

Getting Started

with your 8718

This Getting Started Guide is a duplication made as a reference and convenience to our customers who have misplaced the original (printed in 1996) that came with their 8718 RF Radiation Survey Meter.

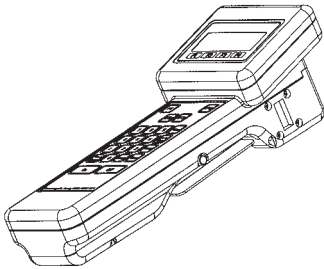
Narda's logo and contact information has been updated to enable you to contact us as needed.



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1 *Introduction*



About the Model 8718

Your Model 8718 is a hand-held, battery-powered meter designed to simplify the measurement of electromagnetic fields. It can be used with any Narda 8700 Series probe.

The meter enables you to perform both simple measurements and more demanding ones that require averaging and/or data logging. It can be mounted on a tripod and used with optional fiber optic links for enhanced accuracy in certain applications.

This manual will help you as you begin using your Model 8718.

Equipment Supplied

Your Model 8718 is supplied with:

- Meter
- Battery Charger/Power Supply
- Power Cord (220 volt chargers only)
- Storage Case
- Interface Software
- Operation and Maintenance Manual
- Getting Started Book

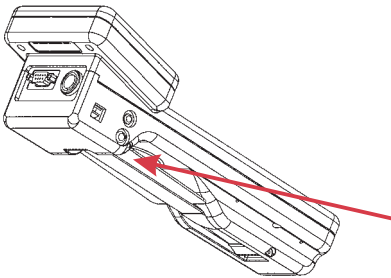
2 *Understanding Your Model 8718*

General Description

It is important to be familiar with the Model 8718 before you use it. This section includes descriptive data keyed to highlighted illustrations to help you locate the various features of the meter. The descriptions not only identify the features but tell you how they are used.

Battery Charger and Power Cord

The battery charger and power cord are used to recharge the battery within the Model 8718.

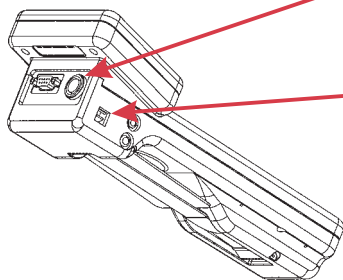


To recharge the meter, first connect the cable of the battery charger to the larger jack on the left side of the meter. Make sure the plug is fully inserted into the jack (there are two "stops"). Connect the power cord to the wall outlet.

The battery will be fully charged in about 8 hours. A full charge will give you about 40 hours of operation (approximately 8 hours if back lighting is used).

The charger can also be used to power the Model 8718 when it is to be operated for periods beyond the capacity of the battery.

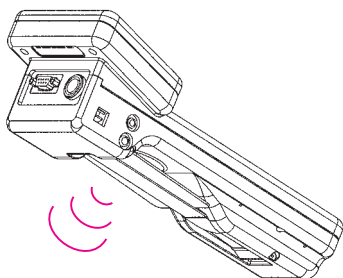
Probe Connection



To make measurements, use your Model 8718 with a probe. Connect the cable of the probe to the probe connector located at the top of the unit.

If you use a fiber optic link, the probe connects to a fiber optic transmitter. A fiber optic cable connects the transmitter to the rectangular fiber optic jack on the left side of the meter.

Audio Alarm



Your Model 8718 is equipped with an audible alarm that emits sound through a tiny hole on the bottom of the meter. The alarm sounds whenever the field strength exceeds the measurement range of the probe (over ranges).

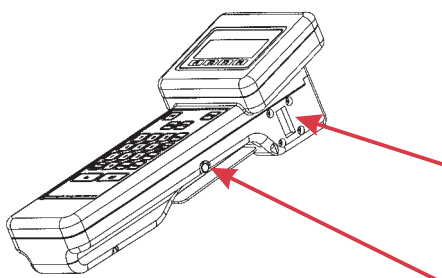
You can also set the meter to sound its alarm at a specific level and/or turn on a variable-tone mode.

Probe Test Sources

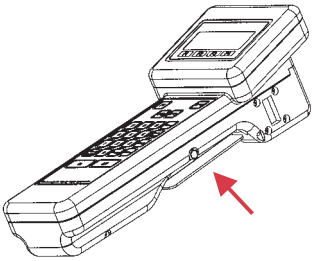
Your Model 8718 is equipped with two RF sources for testing your probes. The **Test Source** key will turn these sources on. They will stay on for approximately 20 seconds.

A microwave (waveguide) window on the right side of the probe is used for testing high frequency probes.

A contact on the right side of the meter is used for testing low frequency probes. These probes have three test points on the head of the probe.



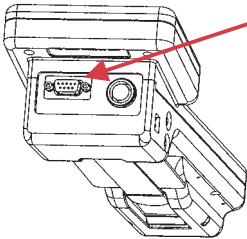
Strap and Tripod Mount



A strap is provided on the underside of the Model 8718. It has a hook and loop closure to permit easy adjustment, around your hand.

Behind the strap is a threaded connector used to secure the meter to a tripod. Loosen the strap to access this connector.

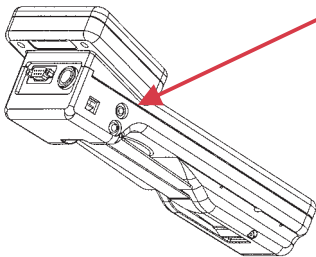
Operation With a Computer



To update probe calibration information or retrieve stored measurements, you must connect your Model 8718 to a personal computer and use the Interface Software provided by Narda.

Refer to the Operation and Maintenance Manual for detailed information regarding computer operations.

Operation With a Recorder



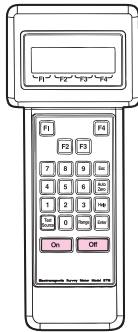
To obtain a continuous record of measurement over an extended period of time, you can connect a data recorder to the smaller jack located on the left side of the meter.

Keyboard

The Model 8718 has four groups of keys distinguished by their color.

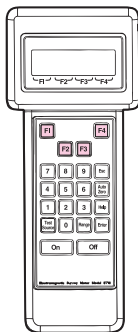
Function keys	(green)
Numeric keys	(yellow)
Special Function keys	(white)
Power keys	(blue, green)

Power Keys



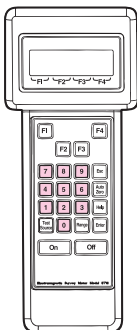
Two power keys are used to turn the Model 8718 **On** and **Off**.

Function Keys



Use the four function keys (**F1-F4**) to select the options displayed on the bottom line of the display screen directly above the F1, F2, F3, and F4 markings. In a few cases the options will be spelled out on the display.

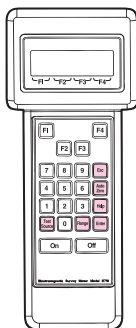
Numeric Keypad



Use the numeric keypad to enter number data into the Model 8718. You also use the numeric keypad to select an option listed on the display screen.

Special Function Keys

Six special function keys enable you to perform specific functions.



- Esc** Returns you to the previous menu. In a few cases you must enter a selection rather than use the **Esc** key.
- Auto Zero** Enables you to automatically zero the meter and probe.
- Help** Displays a help screen that explains your options.
- Test Source** Turns on the built-in low frequency and high frequency probe test sources for approximately 20 seconds.
- Range** Locks in a specific measurement range for the bar graph. The *digital display is not affected*. The meter automatically displays a digital value over the probe's entire measurement range. See *Bar Graph Ranges* on page 21.
- Enter** Stores data you entered with the numeric keypad. Confirms an option you selected from a menu screen.

3 *Getting Ready*

Introduction

This section will help you get ready to take measurements with your Model 8718. Information is included for selecting a probe, connecting the probe to your Model 8718, and connecting the optional fiber optic link.

Probe Selection

If you have more than one Series 8700 probe, select the probe best suited for your task. Factors that you should consider:

FREQUENCY RANGE

The probe frequency range should include the frequencies of all the emitters to be surveyed at one time.

POWER DENSITY or FIELD STRENGTH

The measurement range of the probe should be adequate for the field levels that you anticipate (i.e., do you expect strong fields or weak fields?).

ELECTRIC FIELD or MAGNETIC FIELD

Most standards recommend that you measure both electric (E) and magnetic (H) fields below 300 MHz.

FLAT RESPONSE or SHAPED FREQUENCY RESPONSE

Flat response probes are the most common. Narda's patented shaped probes read out in **Percent of Standard** and are particularly useful in complex, multi-signal environments where the exposure limits are different for the various emitter frequencies.

Connecting a Probe

Connect the cable of your probe to the probe connector at the top of your Model 8718. Make certain that the retaining ring of the connector is securely fastened.

Using a Fiber Optic Link (optional)

A fiber optic link is useful when remote or low frequency (<30 MHz) readings are to be made with your Model 8718.

To use the fiber optic link...

1. Connect the probe to the fiber optic transmitter and make certain that the connector retaining ring is securely fastened.
2. Connect one end of the fiber optic cable to the fiber optic transmitter and the other end to the rectangular fiber optic jack on the left side of the meter.
3. Turn the meter **ON** and press **F4** to access the menu system. Press **8 (NEXT)** to get to the second menu screen. Select **CABLE/FO** (press 1).
4. If the screen shows that the fiber optic receiver is turned on, you are ready to proceed. If the screen shows that the fiber optic receiver is turned off, press **F1 (ON)**.
5. Press **Esc** twice to return to the opening menu screen.
6. Press **F1** to select a probe and begin the measurement process.

Note

The meter will remain set to use the same input (fiber optic receiver or cable), even if you turn the meter off, until you use the menu system to change the input.

4 *Making a Measurement*

Introduction

This section will help you take measurements with your Model 8718. Information is included for turning the meter on, selecting, zeroing, and testing a probe, plus an explanation of the main measurement screen of the meter. Some general information is also included about measurement surveys, precautions you should observe, and the use of probe correction factors.

Getting Started

Press the **ON** power key. After a few seconds, the display screen will show the meter's calibration date and tell you to **CONNECT PROBE NOW**.

To Make Measurements...

1. Select the probe you want to use and connect it to the meter.
2. Press **F1** and proceed to enter the probe model number

To access the meter's menu system to perform some other function...

1. Press **F4**. The first of three menu screens will appear. See *Section 5, Menu System*, for details on features and operation.

Entering the Probe Model

Narda's 8700 Series system is completely modular — all 8700 meters work with all 8700 probes. ***The single most important thing you must do is "tell" the 8718 meter which probe you are using.***

The Model 8718 has the basic characteristics of every 8700 Series probe stored in its internal memory. All you have to do is select the correct model number and the meter automatically sets the correct scales.

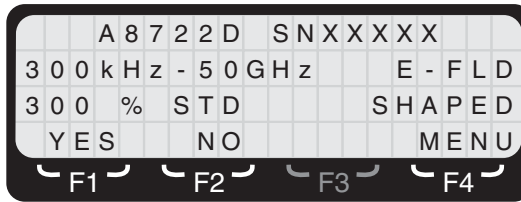
The Model 8718 ***can also store the specific calibration details for up to six probes.*** This includes the probe serial number, calibration date, and the calibration factors marked on the handle of the probe. Probes with this additional detail stored in the meter are referred to as ***probes in memory.***

Putting probes into memory has several advantages:

- It makes it easier to select a probe
- Data that is downloaded after using a data logging mode will include a record of the probe's calibration date and its serial number.
- It makes using frequency correction much easier.

Probes are put into the meter's memory using a personal computer:

- *By Narda* on the day of shipment for all probes shipped at the same time as the meter.
- *By you* at any time when you use the Interface Software supplied by Narda and a personal computer. Refer to *Operation and Maintenance Manual* for detailed information regarding computer operations.



Zeroing the Probe

The probe and meter must be “zeroed” together. It is important that the probe is not exposed to radiated fields during the zeroing process. The storage case is shielded and provides a convenient “zero density” environment.

Note

Position the probe in the case with one test point pointed downward and the other two test points above the foam. This will insure that the test points are not touching the foam.

To zero the probe...

1. Place the probe in the storage case. Be careful not to move the probe while zeroing takes place (on probes with low frequency test points, you can create static which will give inaccurate results).
2. When you are ready, press the **ENTER** key. The screen will say **ZEROING...**
3. After zeroing is completed, the main measurement screen will appear.

If you get a message that the probe could not be zeroed, the most likely causes are:

- *The probe is not connected properly.* Check the connector and retry.
- *The meter is set for a fiber optic input and you are using the standard cable input (or vice versa).* Turn the meter off. Turn the meter back on and press **(F4)** to access the menu system. Press **8 (NEXT)** to get to the *Second Menu Screen*. Select **CABLE/FO** (press 1). Check the **CABLE/FO** setting to make sure the fiber optic receiver input (**FO**) is turned on. If the screen shows that the fiber optic receiver is turned off, press **F1 (ON)** to enable it. Then press **Esc** twice to return to the *Opening Menu Screen*.

- *The field strength is not low enough.* Move away from the antenna and use the storage case to zero the probe.
- *The probe is damaged.* Try another probe.

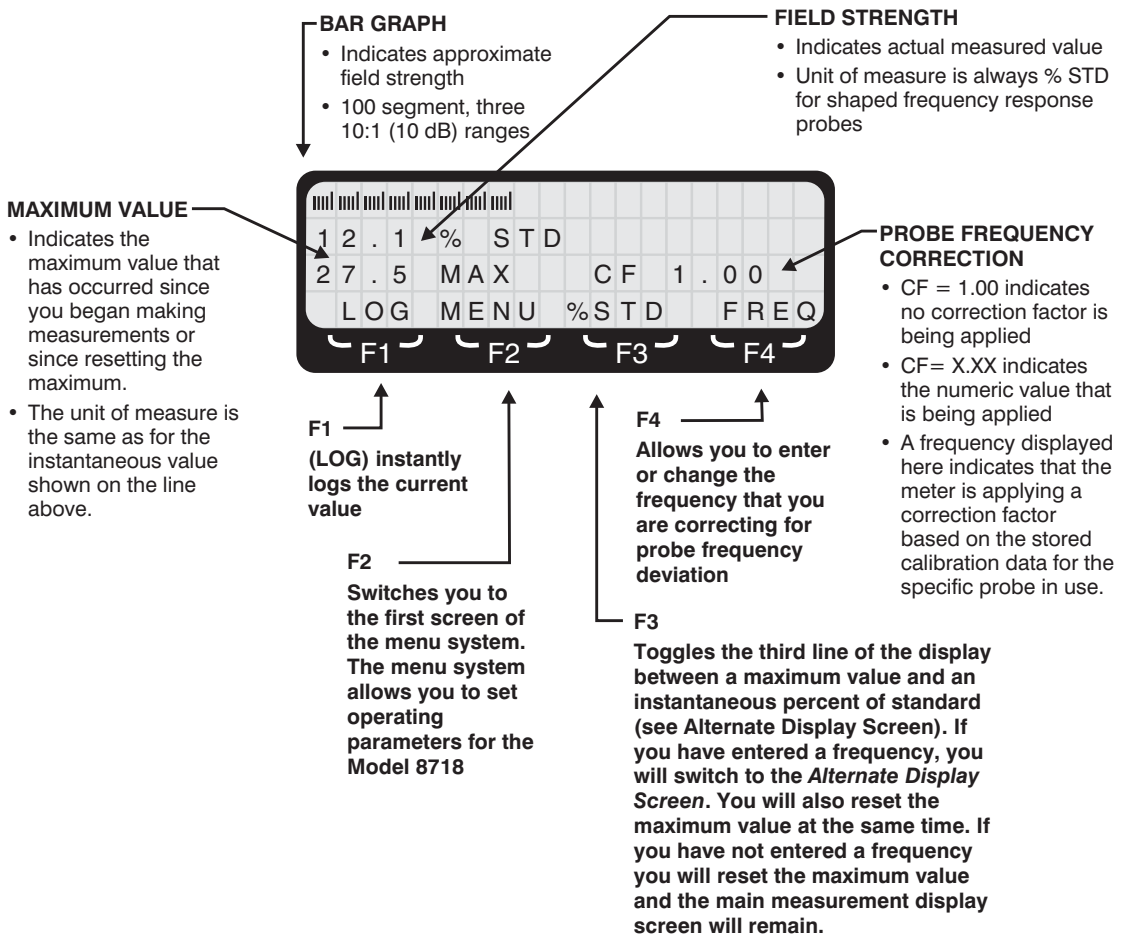
To reconfirm the zero while the instrument is in use...

1. Establish a zero density environment for the probe as before.
2. Press the **Auto Zero** key. This will automatically “touch up” the zero and correct for any drift in about 10 seconds.

Measurement Display Screen

The *Main Measurement Display Screen* shows a maximum value on the third line of the display. The *Alternate Measurement Display Screen* provides frequency-specific, real time information instead of a maximum value.

Main Measurement Display Screen (Shaped Probes)

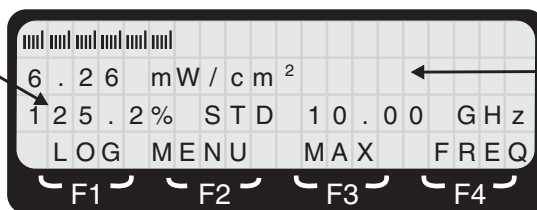


Alternate Display Screen

The *Alternate Display Screen* is very similar to the *Main Measurement Display Screen* with one difference. On the third line an instantaneous indication of the percent of standard is shown instead of displaying a maximum value. This screen should only be used with flat response probes for single frequency measurements or where all the emitter frequencies are close and the standard has the same limits.

CALCULATED PERCENT OF STANDARD

- Displays percent of standard that has been calculated from the field strength reading using the referenced standard and the indicated frequency



FIELD STRENGTH

- Indicates actual measured value
- Unit of measure can be changed by going to the First Menu Screen

To use the Alternate Display Screen...

1. Press **F4 (FREQ)** and then enter the frequency that you are measuring. You must fill all four positions. Use **F1**, **F2**, or **F3** as required to change the units.
2. Press **F4 (SAVE)**. The probe correction factor will be displayed briefly if you are using a probe in memory and you will return to the main measurement screen.
3. Press **F2 (MENU)**, then **8 (NEXT)** to access the second menu screen. Select **STNDS (6)**. Press the appropriate standard that you want to reference. (You must use a function key even if the current setting is correct.) A new screen will appear.
4. Press **F1** to verify or **F4** to make another selection. Press **Esc** twice to go back to the main measurement screen.
5. From the Main Measurement Screen select **%STD** by pressing **F3**. The meter will now automatically display the instantaneous measured value in the chosen units on the second line and at the same time compare that

value to the standard at the frequency shown on line 3. This instantaneous readout of percent of standard is particularly useful where the allowable level must normally be calculated. If you are using a probe in memory or have entered a numeric correction factor, the meter will also be correcting for probe frequency deviation.

6. Note that pressing **F3** also clears the maximum value from the meter's memory.

Bar Graph Ranges

The **Range** key is used to control how the bar graph displays information. The *digital display is not affected* and the meter automatically displays a digital value over the probe's entire measurement range. There are four available settings: **AUTO**, **HIGH**, **MID**, and **LOW**. The bar graph has 100 divisions.

You will probably find it convenient to use the **AUTO** setting most of the time, but under a few conditions you may find one of the three fixed ranges useful. The following table illustrates how the range setting will affect the bar graph. For simplicity, a probe with a full scale rating of 100 mW/cm² is used as an example.

Note

The Range Key only affects how the bar graph displays information.

Range	Measurement Range
--------------	--------------------------

AUTO	As the level increases the bar graph automatically switches between three ranges: 0.01 to 1, 1 to 10, and 10 to 100.
-------------	--

HIGH	1 to 100
-------------	----------

MID	0.1 to 10
------------	-----------

LOW	0.01 to 1
------------	-----------

If you exceed the upper limit of either the **MID** or **LOW** range, the bar graph will be replaced with the message **RANGE OVERLOAD**. The digital display will continue to show the correct value.

Using Audio Alarms

You can set an audio alarm to sound at a specific value. You can also activate a variable tone alarm. Both alarms can help you conduct surveys and can provide a warning of high electromagnetic fields. You can even use both at the same time. Under these conditions, the variable tone alarm will change with the field strength unless the threshold you specified is exceeded. At this point the continuous tone of the fixed alarm takes over.

To use the fixed audio alarm...

1. From either measurement screen, press **F2 (MENU)**, then **7 (AUDIO)**.
2. Set the alarm level by entering a two digit number using the numeric keys. This number is equal to the percentage of full scale rating of the probe that you are using. For example, if you are using a probe rated at 20 mW/cm² and you enter 35, the alarm will sound at 7 mW/cm² (35% of 20).
3. Press **Enter**.
4. Press **F1** to turn the fixed alarm **ON**.
5. Press **Esc** twice to return to the measurement screen

To use the variable alarm...

1. From either measurement screen, press **F2 (MENU)**, then **7 (Audio)**.
2. Press **F3** to turn the variable alarm **ON**.
3. Press **Esc** twice to return to the measurement screen.

The audio alarm will increase its repetition rate in response to the intensity of the field being measured. Note that the variable alarm corresponds to the bar graph. It may be desirable to use the **Range** key to select a fixed range setting (see *Bar Graph Ranges* on page 21).

Testing the Probe

Your Model 8718 is equipped with two RF sources for testing probes. Press **Test Source** and both sources will stay on for approximately 20 seconds.

A contact on the right side of the unit is used for testing low frequency probes. These probes have three test points around the head of the probe. Position the probe so that one of the test points touches the contact on the meter. You should get a deflection on the bar graph but the amount of deflection is not important. Repeat for the other two test points to insure that the probe is working correctly.

A microwave window on the right side of the probe is used for testing high frequency probes. Hold the probe parallel to the right side of the meter and position the probe head against the test window so that one of three arrows on the probe is pointing towards the window. These arrows indicate the location of the three sensors inside the probe. A deflection of any magnitude on the bar graph is acceptable. Repeat for the other two sensors to insure that the probe is working correctly.

Ultra-broadband probes contain both high frequency and low frequency sensors. These probes require six checks – three high frequency and three low frequency.

Using Probe Correction Factors

All probes have a certain amount of *frequency sensitivity*. Frequency sensitivity is the amount of deviation from the correct measured value that a probe yields at various frequencies. Obviously, the smaller the deviation, the better. But since a certain amount of frequency deviation is unavoidable, the more frequencies that you calibrate the probe at, the better. At each calibration frequency, you have a correction factor.

Multiplying the reading on the meter by a correction factor marked on the handle of a Narda 8700 Series probe compensates for the probe's frequency sensitivity. The Model 8718 is unique because it can perform this task automatically.

Correction factors can be used:

- When there is only a single emitter being surveyed.
- When there are multiple emitters all operating at the same frequency (this is often the case with industrial equipment).
- When there are multiple emitters with frequencies that are close to each other and the nearest calibration frequencies have very similar correction factors.

Correction factors should NOT be used:

- When the frequencies of the emitters are diverse. Correction factors may vary considerably and there is no way to determine the distribution of energy from the various emitters. It is more accurate not to use a correction factor under these conditions. See *Measurement Uncertainty* on page 26.

To use a correction factor for a probe in memory...

1. Press **F4 (FREQ)** from the measurement screen. A new screen will appear to allow you to enter a frequency.
2. Enter the frequency for which you want to correct for. Make sure you fill in all four positions. If you make a mistake just enter more digits until correct. For greater accuracy, use the units that allow the larger numbers. For example, enter 10 kHz, not 00.01 MHz.
3. Change the units (if needed) by pressing either **F1 (kHz)**, **F2 (MHz)**, or **F3 (GHz)**.
4. Press **F4 (SAVE)**. The meter will automatically calculate the correction factor for the frequency you have entered from the two closest correction factors that were stored when you put the probe in memory. The calculated numeric value will be displayed briefly before the meter automatically returns to the measurement screen.
5. The frequency that you are correcting for will be displayed on the right side of the third line of the display.

To use a correction factor for a probe NOT in memory...

1. Press **F2 (MENU)**. The *First Menu Screen* will appear.
2. Press **3 (COR FACT)**. A screen will appear that shows the correction factor.
3. Use the correction factors on the handle of the probe to determine the appropriate correction factor and then use the numeric keys on the meter to enter this value. Enter a three digit number, ignoring the decimal point, and rounding to two digits to the right of the decimal point. If you make a mistake, just enter more digits until correct. For example, to enter a correction factor of 1.22, simply enter **1**, **2**, and then **2** while a correction factor of 0.94 is entered as **0**, **9**, and **4**.
5. Press **Enter** to save this correction factor. The meter automatically returns to the measurement screen.
6. The numeric correction factor will be displayed on the right side of the third line of the display in the form **CF X.XX**.

Measurement Uncertainty

The uncertainty of any measurement includes several factors:

- Frequency response or frequency sensitivity is typically ± 1 dB to ± 2 dB (from about $\pm 25\%$ to about $\pm 55\%$). The correct use of correction factors can greatly reduce the amount of uncertainty associated with frequency response.
- Ellipse ratio is ± 0.75 dB or better, depending on the model of the probe. The ellipse ratio is the ratio of readings that occur when one rotates the probe around the axis of its handle. Narda calibrates its probes by rotating the probe about its axis and using the mean value to determine the correction factor. If you rotate the probe around its axis and use the mean value, ellipse ratio can be eliminated as a source of uncertainty.
- Isotropic response is the error that occurs when the probe is pointed in different directions. It includes the ellipse ratio plus some additional uncertainties. Although the probes pick up energy from all directions, they are most accurate when pointed at the source of energy. Generally speaking, the isotropic response is no greater than the ellipse ratio providing that the probe is pointed towards the source.
- Calibration uncertainty represents another 0.5 dB.
- The Model 8718 meter is accurate within $\pm 3\%$.

A good rule of thumb is that the total uncertainty is no greater than ± 3 dB when correction factors are not used, providing that the probe is pointed at the source of energy.

Obtaining a Reading

A reading is obtained by holding your Model 8718 in one hand and your probe in the other. As you approach the source, observe the bar graph and measured value of signal strength on your meter. If you know where the source of energy is, point the probe towards it. If you do not know where the source is located or there are multiple sources, hold the probe above your head pointed up at about 45 degrees above the horizontal. Rotate the probe in a circle to find the direction where the maximum indication is obtained. The bar graph is a useful tool in obtaining the maximum indication.

About Measurement Surveys

When you perform surveys, it is important that you observe a few guidelines to insure accurate readings:

- Make sure you move the probe to obtain a maximum reading.
- Keep the arm holding the probe extended out from your body as far as possible with the probe pointed towards the source of radiation.
- Low frequency measurements (<50 MHz and especially <10 MHz) require special techniques because the human body acts as an antenna and introduces errors. Using the best technique, place the probe next to the meter on a non metallic stand such as a wooden ladder or cardboard box. Stand back and read the meter without touching it.

The human body has far less affect on magnetic fields and therefore these measurement techniques are less critical for magnetic fields than they are for electric fields.

Refer to the operations manual for more complete information on planning, conducting, and documenting measurement surveys.

Precautions

When making measurements of electromagnetic fields, a potential exists to expose yourself to excessive levels. Approach the source of energy slowly and begin making measurements from a distance at which low field levels exist. Be prepared to evacuate the area immediately if RF field levels in excess of the applicable standard are observed.

5

Using the Menu System

Introduction

This section will help you use the Model 8718's menu system. The menu system allows you to enter and store data and to select various options during operation.

The menu system is always available from any measurement mode. It is accessed by pressing the appropriate function key that corresponds to **MENU** on the bottom line of the display screen.

The menu system is comprised of three menu screens where all the basic options are listed. A specific menu item is selected by pressing the appropriate numeric key that corresponds with that menu item. Instructions or sub menus appear when one of the basic menu options is selected. If it isn't clear what to do, press the **Help** key.

First Menu Screen

1=SETUPS	5=PROBE
2=DISPLAY AV	6=UNITS
3=CORR FACT	7=AUDIO
4=BAT TEST	8=NEXT

Key	Menu	Options
1	SETUPS	Up to four sets of measurement situations can be stored and recalled. Setups are similar to macros in other computer programs and can save keystrokes when repeating measurements with the same meter settings.
2	DISPLAY AVG	Select from four options to determine how fast the digital information is updated on the screen.
3	COR FACT	Enter a numeric correction factor.
4	BAT TST	Check battery charge status and estimated use time remaining. Turn the back light <i>on</i> or <i>off</i> using F3 . Adjust display contrast (Press Help for instructions).
5	PROBE	Show the model and serial number of the probe in use. Select the measurement range when using Models 8782 and E8782 probes.
6	UNITS	Select from all appropriate units of measure (i.e., mW/cm ² , V/m, V ² /m ²) for the probe in use. Percent of Standard is the only unit of measure for shaped probes.
7	AUDIO	Turn the audio alarm <i>on</i> or <i>off</i> . Set the alarm threshold in terms of percent of full scale of the probe in use (1% to 99%). Turn the variable tone alarm <i>on</i> or <i>off</i> .
8	NEXT	Go to the <i>Second Menu Screen</i> .

Second Menu Screen

1=CABLE/FO	5=RS232
2=TIME AVG	6=STDS
3=DATA LOG	7=BACK
4=TIME SET	8=NEXT

Key	Menu	Options
1	CABLE/FO	Select between the standard probe cable input and the fiber optic receiver.
2	TIME AVG	Turn fixed time averaging (various duration) <i>on</i> or <i>off</i> . Turn the spatial averaging mode (used for whole body averaging measurements) <i>on</i> or <i>off</i> .
3	DATA LOG	Log with time and date stamp. Log with time and date stamp plus reference number. Continuous logging at various specific rates.
4	TIME SET	Check or set the meter's internal clock (time/date).
5	RS232	Turn the RS232 port <i>on</i> or <i>off</i> . Default is off. Change the baud rate.
6	STNDS	Check or set the standard that is referenced for various measurement options.
7	BACK	Return to the first menu screen.
8	NEXT	Go to the <i>Third Menu Screen</i> .

Third Menu Screen

1=LOCKOUT	3=BACK
2=BLANKOUT	

The three menu items provide these options:

Key	Menu	Options
1	LOCKOUT	Lock the keypad so that settings will not accidentally change. To release, press ENTER and ESC together.
2	BLANKOUT	Blank the display and lock the keypad. To release, press ENTER and ESC together and then select another menu item.
3	BACK	Return to the <i>Second Menu Screen</i> .

Future firmware options will be added to this screen.

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