

---

# **SITE ANALYZER™**

**CABLE AND ANTENNA TESTER  
FOR WIRELESS SYSTEMS**

**OPERATING INSTRUCTIONS**

**FOR MODELS  
SA-1700, SA-1700-P  
SA-2500A, SA-4000**



**Electronic Corporation  
Cleveland (Solon) Ohio USA**

---

*©Copyright 2003 by Bird Electronic Corporation*  
Instruction Book Part Number 920-7002A400 Rev. E

Site Analyzer is a trademark of Bird Electronic Corporation  
Microsoft® and Windows® are registered trademarks  
of the Microsoft Corporation



## Safety Precautions

### **Remove Power**

Observe general safety precautions. Do not open the instrument with the power on.

### **Safety Earth Ground**

An uninterruptible safety earth ground must be supplied from the main power source to the instrument. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly installed.

### **Safety Symbols**

#### **WARNING**


Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

#### **CAUTION**

Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.



The caution symbol appears on the equipment indicating there is important information in the instruction manual regarding that particular area. See page 75 for specific cautions.

 **NOTE:** Calls attention to supplemental information.

### **Warning Statements**

The following safety warnings appear in the text where there is danger to operating and maintenance personnel, and are repeated here for emphasis.

#### **WARNING**

The SA-BATPAK is shipped charged. Be careful when removing the safety cap, 12Vdc @ 2.0 AH/20 hour rate can be present inside the receptacle. Do not touch the inside of the receptacle.  
The possibility of an electric shock exists.

**WARNING**

This equipment should not be connected to an antenna or operated during a storm that has the potential to produce lightning. The possibility exists for electrical shock.

**WARNING**

When using the ac adapter, only connect the plug to a properly grounded receptacle. Serious injury or death can occur if grounding is not properly installed.

**Caution Statements**

The following equipment cautions appear in the text and are repeated here for emphasis.

**CAUTION**

Harsh or abrasive detergents, and some solvents, can damage the display unit and information on the labels.

**CAUTION**

Always turn off the SA before connecting or disconnecting a sensor.

**CAUTION**

When using a Bird 5011 or 5011-EF, do not exceed 2 W average or 125 W peak power for 5  $\mu$ s. Doing so will render the sensor inoperative.

**CAUTION**

+22 dBm max. input  
Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

**Safety Statements**



**USAGE**

ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.

**USO**

EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.

**BENUTZUNG**

WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.

## UTILISATION

TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.

## IMPIEGO

QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.



### SERVICE

SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE - TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.

## SERVICIO

LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERLO.

## WARTUNG

ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL.

ZUR VERMEIDUNG GEFÄHRLICHER, ELEKTRISCHER SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.

## ENTRETIEN

L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.

## ASSISTENZA TECNICA

LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE ELETTRICHE NON EFFETTUARE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.

## About This Manual

---

### ***Changes to This Manual***

We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Solon, Ohio factory. This manual may be periodically updated. When inquiring about updates to this manual refer to the part number and revision on the title page.

### ***Reference Card***

The Reference Card contains minimum operational steps and the order they should be performed. Use this manual for reference or if further explanation of any step is required.

### ***Chapter Layout***

**Introduction** — Describes the features of the Bird Site Analyzer and provides power-up instructions.

**Calibration** — Lists the steps to calibrate the Site Analyzer, which must be done before using Measure Match or Fault Location modes.

**Measure Match Mode** — Lists the steps to make match measurements, as well as providing instructions for all functions available in Measure Match mode.

**Fault Location Mode** — Lists the steps to make distance to fault measurements, as well as providing instructions for all functions available in Fault Location mode.

**Save and Recall** — Describes how to save and recall traces and setups in Measure Match or Fault Location modes.

**Measure Power Mode** — Lists the steps to make power measurements, as well as providing instructions for all functions available in Measure Power mode.

**Utilities** — Describes utilities to set up the Site Analyzer.

**Computer Software** — Provides installation instructions and lists the features of the Bird Site Analyzer PC Software.

**Maintenance** — Lists routine maintenance tasks for the Site Analyzer, as well as troubleshooting for common problems. Specifications and parts information are also included.

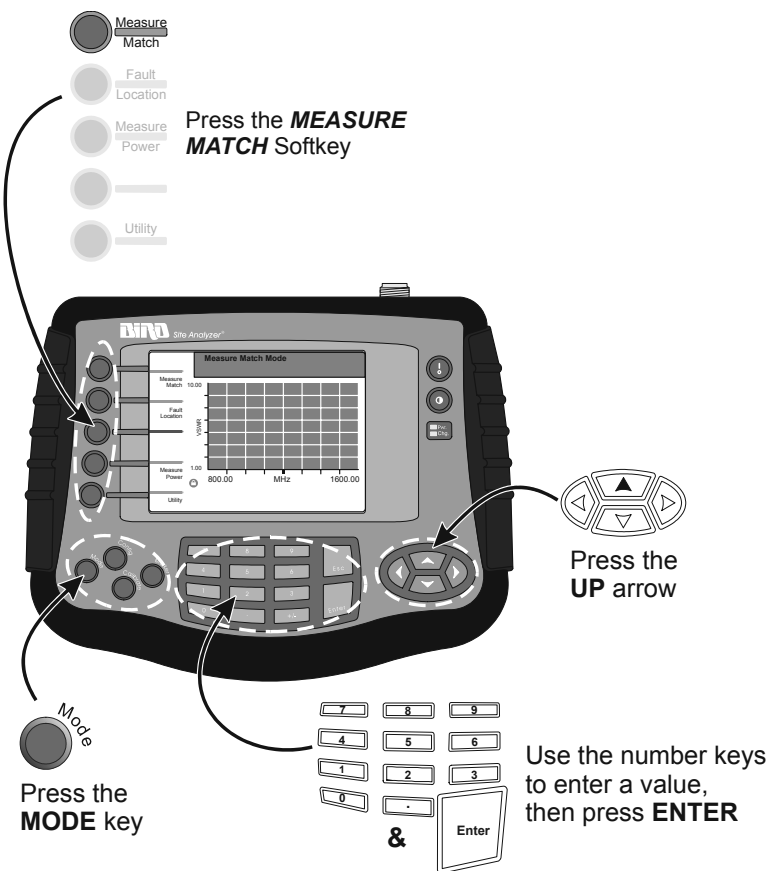
**Step By Step Guide** — Identifies buttons and connectors on the Site Analyzer, and explains the display. Also provides step by step instructions for making the most common measurements.

# Site Analyzer Keys

There are two types of keys on the Site Analyzer. The first type is a hard key which always has a particular function. The function is indicated on or next to the key. Hard key names in all caps and bold, e.g. Press the **ENTER** key.

The second type is a soft key. Each of the soft keys (there are five to the left of the display), has a function which varies depending on the current mode. The name will be at the left of the display, next to the appropriate key. Soft key names are set in all caps, bold, and italic, e.g. Press the ***SCALE*** key.

The figure below shows examples of text instructions. It also shows the graphical instruction used for each group of keys, along with an arrow pointing to where the keys are located on the Site Analyzer.



## Table of Contents

---

<b>Safety Precautions</b> .....	<b>i</b>
<b>About This Manual</b> .....	<b>iv</b>
<b>Site Analyzer Keys</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>1</b>
Items Supplied .....	1
Items Not Supplied .....	2
Site Analyzer Features .....	2
Power Supply .....	5
Power Up .....	7
<b>Calibration</b> .....	<b>9</b>
Calibration Accessories .....	9
Calibrating .....	9
<b>Measure Match Mode</b> .....	<b>11</b>
Setting the Frequency .....	12
Setting the Scale & Unit of Measure .....	15
Cable Loss Measurements .....	19
Limit Line .....	20
Limit Test .....	21
Markers .....	22
Measurement Hold .....	27
Printing .....	28
<b>Fault Location Mode</b> .....	<b>29</b>
Setting the Frequency Span .....	30
Setting the Cable Type .....	34
Setting the Distance .....	37
Setting the Scale & Unit of Measure .....	40
Limit Line .....	44
Limit Test .....	45
Markers .....	46
Smooth .....	51
Measurement Hold .....	52
Printing .....	53



<b>Save and Recall</b> .....	<b>55</b>
Save Trace .....	55
Trace Label .....	56
Trace Label Quicktext .....	61
Trace Label Config. ....	65
Save Setup .....	67
Recall Trace .....	68
Recall Setup .....	69
Delete Trace .....	70
Delete Setup .....	71
<b>Measure Power Mode</b> .....	<b>73</b>
Connecting a Sensor .....	75
Display Description .....	76
Setting the Full Scale Power .....	77
Zeroing Bird Power Sensors .....	78
Choosing the Displayed Measurement .....	80
Setting Units .....	80
Changing the mode for the 5010B .....	81
Using the 5012 Wideband Power Sensor .....	82
Setting the Offset .....	88
Recall Setups .....	90
<b>Utilities</b> .....	<b>91</b>
Adjust Date and Time .....	92
Return to Defaults .....	93
FM Modulation .....	94
Printer .....	95
<b>Computer Software</b> .....	<b>97</b>
Features .....	97
Computer Requirements .....	97
<b>Maintenance</b> .....	<b>99</b>
Cleaning .....	99
Charging the Battery .....	99
Troubleshooting .....	99
Battery Replacement .....	101
Unit Reset .....	102
Flash ROM Upgrade .....	103

Customer Service .....	104
Specifications.....	105
General .....	107
Parts List .....	111
Optional Equipment Available .....	112
<b>Step By Step Guide .....</b>	<b>115</b>
Definitions .....	115
How To Read The Instructions .....	116
Connectors.....	117
Buttons.....	118
Measure Match Measurement.....	123
Fault Location Measurement .....	126
Cable Loss Measurement .....	130

The Bird Site Analyzer is a multifunction test instrument for use in installation and maintenance of wireless systems.

Antenna systems are tested by using a Site Analyzer to measure match conditions. Data is graphed at 238 points across a user-specified frequency band or distance range. Transmitter systems are tested by using a Site Analyzer and a Bird power sensor to measure RF power. Data is displayed as power or match efficiency, depending on the sensor.

### ***Items Supplied***

1. Site Analyzer
2. Soft-Sided Carrying Case
3. PCTool Software
4. AC Power Adapter
5. Automobile Cigarette Lighter Adapter
6. 9-Pin Serial Communications Cable
7. Instruction Manual (Not Shown)
8. Reference Card (Not Shown)



## ***Items Not Supplied***

- Calibration Combination



## ***Site Analyzer Features***

### **General**

- Easy to operate and field ready for first-time, occasional, and experienced users.
- Step by step guide shows how to make some of the most common measurements.
- High-resolution color display.
- Field replaceable Li-ion battery.
- Automatic power down conserves battery life.
- Operates in temperatures as low as 14°F (–10°C).

### **Antenna Test**

- Rejects on-channel interfering signals to +13 dBm.
- Stores up to 15 setups.
- Adjustable pass/fail limit with visual indicator.
- Stores up to 300 sets of measurement data in raw format to facilitate conversion between Measure Match (Sweep) and Fault Location (DTF).
- Measurement data can be transferred to the Anritsu Site Master Software Tools.
- On-screen comparison between current measurement and stored data – no PC required.

- Pop-up menus contain over 70 cable types and 30 frequency band presets.
- X and Y scales and units are user adjustable.
- Six markers for either direct or difference measurements. Can also measure relative to limit line or recalled trace.
- Measurement hold to temporarily store a trace.
- Printing capability. The Bird Site Analyzer is compatible with all printers that use HP PCL Level 3, including most HP printers.

**Measure  
Match Mode**

- Fast swept measurement.
- Frequency can be set using either Start/Stop or Center/Span frequencies.
- Measurement units can be either return loss [dB], cable loss [dB], or VSWR [ratio].

**Fault  
Location  
Mode**

- Transform Algorithm - Fast Fourier Transform (FFT) with three levels of smoothing.
- Distance units can be either feet or meters.
- Measurement units can be either return loss [dB] or VSWR [ratio].

## Transmitter Test

### Measure Power Mode

- Numerical readout and analog dial.
- Can display either forward power, reflected power, or match efficiency depending on the sensor.
- Power measurement units can be either Watts or dBm. Match units can be either VSWR, return loss, or % match efficiency.
- Compatible with the Bird Directional Power Sensor, Terminating Power Sensors, VSWR Alarms, and Broadcast Power Monitors.

### Bird 5010B Directional Power Sensor



### Bird 5011 or 5011-EF Terminating Power Sensor




### Bird 5012 Wideband Power Sensor



## Power Supply

### Internal Battery

The Bird Site Analyzer has an internal, rechargeable, lithium-ion battery pack. This will operate the unit for a minimum of 3 hours of continuous usage. Recharging time, from a full discharge, is approximately 4 hours.

 **NOTE:** When the unit is received the battery may not be fully charged. An ac adapter should be used when operating the unit for the first time.

The battery gauge indicates the approximate battery life remaining. At  $\frac{1}{4}$  charge the gauge also displays “LO”. When using an external power source, a power cord symbol replaces the battery gauge.

### Adapters

The Bird Site Analyzer can be operated using an ac adapter or a 12V automobile cigarette lighter adapter. Using these will also charge the internal battery.

#### WARNING

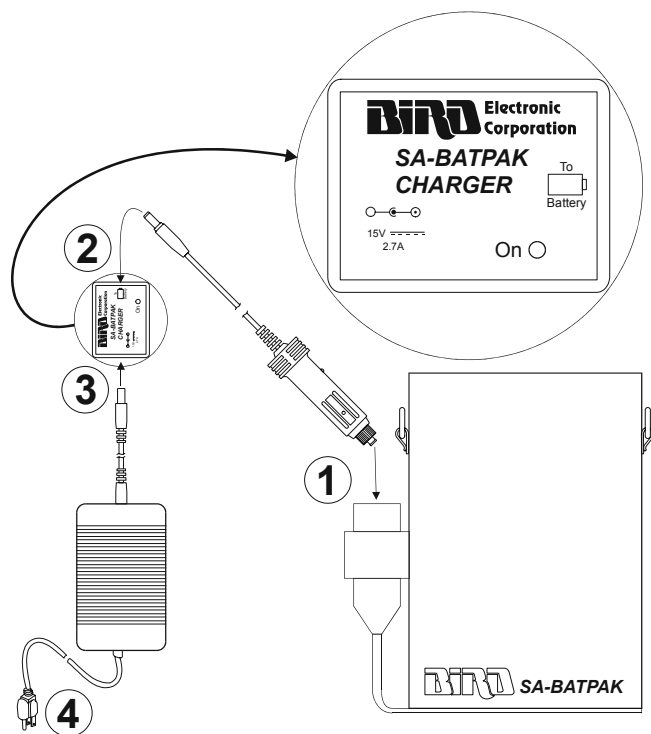
When using the ac adapter, only connect the plug to a properly grounded receptacle. Serious injury or death can occur if not properly grounded.

### External Battery Pack (Optional)

The SA-BATPAK is an optional external battery pack. This will operate the unit for approximately 2 hours. The liquid acid gel battery will fully charge, from a full discharge, in about 6-8 hours.

#### WARNING

The SA-BATPAK is shipped charged. Be careful when removing the safety cap, 12Vdc @ 2.0 AH/20 hour rate can be present inside the receptacle. Do not touch the inside of the receptacle. The possibility of an electric shock exists.



To charge the external battery pack:

1. Plug the automobile cigarette lighter adapter into the external battery pack on the side that says "To Battery". Refer to the figure above.
2. Plug the other end of the cigarette lighter adapter into the charger adapter.
3. Plug the ac adapter into the charger adapter.
4. Plug the ac adapter into a properly grounded outlet. The charger's "On" LED comes on and stays on until the charger is disconnected.

To use the external battery pack with a Site Analyzer:

1. Plug the automobile cigarette lighter adapter into the charged external battery pack.
2. Plug the other end of the cigarette lighter adapter into the dc input of the Site Analyzer.



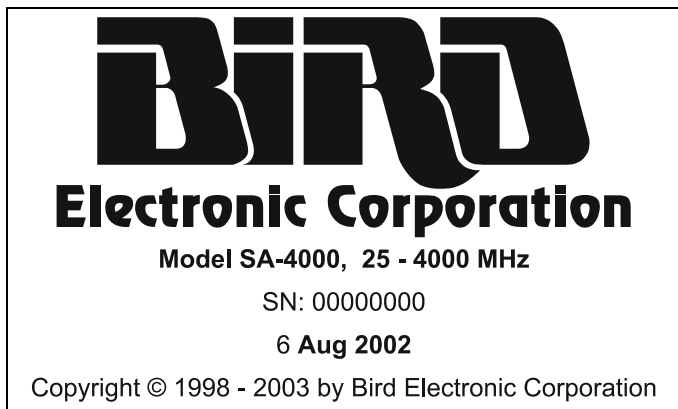
## Power Up

For the first powerup and after a failure, reset the unit (See “Return to Defaults”, page 93).

### Self Test

A self test is run at power up. If the test fails, see “Troubleshooting” on page 99 for instructions. If the problem persists, return the unit for service.

The software revision information is displayed during the self test, as shown below.



### System Information

Have the following system information ready before you begin using the Site Analyzer:


- **Frequency Span** — ex: 824-894 MHz (cellular band)
- **Cable Type** — ex: LDF 7-50A
- **Approximate Cable Length** — ex: 300 feet
- **Transmitter Power** — ex: 50 W

#### WARNING

This equipment should not be connected to an antenna or operated during a storm that has the potential to produce lightning.  
The possibility exists for electrical shock.



### Calibration Accessories

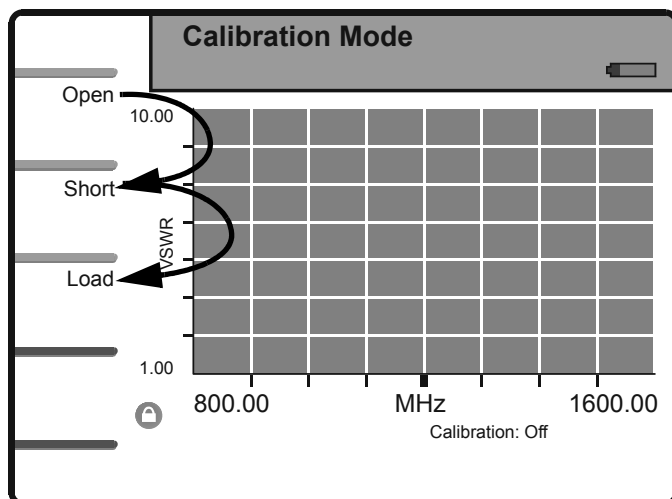
- Calibration Combination including:
    - One 50 ohm load
    - One Open standard
    - One Short standard
  - Test Cable (optional) – A phase-stable cable will provide consistent, reliable results.
-  **NOTE:** When using a test cable, attach the Cal Combo to the end of the cable during calibration.

### Calibrating

For best results, set the frequency and calibrate the Bird Site Analyzer immediately before taking measurements.

**START**

  
**Press key  
 from either  
 Measure  
 Match or  
 Fault  
 Location  
 mode**




- Press **CALIBRATE**.
  - Attach the open standard.  
Press **OPEN**.  
Wait for a “beep” and for the trace to scroll before continuing.
  - Attach the short standard.  
Press **SHORT**.  
Wait for a “beep” and for the trace to scroll before continuing.
  - Attach the load standard.  
Press **LOAD**.  
Wait for a “beep” and for the trace to scroll before continuing.
  - After all three standards have been tested, the Site Analyzer will automatically return to the main screen and new coefficients will be calculated. The Site Analyzer is now calibrated.
- 📖 NOTE: When calibrated, the Site Analyzer’s main screen will display “Calibration: FULL”. When uncalibrated, the Site Analyzer’s main screen will display “Calibration: OFF”.



## Chapter 3

## Measure Match Mode

This measurement verifies and monitors the match conditions in the antenna system at various frequencies. The results are shown on an x-y graph. Frequency is shown on the x-axis while return loss, cable loss, or VSWR is shown on the y-axis.

 **NOTE:** For best results, set the frequency and calibrate the Site Analyzer immediately before taking measurements.

**START**



**Press the  
Mode key**

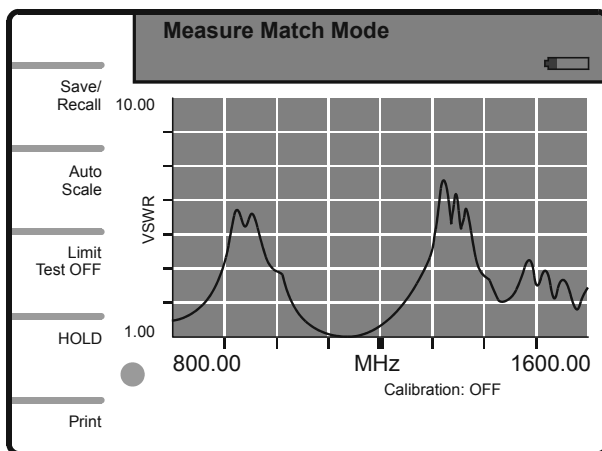


**Press from  
Select Mode**

Result Location



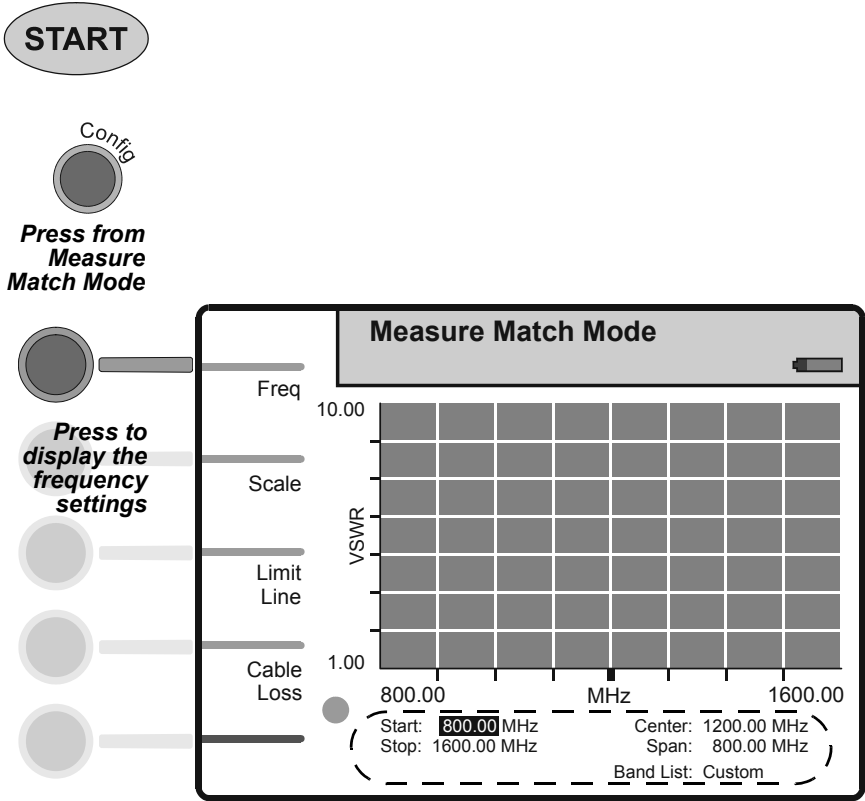
**STOP**



### Setting the Frequency

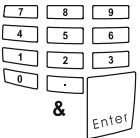
Frequencies can be set manually or chosen from a list of presets. If the start, stop, center, or span is manually changed, the band will become “Custom”.

- NOTE: Changing the frequency settings will automatically turn calibration off. Always set the frequency before calibrating the unit.
- NOTE: If a frequency outside of the Site Analyzer’s range is entered, the unit’s minimum or maximum frequency will be set instead.

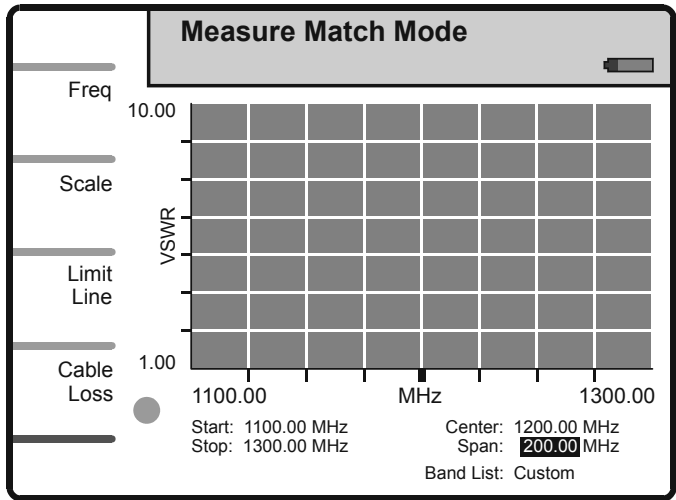




**Scroll to  
Start, Stop,  
Center, or  
Span**



**Enter a new  
value**

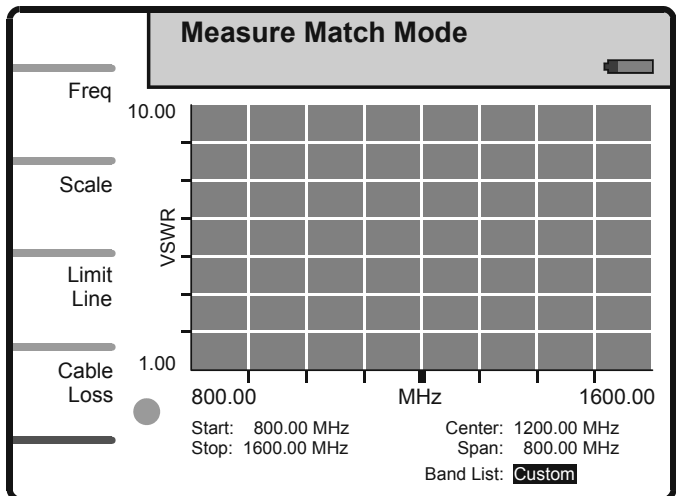


## Band List

The band list pop-up menu contains frequency band presets. Using a preset is quick, easy, and sets test parameters while eliminating a possible source of operator error.

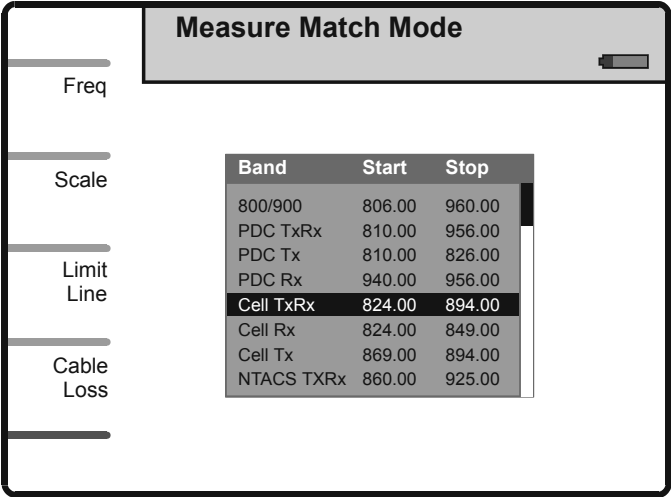


**Scroll to  
Band List**

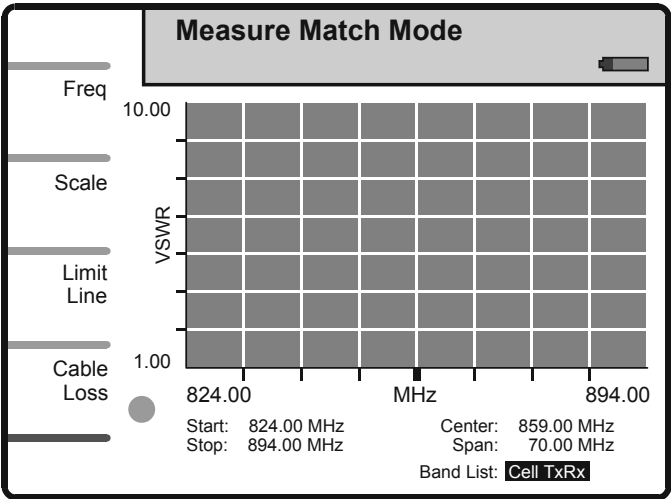




Display the  
band list  
and select a  
frequency  
band



Activate the  
selected  
band





## Setting the Scale & Unit of Measure

The display scale can be set manually or by using Auto Scale. The display can have units of return loss [dB], cable loss [dB], or VSWR [ratio].

**START**



**Press from  
Measure  
Match Mode**



Freq



Scale

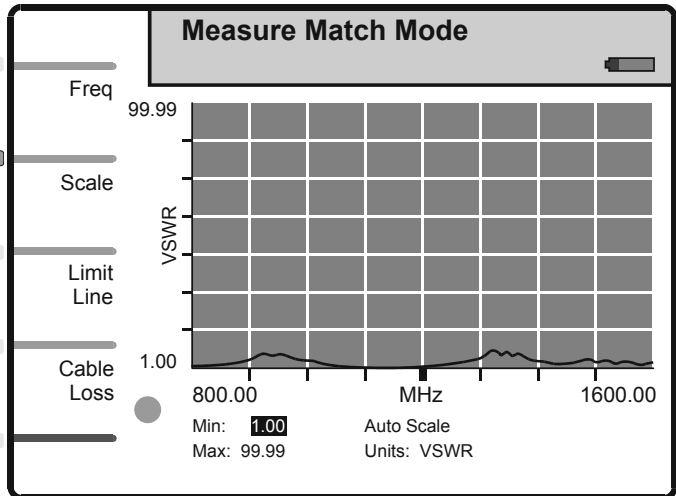


**Press to  
display the  
scale  
settings**

Limit  
Line



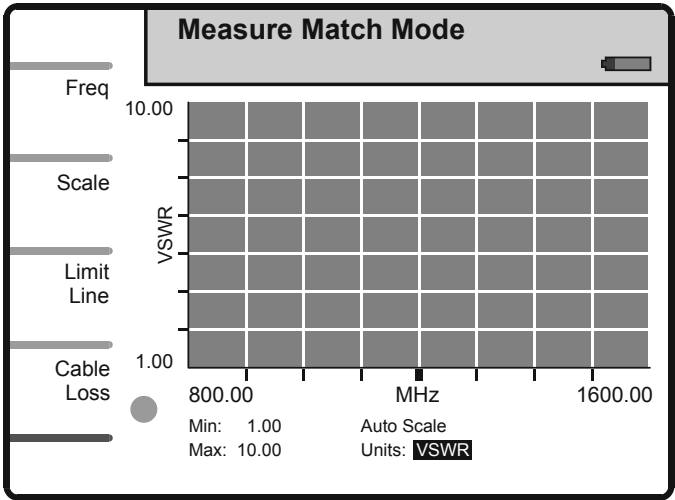
Cable  
Loss



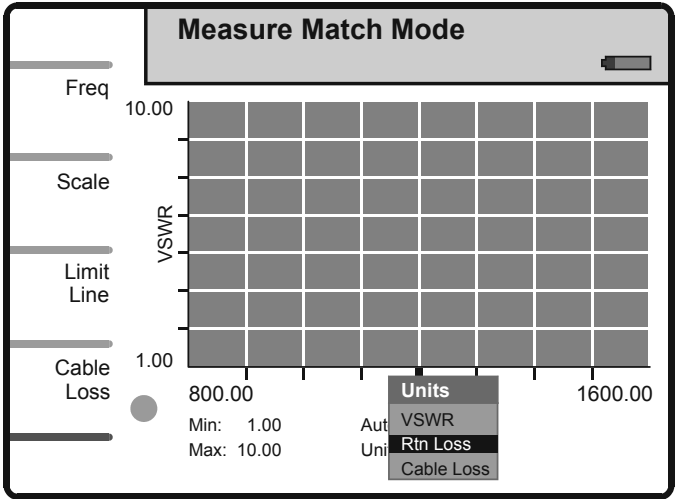
Setting Units



Scroll to  
Units

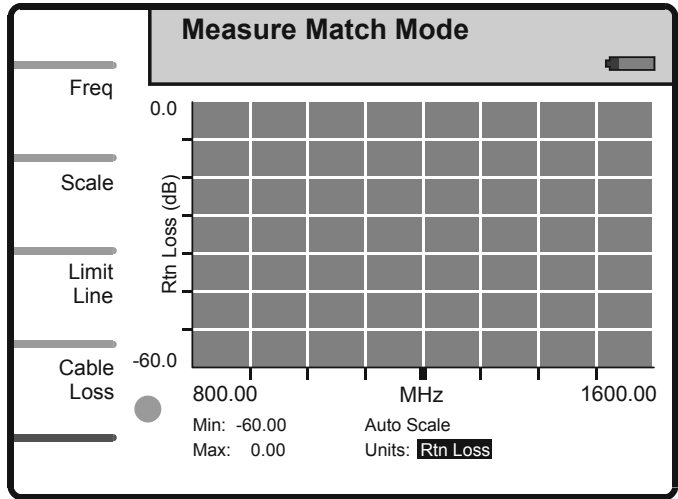


Display the  
units list  
and select  
VSWR,  
Cable Loss,  
or  
Return Loss





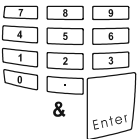
**Activate the  
selected  
unit**



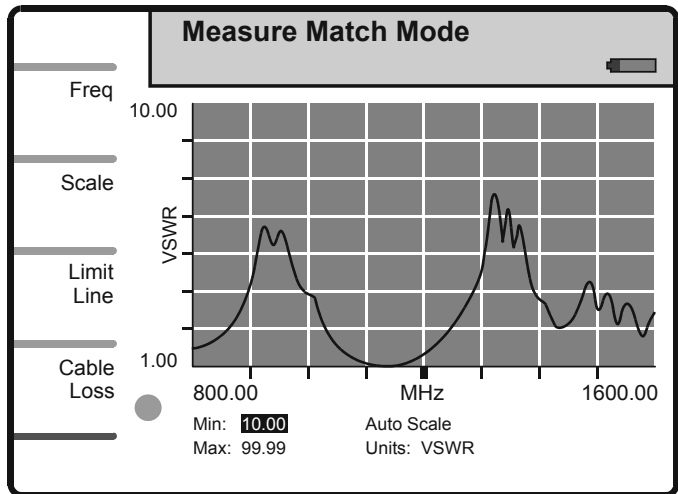
### Setting Scale



**Scroll to Min  
or Max**



**Enter a new  
value**



Auto Scale

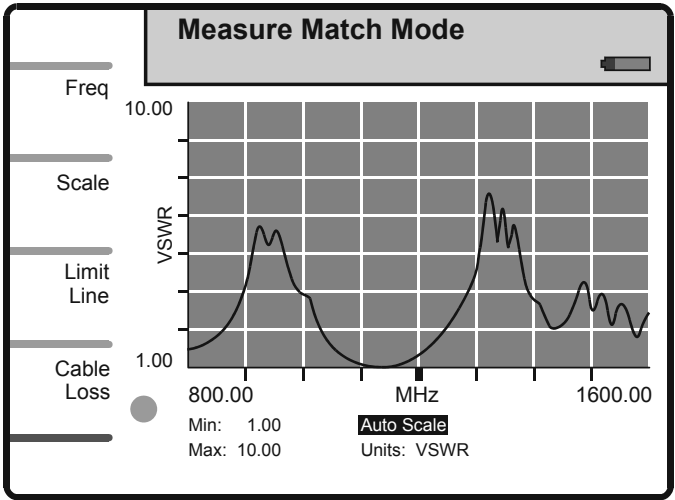
Auto Scale automatically sets the display scale so that the entire trace is displayed.



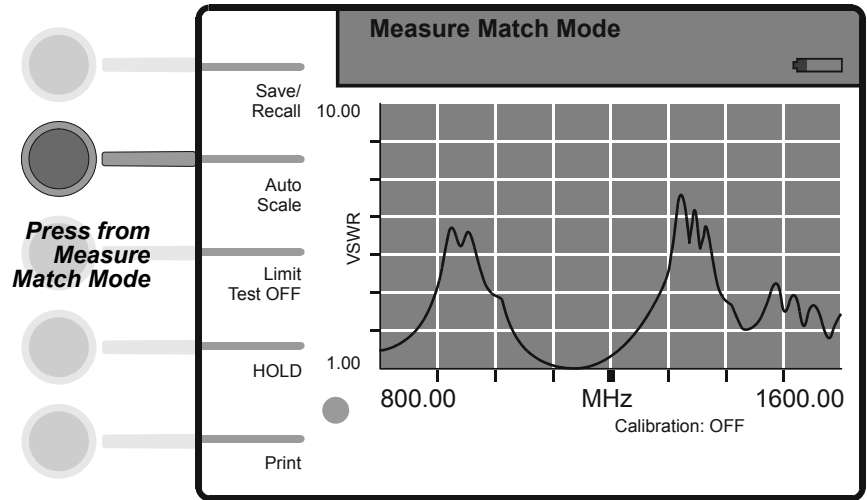
Scroll to  
Auto Scale



Activate  
Auto Scale



Auto Scale can also be activated from the main screen.



## Cable Loss Measurements

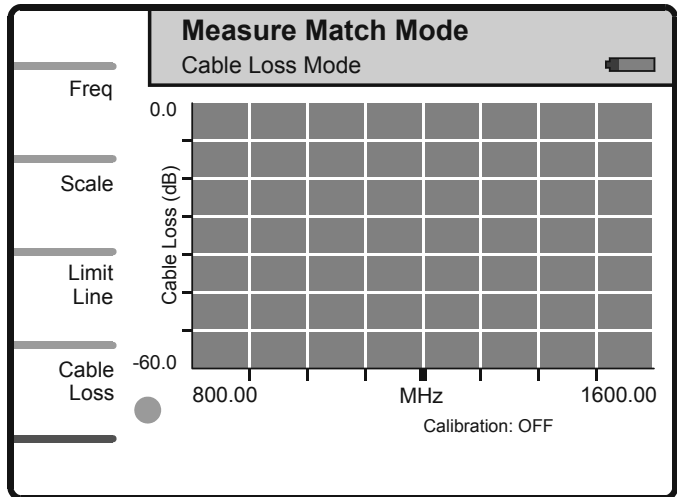
To measure cable loss, the cable being tested should have an open on the far end.



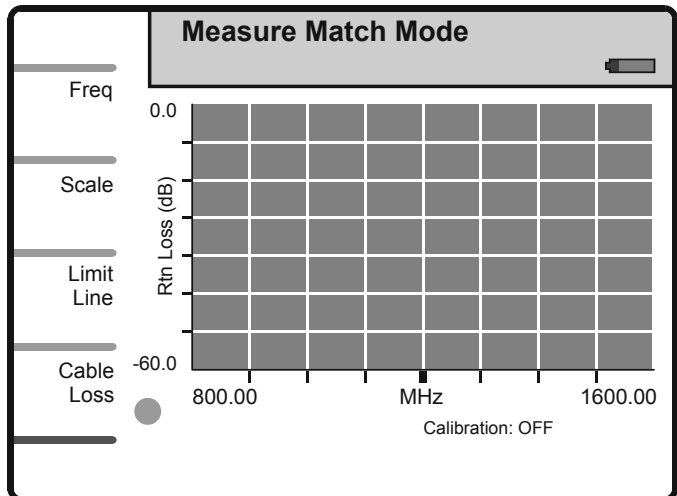
**Press from  
Measure  
Match Mode**



**Press to  
activate  
Cable Loss**



**Press to  
deactivate  
Cable Loss**



Limit Line

The limit line helps you see failures. It appears as a horizontal line at the limit line value.

START

Config

Press from Measure Match Mode

Press to display the limit line value

Measure Match Mode

Freq

10.00

Scale

VSWR

Limit Line

1.00

Cable Loss

800.00

MHz

1600.00

Limit Line: 3.00

789

456

123

0. & Enter

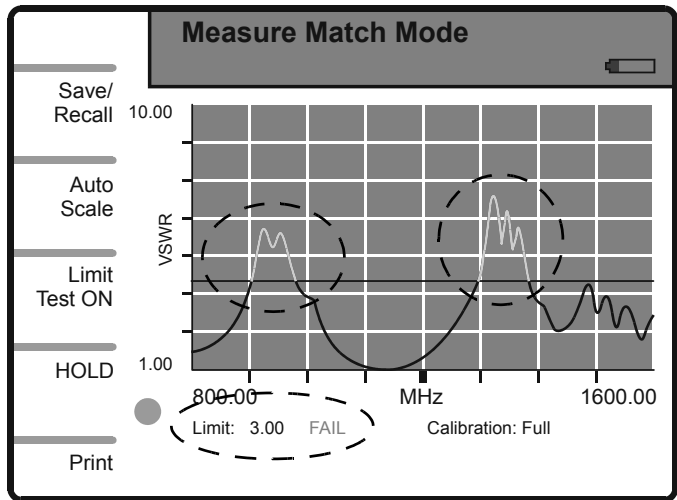
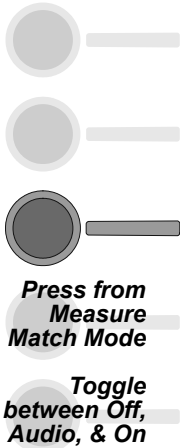
Enter a new value

STOP

## Limit Test

Limit Test compares the trace to the limit line.

**START**



**STOP**

**Test Off** — disables the comparison and the pass/fail indicator.

**Test On** — enables the comparison. If all of the trace is below the limit value, “PASS” is displayed at the bottom of the screen. If any part of the trace exceeds the limit value, that portion is displayed in red and “FAIL” is displayed at the bottom of the screen.

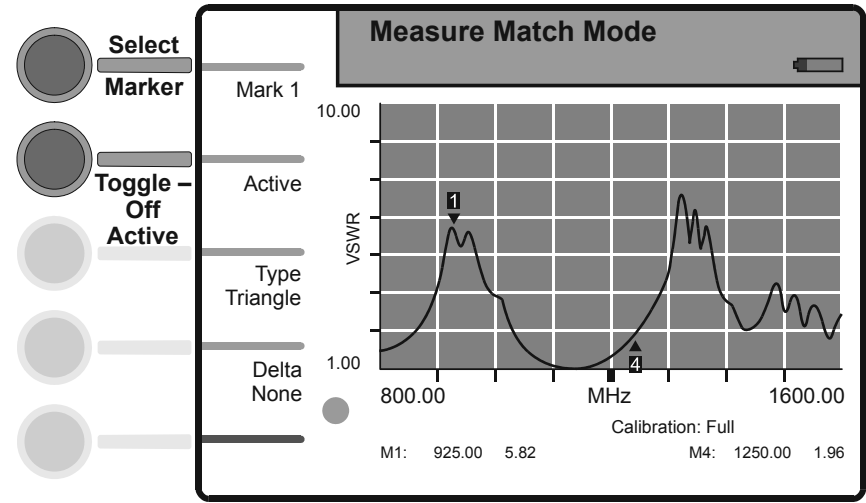
**Test Audio** — as Test On. In addition, the Site Analyzer will beep if any part of the trace exceeds the limit value.

Markers

Markers indicate VSWR to 0.01, or Return or Cable Loss to 0.1 dB. Up to six markers may be displayed. The exact values of the markers are displayed at the bottom of the screen.



Activating Markers





## Moving Markers

The active marker can be moved with the arrow keys or by entering a distance with the number pad.



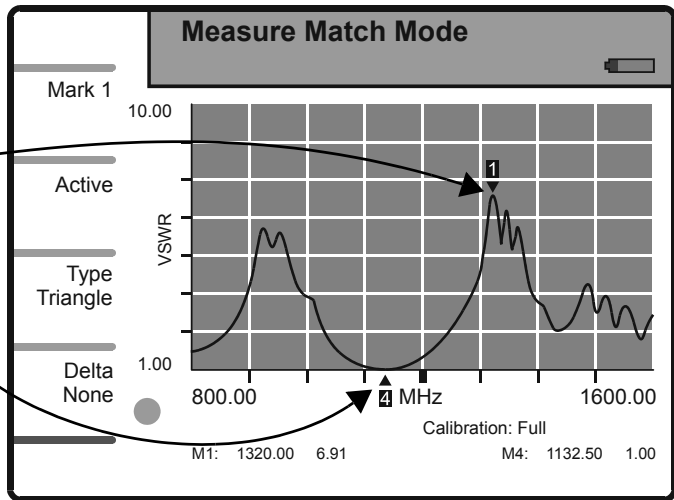
**Move  
across the  
trace**



**Locate the  
highest  
point of the  
trace**

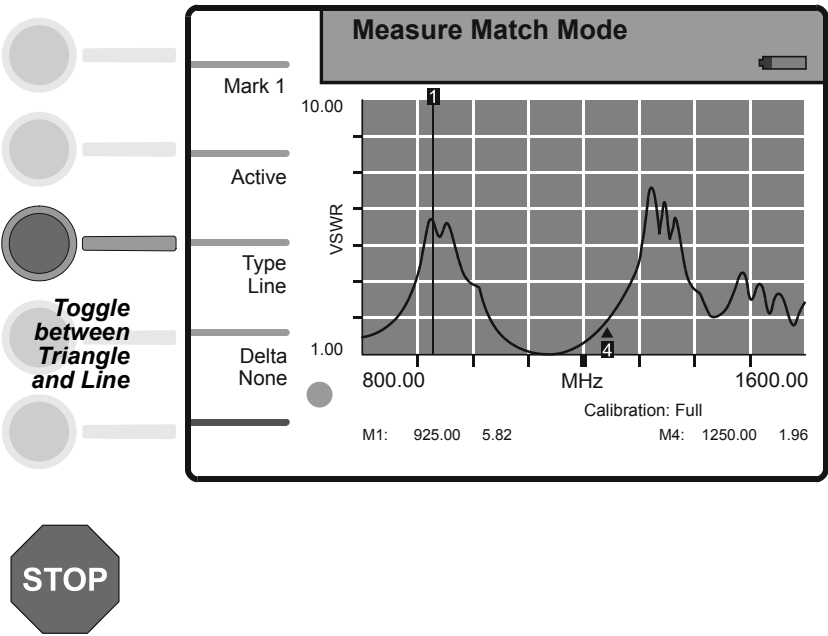


**Locate the  
lowest point  
of the trace**



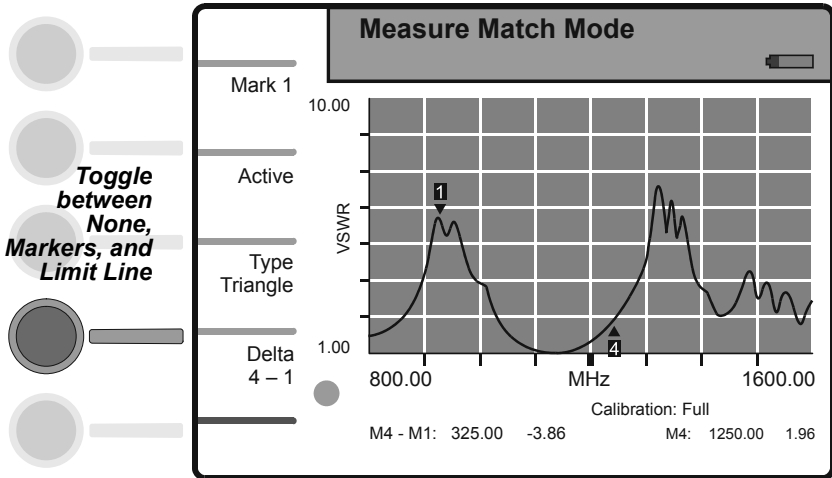
### Setting Marker Style

Two styles of marker can be used. Triangle markers are displayed as a triangular pointer on the trace. Line markers are displayed as a vertical line.



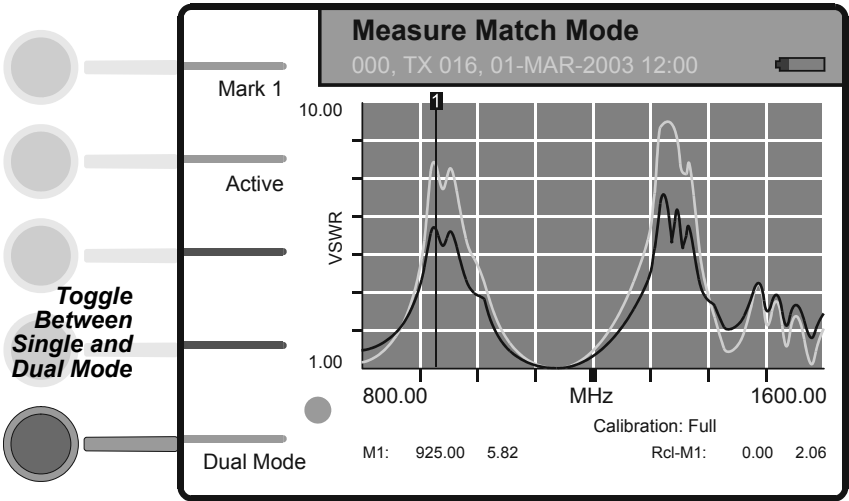
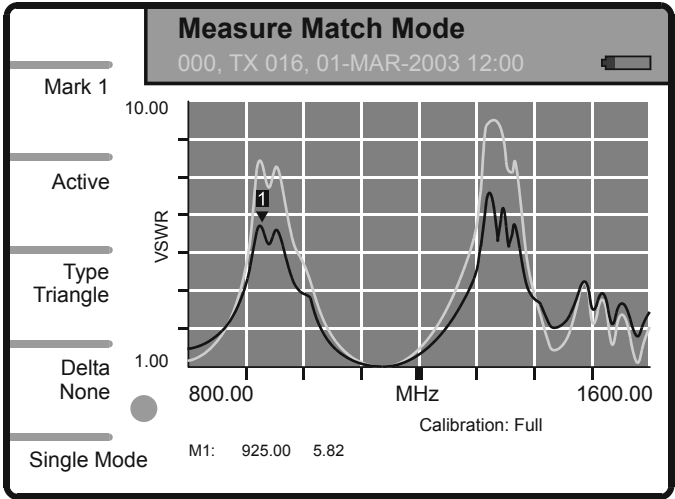
## Using Delta Markers

When a marker is used as a delta marker, it shows the difference between its value and the value of another visible marker, or of the limit line.



### Using Markers with Recalled Traces

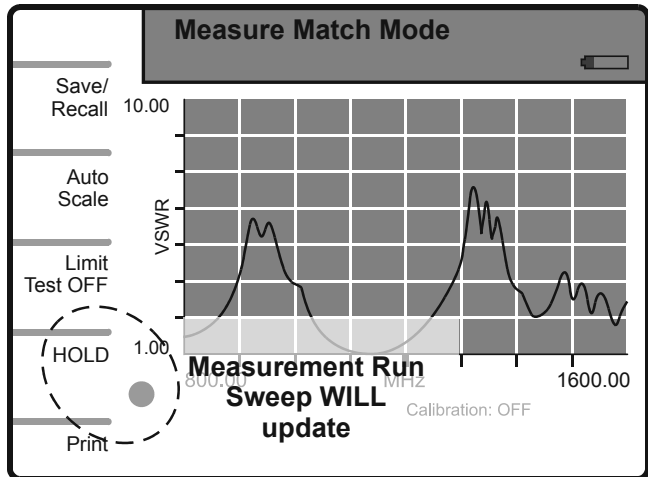
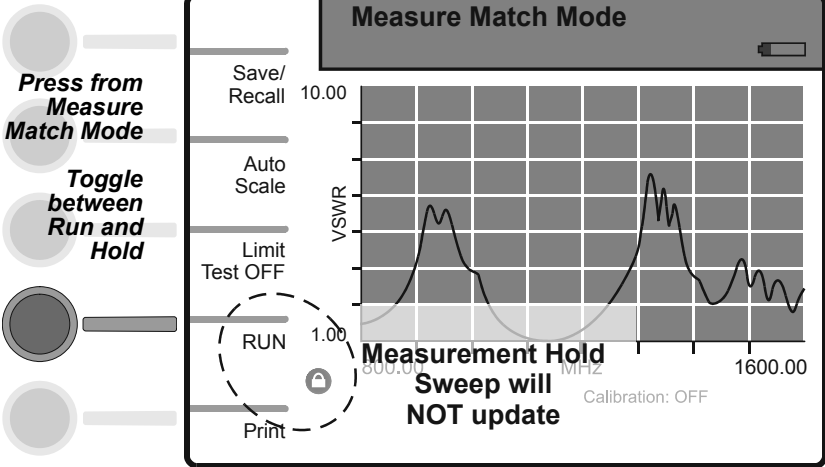
When a trace is recalled, there is an additional marker option. In single mode, the markers function normally. In dual mode, the markers show the difference between the recalled trace and the current reading. Only three markers are available in dual mode.



## Measurement Hold

**START**

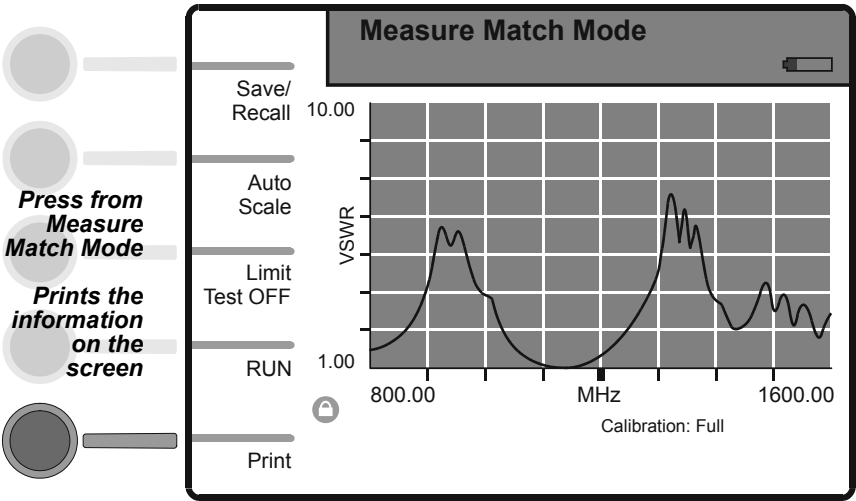
Measurement Hold stops updating the display at the end of the current sweep. A measurement is held when there is a lock icon in the indicator ball. The measurement will update when the lock is not present.



**STOP**

Printing


The Bird Site Analyzer can print the information displayed on the screen to any HP Deskjet printer that supports the PCL Level 3 protocol.



## Chapter 4

## Fault Location Mode

This measurement identifies the position of impedance discontinuities (faults) within the antenna/feeder system. The measurement results are displayed on an x-y graph. Distance from the Site Analyzer is shown on the x-axis, while relative magnitude of the discontinuity is shown on the y-axis.

 **NOTE:** For best results, set the frequency span, the cable type, and calibrate the Site Analyzer immediately before taking measurements.

**START**



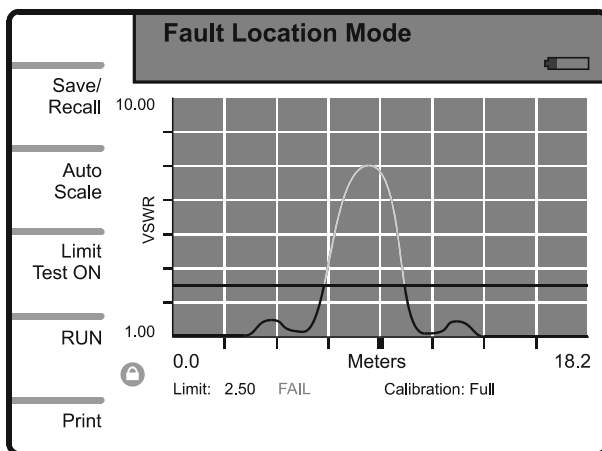
**Press the  
Mode key**




**Press from  
Select Mode**



**STOP**



### Setting the Frequency Span

 NOTE: Changing the frequency settings will automatically turn calibration off. Always set the frequency before calibrating the unit.

The frequency span and relative propagation velocity determine the maximum distance at which distance-to-fault measurements can be taken. For best results, use the table below to select the frequency span which matches the length and propagation velocity of the cable under test.

**Fault Location Distance and Resolution**

Velocity Percentage	66 %				88 %			
Freq Span (MHz)	Distance		Resolution		Distance		Resolution	
	m	ft	cm	in	m	ft	cm	in
100	234.6	769.8	99.0	39.0	312.8	999.9	132.0	50.6
200	117.3	384.9	49.5	19.5	156.4	513.2	66.0	26.0
300	78.2	256.6	33.0	13.0	104.3	342.1	44.0	17.3
400	58.7	192.5	24.8	9.7	78.2	256.6	33.0	13.0
500	46.9	154.0	19.8	7.8	62.6	205.3	26.4	10.4
600	39.1	128.3	16.5	6.5	52.1	171.1	22.0	8.7
700	33.5	110.0	14.1	5.6	44.7	146.6	18.9	7.4
800	29.3	96.2	12.4	4.9	39.1	128.3	16.5	6.5
900	26.1	85.5	11.0	4.3	34.8	114.0	14.7	5.8
1000	23.5	77.0	9.9	3.9	31.3	102.6	13.2	5.2
1200	19.6	64.2	8.3	3.2	26.1	85.5	11.0	4.3
1400	16.8	55.0	7.1	2.8	22.3	73.3	9.4	3.7
1500	15.6	51.3	6.6	2.6	20.8	68.4	8.7	3.4

For example, for a cable with a dielectric constant of 2.296, the velocity percentage is 66%. If the cable is 100 feet long, then the Site Analyzer should be set to a frequency span of 700 MHz. The resolution of the graph will be 5 inches.



If your cable velocity or length of interest is not on this table, you can determine the approximate span required by using the equation

$$\text{Freq. Span} = 35,000 * \text{Relative velocity (\%)} / \text{Test length (m)}$$

If you enter a span greater than the current settings allow, the span will be set to the maximum possible value. In this case, set the center frequency shown below for your model and try to set the span again.

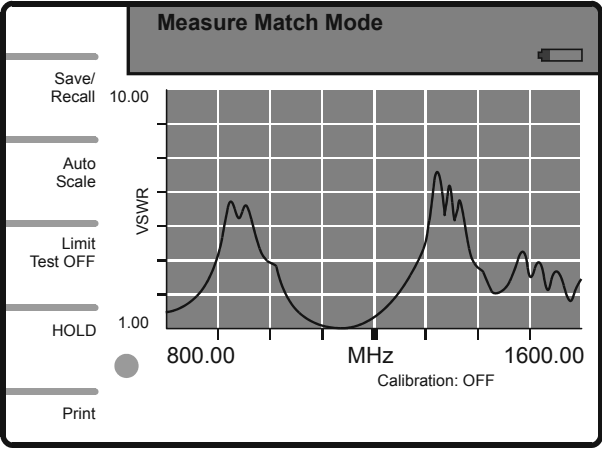
SA-1700	863 MHz
SA-2500A	1640 MHz
SA-4000	1988 MHz



**Press the  
Mode key**



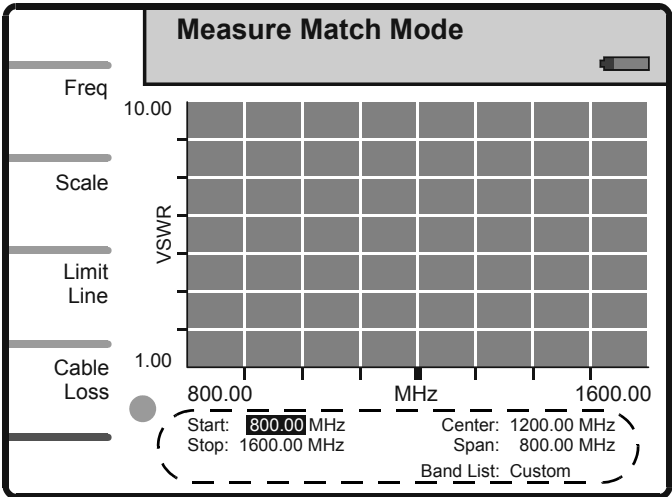
**Press from  
Select Mode**



**Press from  
Measure  
Match Mode**

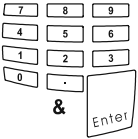


**Press to  
display the  
frequency  
settings**

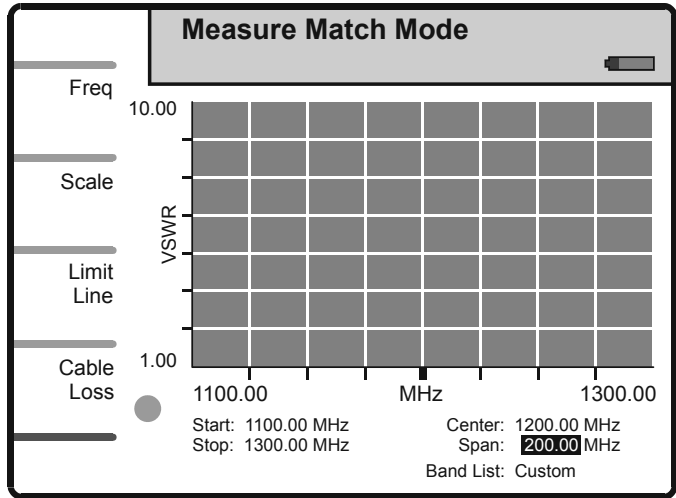




**Scroll to the Span value**



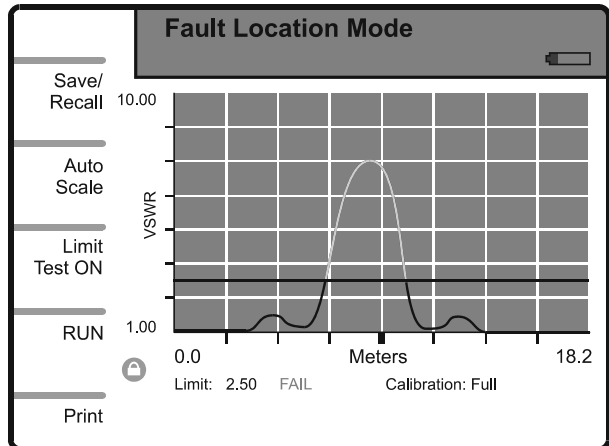
**Enter the value from the table on page 30**



**Press the Mode key**




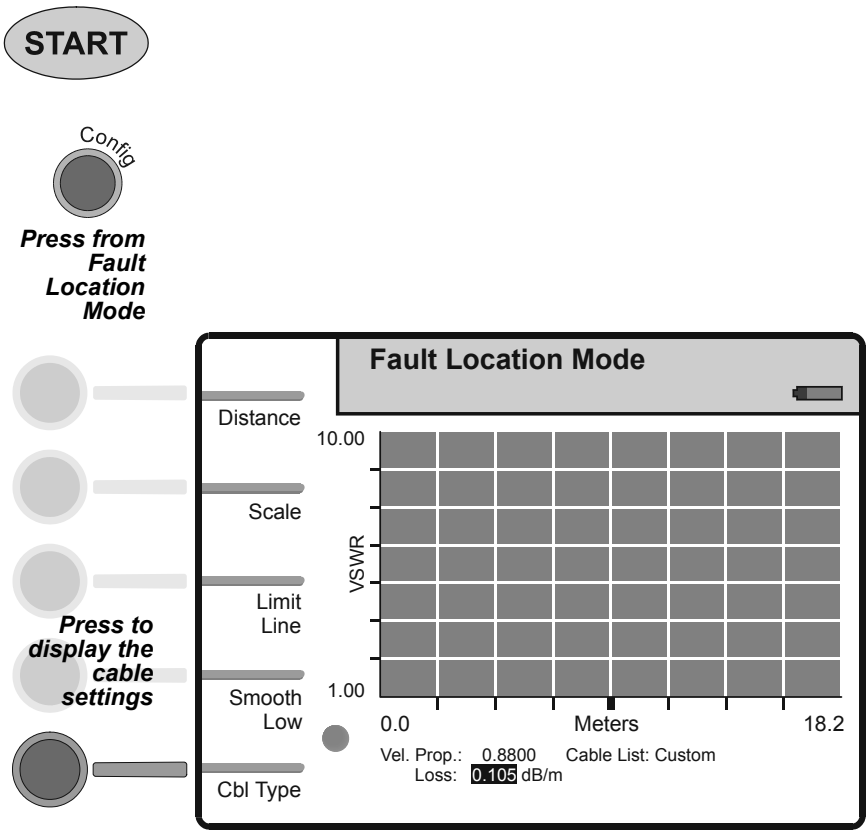
**Press from Select Mode**



### Setting the Cable Type

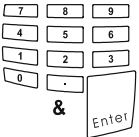
The cable type can be set manually or chosen from a list of presets. If the velocity of propagation or loss is manually changed, the cable will become “Custom”.

 **NOTE:** Changing the cable type or velocity of propagation will reset the distance scale to the maximum possible distance. Always set the cable type before setting the distance scale.

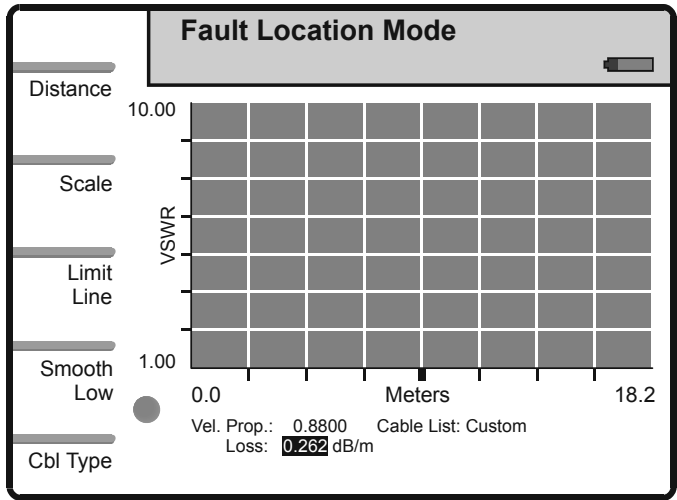




**Scroll to  
Velocity of  
Propagation  
or Loss**



**Enter a new  
value**



Cable List

The cable list pop-up menu contains cable presets. Using a preset is quick, easy, and sets test parameters while eliminating a possible source of operator error.



Scroll to Cable Type



Display the cable list and select a cable

Distance

Scale

Limit Line

Smooth Low

Cbl Type

Fault Location Mode

Type	Vp@1Ghz	Loss
5062	0.8200	0.1447
5088	0.8800	0.1047
5092	0.8200	0.1089
5128	0.8800	0.0745
5228	0.8800	0.0420
5328	0.8800	0.0312
5438	0.8800	0.0259
FSJ1-50A	0.8400	0.1968



Activate the selected cable

Distance

Scale

Limit Line

Smooth Low

Cbl Type

Fault Location Mode

VSWR

10.00

1.00

0.0

Meters

18.2

Vel. Prop.: 0.8200

Cable List: 5062

Loss: 0.1447 dB/m

## Setting the Distance

The maximum possible Stop Distance is determined by the frequency span. (See the table on page 30)

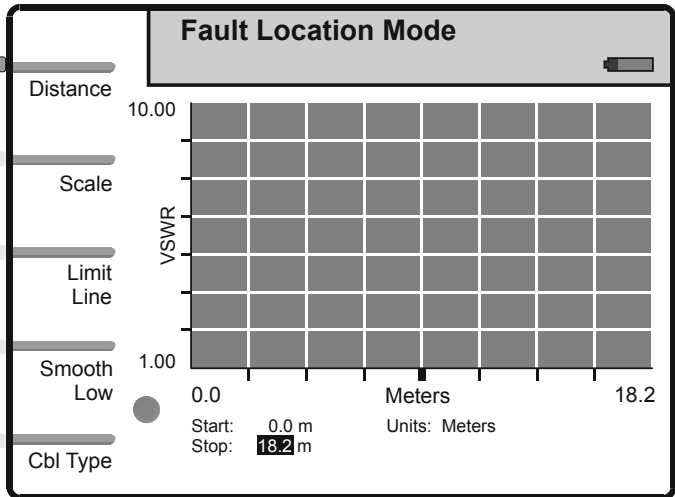
**START**



**Press from  
Fault  
Location  
Mode**



**Press to  
display the  
distance  
settings**





Scroll to  
Start or Stop

7

8

9

4

5

6

1

2

3

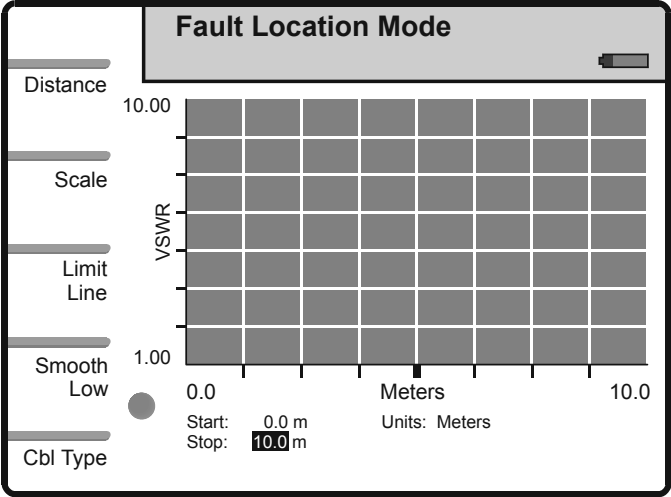
0

.

Enter

&

Enter a new  
value





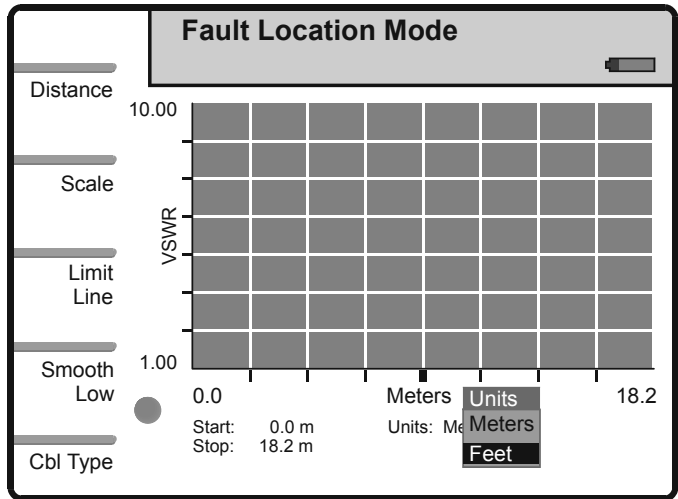
## Setting Distance Units



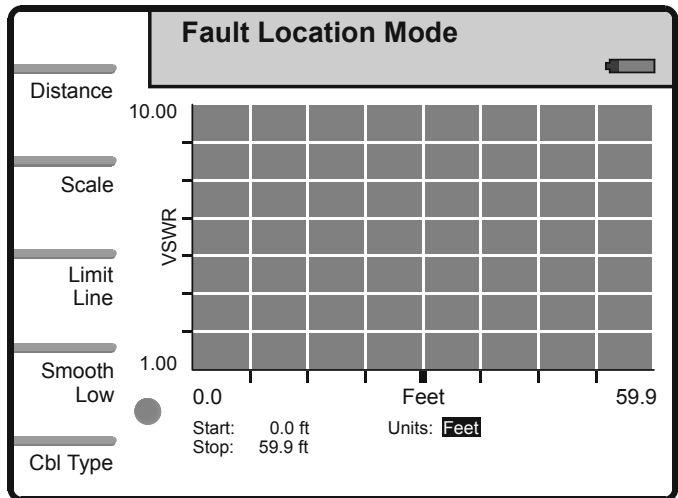
**Scroll to  
Units**



**Display the  
units list  
and select  
Meters or  
Feet**

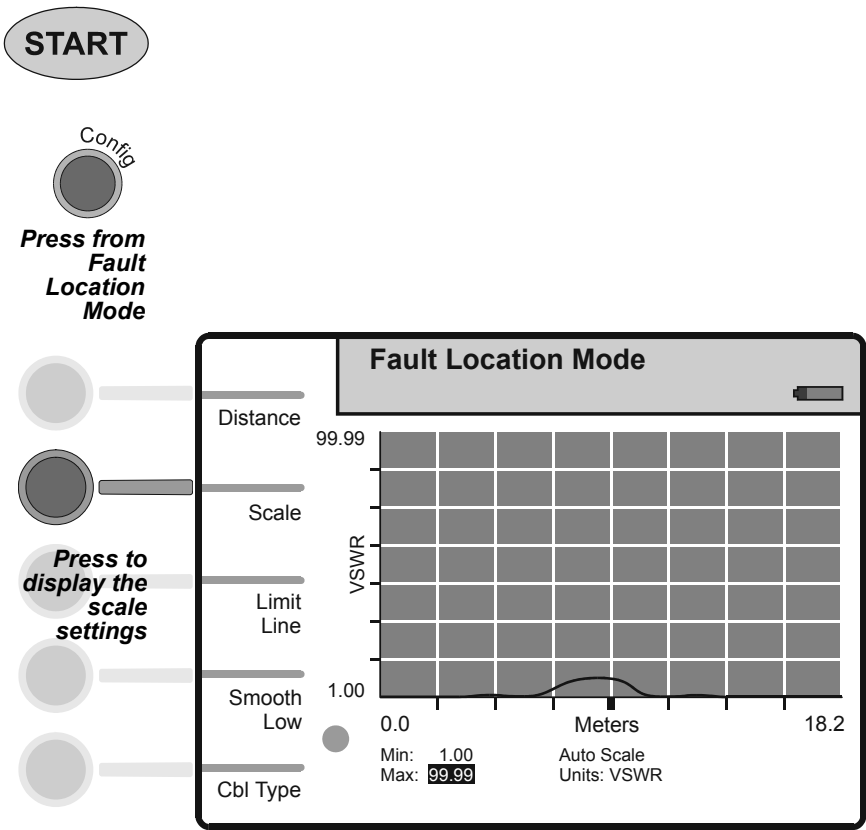


**Activate the  
selected  
unit**



Setting the Scale & Unit of Measure

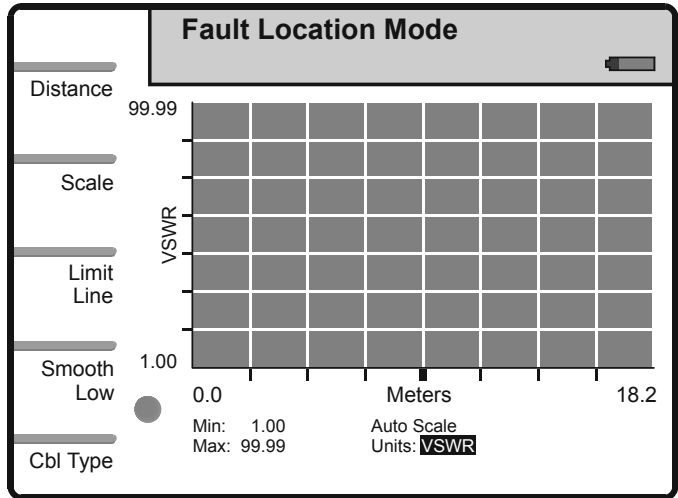
The display scale can be set manually or by using Auto Scale. The display can have units of return loss [dB] or VSWR [ratio].



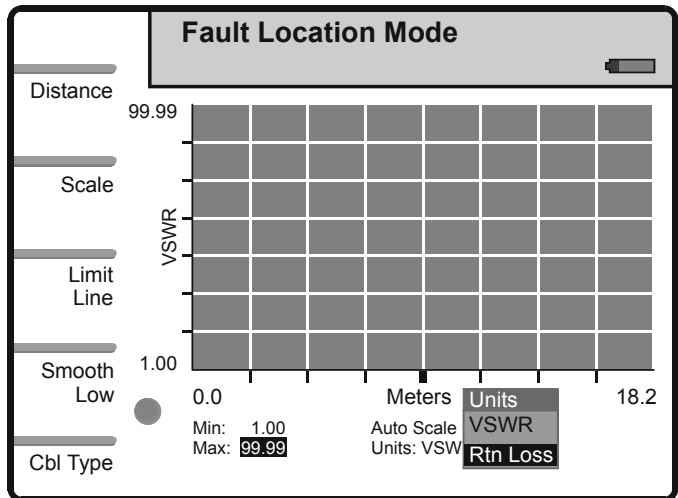
## Setting Units



**Scroll to  
Units**

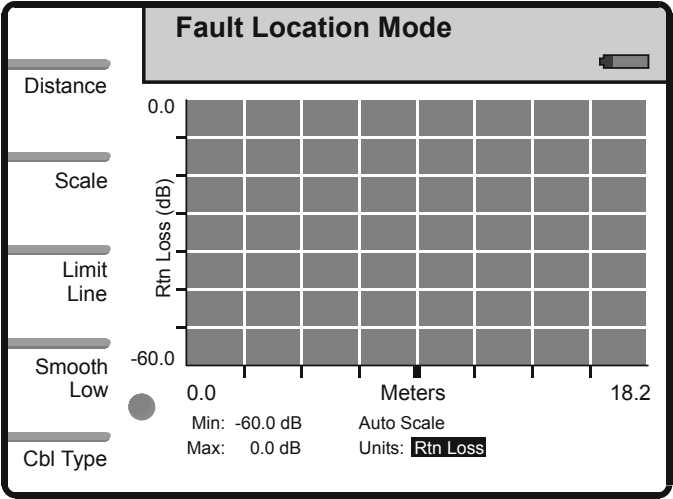


**Display the  
units list  
and select  
VSWR or  
Return Loss**





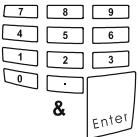
Activate the selected unit



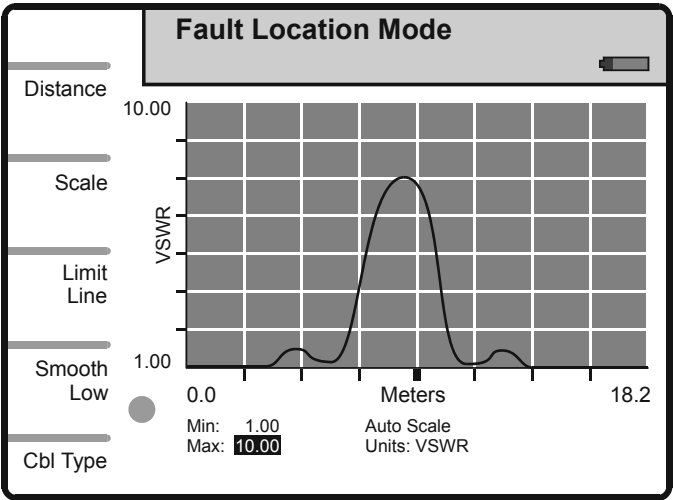
Setting Scale



Scroll to Min or Max



Enter a new value



## Auto Scale

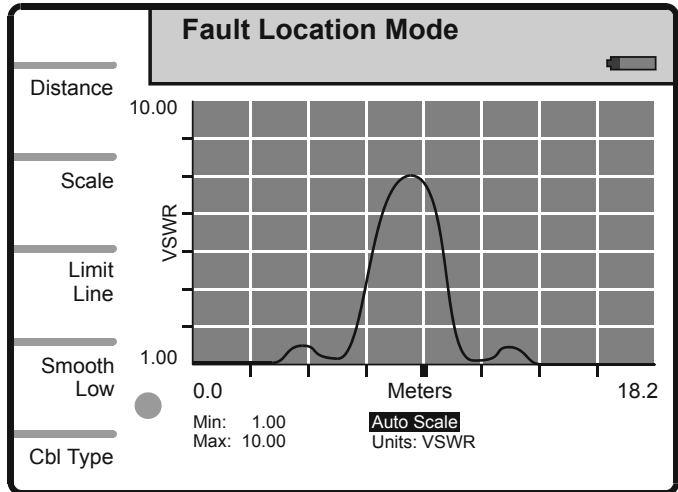
Auto Scale automatically sets the display scale so that the entire trace is displayed.



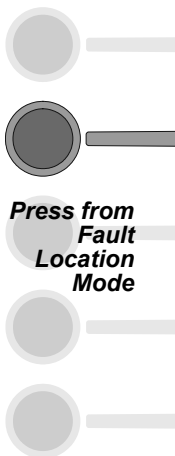
**Scroll to  
Auto Scale**



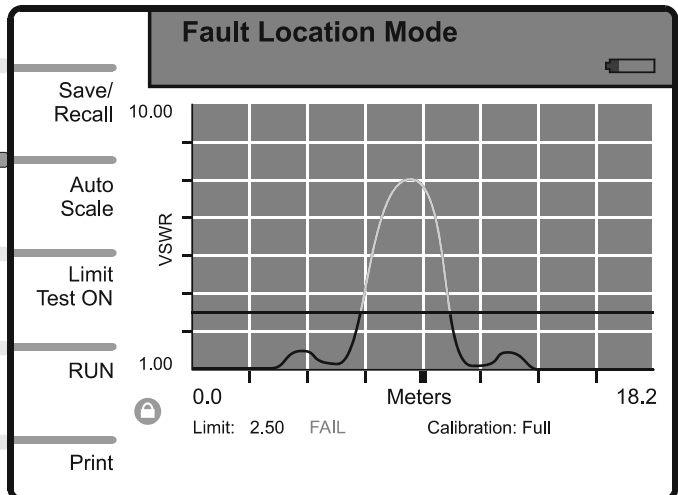
**Activate  
Auto Scale**



Auto Scale can also be activated from the main screen.



**Press from  
Fault  
Location  
Mode**



Limit Line

The limit line helps you see failures. It appears as a horizontal line at the limit line value.

START

Config

Press from Fault Location Mode

Press to display the limit line value

789

456

123

0.-

&Enter

Enter a new value

STOP

Fault Location Mode

Distance

Scale

Limit Line

Smooth Low

Cbl Type

10.00

VSWR

1.00

0.0

Meters

18.2

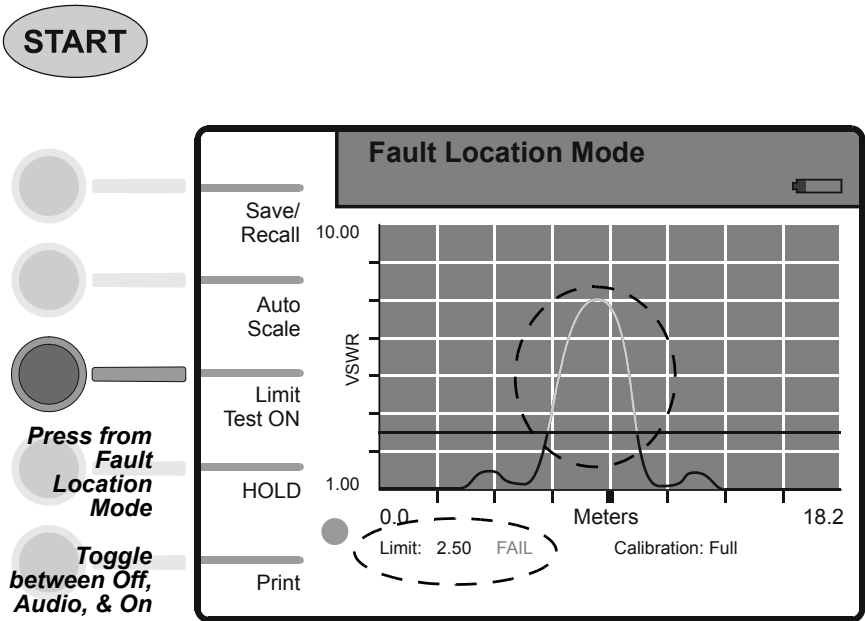
Limit Line:

2.50

44

## Limit Test

Limit Test compares the trace to the limit line.



**Test Off** — disables the comparison and the pass/fail indicator.

**Test On** — enables the comparison. If all of the trace is below the limit value, “PASS” is displayed at the bottom of the screen. If any part of the trace exceeds the limit value, that portion is displayed in red and “FAIL” is displayed at the bottom of the screen.

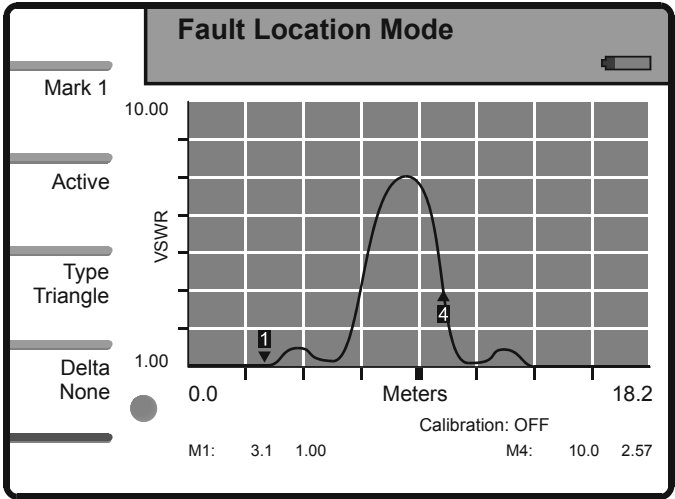
**Test Audio** — as Test On. In addition, the Site Analyzer will beep if any part of the trace exceeds the limit value.

### Markers

Markers indicate VSWR to 0.01, or Return or Cable Loss to 0.1 dB. Up to six markers may be displayed. The exact values of the markers are displayed at the bottom of the screen.



### Activating Markers





## Moving Markers

The active marker can be moved with the arrow keys or by entering a distance with the number pad.



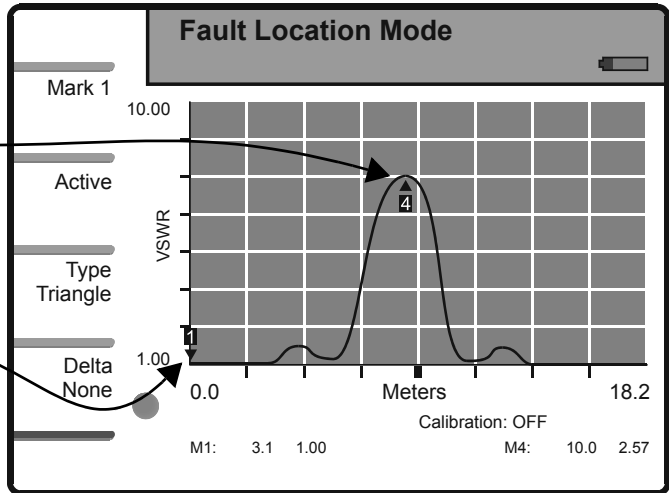
**Move  
across the  
trace**



**Locate the  
highest  
point of the  
trace**

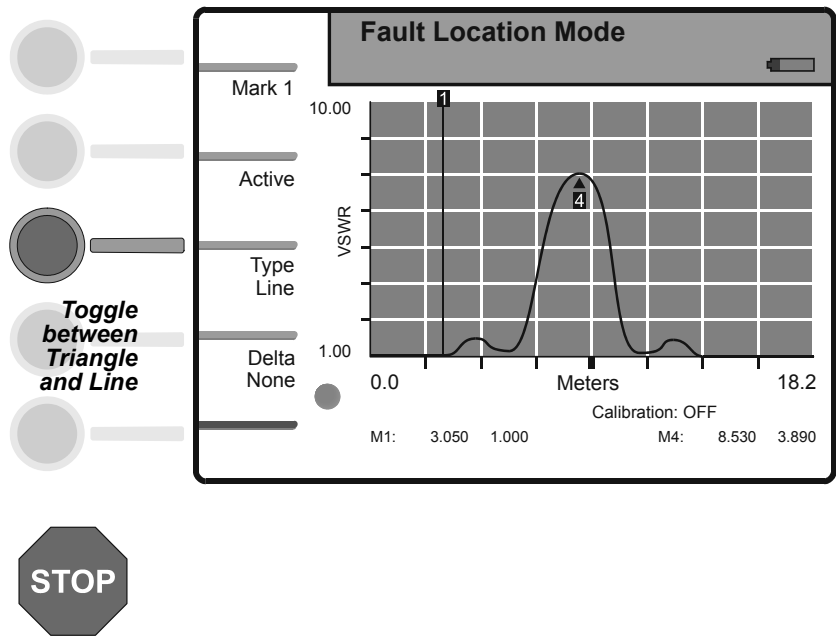


**Locate the  
lowest point  
of the trace**



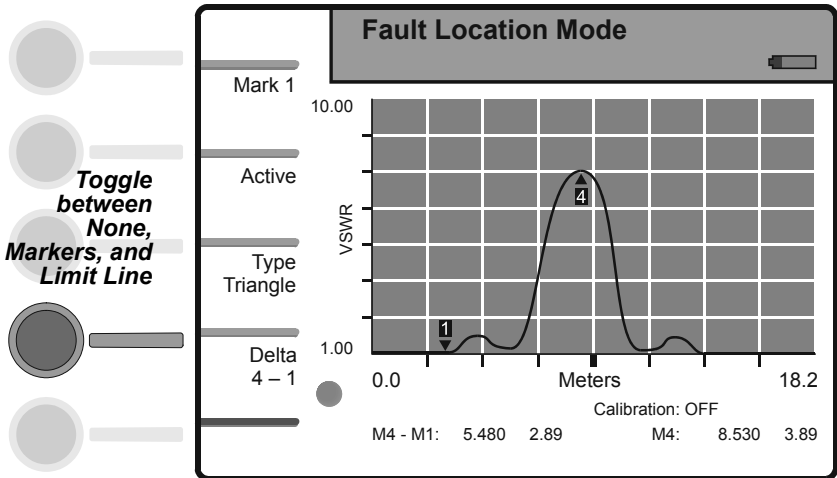
Setting Marker Style

Two styles of marker can be used. Triangle markers are displayed as a triangular pointer on the trace. Line markers are displayed as a vertical line.



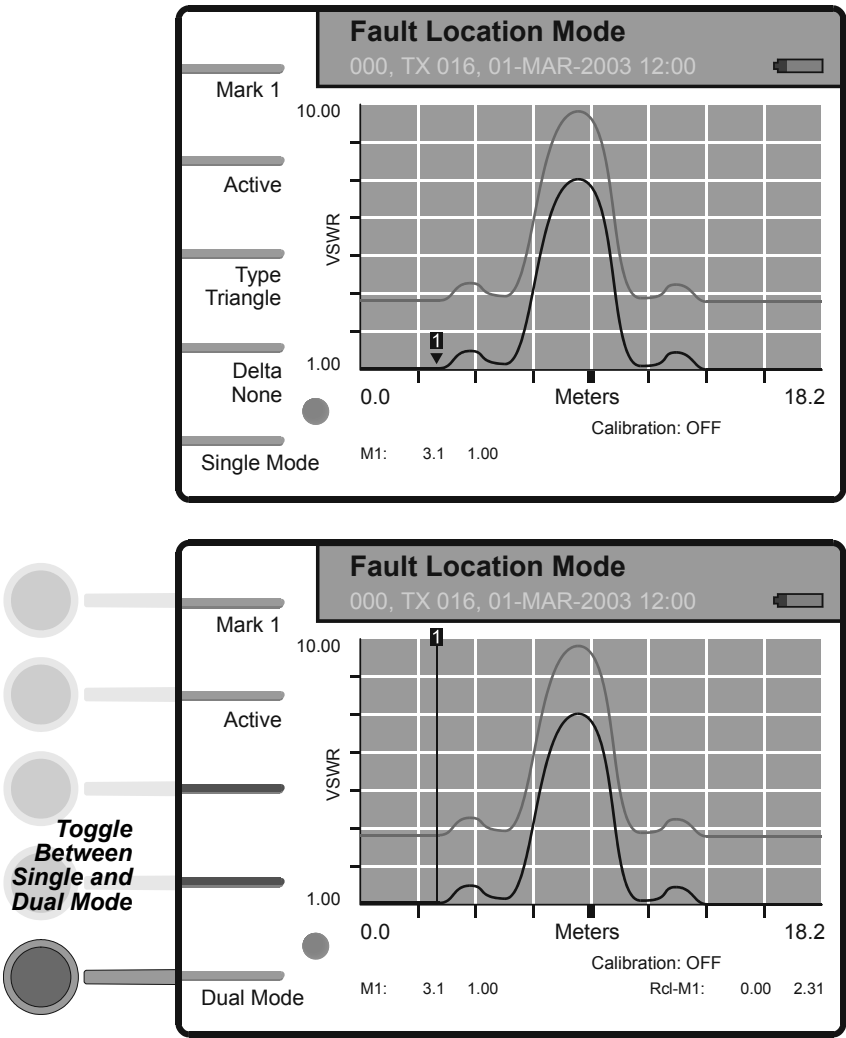
## Using Delta Markers

When a marker is used as a delta marker, it shows the difference between its value and the value of another visible marker, or of the limit line.



Using Markers with Recalled Traces

When a trace is recalled, there is an additional marker option. In single mode, the markers function normally. In dual mode, the markers show the difference between the recalled trace and the current reading. Only three markers are available in dual mode.

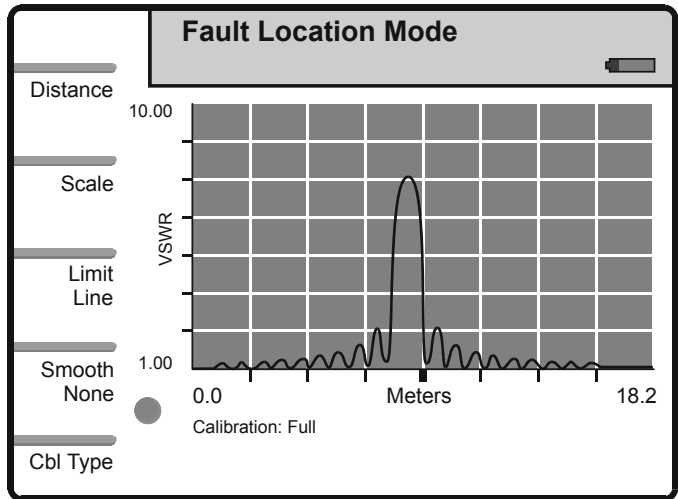


## Smooth

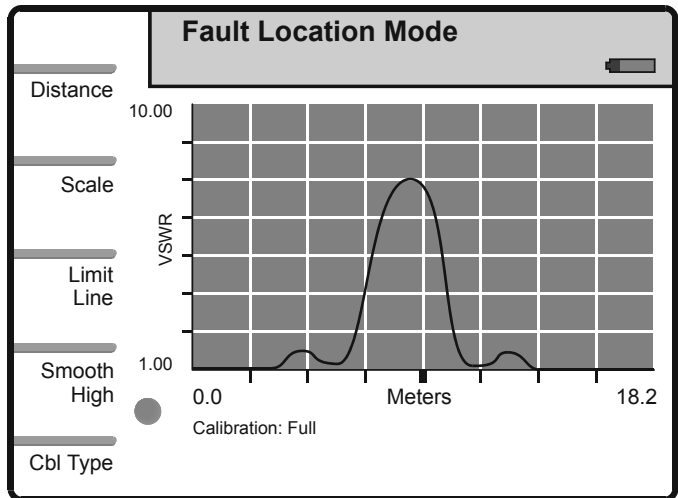
Smooth is an option that will digitally average the displayed trace. Three levels of smooth are available.

**START**

Config  
Press from  
Fault  
Location  
Mode



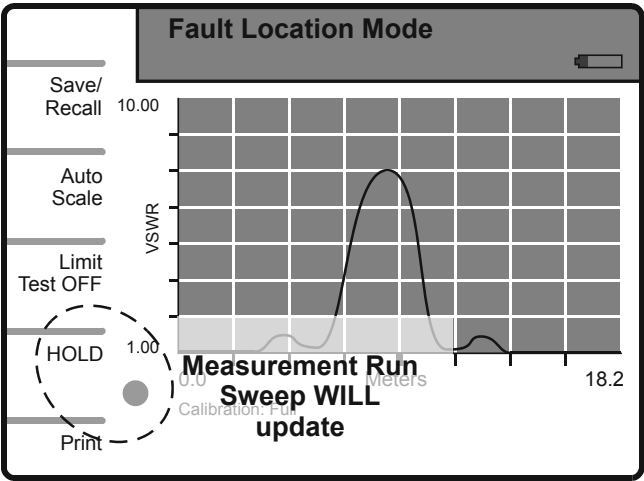
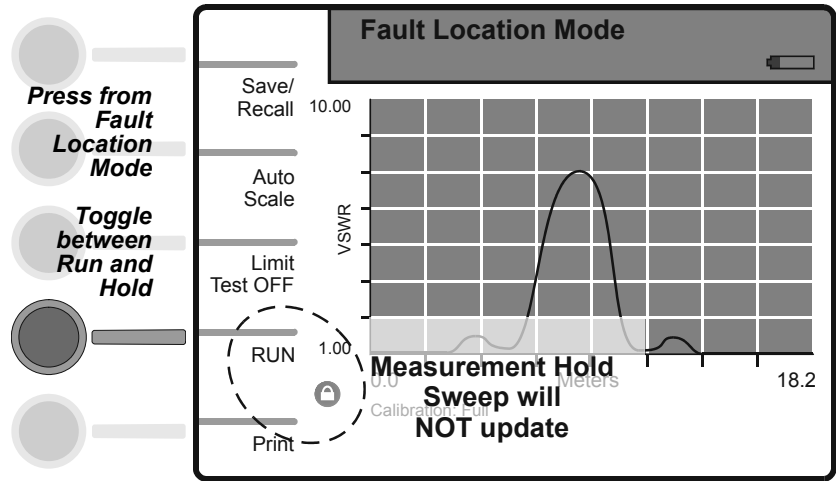
Toggle  
between  
None, Low,  
Medium,  
and High



**STOP**

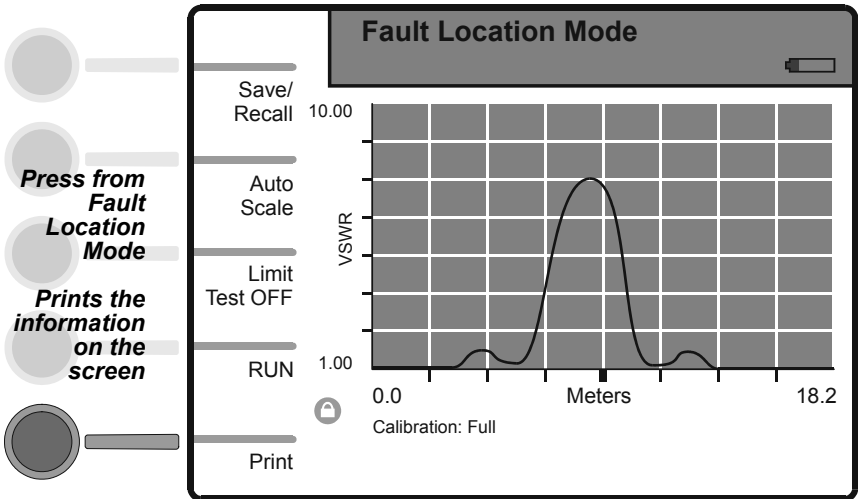
Measurement Hold

Measurement Hold stops updating the display at the end of the current sweep. A measurement is held when there is a lock icon in the indicator ball. The measurement will update when the lock is not present.



## Printing

The Bird Site Analyzer can print the information displayed on the screen to any HP Deskjet printer that supports the PCL Level 3 protocol.

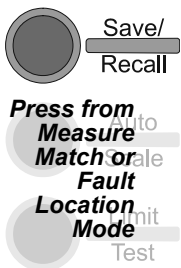






Traces and setups can be stored in nonvolatile memory along with descriptive labels and a time-date stamp.

START



Save and Recall

Save

Recall

Label

Delete

Setup

Reg	Description	Date
001	015 ALPHA RX02	01-JAN-2003 11:26

1 of 1:

Save Trace



Save and Recall

Save

Recall

Label

Delete

Setup

Reg	Description	Date
001	015 ALPHA RX02	01-JAN-2003 11:26
000		01-JAN-2003 11:26

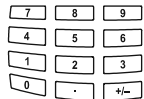
2 of 2:

### Trace Label

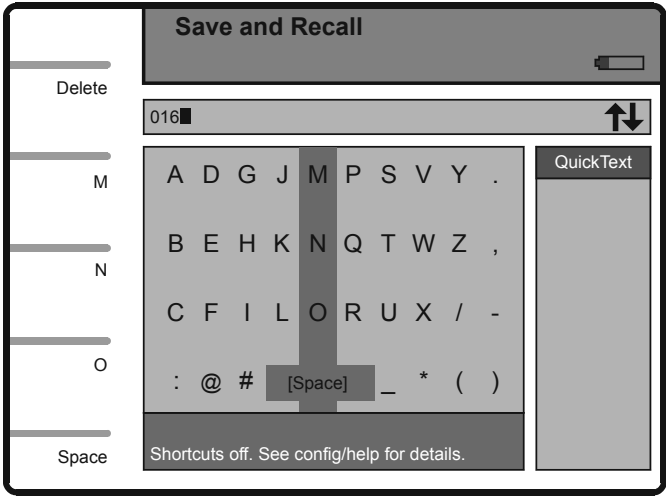
After saving a trace, you will automatically enter the label menu, where you can label the saved trace. The last label entered will be displayed by default.

### Entering Text

If the numeric shortcuts are off, press a number key once to enter a number. If the shortcuts are on, press the key twice. Shortcuts are turned off by default.



**Enter numbers using the number pad.**

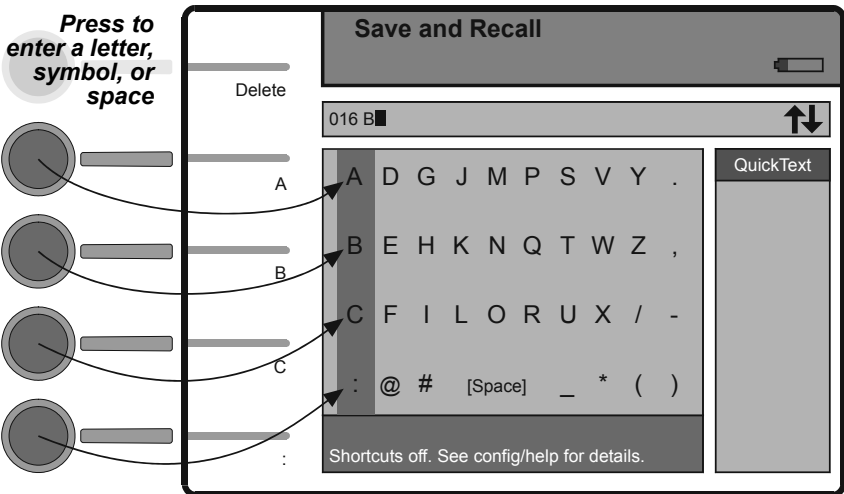


**Delete** is always the first softkey. Use the other softkeys to enter text, spaces, and other characters from the highlighted column.



**Scroll to a column**

**Press to enter a letter, symbol, or space**



Saving Labels

A complete label

Delete

V

W

X

\*

Save and Recall

016 BETA TX01

A D G J M P S V Y .

B E H K N Q T W Z ,

C F I L O R U X / -

: @ # [Space] \_ \* ( )

QuickText

Shortcuts off. See config/help for details.

Enter

Save the label

Save

Recall

Label

Delete

Setup

Save and Recall

Reg	Description	Date
001	015 ALPHA RX02	01-JAN-2003 11:26
000	016 BETA TX01	01-JAN-2003 11:26

2 of 2:

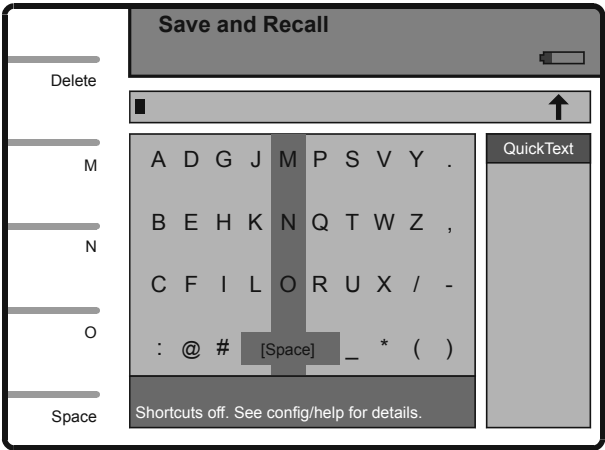



# Changing Labels

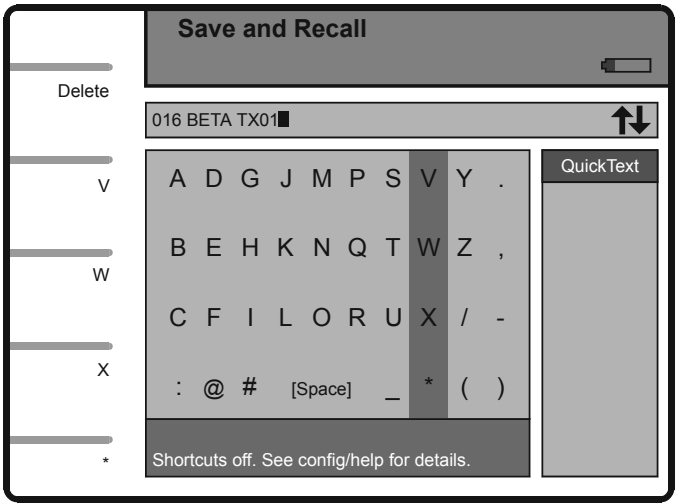
To edit a label, activate the label menu.

**Press from  
Save and  
Recall after  
selecting a  
saved trace**

**The Label  
menu is  
displayed**



**The label  
should be  
RX01,  
not TX01**





*Scroll to the text to be changed*

*Enter the correct character*

Save and Recall

Delete

016 BETA RX01

A D G J M P S V Y .

B E H K N Q T W Z ,

C F I L O R U X / -

: @ # [Space] \_ \* ( )

QuickText

P

Q

R

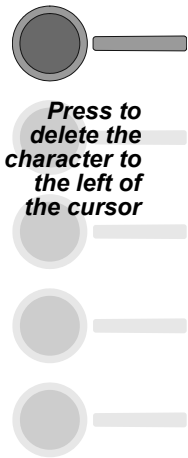
Space

Shortcuts off. See config/help for details.

Deleting Labels



*Scroll to the text to be deleted*



*Press to delete the character to the left of the cursor*

Save and Recall

Delete

016 TX01

A D G J M P S V Y .

B E H K N Q T W Z ,

C F I L O R U X / -

: @ # [Space] \_ \* ( )

QuickText

V

W

X

\*

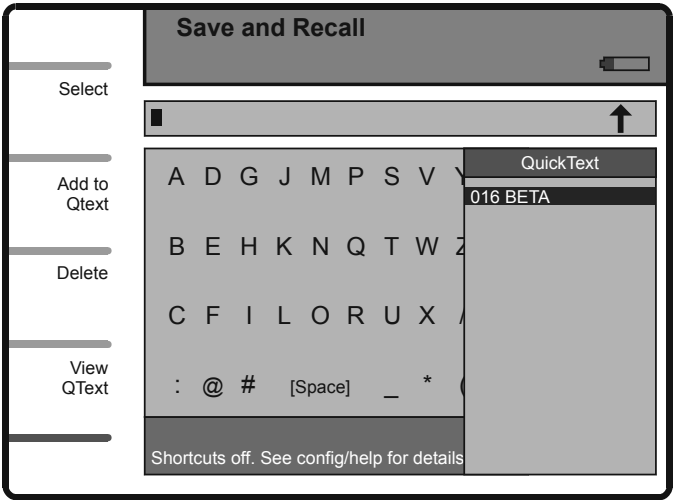
Shortcuts off. See config/help for details.

# Trace Label Quicktext

Store commonly used label elements in the Quicktext to speed label entry.



**From Trace Label, scroll past the rightmost column to activate Quicktext**

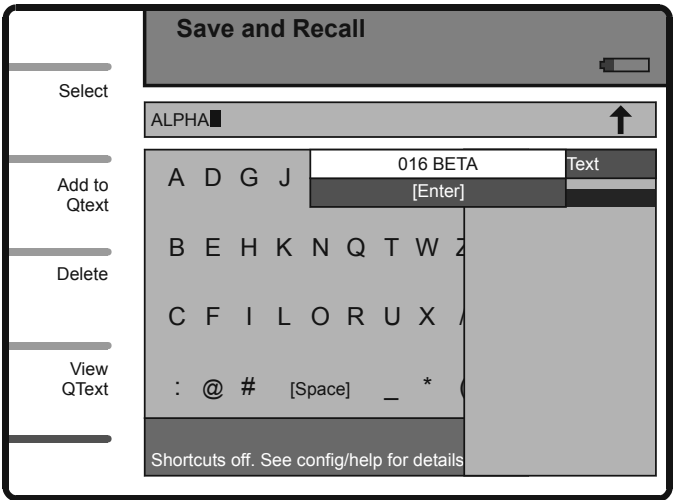


## View Quicktext

If a Quicktext entry is more than 15 characters long, the complete entry will not be shown in the column.

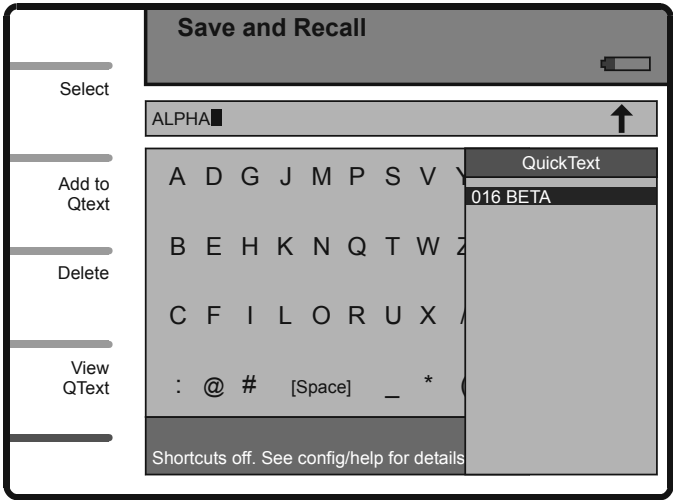


**Press to view the full Quicktext entry**

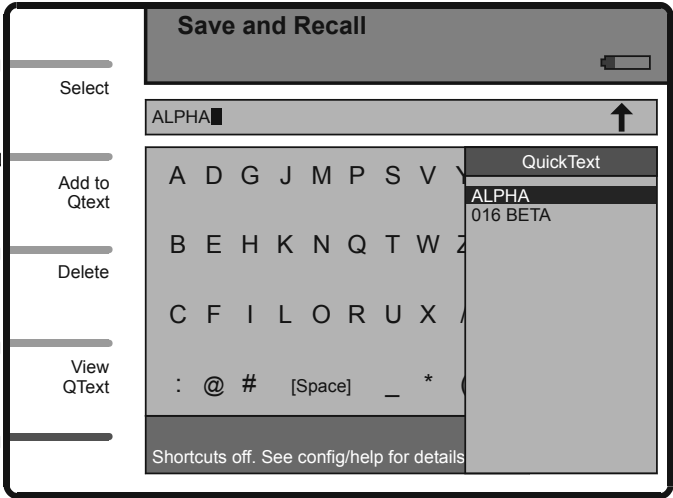


Create Quicktext

Enter text into the label, then activate Quicktext



Press to store the label contents in Quicktext

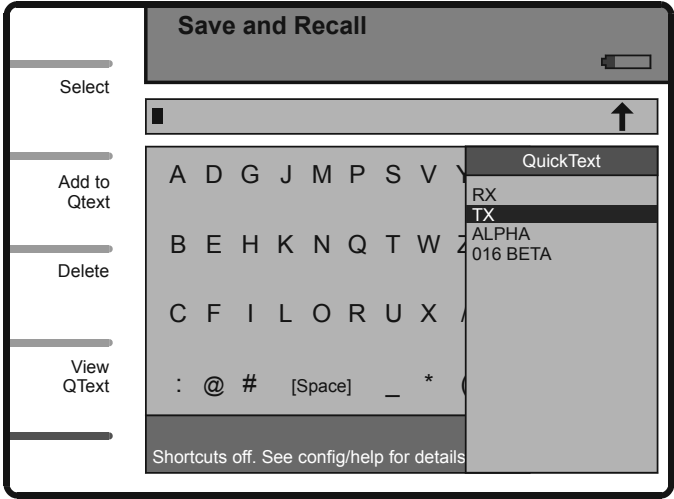




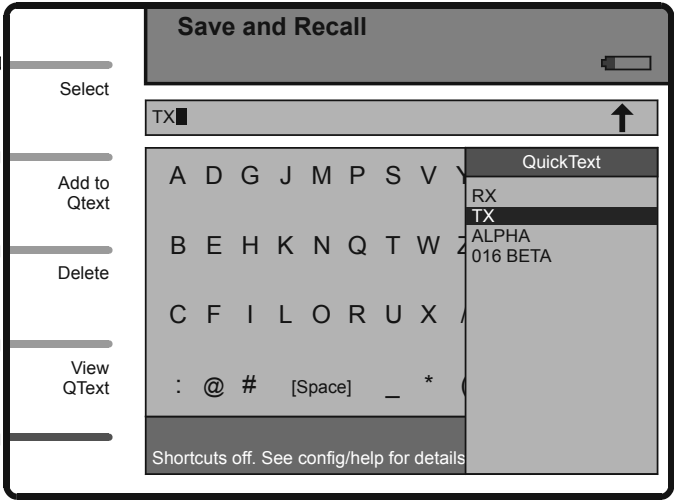
Use Quicktext



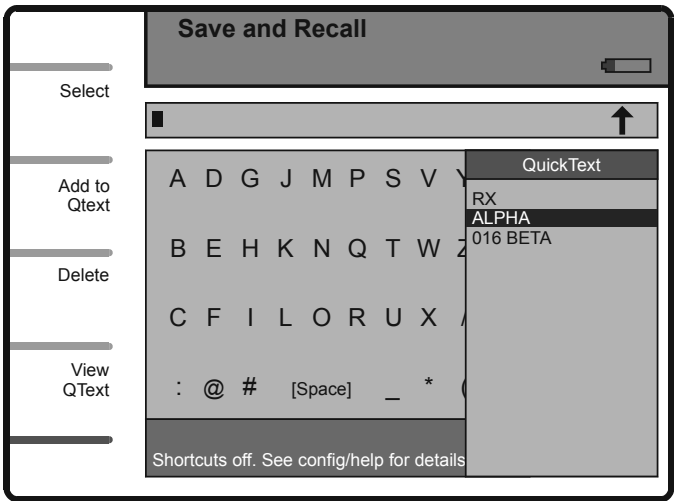
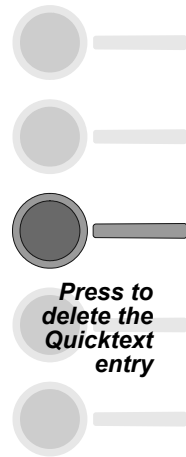
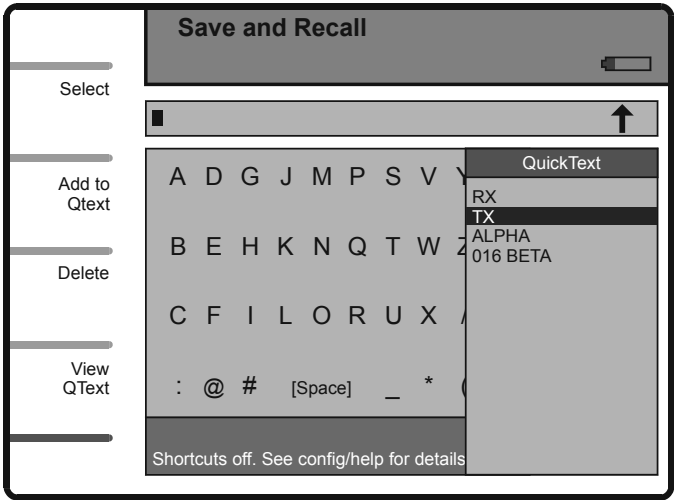
Scroll to a Quicktext entry



Press to insert the Quicktext at the cursor



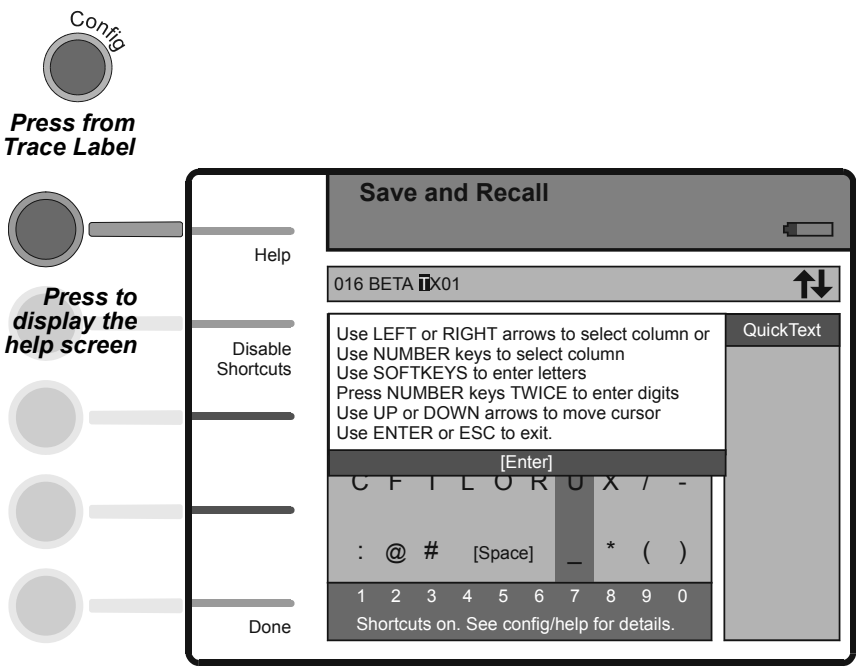
Delete Quicktext



# Trace Label Config

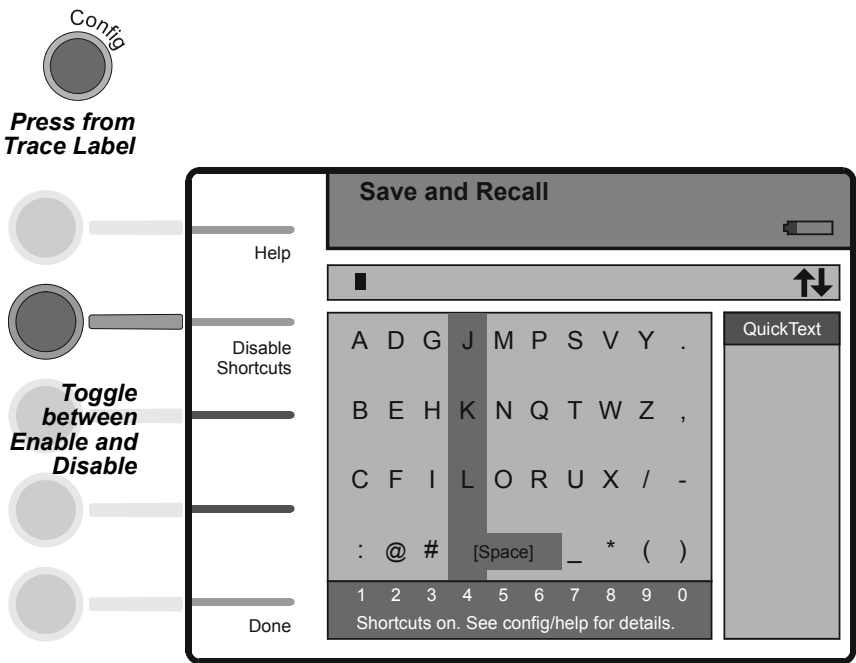
## Label Help

Label Help provides instructions for labelling traces.



Label Shortcuts

Enabling shortcuts allow you to select a column by pressing the key corresponding to the column number. When shortcuts are enabled, press the number key once to move the column, and twice to enter a number.



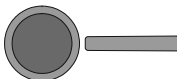
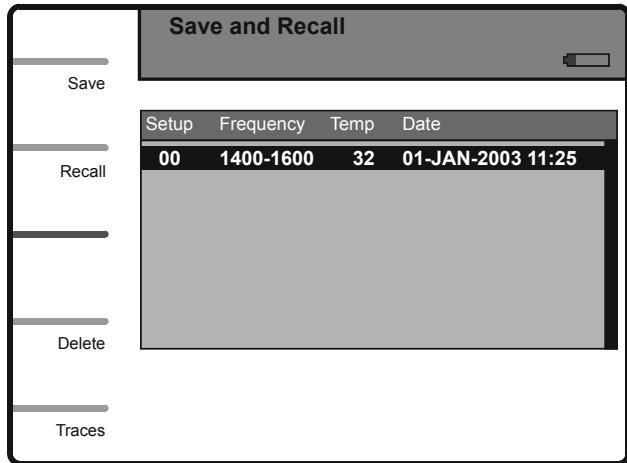
## Save Setup

Saving the setup will save the following:

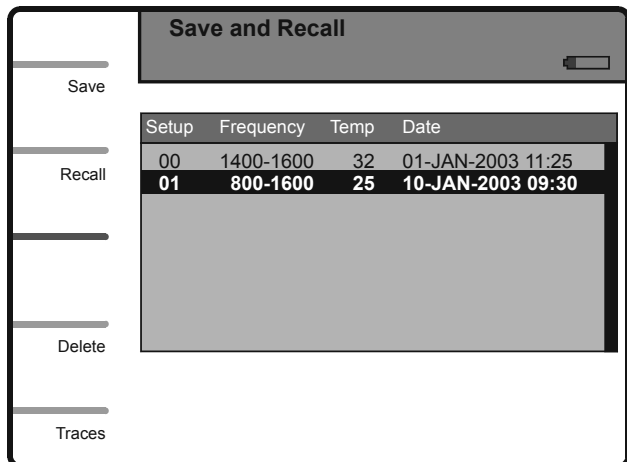
Scale Min	Start Frequency	Center Frequency
Scale Max	Stop Frequency	Span Frequency
Start Distance	Units	Calibration Coeff.
Stop Distance	FM Status	Limit Line

Press from  
Save and  
Recall

The Setup  
menu is  
displayed




Press to  
save the  
current  
setup



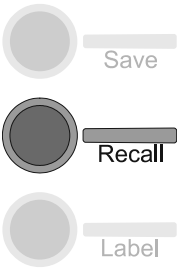
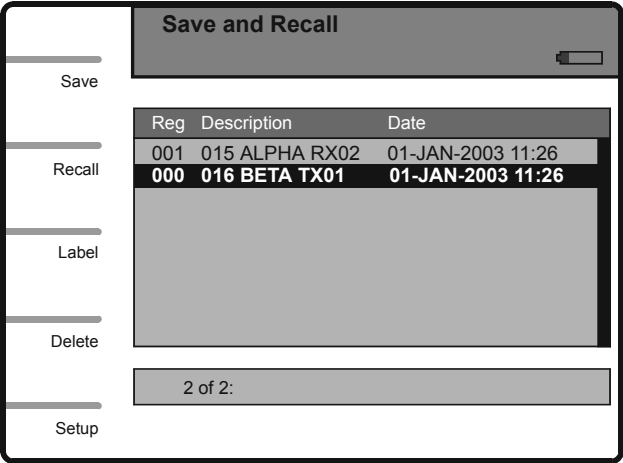
Recall Trace

When a trace is recalled it is displayed along with the trace currently being measured. The frequency range will be changed to the recalled trace's settings. To remove a recalled trace from the display, press **ESCAPE** from the Save and Recall screen.

 **NOTE:** Calibration is automatically turned off if the recalled trace has a different frequency range.

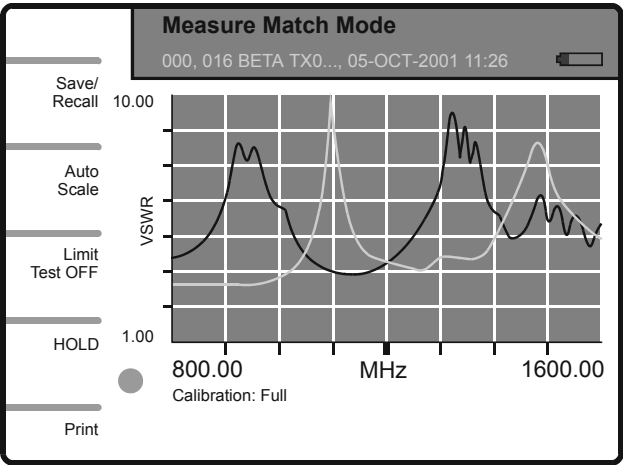


*From Save and Recall, scroll to the trace to be recalled*




**OR** 

*The trace is recalled*



## Recall Setup

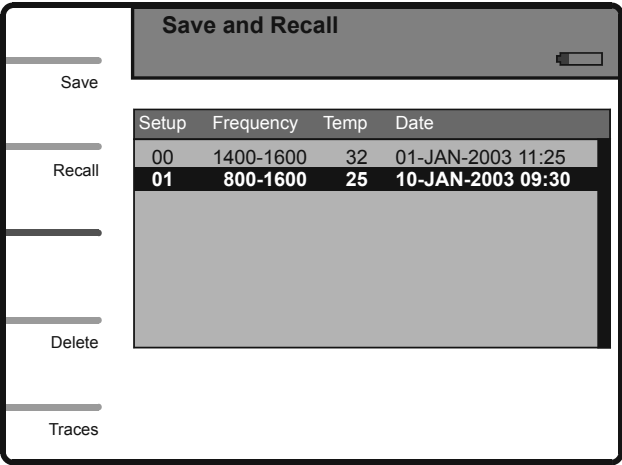
 **NOTE:** For best results, calibrate the Bird Site Analyzer immediately before taking measurements.

**Press from  
Save and  
Recall**

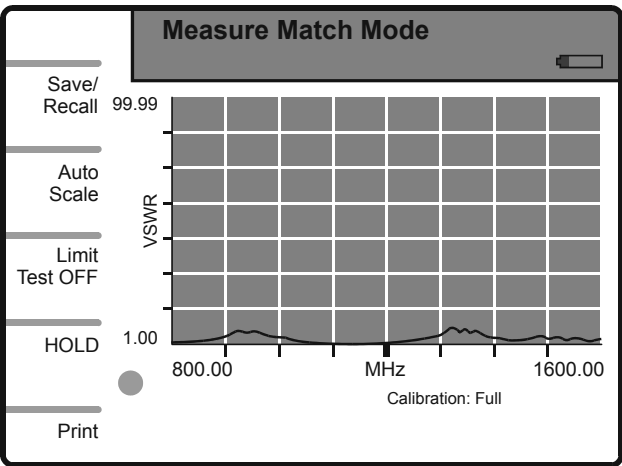
**The Setup  
menu is  
displayed**



**Scroll to the  
setup to be  
recalled**



**OR** 



**The setup is  
recalled**

## Delete Trace



**From Save and Recall, scroll to the trace to be deleted**

Save and Recall

Save

Recall

Label

Delete

Setup

Reg	Description	Date
001	015 ALPHA RX02	01-JAN-2003 11:26
000	016 BETA TX01	01-JAN-2003 11:26

2 of 2:



**Press to delete the trace. Press again when asked "Are You Sure?"**



Save and Recall

Save

Recall

Label

Delete

Setup

Reg	Description	Date
001	015 ALPHA RX02	01-JAN-2003 11:26

1 of 1:



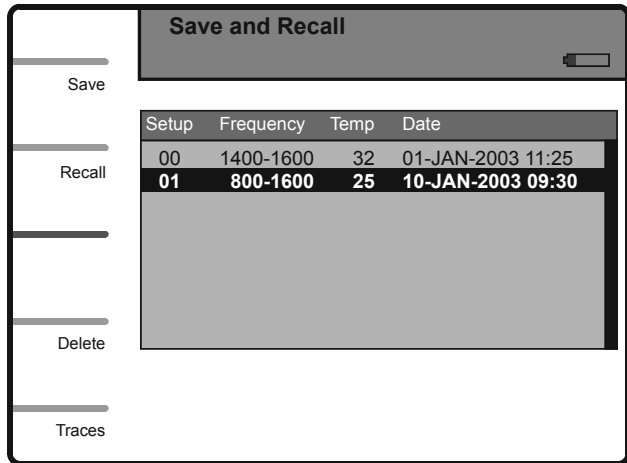
## Delete Setup

Press from  
Save and  
Recall

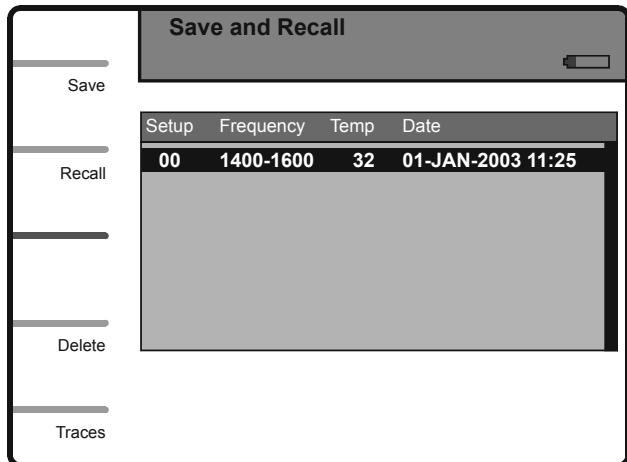
The Setup  
menu is  
displayed




Scroll to the  
setup to be  
deleted



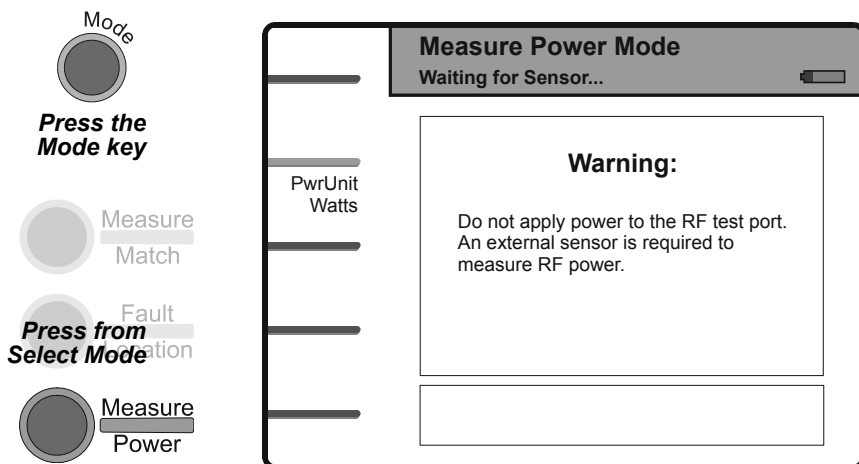
Press to  
delete the  
setup. Press  
again when  
asked "Are  
You Sure?"

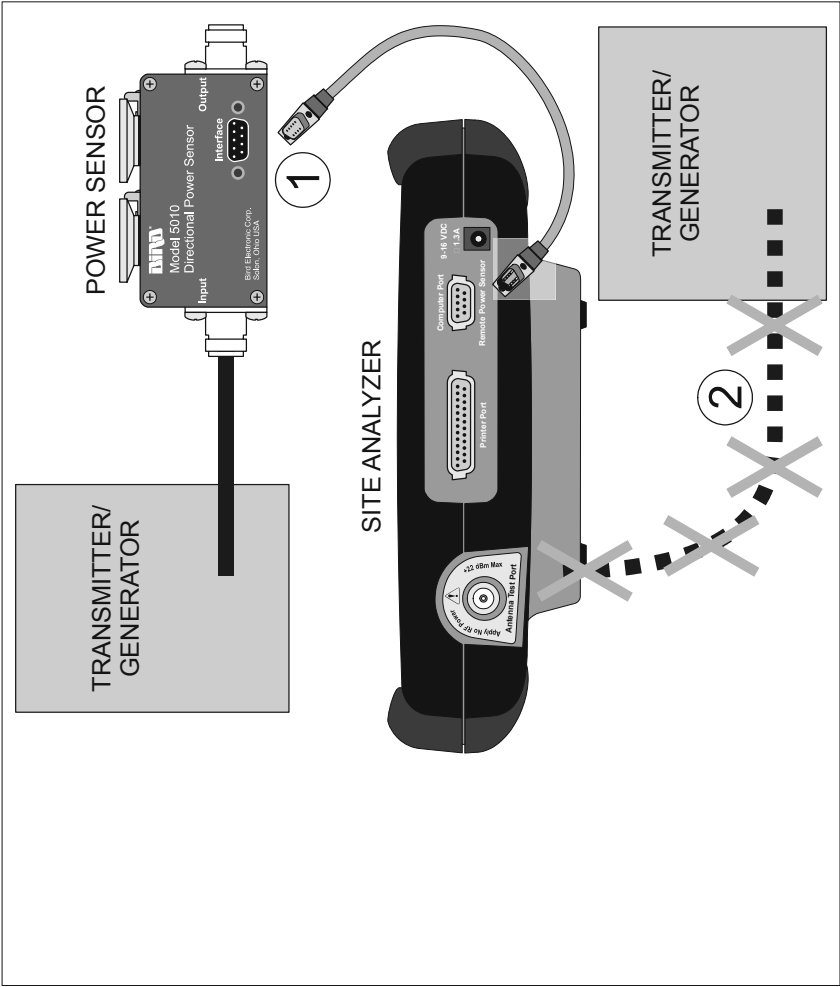




 **NOTE:** Power measurement comes standard on all models *except* the SA-1700. To upgrade a SA-1700 to a SA-1700-P, which has power measurement capability, please contact Customer Service.

This measurement verifies and monitors the condition of the transmitter system. Multiple measurement values can be simultaneously displayed, depending on the sensor. One measurement is also displayed on an analog dial. Sensors compatible with the Bird Site Analyzer include Bird VSWR Monitors and Broadcast Power Monitors, as well as the Bird 5010B, 5011, and 5012.





- 1. Connect Power Sensor to SA "Remote Power Sensor" Port
- 2. DO NOT connect Transmitter to SA "Antenna Test" Port!

## Connecting a Sensor



### CAUTION

Always turn off the SA before connecting or disconnecting a sensor.

### CAUTION

+22 dBm max. input

Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

### CAUTION

When using a Bird 5011 or 5011-EF, do not exceed 2 W average or 125 W peak power for 5  $\mu$ s. Doing so will render the sensor inoperative.

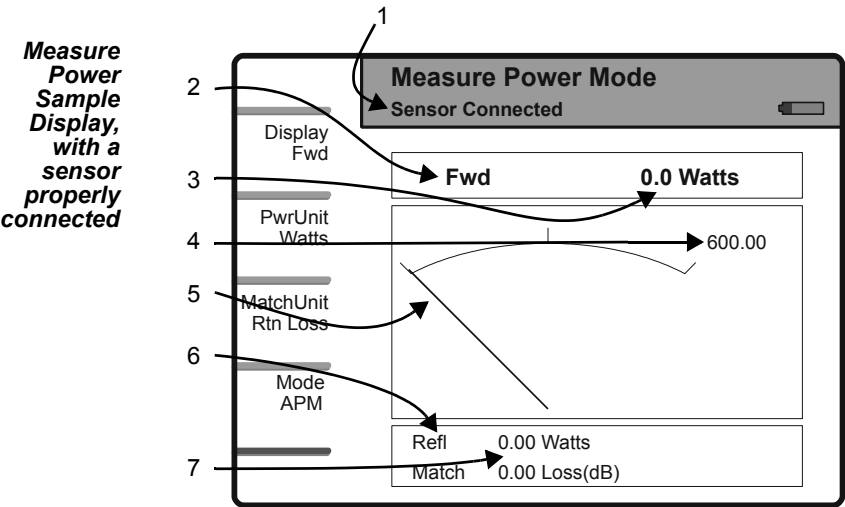
The antenna test port is only used for testing unpowered systems. For power measurement, an external power sensor connected to the “Remote Power Sensor” port *must* be used.

Although unlikely, it is possible to corrupt the power sensor firmware by connecting it to the Site Analyzer while the SA is on. To prevent this, turn the SA off before connecting or disconnecting a sensor.

Use a 9-pin serial cable to connect a power sensor to the Site Analyzer’s serial port, labeled “Remote Power Sensor” (see “Connectors” on page 117). When a sensor is properly connected, the status message will change from “Waiting for Sensor” to “Sensor Connected”. The warning screen will be replaced by the main display.

For best results with element-based sensors such as the Bird 5010B, connect the sensor and enter the forward element’s power rating before taking any data (see “Setting the Full Scale Power” on page 77).

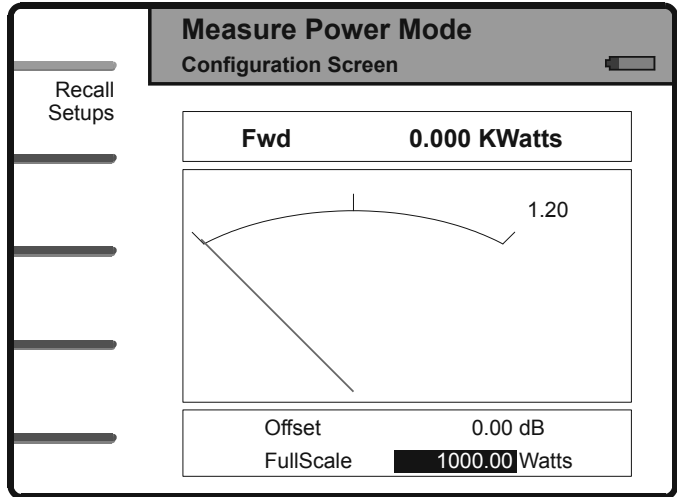
Display Description



1. Sensor Status	Indicates the connection status of the power sensor.
2. Primary Measurement	Identifies the measurement displayed on the analog dial.
3. Primary Value	Numeric display of the primary value.
4. Measurement Scale	Indicates the dial's full scale.
5. Dial	Graphic display of the primary measurement.
6. Secondary Measurements	Identifies measurements not displayed on the dial.
7. Secondary Value	Numeric display of secondary values.

## Setting the Full Scale Power

For element-based sensors, enter the power rating listed on the forward element before making any measurements. Also, check that the reflected element's rating is 10% of the forward element's.




The Bird Site Analyzer will automatically set the full scale power for sensors that do not use elements, such as the Bird 5011 or 5012.

## Zeroing Bird Power Sensors

### CAUTION

When using a Bird 5011 or 5011-EF, do not exceed 2 W average or 125 W peak power for 5  $\mu$ s. Doing so will render the sensor inoperative.

Over time, the sensor's "zero value" (reading with no applied RF power) can drift, making all readings inaccurate by this value. For example, if the zero value is  $-2 \mu$ W, measuring a 5 mW signal will give a reading of 4.998 mW, a 0.04% error. Measuring a 50  $\mu$ W signal will give a reading of 48  $\mu$ W, a 4% error. To keep this drift from causing a significant error, rezero the sensor as necessary. This applies to 5011 and 5012 power sensors.

 **NOTE:** For best results, make sure the sensor has been connected to the Site Analyzer and the SA turned on for at least 5 minutes. Do not apply RF power to the sensor during calibration.



**Press from  
Measure  
Power Mode**



**Press to  
begin the  
calibration**



Recall Setups

Zero Calibrate

**Measure Power Mode**  
 Configuration Screen

**Fwd**
**0.00 mWatts**

This will take about 45 seconds to complete. Do you wish to continue?

[Enter/Esc]

Offset
0.00 dB

FullScale
0.01 Watts





**Press to  
accept the  
warning**


Measure Power Mode Configuration Screen	
Recall Setups	<div>Fwd 0.00 mWatts</div> <div> <div>12.00</div> <div> <b>WARNING</b>            Do not disconnect sensor            until cal is complete.         </div> </div>
Zero Calibrate	<div>Offset 0.00 dB</div> <div>FullScale 0.01 Watts</div>

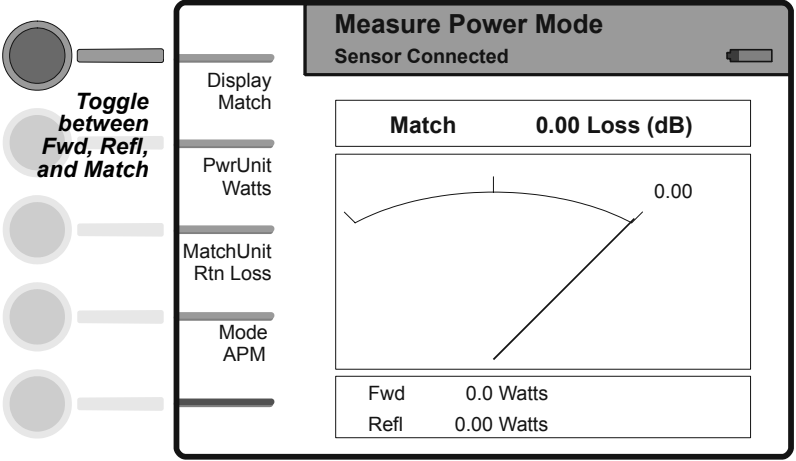
**Wait for  
calibration  
to finish**

Measure Power Mode Configuration Screen	
Recall Setups	<div>Fwd 0.00 mWatts</div> <div> <div>12.00</div> </div>
Zero Calibrate	<div>Offset 0.00 dB</div> <div>FullScale 0.01 Watts</div>

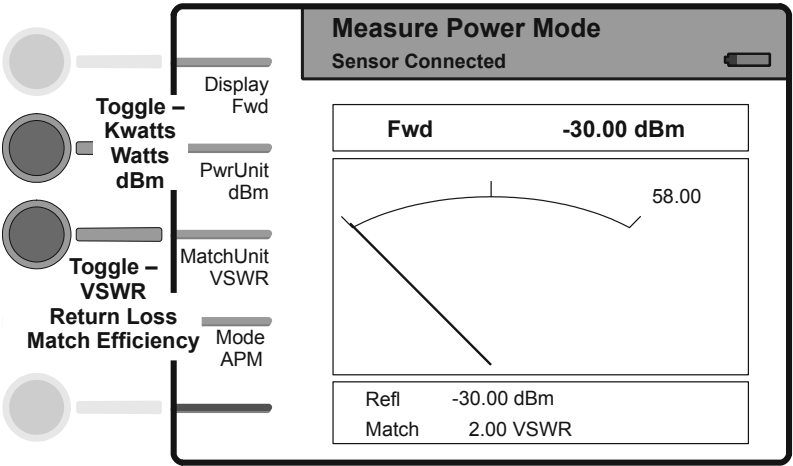
### Choosing the Displayed Measurement

The primary display shows one value on the large numerical display and the dial. Other measurements are displayed numerically below the dial.

 **NOTE:** When using a terminating power sensor, only forward power can be measured. Reflected power and match will not be displayed.

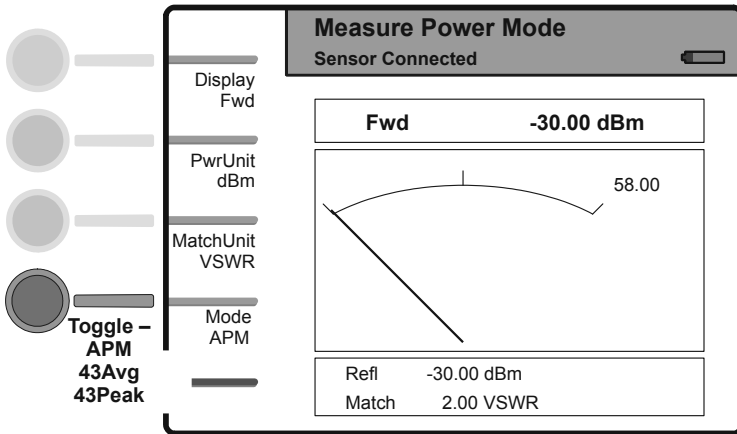


### Setting Units



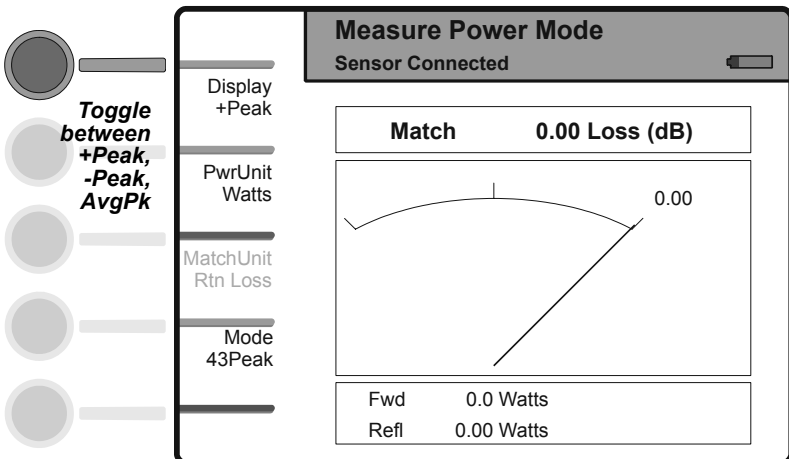
## Changing the mode for the 5010B


The 5010B has three modes of operations, APM, 43Avg, and 43Peak. Bird 43 Elements can measure average, peak, and average of max. and min. power. Bird APM Elements can only measure average power.



### The 43Peak Mode

When the 5010B is in the 43Peak mode, the measurements change as shown below.

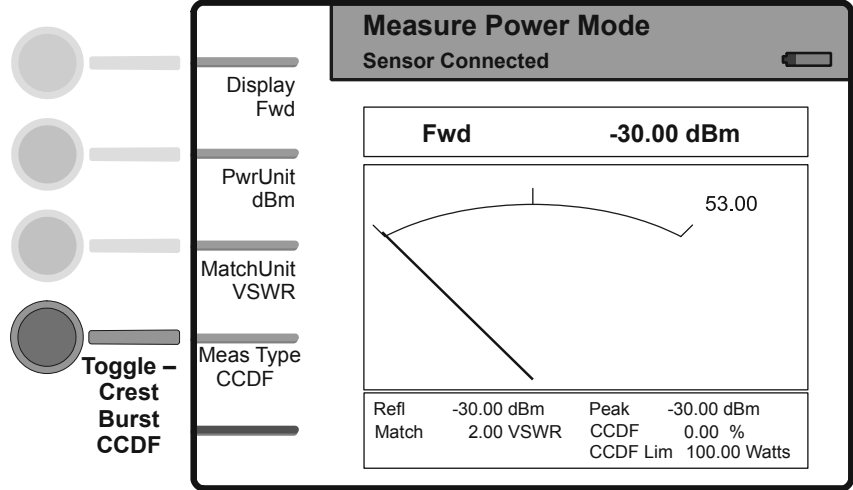


 Note: When using the 5010B in the 43Peak mode, the match units are no longer needed and are greyed out.

Using the 5012 Wideband Power Sensor

Changing the Measurement Type

The 5012 has three different measurement modes, Creat, Burst, and CCDF.



Choosing the Displayed Measurement

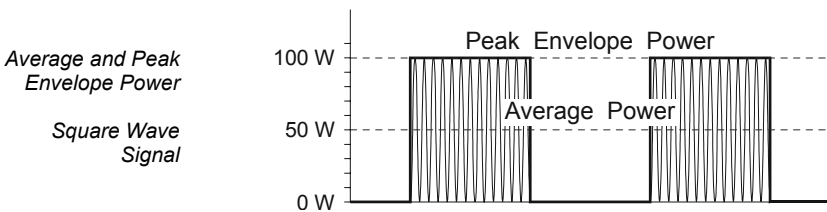
There are five measurements that can be displayed in each measurement type. FWD, REFL and MATCH are common to all of the measurement types. The other two depend on the measurement type as show in the table below.

Meas. Type	Crest	Burst	CCDF
Displayed	Peak	Burst	Peak
Meas.	Crest	Duty	CCDF

## Function Descriptions

### **Average Power**

Average power is a measure of the equivalent “heating” power of a signal, as measured with a calorimeter. It measures the total RF power in the system, and does not depend on number of carriers or modulation scheme. The WPS is a broadband sensor that measures power across its entire frequency range. Its diodes operate in their ‘square law’ region so that the detector output is directly proportional to the average power, without any additional error correction.



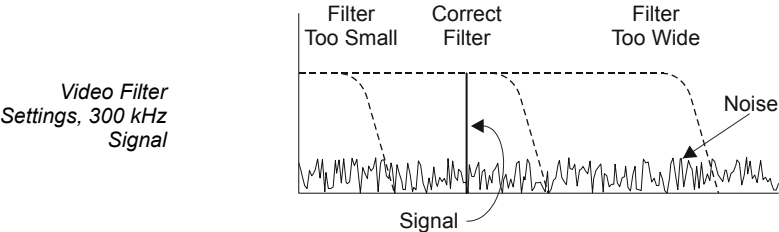
### **VSWR**

VSWR measures the relation between forward and reflected average power. The Bird Wideband Power Sensor calculates the VSWR from the Forward and Reflected Average Power measurements. Rho and Return Loss are also the same measurement, but in different units:

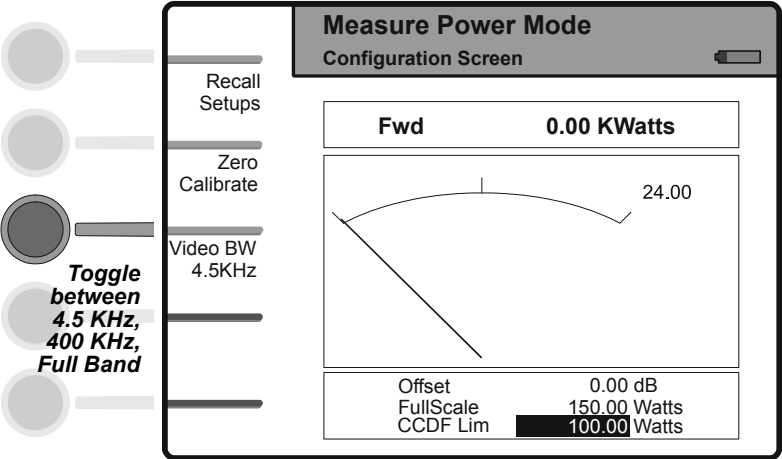
$$\text{Rho } (\rho) = \sqrt{P_F / P_R} , \quad \text{VSWR} = \frac{1 + \rho}{1 - \rho} , \text{ and}$$

$$\text{Return Loss (dB)} = 20 \times \log \rho$$

**Video Filter** Except for average power and VSWR measurements, all WPS measurements rely on a variable video filter to improve accuracy. This filter can be set to either 4.5 kHz, 400 kHz, or full bandwidth. It should be as narrow as possible while still being larger than the demodulated signal bandwidth (video bandwidth). Narrowing the filter limits the noise contribution caused by interfering signals. Listed below are some common modulation schemes and the appropriate video filter.



Video Filter	Modulation Type
4.5 kHz	CW Burst (Burst width > 150 μs), Voice Band AM, FM, Phase Modulation, Tetra
400 kHz	CW Burst (b.w. > 3 μs), GSM, 50 kHz AM, DQPSK
Full Bandwidth	CW Burst (b.w. > 200 ns), CDMA, WCDMA, DQPSK, DAB/DVB-T

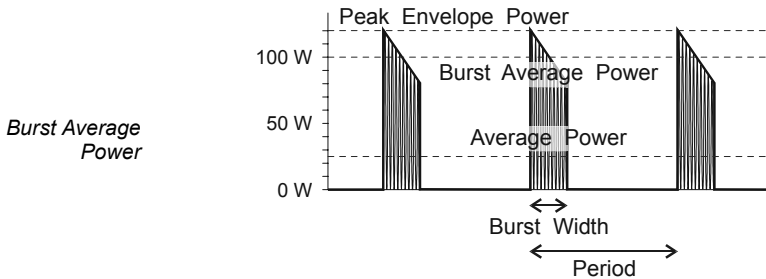


**Peak  
Envelope  
Power**

Peak power measurements detect amplitude changes as a signal modulates the carrier envelope. The WPS operates in an asynchronous cycle: 300 ms of waveform sampling followed by a 50 ms reset period. The peak power is then displayed and the cycle repeats. The display therefore updates about three times per second.

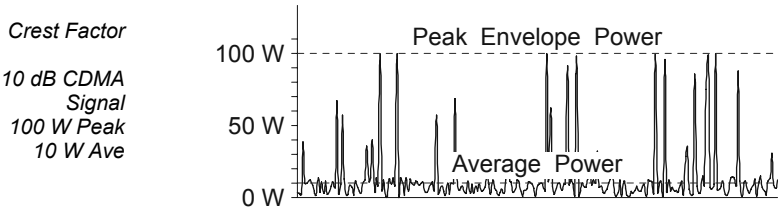
**Burst  
Average  
Power**

Burst width (BW) is the duration of a pulse. Period (P) is the time from the start of one pulse to the start of the next pulse. Duty cycle (D) is the percentage of time that the transmitter is on. To calculate the duty cycle simply divide the burst width by the period ( $D = BW / P$ ). Low duty cycles mean that the burst width is much less than the period; a large amount of dead time surrounds each burst. For low duty cycles, the burst average power will be much larger than the average power.



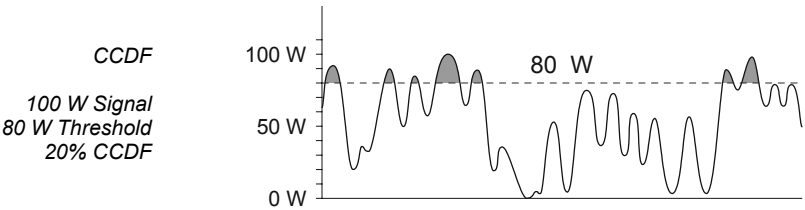
After peak power is measured, a threshold of  $\frac{1}{2}$  the peak is set. The sampled power crosses that threshold at the beginning and end of each burst. The time between crossings is used to calculate the duty cycle. Burst Average Power is calculated by dividing the Average Power by the Duty Cycle.

**Crest Factor** Crest factor (CF) is the ratio of the peak and average powers, in dB. The WPS calculates the Crest Factor from the Forward Peak and Average Power measurements.



**Comple-4** mentary Cumulative Distribution Function (CCDF)

CCDF measures the amount of time the power is above a threshold. Equivalently, it is the probability that any single measurement will be above the threshold. The WPS samples the power over a 300 ms window and compares it to a user-specified threshold, in Watts. The time above the threshold relative to the total time is the CCDF.





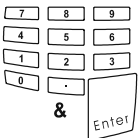
## Setting the CCDF Limit



**Press from Measure Power Mode**



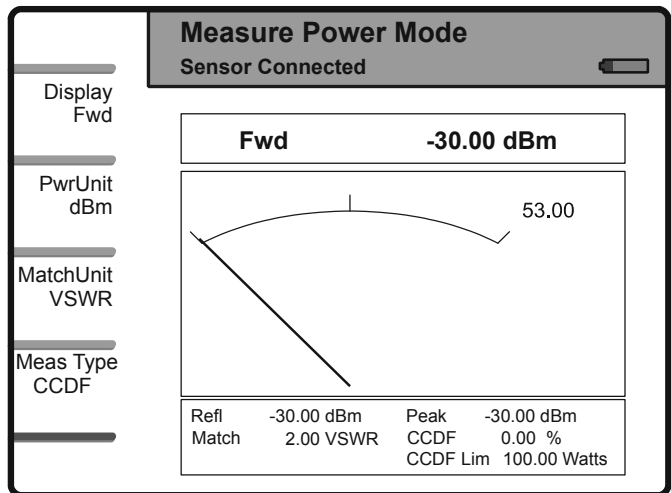
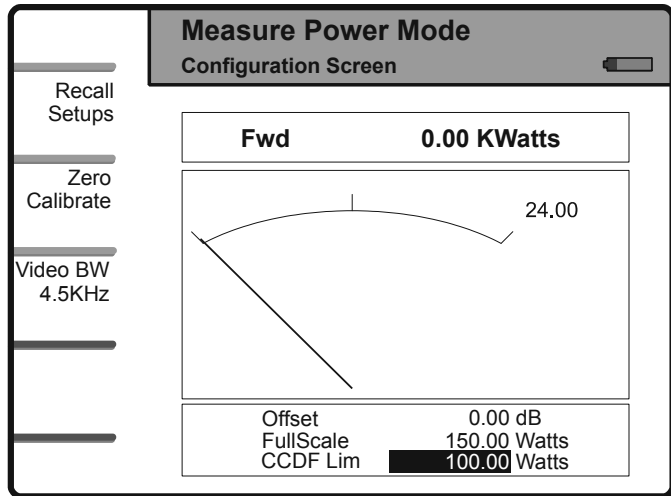
**Scroll to CCDF Lim**



**Enter the new value**



**The CCDF Limit is displayed at the bottom of the main display**



## ***Setting the Offset***

To read unattenuated power when using a coupler or attenuator, enter (in dB) the attenuation or coupling factor. To convert percentages to dB, use the equation:

$$\text{Attenuation(dB)} = 10 \times \text{Log}_{10}[\text{Attenuation}(\%) / 100]$$

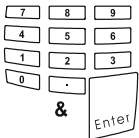
- 5011-EF** The Bird 5011-EF uses frequency-dependent correction factors to provide more accurate measurements. To use these, look at the label on the side of the sensor and find the correction factor at the frequency being measured. Add the correction factor to the other attenuation or coupling factors, and enter this as an offset in the Site Analyzer.



**Press from  
Measure  
Power Mode**



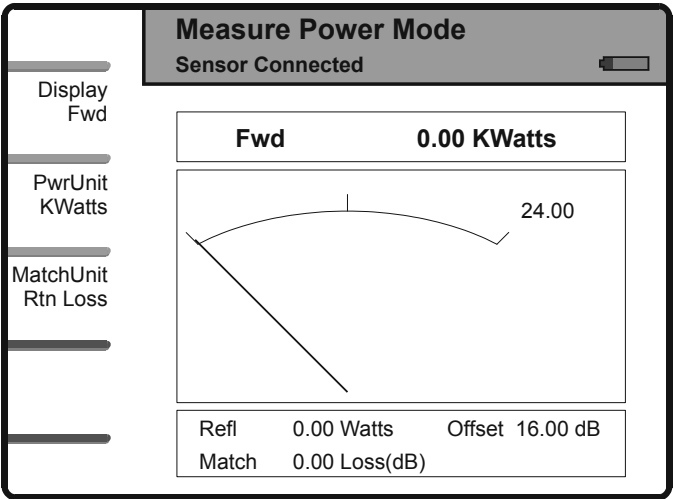
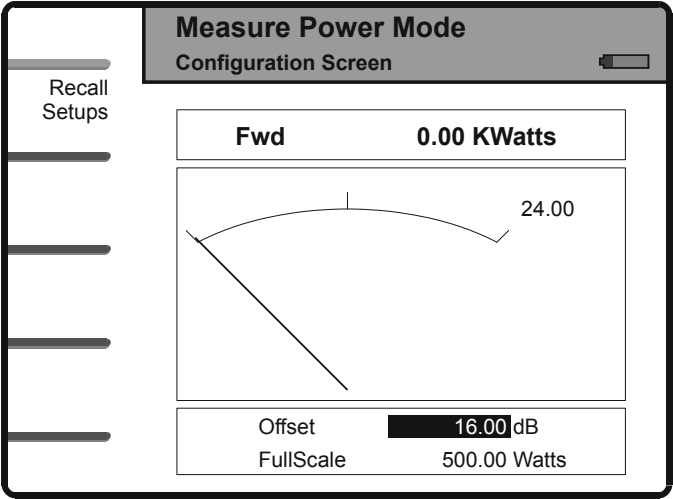
**Scroll to  
Offset**



**Enter the  
new value**




**The offset is  
displayed at  
the bottom  
of the main  
display**






Recall Setups

Power measurement setups can be created using the Bird Site Analyzer PCTool Software, then stored in the Site Analyzer’s nonvolatile memory. These setups store both the offset and the full scale power.

  
**Press from  
Measure  
Power Mode**

  
**Press to  
display the  
Power  
Setup menu**

  
**Scroll to the  
setup to be  
recalled**

  
**The setup is  
recalled**

Measure Power Mode

Select Power Setup

Recall

Name	Offset	Scale
Setup1	16.00	1000.00 W
Dfit1	0.00	500.00 W
Dfit2	0.00	500.00 W
Dfit3	0.00	500.00 W
Dfit4	0.00	500.00 W
Dfit5	0.00	500.00 W
Dfit6	0.00	500.00 W
Dfit7	0.00	500.00 W

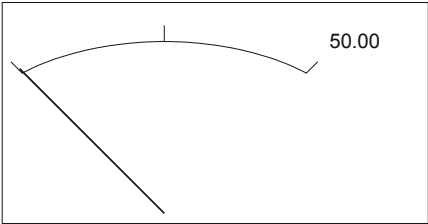
Measure Power Mode

Configuration Screen

Recall Setups

Fwd

0.00 KWatts



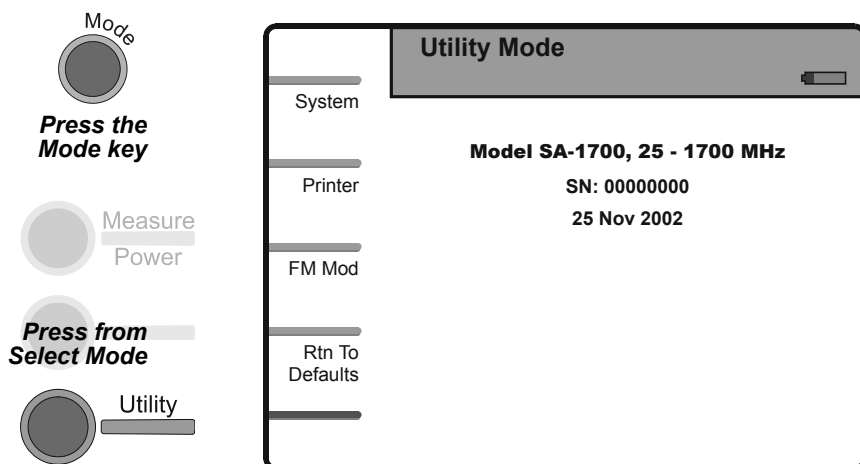
Offset

16.00 dB

FullScale

1000.00 Watts

These utilities adjust the Bird Site Analyzer's date and time, return the unit to default settings, or check the printer status.



## Adjust Date and Time



**Press to  
display the  
system  
settings**



Utility Mode	
System	
Printer	<b>Model SA-1700, 25 - 1700 MHz</b> SN: 00000000 25 Nov 2002
FM Mod	
Rtn To Defaults	<b>Current Date / Time:</b> 12 - <b>DEC</b> - 2001 12:05 p



**Scroll  
through the  
date & time**

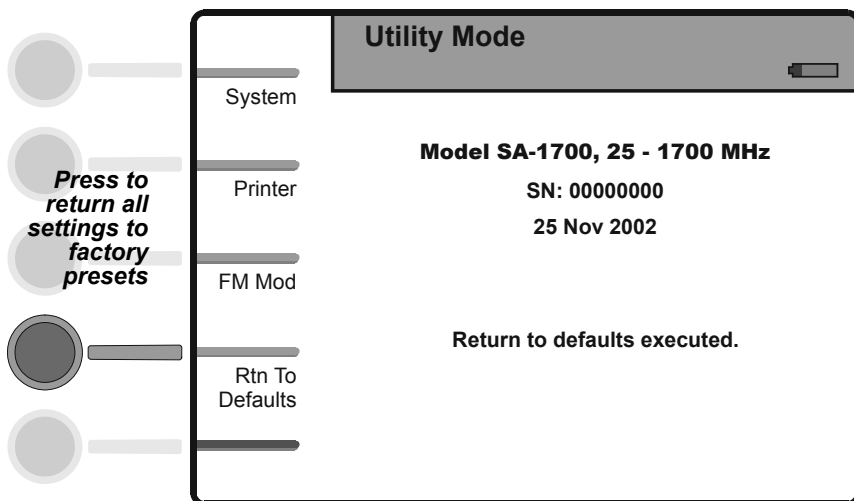


**Change the  
date or time**

Utility Mode	
System	
Printer	<b>Model SA-1700, 25 - 1700 MHz</b> SN: 00000000 25 Nov 2002
FM Mod	
Rtn To Defaults	<b>Current Date / Time:</b> 12 - <b>FEB</b> - 2002 12:05 p

## Return to Defaults

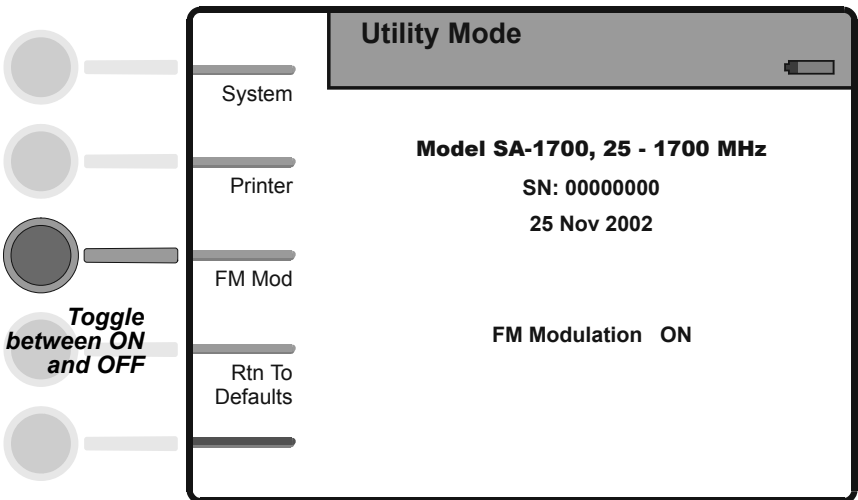
All settings will be returned to the factory presets. Saved traces and setups will not be affected. This function should be used after a unit failure and on the first power up after a firmware upgrade.



## FM Modulation

The Bird Site Analyzer uses FM modulation to improve its immunity to interfering signals. Under certain circumstances, such as while making cable loss or other high reflection measurements with long cables, FM modulation may reduce signal quality. In that case, the modulation should be turned off.

- FM modulation is on by default, and will be turned back on whenever the unit is reset to defaults.
- FM modulation is automatically turned off while the unit is in Cable Loss Mode and returned to its previous state on exiting Cable Loss Mode.
- Saving a setup saves the status of the modulation.

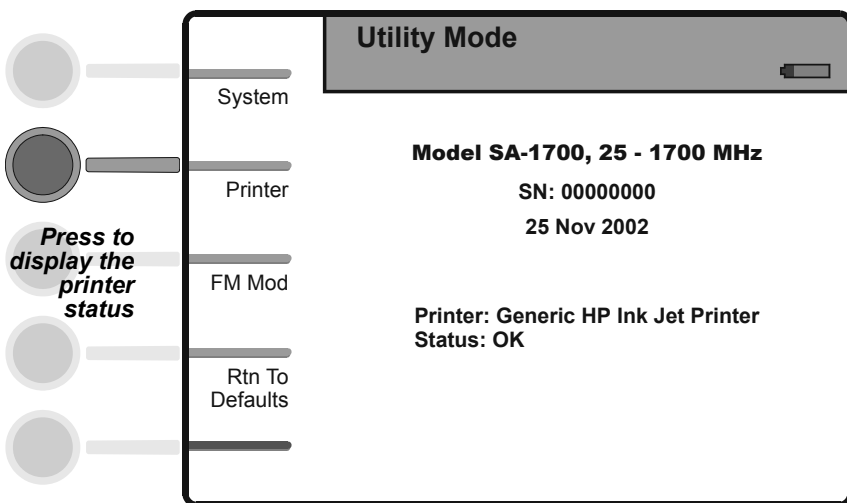




## Printer


The Bird Site Analyzer is compatible with all printers that use HP PCL Level 3, including most HP printers.

When a printer error occurs, this screen will display an error message describing the printer problem.





The Bird Site Analyzer Software is designed to help you use the Site Analyzer more effectively. It allows you to use a PC for archiving and analyzing measurement data. For complete instructions refer to the help files included with the software.

 **NOTE:** The new Bird Serial to USB adapter (P/N DC-DB9-U) converts the supplied serial cable to USB. This lets the SA be connected to a PC's USB port if the serial port is unavailable.

### ***Features***

- Multiple Document Interface - allows any number of trace documents to be open simultaneously.
- Intelligent drag-and-drop automatically converts traces to a common scale for precise and reliable comparisons.
- Documents can be viewed in the frequency or distance domains, or as a Smith chart.
- Data values can be read off the status bar as the mouse is moved along the trace.
- Compatible with other cable and antenna testers including the Bird AT Series.
- Automatic cursor calibration maintains accurate readouts of trace data even if the x-axis changes.
- Supports long file names for easy identification.

### ***Computer Requirements***

To install and run the software, your computer system must meet the following requirements:

- Windows 95 or later operating system
- 486, 66 MHz, or better processor
- Hard disk with 3 MB of free space
- CD-ROM Drive



***Cleaning*****CAUTION**

Harsh or abrasive detergents, and some solvents, can damage the display unit and labels.

Only clean the Bird Site Analyzer with a soft cloth dampened with mild detergent and water. Do not use any other type of cleaning solution.

***Charging the Battery***

The internal battery pack will automatically recharge when the Site Analyzer is powered from the ac or cigarette lighter adapter. Recharging time, from a full discharge, is approximately 4 hours.

***Troubleshooting***

Any service procedure not covered in this manual should be referred to an authorized service facility.

Locate the problem, review the possible causes, and perform the action listed. If the problem is not corrected, give us a call or return the unit for service.

<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Correction</b>
Unit will not power up	Battery pack drained	Charge the battery pack.
	Battery pack unable to keep a charge	Replace the battery pack.
	AC adapter is damaged	Replace the ac adapter.
Self test fails	Error condition	Turn the unit off and then back on. If the problem persists, return the unit for service.

Problem	Possible Cause	Possible Correction
Date and time appear, hiding the display	Internal error	Press <b>Mode</b> , <b>Utility</b> , and then <b>Escape</b> .
Fault Location trace appears incorrect	Scale too large	Press <b>Auto Scale</b> to make the scale smaller.
	Incorrect cable loss or velocity of propagation	Check the cable loss and $V_p$ settings.
Erratic antenna test measurements	Bad calibration combo	Use a different calibration combo.
Soft keys beep when pressed without performing any function	Context switching operations taking place	Wait for screen changes to complete before.
Keys do not respond	Unit is "Locked Up"	Turn the unit off and then back on.
		Perform a full system initialization. Disconnect the AC adapter, hold down the Contrast key and turn the unit off. Turn the unit back on.
Limit line disappears in Fault Location	Limit line not drawing	Turn the limit line off and then back on.
Recalled fault location trace is invalid	No fault location measurement made since last full system initialization	Change to Measure Match Mode and then back to Fault Location Mode.
Unit beeps and turns off	Internal error	Turn the unit back on and continue.
Unit is unable to print. "Error" is displayed after pressing <b>PRINT</b>	Printer error	Check the error condition in Utility Mode ( <b>Mode</b> , <b>Utility</b> , <b>Printer</b> ). Correct the error.
Trace drifts outside of specifications	Calibration lost	Calibrate the unit immediately before making a measurement.

## Battery Replacement

- Lay the Site Analyzer, display side down, on a clean surface.
- Remove the four screws and the battery cover. Refer to the picture below.
- ☞ NOTE: Check the direction of the notch in the battery cover. It is important to replace the cover the same way it was removed.
- Disconnect and remove the old battery pack from the battery compartment.
- ☞ NOTE: Do not tear the protective label covering the EPROM and Reset access. Hold the wires coming from the unit while disconnecting the battery.
- Install the new battery. Make sure the wires are firmly connected.
- Place the battery in the battery compartment. Make sure the battery is flat in the compartment, and will not damage any wires when the cover is installed.
- Replace the battery cover and the screws.




## ***Unit Reset***

- Lay the Site Analyzer, display side down, on a clean surface.
- Remove the battery (see “Battery Replacement” on page 101).
- Remove the label covering the Reset and EPROM access. Refer to the picture on the previous page.
- Press the Reset button with a nonconductive instrument.
- Place a new label over the Reset and EPROM access area.
- Replace the battery and battery cover (see “Battery Replacement” on page 101).



## **Flash ROM Upgrade**

The Site Analyzer uses flash-programmable ROM. It is not necessary to replace the EPROM to upgrade the firmware.

 **NOTE:** The update process will erase the memory of the Site Analyzer, including all saved traces and setups. Use the PC software to save all traces to a PC before updating the flash ROM.

- Install the FlashLoader program on a PC.
- Turn off the Site Analyzer and disconnect the external power supply.
- Connect the PC to the Site Analyzer's serial port with the supplied serial cable.
- Run the FlashLoader and click the Begin button. The status will change to "Waiting to Connect".
- Connect the Site Analyzer to the power supply. The green LED on the SA will turn on and the Flash Updater will display "Connected."
- Select the data file (e.g. 06Aug2002.sre) and click "Open".
- Select "Yes" to accept the warning and update the flash, or "No" if you do not want to proceed.
- The update process takes 3 to 5 minutes. After this the Site Analyzer will beep several times, the green power LED will turn off and the amber charging LED will start blinking.
- Turn on the Site Analyzer and do a "Return to Defaults" (see "Return to Defaults" on page 93).

## **Customer Service**

If you need to return the unit for any reason, contact the Bird Service Center for a return authorization. All instruments returned must be shipped prepaid and to the attention of Bird Service Center.

**Service  
Facility**

**Bird Service Center**

30303 Aurora Road  
Cleveland (Solon), Ohio 44139-2794  
Phone: (440) 519-2298  
Fax: (440) 519-2326  
E-mail: *bsc@bird-technologies.com*

**Sales  
Facilities**

For the location of the Sales Office nearest you, give us a call or visit our Web site at:

*<http://www.bird-electronic.com>*

## Specifications

### Antenna Testing

#### Test Port

Connectors	Female N normally supplied
Impedance	50 Ohms

Directivity, After Calibration	Connector	Frequency	Directivity
	N	25 – 2500 MHz	– 42 dB
	N	2.5 – 4.0 GHz	– 38 dB
	7/16	25 – 2500 MHz	– 40 dB
	7/16	2.5 – 4.0 GHz	– 35 dB

#### Source VSWR

SA-2500A	1.2
All other models	1.12

<b>Measurement Speed</b>	< 4 seconds / sweep, test port open, Y-axis set to full scale
--------------------------	---

<b>Immunity to Interfering Signals</b>	≥ 13 dB interferer at desired measurement frequency.
--	--

<b>Maximum Input Signal (Damage Level)</b>	≥ 22 dBm
--	----------

<b>Output Power</b>	< 0 dBm
---------------------	---------

### Match Measurement

#### Frequency Range

SA-2500A	780 – 2500 MHz
SA-1700, SA-1700-P	25 – 1700 MHz
SA-4000	25 – 4000 MHz

#### Frequency Resolution

SA-2500A	50 kHz
All other models	
25 – 800 MHz	25 kHz
800 – 2500 MHz	50 kHz
2500 – 4000 MHz	100 kHz

<b>Frequency Accuracy</b>	± 150 kHz (75 ppm)
---------------------------	--------------------

<b>Number of Points</b>	238
-------------------------	-----

### Measurement Range and Resolution

	Range	Resolution
Return Loss	0.0 to -60.0 dB	0.1 dB
VSWR	1.00 to 99.99	0.01

### Measurement Uncertainty (after 1 display refresh)\*

Return Loss	Determined graphically from composite of source VSWR, instrumentation error, and directivity. Refer to the figures on page 108, page 109, and page 110.
VSWR	Calculated from Return Loss

\* Accuracy only guaranteed when using the the Bird Calibration Combo listed in this manual (See page 112).

### Distance to Fault (DTF) Measurement

---

Mode	Internal
------	----------

#### Resolution [R]

X-Axis

$$R \equiv 150 \times \frac{V_p}{\Delta F}$$

Where R=Resolution (meters),  $V_p$ =Velocity of Propagation,  $\Delta F$ = Frequency Span (MHz)

Y-Axis

0.1 dB, 0.01 VSWR

#### Range

X-Axis

238 x R

Y-Axis

0 to -60 dB

#### Accuracy

X-Axis

± 2% of full-scale range with  $V_p = 1$

Y-Axis

Same as for Return Loss Measurements

#### $V_p$ Range

0.20 to 1.00, or 1 to 99%

## Power Measure Mode

<b>Function</b>	Displays power from Bird 5010B, 5011, and 5012 power sensors, VSWR Alarm and BPM (specifications determined by sensor)
-----------------	--

## General

<b>Data Storage</b>	300 traces (250 for SA-1700 and SA-1700-P) in fundamental data format stored in non-volatile memory. Traces may be recalled and displayed in any of the display formats.
---------------------	--

### PC/Remote Power Sensor Interface Port

Connector	Female DB-9, compatible with PC serial port
Protocol	Serial RS-232, 9600 baud, 8 data bits, 1 stop bit, no parity, and no handshake

### Printer Interface Port

Connector	Female DB-25, compatible with PC parallel port
Compatibility	HP Deskjet printers with PCL Level 3 protocol

### Power Requirements

Internal	Lithium-ion rechargeable battery 3 hours minimum operating time
External DC	9 to 16 Vdc
External AC	90 to 264 Vac @ 45 to 66 Hz

### Physical Specifications

Dimensions	10.5" x 8.4" x 3.3" (265 x 212 x 83 mm)
Weight	< 5 lbs. (2.3 kg)

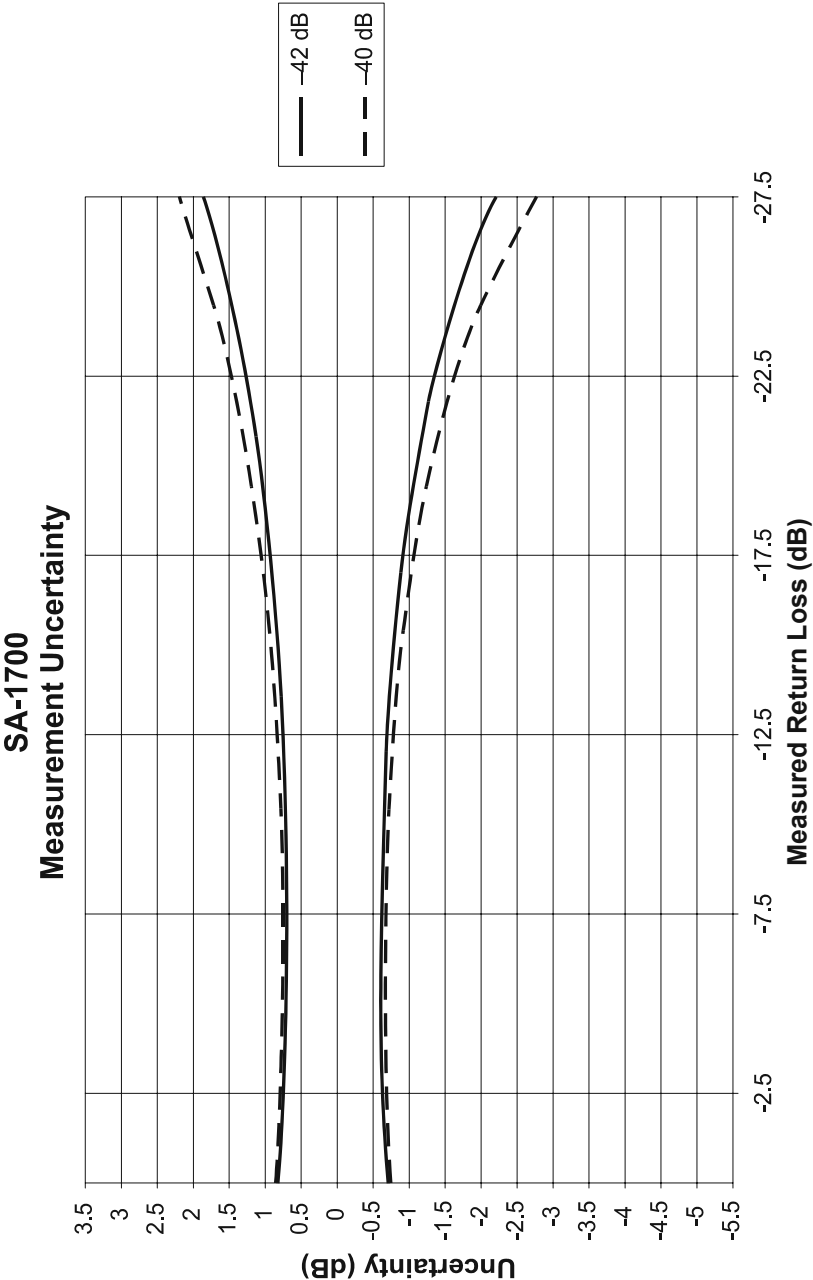
### Environmental Specifications

Operating Temp	-10 to +50°C (14 to 122°F)
Storage Temp	-40 to +80°C (-40 to +176°F)
Humidity	95% maximum (non-condensing)
Altitude	15,000 feet (4,572 m) max

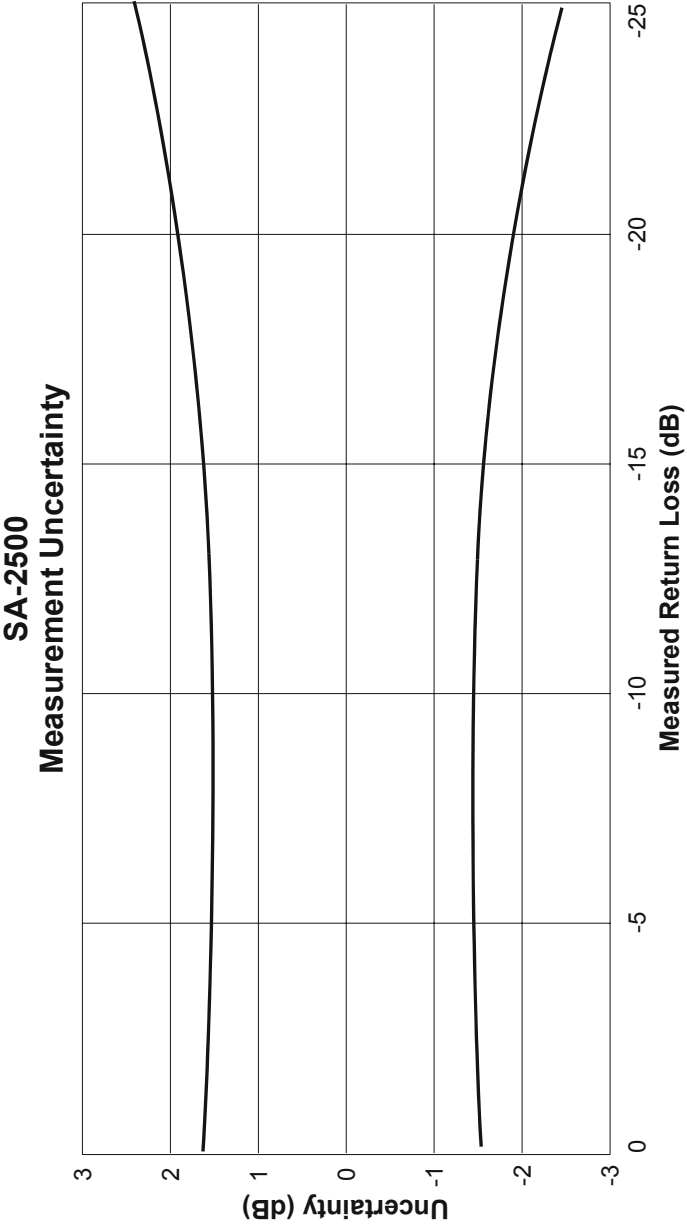
### Calibration

Calibration Cycle	User Defined
Recommended Calibration Interval	12 months

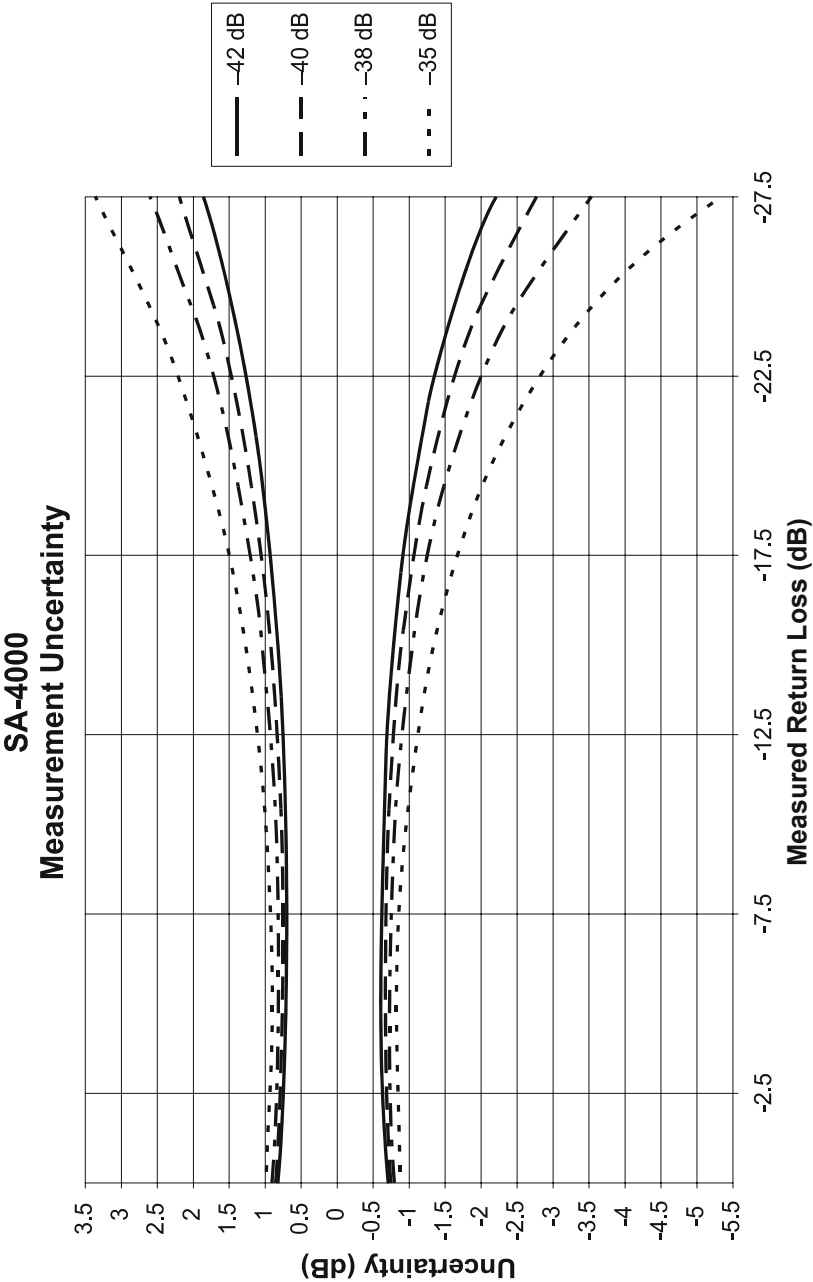
SA-1700 Measurement Uncertainty (Return Loss after one refresh)



SA-2500A Measurement Uncertainty (Return Loss after one refresh)



SA-4000 Measurement Uncertainty (Return Loss after one refresh)





**Parts List**

<b>Part Name</b>	<b>Part Number</b>
Site Analyzer - Complete	
780 – 2500 MHz	SA-2500A
25 – 1700 MHz	
With Power Measure	SA-1700-P
Without Power Measure	SA-1700
25 – 4000 MHz	SA-4000
AC adapter (15 Vdc output)	5A2436
Automobile cigarette lighter adapter	5A2238-2
Soft Carrying case	7002A850
9-pin Serial interface cable	5A2264-09-MF-10
Serial to USB Adapter	DC-DB9-U
PC interface software kit	7002A844
Instruction manual	920-7002A400
Internal Battery Pack	5A2431

## ***Optional Equipment Available***

### ***Precision Adapters:***

<b>Connectors</b>	<b>Part Number</b>	<b>Connectors</b>	<b>Part Number</b>
Male N to Male 7/16 DIN	PA-MNME	Female 7/16 DIN to Male 7/16 DIN Right Angle	PA-FEME-R
Female N to Male 7/16 DIN	PA-FNME	Female N to Female N	4240-500-1
Male N to Female 7/16 DIN	PA-MNFE	Female N to Male N, Right Angle	4240-500-3
Female N to Female 7/16 DIN	PA-FNFE	Female N to Female SMA	4240-500-4
Female 7/16 DIN to Female 7/16 DIN	PA-FEFE	Female N to Male SMA	4240-500-4

### ***Armored (Phase Stable) Test Cables:***

<b>Connector Types</b>	<b>Length</b>	<b>Part Number</b>
Male N to Male N	1.5 meter	TC-MNMN-1.5
Male N to Male N	3.0 meter	TC-MNMN-3.0
Male N to Female N	1.5 meter	TC-MNFN-1.5
Male N to Female N	3.0 meter	TC-MNFN-3.0
Male N to Female 7/16 DIN	1.5 meter	TC-MNFE-1.5
Male N to Female 7/16 DIN	3.0 meter	TC-MNFE-3.0

### ***Precision Open/Short/Load Combinations:***

<b>Connector Type</b>	<b>Part Number</b>
Male N	CAL-MN-B
Female N	CAL-FN-B
Male 7/16 DIN	CAL-ME-B
Female 7/16 DIN	CAL-FE-B

<b>Hard Transit Case</b>	P/N: 7002C870 Holds Site Analyzer, standard accessories, calibration combo, armored cable assembly, and adapters.
<b>External Battery Pack</b>	P/N: SA-BATPAK Includes ac adapter and dc power cord.
<b>Directional Power Sensor</b>	P/N: 5010B Sensor for Thruline power measurement. Requires two Bird DPM elements. Refer to DPM Element Guide, P/N 871-DPM-019-901, for a complete list of elements.
<b>Terminating Power Sensor</b>	P/N: 5011 or 5011-EF Sensor for terminating power measurement. The Bird 5011 frequency range is 40 MHz – 4 GHz. The 5011-EF frequency range is 40 MHz – 12 GHz.
<b>Wideband Power Sensor</b>	P/N: 5012 Sensor for Thruline power measurement.

### ***Terminating Power Sensor Accessories:***

<b>Description</b>	<b>Part Number</b>
Female N to Male N Attenuators (RF power range using TPS)	
30 dB (10 mW – 10 W)	8353A030-10
40 dB (100 mW – 50 W)	8353A040-50
DC Block	5011A035-1
General Purpose Test Cable, Male N to Female N, 1.5 m	TC-MNFN-1.5-G
Calibration Data	5011-CALDATA
Recommended for attenuators, test cables, and dc block	



This chapter shows you how to make standard measurements with the Bird Site Analyzer. It begins with definitions of some common words, then tells you, in order, what to do to take a measurement. Where necessary, you will be referred to a page with specific keypress instructions and screenshots. After going somewhere else in this book, flip to the separator page here to bring you back to this guide.

### ***Definitions***

**Measure  
Match Mode**

The Match Measurement mode shows the resonant frequencies for an antenna or filter. It also confirms that there are no impedance problems in the nonresonant components such as cables, connectors, lightning protectors, and jumpers.

**Fault  
Location  
Mode**

The Fault Location mode shows the location of any problems in the antenna system. This is shown in either feet or meters from the cable end connected to the Site Analyzer.

**Cable Loss  
Mode**

The Cable Loss mode shows the insertion loss of a coaxial cable. By comparing this with the manufacturer's specs, it confirms that there are no problems with the cable.

**VSWR**

VSWR units used to be the preferred way to measure an antenna system. A good antenna has a VSWR of less than 1.5:1 at its operating frequency.

**Return Loss**

Return Loss measures, in dB, how much of a wave is reflected back to the source. It is now the preferred method for measuring antenna systems. A good antenna will have a return loss of -14 dB or less at the operating frequency. The more negative the reading, the better the antenna.

**Markers** Markers are used to show the exact value at one point on the graph. In Measure Match and Cable Loss modes, the marker displays the frequency and loss (or VSWR). In Fault Location mode, the marker displays the distance and loss.

**Run / Hold** When **HOLD** is displayed, the unit makes a new sweep every few seconds, and displays the latest sweep.

When **RUN** is displayed, the unit will only make a single sweep. The display will not update if the Site Analyzer is disconnected or if the cable is jiggled. This is usually preferred.

## ***How To Read The Instructions***

Instructions are provided for making a typical Match Measurement, Fault Location Measurement, and Cable Loss Measurement. Follow each step of the instructions.

If you are not sure where a button is on the Bird Site Analyzer, refer to the button diagram in this section.



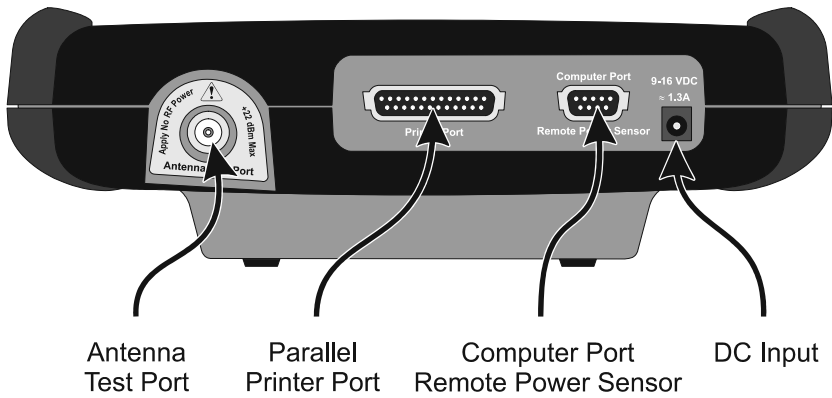
**START**

Each step will refer you to a page in this manual for specific instructions. Turn to that page and follow the instructions on the left-hand side, beginning at the **START** icon. The screenshots next to each instruction show what the Site Analyzer display should look like after each instruction. When you reach the **STOP** icon, return to this section and go to the next step.



**STOP**

## Connectors



### CAUTION

+22 dBm max. input

Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

<b>Antenna Test Port</b>	Female N connector for connecting to the antenna. Use a phase-stable cable for best results.
<b>Parallel Printer Port</b>	25-pin (DB25) parallel connector for connecting to HP-type inkjet printers. A printer cable is not included.
<b>Computer/Power Sensor Port</b>	9-pin RS-232 (DB9) serial connector for connecting to a PC or to Bird power sensors.
<b>DC Input</b>	Input for external power supplies. Plug either the ac power supply or the cigarette lighter adapter into the dc input. The external supplies operate the unit and charge the internal battery.

Buttons



<b>1. Soft Keys</b>		Activates the function described directly to the right of the key.
<hr/>		
<b>2. Mode Keys</b>		
Mode		Activates the mode menu. Use this to select Measure Match, Fault Location, Measure Power, or Utilities mode.
Config		Activates the configuration menu for the current mode. Use this to set variable parameters (e.g. frequency band, distance, and units).
Calibrate		Activates the calibration menu.
Marker		Activates the marker menu. Use this to turn markers on or off and to move the active marker.
<hr/>		
<b>3. Numeric Keys</b>		Enters numeric data into the selected item, or as defined by the function description.
<hr/>		
<b>4. Escape Key</b>		
During:		
Menu Use		Backs up one menu level.
Data Entry		Exits data entry without changing the value.



## 5. Enter Key

During:

List Selection	Selects the highlighted item in the list.
Data Entry	Exits data entry, changing the value.

## 6. Cursor Keys

### Left Arrow

During:

Data Entry	Deletes previously entered data one character at a time.
Marker Use	Moves active marker left one point at a time.
All other times	As defined by the function description.

### Right Arrow

During:

Marker Use	Moves active marker right one point at a time.
All other times	As defined by the function description.

### Up Arrow

During:

Data Entry	Increases the numeric value.
Marker Use	Moves the marker to the maximum trace value.
While pressing the Contrast key	Increases the display contrast.
All other times	As defined by the function description.

### Down Arrow

During:

Data Entry	Decreases the numeric value.
Marker Use	Moves the marker to the minimum trace value.
While pressing the Contrast key	Decreases the display contrast.
All other times	As defined by the function description.

## 7. Battery LED

The yellow LED lights when the unit is powered from an external dc power source. It blinks while charging the internal battery. Once the battery is fully charged the yellow LED stops blinking.

The green LED lights whenever the unit is on.

## 8. Contrast Key

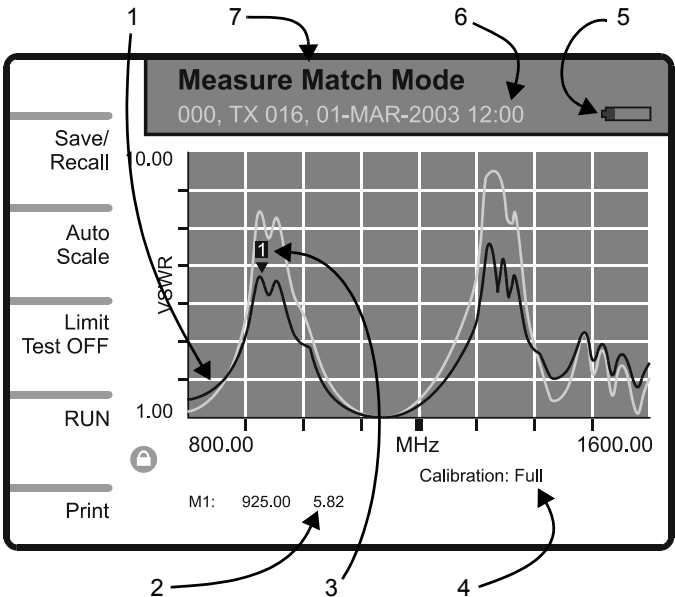
Hold while pressing the up/down arrow keys to adjust the contrast of the display.

## 9. I/O (On/Off)

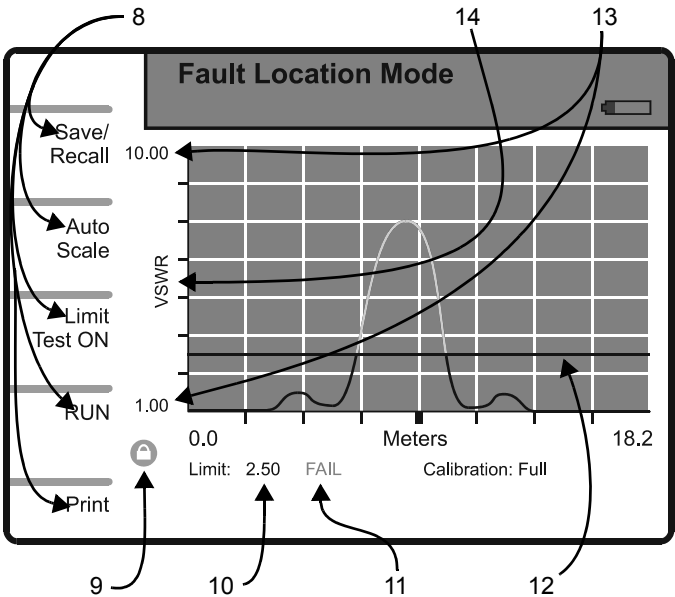
Turns the instrument on and off. The key must be pressed for at least one-half (½) second.

Display Description

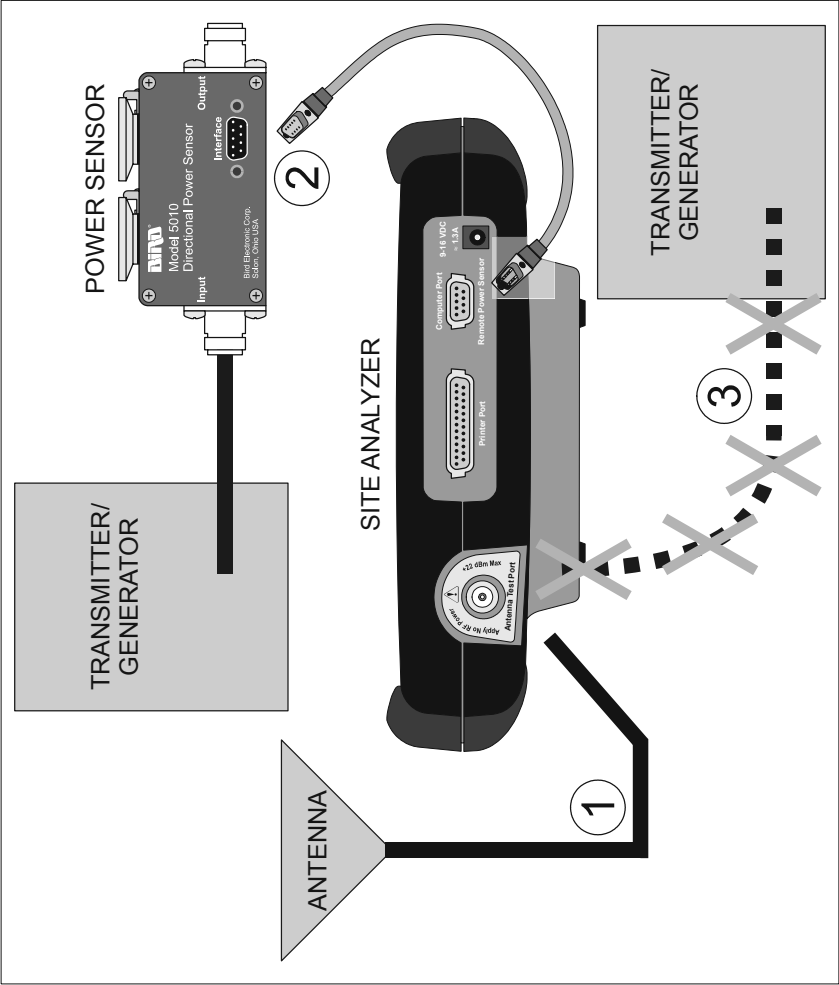
Measure  
Match  
Sample  
Display



Fault  
Location  
Sample  
Display




<b>1. Trace</b>	Graphic display of the measurement.
<b>2. Marker Value</b>	Indicates the position and value of a trace point.
<b>3. Marker Cursor</b>	Identifies the trace point displayed in the marker value.
<b>4. Calibration Indicator</b>	Indicates the calibration status.
<b>5. Battery Gauge</b>	Indicates whether the Site Analyzer is using the internal battery or an external power supply, and indicates the amount of battery life remaining.
<b>6. Recalled Name</b>	Indicates the name of a recalled trace.
<b>7. Mode Indicator</b>	Name of the current mode.
<b>8. Soft Key Description</b>	Describes the function of the soft key to the left of the description.
<b>9. Indicator Ball</b>	Indicates if the trace is sweeping.
<b>10. Limit Line Value</b>	Indicates the limit value.
<b>11. Limit Test Indicator</b>	Displays FAIL if any part of the trace exceeds the limit value.
<b>12. Limit Line</b>	A horizontal line that graphically displays the limit value.
<b>13. Scale</b>	Indicates the minimum and maximum values displayed on that axis.
<b>14. Units</b>	Indicates the measurement units for that axis.



1. Connect antenna to SA "Antenna Test" Port
2. Connect Power Sensor to SA "Remote Power Sensor" Port
3. DO NOT connect Transmitter to SA "Antenna Test" Port!

## Measure Match Measurement


 **NOTE:** If you get lost or the unit is not responding correctly, press **ESCAPE** three or four times to get back to the main screen and continue from there. If this does not solve the problem, turn the unit off, wait five seconds, and then turn it back on.

### Before Connecting The Bird Site Analyzer

#### CAUTION

+22 dBm max. input

Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

1. Use a service monitor, power meter, or spectrum analyzer to check that the component being tested does not have power greater than +22 dBm.
  2. Make sure that you have the correct adaptors and connectors, and a Bird Cal Combo. Make sure you know the frequency band of the system.
  3. Press **ON/OFF** for ½ second to turn the Bird Site Analyzer on.
  4. Go to page 11 and select Measure Match Mode.
  5. Go to page 12 and set the frequency to well beyond the normal range of the antenna.
-  **FOR EXAMPLE:** sweep a 450 MHz antenna from 400 to 500 MHz. Sweep an 800 MHz antenna from 700 to 1,100 MHz.
6. Go to page 15 and select Return Loss units. Set the Minimum to -60 dB. Set the Maximum to 0 dB.

#### Component Return Loss Limits

Antenna at Resonance	-14 dB
Connectors	-25 dB
Jumpers	-35 dB
Lightning Protector	-25 dB
Transmission Lines	-30 dB

7. Go to page 20 and set the limit line. Use the value from the table above for the component under test.
8. Go to page 21 and turn the limit test on.
9. Connect the Phase Stable Cable to the Site Analyzer's Antenna Test Port.
10. Go to page 9 and calibrate the Bird Site Analyzer with the Cal Combo.
- 🔊 NOTE: After calibration, with the Load still connected, the output must be below  $-45$  dB or there is a problem. It is common to see spikes from  $-60$  to  $-45$  dB. These can be ignored.
11. Remove the Cal Combo from the cable. Keep the cable connected to the Site Analyzer.

### Test Setup

Now, you must connect the Site Analyzer to the component being tested.

- **ANTENNA** – Connect the Phase Stable Cable directly to the coaxial connector of the antenna. There should be no other transmission lines or jumpers connected.
- **OTHER COMPONENTS** – (Including Jumpers, Transmission Lines, Lightning Protectors, and RF Filters) Connect the Phase Stable Cable to one end of the component. Connect the Cal Combo Load to the other end of the component.

### Making The Measurement

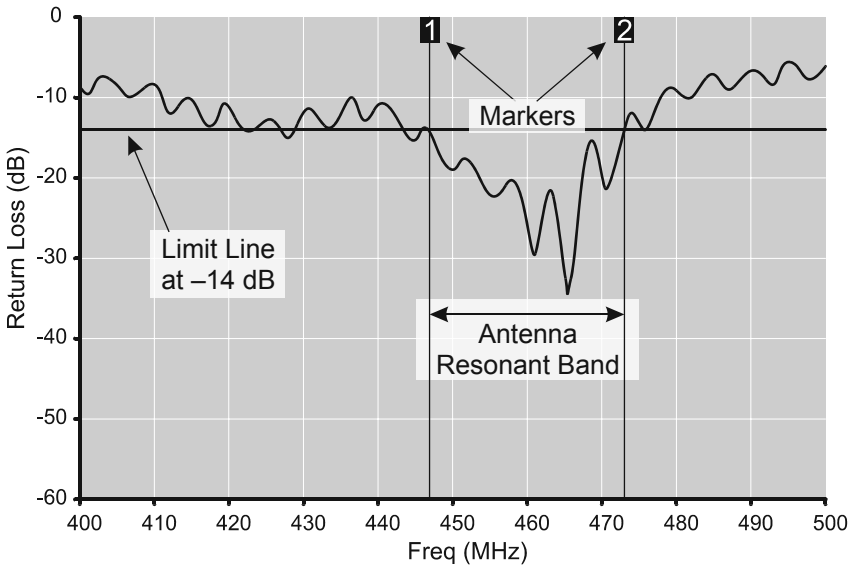
12. Wait 10 seconds for the sweep to update.
13. Go to page 27 and hold the sweep on the screen.
14. Go to page 22 and turn marker 1 on. Place it at the low end of the antenna range. Turn marker 2 on. Place it at the high end of the antenna range. Set both marker types to Line.

### Saving The Measurement

15. Go to page 55 to save and label the trace.


## Interpreting the Measurement

The graph below shows a typical Match Measurement for an antenna system.



1. Parts of the sweep below the limit line are better than the limit.
2. Antennas and filters should be below the limit line for the entire band, and above the limit line outside the band.
3. Other components should be flat and below the limit line across the entire band.

## **Fault Location Measurement**

 **NOTE:** If you get lost or the unit is not responding correctly, press **ESCAPE** three or four times to get back to the main screen and continue from there. If this does not solve the problem, turn the unit off, wait five seconds, and then turn it back on.

## **Before Connecting The Bird Site Analyzer**

### **CAUTION**

+22 dBm max. input

Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

1. Use a service monitor, power meter, or spectrum analyzer to check that the component being tested does not have power greater than +22 dBm.
2. Make sure that you have the correct adaptors and connectors, and a Bird Cal Combo. Make sure you know the frequency band of the system.
3. Press **ON/OFF** for ½ second to turn the Bird Site Analyzer on.
4. Go to page 11 and select Measure Match Mode.




5. Determine the frequency span required with the table below:
    - Read across the top row to find the column with the velocity closest to the cable in your system.
    - Look down that column for a distance about 25% larger than the tower height. Make sure that you don't confuse feet and meters!
    - Look left from the tower height to find the frequency span.
- ☞ **FOR EXAMPLE:** for a 100 ft tower, with a cable velocity ( $V_p$ ) of 0.66, the frequency span should be about 700 MHz.

**Fault Location Distance**

Velocity Percentage	66 %		88 %	
Freq Span (MHz)	Distance		Distance	
	m	ft	m	ft
<b>100</b>	234.6	769.8	312.8	999.9
<b>200</b>	117.3	384.9	156.4	513.2
<b>300</b>	78.2	256.6	104.3	342.1
<b>400</b>	58.7	192.5	78.2	256.6
<b>500</b>	46.9	154.0	62.6	205.3
<b>600</b>	39.1	128.3	52.1	171.1
<b>700</b>	33.5	110.0	44.7	146.6
<b>800</b>	29.3	96.2	39.1	128.3
<b>900</b>	26.1	85.5	34.8	114.0
<b>1000</b>	23.5	77.0	31.3	102.6
<b>1200</b>	19.6	64.2	26.1	85.5
<b>1400</b>	16.8	55.0	22.3	73.3
<b>1500</b>	15.6	51.3	20.8	68.4

6. Go to page 12 and set the center frequency to the center of the antenna's frequency range. Set the frequency span to the value you just found.

7. Go to page 29 and select Fault Location Mode.
  8. Go to page 34 and select the cable type. If more than one type or size of cable is used in the system, select the most-used one.
  9. Go to page 37 and set the start distance to 0 and the stop distance to about 10% more than the height of the tower.
  10. Go to page 40 and select Return Loss units. Set the Minimum to -60 dB. Set the Maximum to 0 dB.
  11. Go to page 51 and set the smoothing to none.
  12. Connect the Phase Stable Cable to the Site Analyzer's Antenna Test Port.
  13. Go to page 9 and calibrate the Bird Site Analyzer with the Cal Combo.
-  **NOTE:** After calibration, with the Load still connected, the output must be below -45 dB or there is a problem. It is common to see spikes from -60 to -45 dB. These can be ignored.
14. Remove the Cal Combo from the cable. Keep the cable connected to the Site Analyzer.

### **Test Setup**

15. Connect the Phase Stable Cable to the coaxial connector of the system.

### **Making The Measurement**

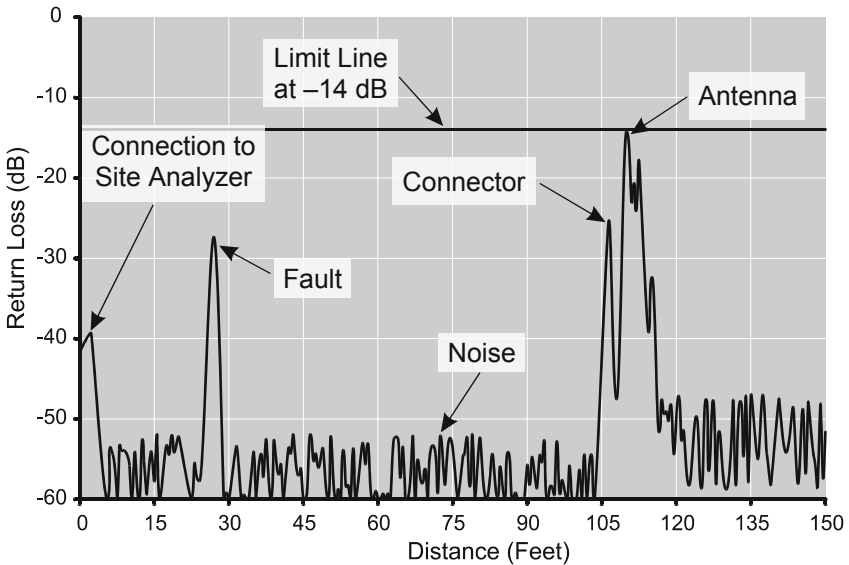
16. Wait 10 seconds for the sweep to update.
17. Go to page 52 and hold the sweep on the screen.
18. Go to page 46 and turn marker 1 on. Set the marker type to Triangle. Move it to find the Return Loss and distance of all the peaks.

### **Saving The Measurement**

19. Go to page 55 to save and label the trace.

## Interpreting the Measurement

The graph below shows a typical Fault Location measurement for an antenna system. The table lists typical component return losses.




**Typical Component Return Loss**

Antenna	-14 dB
Connectors	-25 dB
Jumpers	-35 dB
Lightning Protector	-25 dB
Transmission Lines	-30 dB

1. Each connector or jumper will show up as a spike. If it is larger than the typical value, check the connector for damage.
2. Spikes where there are no components represent faults. Note the distance and check the line at that point for damage.
3. The largest spike is usually due to the antenna. The trace after the antenna can be ignored.

## Cable Loss Measurement



 **NOTE:** If you get lost or the unit is not responding correctly, press **ESCAPE** three or four times to get back to the main screen and continue from there. If this does not solve the problem, turn the unit off, wait five seconds, and then turn it back on.

### Before Connecting The Bird Site Analyzer

#### CAUTION

+22 dBm max. input

Do not apply RF power to Antenna Test Port. Exceeding the maximum input will damage the Site Analyzer.

1. Use a service monitor, power meter, or spectrum analyzer to check that the cable being tested does not have power greater than +22 dBm.
  2. Make sure that you have the correct adaptors and connectors, and a Bird Cal Combo. Make sure you know the frequency band of the system.
  3. Press **ON/OFF** for ½ second to turn the Bird Site Analyzer on.
  4. Go to page 11 and select Measure Match Mode.
  5. Go to page 12 and set the frequency to well beyond the normal range of the antenna.
-  **FOR EXAMPLE:** Sweep a cable for a 450 MHz antenna from 400 to 500 MHz. Sweep an 800 MHz cable from 700 to 1,100 MHz.
6. Go to page 15 and select Cable Loss units. Set the Minimum to -60 dB. Set the Maximum to 0 dB.
  7. Connect the Phase Stable Cable to the Site Analyzer's Antenna Test Port.
  8. Go to page 9 and calibrate the Bird Site Analyzer with the Cal Combo.
-  **NOTE:** After calibration, with the Load still connected, the output must be below -25 dB or there is a problem.
9. Remove the Cal Combo from the Phase Stable Cable. Keep the Phase Stable Cable connected to the Site Analyzer.

### **Test Setup**

10. Connect the Phase Stable Cable to one end of the cable being tested. Connect the Cal Combo Short to the other end of the cable being tested.

### **Making The Measurement**

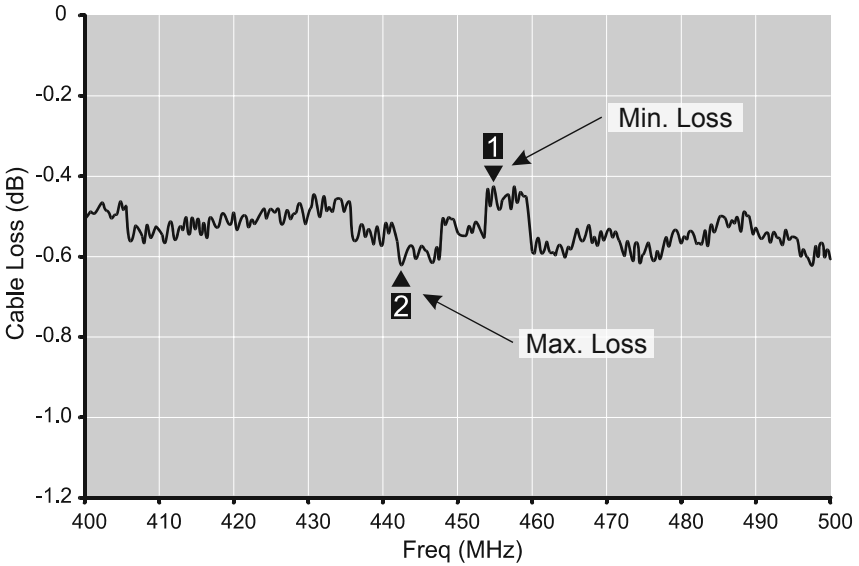
11. Wait 10 seconds for the sweep to update.
12. Go to page 27 and hold the sweep on the screen.
13. Go to page 22 and turn marker 1 on. Place it at the minimum loss within the frequency band. Turn marker 2 on. Place it at the maximum loss within the band. Set both marker types to Triangle.

### **Saving The Measurement**

14. Go to page 55 to save and label the trace.

## Interpreting the Measurement

The graph below shows a typical cable loss measurement. Note that the scale is greatly reduced to show the cable's variation across frequency.



1. Take the average of M1 and M2. This is the average cable loss across the frequency band.
2. Compare the loss with the manufacturer's specified loss for a cable of this length. If they do not correspond, retake the measurement, then check the cable for problems.
3. The Cable Loss for a good cable should be flat across the frequency band.

## Limited Warranty

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of two (2) years, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect.

The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. Routine (regularly required) calibration is not covered under this limited warranty. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.