

# MFJ

## *Deluxe True Peak-Reading SWR/Wattmeter 1.8-60 MHz*

*Model MFJ-815D*



### INSTRUCTION MANUAL

CAUTION: Read All Instructions Before Operating Equipment

## MFJ ENTERPRISES, INC.

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## **MFJ-815D Deluxe HF True Peak Reading SWR/Wattmeter 1.8-60 MHz**

### **Introduction**

The MFJ-815D is a true peak reading SWR/Wattmeter designed to operate on 1.8-60 MHz. This meter uses our *TrueActive*™ peak reading circuit to read true peak/average forward and reflected power and SWR simultaneously. It has 3000/300 Watts forward and 600/60 Watts reflected power scales. The MFJ-815D utilizes a large illuminated three-inch Cross-Needle meter to read the SWR from 1:1 to  $\infty$ .

#### **IMPORTANT:**

**Please read entire manual before attempting to operate this equipment. This unit does not provide a dc or low frequency earth ground. A separate wire should be connected from the station ground bus to an electric ground. Do not place any non-coaxial feed wires near metallic or RF sensitive devices.**

### **Installation**

1. Connect your transmitter to the connector on the back of the unit labeled TRANSMITTER and your antenna to the connector labeled ANTENNA. It is important that you use good quality coax and properly installed connectors.
2. The MFJ-815D has a *TrueActive*™ peak reading circuit that requires a DC power supply such as the MFJ-1312D in order to function. A 9 VDC may also be installed inside the meter with a battery clip that is included. The rear panel accepts a 2.1 mm coaxial plug with the center conductor positive (+) and the sleeve negative (-). The negative lead is grounded inside the meter. There is no need to disconnect the battery when using external power.
3. An internal lamp backlights the meter scale. The lamp circuit requires 12 VDC and will not illuminate with the 9 VDC battery alone.
4. To measure the power output capability of a transmitter/amplifier you should connect a quality 50-ohm dummy load to the ANTENNA connector of the MFJ-815D.

#### **NOTE:**

**The wattmeter must have a power source in order to function. A nine-volt battery may be installed in the compartment on the rear panel, or an external 12 VDC source, such as the optional MFJ-1312D power supply, may be used.**

## Operation

1. With the DC power supply or 9 VDC battery installed, push the **ON/OFF** button **in** to turn the unit ON. If 12 VDC is used, the lamp will also be turned ON.
2. The meter's full-scale forward and reflected power range is controlled by the **3000/300 Watt** button. When the button is pushed **in**, the forward power scale is on 3000 Watts and the reflected power scale is on 600 Watts. When the button is pushed **out**, the forward power scale is on 300 Watts and the reflected power scale is on 60 Watts. If your transmitter/amplifier runs more than 300 Watts of output power, push the button **in** for 3000 Watts. If your transmitter runs less than 300 Watts of output power, push the button **out** for 300 Watts.
3. Average power is measured when the **PEAK/AVG** button is pushed **out**. Peak envelope power (PEP) is measured when the **PEAK/AVG** button is pushed **in**. Peak and average power values are equal with steady unmodulated carriers, FSK, or FM. The meter reading on these modes will be the same whether the **PEAK/AVG** button is pushed **in** or **out**. On SSB, the PEP meter reading should be twice the average power with two-tone test modulation. On SSB, the ratio of PEP to average power varies with different voice characteristics. With most voices, the PEP reading is three to five times higher than the average voice power reading. The most accurate PEP readings are obtained only with sustained carrier, voice or two-tone test modulation. During normal voice modulation, the wattmeter will typically indicate only 70% of the true Peak Envelope Power.
4. Forward power is displayed on the left-hand FORWARD meter scale. This scale is calibrated from 0 to 300 Watts and is read directly in the **300W (out)** position. Each picket (scale mark) represents 5 Watts below 10 Watts, 10 Watts between 10 and 100 Watts, and 25 Watts between 100 and 300 Watts. In the **3000W (in)** position, the forward power scale must be multiplied by 10. Each picket represents 50 Watts below 100 Watts, 100 Watts from 100 to 1000 Watts, and 250 Watts from 1000 to 3000 Watts.
5. The reflected power is read on the right-hand REFLECTED meter scale. Reflected power is 60 Watts full scale when the **300W (out)** power scale is selected, and 600 Watts full scale when the **3000W (in)** power scale is selected.
6. The most accurate power readings occur in the upper half of the meter scales. When trying to measure power with a less than perfect match, the reflected power should be subtracted from the forward power reading in order to find the true power.
7. The SWR is read directly from nine red SWR curves that range from 1:1 to  $\infty$ . SWR is measured by observing the point where the forward and reflected power needles cross. The SWR is indicated by the red curve closest to the needle crossing point.

## Calibration

The MFJ-815D has been calibrated at the factory. If it should ever need to be recalibrated, then follow this procedure:

### Equipment Needed

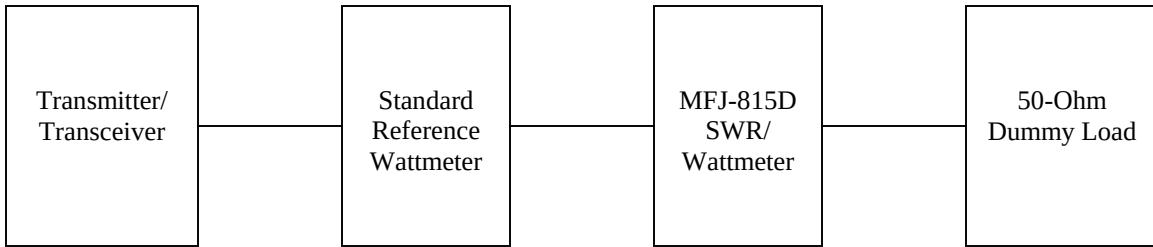
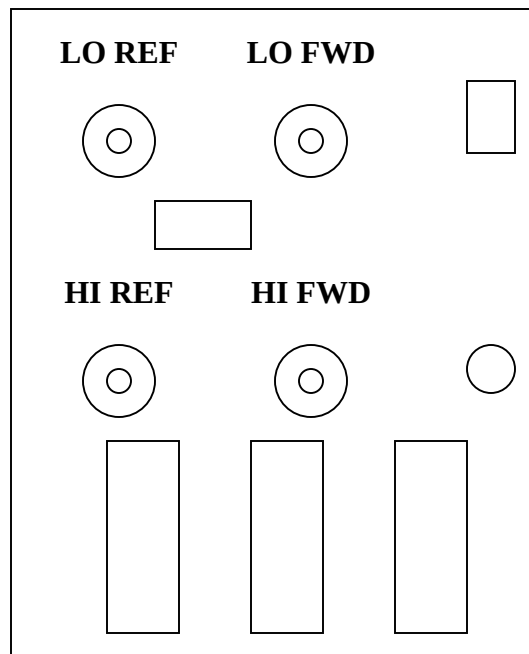
1. Transmitter capable of supplying enough power to obtain ½ to full-scale reading at 14 or 21 MHz.
2. 50-ohm dummy load that is capable of handling full transmitter output power and has better than a 1.15:1 SWR.
3. Power meter of known accuracy. The calibration will only be as good as the standard reference meter.
4. 50-ohm cables capable of handling the power. RG-58/u is recommended. DO NOT USE RG-59 or RG-11.

### Meter Calibration

1. Refer to *Figure 1* for the Test Setup and refer to the PCB layout in *Figure 2* for trim pot location.
2. Remove the top of the MFJ-815D.
3. Connect the Test Setup equipment as shown in *Figure 1*. Use a 50-ohm dummy load for the antenna. Set the Transmitter to the 14 MHz in the 20-meter band.
4. With the **3000/300 Watts** button pushed **out** for the 300 Watt scale, Transmit 100 Watts as indicated on the reference meter. Adjust the LO FWD trim pot to set the forward power scale to 100 Watts.
5. With the **3000/300 Watts** button pushed **in** for the 3000 Watt scale, Transmit 1000 Watts as indicated on the reference meter. Adjust the HI FWD trim pot to set the forward power scale to 1000 Watts.
6. To set the reflected power, interchange the TRANSMITTER and ANTENNA coax cables so that the transmitter is connected to the ANTENNA connector and the dummy load is connected to the TRANSMITTER connector.
7. With the **3000/300 Watts** button pushed **out** for the 60 Watt reflected scale, Transmit 10 Watts as indicated on the reference meter. Adjust the LO REF trim pot to set the reflected power scale to 10 Watts.

**Meter Calibration (cont.)**

8. With the **3000/300 Watts** button pushed **in** for the 600 Watt reflected scale, Transmit 100 Watts as indicated on the reference meter. Adjust the HI REF trim pot to set the reflected power scale to 100 Watts.
9. SWR requires no calibration.

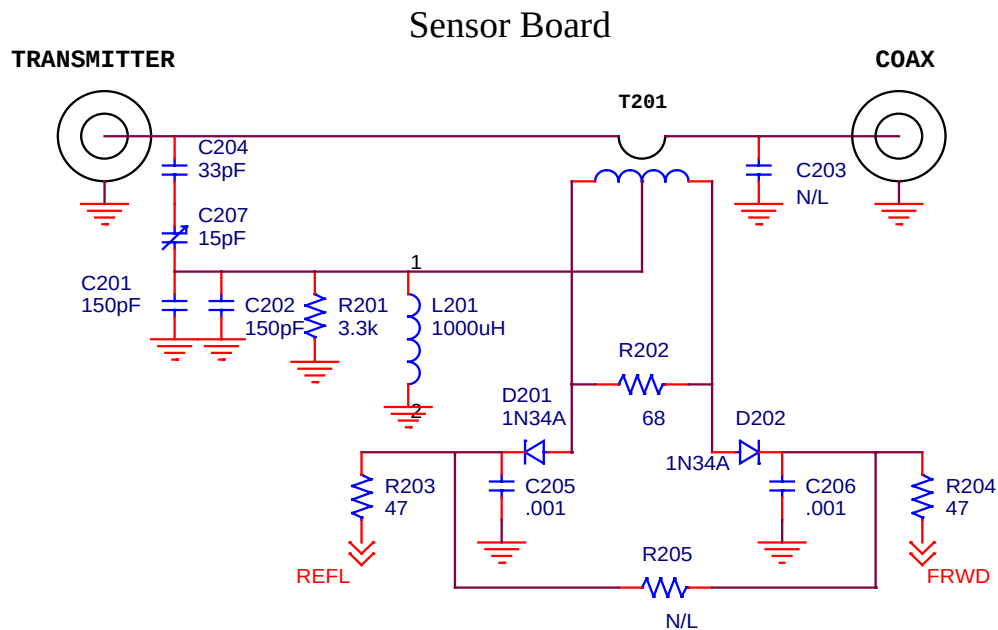
**Figure 1: Test Setup****Figure 2: PCB Layout and Trim Pot Location**

## Technical Assistance

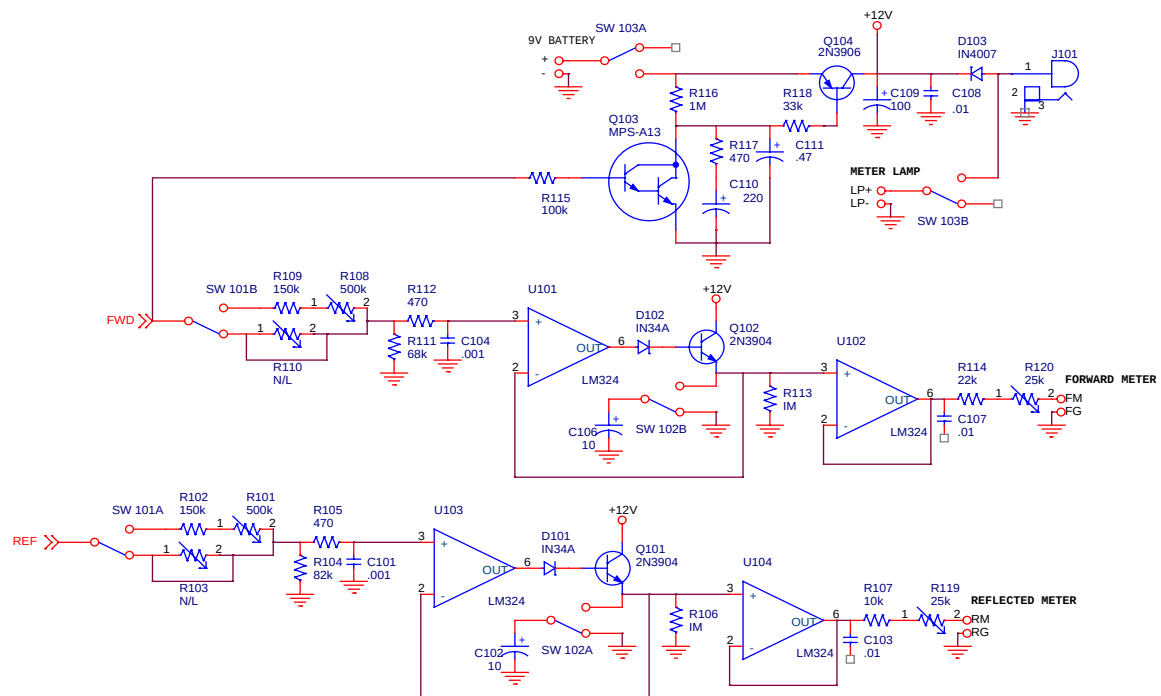
If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or reading the manual does not solve your problem, you may call *MFJ Technical Service* at **662-323-0549** or the *MFJ Factory* at **662-323-5869**. You will be best 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 (FAX) to 662-323-6551; or by email to [techinfo@mfjenterprises.com](mailto: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



## Meter Board



## LIMITED 12 MONTH WARRANTY

MFJ Enterprises, Inc. warrants to the original owner of this product, if manufactured by MFJ Enterprises, Inc. and purchased from an authorized dealer or directly from MFJ Enterprises, Inc. to be free from defects in material and workmanship for a period of 12 months from date of purchase provided the following terms of this warranty are satisfied.

1. The purchaser must retain the dated proof-of-purchase (bill of sale, canceled check, credit card or money order receipt, etc.) describing the product to establish the validity of the warranty claim and submit the original or machine reproduction of such proof of purchase to MFJ Enterprises, Inc. at the time of warranty service. MFJ Enterprises, Inc. shall have the discretion to deny warranty without dated proof-of-purchase. Any evidence of alteration, erasure, or forgery shall be cause to void any and all warranty terms immediately.
2. MFJ Enterprises, Inc. agrees to repair or replace at MFJ's option without charge to the original owner any defective product under warrantee provided the product is returned postage prepaid to MFJ Enterprises, Inc. with a personal check, cashiers check, or money order for **\$7.00** covering postage and handling.
3. This warranty is **NOT** void for owners who attempt to repair defective units. Technical consultation is available by calling the Service Department at 662-323-0549 or the MFJ Factory at 662-323-5869.
4. This warranty does not apply to kits sold by or manufactured by MFJ Enterprises, Inc.
5. Wired and tested PC board products are covered by this warranty provided **only the wired and tested PC board product is returned**. Wired and tested PC boards installed in the owner's cabinet or connected to switches, jacks, or cables, etc. sent to MFJ Enterprises, Inc. will be returned at the owner's expense unrepaired.
6. Under no circumstances is MFJ Enterprises, Inc. liable for consequential damages to person or property by the use of any MFJ products.
7. **Out-of-Warranty Service:** MFJ Enterprises, Inc. will repair any out-of-warranty product provided the unit is shipped prepaid. All repaired units will be shipped COD to the owner. Repair charges will be added to the COD fee unless other arrangements are made.
8. This warranty is given in lieu of any other warranty expressed or implied.
9. MFJ Enterprises, Inc. reserves the right to make changes or improvements in design or manufacture without incurring any obligation to install such changes upon any of the products previously manufactured.
10. All MFJ products to be serviced in-warranty or out-of-warranty should be addressed to:

**MFJ Enterprises, Inc.,  
300 Industrial Park Road  
Starkville, Mississippi 39759 USA**

and must be accompanied by a letter describing the problem in detail along with a copy of your dated proof-of-purchase.

11. This warranty gives you specific rights, and you may also have other rights which vary from state to state.