

## MFJ-971 QRP PORTABLE ANTENNA TUNER

**GENERAL DESCRIPTION:** The MFJ-971 is a compact 200-Watt portable tuner compatibly packaged with MFJ QRP transceivers. The MFJ-971 is also a perfect mate for any of today's ultra-compact SSB radios. It provides a convenient cross-needle type SWR/Wattmeter and features a special user-selectable 6-Watt range for QRP operation. The T-match tuner covers 1.8-30 MHz and tunes almost any coax, wire, or balanced-feed type antenna (a 4:1 toroid balun is built in for balanced line).

**READING THE CROSS NEEDLE SWR INDICATOR:** The MFJ-971 uses a cross-needle style meter to display FORWARD power, REFLECTED power, and SWR simultaneously. To read Forward Power, observe the FORWARD meter scale. To read Reflected Power, observe the REFLECTED meter scale. To read SWR, observe where the two needles cross. The corresponding red curve on the meter face displays your SWR reading. No "zero" or "sensitivity" adjustment is required with cross-needle SWR displays.

**POWER LEVELS:** The FORWARD scale is calibrated from 0-300 Watts and the REFLECTED scale from 0-60 Watts. In the high-power range, read both scales directly (x 1). In the 30 Watt range, move the decimal point one place to the left (x 0.1).

For QRP sensitivity (6-Watts FORWARD, 1.2-Watts REVERSE), you must perform a simple conversion to obtain actual power. You can convert in your head by moving the decimal point two places to the left and doubling the reading (ie. 300 W = 3.00 x 2 = 6 W). You may also multiply the scale reading times 0.02 on a pocket calculator -- or use this conversion chart:

FORWARD SCALE			REFLECTED SCALE		
300W	30W	QRP	60W	6W	QRP
-----	-----	-----	-----	-----	-----
300W	30W	6W	60w	6w	1.2W
250W	25W	5W	50W	5W	1.0W
200W	20W	4W	40W	4W	0.8W
150W	15W	3W	30w	3W	0.6W
100W	10W	2W	20W	2W	0.4W
50W	5W	1W	10W	1W	0.2W

**SELECTING POWER RANGE:** The "IN" position of the meter's range switch selects the 30-W range. The "OUT" position provides a choice of 300-W or 6-W QRP range, as determined by two jumpers on the powermeter pc board (see Figure 1A,1B). When jumper plugs are installed in position "A", meter sensitivity is 6-Watts (QRP). When installed in position "B", sensitivity is 300-Watts. Jumpers are normally set for "B" (High Power) at the factory.

**CAUTION:** Running high power while in the "QRP" range could damage your meter movement.

INSTALLING YOUR TUNER: The MFJ-971 tuner may be stacked with a companion MFJ transceiver and power pack, or used separately. Two brackets and 8 screws are included in this package to connect the tuner to the MFJ transceiver and power pack if you choose to do so. Locate your tuner to prevent accidental contact with connectors on the rear panel; even low-power radios can cause serious RF burns when fed into a random wire antenna. The tuner meter lamp may be powered from any 12-VDC source. Use a 5.5mm x 2.1mm coaxial plug; center pin positive (+).

TUNER CONNECTIONS: Set up your MFJ-971 as follows:

1. Connect radio to the SO-239 connector marked TRANSMITTER. 2.

Connect antenna feed to the appropriate tuner output:

- (a.) COAX-FEED to the SO-239 connector marked ANTENNA.
- (b.) RANDOM WIRE to the red binding post below ANTENNA jack.
- (c.) BALANCED FEEDERS to the BALANCED binding posts.\*

\* WHEN USING BALANCED FEEDLINE, CONNECT A SHORT JUMPER FROM THE LOWER "BALANCED" BINDING POST TO THE RED "ANTENNA" BINDING POST. This routes the balun's unbalanced output to the tuner circuit.

3. Connect your tuner and transmitter to a good earth ground.

CAUTION: For reasons of safety and radiation efficiency, random wire antennas should be high, clear of obstructions, and at least 1/4 wavelength long. They should also be well insulated from humans, animals, vegetation, and grounded objects.

OPERATING YOUR TUNER: If your radio has tube finals, set the transmitter on-frequency and "tune up" into a 50-Ohm resistive load. Once this is done, leave your TUNE and LOAD controls set and connect the tuner. If your radio has solid-state finals, omit this step (it is already matched to a 50-Ohm non-reactive load).

1. REDUCE TRANSMITTER OUTPUT before making initial adjustments.

2. Set tuner's TRANSMITTER and ANTENNA controls at 12:00 (3-1/2). 3

Switch INDUCTANCE for loudest receiver background noise.

4. Transmit a steady carrier (at low power), alternately adjusting TRANSMITTER and ANTENNA controls for minimum SWR.

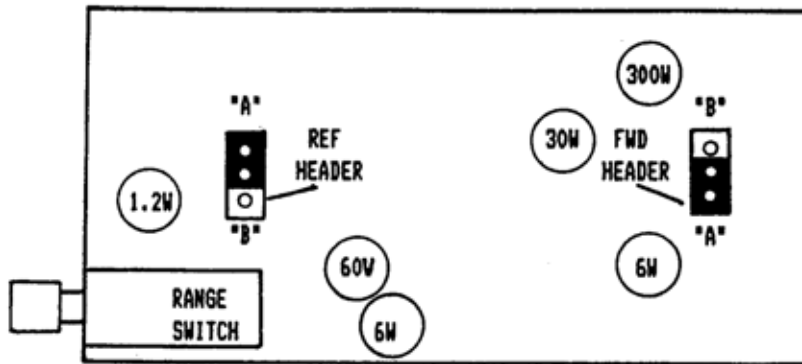
NOTE: Since these controls interact, try moving the TRANSMITTER control a small increment, then rotate the ANTENNA control for minimum SWR. Repeat until you obtain the lowest SWR possible.

5. If you cannot obtain a 1:1 match, increase or decrease INDUCTANCE and repeat step 4. Also, if RF arcing occurs inside the tuner, change INDUCTANCE and repeat step 4).

The MFJ-971 should reduce the SWR of most feed systems to 1:1. If you cannot achieve 1:1, try increasing or decreasing the length of your antenna. Also, you may find minimum SWR occurs at more than one combination of control settings. To confirm you have selected the BEST one, check your RF power output (Po). If output appears abnormally low, try another INDUCTANCE position and repeat step 4. Finally, if your are using the MFJ-971 for receive only, tune as described in steps 2-3.

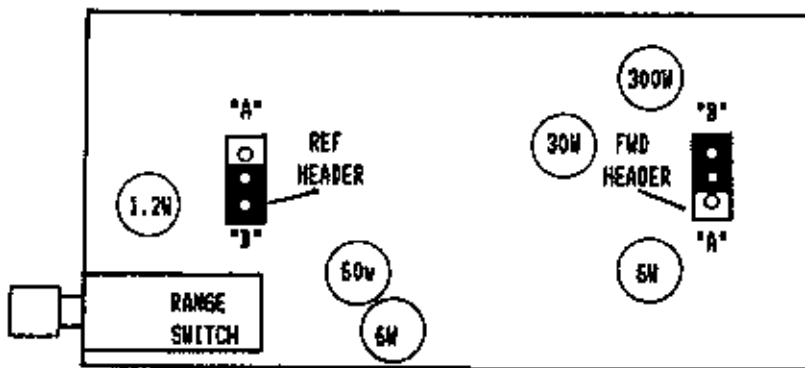
IN CASE OF TROUBLE: Your MFJ-971 is backed by our "No Matter What (TM)" guarantee for one full year. If you have a problem with your tuner, first carefully inspect interconnecting cables and antenna leads for shorts or opens (use an Ohm-meter). If unable to solve your problem, call 1-800-647-TECH for assistance.

TO SET QRP JUMPER POSITIONS (Figure 1A):



Place plugs on headers in position "A" for 6-Watt [sensitivity. TO](#)

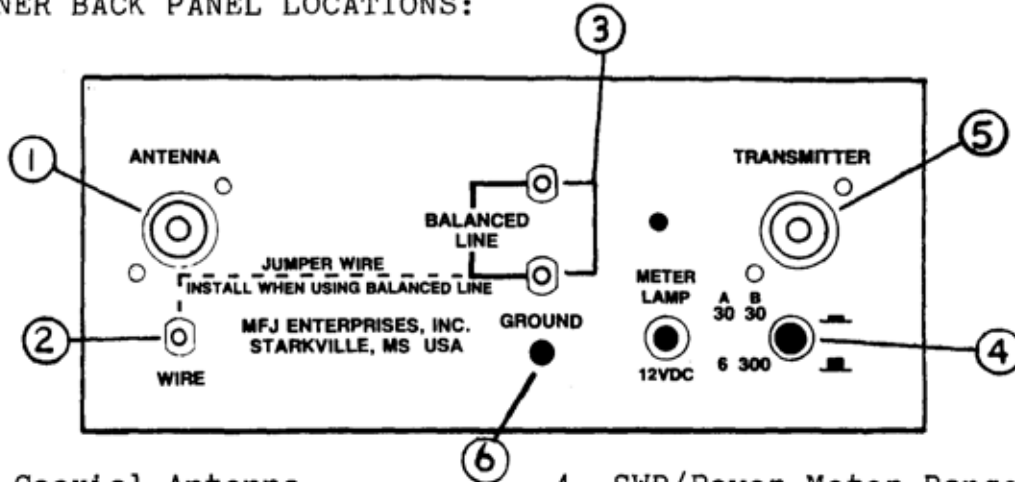
SET HIGH-POWER JUMPER POSITIONS (Figure 1B):



Place plugs on headers in position "B" for 300-Watt sensitivity.

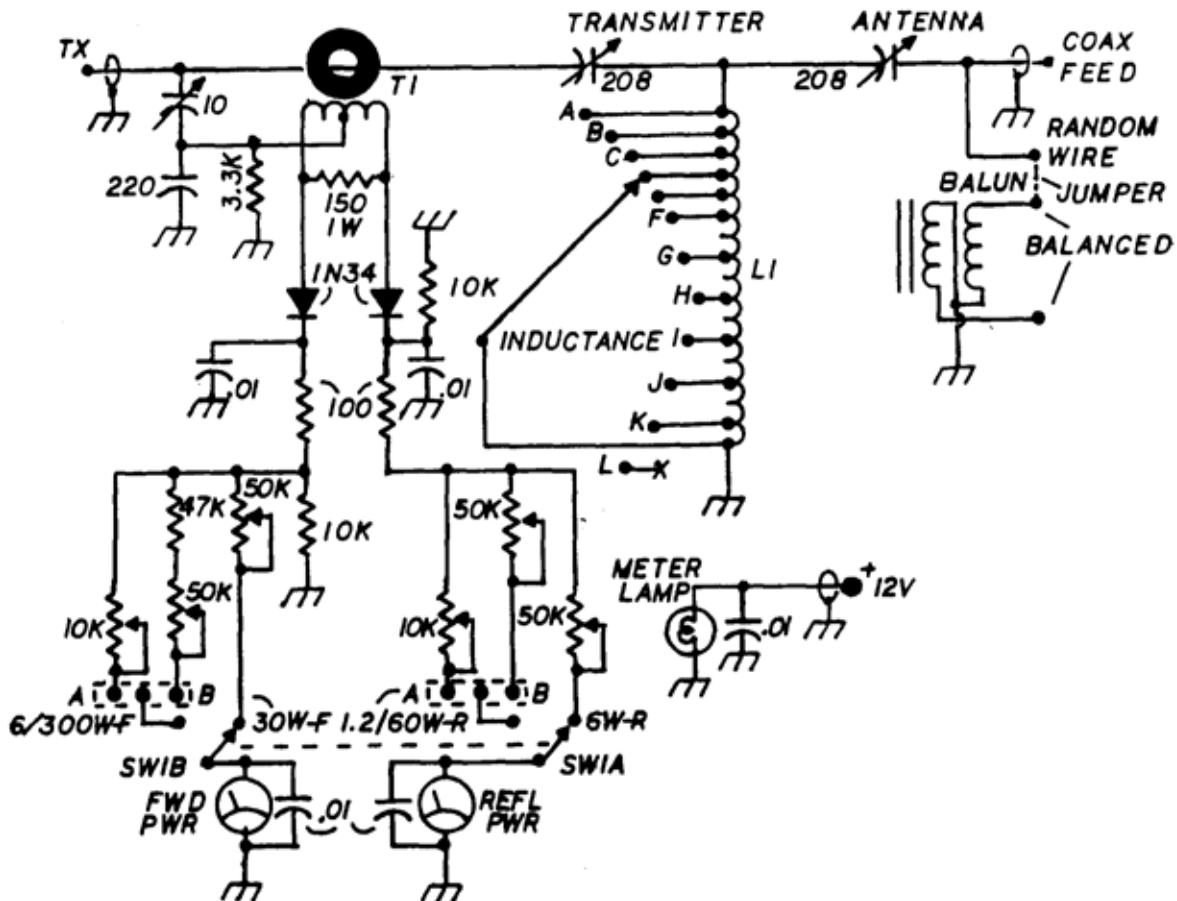
CAUTION: Do not attempt to operate a high-power transmitter into your MFJ-971 tuner when QRP meter sensitivity is selected. The meter movement could be physically damaged.

TUNER BACK PANEL LOCATIONS:



- |                              |                                 |
|------------------------------|---------------------------------|
| 1. Coaxial Antenna           | 4. SWR/Power Meter Range Switch |
| 2. Random-Wire Antenna       | 5. Transmitter Jack             |
| 3. Balanced Feedline (balun) | 6. Earth Grounding Post         |

SCHEMATIC, MFJ-971 PORTABLE ANTENNA TUNER:



WARNING: CONSTRUCTING OR ERECTING AMATEUR RADIO ANTENNAS IN LOCATIONS WHERE THEY MAY COME INTO CONTACT WITH ELECTRICAL POWER LINES MAY RESULT IN ACCIDENTAL INJURY OR DEATH. ALWAYS USE CAUTION.