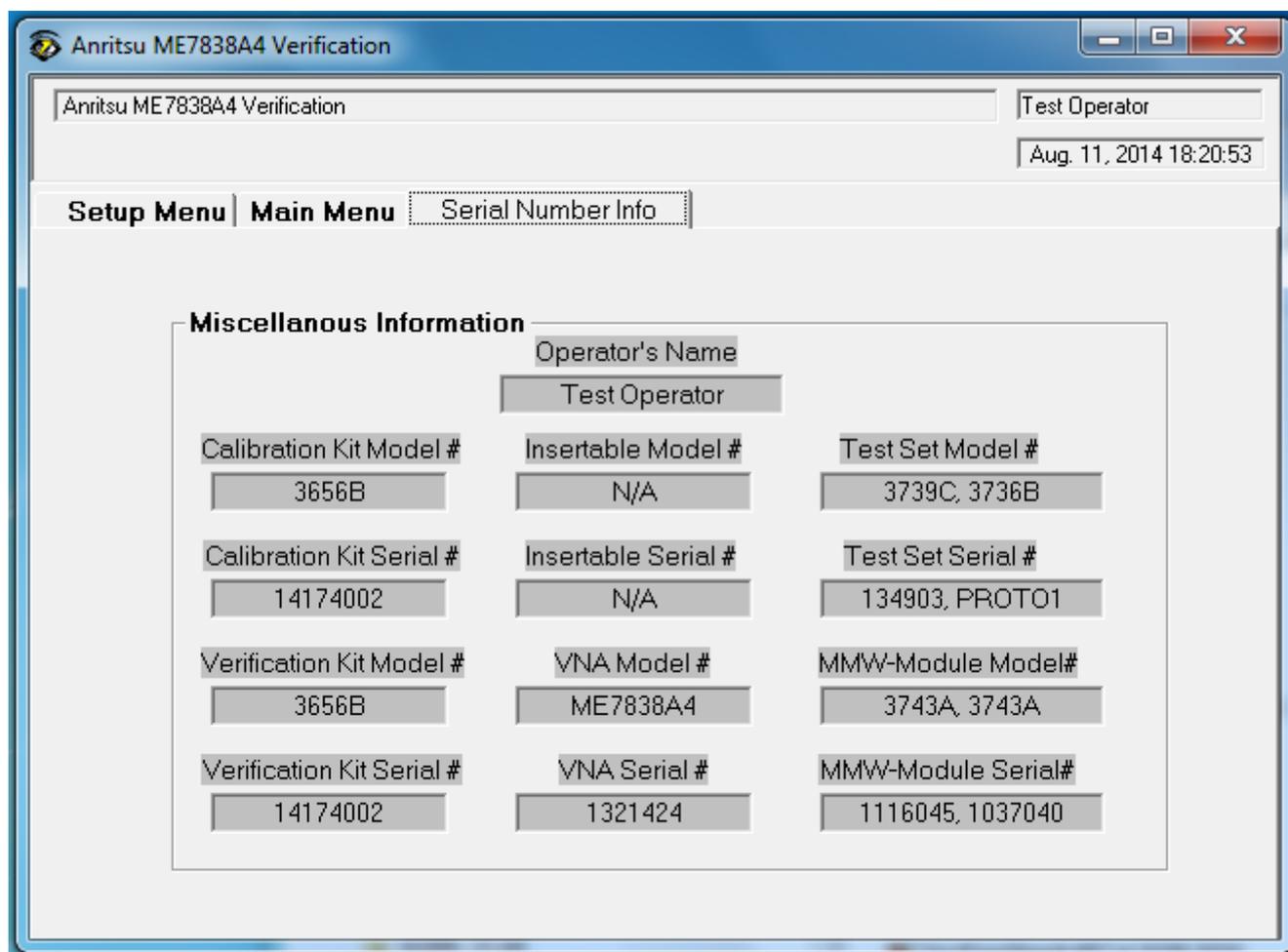


Figure 4-72. ME7838A4 Application Interface – Serial Number Tab

4-19 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 4-20 “Mismatched Thru Tests” on page 4-56](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 4-17 “Application Interface – Main Menu Tab” on page 4-47](#).

Note

The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

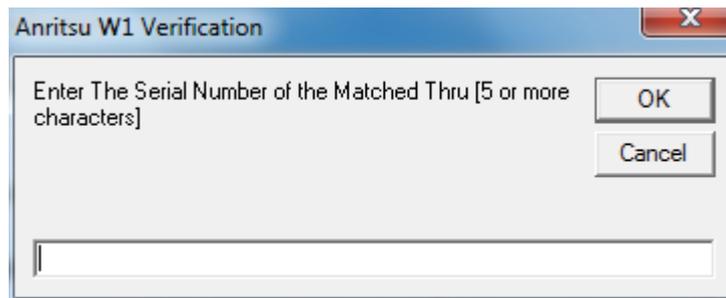


Figure 4-73. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note

The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

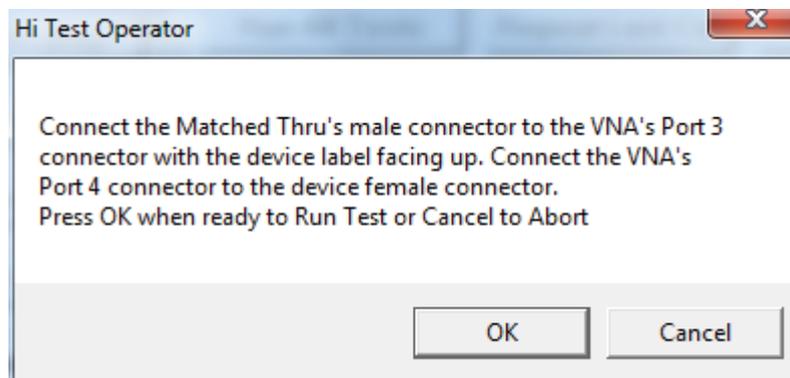


Figure 4-74. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 3 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 4.
7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

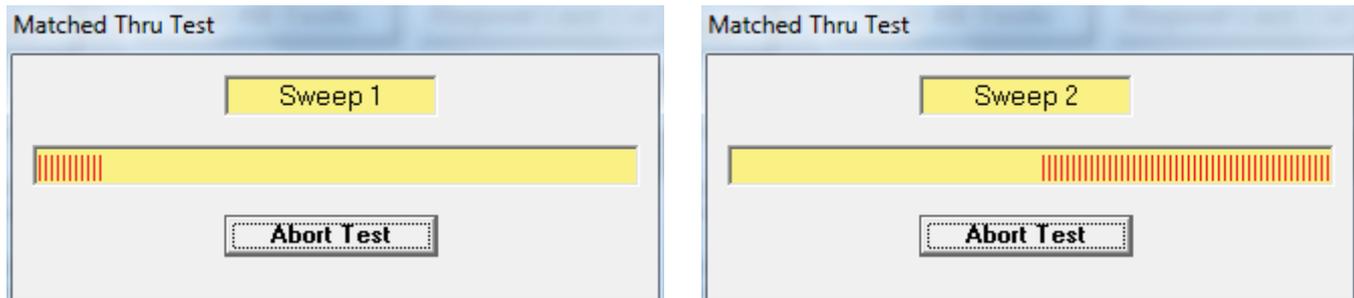


Figure 4-75. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

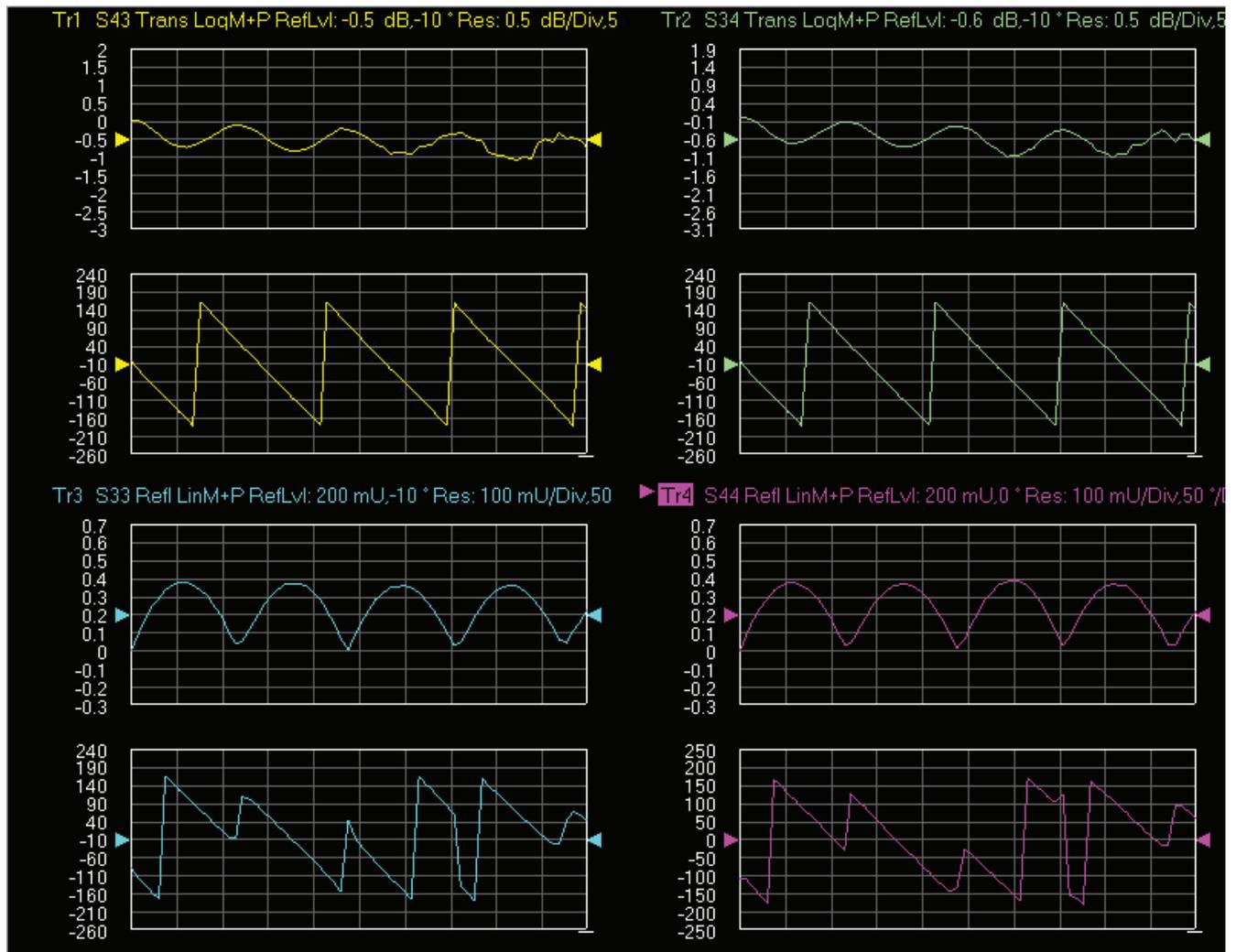


Figure 4-76. MS4640B Series VNA, Typical Matched Thru Data in Low Band

Upper-left quadrant= S43 – Forward Transmission
 Upper-right quadrant= S34 – Reverse Transmission
 Lower-left quadrant= S33 – Forward Reflection
 Lower-right quadrant= S44 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “[Application Interface – Main Menu Tab](#)” on page 4-47. The dialog box is shown in [Figure 4-69, “ME7838A4 Application Interface – Main Menu Tab”](#) on page 4-47.
10. If the Run All Tests button was selected, the program execution continues with the following [Section 4-19, “Matched Thru Tests”](#).

4-20 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in [Section 4-19 “Matched Thru Tests” on page 4-53](#)) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 4-17 “Application Interface – Main Menu Tab” on page 4-47](#).

Note	The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports . Use the torque wrench supplied with the verification kit when tightening the device connections.
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The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in [Section 4-17 “Application Interface – Main Menu Tab” on page 4-47](#).

The dialog box is shown in [Figure 4-69, “ME7838A4 Application Interface – Main Menu Tab” on page 4-47](#).

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in [Section 4-20 “Mismatched Thru Tests” on page 4-56](#)) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.

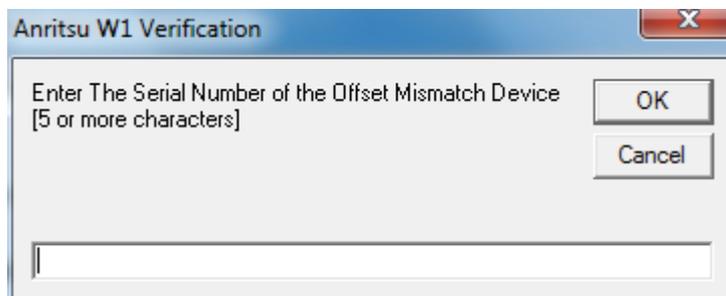


Figure 4-77. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note	The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.
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- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

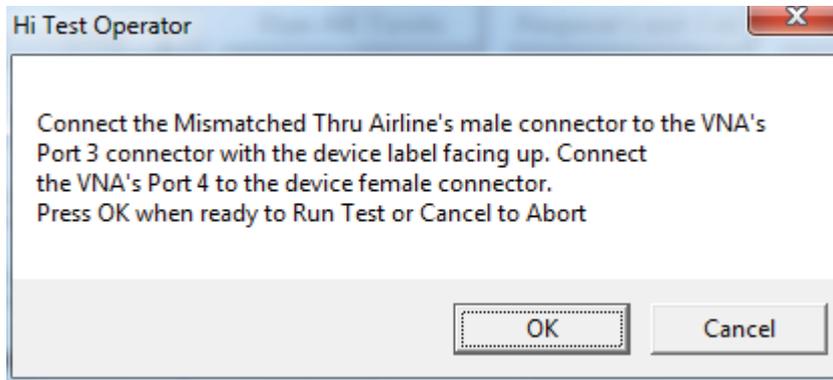


Figure 4-78. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 3 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 4.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

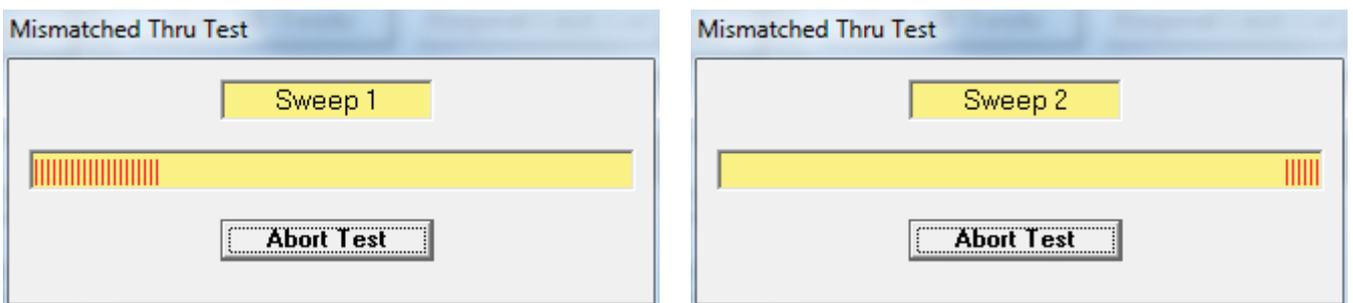


Figure 4-79. Status Dialogs

7. When the test completes, the program returns to the main menu described [Section 4-17 “Application Interface – Main Menu Tab”](#) on page 4-47, and the display should look similar to [Figure 4-70](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

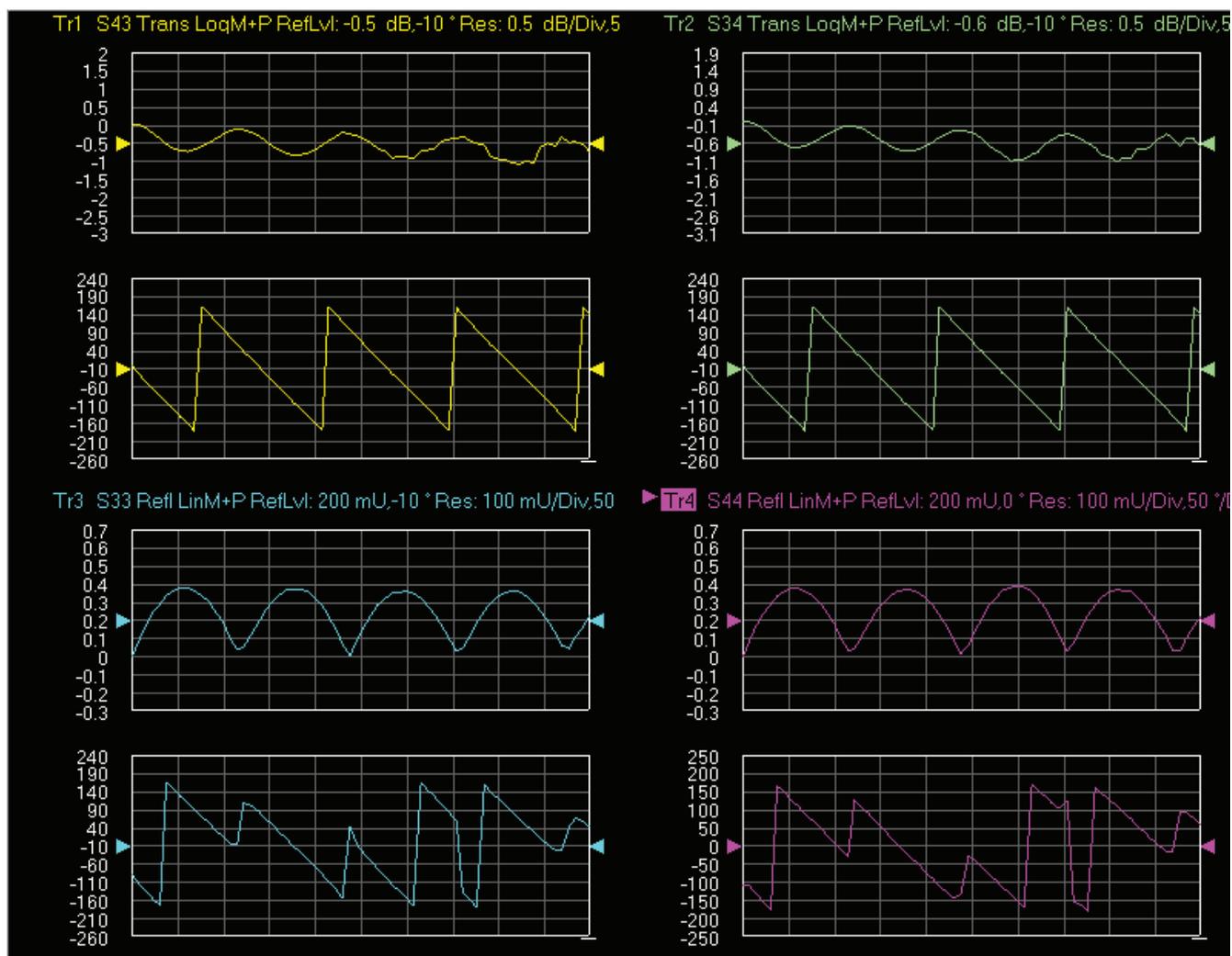


Figure 4-80. MS4640B Series VNA, Typical Mismatched Thru Data in Low Band

Upper-left quadrant= S43 – Forward Transmission
 Upper-right quadrant= S34 – Reverse Transmission
 Lower-left quadrant= S33 – Forward Reflection
 Lower-right quadrant= S44 – Reverse Reflection

4-21 Saving Verification Data

If the Save Data button on the Main Menu tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 4-17 “Application Interface – Main Menu Tab”](#) on page 4-47.

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru LowPort3and4.dat
- C:\mmdcsvc\Data\Mismatched Thru LowPort3and4.dat
- C:\mmdcsvc\Data\Matched Thru HighPort3and4.dat
- C:\mmdcsvc\Data\Mismatched Thru HighPort3and4.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

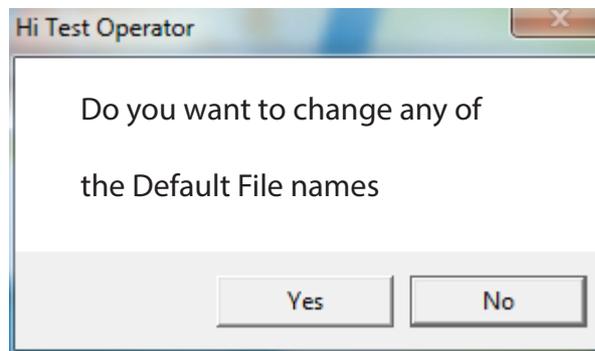


Figure 4-81. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.

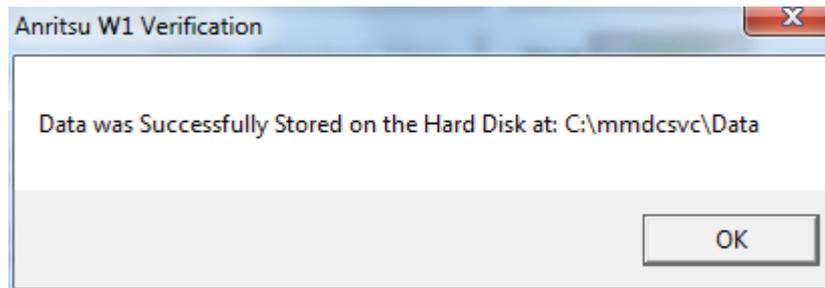


Figure 4-82. Information Dialog

4-22 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 4-17, “Application Interface – Main Menu Tab”](#) on page 4-47.
3. The Choose The Restart Method dialog box appears as shown in [Figure 4-83](#).

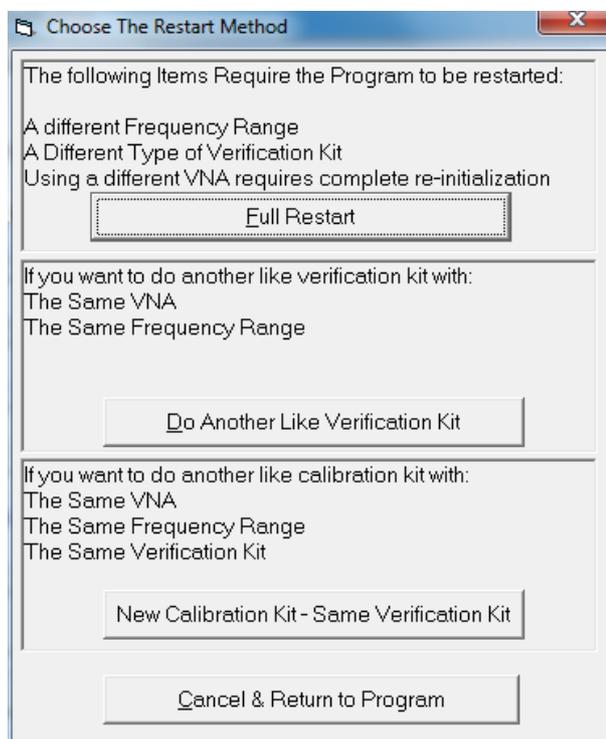


Figure 4-83. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as described previously starting in [Section 4-5, “Running the Verification Software”](#) on page 4-6, Step 7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK to proceed to the next step.
6. Enter the GPIB Board 0.
7. Enter the GPIB Address 6.
8. Enter the Test Set Serial Number.
9. Enter the User Name.
10. Enter the Cal Kit Type selection.
11. Enter the Cal Kit Serial Number selection.
12. Enter the Load Cal Kit Disk from VNA Floppy selection.

13. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.
14. Enter the Verification Kit Type selection.
15. Enter the Verification Kit Serial Number selection.
16. Click the Go to USB Drive Locator button and click the Verify Files on USB Drive button.
17. Complete the calibration and verification of the devices for the second frequency range.
18. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
19. This series of automated tests has verified that the VectorStar ME7838A4 Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
20. The program returns to the main menu described in [Section 4-17, “Application Interface – Main Menu Tab”](#) on page 4-47.

4-23 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed with the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting the performance verification software, the verification kit data USB memory device is installed in the correct USB port and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit USB drive matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, and in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu customer service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 5 — Using the 2300-584-R Software with the ME7838E4

5-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) with the VectorStar ME7838E4 Modular BB/mm-Wave VNA Measurement System. The ME7838E4 is based on the VectorStar MS4647B Vector Network Analyzer equipped with Option 08x.

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired.
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5-2 Required Equipment

Required VectorStar ME7838E4 Broadband System, 70 kHz to 110 GHz Instruments and Components

The VectorStar ME7838E4 Broadband/Millimeter Wave Measurement System consists of:

- VectorStar MS4647B VNA, 70 kHz to 70 GHz, V Connectors, equipped with Option 08x
- MN4697C 4-port Test Set
- 3736B Master Test Set
- 3739C Broadband Test Set
- Four (4) 3743E Millimeter-Wave (mm-Wave) Modules, 70 GHz to 110 GHz.
- Necessary rear panel interconnect cables between the test set and the VNA.
- Necessary front panel interconnect cables between the test set and the VNA
- Necessary interconnect cables to the 3743E mm-Wave Modules.

5-3 Configuring the Hardware

This section describes how the various system elements are interconnected and describes the preliminary steps required for operation of the verification software. See [“Required VectorStar ME7838E4 Broadband System, 70 kHz to 110 GHz Instruments and Components” on page 5-1](#) for a complete equipment list.

1. Ensure that the VNA system is set to “Broadband”.
2. To verify the setting, from the right side MAIN menu, select the broadband test set button:
 - MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Test Set) or BB/mmWave (3739 Test Set)
3. Select the Broadband Receiver Configuration.
4. Connect a GPIB cable between the PC Controller and the VNA Rear Panel GPIB port labeled IEEE 488.2 GPIB.

Caution	Do not connect the cable to the VNA Rear Panel GPIB port labeled Dedicated GPIB .
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5-4 W1 Verification Application Installation

Prior to installation of the W1 Application, the National Instruments GPIB card and drivers must be installed in the Windows PC.

This needs to be done only once per PC Controller. The software is contained on the Disk supplied with each Verification Kit.

In order to correctly install the PVS application, the user (logged in) must have Administrative rights on the Windows PC Controller.

- Note** The PVS application is installed onto the PC Controller on an all-user basis.
If your organization does not allow for all-user installations, consult your internal PC and network support group on how to best proceed.

1. Prior to installation of the 2300-584-R PVS, the National Instruments GPIB card and its drivers must be installed in the PC Controller.
2. Turn off all other running applications on the PC Controller.
3. Insert the USB Memory Device into the USB slot.
4. Open Windows Explorer, browse to the USB Drive, and double click on **Startup.htm**.



Figure 5-1. PVS Installation and Documentation Screen

5. On the navigation page, click the Install Anritsu 1.0 mm Verification Application Software link.
6. The first of several installation dialog boxes appears

7. Click Run on the two security dialog boxes.

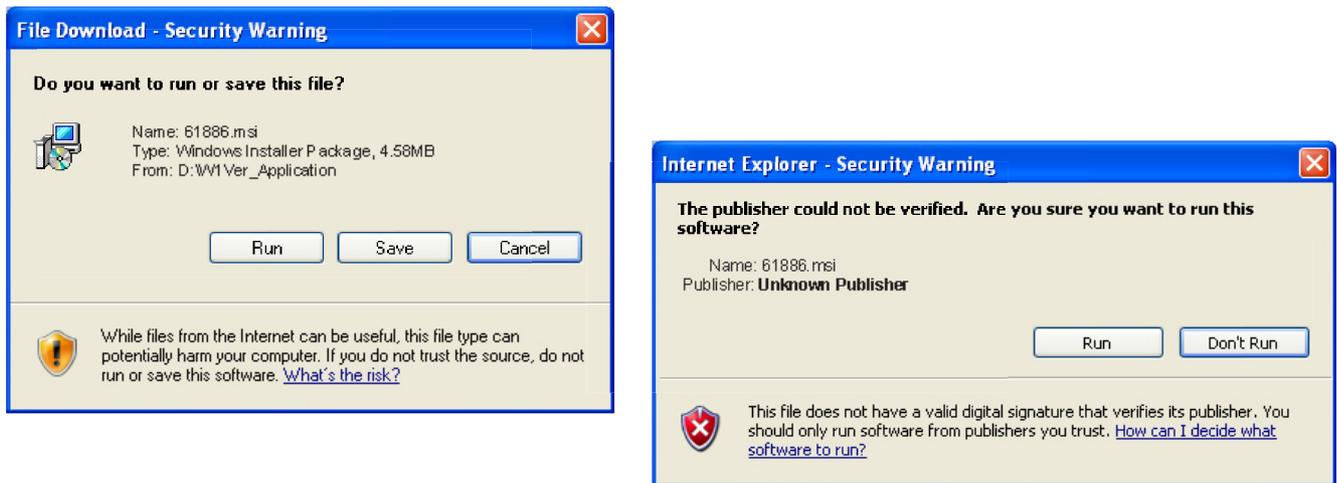


Figure 5-2. Installation Security Dialog Boxes – Click Run on each

8. If either of the two dialog boxes shown in [Figure 5-3](#) appear that display Error 1321 or Error 1931, follow these instructions:

- Error 1321 – Select Exit Installation and make sure you have Administrator privileges on the PC Controller.
- For Error 1931 – Select OK to bypass the error message and continue the installation.

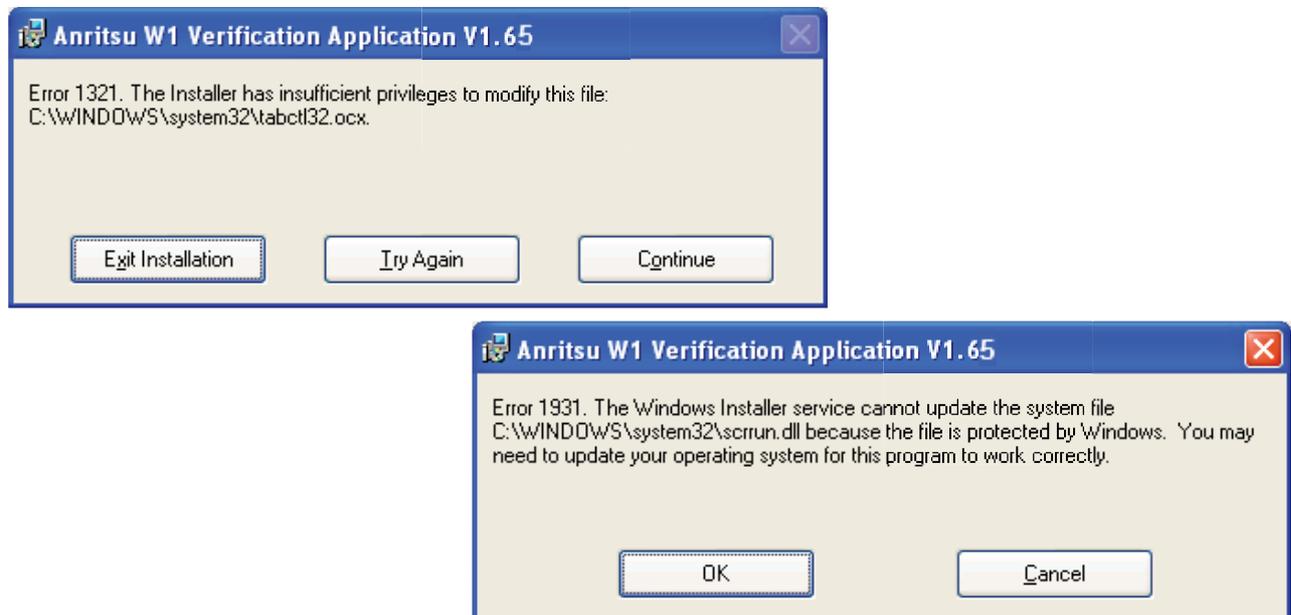


Figure 5-3. Installation Error 1321 and Error 1931 Dialog Boxes

9. Two installation wizard setup dialog boxes appear in sequence. Click Next to proceed through each dialog box. The final dialog box shows an installation progress bar.

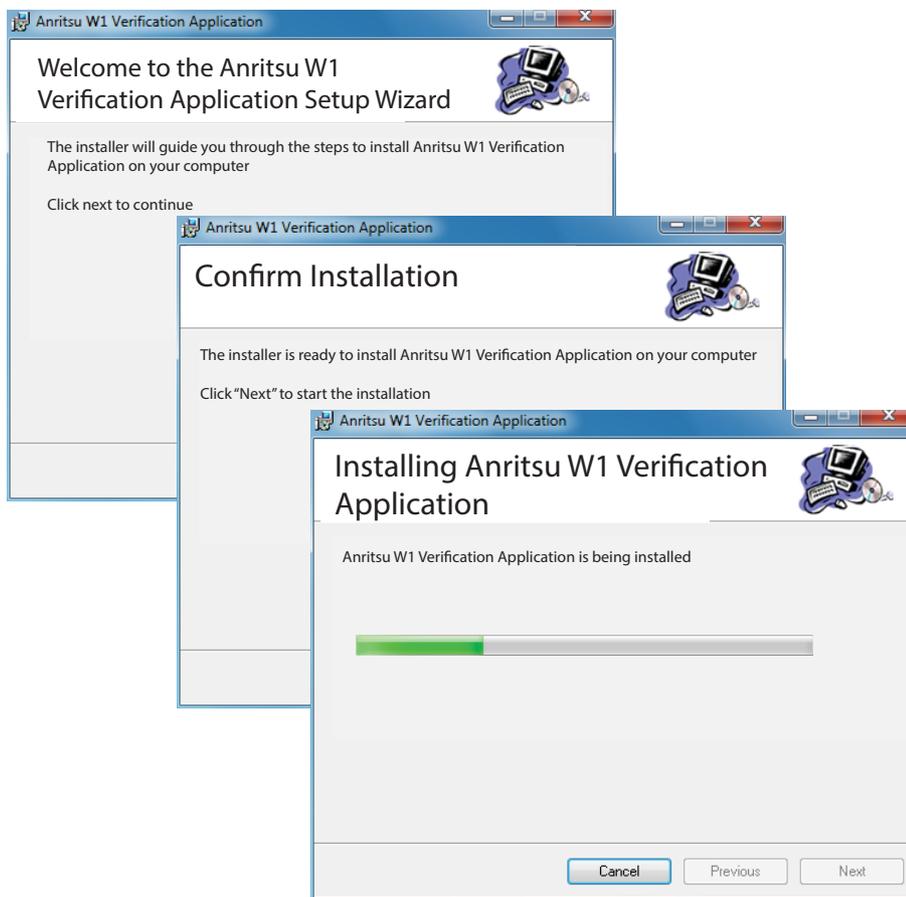


Figure 5-4. Installation Confirmation and Progress Dialog Boxes – Click Next on each

- When the installation progress bar shows complete, click **Next**. The final Application Information dialog box appears. Click **Next**, and the Installation Complete dialog box appears.

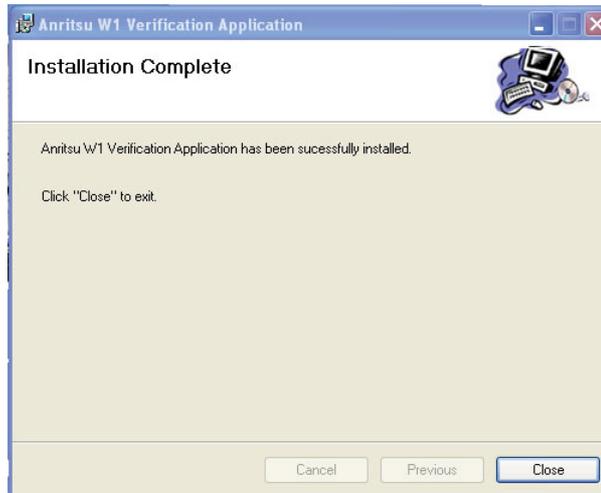
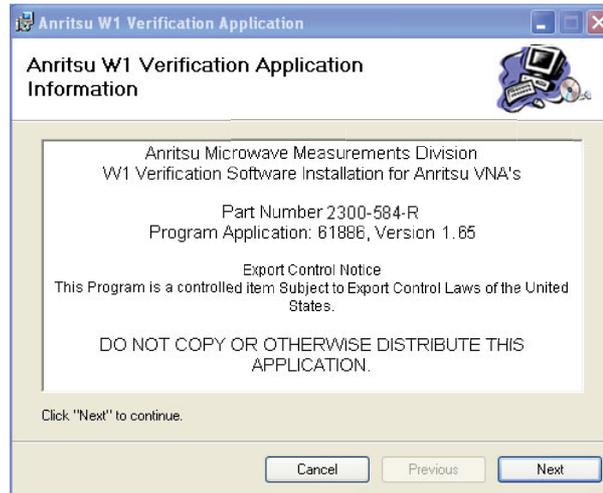


Figure 5-5. Final Application Information and Installation Complete Dialog Boxes

- The installer adds all required files and makes the necessary registry updates on the PC Controller. When done, the navigation page ([Figure 5-1](#)) reappears.
- If desired, open the **User Guide** (this document) and the **Quick Start Guide** and save and/or print a copy.
- The PVS application is available either the **Start** or **Program** menu of the PC Controller.

5-5 Running the Verification Software

After the VNA and PC have been configured as described above, you are ready to run the program and perform the calibration/verification. Make sure you have the following information available:

- Serial number of the 3656B W1 Calibration/Verification Kit
- Serial number of the 3739C Broadband/Millimeter Wave Test Set
- Serial Number of the 3736B Master Test Set
- MN469xC 4-port Test Set
- Model number and serial number of the Port 1 and Port 2 BB/mm Module
- Model number and serial number of the Port 3 and Port 4 BB/mm Module

Procedure

1. With the equipment and software configured as described in “Configuring the Hardware” on page 5-1, turn on the computer and allow it to start Windows.
2. Locate the Anritsu W1 Verification icon (shown below) on the desktop and double-click it.



3. The program displays an About dialog box with version information. Click OK to continue.

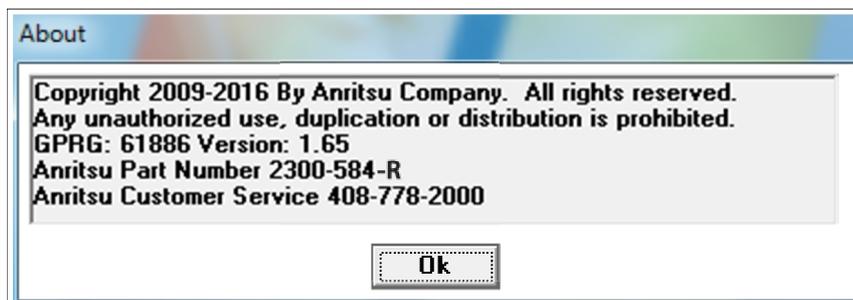


Figure 5-6. About Dialog

4. The Test Operator Name dialog box appears. Enter a user name or other identification.

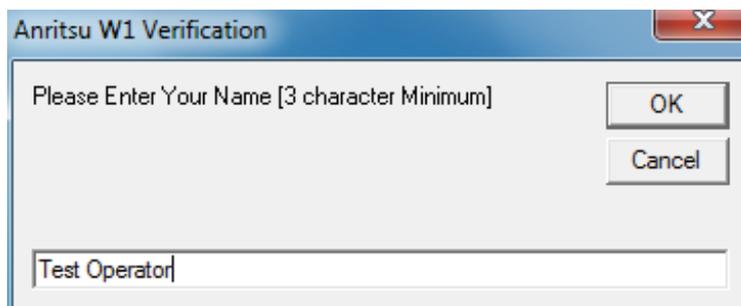


Figure 5-7. Name Dialog

5. Click OK to continue. The program searches for the GPIB Board in the PC Controller that is set to GPIB Address 6 and displays a confirmation dialog.

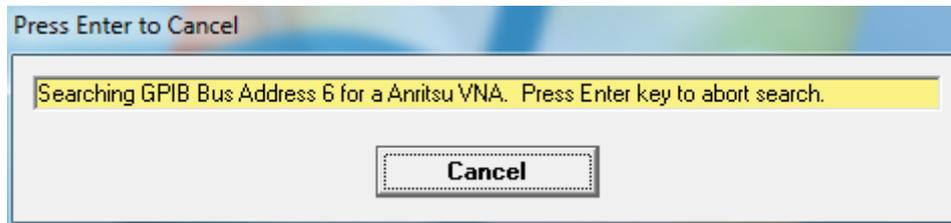


Figure 5-8. GPIB Board Dialog

6. Click Yes to continue. Click No to search for another GPIB Board.
7. If Yes was clicked, the program searches for a compatible VNA on the GPIB. When the VNA is found, a confirmation dialog box appears.

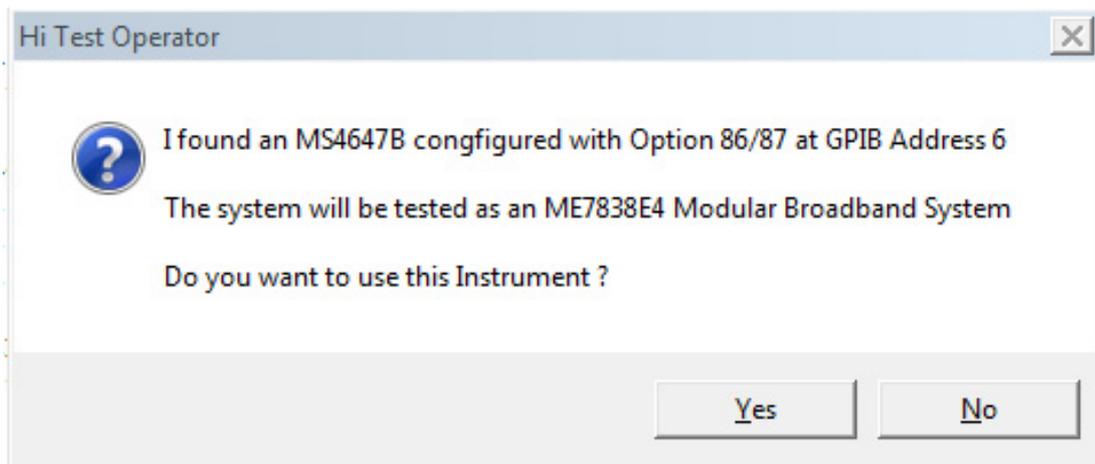


Figure 5-9. Found Instrument Dialog

8. Click Yes to continue, or click No to search for another VNA.

Note If your system is configured with a Lightning 37000 series VNA, refer to [Chapter 7, “2300-584-R Software with the Lightning ME7808A/B/C”](#).

9. If Yes is clicked above, the program searches for the BB/mm Modules and, when found, requests the model number and the serial number of the test set and each module.

10. The ME7838E4 is a 4-port system. The calibration and verification testing can be performed to only two ports at a time. At the prompt below, select to test either Port 1 and Port 2, or test Port 3 and Port 4. If testing Port 3 and Port 4 is requested, select Yes. If testing port 1 and 2 is requested, select No.

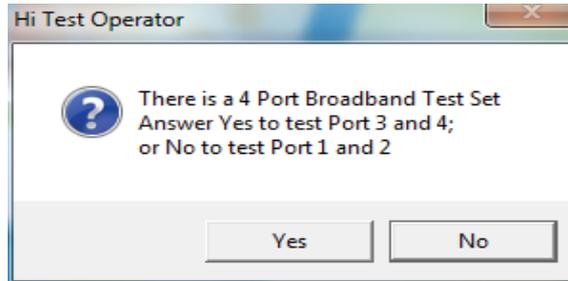


Figure 5-10. Port Test Selection Dialog

Enter Port 1 BB/mm-Wave Module Information

11. Enter the Port 1 BB/mm-Wave Module model number and click OK

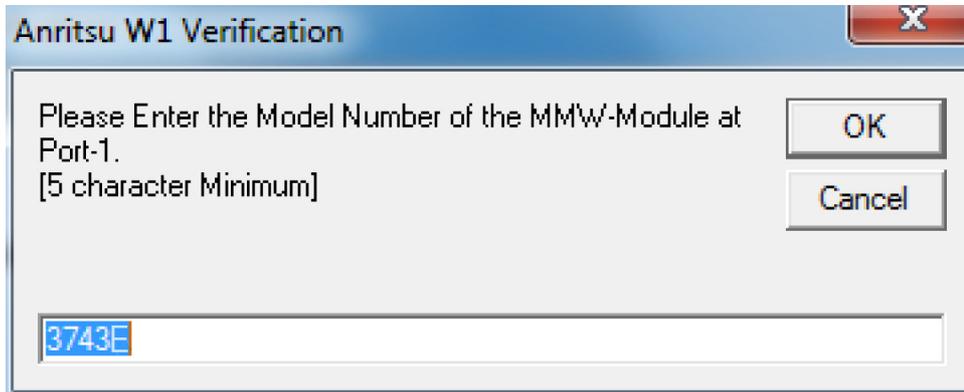


Figure 5-11. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Model Number

12. Enter the Port 1 BB/mm-Wave Module serial number and click OK.

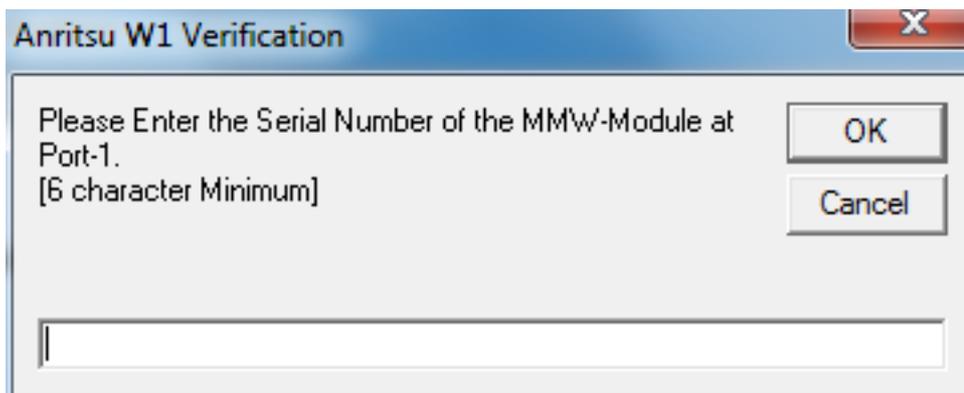


Figure 5-12. Anritsu W1 Verification Dialog – Port 1 BB/mm-Wave Module – Serial Number

Enter Port 2 BB/mm-Wave Module Information

13. Enter the Port 2 BB/mm-Wave Module model number and click OK.

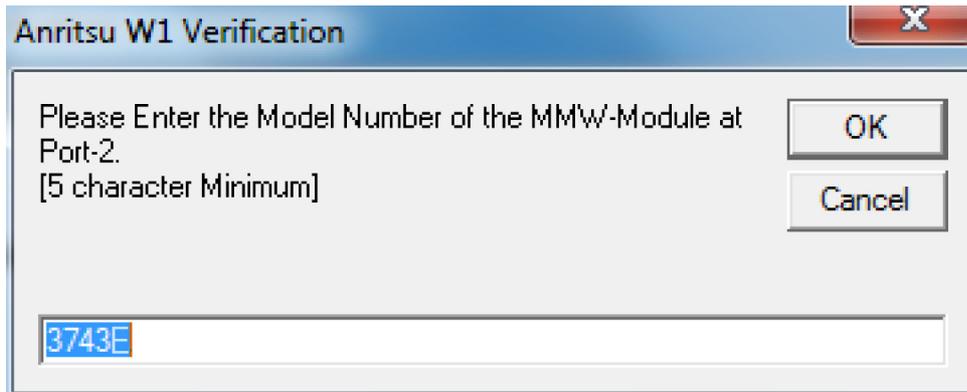


Figure 5-13. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Model Number

14. Enter the Port 2 BB/mm-Wave Module serial number and click OK.

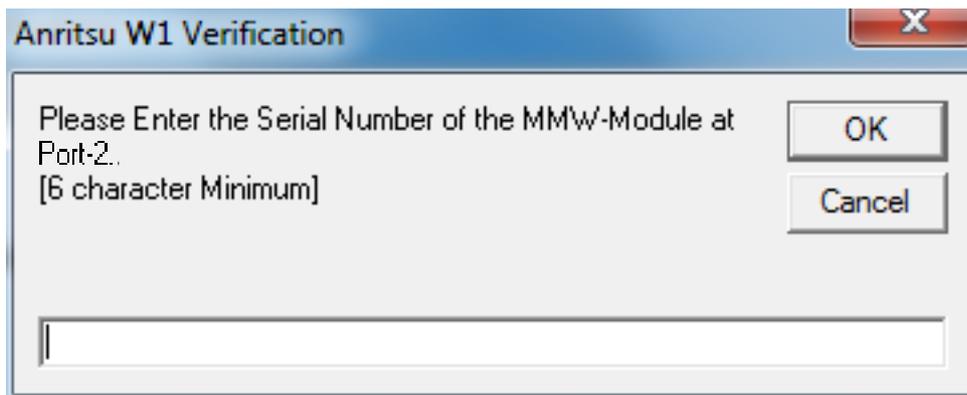


Figure 5-14. Anritsu W1 Verification Dialog – Port 2 BB/mm-Wave Module – Serial Number

Enter Port 3 BB/mm-Wave Module Information

15. Enter the Port 3 BB/mm-Wave Module model number and click OK.

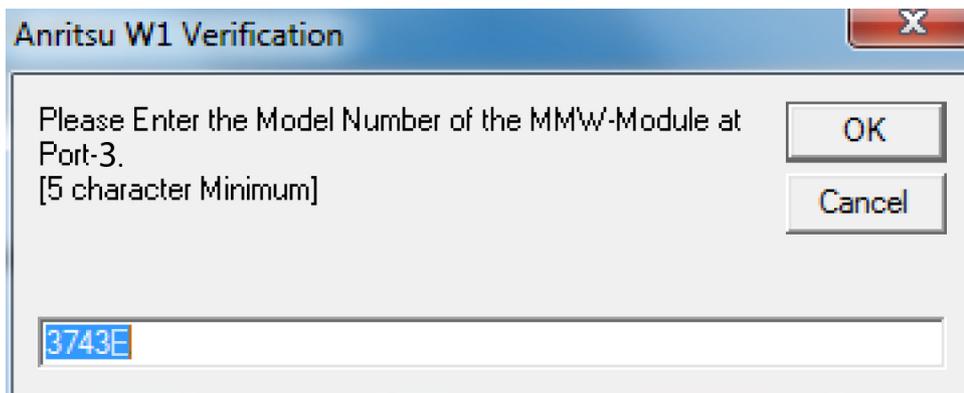


Figure 5-15. Anritsu W1 Verification Dialog – Port 3 BB/mm-Wave Module – Model Number

16. Enter the Port 3 BB/mm-Wave Module serial number and click OK.

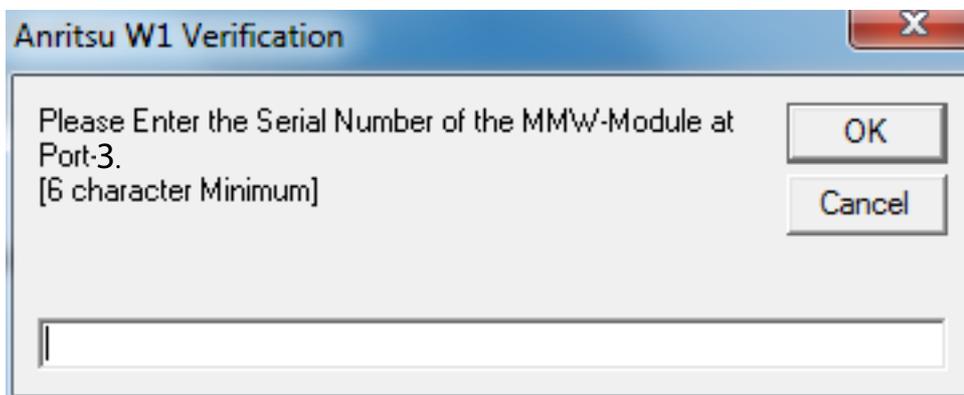


Figure 5-16. Anritsu W1 Verification Dialog – Port 3 BB/mm-Wave Module – Serial Number

Enter Port 4 BB/mm-Wave Module Information

17. Enter the Port 4 BB/mm-Wave Module model number and click OK.

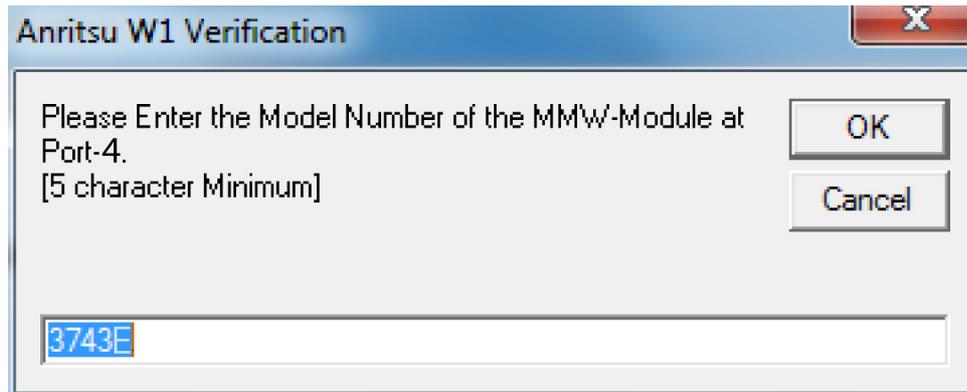


Figure 5-17. Anritsu W1 Verification Dialog – Port 4 BB/mm-Wave Module – Model Number

18. Enter the Port 4 BB/mm-Wave Module serial number and click OK.

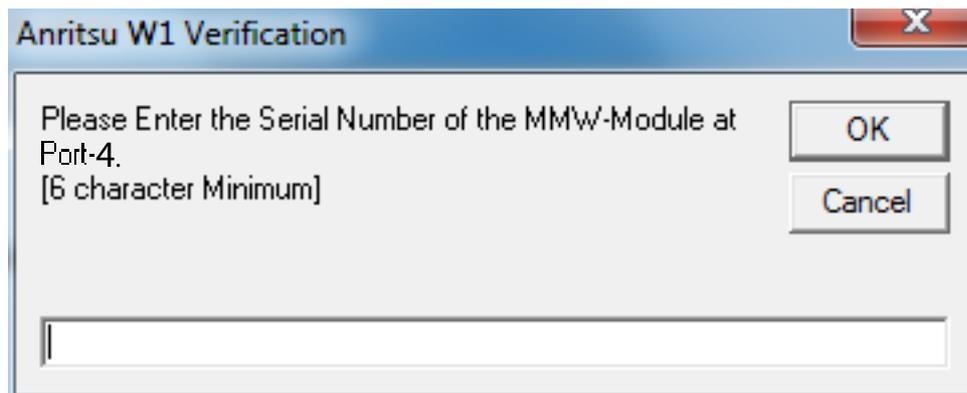


Figure 5-18. Anritsu W1 Verification Dialog – Port 4 BB/mm-Wave Module – Serial Number

Enter Port 1 and Port 2 Test Set Information

19. Enter the Test Set model number and click OK.

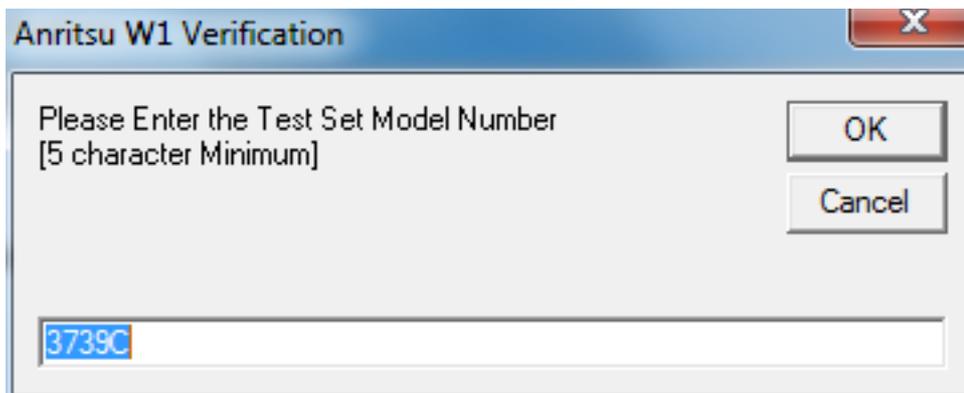


Figure 5-19. Anritsu W1 Verification Dialog – Test Set – Model Number

20. Enter the Test Set serial number found on the rear panel and click OK.

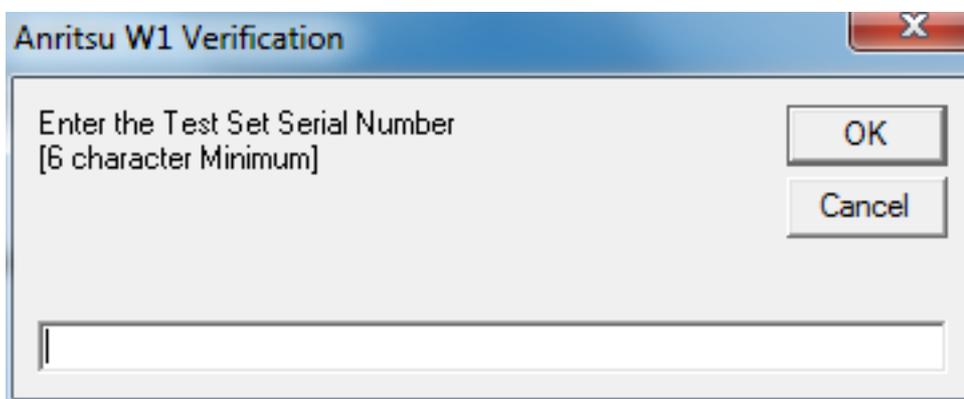


Figure 5-20. Anritsu W1 Verification Dialog – Test Set – Serial Number

21. The program execution continues to the following [Section](#) , “[Enter Port 3 and Port 4 Test Set Information](#)” on page 5-13.

Enter Port 3 and Port 4 Test Set Information

22. Enter the Test Set model number and click OK.

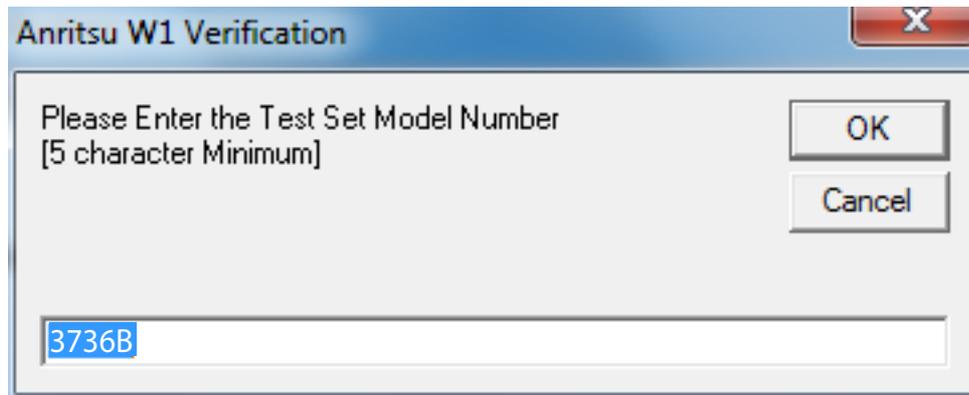


Figure 5-21. Anritsu W1 Verification Dialog – Test Set – Model Number

23. Enter the Test Set serial number found on the rear panel and click OK.

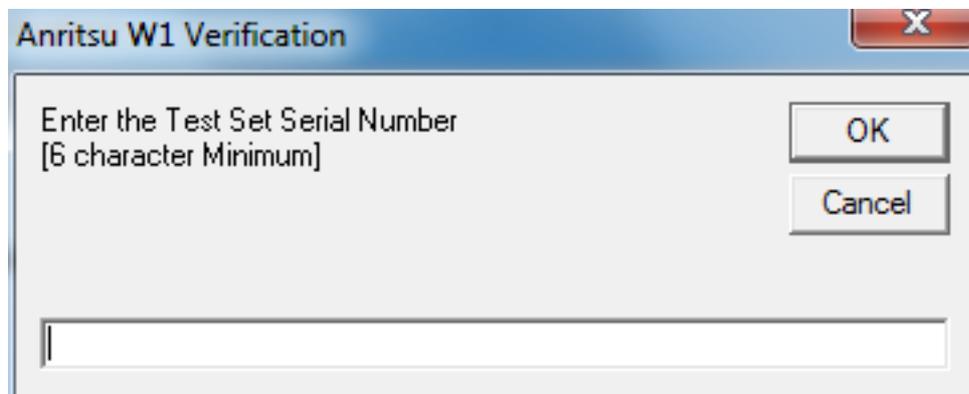


Figure 5-22. Anritsu W1 Verification Dialog – Test Set – Serial Number

The program execution continues to the following [Section 5-6, “Application Interface – Setup Menu Tab”](#) on page 5-14.

5-6 Application Interface – Setup Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections:

- The Setup Menu tab is described in this section.
- The Main Menu tab display is described in [Section 5-9, “Application Interface – Main Menu Tab” on page 5-27](#).
- The Serial Number Info tab is described in [Section 5-10, “Application Interface – Serial Number Tabs” on page 5-31](#).

Procedure

The following procedure continues the program setup from the previous section:

1. In the Calibration Kit Type area, select W Coax.
2. In the Serial Number (5 Digits) area, enter the serial number for the 3656B Calibration/Verification Kit. At least five (5) digits are required.
3. In the Load Cal-Kit Coefficients to VNA area, select Yes.

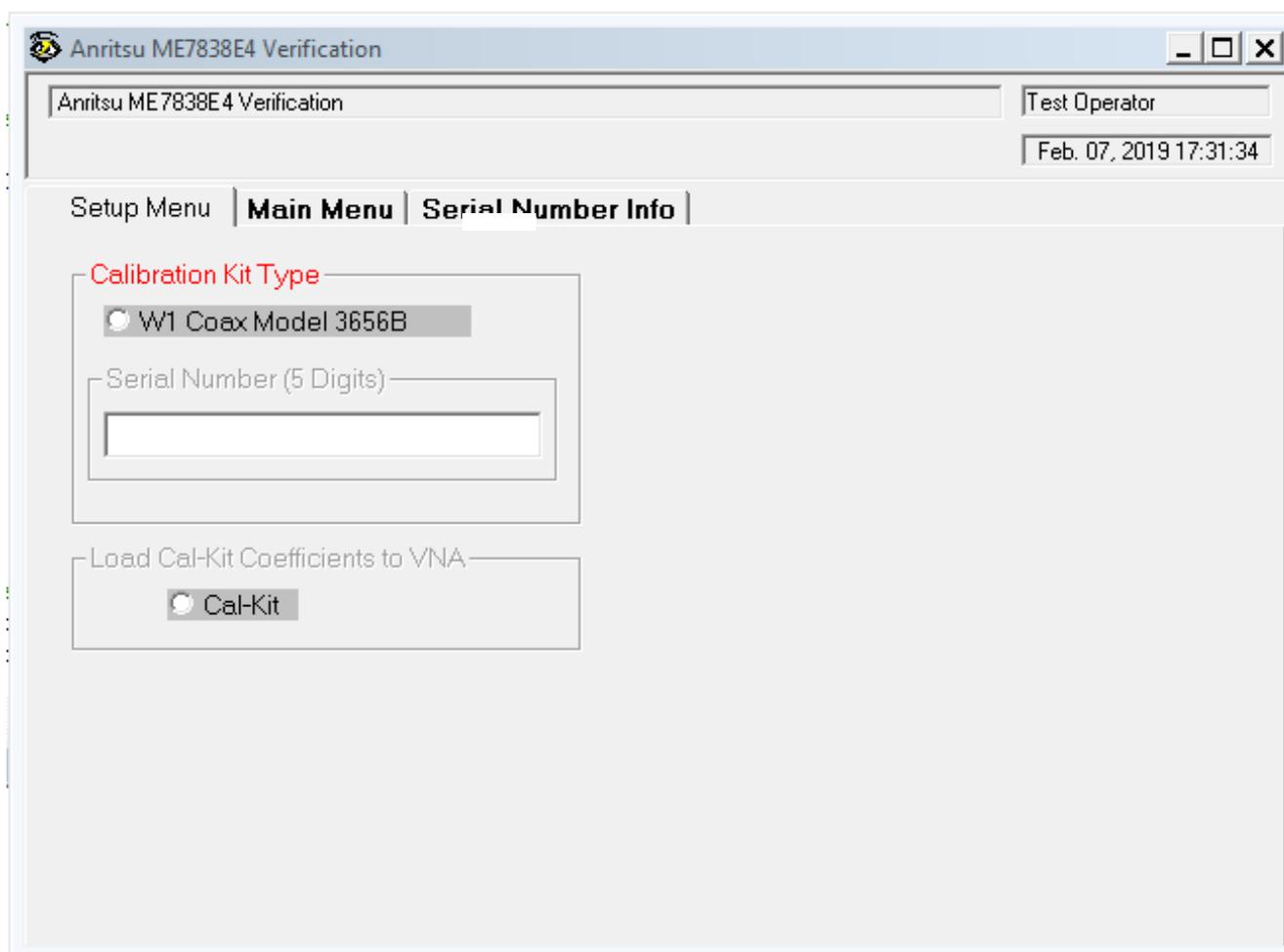


Figure 5-23. ME7838E4 Application Interface – Setup Menu Tab

4. The Install Calibration-Kit Coefficients to the VNA dialog box appears.

5. Follow the dialog box instructions for installing the 3656B calibration coefficients into the VNA, then click OK.

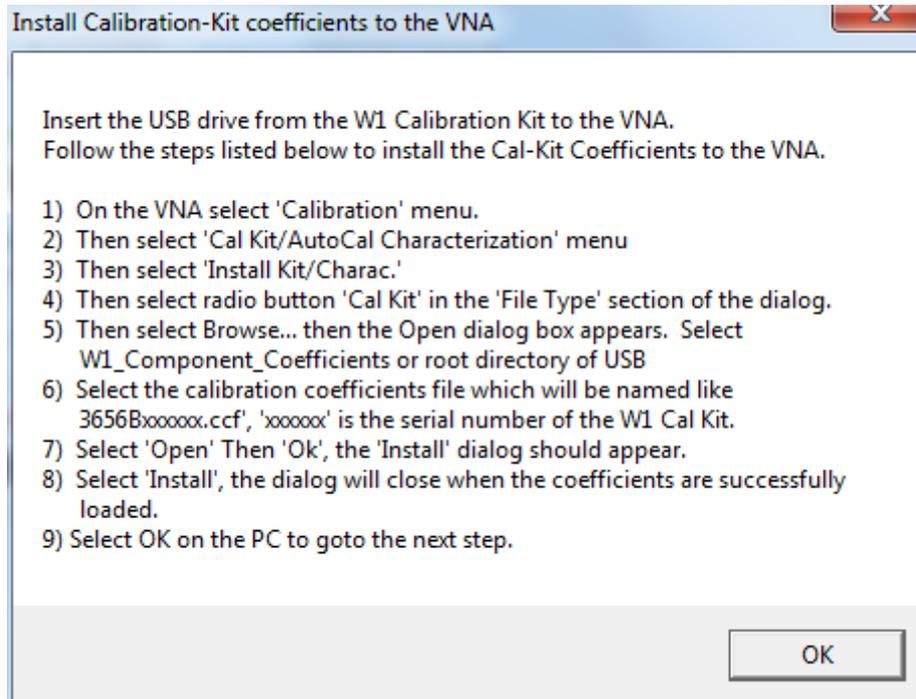


Figure 5-24. Install Calibration Kit Coefficients Dialog

6. The VNA displays an acknowledgment dialog box when the file load is complete, indicating that 10 files were loaded. After the VNA has loaded the 10 Calibration coefficient files, select OK on the PC application. The application will then prompt you to remove the USB drive from the VNA and install the USB drive to the PC.



Figure 5-25. Install USB Drive in PC Dialog

7. The Application Interface dialog box reappears displaying the Setup Menu tab and Frequency Range area. In the Frequency Range area, select either the low range (40 MHz to 65 GHz) or the high range (65 GHz to 110 GHz). For purposes of this document, the low band is done first. The range that is not selected is calibrated during the Restart Procedure described in [Section 5-14 “Restart for Alternate Frequency Band” on page 5-39](#). After selecting the frequency range, click OK. The Verification Kit Information area appears.

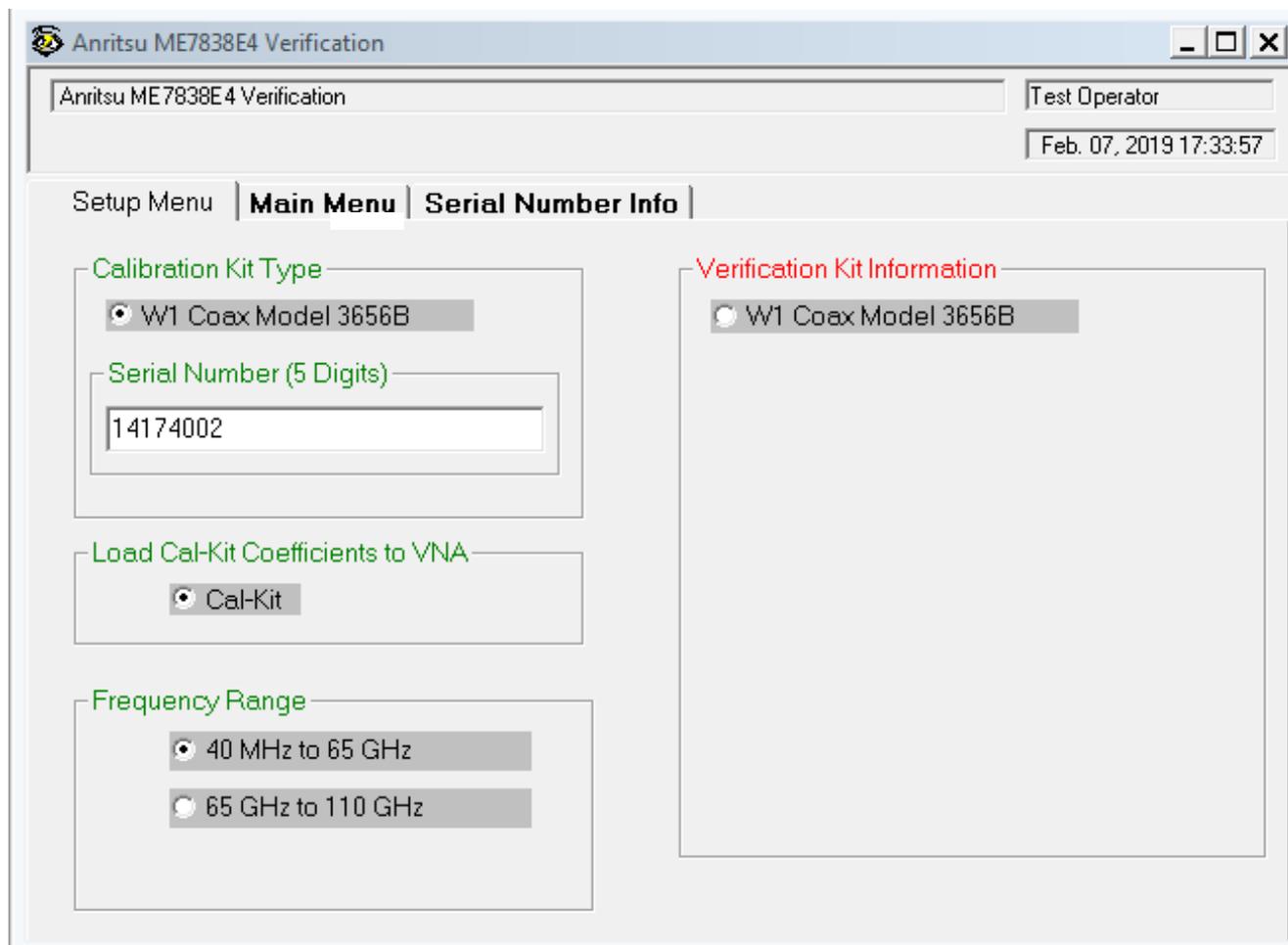


Figure 5-26. ME7838E4 Application Interface – Setup Menu Tab

8. Select the W1 Coax type, and then the Verification Kit Serial Number (usually the same as the Calibration Kit). When the Serial Number is complete, the Locate USB Drive Kit Data on PC area appears.

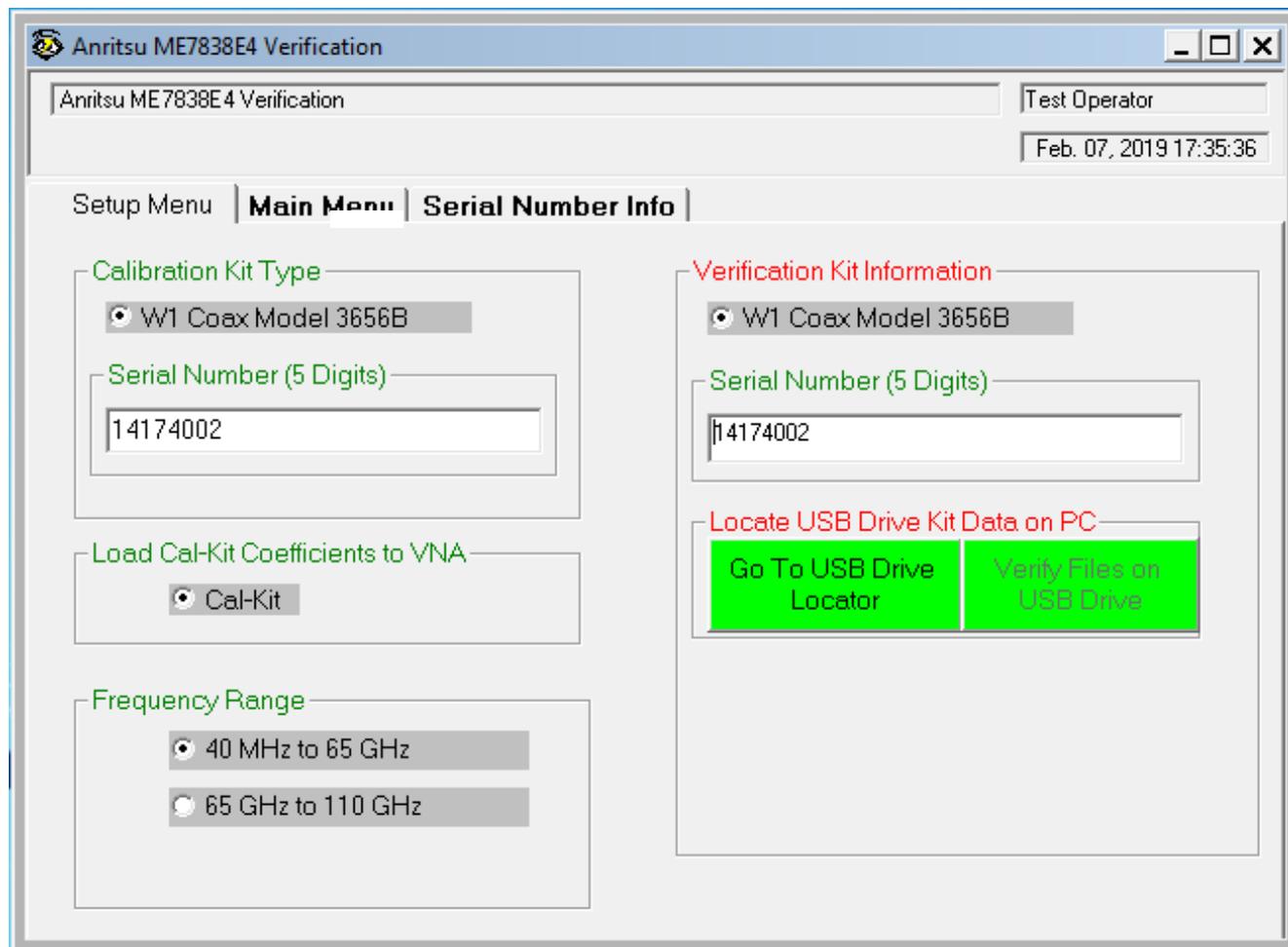


Figure 5-27. ME7838AE4 Application Interface – Setup Menu Tab

9. In [Figure 5-27](#) find the Locate USB Drive Kit Data on PC area, click the Go To USB Drive Locator button.

- When the Auto Find Verification Kit Data dialog box first appears in [Figure 5-28](#), the Verification Kit Data Path text field is blank. Click the Auto-Locate USB Drive Verification Kit Data on PC button. The application automatically locates the verification kit data on the USB drive and displays the path in the Verification Kit Data Path text field.

In rare instances, due to PC/USB configurations, the Auto-find function may not be able to locate the verification data on the USB drive. In this case, you may need to use the Manually Locate Verification Data Kit button. This utility allows you to manually select the path where the verification kit data is located. The data path will be on the USB drive shipped with the verification kit. On most PC's, this will be the E, F, or G drive assignments. Navigate to the verification kit data in the file-path location shown in the example below (for this example, the USB drive was at E:\):

```
E:\W1_Verification_Data\W1_3656B_XXXXXX
```

(where xxxxxx is the serial number of the Kit)

Within each data set on the USB, there is a file named EnableKit.dat. Double click that file to identify the file. This builds the path for the verification kit data and returns back to the Find Verification Kit Data on the removable USB drive. Once the data is found, the Verification Kit Data Path information appears in the text field. Click Next > to return to the Application Interface dialog box.

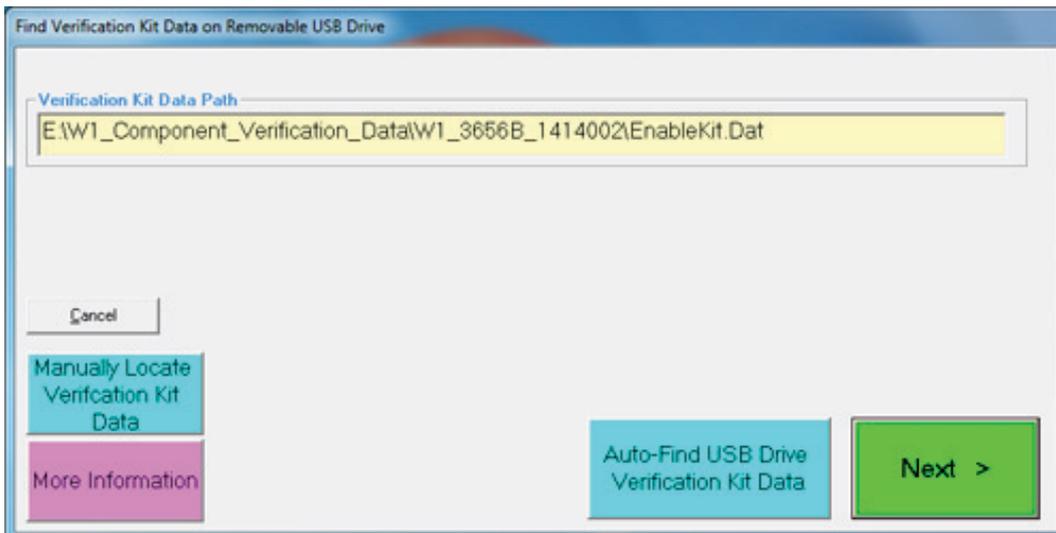


Figure 5-28. USB Drive Locator Dialog

11. Click Verify Files on USB Drive. The application checks the files on the USB drive to verify that all files are present and that each has the proper number of data points.

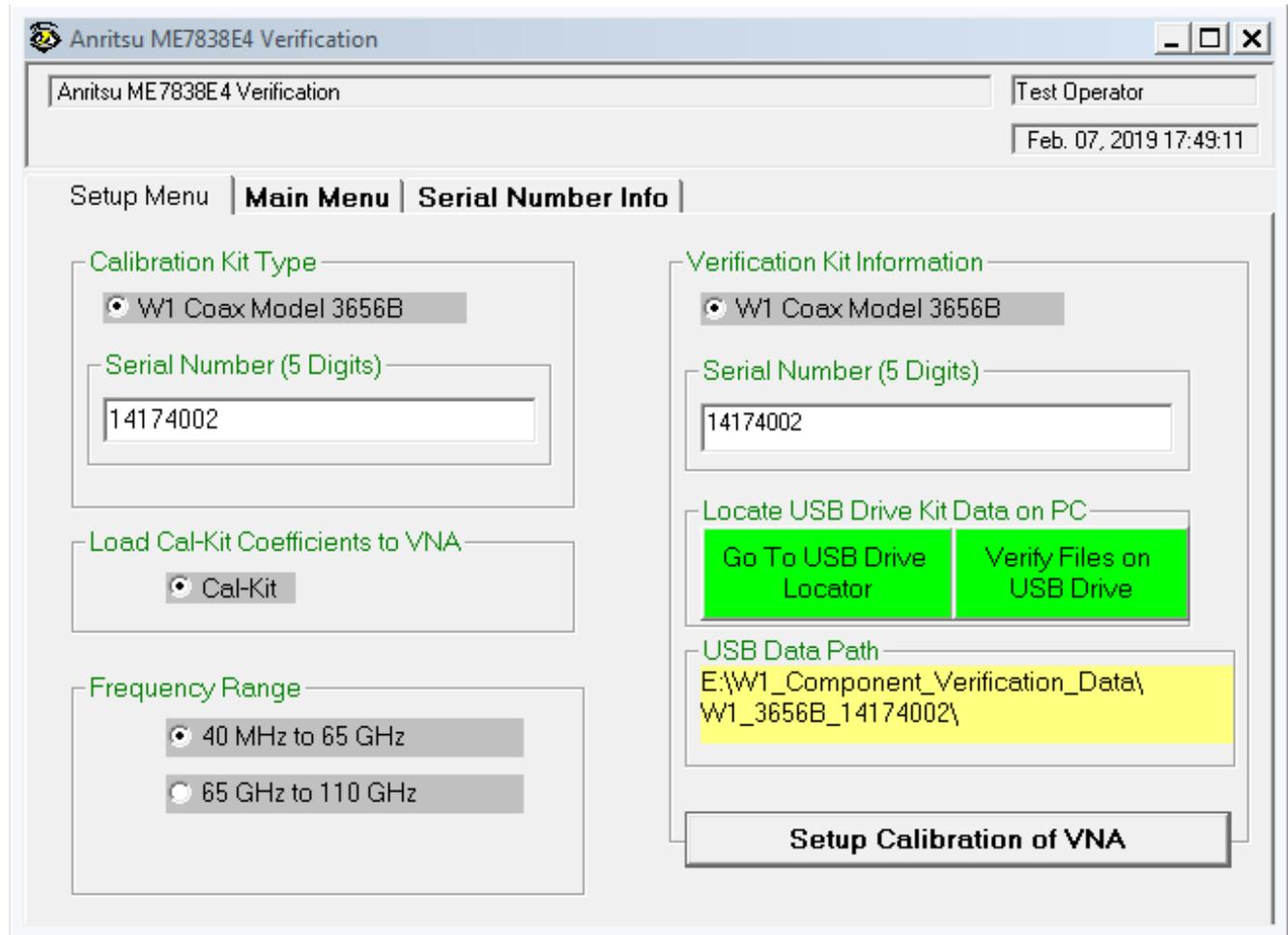


Figure 5-29. ME7838E4 Application Interface – Setup Menu Tab

12. When all information is entered and you are ready to start, click the Setup Calibration of VNA button.

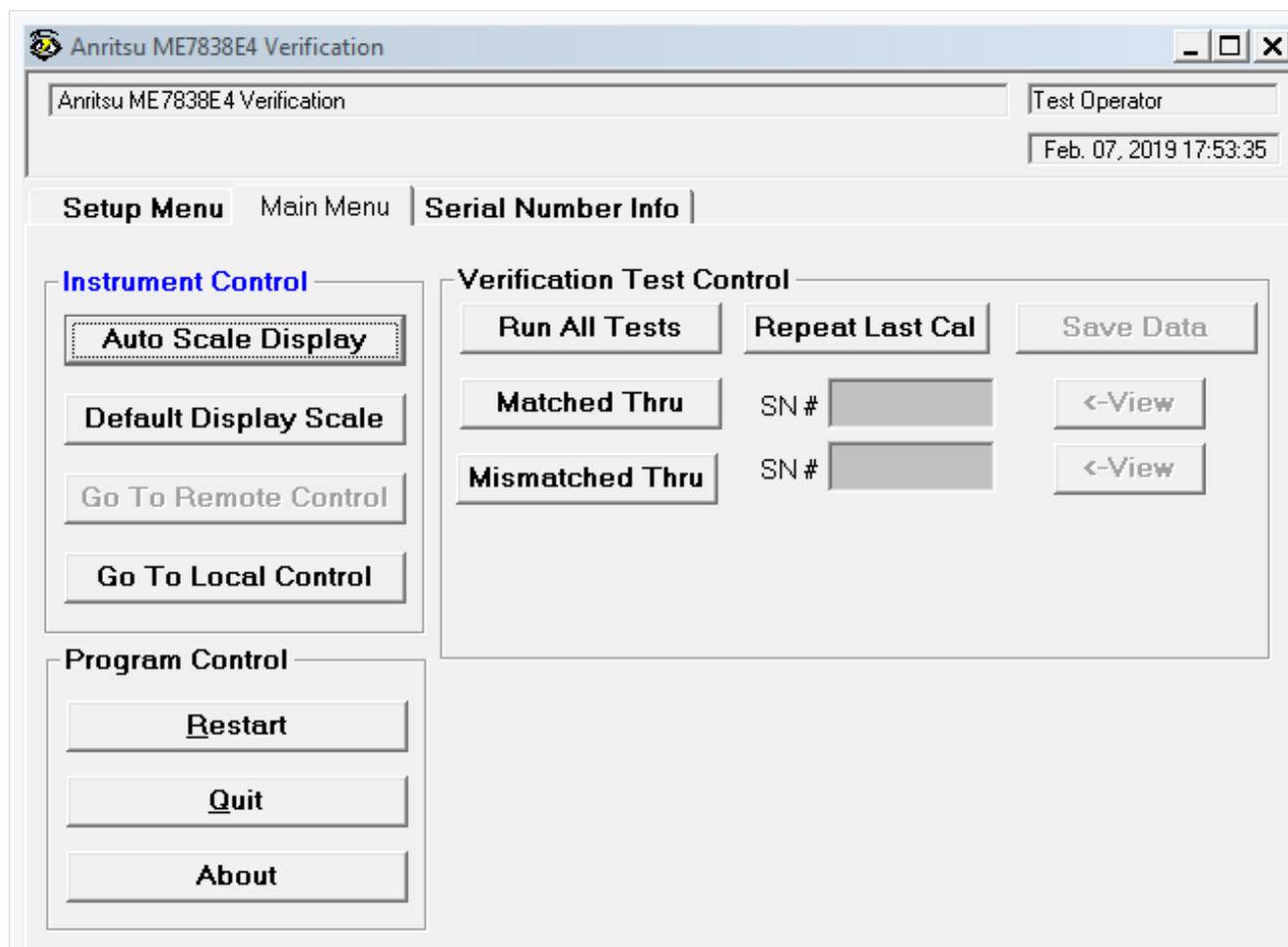


Figure 5-30. ME7838E4 Application Interface – Setup Menu Tab

13. The ME7838E4 system is a 4-port system, which requires a low-band calibration and a high-band calibration to be performed on only two ports at a time. The program execution for port 1 and port 2 continues in either [Section 5-7, “Low-Band Calibration Port 1 – Port 2” on page 5-21](#) or [Section 5-8, “High-Band Calibration Port 1 – Port 2” on page 5-24](#). The program execution for port 3 and port 4 continues in either [Section 5-15, “Low-Band Calibration Port 3 – Port 4” on page 5-41](#) or [Section 5-16, “High-Band Calibration Port 3 – Port 4” on page 5-44](#).

5-7 Low-Band Calibration Port 1 – Port 2

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 5-8 “High-Band Calibration Port 1 – Port 2” on page 5-24](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

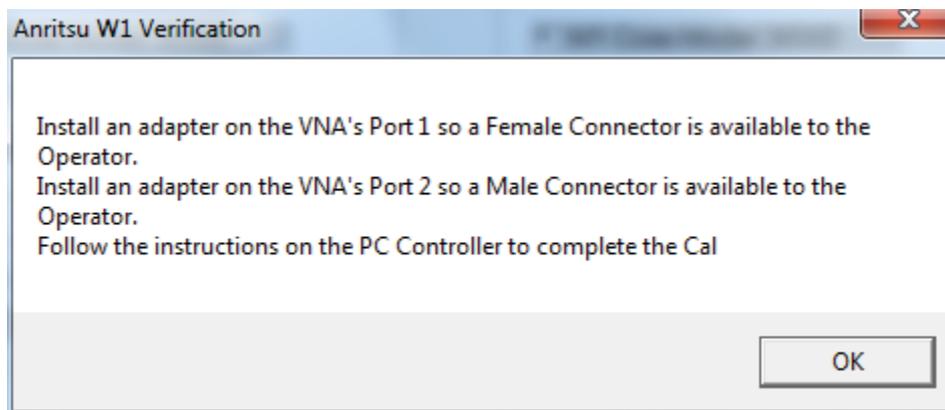


Figure 5-31. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.

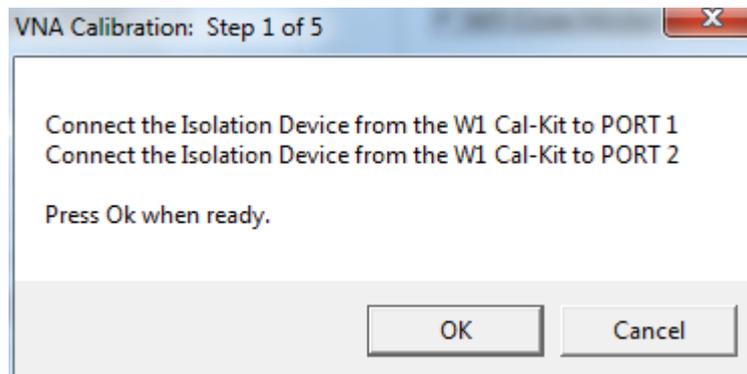


Figure 5-32. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 1.
 - b. Connect the Female Broadband Load Device to VNA Port 2.
 - c. When ready to proceed, click OK.

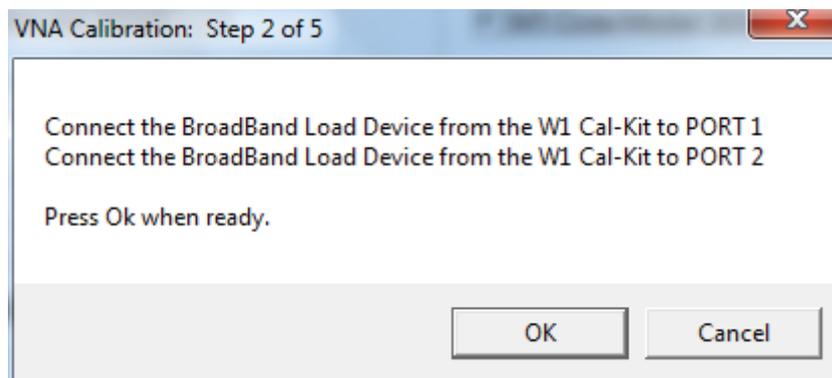


Figure 5-33. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 1.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 2.
 - c. When ready to proceed, click OK.

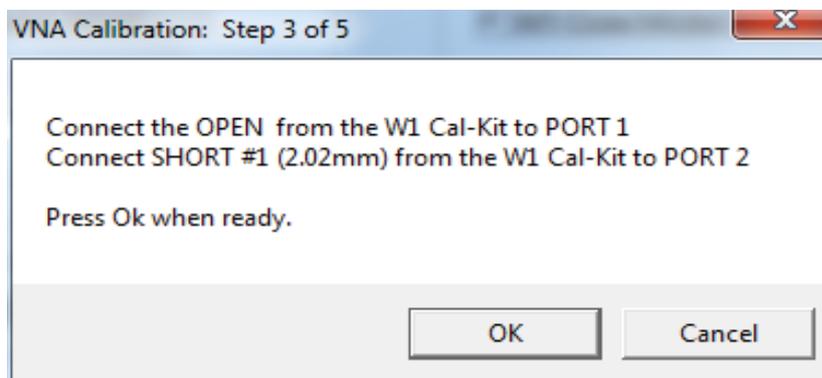


Figure 5-34. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 1.
 - b. Connect the Female Open to VNA Port 2.

- c. When ready to proceed, click OK.

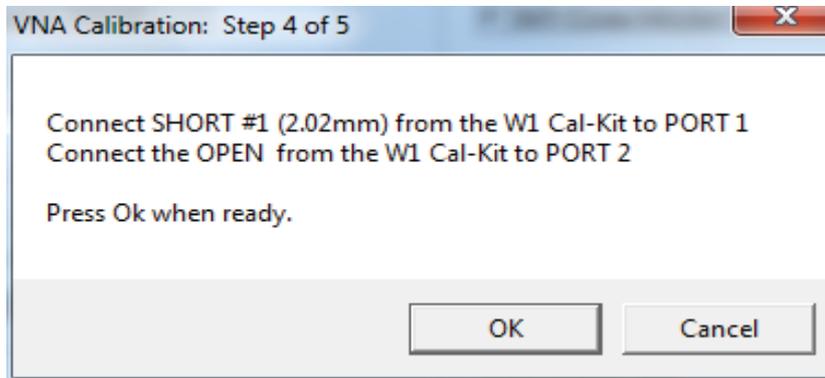


Figure 5-35. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 1 and Port 2, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.

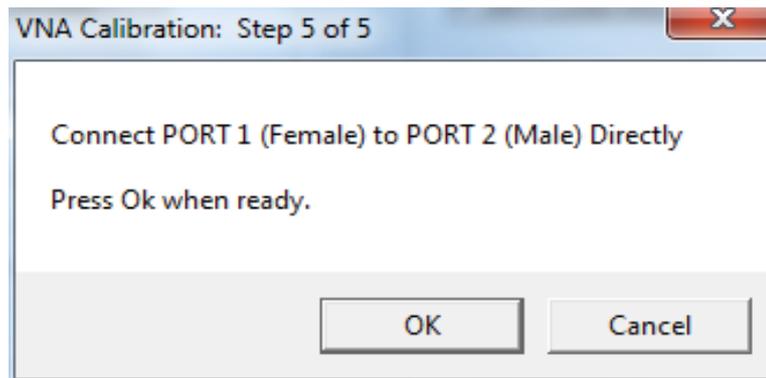


Figure 5-36. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 5-9 “Application Interface – Main Menu Tab”](#) on page 5-27.

5-8 High-Band Calibration Port 1 – Port 2

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 5-7 “Low-Band Calibration Port 1 – Port 2”](#) on page 5-21, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

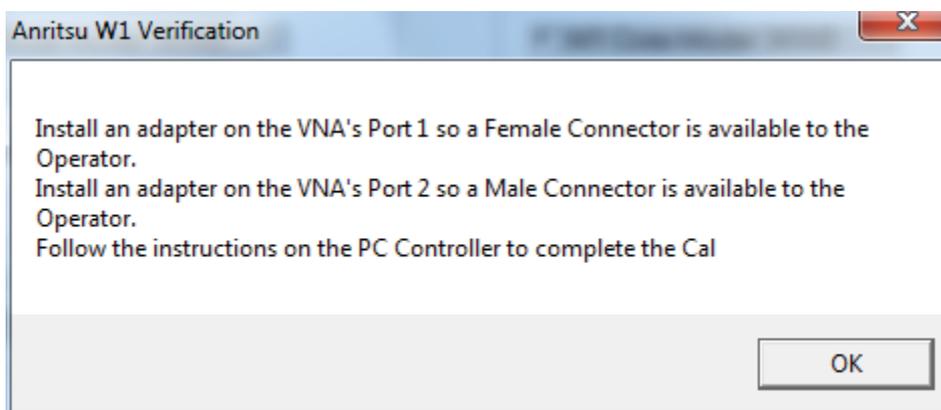


Figure 5-37. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.

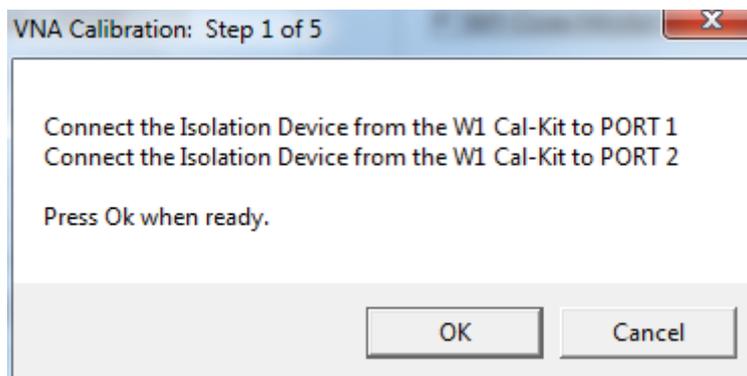


Figure 5-38. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 1.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 2.
 - c. When ready to proceed, click OK.

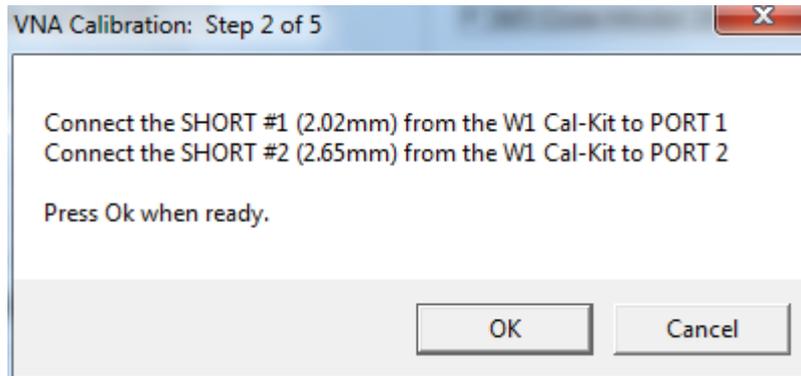


Figure 5-39. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 1.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 2.
 - c. When ready to proceed, click OK.

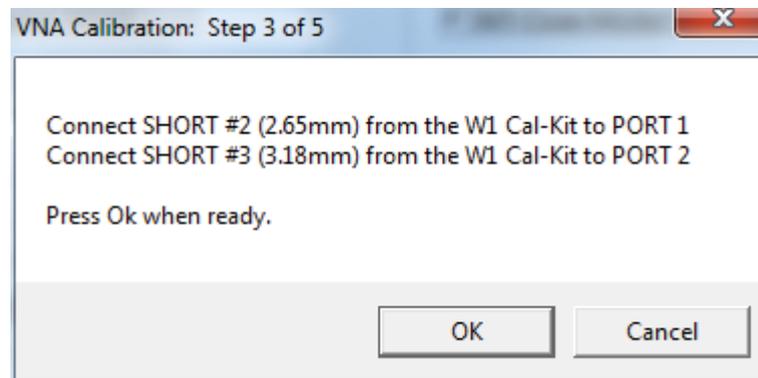


Figure 5-40. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 1.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 2.
 - c. When ready to proceed, click OK.

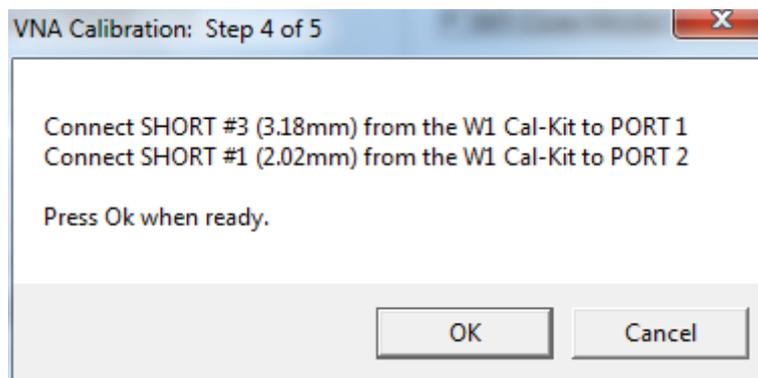


Figure 5-41. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 1 and Port 2.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.

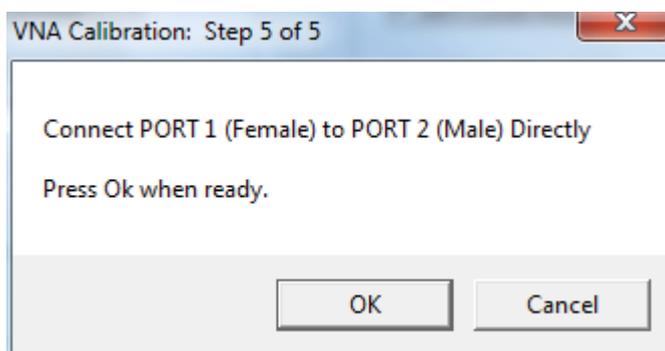


Figure 5-42. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 5-9 “Application Interface – Main Menu Tab”](#) on page 5-27.

5-9 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections below.

- The Setup Menu tab is described in [Section 5-6, “Application Interface – Setup Menu Tab”](#) on page 5-14.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 5-43](#)
- The Serial Number tab is described in [Section 5-10, “Application Interface – Serial Number Tabs”](#) on page 5-31.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

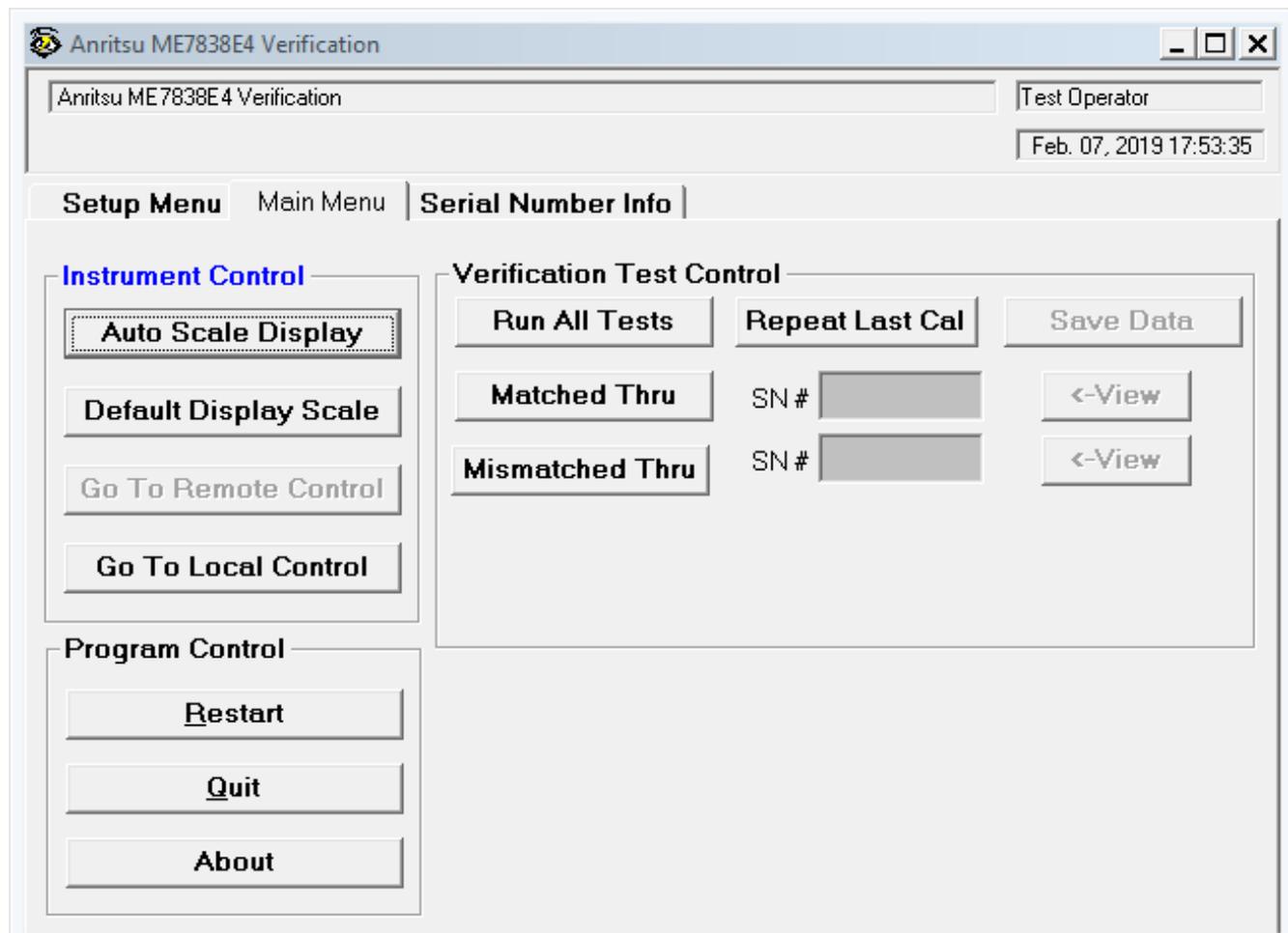


Figure 5-43. ME7838E4 Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S21 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S12 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S11 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S22 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 5-44](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

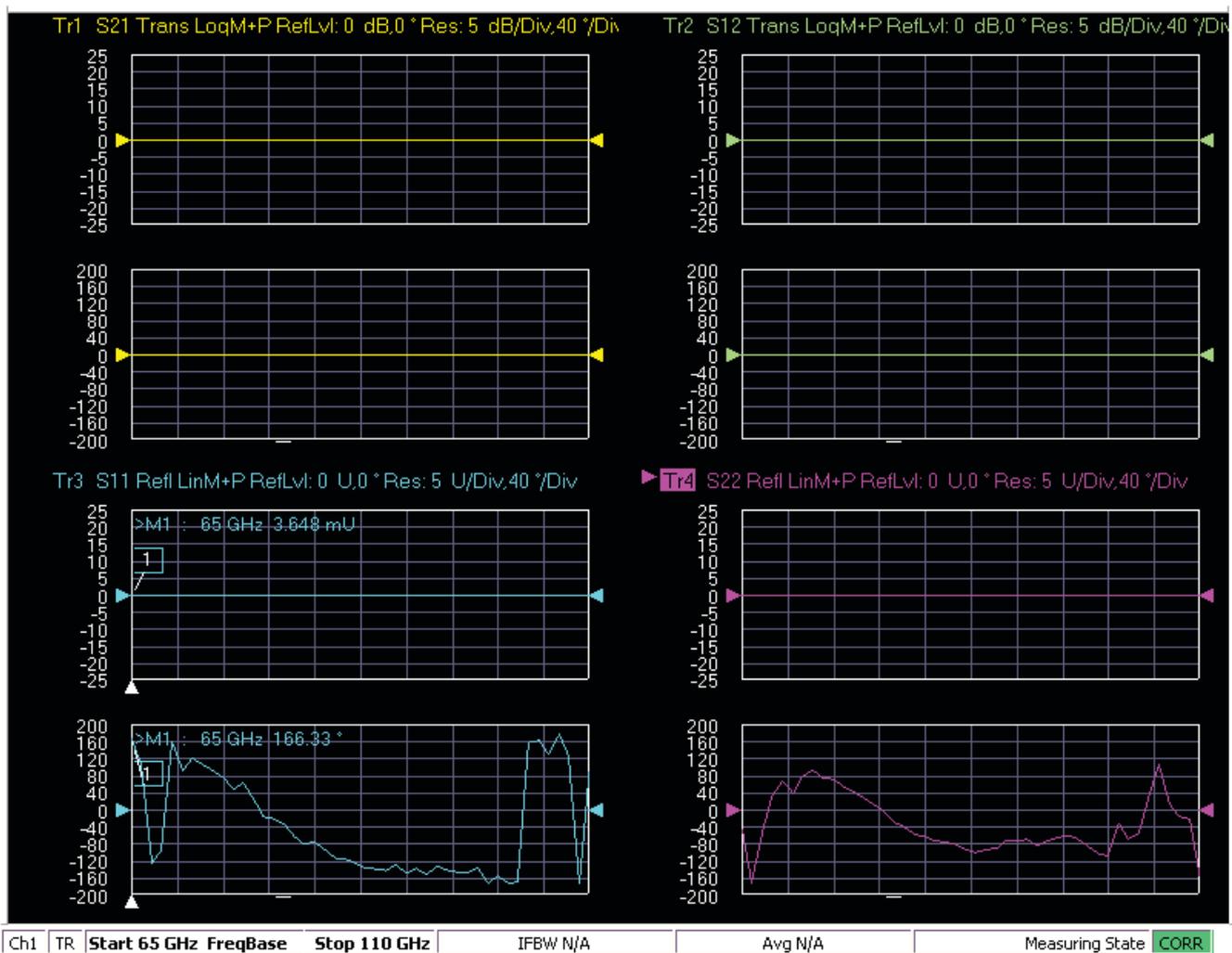


Figure 5-44. MS4640B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the **Go to Local Control** button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

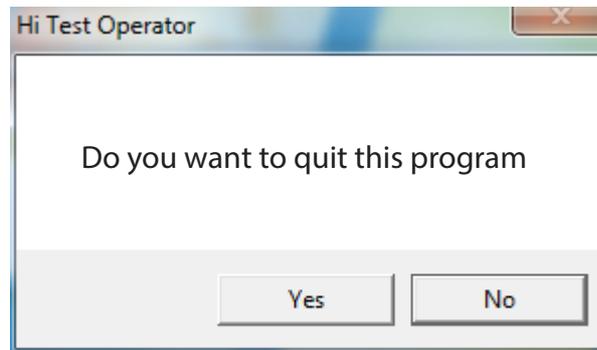
Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution	Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.
----------------	--

Restart Button

The **Restart** button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting **Yes** causes the program to return to the program initialization stage.



Usually, this button is used to test for second frequency band and program execution continues in [Section 5-14 “Restart for Alternate Frequency Band”](#) on [page 5-39](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting **Quit** brings up a confirmation dialog box. Selecting **Yes** exits the program; selecting **No** returns you to the previous screen.

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 5-11 “Matched Thru Tests”](#) on [page 5-32](#) and then continues with [Section 5-12 “Mismatched Thru Tests”](#) on [page 5-34](#). When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 5-43](#) on [page 5-27](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 5-43 on page 5-27](#).

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 5-13 “Saving Verification Data” on page 5-38](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at C:\mmcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 5-11 “Matched Thru Tests” on page 5-32](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 5-9 “Application Interface – Main Menu Tab” on page 5-27](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 5-12 “Mismatched Thru Tests” on page 5-34](#). When the tests are completed, the program returns to the Main Menu tab shown in [Table 5-43 on page 5-27](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

5-10 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

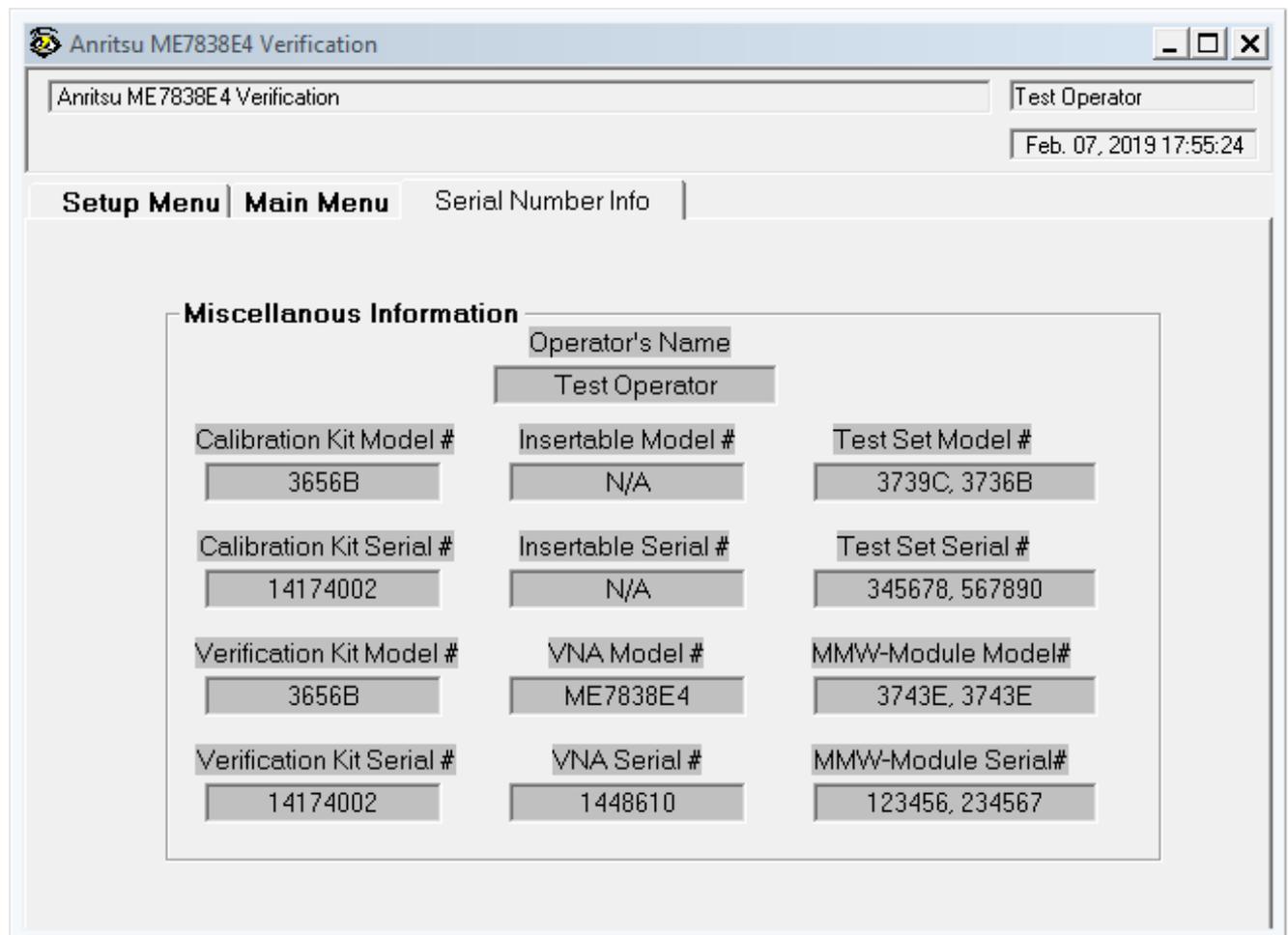


Figure 5-45. ME7838E4 Application Interface – Serial Number Tab

5-11 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 5-12 “Mismatched Thru Tests” on page 5-34](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 5-9 “Application Interface – Main Menu Tab” on page 5-27](#).

Note The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

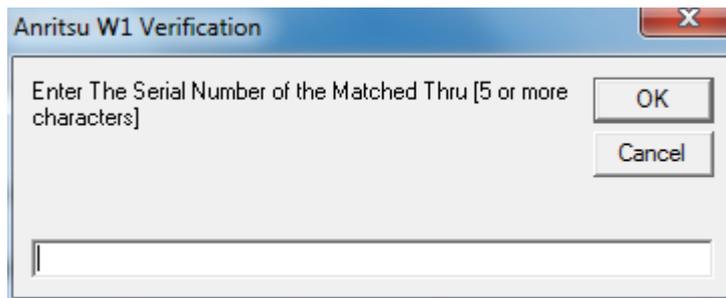


Figure 5-46. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

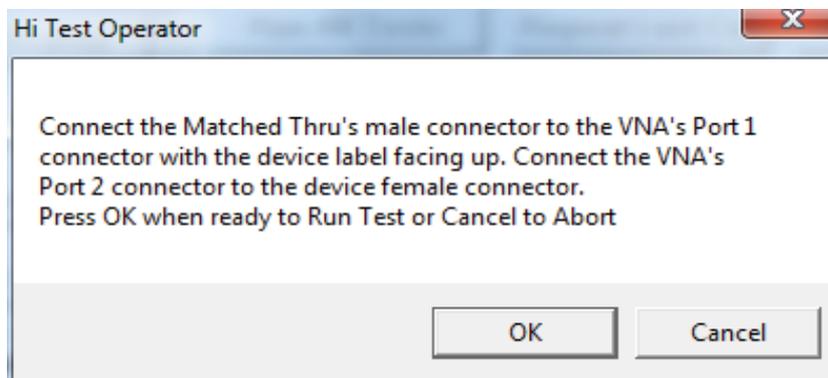


Figure 5-47. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 1 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 2.
7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

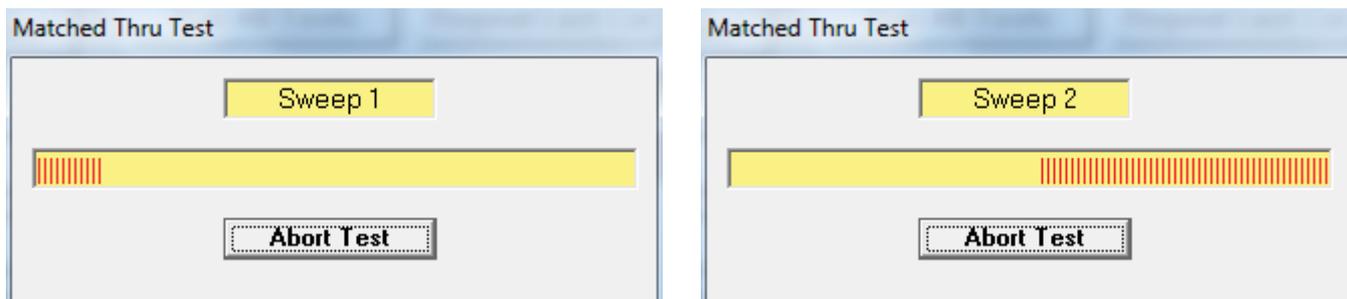


Figure 5-48. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

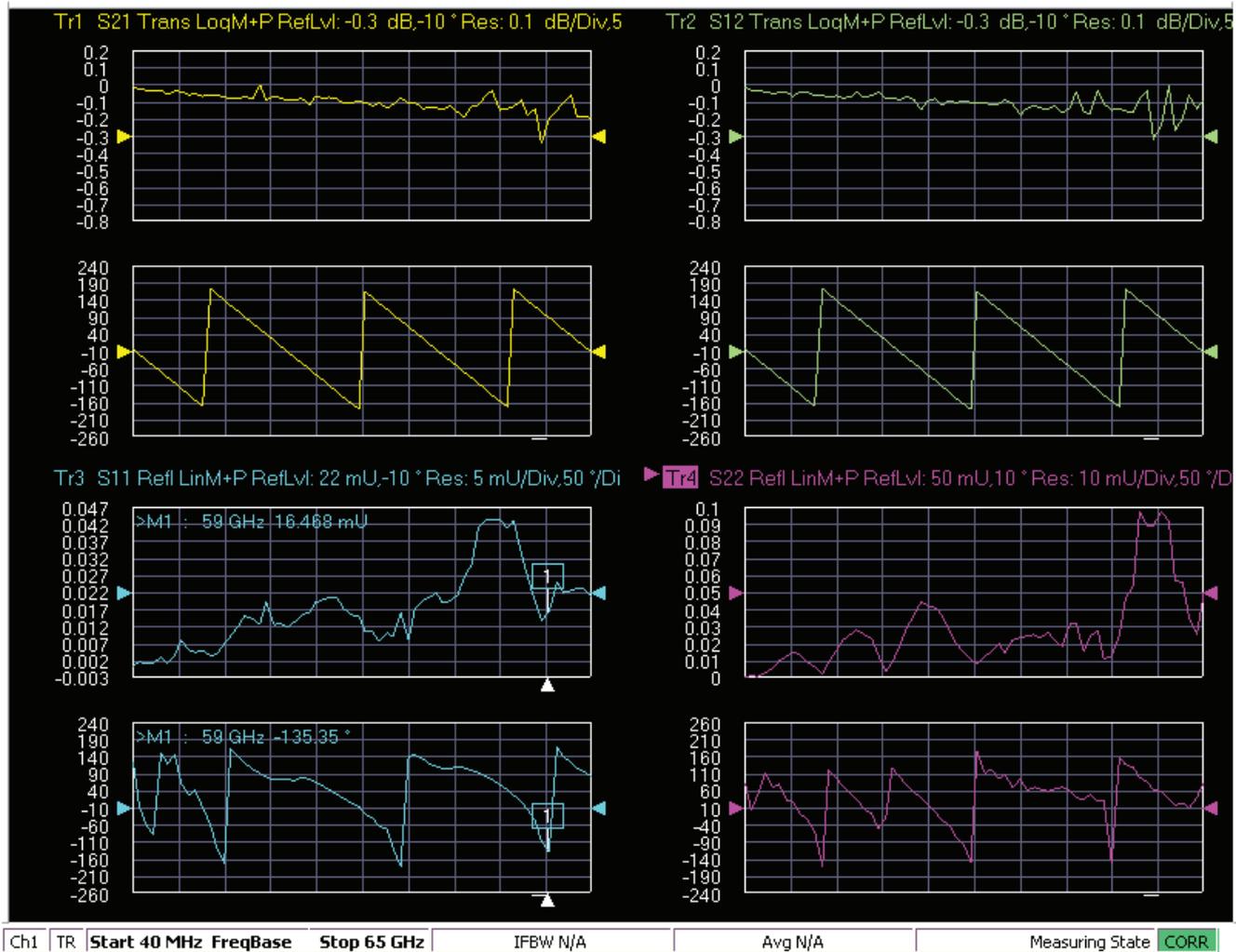


Figure 5-49. MS4640B Series VNA, Typical Matched Thru Data in Low Band

Upper-left quadrant= S21 – Forward Transmission
 Upper-right quadrant= S12 – Reverse Transmission
 Lower-left quadrant= S11 – Forward Reflection
 Lower-right quadrant= S22 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “[Application Interface – Main Menu Tab](#)” on page 5-27. The dialog box is shown in [Figure 5-43](#), “[ME7838E4 Application Interface – Main Menu Tab](#)” on page 5-27.
10. If the Run All Tests button was selected, the program execution continues with the following [Section 5-12](#), “[Mismatched Thru Tests](#)”.

5-12 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in [Section 5-11 “Matched Thru Tests”](#) on page 5-32) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 5-9 “Application Interface – Main Menu Tab” on page 5-27](#).

Note The verification devices must be connected to the **W1 Connector Coupler Ports** and not to the **VNA Ports**. Use the torque wrench supplied with the verification kit when tightening the device connections.

The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in [Section 5-9 “Application Interface – Main Menu Tab” on page 5-27](#).

The dialog box is shown in [Figure 5-43, “ME7838E4 Application Interface – Main Menu Tab” on page 5-27](#).

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in [Section 5-11 “Matched Thru Tests” on page 5-32](#)) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.

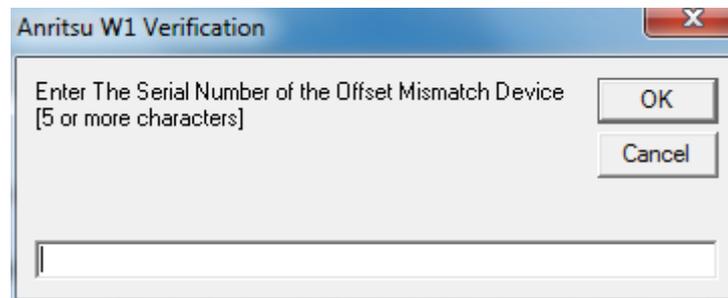


Figure 5-50. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

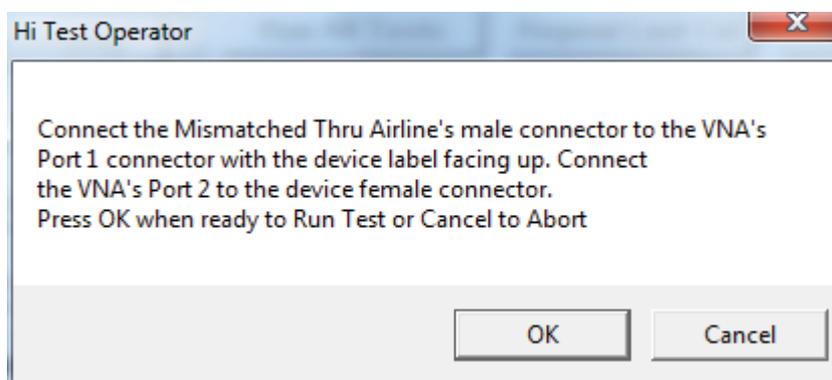


Figure 5-51. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 1 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 2.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

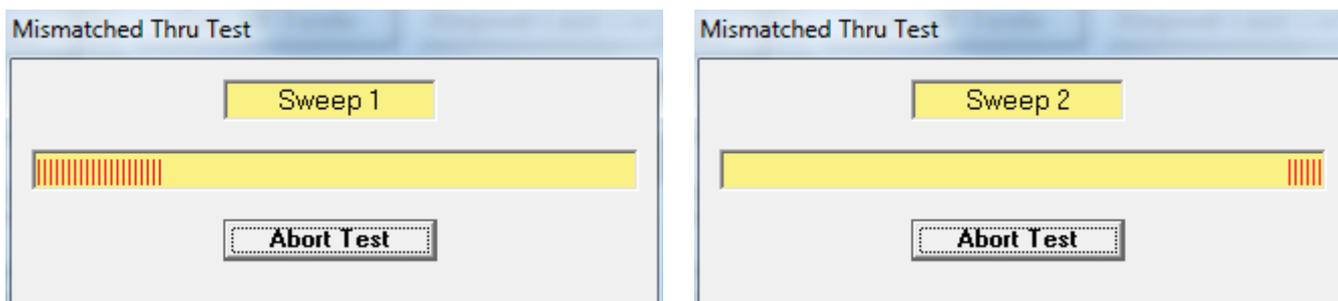


Figure 5-52. Status Dialogs

- When the test completes, the program returns to the main menu described [Section 5-9 “Application Interface – Main Menu Tab”](#) on page 5-27, and the display should look similar to [Figure 5-53](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

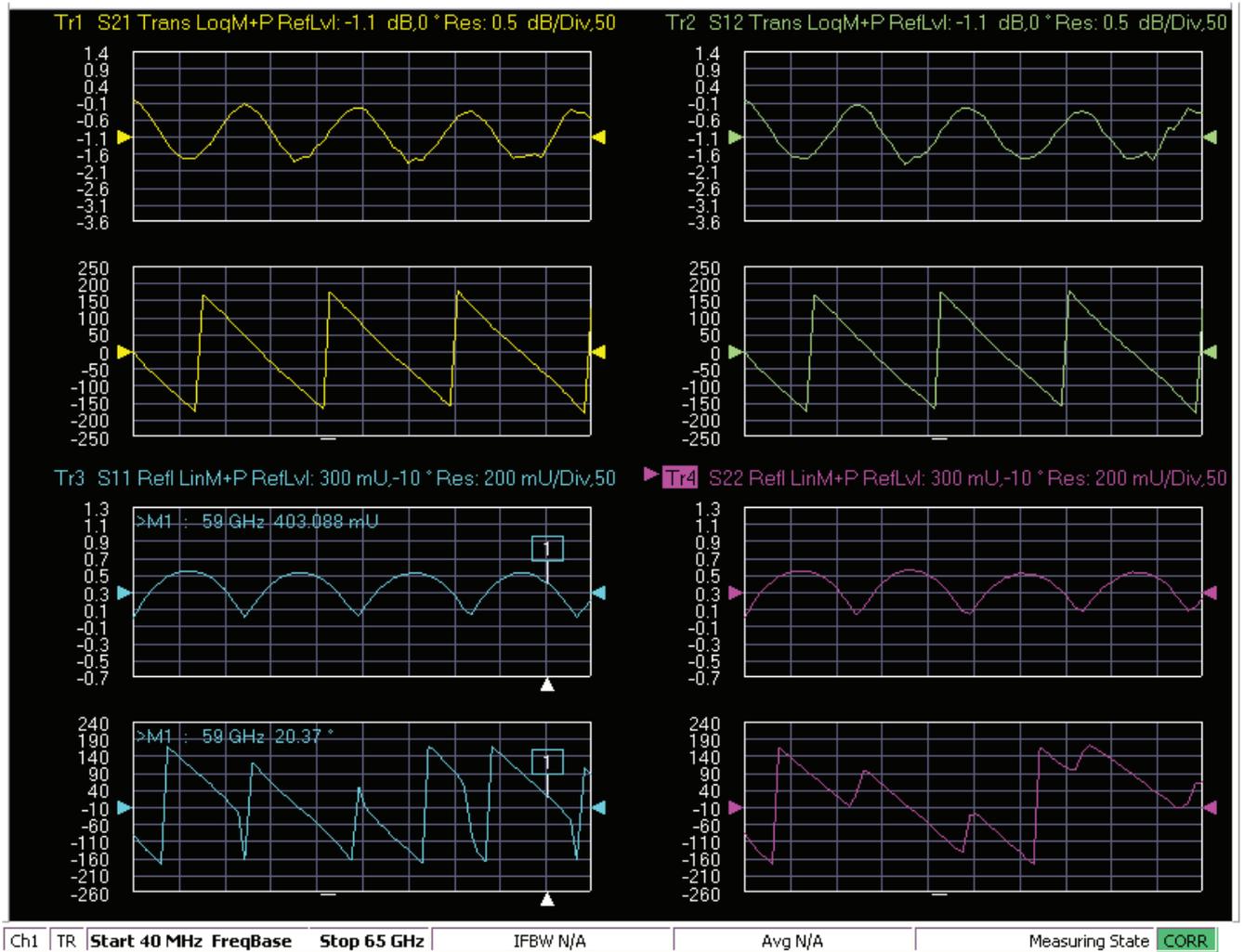


Figure 5-53. MS4640B Series VNA, Typical Mismatched Thru Data in Low Band

5-13 Saving Verification Data

If the **Save Data** button on the **Main Menu** tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 5-9 “Application Interface – Main Menu Tab”](#) on page 5-27.

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru Low.dat
- C:\mmdcsvc\Data\Mismatched Thru Low.dat
- C:\mmdcsvc\Data\Matched Thru High.dat
- C:\mmdcsvc\Data\Mismatched Thru High.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

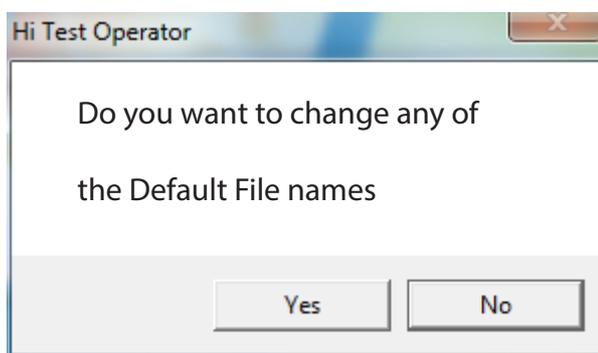


Figure 5-54. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.

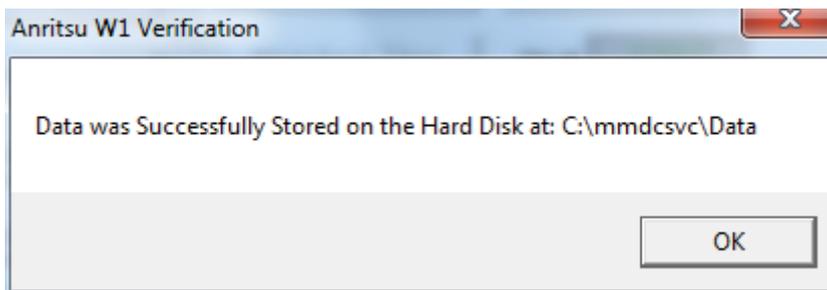


Figure 5-55. Information Dialog

5-14 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 5-9, “Application Interface – Main Menu Tab”](#) on page 5-27.
3. The Choose The Restart Method dialog box appears as shown below in [Figure 5-56](#).

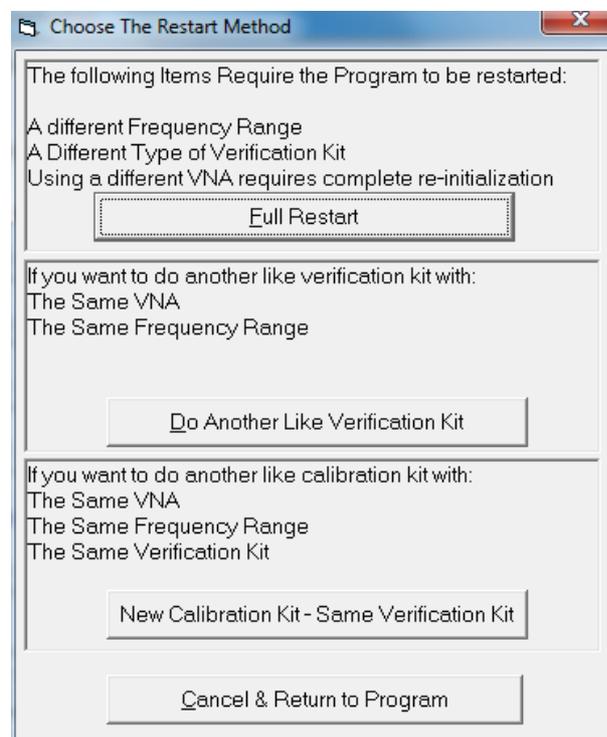


Figure 5-56. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as the procedures described previously starting in [Section 5-5, “Running the Verification Software”, Step 7](#) on page 5-7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK when ready to proceed to the next step.
6. Enter the GPIB Board 0 and then the GPIB Address 6.
7. Enter the Test Set Serial Number.
8. Enter the User Name.
9. Enter the Cal Kit Type selection.
10. Enter the Cal Kit Serial Number selection.
11. Enter the Load Cal Kit Disk.

12. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.
13. Enter the Verification Kit Type selection.
14. Enter the Verification Kit Serial Number selection.
15. Click the Go to USB Drive Locator button.
16. Click the Verify Files on USB Drive button.
17. Complete the calibration and verification of the devices for the second frequency range.
18. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
19. This series of automated tests has verified that the VectorStar ME7838E4 Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
20. The program returns to the main menu described in [Section 5-9, “Application Interface – Main Menu Tab” on page 5-27](#).

5-15 Low-Band Calibration Port 3 – Port 4

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 5-16 “High-Band Calibration Port 3 – Port 4” on page 5-44](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 3 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 4 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

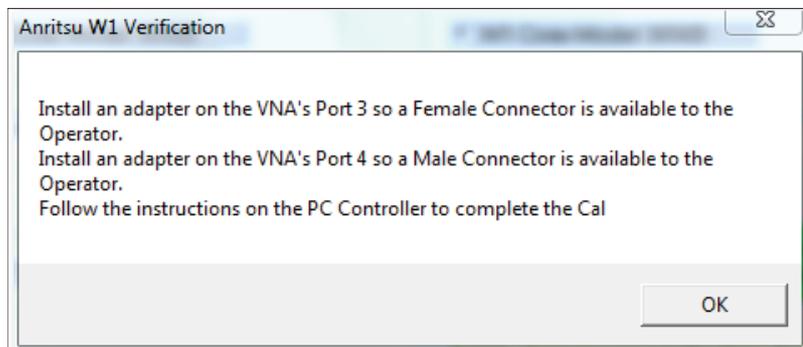


Figure 5-57. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 3.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 4.
 - c. When ready to proceed, click OK.

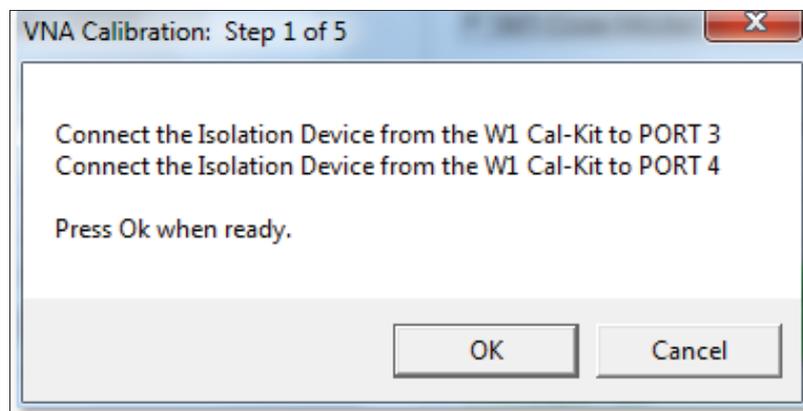


Figure 5-58. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 3.
 - b. Connect the Female Broadband Load Device to VNA Port 4.
 - c. When ready to proceed, click OK.

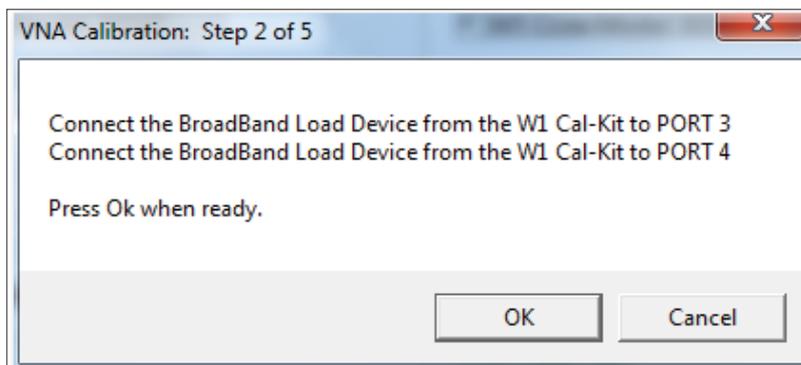


Figure 5-59. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 3.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 4.
 - c. When ready to proceed, click OK.

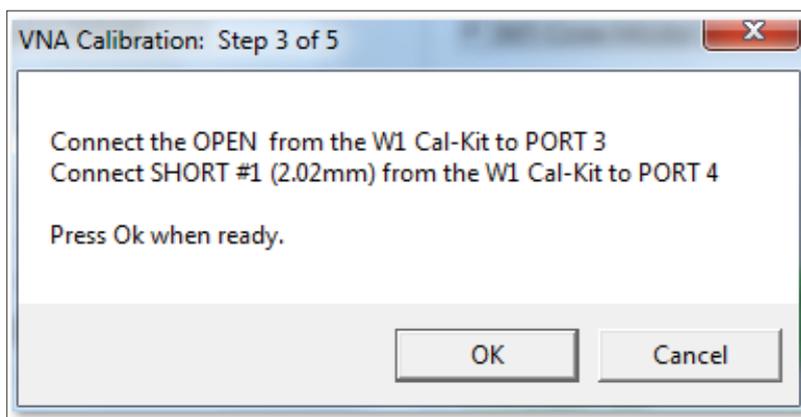


Figure 5-60. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 3.
 - b. Connect the Female Open to VNA Port 4.
 - c. When ready to proceed, click OK.

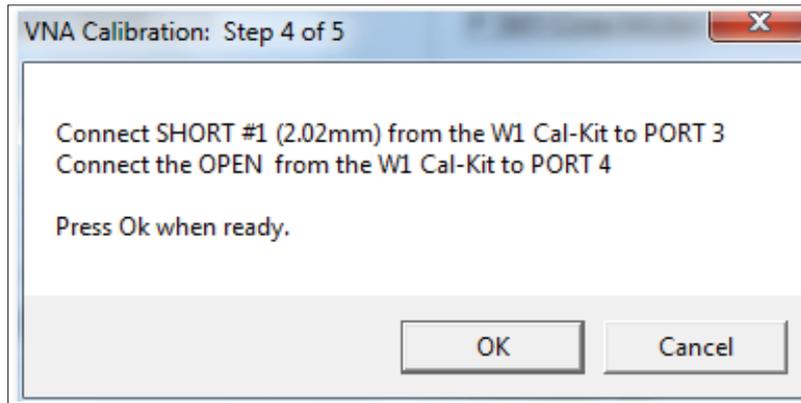


Figure 5-61. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 3 and Port 4, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 3 (Female) to VNA Port 4 (Male) directly.
 - c. When ready to proceed, click OK.

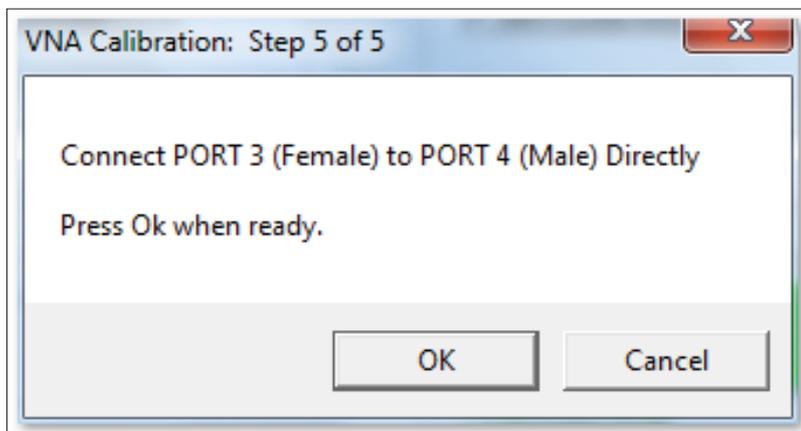


Figure 5-62. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 5-17 “Application Interface – Main Menu Tab”](#) on page 5-47.

5-16 High-Band Calibration Port 3 – Port 4

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 5-15 “Low-Band Calibration Port 3 – Port 4” on page 5-41](#), the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 3 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 4 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

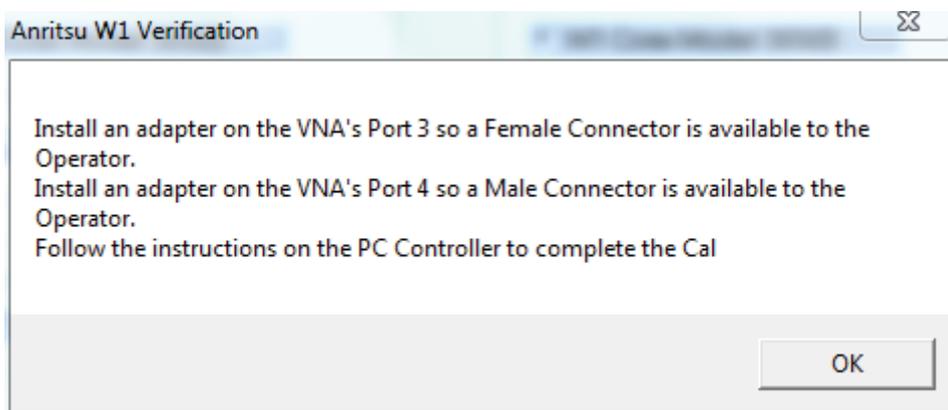


Figure 5-63. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 3.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 4.
 - c. When ready to proceed, click OK.

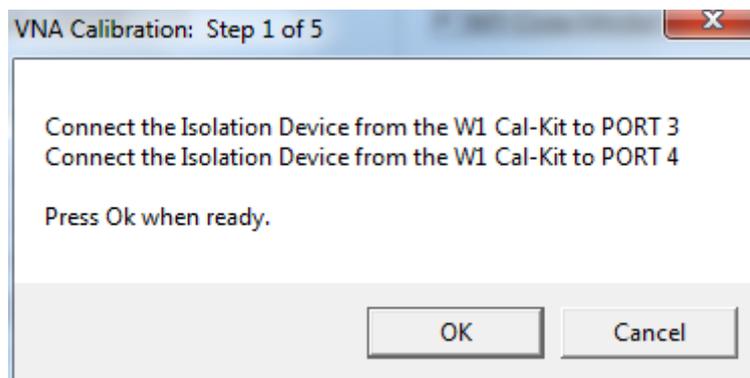


Figure 5-64. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 3.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 4.
 - c. When ready to proceed, click OK.

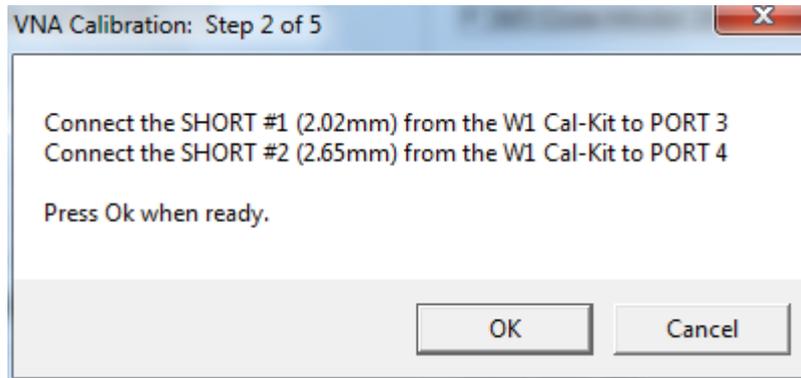


Figure 5-65. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 3.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 4.
 - c. When ready to proceed, click OK.

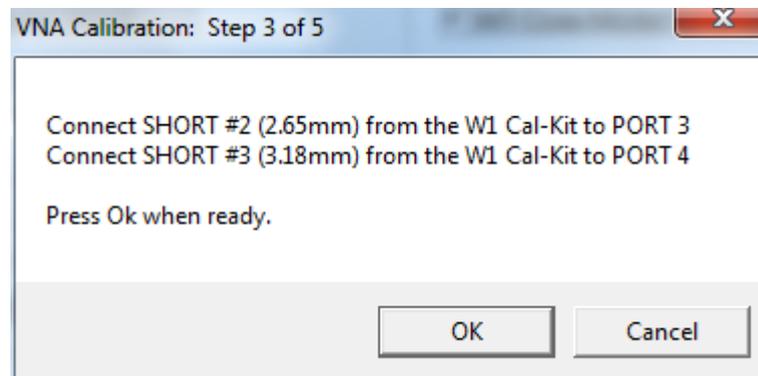


Figure 5-66. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 3.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 4.
 - c. When ready to proceed, click OK.

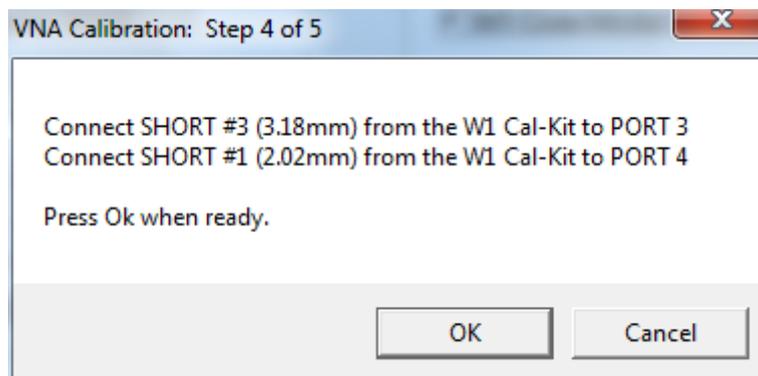


Figure 5-67. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 3 and Port 4.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 3 (Female) to VNA Port 4 (Male) directly.
 - c. When ready to proceed, click OK.

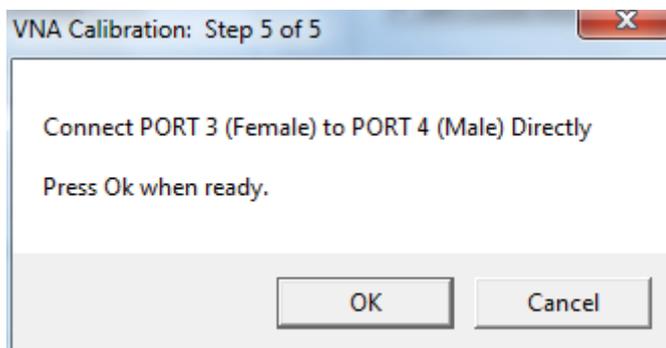


Figure 5-68. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 5-17 “Application Interface – Main Menu Tab”](#) on page 5-47.

5-17 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections.

- The Setup Menu tab is described in [Section 5-6, “Application Interface – Setup Menu Tab”](#) on page 5-14.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 5-43](#)
- The Serial Number tab is described in [Section 5-18, “Application Interface – Serial Number Tabs”](#) on page 5-52.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

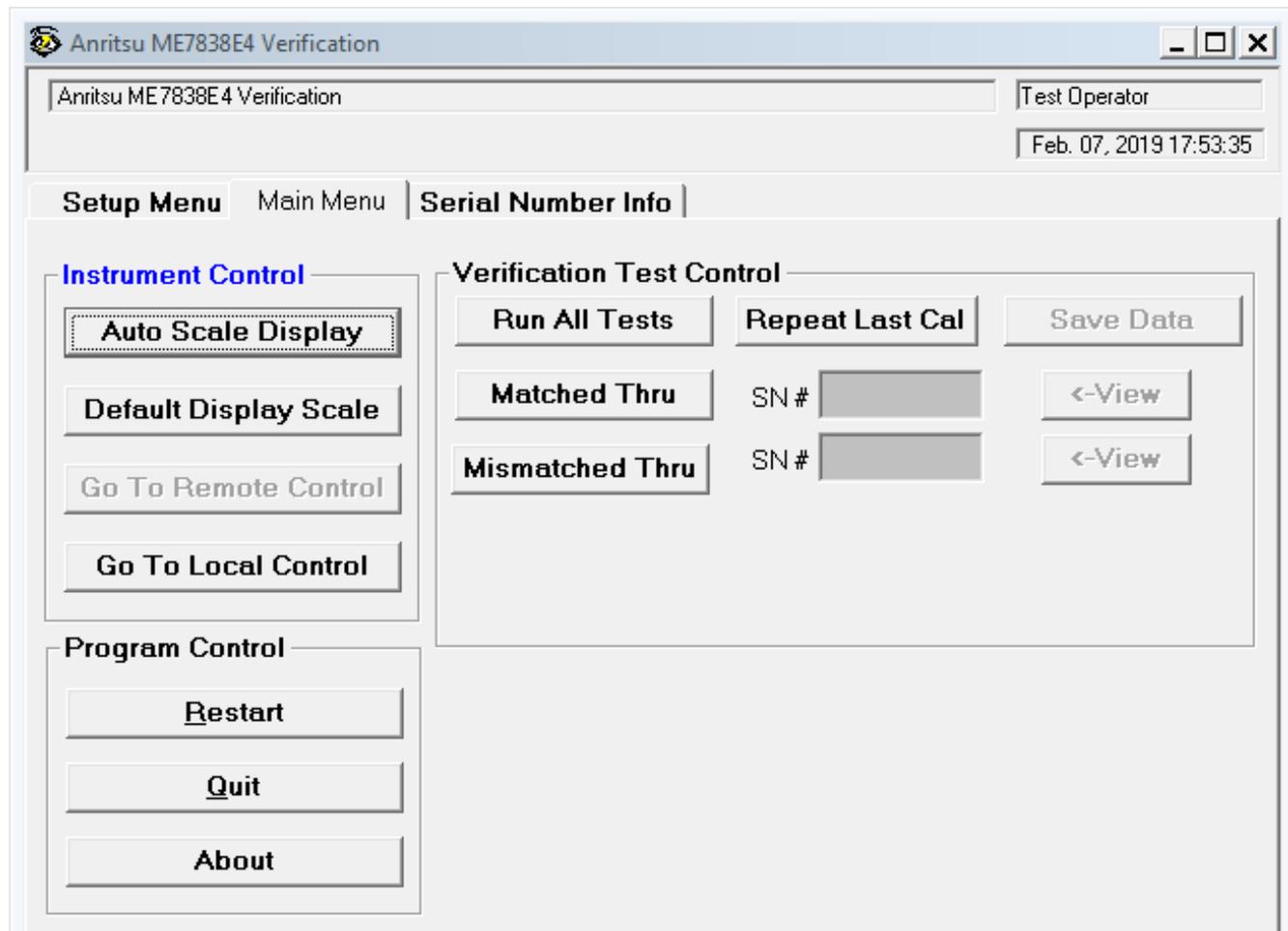


Figure 5-69. ME7838E4 Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S43 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S34 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S33 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S44 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 5-70](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

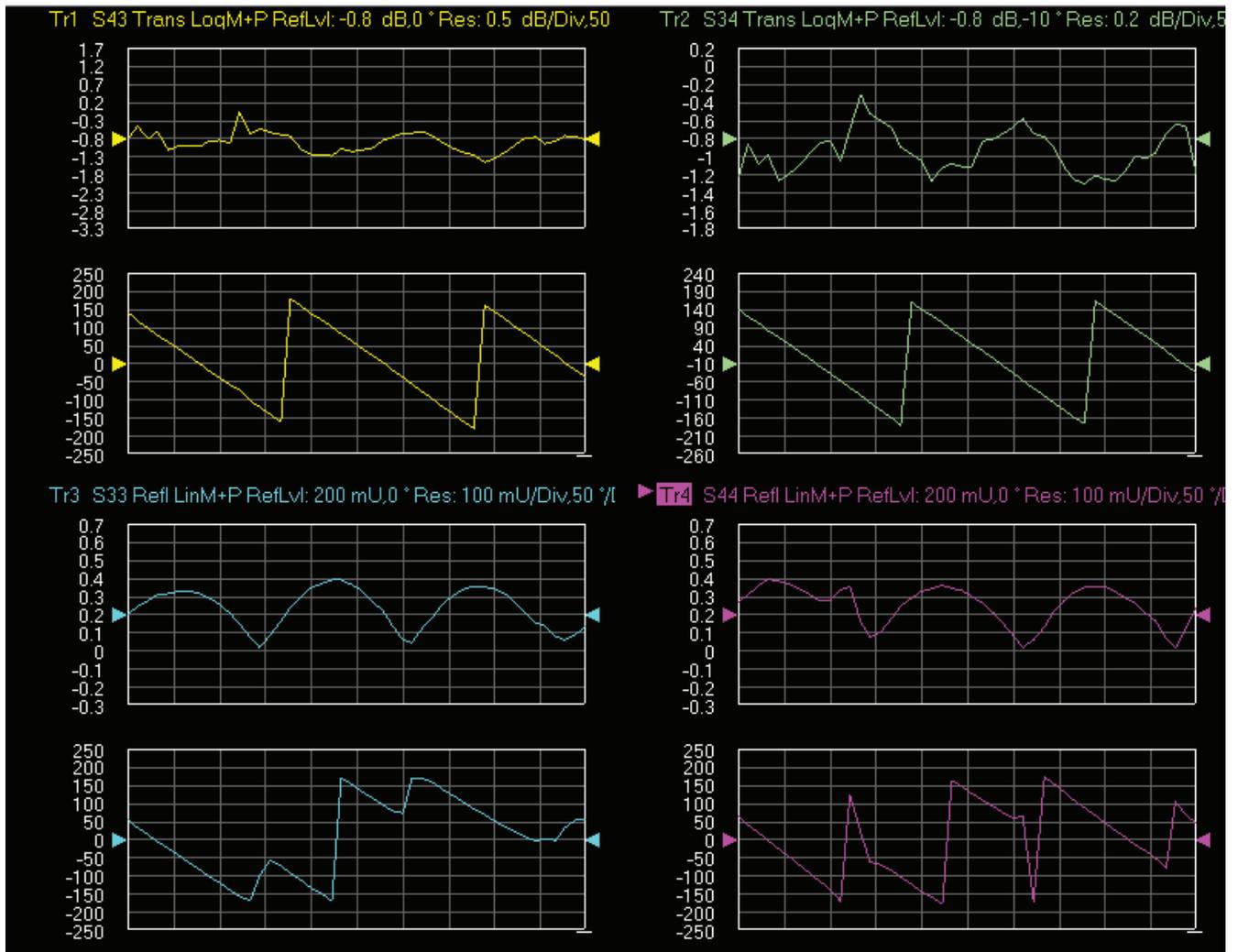


Figure 5-70. MS4640B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the **Go to Local Control** button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.

Restart Button

The Restart button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting Yes causes the program to return to the program initialization stage.

Usually, this button is used to test for second frequency band and program execution continues in [Section 5-22 “Restart for Alternate Frequency Band” on page 5-60](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting Quit brings up a confirmation dialog box shown in [Figure 5-71](#). Selecting Yes exits the program; selecting No returns you to the previous screen.

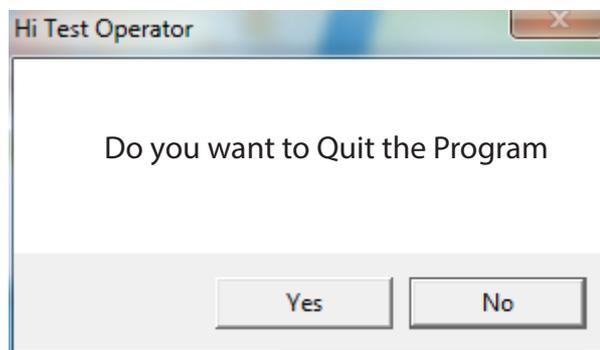


Figure 5-71. Confirmation Dialog

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 5-19 “Matched Thru Tests” on page 5-53](#) and then continues with [Section 5-20 “Mismatched Thru Tests” on page 5-56](#). When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 5-72 on page 5-52](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 5-69 on page 5-47](#).

Save Data

This command button writes data files to the PC Controller and stores the files at C:\mmcsvc\Data. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 5-21 “Saving Verification Data” on page 5-59](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at C:\mmcsvc\Data

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 5-19 “Matched Thru Tests” on page 5-53](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 5-17 “Application Interface – Main Menu Tab” on page 5-47](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 5-20 “Mismatched Thru Tests” on page 5-56](#). When the tests are completed, the program returns to the Main Menu tab shown in [Table 5-72 on page 5-52](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

5-18 Application Interface – Serial Number Tabs

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

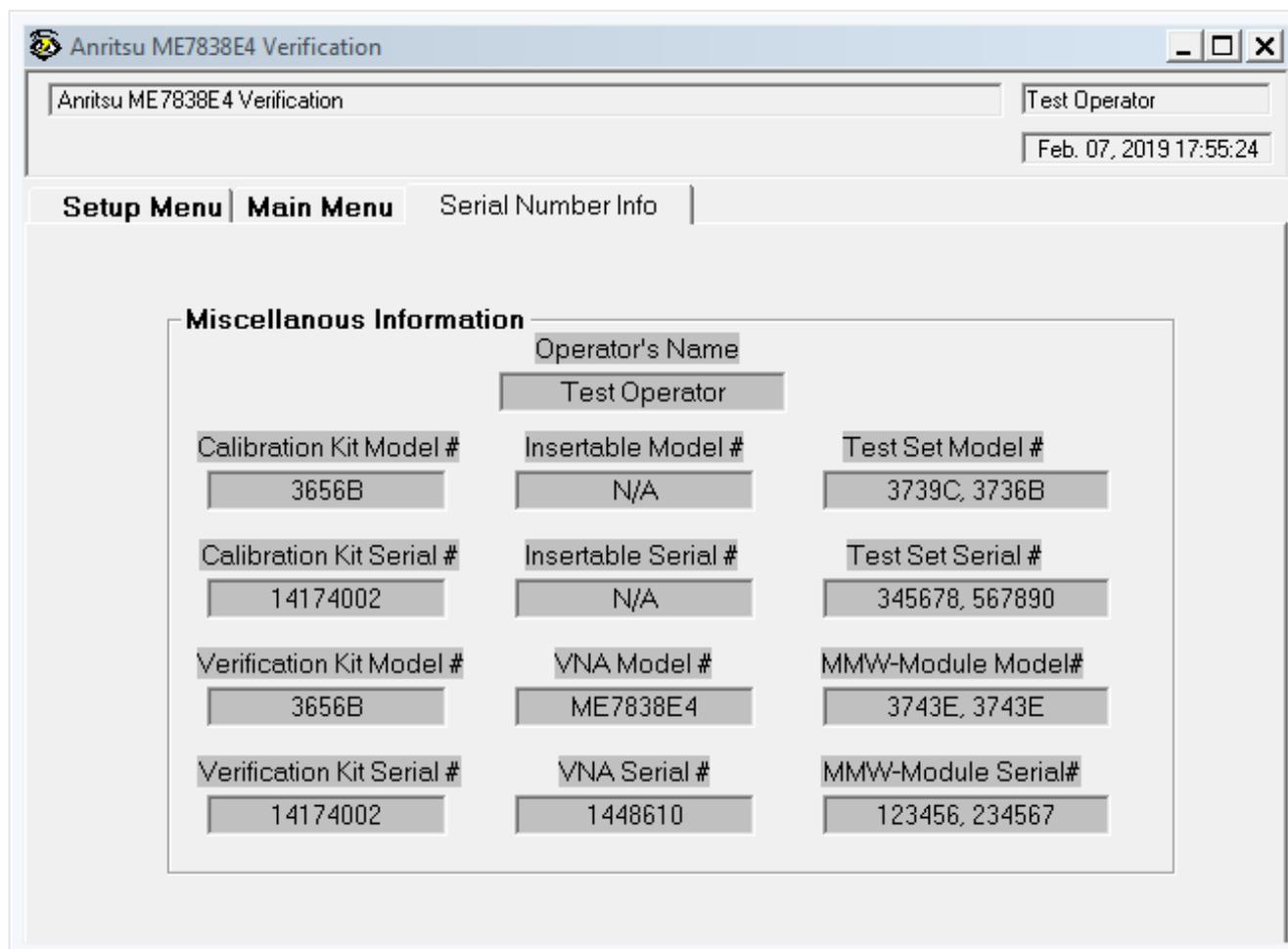


Figure 5-72. ME7838E4 Application Interface – Serial Number Tab

5-19 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 5-20 “Mismatched Thru Tests” on page 5-56](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 5-17 “Application Interface – Main Menu Tab” on page 5-47](#).

Note

The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

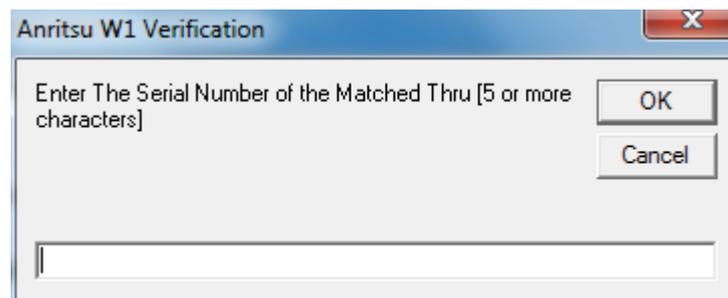


Figure 5-73. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note

The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

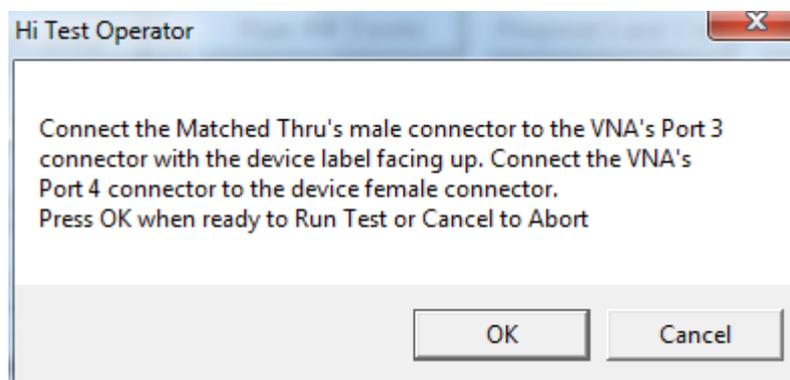


Figure 5-74. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 3 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 4.
7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

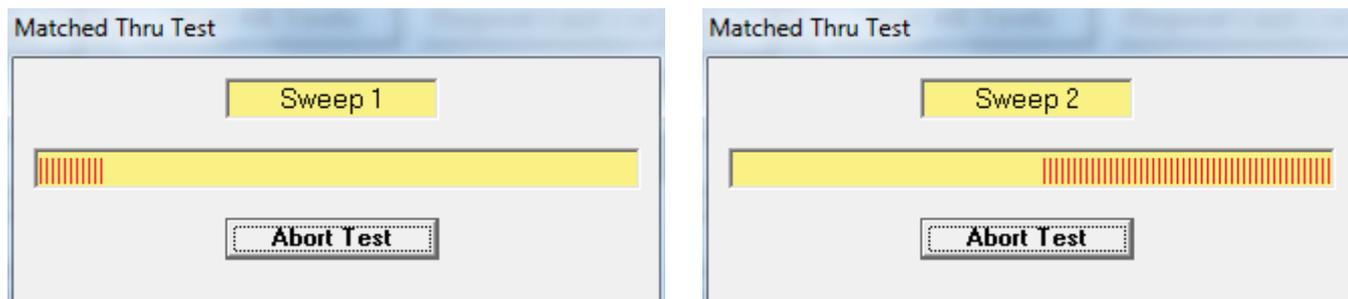


Figure 5-75. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

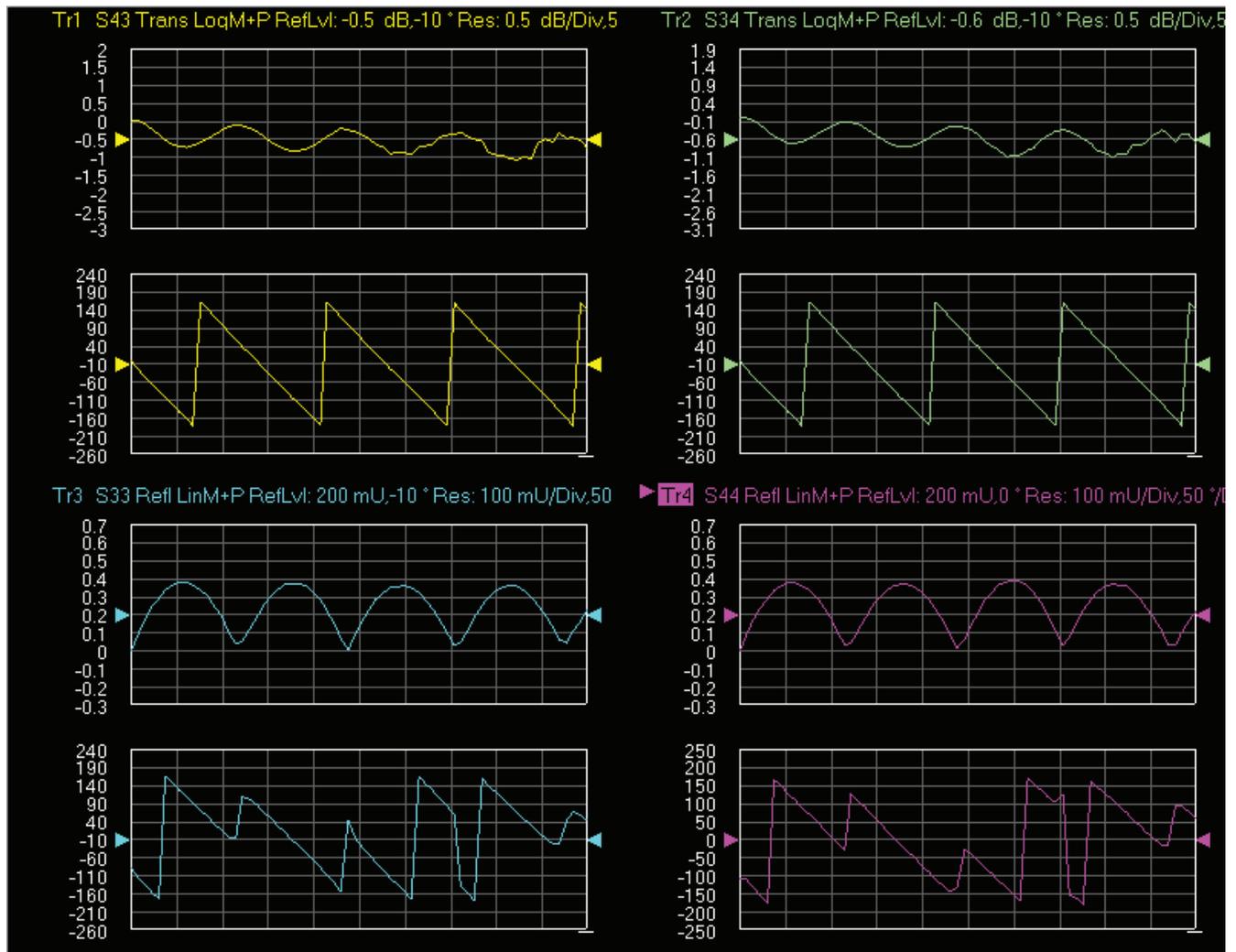


Figure 5-76. MS4640B Series VNA, Typical Matched Thru Data in Low Band

Upper-left quadrant= S43 – Forward Transmission
 Upper-right quadrant= S34 – Reverse Transmission
 Lower-left quadrant= S33 – Forward Reflection
 Lower-right quadrant= S44 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “[Application Interface – Main Menu Tab](#)” on page 5-47. The dialog box is shown in [Figure 5-69, “ME7838E4 Application Interface – Main Menu Tab](#)” on page 5-47.
10. If the Run All Tests button was selected, the program execution continues with the following [Section 5-19, “Matched Thru Tests”](#).

5-20 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in [Section 5-19 “Matched Thru Tests” on page 5-53](#)) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 5-17 “Application Interface – Main Menu Tab” on page 5-47](#).

Note	The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports . Use the torque wrench supplied with the verification kit when tightening the device connections.
-------------	--

The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in [Section 5-17 “Application Interface – Main Menu Tab” on page 5-47](#).

The dialog box is shown in [Figure 5-69, “ME7838E4 Application Interface – Main Menu Tab” on page 5-47](#).

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in [Section 5-20 “Mismatched Thru Tests” on page 5-56](#)) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.

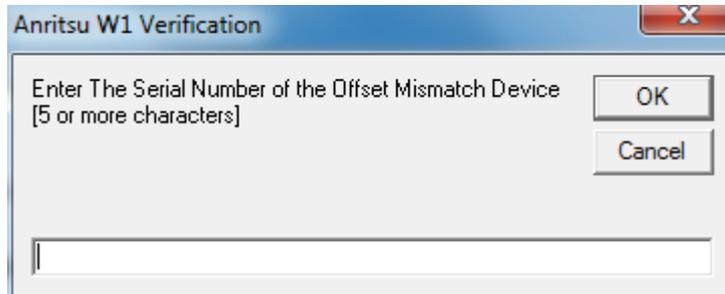


Figure 5-77. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note	The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.
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- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

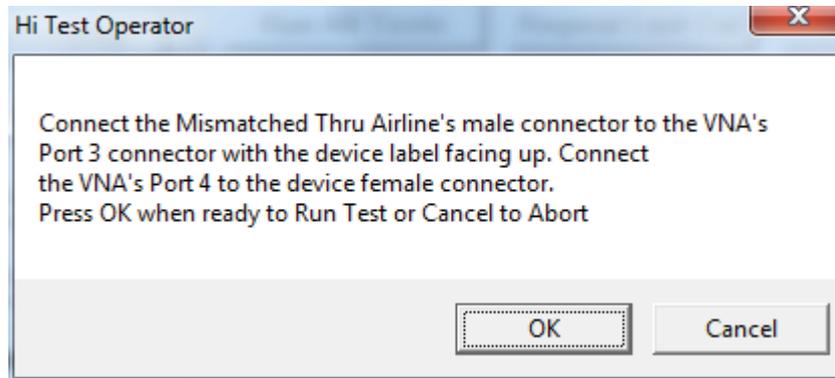


Figure 5-78. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 3 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 4.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

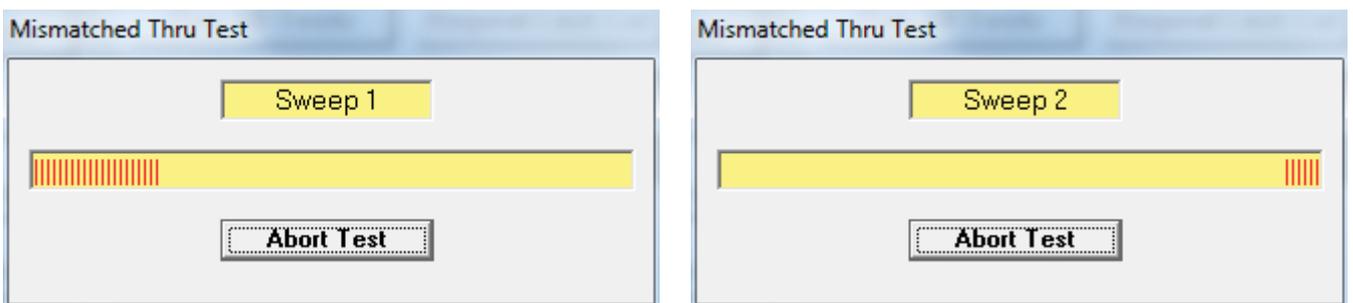


Figure 5-79. Status Dialogs

7. When the test completes, the program returns to the main menu described [Section 5-17 “Application Interface – Main Menu Tab”](#) on page 5-47, and the display should look similar to [Figure 5-70](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

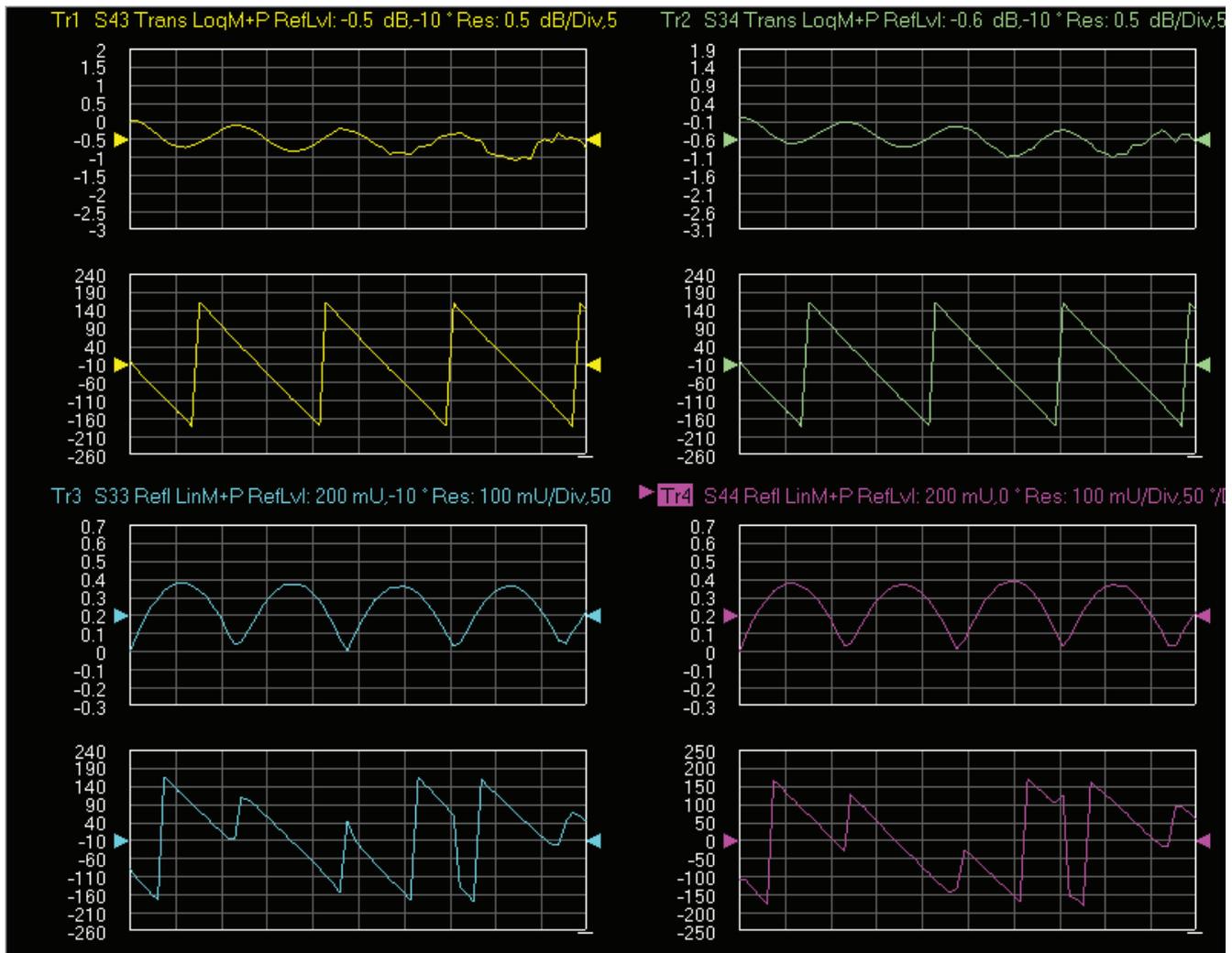


Figure 5-80. MS4640B Series VNA, Typical Mismatched Thru Data in Low Band

Upper-left quadrant= S43 – Forward Transmission
 Upper-right quadrant= S34 – Reverse Transmission
 Lower-left quadrant= S33 – Forward Reflection
 Lower-right quadrant= S44 – Reverse Reflection

5-21 Saving Verification Data

If the Save Data button on the Main Menu tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 5-17 “Application Interface – Main Menu Tab” on page 5-47](#).

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru LowPort3and4.dat
- C:\mmdcsvc\Data\Mismatched Thru LowPort3and4.dat
- C:\mmdcsvc\Data\Matched Thru HighPort3and4.dat
- C:\mmdcsvc\Data\Mismatched Thru HighPort3and4.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

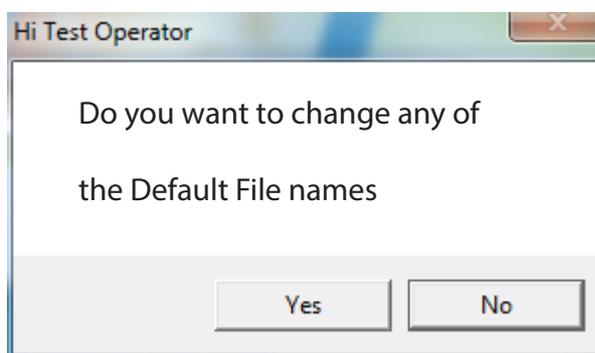


Figure 5-81. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.

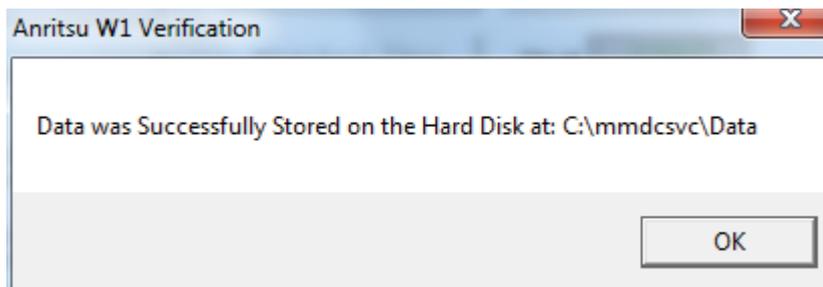


Figure 5-82. Information Dialog

5-22 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 5-17, “Application Interface – Main Menu Tab”](#) on page 5-47.
3. The Choose The Restart Method dialog box appears as shown in [Figure 5-83](#).

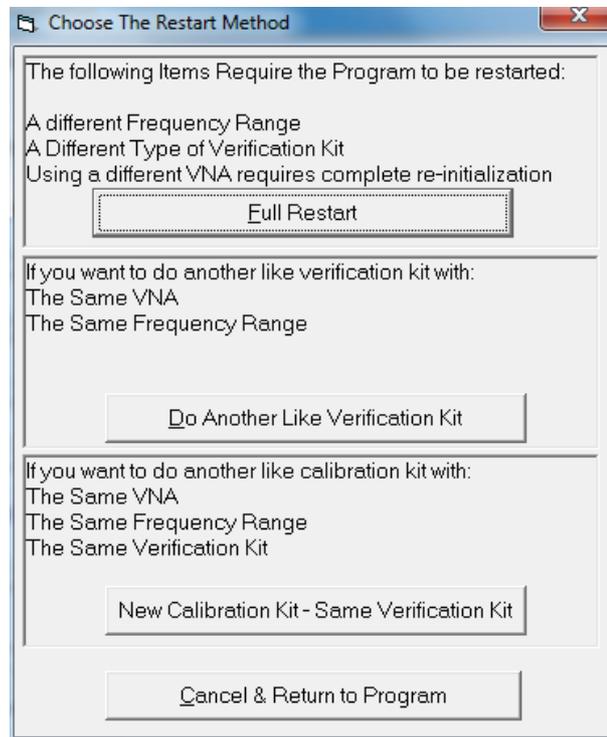


Figure 5-83. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as described previously starting in [Section 5-5, “Running the Verification Software”](#) on page 5-6, Step 7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK to proceed to the next step.
6. Enter the GPIB Board 0.
7. Enter the GPIB Address 6.
8. Enter the Test Set Serial Number.
9. Enter the User Name.
10. Enter the Cal Kit Type selection.
11. Enter the Cal Kit Serial Number selection.
12. Enter the Load Cal Kit Disk from VNA Floppy selection.

13. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.
14. Enter the Verification Kit Type selection.
15. Enter the Verification Kit Serial Number selection.
16. Click the Go to USB Drive Locator button and click the Verify Files on USB Drive button.
17. Complete the calibration and verification of the devices for the second frequency range.
18. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
19. This series of automated tests has verified that the VectorStar ME7838E4 Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
20. The program returns to the main menu described in [Section 5-17, “Application Interface – Main Menu Tab”](#) on page 5-47.

5-23 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed with the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting the performance verification software, the verification kit data USB memory device is installed in the correct USB port and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit USB drive matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, and in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu customer service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 6 — Using the 2300-584-R Software with the ME7828A

6-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) with the VectorStar ME7828A Standard BB/mm-Wave VNA Measurement System. The ME7828A is based on the VectorStar MS4640A/B Series Vector Network Analyzers (VNAs).

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired. This document supports all software versions 1.2x and above.
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Required VectorStar ME7828A Instruments and Components

The VectorStar ME7828A Broadband/Millimeter Wave Measurement System is composed of the following instruments:

- VectorStar MS4647A/B VNA, 10 MHz to 70 GHz, V Connectors
- 3738A Test Set
- 3700C3 Floor Console
- Two 3742A-EW Transmission-Reflection WR-10 Modules, 70 GHz to 110 GHz
- 66670-3 Left WR-10 Combiner Coupler
- 66671-3 Right WR-10 Combiner Coupler
- Two MG37022A Fast-Switching Signal Generators, 2 to 20 GHz, for LO and RF Sources

6-2 Configuring the Hardware

This section describes how the various system elements are interconnected and the preliminary steps required for operation of the verification software. See [“Required Equipment” on page 1-1](#) above for a complete equipment list.

1. Ensure that the VNA system is set to “Broadband”.
2. To verify the setting, from the right side MAIN menu, select:
MAIN | Application | APPLICATION | Rcvr Config | RCVR CONFIG | BB/mmWave (3738 Set up) or BB/mmWave (3739 Set up)
3. Select Broadband in the Rcvr Config section.
4. Connect a GPIB cable between the PC Controller and the VNA Rear Panel GPIB port labeled IEEE 488.2 GPIB.

Note	Do not connect the cable to the VNA Rear Panel GPIB port labeled Dedicated GPIB .
-------------	--

6-3 W1 Verification Application Installation

Prior to installation of the W1 Application the National Instruments GPIB card and drivers must be installed in the Windows PC.

This only needs to be done once per PC Controller. The software is contained on the Disk supplied with each Verification Kit.

In order to correctly install the PVS application, the logged in user must have Administrative rights on the Windows PC Controller.

- Note** The PVS application is installed onto the PC Controller on an all-user basis.
- If your organization does not allow for all-user installations, consult your internal PC and network support group on how to best proceed.

1. Prior to installation of the 2300-584-R PVS, the National Instruments GPIB card and its drivers must be installed in the PC Controller.
2. Turn off all other running applications on the PC Controller.
3. Insert the USB Memory Device into the USB slot.
4. Open Windows Explorer, browse to the USB Drive, and double click on **Startup.htm**.

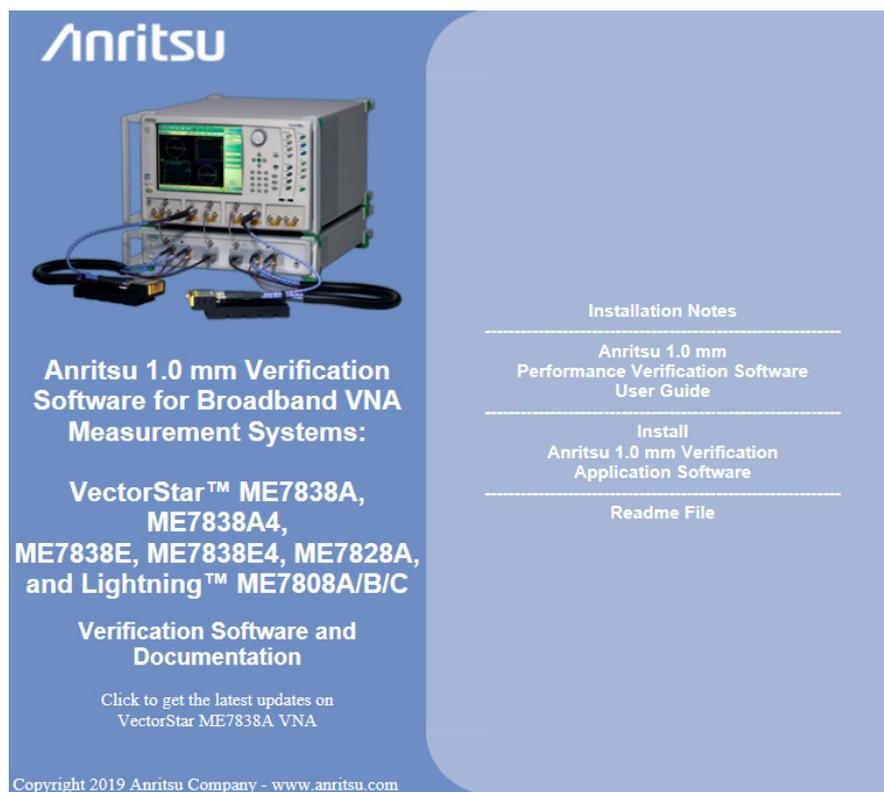


Figure 6-1. PVS Installation and Documentation Screen

5. On the navigation page, click the **Install Anritsu 1.0 mm Verification Application Software** link.
6. The first of several installation dialog boxes appears as shown in [Figure 6-2](#).

7. Click Run on the two security dialog boxes.

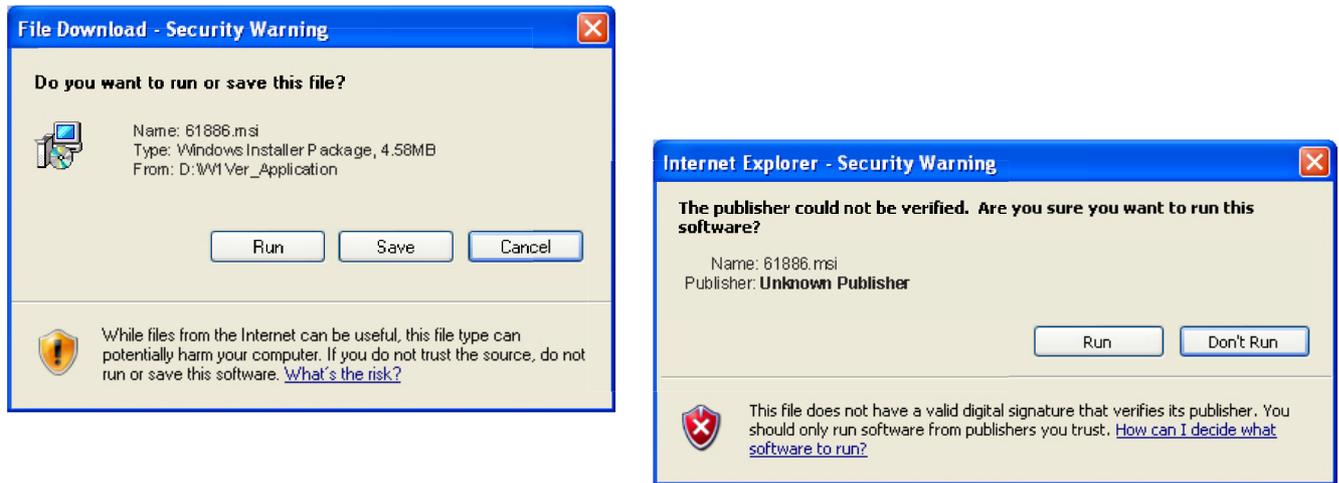


Figure 6-2. Installation Security Dialog Boxes – Click Run on each

8. If either of the two dialog boxes shown in [Figure 6-3](#) for Error 1321 or Error 1931 appear, follow these instructions:

- Error 1321 – Select Exit Installation and make sure you have Administrator privileges on the PC Controller.
- For Error 1931 – Select OK to bypass the error message and continue the installation.

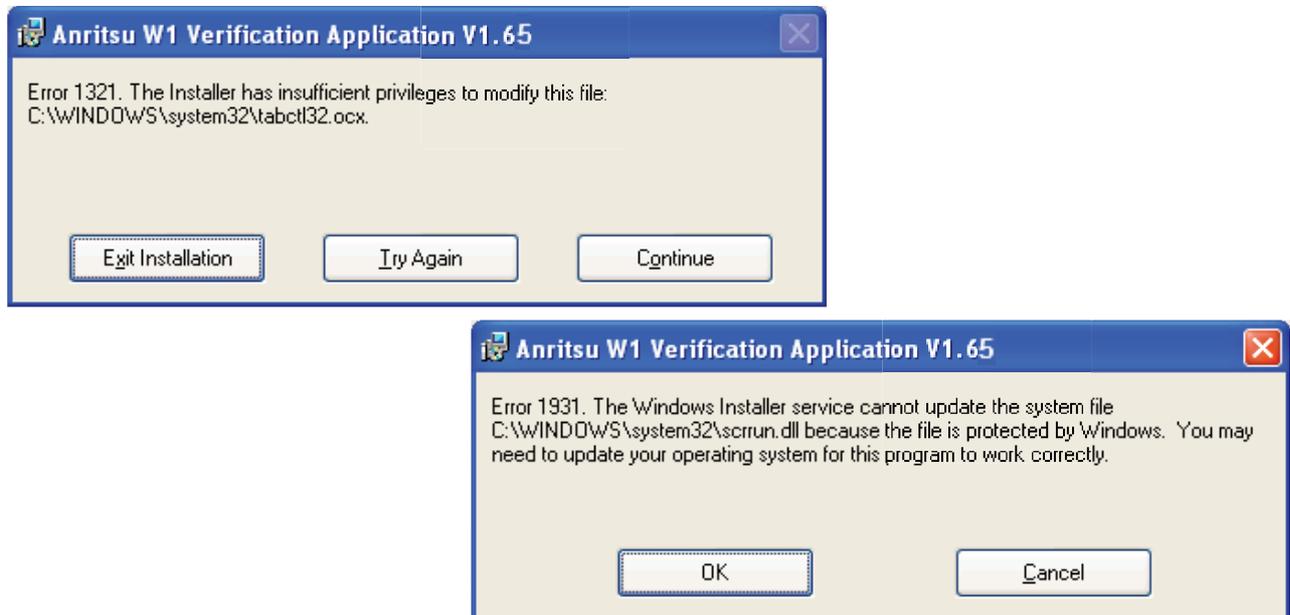


Figure 6-3. Installation Error 1321 and Error 1931 Dialog Boxes

9. Two installation wizard setup dialog boxes appear in sequence. Click Next to proceed through each dialog box. The final dialog box shows an installation progress bar.

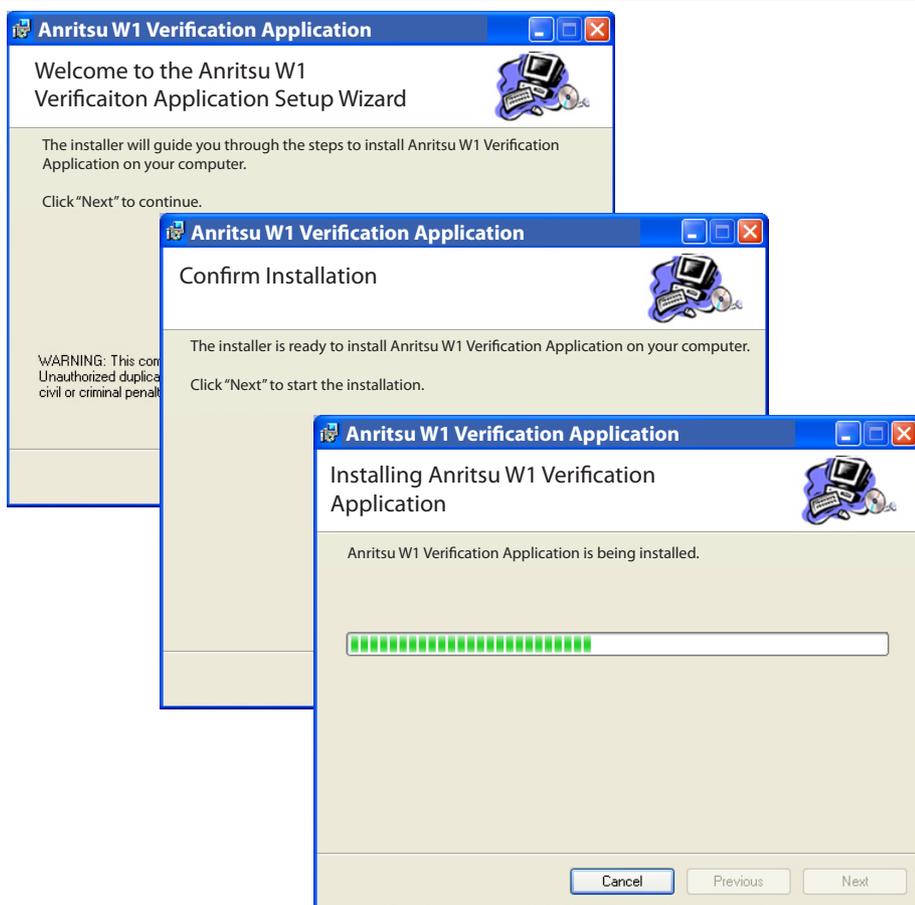


Figure 6-4. Installation Confirmation and Progress Dialog Boxes – Click Next on each

10. When the installation progress bar shows complete, click **Next**. The final Application Information dialog box appears. Click **Next** and the **Installation Complete** dialog box appears.

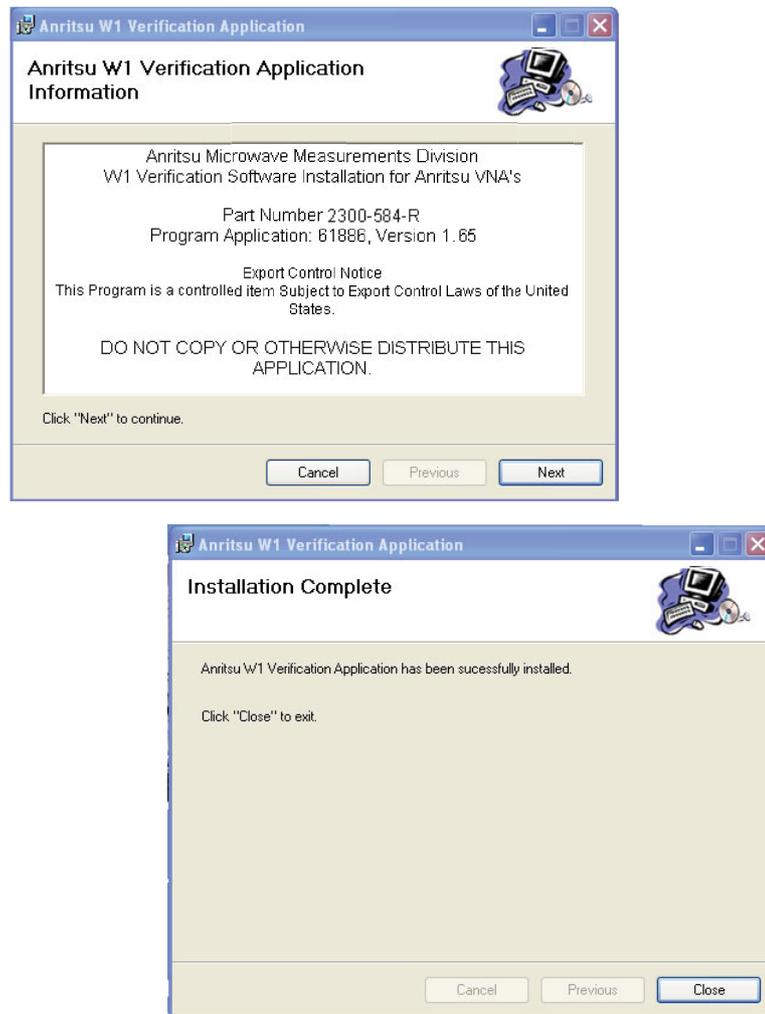


Figure 6-5. Final Application Information and Installation Complete Dialog Boxes

11. The installer adds all required files and makes the necessary registry updates on the PC Controller. When done, the navigation page ([Figure 6-1](#)) reappears.
12. If desired, open the **User Guide** (this document) and the **Quick Start Guide** and save and/or print a copy.
13. The PVS application is available on the **Start** or **Program** menu of the PC Controller.

6-4 Running the PVS Program

After the VNA and PC have been configured as described above, you are ready to run the program and perform the calibration/verification. Make sure you have the following information available:

- Serial number of the 3656B Calibration/Verification Kit
- Serial number of the 3739A Broadband Test Set
- Model number of the LO Source (upper signal generator, usually an MG37022A)
- Serial number of the LO Source (from the upper signal generator's rear panel)
- Model number of the RF Source (lower signal generator, usually an MG37022A)
- Serial number of the RF Source (from the lower signal generator's rear panel)

1. With the equipment and software configured as described in [“Configuring the Hardware” on page 6-1](#), turn on the computer and allow it to boot up to Windows.
2. Locate the W1 Verification Software icon (shown below) on the desktop and double-click on it.



3. The program displays an About dialog box with version information. Click OK to continue.

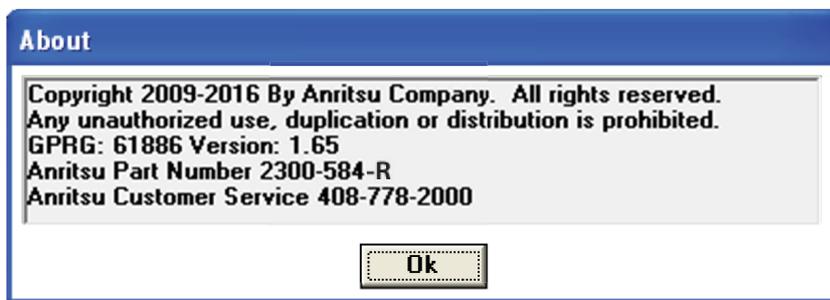


Figure 6-6. About Dialog

4. The Test Operator Name dialog box appears. Enter a user name or other identification.

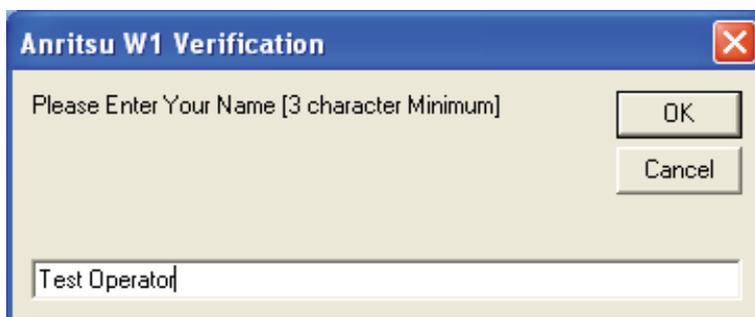


Figure 6-7. Name Dialog

5. Click OK to continue. The program searches for a compatible VNA on the GPIB. When the VNA is found, a confirmation dialog box appears.

- Click Yes to continue. Click No to search for another VNA.



Figure 6-8. Instrument Dialog

Note If your system is configured with a 37000 series VNA, refer to [Chapter 7, “2300-584-R Software with the Lightning ME7808A/B/C”](#).

- When Yes is clicked above, the program searches for the Signal Generator LO Source and, when found, the LO Source Model Number dialog box appears.

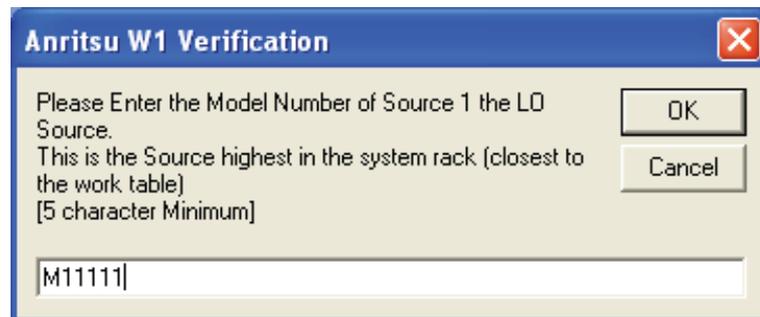


Figure 6-9. Source 1 LO Model Number Dialog

- Enter the Source 1 LO model number (upper Signal Generator, usually an MG37022A) and click OK.
- Enter the Source 1 LO serial number (found on the rear panel of the upper Signal Generator) and click OK.

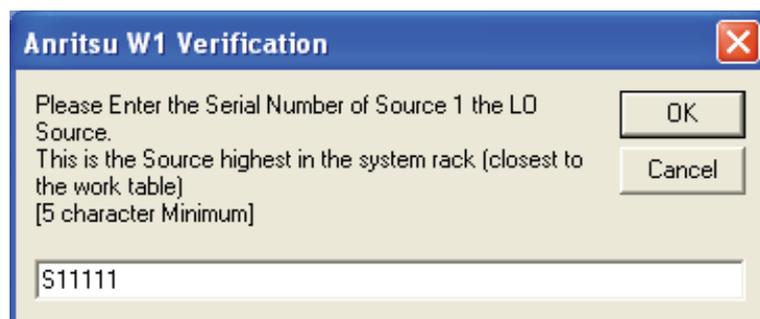


Figure 6-10. Source 1 LO Serial Number Dialog

10. Enter the Source 2 RF model number (lower Signal Generator, usually an MG37022A) and click OK.

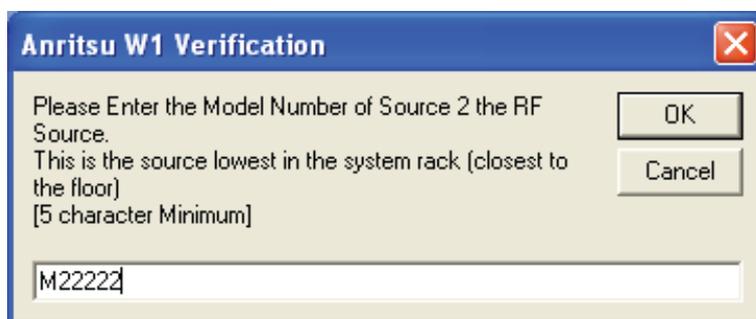


Figure 6-11. Source 2 RF Model Number Dialog

11. Enter the Source 2 RF serial number (found on the rear panel of the lower Signal Generator) and click OK.

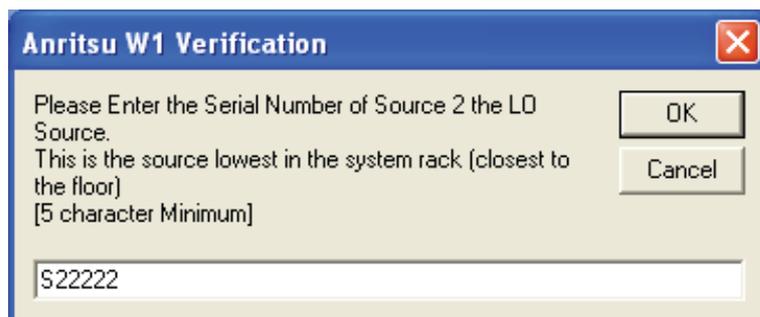


Figure 6-12. Source 2 RF Serial Number Dialog

12. Enter the test set serial number found on the rear panel and click OK.

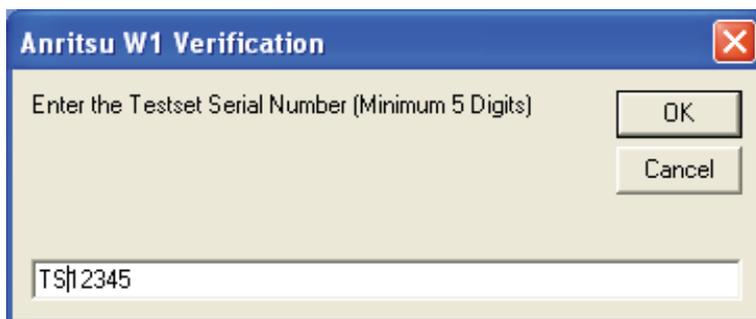


Figure 6-13. Test Set Serial Number Dialog

13. Confirm that the test serial number is correct by clicking Yes.

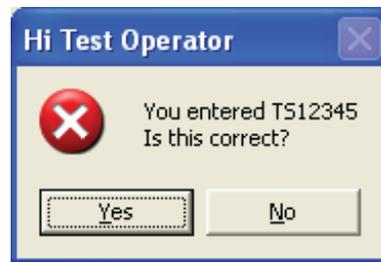


Figure 6-14. Test Set Serial Number Confirmation Dialog

14. The program execution continues to the following [Section 6-5 “Application Interface – Setup Menu Tab”](#) on page 6-10.

6-5 Application Interface – Setup Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections:

- The Setup Menu tab is described in this section.
- The Main Menu tab display is described in [Section 6-8 “Application Interface – Main Menu Tab” on page 6-22](#).
- The Serial Number tab is described in [Section “Serial Number Tab Functions” on page 6-26](#).

The following procedure continues the program setup from the previous section:

1. In the Calibration Kit Type area, select **W Coax**.
2. In the Serial Number (5 Digits) area, enter the serial number for the 3656B Calibration/Verification Kit. At least five (5) digits are required.
3. In the Load Cal-Kit Coefficients to VNA area, select **Yes**.

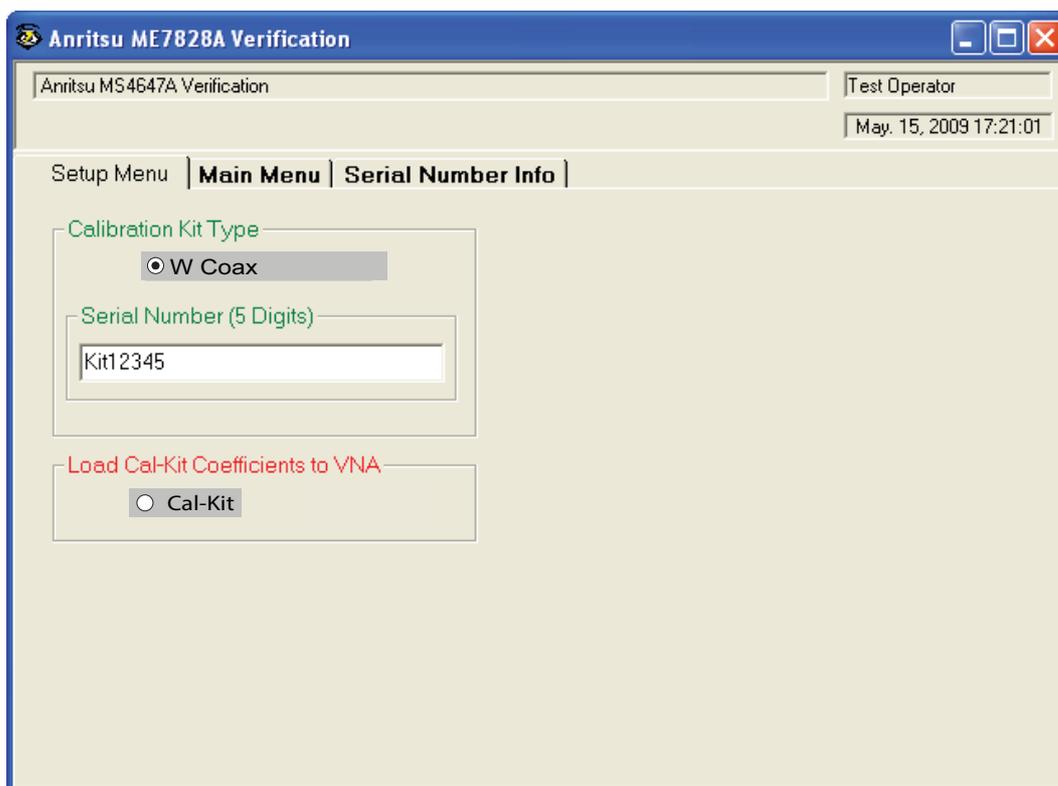


Figure 6-15. ME7828A Application Interface – Setup Menu Tab

4. The Install Calibration-Kit Coefficients to the VNA dialog box appears.

5. Follow the dialog box instructions for installing the 3656B calibration coefficients into the VNA, then click OK.

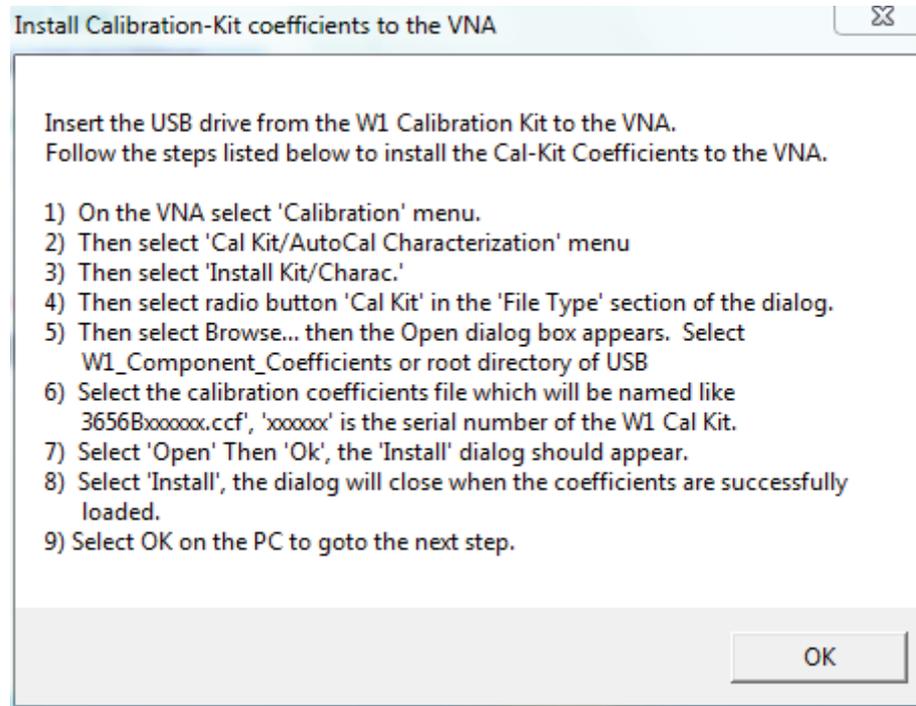


Figure 6-16. Install Calibration Kit Coefficients Dialog

6. The VNA displays an acknowledgment dialog box when the file load is complete, indicating that 10 files were loaded. After the VNA has loaded the 10 Calibration coefficient files, select OK on the PC application. The application will then prompt you to remove the USB drive from the VNA and install the USB drive to the PC.



Figure 6-17. Install USB Drive in PC Dialog

7. The Application Interface dialog box reappears displaying the Setup Menu tab and Frequency Range area. In the Frequency Range area, select either the low range (40 MHz to 65 GHz) or the high range (65 GHz to 110 GHz). For purposes of this document, the low band is done first. The range that is not selected is calibrated during the Restart Procedure described in [Section 6-12 “Restart for Alternate Frequency Band”](#) on page 6-33. After selecting the frequency range, click OK. The Verification Kit Information area appears.

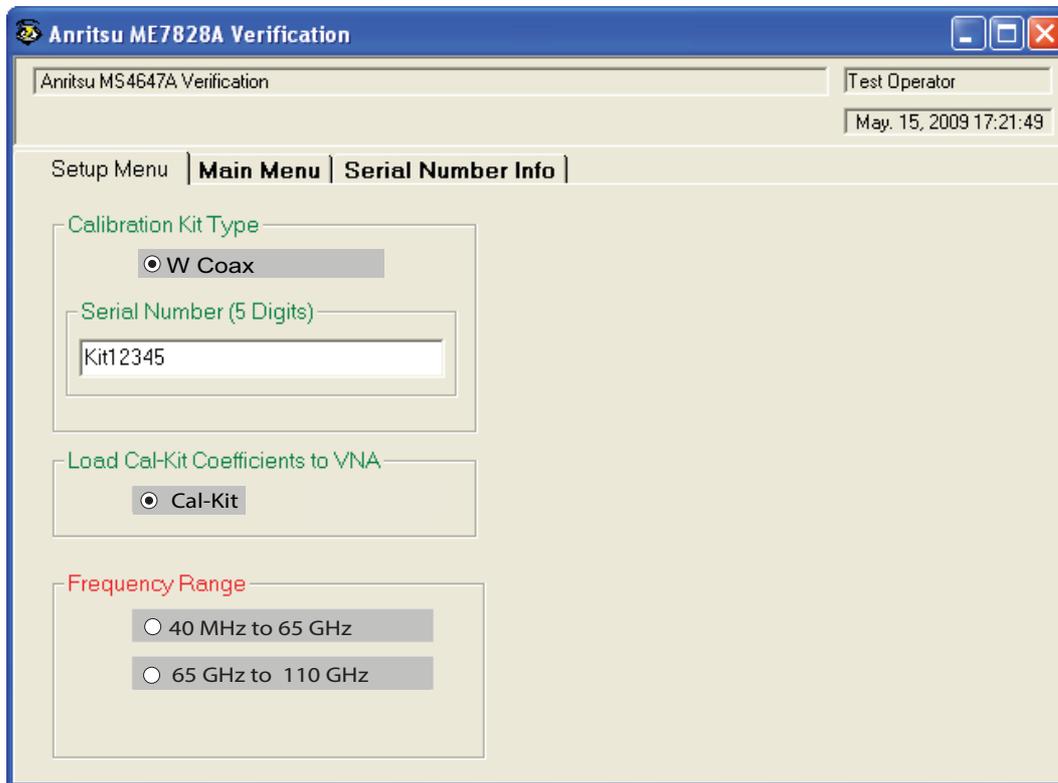


Figure 6-18. ME7828A Application Interface – Setup Menu Tab

8. Select the W Coax type, and then the Verification Kit Serial Number (usually the same as the Calibration Kit). When the Serial Number is complete, the Locate USB Drive Kit Data on PC area appears.

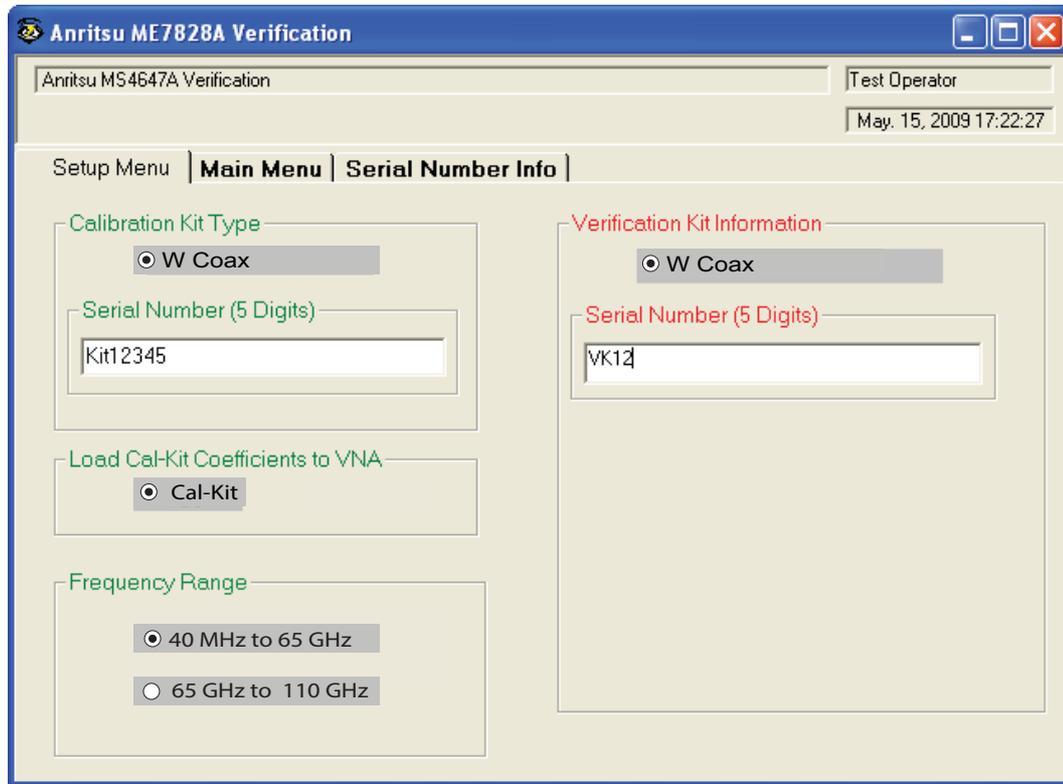


Figure 6-19. ME7828A Application Interface – Setup Menu Tab

9. In the Locate USB Drive Kit Data on PC area, click the Go To USB Drive Locator button.

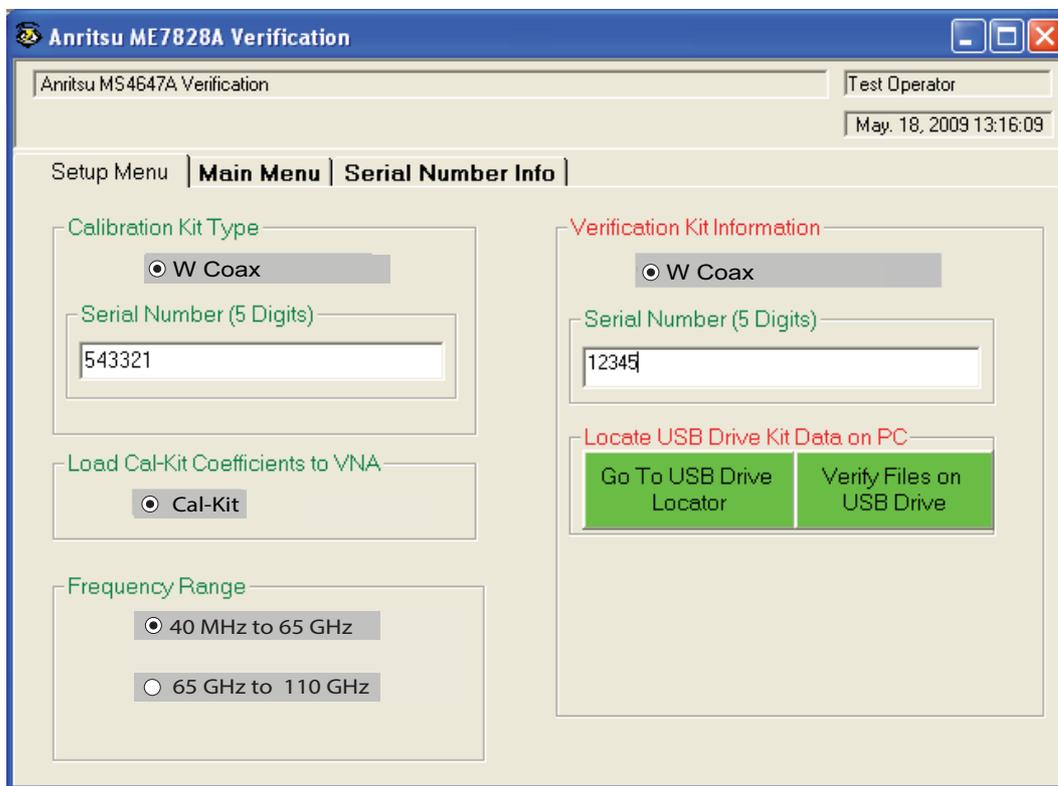


Figure 6-20. ME7828A Application Interface – Setup Menu Tab

10. When the Auto Find Verification Kit Data dialog box first appears, the Verification Kit Data Path text field is blank. Click the Auto-Find USB Drive Verification Kit Data button. The application automatically locates the verification kit data on the USB drive and displays the path in the Verification Kit Data Path text field.

In rare instances, due to PC/USB configurations, the Auto-find function may not be able to locate the verification data on the USB drive. In this case, you may need to use the Manually Locate Verification Data Kit button. This utility allows you to manually select the path where the verification kit data is located. The data path will be on the USB drive shipped with the verification kit. On most PC's, this will be the E, F, or G drive assignments. Navigate to the verification kit data in the file-path location shown in the example below (for this example, the USB drive was at **E:**):

```
E:\W1_Verification_Data\W1_3656B_XXXXXX
```

(where XXXXXX is the serial number of the Kit)

Within each data set on the USB, there is a file named EnableKit.dat. Double click that file to identify the file. This builds the path for the verification kit data and returns back to the Find Verification Kit Data on the removable USB drive. Once the data is found, the Verification Kit Data Path information appears in the text field. Click Next > to return to the Application Interface dialog box.

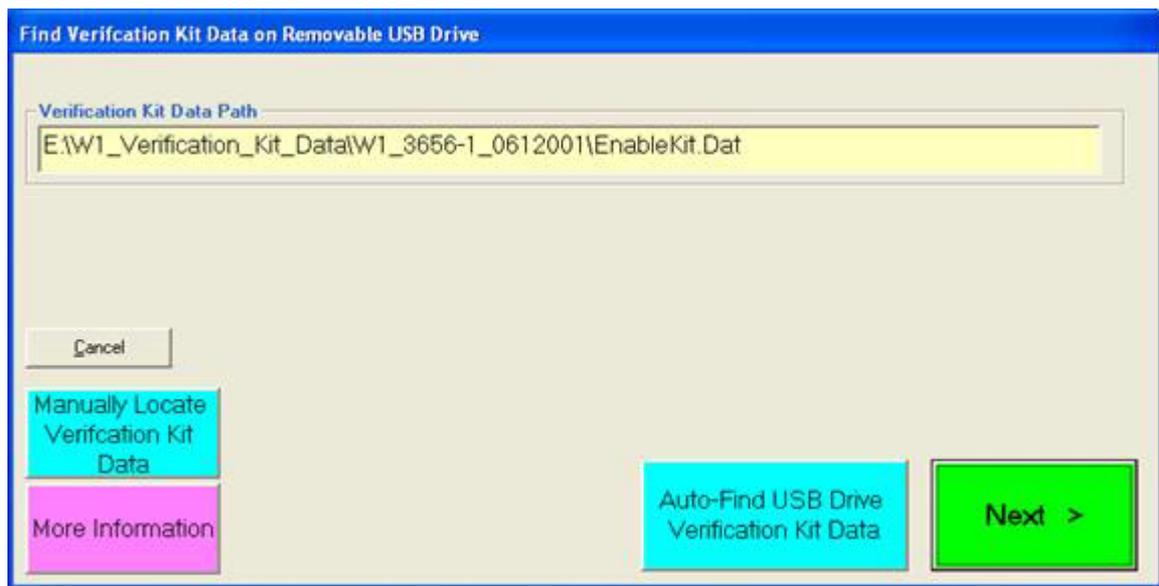


Figure 6-21. USB Drive Locator Dialog

11. Click Verify Files on USB Drive. The application checks the files on the USB drive to verify that all files are present and that each has the proper number of data points.
12. When all information is entered and you are ready to start, click the Setup Calibration of VNA button.

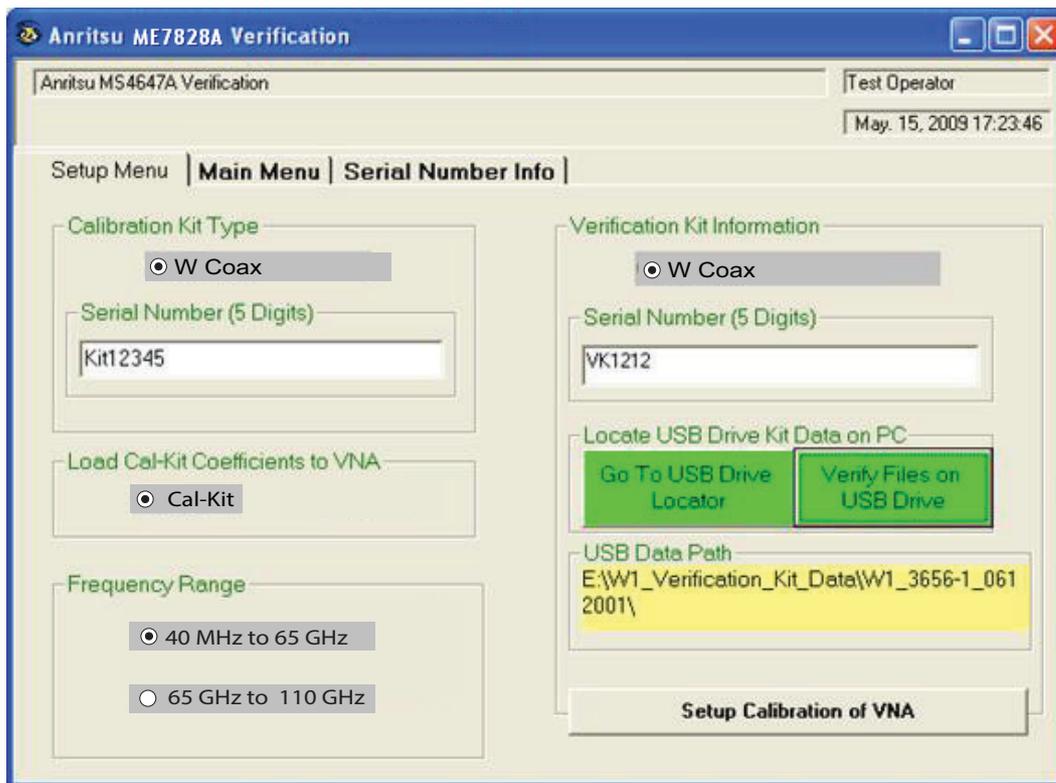


Figure 6-22. ME7828A Application Interface – Setup Menu Tab

13. The program execution continues in either [Section 6-6 “Low-Band Calibration”](#) on page 6-17 or [Section 6-7 “High-Band Calibration”](#) on page 6-19 depending on the previous band selection.

6-6 Low-Band Calibration

During this procedure, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration. In [Section 6-7 “High-Band Calibration” on page 6-19](#), the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

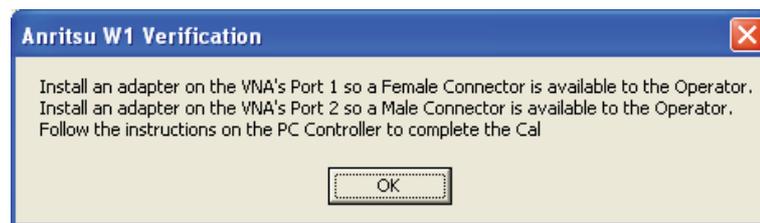


Figure 6-23. Anritsu W1 Verification Dialog

2. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-24. VNA Calibration: Step 1 of 5 Dialog

3. The VNA measures the load device data, then the VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Broadband Load Device to VNA Port 1.
 - b. Connect the Female Broadband Load Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-25. VNA Calibration: Step 2 of 5 Dialog

4. The VNA measures the broadband load device data, then the VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Open to VNA Port 1.
 - b. Connect the Female Short #1 (2.02 mm) to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-26. VNA Calibration: Step 3 of 5 Dialog

5. The VNA measures the open/short device data, then the VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male Short #1 (2.02 mm) to VNA Port 1.
 - b. Connect the Female Open to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-27. VNA Calibration: Step 4 of 5 Dialog

6. The VNA measures the short/open device data, then the VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the Short and the Open from Port 1 and Port 2, respectively.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 6-28. VNA Calibration: Step 5 of 5 Dialog

7. The program execution skips to [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22.

6-7 High-Band Calibration

During this procedure, the high-band portion of the VNA is calibrated with a full 12-term SSST (Short-Short-Short-Thru) calibration. In [Section 6-6 “Low-Band Calibration”](#) on page 6-17, the low-band portion of the VNA is calibrated with a full 12-term SOLT (Short-Open-Load-Thru) calibration.

Procedure

1. The W1 Verification Install Adapter dialog box appears.
 - a. Install a F-F adapter on VNA Port 1 so that a Female connector is available to the operator.
 - b. Install a F-M adapter on VNA Port 2 so that a Male connector is available to the operator.
 - c. When ready to proceed, click OK.

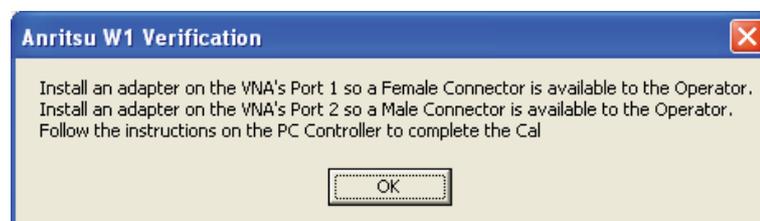


Figure 6-29. Anritsu W1 Verification Dialog

2. When ready to proceed, click OK. The VNA Calibration: Step 1 of 5 dialog box appears.
 - a. Connect the Male Cal Kit Isolation Device to VNA Port 1.
 - b. Connect the Female Cal Kit Isolation Device to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-30. VNA Calibration: Step 1 of 5 Dialog

3. The VNA Calibration: Step 2 of 5 dialog box appears.
 - a. Connect the Male 2.02 mm Short #1 to VNA Port 1.
 - b. Connect the Female 2.65 mm Short #2 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-31. VNA Calibration: Step 2 of 5 Dialog

4. The VNA Calibration: Step 3 of 5 dialog box appears.
 - a. Connect the Male 2.65 mm Short #2 to VNA Port 1.
 - b. Connect the Female 3.18 mm Short #3 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-32. VNA Calibration: Step 3 of 5 Dialog

5. The VNA Calibration: Step 4 of 5 dialog box appears.
 - a. Connect the Male 3.18 mm Short #3 to VNA Port 1.
 - b. Connect the Female 2.02 mm Short #1 to VNA Port 2.
 - c. When ready to proceed, click OK.



Figure 6-33. VNA Calibration: Step 4 of 5 Dialog

6. The VNA Calibration: Step 5 of 5 dialog box appears.
 - a. Remove the offset Shorts from Port 1 and Port 2.
 - b. Slide the two T-R modules towards each other and connect the VNA Port 1 (Female) to VNA Port 2 (Male) directly.
 - c. When ready to proceed, click OK.



Figure 6-34. VNA Calibration: Step 5 of 5 Dialog

7. The program execution continues to [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22.

6-8 Application Interface – Main Menu Tab

The SPV Application Interface dialog box displays three tabs with configuration, control, and serial number information. Each tabbed dialog box contains buttons to control program operations as outlined in the following sections.

- The Setup Menu tab is described in [Section 6-5 “Application Interface – Setup Menu Tab”](#) on page 6-10.
- The Main Menu tab display is described in the section immediately following and is shown in [Figure 6-35, “ME7828A Application Interface – Main Menu Tab”](#) on page 6-22
- The Serial Number tab is described in [Section “Serial Number Tab Functions”](#) on page 6-26.

Whenever the program is executing a command from the main menu, the buttons are disabled, due to the event-driven nature of the Windows Operating System, until the current command is finished. While a command is being executed, informational messages are usually displayed on the screen to aid the operator in understanding which steps the application is performing.

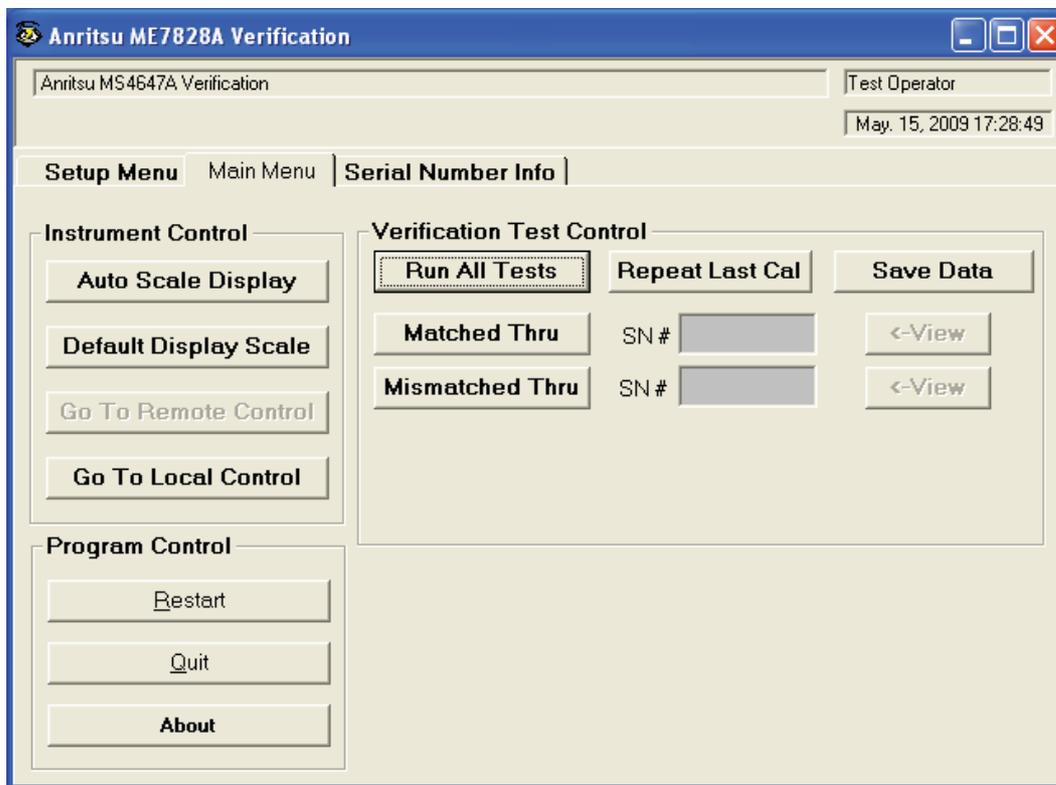


Figure 6-35. ME7828A Application Interface – Main Menu Tab

Auto Scale Display Button

This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as using the VectorStar VNA menus to navigate to and select either the Auto Scale Active Channel or Auto Scale All Channels buttons. The full path to these buttons is:

- MAIN | Scale | SCALE | Auto Scale Active Channel
- MAIN | Scale | SCALE | Auto Scale All Channels

When the program detects the VNA has finished a sweep, the program auto-scales all four channels before continuing.

The VNA display during the calibration and verification tests is set to one Channel and four traces. Each trace displays the following parameters:

- Upper-left quadrant – S21 – Forward Transmissions, Log Mag (top) and Phase (Bottom)
- Upper-right quadrant – S12 – Reverse Transmissions, Log Mag (top) and Phase (Bottom)
- Lower-left quadrant – S11 – Forward Reflections, Lin Mag (top) and Phase (Bottom)
- Lower-right quadrant – S22 – Reverse Reflections, Lin Mag (top) and Phase (Bottom)

See [Figure 6-36](#) for a display example. This is a typical display immediately after performing the High Band calibration. Please note this is for reference only and that the actual data on the VNA display may not be identical.

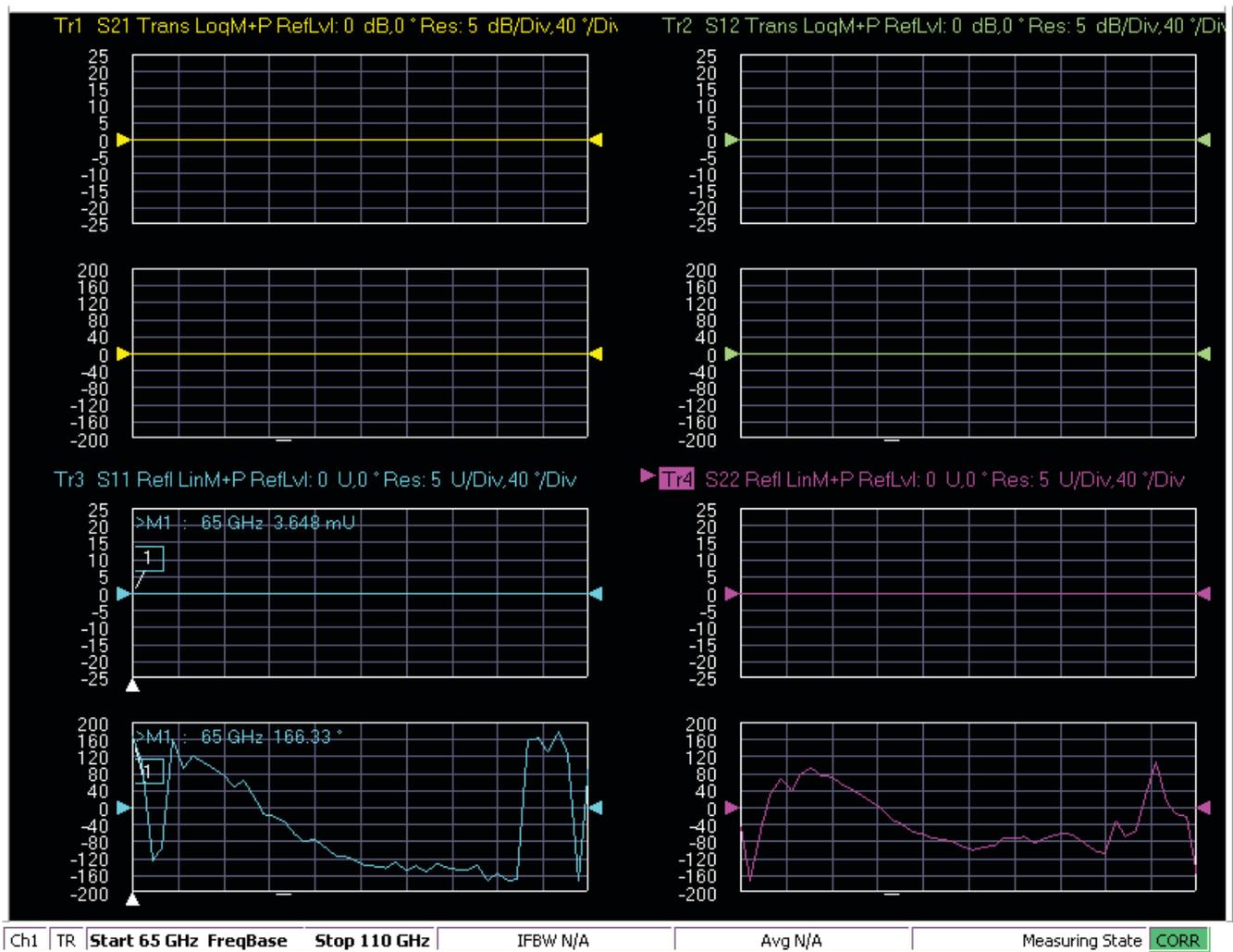


Figure 6-36. MS4640A/B Series VNA Auto Scale Example Trace Display

Default Display Scale Button

This command sets all four channels to a scale of 5 dB/div for the Magnitude displays and to 40 degrees/div for the Phase displays, and the reference value to 0. This allows you to see if the device is properly connected.

Go To Remote Control Button

This command is only available after you have clicked the Go to Local Control button. When you click this button, the program takes control of the VNA Display type and Display scale settings and sets them to the program default values.

Go To Local Control Button

This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Caution	Modifying the VNA settings (such as power level, bandwidth, averaging, etc.) could adversely affect the measurement results. This should only be used to view the data or for using markers.
----------------	--

Restart Button

The Restart button command allows you to change the tested instrument, the frequency range, or the selected verification kit. Selecting Yes causes the program to return to the program initialization stage.

Usually, this button is used to test for second frequency band and program execution continues in [Section 6-12 “Restart for Alternate Frequency Band” on page 6-33](#) and the Choose The Restart Method dialog box appears.

Quit Button

Selecting Quit brings up a confirmation dialog box shown in [Figure 6-37](#). Selecting Yes exits the program; selecting No returns you to the previous screen.

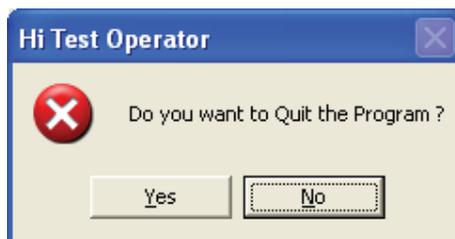


Figure 6-37. Confirmation Dialog

About

Displays version information, copyright, other legal notices, and company contact information.

Run All Tests

This command button runs both the Matched Thru and Mismatched Thru tests. Program execution starts with [Section 6-9 “Matched Thru Tests” on page 6-27](#) and then continues with [Section 6-10 “Mismatched Thru Tests” on page 6-29](#). When both tests are completed, program execution returns to the Main Menu tab shown in [Figure 6-35, “ME7828A Application Interface – Main Menu Tab” on page 6-22](#).

Repeat Last Cal

This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to recalibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason. When the calibration sequence is complete, program execution continues to the Main Menu tab shown previously in [Figure 6-35, “ME7828A Application Interface – Main Menu Tab” on page 6-22](#).

Save Data

This command button writes data files to the PC Controller and stores the files at `C:\mmdcsvc\Data`. The program does not write data to the verification kit USB memory device. If selected, program execution continues as described in [Section 6-11 “Saving Verification Data” on page 6-32](#).

The number of saved files varies depending on the user settings:

- If both the matched and mismatched thru tests are run, two files are written to the PC Controller hard drive.
- If only one of the tests was run, only one file is written to the PC Controller’s hard drive at `C:\mmdcsvc\Data`

Matched Thru

This command button only runs the Matched Thru tests. If selected, program execution continues as described in [Section 6-9 “Matched Thru Tests” on page 6-27](#). When the tests are completed, the program returns to the Main Menu tab shown in [Section 6-8 “Application Interface – Main Menu Tab” on page 6-22](#).

Matched Thru SN

This field is used to enter the serial number of the matched thru.

Mismatched Thru

This command button only runs the Mismatched Thru tests. If selected, program execution continues in [Section 6-10 “Mismatched Thru Tests” on page 6-29](#). When the tests are completed, the program returns to the Main Menu tab shown in [Figure 6-35, “ME7828A Application Interface – Main Menu Tab” on page 6-22](#).

Mismatched Thru SN

This field is used to enter the serial number of the matched thru.

Serial Number Tab Functions

The Serial Number Info tab displays a summary of the model number and serial number for the following devices. All screen information is included in the report headers.

- Operator Name
- Calibration Kit
- Test Set
- Verification Kit
- Vector Network Analyzer
- Test Set
- Signal Generator Sources

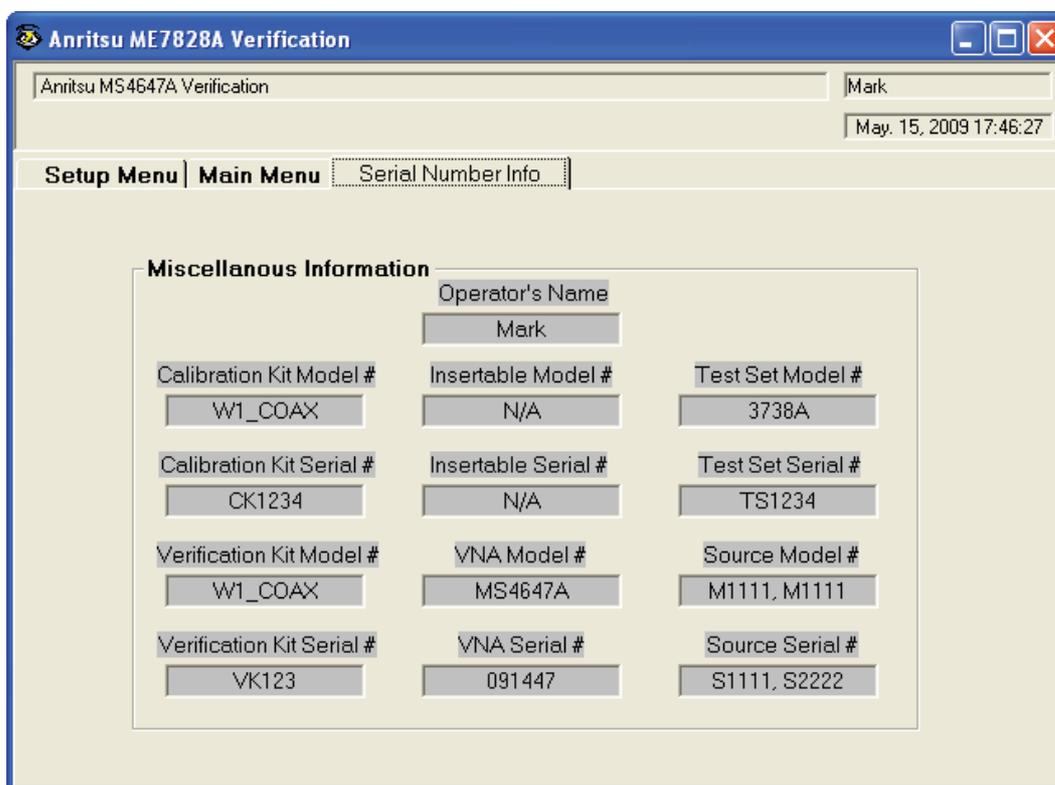


Figure 6-38. ME7828A Application Interface – Serial Number Tab

6-9 Matched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests are executed followed by the Mismatched Thru tests described in [Section 6-10 “Mismatched Thru Tests” on page 6-29](#).

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described [Section 6-8 “Application Interface – Main Menu Tab” on page 6-22](#).

Note

The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

Procedure

1. The Enter Serial Number Match Thru dialog box appears.

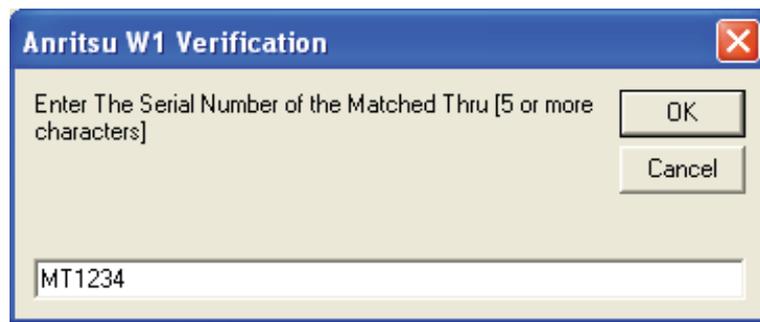


Figure 6-39. Anritsu W1 Verification Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

3. Enter the serial number of the Matched Thru.
4. When ready to proceed, click OK. The Connect Matched Thru Male Connector dialog box appears.

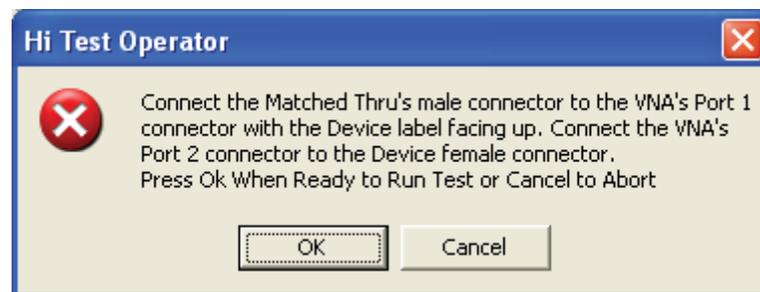


Figure 6-40. Matched Thru Dialog

5. Connect the Matched Thru male connector to VNA Port 1 with the label facing up.
6. Connect the Matched Thru female connector to VNA Port 2.

7. When ready to proceed, click OK. The matched thru test starts and the Matched Thru Test - Sweep 1 dialog box appears. After it completes, the Matched Thru Test - Sweep 2 dialog box appears.

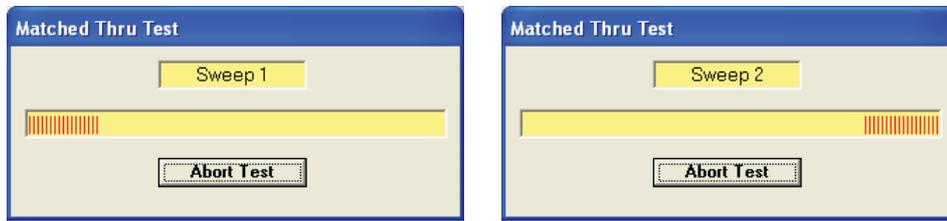


Figure 6-41. Matched Thru Test, Sweep 1 and Sweep 2 Dialog Boxes

8. When the test completes, the next action depends on what the user selected in the Main Menu tab above. The VNA main display should be similar to the one below. This is a typical display immediately after measuring the Matched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

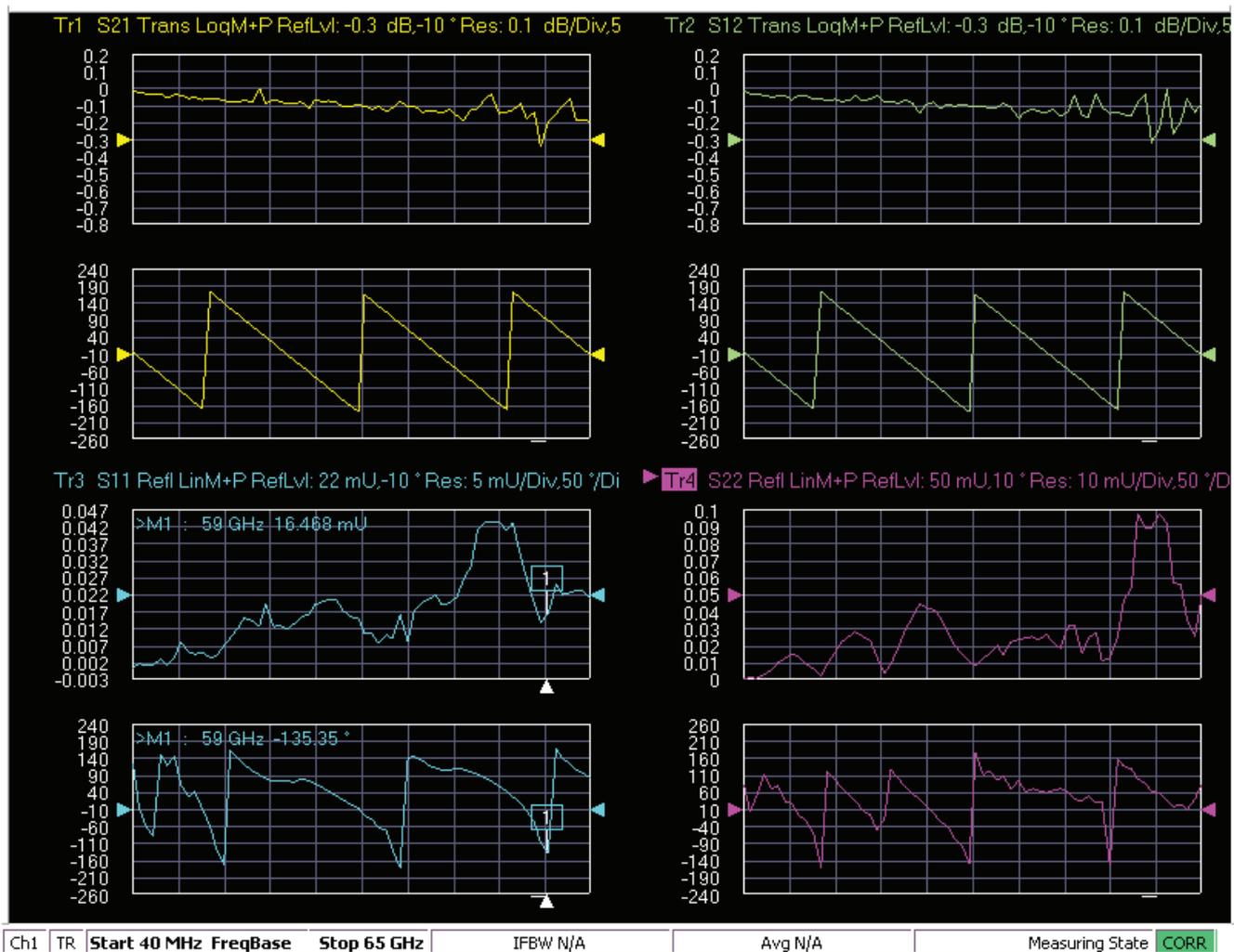


Figure 6-42. MS4640A/B Series VNA, Typical Matched Thru Data in Low Band

- Upper-left quadrant= S21 – Forward Transmission
- Upper-right quadrant = S12 – Reverse transmission
- Lower-left quadrant= S11 – Forward Reflection
- Lower-right quadrant= S22 – Reverse Reflection

9. If only the Matched Thru button was selected, the program returns to the “Application Interface – Main Menu Tab” on page 6-22. The dialog box is shown in Figure 6-35, “ME7828A Application Interface – Main Menu Tab” on page 6-22.
10. If the Run All Tests button was selected, the program execution continues with the following Section 6-10, “Mismatched Thru Tests”.

6-10 Mismatched Thru Tests

If the Run All Tests button on the Application Interface - Main Menu tab was selected, the Matched Thru tests (described in Section 6-9 “Matched Thru Tests” on page 6-27) is executed first, followed by the Mismatched Thru tests described in this section.

If the Matched Thru test button was selected, only the steps in this section are executed. When this test is complete, the program returns to the main menu described Section 6-8 “Application Interface – Main Menu Tab” on page 6-22.

Note The verification devices must be connected to the W1 Connector Coupler Ports and not to the VNA Ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

The entry point for this portion of the verification software depends on the user selections made in the Application Interface – Main Menu tab described in Section 6-8 “Application Interface – Main Menu Tab” on page 6-22.

The dialog box is shown in Figure 6-35, “ME7828A Application Interface – Main Menu Tab” on page 6-22.

If only the Mismatched Thru button was selected above, program execution starts here.

If the Run All Tests button was selected above, program execution continues here after the Matched Thru tests (described in Section 6-9 “Matched Thru Tests” on page 6-27) have been completed.

Procedure

1. The Enter Serial Number Offset Set Mismatch Device dialog box appears. Enter the serial number of the offset mismatch device.



Figure 6-43. Serial Number Dialog

2. Ensure that the correct device is connected.
 - The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 Coupler Ports and not to the VNA ports.

- When ready to continue, click OK. The Connect Mismatched Thru Airline dialog box appears.

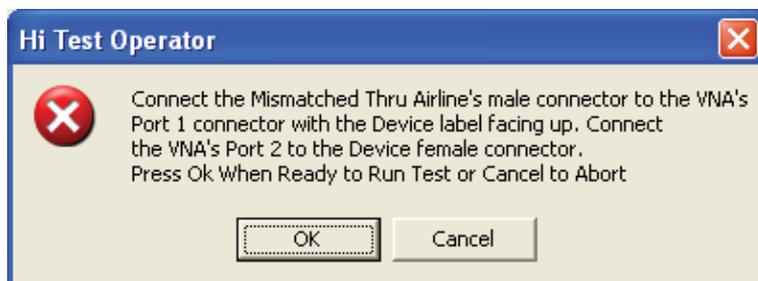


Figure 6-44. Instruction Dialog

- Connect the Mismatched Thru Airline male connector to VNA Port 1 with the device label facing up.
- Connect the Mismatched Thru Airline female connector to VNA Port 2.
- When ready to continue, click OK. The Mismatched Thru Test - Sweep 1 dialog box is displayed first followed by the Mismatched Thru Test - Sweep 2 dialog box.

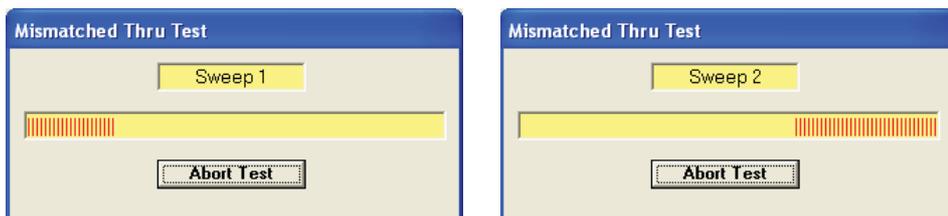


Figure 6-45. Status Dialogs

- When the test completes, the program returns to the main menu described [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22, and the display should look similar to [Figure 6-46](#). This is a typical display immediately after measuring the Mismatched Thru in the Low Band. Please note this is for reference only and that the actual data on the VNA display may not be identical.

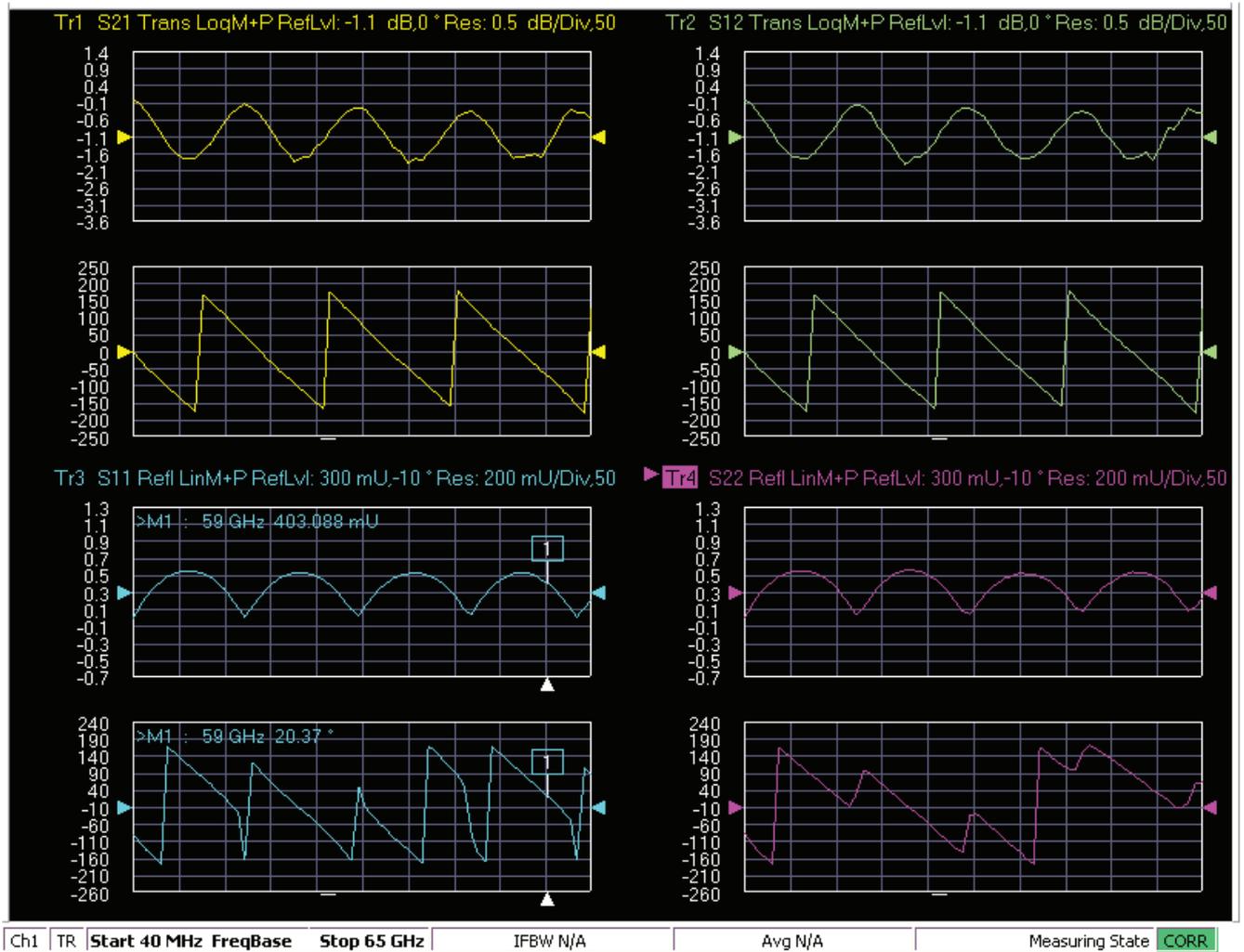


Figure 6-46. MS4640A/B Series VNA, Typical Mismatched Thru Data in Low Band

6-11 Saving Verification Data

If the Save Data button on the Main Menu tab was selected, the save data dialogs described below appear. When the save data procedure is completed, the program returns to the main menu as described previously in [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22.

The default directory path and file names are:

- C:\mmdcsvc\Data\Matched Thru Low.dat
- C:\mmdcsvc\Data\Mismatched Thru Low.dat
- C:\mmdcsvc\Data\Matched Thru High.dat
- C:\mmdcsvc\Data\Mismatched Thru High.dat

If the default file names should be changed, select **Yes** and enter the new file names. Otherwise, select **No**.

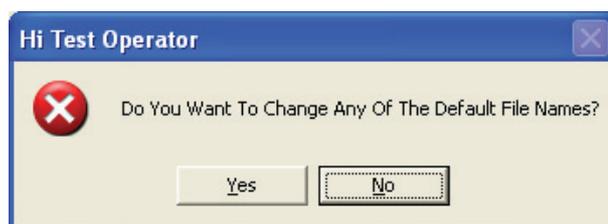


Figure 6-47. Confirmation Dialog

The following dialog is shown when the files are successfully saved to disk.



Figure 6-48. Information Dialog

6-12 Restart for Alternate Frequency Band

After the Matched Thru and Mismatched Thru tests have been successfully completed and the data saved, it is necessary to restart the program and test the other frequency band. For example, if you tested for 40 MHz to 65 GHz Frequency Range on your first calibration pass, on the second pass, select the 65 GHz to 110 GHz Frequency Range.

Procedure

1. Ensure that the verification results of the previous test have been saved to the C:\mmdscvc\Data.
2. To perform the verification tests for the second frequency range, on the System Verification Software Main Menu - Main Menu Tab, select the Restart button. The main menu is described in [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22.
3. The Choose The Restart Method dialog box appears as shown below in [Figure 6-49](#).

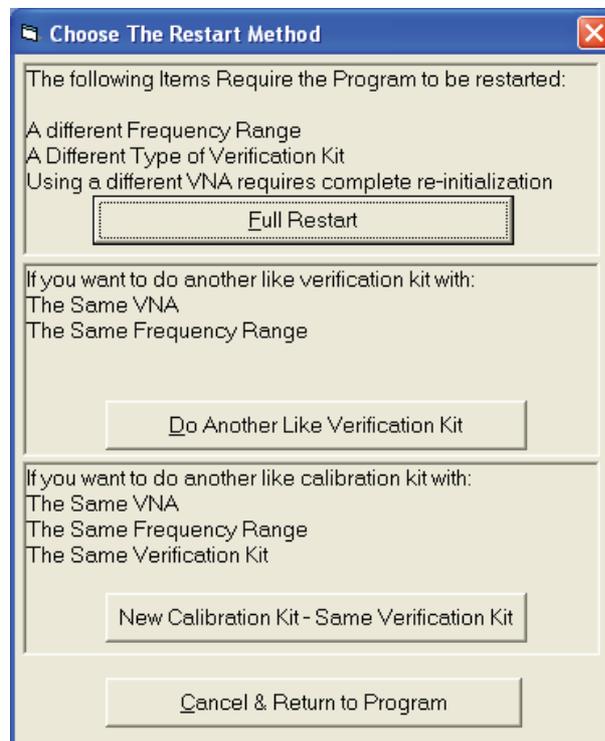


Figure 6-49. Choose The Restart Method Dialog

4. If you selected Full Restart, the calibration process starts again and the procedure steps are the same as the procedures described previously starting in [Section 6-4, "Running the PVS Program", Step 6](#) on page 6-7.
5. On the Setup Menu, repeat the data entry for the following items. Click OK when ready to proceed to the next step.
6. Enter the GPIB Board 0.
7. Enter the GPIB Address 6.
8. Enter the Test Set Serial Number.
9. Enter the User Name.
10. Enter the Cal Kit Type selection.
11. Enter the Cal Kit Serial Number selection.

12. Enter the Load Cal Kit Disk from VNA Floppy selection.
13. Enter the Frequency Range selection. Select the frequency range that has not been tested.
 - a. If the first calibration procedure selected the 40 MHz to 65 GHz Frequency Range, select the 65 GHz to 110 GHz Frequency Range.
 - b. If the first calibration procedure selected the 65 GHz to 110 GHz Frequency Range, select the 40 MHz to 65 GHz Frequency Range.
14. Enter the Verification Kit Type selection.
15. Enter the Verification Kit Serial Number selection.
16. Click the Go to USB Drive Locator button.
17. Click the Verify Files on USB Drive button.
18. Complete the calibration and verification of the devices for the second frequency range.
19. Save the second set of calibration data and verification results to C:\mmdcsvc\Data.
20. This series of automated tests has verified that the VectorStar ME7828A Broadband S-parameter measurement accuracy meets factory specifications and ends the calibration and verification procedure.
21. The program returns to the main menu described in [Section 6-8 “Application Interface – Main Menu Tab”](#) on page 6-22.

6-13 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed with the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting the performance verification software, the verification kit data USB memory device is installed in the correct USB port and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit USB drive matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu customer service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 7 — 2300-584-R Software with the Lightning ME7808A/B/C

7-1 Introduction

This chapter describes the use of the Anritsu 2300-584-R Performance Verification Software (PVS) for the Lightning ME7808A/B/C Broadband/Millimeter-Wave VNA Measurement Systems. The ME7808A/B/C is based on the Lightning 37xxxA/B/C Series Vector Network Analyzers.

Note	Anritsu does not support tests or verification processes for wafer probe equipment. Contact the vendor of the wafer probe equipment if such support is desired. This document supports all software versions 1.2x through 1.5x
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7-2 Required Equipment

The required general equipment is described in [Section 1-3 “Required Equipment”](#).

Required Lightning MS7808A/B/C Instruments and Components

The ME7808A/B/C Broadband Measurement System is composed of any of the following instruments:

- One of the following Lightning VNAs:
 - 37297C with Option 12 or SM5621 (with software version 4.20)
 - 37397C with Option 12 or SM5621 (with software version 4.20)
 - 37297D
 - 37397D
- 3738A Test Set
- 3700C3 Floor Console
- A pair of the following:
 - 3742A-EW (2 each required)
 - SM5645 (2 each required)
- Any of the following W1 couplers:
 - 64057 with 64058
 - 57215 with 57216
 - SC6195 (one pair)
- Any of the following Signal Generators (2), one as LO and one as RF source:
 - MG369XB/C
 - MG3702xA
 - 68037C with Option 15 as LO source and 68037C (without options) as RF source
 - Other 68000 or 69000 models that are known to operate in this system

7-3 Configure the System

This section describes how the various system elements are interconnected and the preliminary steps required for operation of the verification software. Perform the hardware cabling and interconnection setup procedure as shown in [Figure 7-1](#).

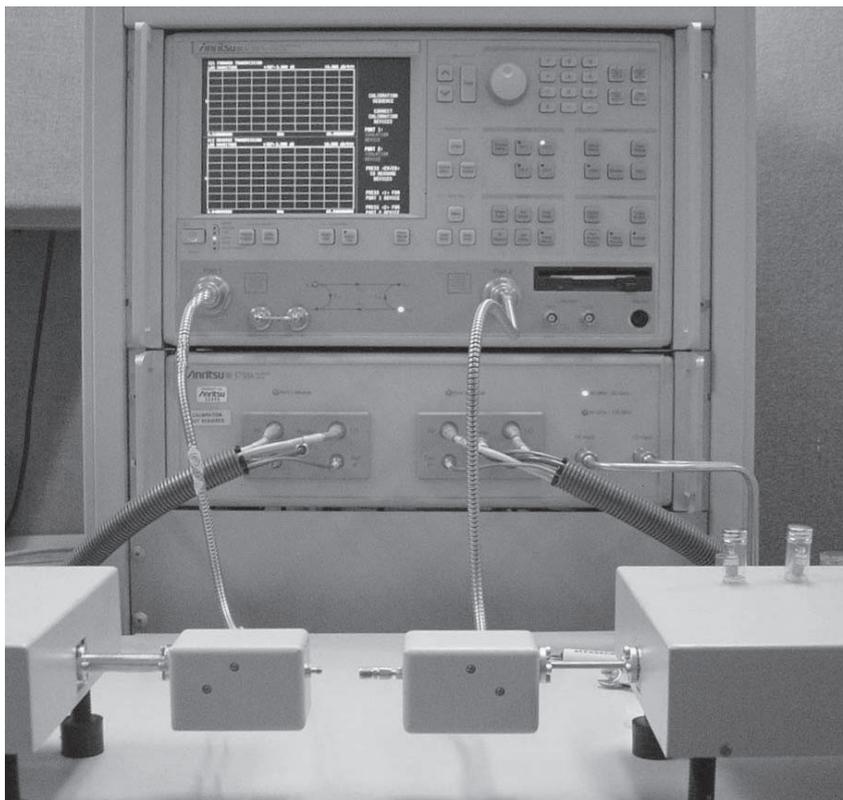


Figure 7-1. VNA Calibration and Measurement Setup

1. Disconnect the ME7808A/B/C from any wafer probe station equipment.
2. Connect the pair of couplers to the WR10 test ports of the 3742A-EW modules. See the [“Required Lightning MS7808A/B/C Instruments and Components”](#) on page 7-1 section for compatible units.
3. Ensure that the system is set to **Broadband** under the **Option Menu** key, Test Set Configuration.
4. Connect a **GPIB cable** between the **PC** and the VNA GPIB port labeled **IEEE 488.2 GPIB**. (Do not connect the cable to the VNA GPIB port labeled **Dedicated GPIB**.)

Install the Performance Verification Software

The performance verification software installation is described in Chapter 3:

[“W1 Verification Application Installation”](#) on page 3-2

7-4 Program Setup and Calibration

The system performance verification software runs in a Windows environment. Note that the actual appearance may vary slightly depending on the operating system used in the GPIB PC Controller.

7-5 Starting the Program and Initializing

1. With the equipment and software configured as described in “Configure the System” on page 7-2, turn on the computer and allow it to boot up to Windows.
2. Insert the W1 Calibration Component disk from the calibration kit into the VNA disk drive and insert the W1 Component Verification disk into the PC disk drive.
3. Locate the W1 Verification Software icon (shown below) on the desktop and double-click it.



4. The program then displays the About dialog box with version information. Press the Enter key or click OK to continue.

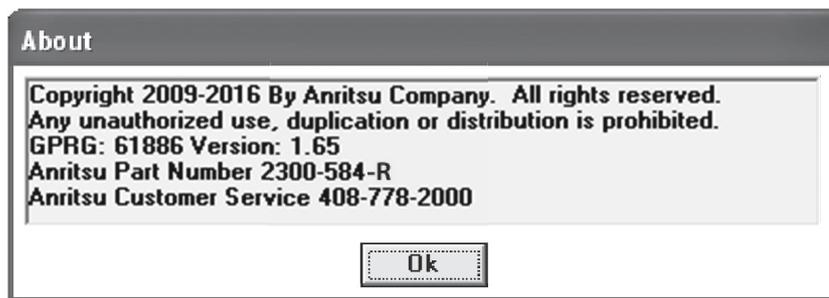


Figure 7-2. About Dialog Box

5. You are first prompted to enter your name.

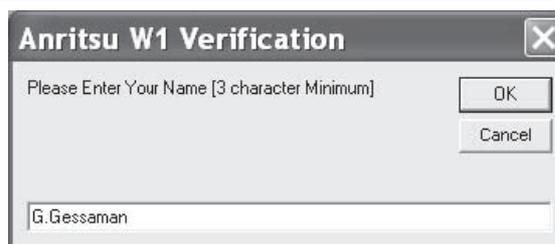


Figure 7-3. Anritsu W1 Verification – Enter Name

- After you enter your name, click OK to continue. Next, the program searches the GPIB bus for an Anritsu 37000 Series VNA instrument. If the program finds any other Anritsu VNA, the program skips those instruments without any response required from you.

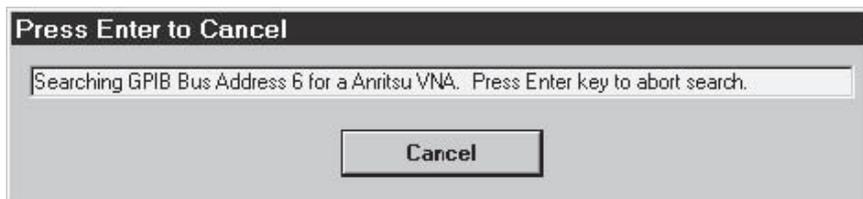


Figure 7-4. Searching for GPIB Bus Address 6 Anritsu VNA

- If the program finds a 37000 Series VNA, it asks you for information about the VNA that you want to use for the verification.
- If there are multiple instruments on the GPIB Bus, and this instrument is not the one you want to use, click NO to search for another instrument on the GPIB bus.
- If this is the required VNA, click Yes.

Note If your system is configured with an MS4640A/B series VNA, refer to [Chapter 7, “2300-584-R Software with the Lightning ME7808A/B/C”](#).

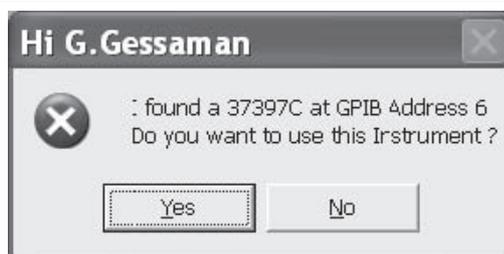


Figure 7-5. Found a 37000 VNA at GPIB Address 6

- After you select the instrument to use, the Anritsu W1 Verification Enter Test Set Serial Number dialog box appears. Enter the 5-digit serial number of the 37000 Series VNA.



Figure 7-6. Anritsu W1 Verification Enter Test Set Serial Number

- Once the serial number is entered, click OK to proceed. The program queries the model and serial number information for the LO and Source instruments. This may take a few moments. The Anritsu 37397 Verification Setup Menu dialog box appears.
- In the display below, in the Calibration Kit Type area, select W Coax. In the Serial Number area, enter the 5-digit serial number of the calibration kit. In the Load Cal Kit Disk From VNA Floppy area, select Yes

which tells the program that the calibration component coefficients are located on the floppy disk located in the VNA floppy drive.



Figure 7-7. Anritsu 37397 Verification – Setup Menu Tab

13. When the VNA is done reading the disk information, the Press Enter dialog box appears. Select OK to continue.

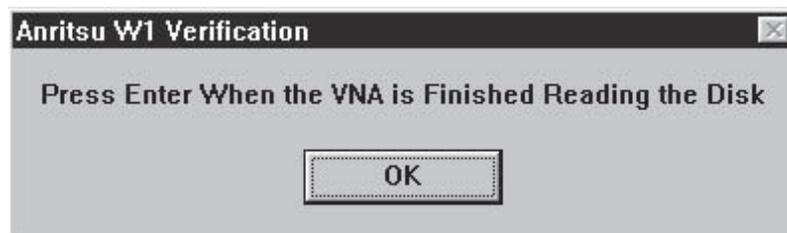


Figure 7-8. Press Enter

14. The Anritsu 37397 Verification Frequency Range dialog appears.

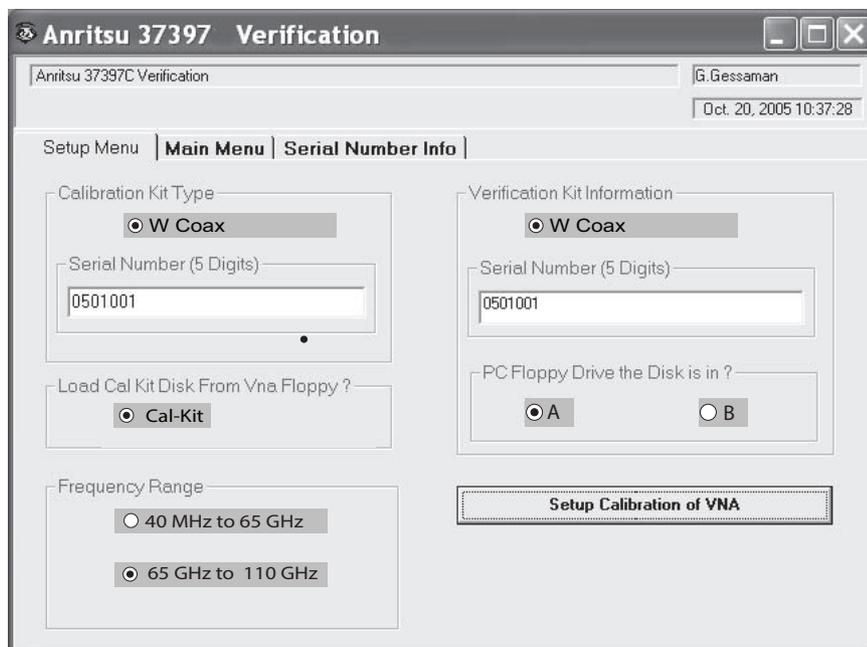


Figure 7-9. Anritsu 37397 Verification – Setup Menu Tab

15. In the Anritsu 37397 Verification Frequency Range use the Frequency Range area to select either frequency range.

Note

You must rerun the program (as described in the steps below) and select the other frequency range to fully test the ME7808A/B/C Broadband Measurement System. For example, if you selected the 40 MHz to 65 GHz frequency range at this point, later you must select the 65 GHz to 110 GHz frequency range.

16. As shown in [Figure 7-9](#), in Verification Kit Information area, select W Coax and in the Serial Number area, enter the 5-digit serial number of the calibration kit. Finally, in the PC Floppy Drive the Disk Is In area, select the PC drive that contains the component data floppy disk.
17. Click the Setup Calibration of VNA button to set up the calibration of the ME7808A/B/C broadband measurement system. At this point, you may perform a 12-term calibration as described in the next section.

7-6 Calibrating the System with a 12-Term Calibration

18. Do not click OK in the dialog below until the following calibrations are finished. The calibrations are performed by connecting the calibration devices to the W1 coupler ports as directed by the VNA on-screen instructions.

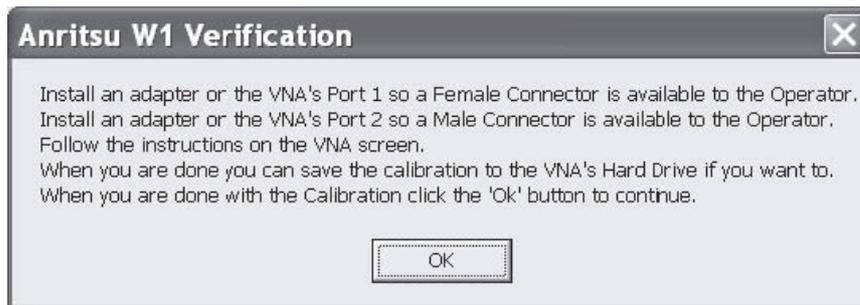


Figure 7-10. Anritsu W1 Verification – Install Adapter (F out) on Port 1 – Install Adapter (M out) on Port 2

19. Verify that the VNA screen shows the trace display shown in [Figure 7-11](#).

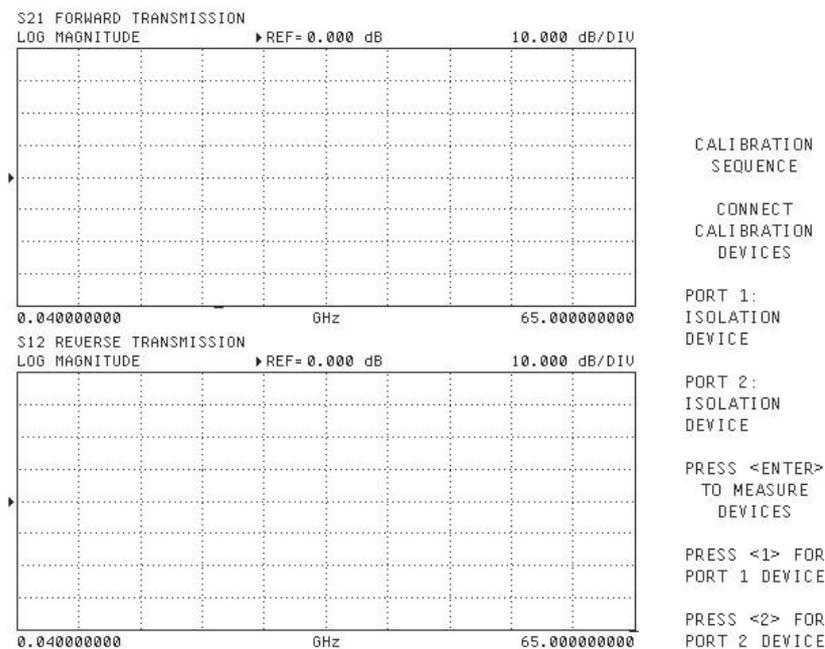


Figure 7-11. VNA Calibration Sequence Display

Note The verification devices must be connected to the W1 connector coupler ports and not to the VNA ports. Use the torque wrench supplied with the verification kit when tightening the device connections.

20. Connect the 50 Ohm Broadband Terminations as Isolation Devices on the W1 coupler ports as directed by the VNA on-screen instructions. Start the calibration by pressing the Enter key on the VNA front panel.
21. The same 50 Ohm Broadband Terminations are used as the Broadband Loads in the second calibration step. Press the Enter key on the VNA front panel to measure the broadband loads.
22. Install the Open and Short calibration standards on the W1 coupler ports as directed by the VNA on-screen instructions.

23. If you have selected the 40 MHz to 65 GHz frequency range, you must use Short 1 as the 2.0200 mm short device.
 24. If you have selected the 65 GHz to 110 GHz frequency range, you must use Short 2 and Short 3 in the calibration sequence.
-

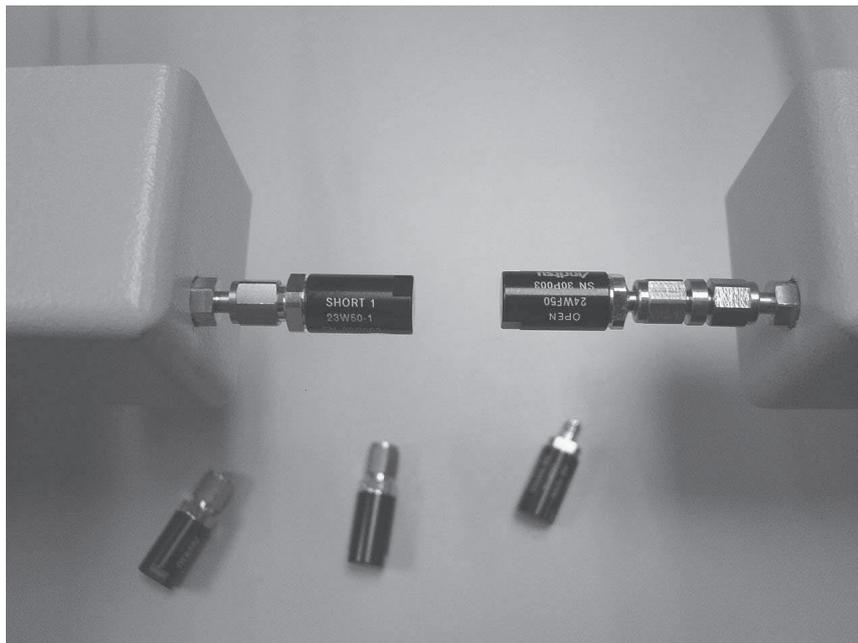


Figure 7-12. Calibration Device Connections

25. The calibration kit contains a matching set of Open and Short calibration standards, each with opposite gender connectors. Ensure that you use the matching set of devices for the Open/Short and Short/Open calibrations.

26. For the through line calibration, you may connect the couplers as shown in [Figure 7-13](#) or use a through line. If a through line is used, it must be in line for all subsequent measurements.

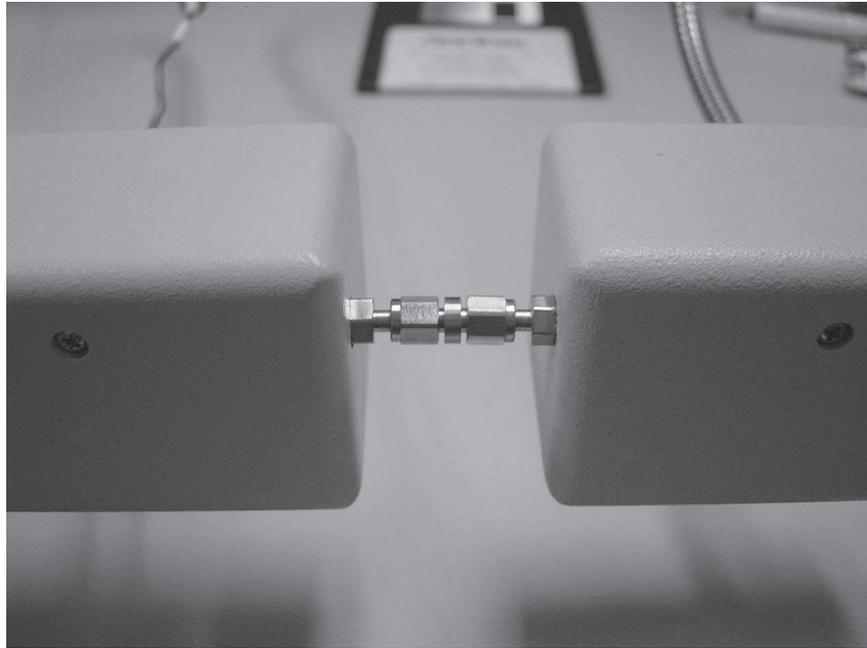


Figure 7-13. Through Line Connections

27. The VNA Apply Cal key led will be lit to indicate that the calibration is complete.
28. Click the OK button in the program dialog box to set up the VNA for running the tests on the verification standards and to display the Main Menu.

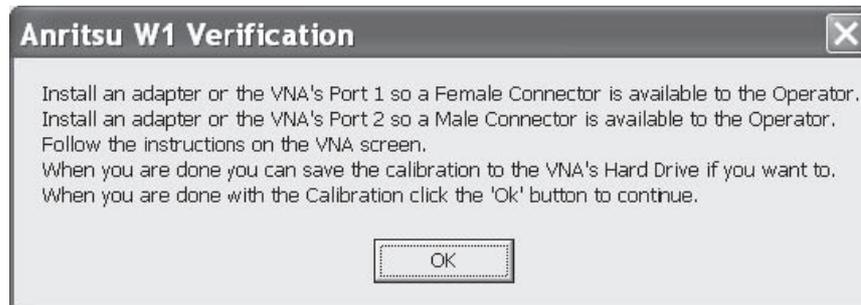


Figure 7-14. Install An Adapter

29. Program initialization and system calibration are now complete.

7-7 Verification Control Dialog Box

The main menu dialog box consists of three tabbed pages for Program Control, Instrument Control, and Verification Test Control. Each tabbed page contains buttons to control various program operations as outlined in the following sections.



Figure 7-15. Anritsu 37397 Verification – Main Menu Tab

Program Control Tab

- **Restart:** This command allows you to change the instrument to test, the frequency range, or the selected verification kit. Selecting Yes causes the program to return to the program initialization stage.
- **Quit:** Selecting Quit brings up a confirmation box. Selecting Yes exits the program; selecting No returns you to the previous screen.
- **About:** Displays version information, copyright, other legal notices, and company contact information.

Instrument Control Tab

- **Auto Scale Display:** This command automatically scales each channel on the Anritsu Vector Network Analyzer. It is the same as selecting a front panel channel button, and then pressing the front panel Auto Scale button for each channel.

Note

When the program detects the Vector Network Analyzer has finished a sweep, the program auto scales all four channels before continuing.

- **Default Display Scale:** This command sets all four channels to a scale of 15 (dB or Unit)/Div and the reference value to 0. This allows you to see if the device is remotely or properly connected.
- **Go to Remote Control:** This command is only available after you have clicked the Go to Local Control button. When you push this button, the program takes control of the VNA and restores the VNA to the same state it was in after the instrument was calibrated.
- **Go to Local Control:** This command allows you access to the front panel buttons while the program is running. The instrument is in Local Lock Out unless this button is pushed. This prevents an inadvertent front panel button actuation from affecting the proper operation of the program.

Verification Test Control Tab

- **Run All Tests:** This command button runs both the Matched Thru and Mismatched Thru tests.
- **Matched Thru:** This command button only runs the Matched Thru tests.
- **Mismatched Thru:** This command button only runs the Mismatched Thru tests.
- **Repeat Last Cal:** This command button re-calibrates the VNA according to the CURRENT calibration. This provides a way to quickly re-calibrate the VNA without having to reset the program parameters in case the original calibration was flawed for some reason.
- **Data to Floppy:** This command button writes two data files to the floppy disk. The program does not write data to the verification kit disk.
- **View Buttons:** These buttons allow you to view or print the test results without the use of an external program.

7-8 Testing the Verification Standards

Whenever the program is executing a command from the main menu, the buttons are disabled until the currently executing command is finished. This is necessary due to the event driven nature of Windows. Also, while a command is being executed, informational messages may be displayed on the screen.



Figure 7-16. Anritsu 37397 Verification – Main Menu Tab

30. Click either the Matched Thru or Mismatched Thru command buttons and follow the on-screen instructions.

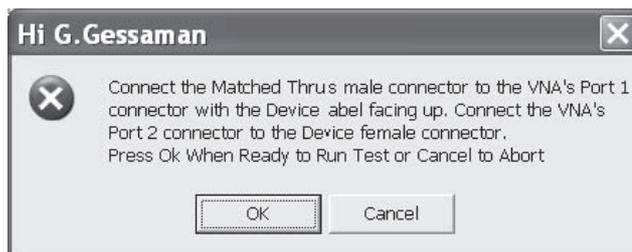


Figure 7-17. Connect the Matched Thru

31. Ensure that the correct device is connected.
- The Matched Thru verification standard is the device with one scribe line.
 - The Mismatched Thru verification standard is the device with two scribe lines.

Note The verification standards must be connected to the W1 coupler ports and not to the VNA ports.

32. If a device verification passes, the serial number text turns GREEN.



Figure 7-18. Device Passed Dialog Box

33. If a device verification fails, the serial number text turns RED. The test results are also displayed in the System Verification Software Main Menu - Main Menu dialog box in the Verification Test Control area.
34. If a device verification was canceled before a pass-fail status could be established, the serial number text is White.
35. If a device verification has not been performed, there is no entry for the serial number; however, a device's serial number may be entered before testing by double clicking a device serial number text box and entering the number manually.
36. The test results, pass or fail, is displayed in dialog boxes and in the Verification Test Control frame.
37. Initially, if a device verification failed, the program displays the number of points that failed and asks if you would like to recheck those points.

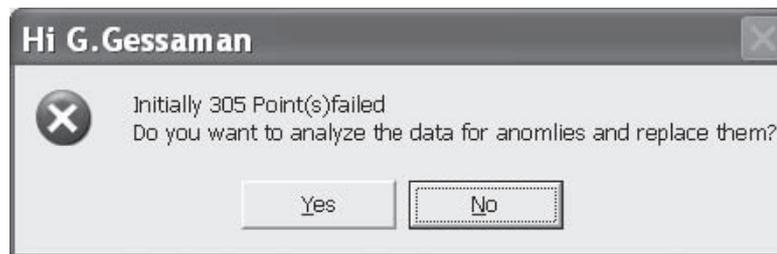


Figure 7-19. Program Message

38. If you answer **Yes**, the points are rechecked. If they now pass, the device verification is considered good and is passed. In contrast, if the points cannot be resolved, the device verification is failed.
39. Test both devices.
40. When both devices have been tested, select **Data to Floppy** for archiving.

Note It is important to save the data to the floppy disk before proceeding or the verification results will be overwritten the next time the program runs.

41. If this is the first frequency band being tested (either 40 MHz to 65 GHz or 65 GHz to 110 GHz), proceed to the restart method below for instructions on completing the full broadband calibration and verification.

7-9 Restart Method for Untested Frequency Band

After both the Matched Thru and Mismatched Thru have passed the tests and the data is saved to disk, it is necessary to retest them in the frequency band that has not been tested (either 40 MHz to 65 GHz or 65 GHz to 110 GHz).

42. Ensure that the calibration data and verification results of the previous test have been saved to the floppy disk before proceeding.
43. To perform the set of tests for the next frequency range, select **Restart** on the Main Menu to see the following display:

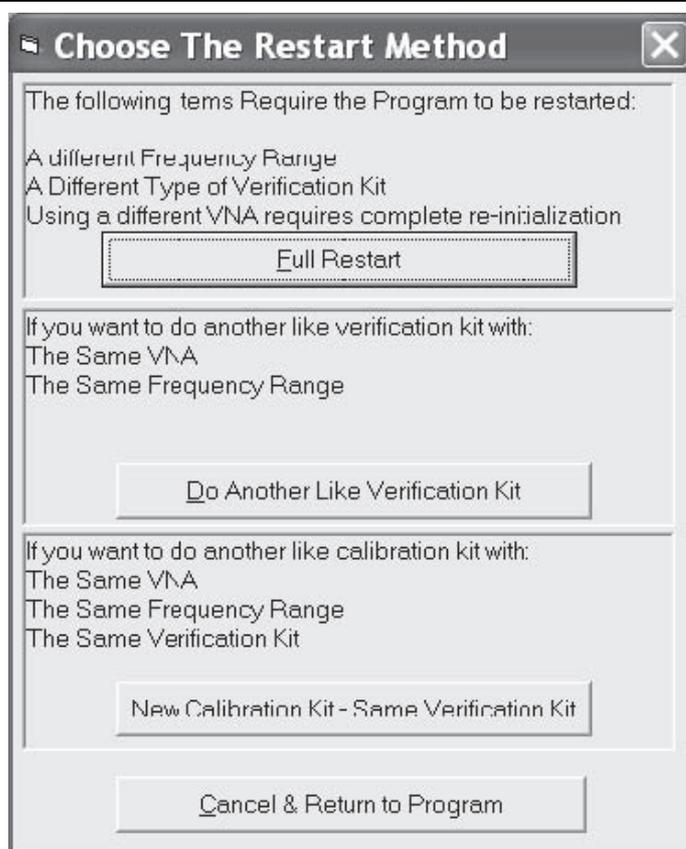


Figure 7-20. Choose the Restart Method Dialog Box

44. Select the **Full Restart** to restart the program from the beginning of the program initialization as shown in [“Starting the Program and Initializing”](#) on page 7-3.
45. On the Setup Menu, repeat the data entry for the following items:
 - a. Enter the User Name.
 - b. Enter the GPIB Board 0.
 - c. Enter the GPIB Address 6.
 - d. Enter the VNA Model Number.
 - e. Enter the Test Set Serial Number.
 - f. Enter the Cal Kit Type selection.
 - g. Enter the Cal Kit Serial Number selection.
 - h. Enter the Load Cal Kit Disk from VNA Floppy selection.

- i. Enter the Frequency Range selection. Select the frequency range that has not been tested. If the first calibration procedure selected the 40 MHz to 65 GHz frequency range, at this point, select the 65 GHz to 110 GHz frequency range.
 - j. Enter the Verification Kit Type selection.
 - k. Enter the Verification Kit Serial Number selection.
 - l. Enter the PC Floppy Drive the Disk Is In selection.
46. Complete the calibration and verification of the devices for the second frequency range.
 47. Save the second set of calibration data and verification results to the floppy disk.
 48. This series of automated tests verify that the ME7808A/B/C broadband S-parameter measurement accuracy meets factory specifications.
 49. This ends the calibration and verification procedure for the Lightning ME7808A/B/C.

7-10 Troubleshooting

Difficulty Running the Program

If you have difficulty getting the program to run properly:

1. Check your GPIB interconnection cables and addresses.
2. Check to see that the Windows GPIB is present on the boot drive, that it is properly configured, and that it passes the National Instruments hardware and software tests.
3. This version of the verification software must be installed with the install program on the USB memory device. The program does not run if it is just copied from the USB memory device to the hard disk.
4. Ensure that, after starting-up the performance verification software, the verification kit data disk is installed in drive A or B and that it contains 20 files.

If, after checking the above, you are still having difficulty, contact your Anritsu customer service center and ask for the Vector Network Analyzer support engineer for further assistance.

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:

1. Check both the verification kit and calibration kit devices for signs of physical damage. Make sure that the connectors are clean.
2. Ensure that the serial number of the verification kit data disk matches that shown on the verification kit.
3. Repeat the process with a fresh calibration. Save the results of both measurements as an aid in troubleshooting, in case you require factory assistance.
4. 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.
5. Assure all active systems have been powered on at least one hour before the start of the calibrations.

If you still have difficulty after following the above steps, please contact Anritsu Customer Service and ask for the Vector Network Analyzer support engineer for further assistance.

Chapter 8 — GPIB Card and Instrument Settings

8-1 Introduction

The following sections describe the recommended GPIB Card and GPIB Instrument Settings. These settings apply to both the VectorStar ME7838A, ME7838E, ME7838A4, ME7838E4, ME7828A BB/mm-Wave Measurement Systems and to the Lightning ME7808A/B/C BB/mm Measurement System.

8-2 GPIB Board Settings

Use these settings for your GPIB controller board.

Table 8-1. GPIB Board Settings

Parameter	Setting
Primary Address	0
Secondary Address	NONE or 0
Time-out Setting	10 seconds
Terminate Read on EOS	NO or unchecked
Set EOI with EOS on Writes	YES or checked
Type of compare on EOS	8-bit
EOS Byte	0Ah or decimal 10
Send EOI at End of Write	YES or checked
System Controller	YES or checked
Assert REN When SC	YES or checked
Enable Auto Serial Polling	NO or unchecked
Enable CIC Protocol	NO or unchecked
Bus Timing	2_seconds
Parallel Poll Duration	Default

The following settings may vary depending on the selected GPIB Card type and Operating System.

Use this GPIB Interface	YES or checked
Board Type	Your board type such as PCIIA or PCI
Base I/O Address	Consult the GPIB card manual
DMA Channel	Consult the GPIB card manual
Interrupt Level	Consult the GPIB card manual

8-3 Instrument Settings

Table 8-2. Instrument Setting

Parameter	Setting
Primary GPIB Address	6
Secondary GPIB Address	NONE
Time-out Setting	10 seconds
Serial Poll Time-out	1 second
Terminate Read on EOS	NO or unchecked
Set EOI with EOS on Writes	YES or checked
Type of compare on EOS	8-bit
EOS Byte	0Ah or decimal 10
Send EOI at End of Write	YES or checked
Enable Repeat Addressing	NO or unchecked

Chapter 9 — Maintenance

9-1 Introduction

This appendix provides instructions for the maintenance and proper connection and torquing of the RF connectors on your Anritsu instrument, and components you connect to the instrument, including the calibration kit components described in this manual. Following the recommendations in this document prevents shortened connector life and less equipment downtime due to connector-related failures. The topics covered in this chapter are:

- Inspection and cleaning
- Connection techniques
- Torque specifications and tools

Note	The components in these kits are of the highest quality and accuracy. All components are NIST (National Institute of Standards Technology) traceable. Mechanical shock can damage them. Handle with care.
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Common Causes of Connector Failure

Following are common causes of connector-related instrument failures and effects on measurement accuracy and repeatability.

- Connectors contaminated with material such as metal debris and dust particles will increase the risk of damaging connector. A dusty connector affects the measurement accuracy due to lack of repeatability.
- Worn or damaged threads can damage mating connectors.
- Over torquing connectors will introduce excessive stress to connector interface. Under torquing will increase repeatability uncertainty.
- Improper pin depth of the center conductor can permanently damage the mating connector.
- ESD – A connector is a perfect conductor for electrostatic discharge (ESD). Excessive charge accumulation will damage expensive and sensitive electronic devices residing in the instrument.

Coaxial Connector Care

Most coax connectors are assembled into a system and forgotten, but some, especially on test equipment interfaces are used almost continuously. The care and cleaning of these connectors is critical to maintain accurate and reliable performance. Good connector performance can be achieved with the following:

- Periodic visual inspection
- Routine cleaning
- Proper connection and disconnection techniques using a torque wrench

9-2 Visual Inspection

Connectors contaminated with material such as metal debris and dust particles will increase the risk of damaging the connector. A dusty connector affects the measurement accuracy due to lack of repeatability. Careful visual inspection with a magnification aid and lighting should be performed at least once per day before connecting. A “good” connector may get damaged if it is mated with a “bad” one.

Any connector with the following defects should be repaired or discarded:

- Plating concerns that include bubbles, blisters, and deep scratches showing bare metal on the mating plane.
- Center conductors with bent, broken or damaged contacts.

Magnification

Use a device with a magnification range of 2X to 10X depending on the connector type.

Connector Type	Minimum Magnification for Inspection
Type N 3.5 mm	2X
K (2.92 mm) V (1.85 mm)	7X

Figure 9-1. Magnification for Connector Inspection

Outer Conductor and Thread Inspection

When connector threads are clean and free from defects, coupling nuts should move freely. Inspect for defects such as:

- Dirt, dust, metal particles and oil
- Damaged threads (distorted, dented, or crushed)
- Dents or raised edges on the mating plane

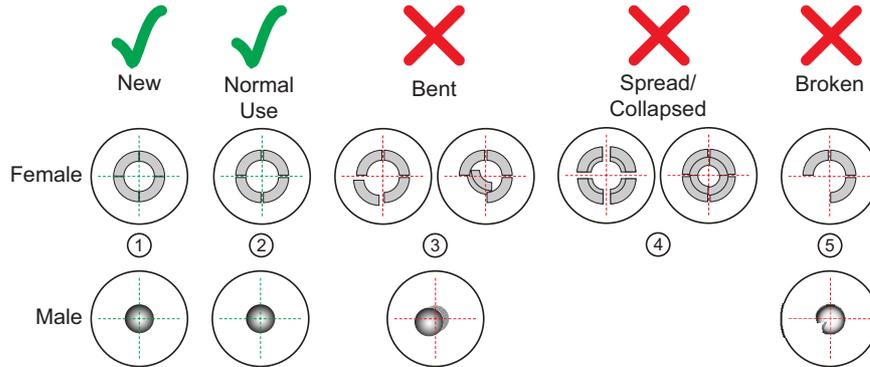
Note

Connectors may lose some gloss over time due to normal usage. Light scratches, marks, and other cosmetic imperfections found on the mating plane surfaces are signs of normal wear and should not be considered cause for replacement.

Regular cleaning and proper connection techniques will minimize wear on the plating due to abrasion from debris.

Center Conductor Inspection

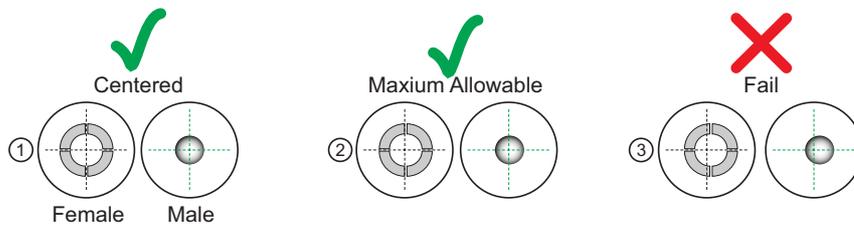
Inspect for bent, broken, or damaged center conductors:



Index	Description
1	New condition
2	Normal use – Slight gap
3	Bent pin section – Discard connector
4	Fingers spread or collapsed – Discard connector
5	Broken pin or pin section – Discard connector

Figure 9-2. Example Connector Damage States

Inspect for center pin concentricity:



Index	Description
1	Centered
2	Maximum allowable off-center
3	Fail – off center – Discard connector

Figure 9-3. Example Connector Concentricity

9-3 Connector Cleaning

With repeated connections and disconnections, the threads and outer conductor mating interface builds up a layer of dirt and metal chips which can severely degrade connector electrical and mechanical performance. This debris can also increase the coupling torque required for a good connection which can then damage the mating interfaces. Cleaning of connectors is essential for maintaining good electrical performance. Therefore, connectors should be checked for cleanliness before making any measurements (or calibration).

Caution Use the correct sized cotton swabs that are made specifically for cleaning small areas. Oversized cotton swabs can put lateral pressure on the center pin and damage it. Inspect after cleaning to be sure that no cotton strands get caught in the connector.

Required Cleaning Items

- Low-pressure dry, compressed air (oil free, solvent free), maximum pressure: 40 PSI
- Lint-free cotton swabs
- Isopropyl alcohol (IPA), 90 %
- Microscope Cleaning Procedure

Teflon Tuning Washers: The center conductor on some RF components contains a small teflon tuning washer located near the point of mating (interface). This washer compensates for minor impedance discontinuities at the interface. The washer's location is critical to the RF component's performance. Be careful not to disturb it with a cotton swab or compressed air and don't apply alcohol to it.

Caution Compressed Air: Do not use compressed air on power sensors. Some power sensors have components internally located near the connector that can be damaged from excessive air pressure.

Solvents: Do not use industrial solvents or water to clean the connector. Use 90 % Isopropyl Alcohol (IPA) only. Do not spray alcohol directly onto connector surfaces. Do not saturate the swab with alcohol. Instead, lightly dampen it by touching the tip onto a bead of alcohol formed at the bottle tip as shown in [Figure 9-4](#).

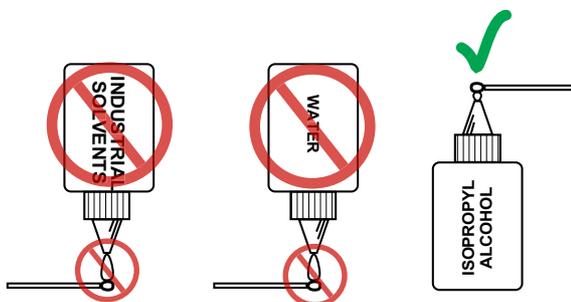


Figure 9-4. Isopropyl Alcohol Only

Procedure

1. Remove loose particles on the mating surfaces, threads, and similar surfaces using low-pressure clean (oil free, solvent free) compressed air (40 PSI max) applied at a shallow angle so foreign particles are not forced down into the connector.

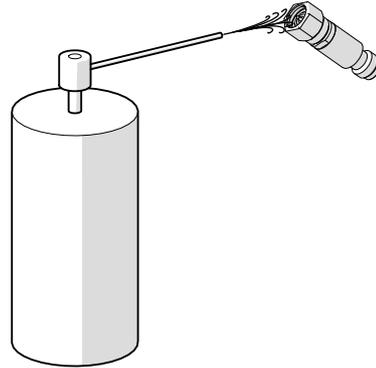


Figure 9-5. Low Pressure Compressed Air Cleaning

2. Clean the threads of the connector with a lint-free cotton swab dampened with IPA.

Caution Do not insert cotton swabs at an angle or use a swab that is too large (Figure 9-6). Doing so can damage the center pin.



Figure 9-6. Avoid Angled or Large Swab

3. Clean the mating surfaces and connector threads by gently moving the cotton swab around the center pin. Avoid applying pressure to the center pin.

When the connector is clean, you should be able to hand tighten the connector to within approximately one half turn of the specified torque.

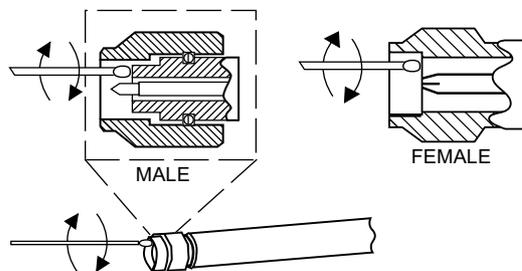


Figure 9-7. Cleaning Connector with Cotton Swabs

4. After cleaning with swabs, again use low-pressure compressed air to remove any remaining small particles and dry the connector surfaces.
5. Using magnification and adequate lighting, inspect the connectors for damage or debris.

9-4 Making a Connection

This section provides connection and torquing instructions for making a repeatable connection and avoiding damage to the connector.

Caution	Connectors should never be forced together when making a connection since forcing often indicates incorrectness and incompatibility.
	Use a torque wrench with the correct setting to tighten the connector. Over torquing connectors may damage the connector center pin.
	Never use pliers or adjustable wrenches to tighten connectors.

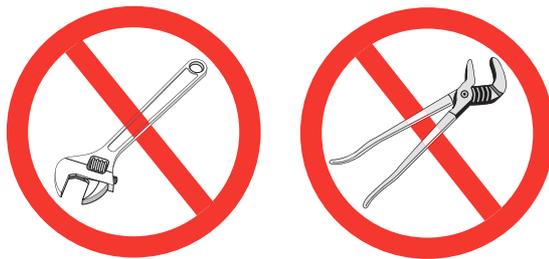


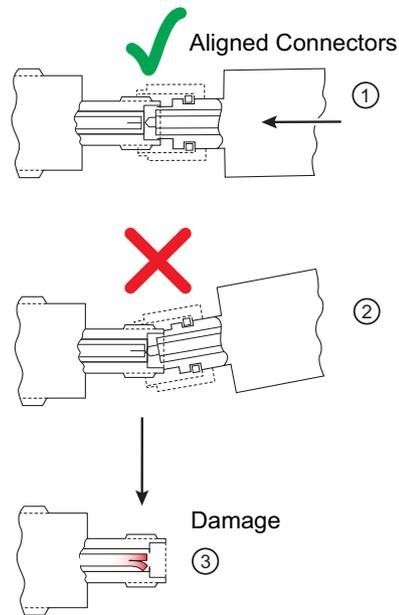
Figure 9-8. Do Not Use Pliers or Adjustable Wrenches

Before Connection

1. Verify the power and voltage levels of the device you are connecting to and the input limits of your test equipment.
2. Visually inspect the connectors for damage, cleanliness, and center pin concentricity as described in [Section 9-2](#)
The coupling nut should move freely. If necessary, clean the connectors
3. Before touching instrument connectors, make sure you have grounded yourself and eliminated all static charge by following proper ESD handling procedures that conform to ANSI/ESD S20.20-2007.

Initial Connection

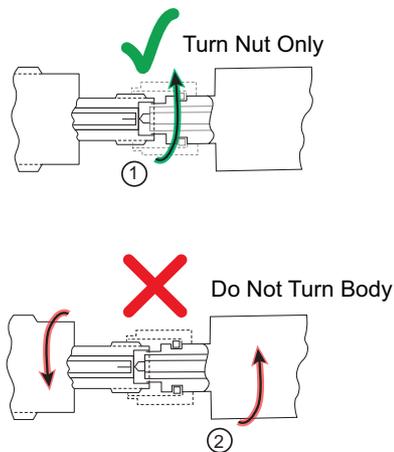
1. Carefully align the connectors as shown in [Figure 9-9 on page 9-7](#).
The male connector center pin must slip concentrically into the contact fingers of the female connector. Never apply excessive force when making a connection.
2. Push the connectors straight together.
3. Do not twist while pushing them together and do not turn the connector body. As the center conductors mate, there is usually a slight resistance. Finger-tighten the connection first by turning the connector nut.
4. Back off the connection by turning the connector nut counter clockwise 1/4 turn. The final tightening is done using the appropriate torque wrench from the kit and as described in [Table 9-1](#)



Index	Description
1	Aligned connectors
2	Misalignment can cause pin damage
3	Damaged pin

Figure 9-9. Avoid Pin Damage Due to Misalignment

Caution Do not turn the connector body. Major damage to the center conductor and the outer conductor can occur if the connector body is twisted.



Index	Description
1	Turn nut only
2	Do not turn body

Figure 9-10. Tightening the Connector Nut

Torquing the Connection

Connectors must be correctly torqued to their required settings to make sure the connector is tight enough to ensure an accurate RF measurement but not so tight as to damage the connector or the instrument. Use the correct torque wrench for the connector type. Applying proper torque will improve connection repeatability and reproducibility. Over torquing connectors is destructive as it may damage the connector center pin. Never use pliers to tighten connectors.

1. Select a torque wrench of proper size and rating for the connector and an open end wrench. The open end wrench is used to prevent the body of the connector from turning. Refer to [Table 9-1](#) for torque specifications.
2. Place the two wrenches at an angle of less than 90° as shown in [Figure 9-11](#).

Caution

Using two wrenches with an angle greater than 90° causes the devices to lift up, which tends to misalign and stress the connectors. This becomes more of a problem when multiple devices are connected together.

Breaking the handle fully can cause the wrench to kick back which may loosen the connection.

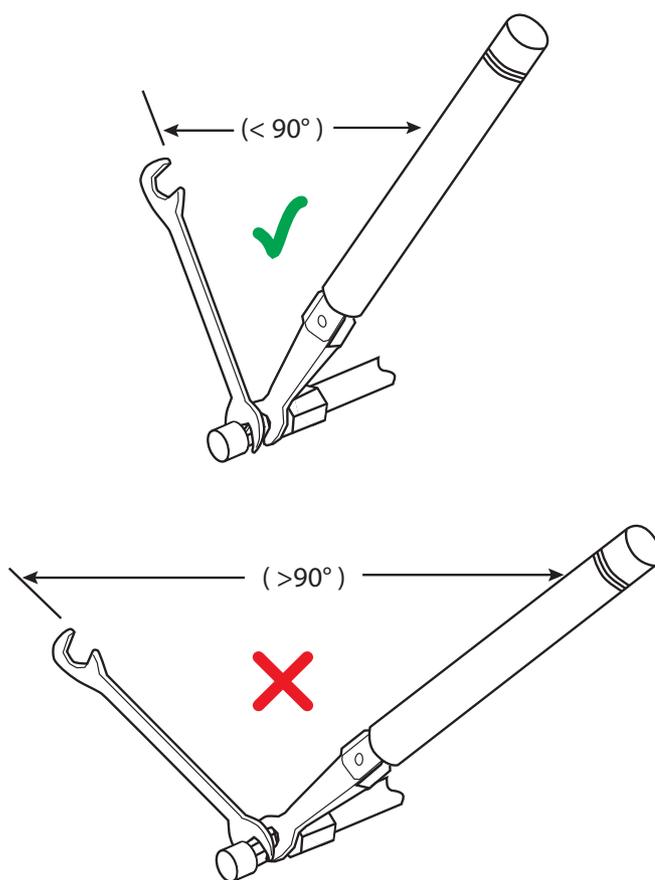
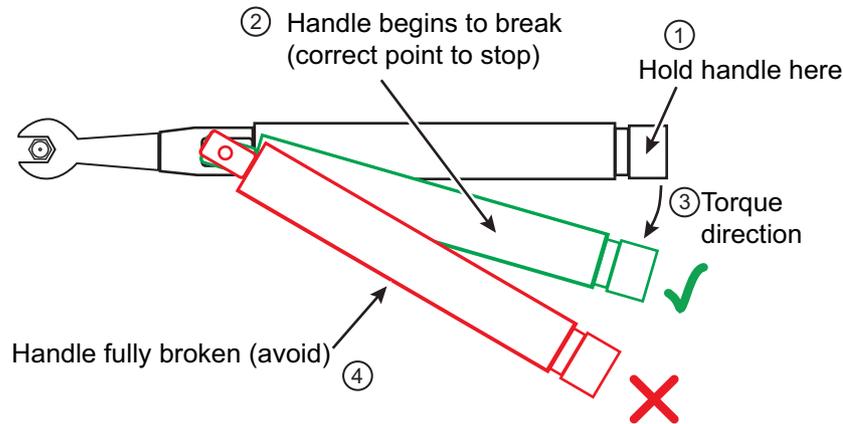


Figure 9-11. Using Wrenches at Proper Angle

3. Hold the torque wrench at the end as shown in [Figure 9-12 on page 9-9](#).

Caution

Holding the torque wrench anywhere but at the end applies an unknown amount of torque and can damage contacts and/or connectors.



Index	Description
1	Hold handle here
2	Handle begins to break – Stop torquing
3	Torque direction
4	Handle fully broken – Avoid torquing this far

Figure 9-12. Using a Torque Wrench

4. Before torquing, make sure long or heavy devices or cables are supported so there is no lateral pressure on the connection
5. Rotate *only* the connector nut when tightening the connection. Apply torque to the fitting until the handle begins to break as shown in [Figure 9-12](#).

W

(1 mm)

6 mm 0.45 N·m

4 lbf·in

01-504 6 mm Torque End Wrench

01-505 6 mm x 7 mm Combination Open End Wrench

Torque Specifications and Tools

Torque values are listed below for connectors used with the 365xx-x mechanical calibration kits. If you are not sure which connector types are available on your instrument, consult the instrument Technical Data Sheet available on the web at www.anritsu.com.

Table 9-1. Connector Torque Settings and Recommended Tools (1 of 2)

Connector Type/Size	Wrench Size	Torque Setting	Recommended Tools
3.5 mm ^{a b}	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in Torque End Wrench 01-204 5/16 in or 8 mm Open End Wrench
GPC-7	19 mm 3/4 in	12 lbf·in 1.36 N·m	01-200 3/4 in Torque End Wrench
K (2.92 mm)	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. or 8 mm Open End Wrench

Table 9-1. Connector Torque Settings and Recommended Tools (2 of 2)

Connector Type/Size	Wrench Size	Torque Setting	Recommended Tools
V (1.85 mm)	8 mm 5/16 in	0.9 N·m 8 lbf·in	01-201 5/16 in. Torque End Wrench 01-204 5/16 in. or 8 mm Open End Wrench
W1 (1 mm)	6 mm	0.45 N·m 4 lbf·in	01-504 6 mm Torque End Wrench 01-505 6 mm x 7 mm Combination Open End Wrench

a. 3.5 mm, 2.92 mm and K connectors are electrically compatible with SMA and have the same connector nut size (8 mm) and torque requirement. Refer to [Table 9-2](#) for connector compatibility information.

b. Although the 2.4 mm, 1.85 mm, and V connectors have the same connector nut size (8 mm) and torque requirement, they are not mechanically compatible with 3.5 mm. Refer to [Table 9-2](#) for connector compatibility information.

Disconnection

To properly separate an RF connection:

1. Use the same wrench usage technique as shown in [Figure 9-11](#).
2. Use one to prevent the connector body from turning. Use the other to loosen the connector nut.
3. Complete the disconnection by hand, turning *only* the connector nut.
4. Pull the connectors straight apart without twisting or bending.

Connector Types and Cross-Mating Compatibility

The following table lists RF connector characteristics and cross-mating compatibilities.

Table 9-2. RF Connector Characteristics

Connector Type/ Parameter	7/16 DIN	20 GHz Type N	Type N	7 mm	SMA	3.5 mm	K (2.92 mm)	2.4 mm	V (1.85 mm)	W1 (1 mm)
Upper Frequency Limit (GHz)	7.5	20	18	18	18	26.5	40	50	67	110
Mating Type	M/F	M/F	M/F	Sexless	M/F	M/F	M/F	M/F	M/F	M/F
Cross-mating Compatibility	7/16 DIN only	Type N	20 GHz Type N	7 mm only	3.5 mm, K,	K, SMA,	3.5 mm, SMA,	V	2.4 mm	W (1 mm) only
Dielectric	Air	Air	Air	Air	Teflon	Air	Air	Air	Air	Air
Thread	M29 x 1.5	5/8–24	5/8–24	0.6785-24	1/4–36	1/4–36	1/4–36	M7 x 0.75	M7 x 0.75	M4 x 0.7
Outer Conductor (mm)	16	7	7	7	4.2	3.5	2.92	2.4	1.85	1

Anritsu



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