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## **Instructions for the “TES 593” RF Meter**

### ***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, remove the battery door on the lower back of the meter, and insert a fresh 9 Volt battery.

When the battery needs to be changed, a “battery” symbol will appear in the upper right corner of the display. Also, if the display becomes too dim to read, change the battery. If the battery is completely dead, nothing will happen when the green ON/OFF button is pressed.

### ***Step 1: Turn ON Your Meter...***

To turn your meter ON, simply press the green “ON/OFF” button (the upper left button on the front). Wait about 15 seconds for the meter to initialize before taking any measurements. To turn the meter OFF, press the green button again.

To conserve battery power, the meter will turn itself OFF after a period of time. Simply press the green button again to turn the meter back ON, and wait 15 seconds for the meter to initialize.

### ***Step 2: Set Up Your Meter...***

Most beginners will want to start with the settings I recommend below. (*Advanced Users: You can read the manufacturer’s instructions and set up the meter to take average or maximum measurements, use single axis operation, change the units of measurement, hold and save measurements, or use other special features.*)

**MAX AVG Button:** When you press the MAX AVG button repeatedly, you will see the words “MAX”, then “AVG”, and then “MAX AVG”, appear at the top of the display. After “MAX AVG”, there will be no words displayed, and then “MAX”, “AVG” and “MAX AVG” will repeat again. When no words are shown, this is the “instantaneous” or “peak” measurement mode we recommend for normal testing. This “instantaneous” mode will give you the best detection of the instantaneous (peak) values of the digital and analog

RF fields. In other words, simply press the *MAX AVG* button until you see none of these words at the top. *The TES 593 will usually begin in the “instantaneous” mode when you first turn the meter ON, but check to be sure.*

**XYZ CAL Button:** Press the *XYZ CAL* button repeatedly until the letters “X”, “Y” and “Z” all appear together on the left side of the display. In this setting, the RF meter will measure and compute the total RF field in all three directions. *The TES 593 will usually begin in the triple-axis “XYZ” mode when you first turn the meter ON, but check to make sure.*

**UNIT Button:** Press the *UNIT* button repeatedly until you see “ $\mu\text{W}/\text{cm}^2$ ” (or “ $\text{mW}/\text{cm}^2$ ”) above the measurement number on the display. Note that “ $\mu$ ” is a scientific symbol which stands for “micro” or millionth. Thus “ $\mu\text{W}/\text{cm}^2$ ” stands for “microwatts per centimeter squared” – the most common unit of RF measurement in the United States. *Note: When you first turn the meter ON, you will usually see “ $\text{mV}/\text{m}$ ” (or “ $\text{V}/\text{m}$ ”) in the display, which gives the measurement in units of electric fields. Press the *UNIT* button and you will then see “ $\mu\text{A}/\text{m}$ ” (or “ $\text{mA}/\text{m}$ ”) which is the measurement in units of magnetic fields. Press the *UNIT* button again and you will next see “ $\mu\text{W}/\text{m}^2$ ” (or “ $\text{mW}/\text{m}^2$ ” or “ $\text{W}/\text{m}^2$ ”), which gives the measurement in power density as used in Europe. Press the *UNIT* button again to see “ $\mu\text{W}/\text{cm}^2$ ” (or “ $\text{mW}/\text{cm}^2$ ”) as used in the United States.*

### **Step 3: Take a Measurement...**

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

Also, carefully note the “units” that are displayed above the measurement number. If you see the symbol “ $\mu\text{W}/\text{cm}^2$ ” then your measurement is in “microwatts per centimeter squared”. If the symbol is “ $\text{mW}/\text{cm}^2$ ” then the measurement is in “milliwatts per centimeter squared”. (Note: One  $\text{mW}/\text{cm}^2$  equals 1,000  $\mu\text{W}/\text{cm}^2$ .) (If you see “ $\mu\text{W}/\text{m}^2$ ” then the measurement is in European units of “microwatts per meter squared”. Press the *UNIT* button to show the US units.)

### **Some Testing Advice...**

Always hold the meter still for a few seconds before you read the value from the display. If you move the meter while testing, the earth’s field may be detected, giving a falsely high 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. Make sure that your body is not positioned between the RF source and the test meter, because your body can act as a shield, giving a falsely low reading.

Take measurements in several locations within each room, because the RF levels can vary greatly depending upon exact location, and how the building itself might shield, reflect or even concentrate the RF fields. For example, there is often more RF

near windows, while the walls may provide some shielding from outside sources. Also, the position of your body can influence the measurements.

### ***For Even More Accuracy...***

Because the human body interacts with many of the RF and microwave frequencies, your body can sometimes reflect, absorb or even amplify the RF fields, and affect the accuracy of the measurement! For greatest accuracy, try positioning the RF test meter on a cardboard box, table or counter top, and then step away a few feet to take the reading.

### ***What Types of RF Are Being Detected?***

This meter measures radio frequency (RF) radiation, including microwaves, from frequencies as low as 10 MHz up to 8 GHz. This includes FM and TV broadcast towers, all cell towers and cell phones, all cordless phones, microwave ovens, Wi-Fi and other wireless systems.

The TES 593 RF Meter is particularly helpful for measuring the instantaneous (peak) levels of digital microwave signals, like those from Wi-Fi and cell phones, as well as common analog signals.

Please note that the frequency range of this test meter does not include frequencies below 10 MHz such as AM radio broadcasting and some ham radio frequencies. A special meter with greater frequency range would be needed for these, such as the Alpha RF Meter.

### ***Why Measure the RF Electromagnetic Fields?***

In our modern world, exposure to RF/microwave energy is increasing. The strongest exposures are usually from personal use of cell phones, cordless phones, Wi-Fi, and wireless computer devices. Significant long-term exposures can also be caused by cellular antennas, TV and radio towers, microwave ovens, community wireless networks, "smart grid" meters for electric service panels, and other sources.

While there is still great controversy about the potential health effects, some scientific studies show that RF fields may indeed be linked to biological changes and adverse health effects, including cancer. For a detailed summary of the potential health effects from RF exposures, go to the BioInitiative Report ([www.bioinitiative.org](http://www.bioinitiative.org)).

### ***What RF Level is Safe?***

There is still great debate about the possible health effects from RF/microwave fields, and the recommended safety limits. Some researchers report important biological effects at low-level exposures, well below the current FCC guidelines for the

general public in the United States. For further information on these potential low-level (non-thermal) health effects, go to the BioInitiative Report ([www.bioinitiative.org](http://www.bioinitiative.org)).

The FCC safety limits for RF vary with frequency, and are usually in the range of hundreds of  $\mu\text{W}/\text{cm}^2$  (microwatt per centimeter squared). At the 860 MHz frequency used by many cell phones, the FCC exposure limit for the general public is  $573 \mu\text{W}/\text{cm}^2$ . For RF frequencies at 2.0 GHz or more, the FCC limit is set at  $1000 \mu\text{W}/\text{cm}^2$ .

The average RF levels measured inside homes and buildings can vary greatly – from less than  $0.00001 \mu\text{W}/\text{cm}^2$  to more than  $1.0 \mu\text{W}/\text{cm}^2$ . In my own professional experience, indoor levels between  $0.001$  and  $0.01 \mu\text{W}/\text{cm}^2$  are the most common (except within 10 feet of operating cell phones, cordless phone bases, Wi-Fi, and other wireless hardware). Office levels are often a little bit higher than in residential areas.

In my professional work with clients, we often use  $0.1 \mu\text{W}/\text{cm}^2$  as the suggested long-term safety level for RF exposures. This is the safety limit suggested by researchers in the independent 2007 BioInitiative Report ([www.bioinitiative.org](http://www.bioinitiative.org)). When there are serious health problems such as cancer, Lyme disease, chronic fatigue or auto-immune disorders, we often try to reduce long-term exposures to  $0.01 \mu\text{W}/\text{cm}^2$  or less.

Anecdotally, many individuals have reported hypersensitivity and other health symptoms from RF exposures at levels of only  $0.001 \mu\text{W}/\text{cm}^2$  and even less (especially from the digital microwaves emitted from Wi-Fi systems, cell towers, cell phones, Smart Meters, etc.). Thus, it might be prudent to consider a safety level of only  $0.001 \mu\text{W}/\text{cm}^2$ , or even less. Please refer to the proper health authorities and research literature to decide for yourself what RF level to consider safe.

### ***How to Reduce the RF Fields...***

In many homes and offices, certain locations will have higher RF levels, while other areas may be much 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 exactly what is causing the highest 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 eliminate the hardware, unplug it, or turn it off (especially at night). Whenever possible, use corded (land line) phones and hard-wired computer cables (avoid all wireless). Try to avoid any products that have wireless capabilities, because sometimes, even if the software is turned off, the wireless hardware still emits RF all the time.

In the long term, an important way to reduce your RF exposure would be to use your RF Test Meter to pretest potential new homes or apartments before you decide to buy or rent them. Also test cordless phones to see if they are emitting RF, even when not in use.

Special shielding materials can be used to reduce the RF fields, and shielding can be very effective in some cases. But placement is critical for effectiveness. And since most RF shields act like “mirrors” by reflecting the RF fields away from you, they can also reflect RF sources back towards you. For technical assistance with shielding, please call us for a professional telephone or on-site consultation.

### ***Need Professional Assistance?***

The telephone consultation fee with Michael Neuert is \$120 per hour, prorated for the actual time used. The minimum fee is \$20 for 10 minutes.

In northern California, Michael provides professional on-site testing services, EMF repairs, shielding services, design of shielded EMF-Free electrical wiring, and other consulting services.

If you need further assistance, please contact our office to make an appointment, at 1-800-638-3781.