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Instructions for the **“Tenmars TM-195” RF Test Meter**

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A. Important Note About the Battery!

Always be sure to turn off your test meter after each use, or the battery will run down quickly and need replacement. To install a new battery, slide down the battery cover on the lower back of the meter, and insert a fresh 9 Volt battery.

When the battery is low, a “battery” symbol will appear in the upper right corner of the display, and you should change the battery then. If the battery is completely dead, nothing will happen when the green ON/OFF button is pressed.

B. How to Use the Tenmars TM-195 RF Test Meter...

Most beginners will want to start with the 4 simple steps I recommend below...

(Advanced users, you can read the manufacturer’s instructions and learn how to take average or maximum measurements, use single axis operation, hold and save measurements, and use other special features.)

Step 1: Turn ON the Meter...

To turn the meter ON, simply press the green button, located in the center of the meter. Wait a few seconds for the meter to initialize before taking any measurements.

To turn the meter OFF, simply press the same green button again. (Sometimes the meter will turn itself OFF after a period of time, to help save battery life. If it does this, press the green button to turn the meter ON and start over again.)

Step 2. Press the “UNIT-ENTER” Button 3 Times – You Should See “ $\mu\text{W}/\text{cm}^2$ ”...

You can press the UNIT-ENTER button to choose the particular unit of measure you wish to use. In the United States radio frequency (RF) fields are usually measured

in units called “microwatts per centimeter squared”, which is abbreviated “ $\mu\text{W}/\text{cm}^2$ ”. Simply press the UNIT-ENTER button repeatedly until you see “ $\mu\text{W}/\text{cm}^2$ ” (or mW/cm^2) below the measurement number on the display.

Note I: The funny looking “u” is actually the Greek letter “ μ ”, which is pronounced “mew” and stands for “micro” which means “one millionth”.

Note II: When you first turn on the meter, you will usually see “ mV/m ” (or V/m) which is the RF measurement expressed in units of RF electric fields. If you press the UNIT-ENTER button, it will change to “ $\mu\text{A}/\text{m}$ ” (or mA/m) which is the equivalent measurement but expressed in units of RF magnetic fields. Push the UNIT-ENTER button again and you will see “ $\mu\text{W}/\text{m}^2$ ” (or mW/m^2) which is the exact same RF measurement but now expressed in power density as commonly done in Europe. And finally, press the UNIT-ENTER button one more time and you will see “ $\mu\text{W}/\text{cm}^2$ ” (or mW/cm^2) which is the measurement expressed in power density as used in the United States.

Step 3. Beginners, Do Not Press Any Other Buttons!

Note III: Every time you turn on the meter, it will begin in what is called “instantaneous” or “peak” measurement mode. This is the best choice for most beginners. In this mode the words “MAX”, “AVG” and “MAX AVG” do not appear at the top of the display. (These are more advanced features. If any of these words appear at the top of the display, simply turn the meter off, and start over again.)

Note IV: Whenever you turn the meter on, you will also see the three letters, “XYZ” shown at the lower left of the display. This is the “triple-axis mode” in which you can measure the “total” RF field strength from all directions combined. This is the best choice for beginners. (If for any reason you see only an “X”, “Y” or “Z” there, the meter is in single-axis mode. Press the XYZ button until you see “XYZ” displayed again.

Step 4: Take a Measurement...

Hold the test meter in one hand, with your arm extended to keep the test meter as far away from your body as possible. Hold still for a few seconds, and read the number on the display. On a sheet of paper, note the time and location, and write down the number you see on the display. Pay careful attention to the decimal point!

Also notice carefully the type of “units” that are displayed above the number. If you see the symbol “ $\mu\text{W}/\text{cm}^2$ ” then your measurement is in units called “microwatts per centimeter squared. If the symbol is “ mW/cm^2 ” then the measurement is in “milliwatts per centimeter squared”. (Note: it takes 1,000 $\mu\text{W}/\text{cm}^2$ to equal 1 mW/cm^2 !)

C. Some Testing Advice...

Always hold the meter still for a few seconds before you read the value from the display. (When you move the meter, static electric charges and the earth’s field will sometimes be detected and give a false reading.)

The sensor antenna is located in the top round part of the meter. To measure a specific source, point the top round end of the test meter toward the source, and make sure that your body is not located between the source and the test meter.

Because the RF levels can vary dramatically in the same room, depending on reflections and absorptions from various building materials, furniture and sources, take multiple measurements in various locations for each room. Often, the highest levels from outside sources will enter through the windows.

D. And For More Accuracy...

Because the human body can easily interact with the various radio frequencies (RF) and microwave fields, your own skin can absorb, reflect or even amplify the RF fields, thus affecting the measurement accuracy of your test meter! For better accuracy, place the RF test meter directly on a bed, table or large cardboard box, and then step away to take the reading. You can also tape the test meter onto the end of a short wooden or plastic stick to keep your body farther away from the test meter.

E. Using the “MAX AVG” Button...

When you press the MAX AVG button, you will first see the word “MAX” appear at the top of the display. In this mode, the display will show (and keep showing) the highest reading that is measured. To determine highest RF level in an entire room, set the meter to “MAX” and then slowly sweep through the room while gradually pointing the meter in all possible directions. The display will show the maximum level detected during the sweep.

To begin a new sweep, press the MAX AVG button several times until you get back to the “MAX” mode again. To return to the original “peak” or “instantaneous” mode for normal testing, you must turn the meter off and start over again. (The AVG and MAX AVG modes are for advanced users and not recommended for beginners.)

F. What Types of RF Are Being Detected?

The Tenmars TM-195 RF Field Strength Meter measures radio frequency (RF) radiation (including microwaves) from the frequencies of 50 MHz up to 3.5 GHz. This includes the RF frequencies from most cell towers, cell phones, cordless phones, Wi-Fi, wireless computer hardware and routers, microwave ovens, FM radio and digital TV broadcasting. This meter is particularly helpful for detecting the short, instantaneous peak levels from digital microwave signals, as well as common analog signals.

Please note that the frequency range of this test meter does not include detection of frequencies below 50 MHz (such as AM radio broadcasts) or above 3.5 GHz (such as the 5.8 GHz frequency of some cordless phones and wireless systems). A special RF test meter with a greater frequency range – such as the *TES 593 Electrosmog Meter* – would be needed for this.

G. Why Measure the RF Electromagnetic Fields?

In our modern world, human exposure to RF/microwave energy is increasing at a rapid pace. While there is still great controversy, a growing number of scientific research studies are reporting that radio frequency (RF) fields may be linked to important biological changes and various adverse health effects.

Typical sources of RF exposure are from the personal use of cell phones, cordless phones, microwave ovens, Wi-Fi, wireless routers and other devices, as well as exposures from cell towers, radio and TV broadcast towers, Smart Meters, and the growing number of wireless devices and systems in our modern world.

H. What Level is Safe?

There is still a great on-going debate about the potential health effects related to radio frequency (RF) fields and the recommended safety limits for human exposure. Please refer to the proper health authorities and research literature to decide for yourself what RF level to consider safe.

International researchers have reported important biological effects at relatively low RF exposure levels – levels well below the current FCC standards for human safety in the United States. For further information on these potential low-level (non-thermal) health effects, go to the BioInitiative Report (www.bioinitiative.org).

The official FCC limits for RF exposures vary with frequency, and are mostly set to protect humans from significant heating (thermal) effects – as in the cooking of food in a microwave oven. For the 860 MHz frequency used by many cell towers and cell phones, the FCC exposure limit for the public is $573 \mu\text{W}/\text{cm}^2$ (microwatt per centimeter squared). For RF frequencies of 2.0 GHz and more, the FCC limit is $1,000 \mu\text{W}/\text{cm}^2$.

In contrast, the safety limit recommended by independent EMF researchers in the 2007 BioInitiative Report (www.bioinitiative.org) is set to address concerns about the “non-thermal” biological effects that are increasingly being reported in the international research literature. The BioInitiative recommendation is for a maximum exposure level of $0.1 \mu\text{W}/\text{cm}^2$. In my professional work, many of my clients choose to use $0.1 \mu\text{W}/\text{cm}^2$ as a much more cautious safety limit for their RF exposure.

Anecdotally, even exposures of only $0.1 \mu\text{W}/\text{cm}^2$ are still troublesome for most individuals with sensitivity to electromagnetic fields. Thus for persons with symptoms and sensitivity related to electromagnetic fields, as well as for persons with any serious health issues such as cancer, Lyme disease, chronic fatigue and chemical sensitivity, we usually try to reduce all RF exposures down to $0.001 \mu\text{W}/\text{cm}^2$ or less.

The RF levels inside modern homes and buildings can vary greatly – from less than $0.001 \mu\text{W}/\text{cm}^2$ to more than $1.0 \mu\text{W}/\text{cm}^2$. In my own professional experience, indoor levels between 0.001 and $0.1 \mu\text{W}/\text{cm}^2$ are common – except within 10 feet of cordless phone bases, wireless routers, cell phones, microwave ovens and other wireless hardware where the exposure levels are even greater.

Many individuals have reported sensitivity and symptoms to RF (especially the digital microwaves from sources such as Wi-Fi and wireless routers) at exposure levels well below $0.001 \mu\text{W}/\text{cm}^2$. Thus it may be prudent for sensitive individuals to remove all possible sources of RF in the home and office, and/or add special shielding to windows, walls and ceilings, as needed to reduce exposures even further.

I. How to Reduce the RF Fields...

In many homes and offices, certain locations will have higher RF levels, while other areas will be lower. Using your test meter, you can arrange your environment to avoid the highest RF fields. For example, you can place beds, couches and chairs in the lowest RF areas, and perhaps use the highest RF areas for storage.

You can often determine what is causing the RF fields, because the strongest sources are often very close – the devices you use in your own home such as cell phones, cordless telephones, Wi-Fi and wireless computer hardware. The best way to reduce these exposures is to completely eliminate the wireless equipment, unplug it, or turn it off (especially at night).

Whenever possible, use corded (land line) telephones and hard-wired computer cables (e.g., Ethernet cables, avoid all wireless). Try to avoid any products that have wireless capabilities, because in many cases even if the software is turned off, the wireless hardware will emit RF all the time.

One of the most important things to check regularly is whether the wireless of your computer system is indeed turned off and not emitting RF. Also test all cordless phones and bases because many will emit RF even when not being used. In the long term, an important way to reduce your RF exposure would be to use your test meter to pretest potential new homes or apartments before you buy or rent them.

Special RF shielding materials can be installed to help reduce the RF fields further, but placement, geometry and grounding of the shielding material can be critical for effectiveness. Remember that most RF shield materials act like “mirrors” and reflect the RF fields away from you, so they can also reflect the RF back to you. For further technical assistance with your RF shielding needs, please call my office to schedule a telephone consultation or on-site shielding appointment.

J. Need Professional Assistance?

My telephone consultation fee is \$120 per hour, prorated for the actual time used, with a \$20 minimum. In northern California, I also provide on-site testing and shielding services, as well as the design and installation of special EMF-Free electrical wiring and other consulting services. If you need further assistance, please contact my office at 1-800-638-3781 to set an appointment.

Thank you