



Testing a Coaxial Cable using a Network Analyzer

Procedure 501

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Table of Contents

Introduction	3
I. Purpose of this Document.....	3
II. Materials Required.....	3
Testing Procedures.....	4
I. Verify Network Analyzer Calibration	4
II. Calibration Procedure	4
III. Select Com Port.....	6
IV. Test a Coaxial Cable	6

Introduction

I. Purpose of this Document

This document will outline the procedures to calibrate your network analyzer, ensure a proper connection to Windows, and test the impedance of a coaxial cable using a network analyzer.

II. Materials Required

- TE3001 Network Analyzer
- Laptop PC with Z'Analyze software
- Precision 50 Ohm test cable
- 50R load
- Coaxial connectors and adapters as appropriate for cables to be tested
- USB-A to USB-B cable
- Coaxial cable to be tested

Testing Procedures

I. Verify Network Analyzer Calibration

1. Turn on the network analyzer.
2. Connect the 50 Ohm precision test cable to the network analyzer output port.
3. Install the 50R load at the end of the precision cable.
4. Press the 'Z' button to set the network analyzer to impedance mode.
5. Set to rectangular impedance by pressing the 'Format' button until screen shows "Rect Impedance".
6. Verify that the 50R load reads $50 \pm j0.1$ Ohm at 13.56 MHz.
→ If load does not read as above, perform following calibration procedure.

II. Calibration Procedure

1. Press "System Z₀" to bring up the System Parameters menu.
2. Use the red arrows to scroll down to "Calibration..."
3. Press the Enter button to bring up the Calibration menu.
4. With the selection arrow pointing to "Cal Type" pressing Enter will alternate between Standard and Custom calibration. Select 'Custom'.
5. Arrow down and set the following parameters:
 - Cal Kit: N-female
 - Cal Start: 0.03 MHz
 - Cal Stop: 300 MHz
6. Press Enter when you have gotten to "Perform Cal" to start the process.
7. Arrow down and follow the on screen prompts, which will take you through the calibration process.
8. Install the 50R load at the end of the test cable when prompted, followed by the "short" load and finally the "open" load (See Fig. 1 and 2 on the next page)
9. When the calibration process is complete, scroll to "Done" and press Enter.

Fig 1. Custom S-O-L Calibration Loads

The N - type calibration kit comes standard with the TE3001

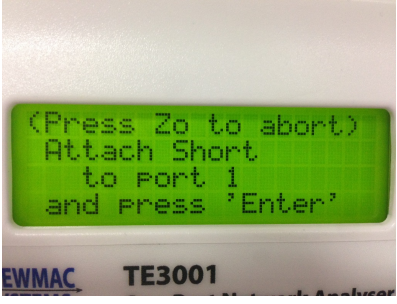

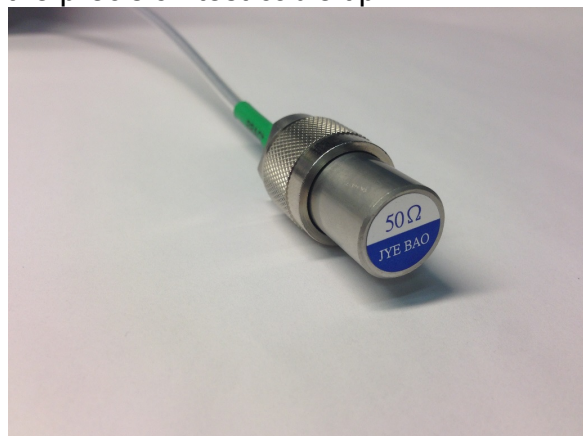
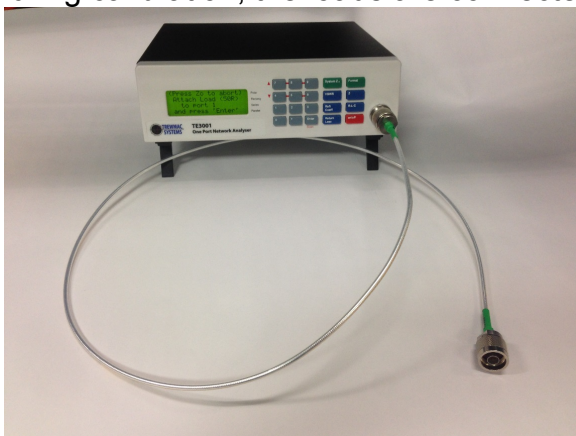
50R Load	"Short" Load	"Open" Load
 <p>(Press Zo to abort) Attach Load (50R) to Port 1 and Press 'Enter'</p> <p>EWMAC SYSTEMS TE3001 One Port Network Analyser</p>	 <p>(Press Zo to abort) Attach Short to Port 1 and Press 'Enter'</p> <p>EWMAC SYSTEMS TE3001 One Port Network Analyser</p>	 <p>(Press Zo to abort) Attach Open to Port 1 and Press 'Enter'</p> <p>EWMAC SYSTEMS TE3001 One Port Network Analyser</p>
 <p>50Ω JYE BAO</p>		

Fig 2. TE3001 Calibration Setup

During calibration, the loads are connected to the precision test cable tip



III. Select Com Port

Ensure the Com port selected matches the Com port on the computer that the network analyzer is plugged into. Selecting the incorrect port will result in a Connection error.

1. Navigate to Windows > Device Manager > Ports (COM and LPT) > USB Serial Port (COM#). This number is the Com port you will be using.
2. In the Z'Analyze software, click the Edit Settings button.
3. Under Serial, select the corresponding COM port from step 1. COM ports higher than COM8 can be manually entered by typing in the configured COM port number, ex. COM17.
4. Select the button "Check connection..."
5. If successfully connected, a popup window will display "Connected to: TE3001 F/W V12.0".

IV. Test a Coaxial Cable

1. Turn on network analyzer.
2. Using the USB-A to USB-B cable, connect the network analyzer to the PC.
3. Connect 50R load to one end of the cable being tested.
4. Attach the other end of cable being tested to the precision test cable.
5. Open up Z'Analyze software.
6. Enter the following values in the Control window:
 - 1 freq.
 - 2000 Samples
 - 1 average
 - 13.56 f (MHz)
7. Click the run arrow on the Control box.
8. Observe whether the impedance is in the center of the Smith Chart at 50 Ohms. (See Fig 3.)
 - a. If it is not, examine all connections to ensure that they are tight.
 - b. If tightening the connections does not bring it to the center of the Smith Chart, the coaxial cable is likely bad.
9. If the trace is in the center of the Smith Chart while the cable is static, then begin to bend and flex the cable at the end with the 50R load while the trace is running.
 - a. If the trace leaves the center of the Smith Chart, it likely means there is a poor braid connection at the connector being manipulated. (See Fig 4.)
 - b. Repeat the bend-and-flex motion for the other end of the cable connected to the precision test cable.

Fig 3. Good Cable Measurement Example

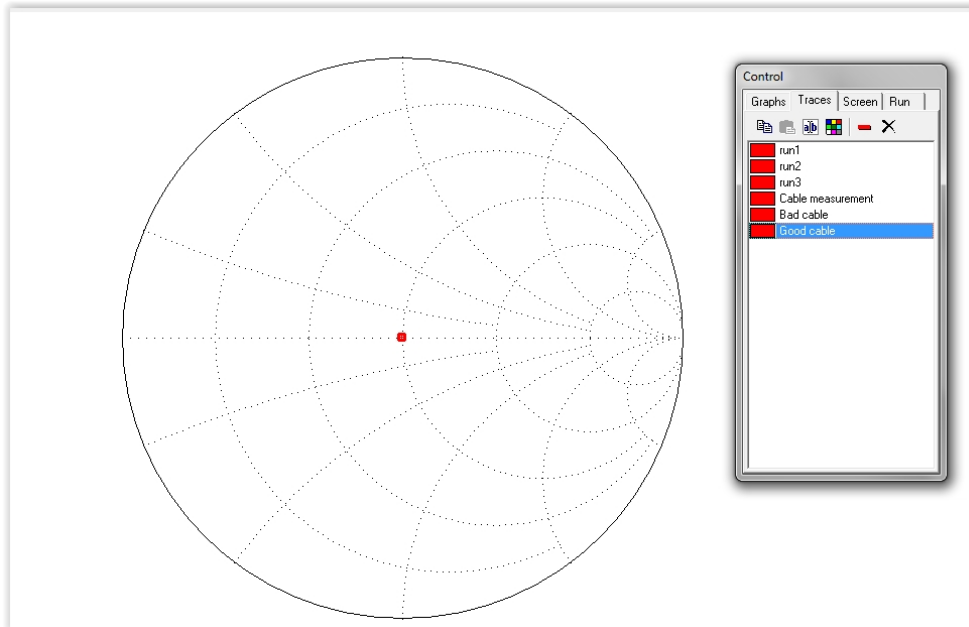


Fig 4. Bad Cable Measurement Example

