INTRODUCTION

Your MFJ-805 is a sensitive handheld device that tracks down elusive spectrum noises caused by microprocessors, high-speed switching, electro-mechanical devices, automotive ignition systems, and many other RF noise generators. You save time and money by isolating radiation sources quickly and installing suppression on only those lines and cables that need it. In addition to eliminating RFI affecting radio receivers, your MFJ-805 can help you to protect sensitive consumer-electronics from disrupted operation caused by powerful transmitter signals by tracking down the cables that pick up the signal. And, if you're a RF experimenter, you may use your MFJ-805 to profile current distribution on antennas, radials, and feedlines using only a low-level RF source.

Important Note: The MFJ-805 RFI Detector is a highly-sensitive amplified electronic device that may be damaged when used improperly in a high-level RF environment. Please read this manual carefully before attempting to use your unit!

RFI--THE *REAL* CAUSE

In Radio Receivers: The spurious signals and noise that make up "RFI" may originate from many sources. However, to radiate and disrupt communications, all sources need a wire or cable to act as an antenna. Not all cabling associated with potential RFI generators radiate signals. Energy transferred over properly-treated cable-pairs or coaxial lines may radiate little or no energy at all. Radiation can only take place when electrical signals appear as *common-mode currents* on lines and cables. That's because common-mode current induces electromagnetic radiation (also called EMR or radio waves). EMR carries may carry unwanted signals over significant distances to radio antennas in the surrounding area.

In Consumer Electronic Devices: The same process occurs in reverse when a powerful transmitter interferes with a RFI-prone consumer product. Wires and cables associated with that device may act like an antenna, picking up EMR and transforming it into electrical current. This, in turn, can invade sensitive electrical circuits and disrupts normal operation. However, without a *common-mode wire to serve as an antenna*, powerful EMR from nearby transmitters can't be transferred into to consumer devices at disruptive levels.

The Cure: If EMR causes RFI, the key to eliminating it is to pinpoint lines that carry elevated levels of common-mode current and to install suppression on them. Readily available suppression devices such as ferrite chokes and RFI line filters diminish a line's ability to act as an antenna. This, in turn, destroys its ability to transmit or receive unwanted EMR.

HOW YOUR MFJ-805 WORKS

The MFJ-805 is a highly-sensitive RF-current meter that picks up low-level common-mode energy over a wide frequency range. This energy is detected, boosted in strength by a high-gain dc amplifier IC, and applied to a sensitive meter movement. The MFJ-805 responds to common-mode current at or *below* levels likely to cause a RFI problem. Consequently, if you have an interference problem, your MFJ-805 can detect it easily!

1. **Eliminating Computer Hash and RFI in Communication Receivers:** With today's explosion of electronic consumer products, communication radios are frequently plagued by hash, birdies, and transient noises. Your MFJ-805 tells you which specific interconnecting cables in the area are "hot" with RF. You treat only the offending lines, and ignore the rest. Your RFI Detector also works in mobile installations for ferreting out alternator hash, ignition pulses, and microprocessor noise on feedlines and power leads. There's no faster or better way to isolate and block RF interference!

2. **Eliminating RFI in Consumer Devices:** The MFJ-805 also isolates cables picking up high levels of RF energy from local transmitters, and indicates when you've suppressed the problem. In most cases, *you can substitute a signal generator for the offending transmitter* to run your tests. Your meter can detect signals picked up by cables and wiring--even if they're attenuated 50 dB below the source! This lets you resolve many problems at very low power, avoiding on-air interference and exposing yourself to high EMR levels.

Important Note: For a low-level RF source, we recommend driving the transmitter antenna with a 50-ohm signal generator set for +10 dBm output, or connecting a MFJ-259 Antenna Analyzer to the antenna. The signal source should be set for the transmitter's usual operating frequency.

3. **Using Your MFJ-805 Research and Testing:** The MFJ-805 also works in conjunction with low-power RF generators to plot current distribution on antennas, networks, ground systems, and control lines. With a low-level RF source applied, you may work legally and safely inside or outside of your licensed frequency allocations (note that the detector coil may interact with elements under test, altering antenna characteristics somewhat).

Important Precaution: This device uses a highly efficient clamp-on RF-current detector in combination with a high-gain dc-servo amplifier. To avoid potential damage, please use with caution around high-power transmitters.

As long as the sensor isn't clamped around a cable, there's minimal risk of damage. However, avoid analyzing transmission lines or antenna circuits carrying more than +20 dBm (100 mW) or 50-mA of RF energy. To check lines where unknown current levels are present, *turn meter Sensitivity fully counter-clockwise (down) before clamping the sensor onto any cable!* If the meter "pins" with the sensitivity turned down, unclamp the sensor at once--unsafe RF levels may be present.

TYPICAL SPECIFICATIONS

Detection Range .....20 uA to 50 mA

Usable Frequency Span .....0.1 MHz - VHF

-6 dB bandwidth .....3-30 MHz

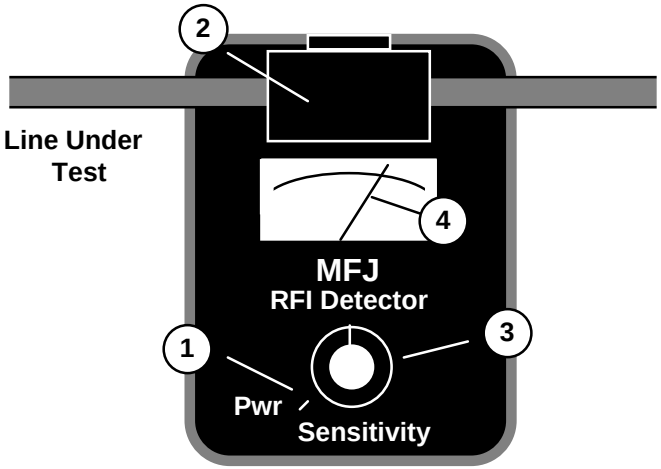
Maximum Sensitivity.....10 MHz

Gain .....Adjustable over a 50-dB range

Cable Probe .....All diameters to 1/4-inch

Power Source.....9V flat-pack battery, < 5mA drain

CONTROLS AND OPERATION



1. Click *Sensitivity* from the *Off* position to minimum sensitivity (CCW).

2. Clamp the sensor onto the cable being tested.

3. Advance *Sensitivity*. Meter will deflect if RF current is present.

4. Stop if meter reaches a reading of "8" and check the *Sensitivity* scale reading.

Interpreting Meter Readings: The chart below interprets meter readings in term of a cable's potential to generate RFI. Use as a guideline when surveying interconnecting cables on pc-computers and other electronic devices:

Sensitivity Setting Meter Reading	Potential Severity of RFI Problem
0 dB, 1/10 scale	Very Clean--Virtually no chance of RFI generation
0 dB, 1/2 scale	Low Level--Disruptive RFI possible, but unlikely
0 dB, full scale	Moderate Level--RFI likely, suppression suggested
-10 dB, full scale	High Level--Severe RFI likely, suppression needed
-20 dB, full scale	Very High Level--RFI certain, suppression needed
-30 dB, full scale	Serious RFI Source, suppress or replace
-40 dB, full scale	Powerful RFI Generator--suppress or replace
>-40 dB, full scale	Transmit-Level RFI Generator--replace

Once you've established that extremely high RF levels aren't present in the area where you're working, you can usually set the meter for full sensitivity and move from cable to cable quickly. Any indication stronger than 1/2 scale should be viewed as a potential RFI generator. Treat the strongest radiators first--this may reduce readings on other cables.

When interpreting readings, note that your MFJ-805 covers a broad frequency spectrum and cannot discriminate between narrow and wide-band signal sources. An elevated current reading may signify radiation of a few strong narrow-band signals over a wide area, or it may indicate diffused radiation of wide-band noise over a more limited area. In addition, the Detector can't tell you which portion of the spectrum is being most affected. Nevertheless, experience dictates that elevated readings mean a high probability of significant RFI--and reduced readings generally result in significant improvement.

Using dB Markings: The sensitivity control is a variable attenuator roughly calibrated in dB. The dB gradients may prove helpful for estimating the effectiveness of suppression techniques. For example, if treating a line yields a 20 or 30 dB energy reduction, it's safe to assume the treatment method was effective. For another example, if you install a balun on an antenna feedline and measure a 10-dB reduction in common-mode current at the feedpoint, it's safe to assume the feedline has effectively isolated the coax from the element.

Important Note: When assessing current distribution on transmitter feedlines, elements, and ground systems, *use low-level signal sources only.*

Remember, a signal generated by a 100-watt transmitter will be +50 dBm in signal strength. That's 30-dB more power than your meter can safely handle! A signal generator set at +10 dBm or a MFJ-259 Antenna Analyzer provide a much safer RF source (for both you and your meter).

TECHNICAL ASSISTANCE

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by reading the manual you may call *MFJ Technical Service* at **662-323-0549** or the *MFJ Factory* at **662-323-5869**. You will be best helped if you have your unit, manual and all information on your station handy so you can answer any questions the technicians may ask.

You can also send questions by mail to MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759; by Facsimile to 662-323-6551; or by email to techinfo@mfjenterprises.com. Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.

SCHEMATIC