# Site Analyzer Calibration Verification Procedure

PURPOSE: This document is to provide instructions on how to verify the calibration status of the Bird Site Analyzer. This procedure is not a calibration instruction and will only provide a status of the Site Analyzer's performance to stated specifications. If the unit is found to be out of calibration it will have to be returned to the factory for re-calibration.

Equipment Requirement:

1. **50 Ohm N type RF load** –Use a high-quality low-VSWR load.
2. **N-type calibration kit or combo** – Use to perform user calibration.
3. **Precision mismatch loads 1.1:1, 1.5:1, & 2:1** – Used as a standard to check Site Analyzer test port return loss measurement performance.

General Equipment notes – Equipment accuracy will highly influence the results of any calibration verification activity. Standard metrology practices must be adhered to. Equipment accuracy must be at least 4 times better than the unit under test. Additionally the uncertainties of the associated equipment must also be considered. To minimize the impact of equipment uncertainties the use of equipment with at least ten times the accuracy of the UUT is recommended. To further improve the accuracy all cables and attenuators should be characterized and taken into consideration when comparing final results.

**1. Site Analyzer Calibration**

1.1. This test demonstrates the ability of the unit to measure a very well matched termination. The specification is -42.0 dB max.

1.2. Site Analyzer settings – Connect the AC adapter and power on the unit. Set the unit to Factory defaults. This step returns the unit to a "factory default" condition. Set the mode to "Measure Match" and configure the scale units for "Return Loss".

1.1. Conduct an Open/Short/Load calibration.

Note: During the OSL (open, short, load) calibration, the unit should complete each calibration sweep within about seven (7) seconds. If the sweep takes much longer than that there is a possible problem with the oscillator or the oscillator-to-RF module interface. Check for proper seating and bent pins. Repair/replace the oscillator if there is no obvious problem with the connections.

Note: Use soft-jaw pliers to securely fasten the calibration kit load standard to the RF port. (It is sufficient to finger-tighten the open and short standards while calibrating.)

Connect the load from the cal kit or combo used in step 1.1 to the Site Analyzer Test-port. The nominal return loss at all frequencies should be < -42dB.

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**2. Site Analyzer Mismatch Test**

2.1. Connect the 1.1:1 mismatch (nominal return loss = -26 dB) load to the VNA Test-port. The return loss at all frequencies should be between -24.48 and -27.73 dB.

2.2. Connect the 1.5:1 mismatch (nominal return loss = -14 dB) load to the VNA Test-port. The return loss at all frequencies should be between -13.34 and -14.60 dB.

2.3. Connect the 2:1 mismatch (nominal return loss = -9.5 dB) load to the VNA Test-port. The return loss at all frequencies should be between -8.91 and -10.02 dB.

NOTE: The performance levels identified are nominal values. The final performance of the Site Analyzer test port measurement should be compared to the calibration data of the loads used for the measurement or by comparing the trace obtained from the load on the Site Analyzer to the trace (S11) obtained from same load on a high accuracy bench top VNA. The limits can be calculated using the following formulas:

Upper limit = $RL-0.000112*(RL)^3-0.001686*(RL)^2-0.003492*(RL)+0.612654$

Lower Limit = $RL-0.000016*(RL)^4-0.000778*(RL)^3-0.014565*(RL)^2-0.092179*(RL)-0.615904$

RL = Return loss of the measurement standard at a specified frequency.