

Product Review: MFJ-994B High Power IntelliTuner  
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Introduction

I recently acquired an Ameritron ALS-600 600-watt solid state amplifier. This is a great no-tune amplifier that is only down 4 dB from full legal limit, and is perfect for my occasional needs for a little more power when I'm chasing DX. However, like most solid state amplifiers and transceivers, the ALS-600 will not tolerate loads that exhibit more than a 2:1 SWR. In particular, the ALS-600 drops off-line if the SWR exceeds 2:1 when putting out its full 600-watts of power. Now while my antenna system consists of resonant antennas on all bands from 160 -10 meters, the 2:1 SWR bandwidth is not full-band on many of these bands. Therefore, I decided to add a high-power auto-tuner at my amplifier output to keep the SWR within the tolerable range of my ALS-600 under extended bandwidth conditions.

The MFJ-994B

There are several high power auto-tuners on the market today. However, I decided on the MFJ-994B due to its wealth of features and its ability to seamlessly interface with a number of transceivers, including my Yaesu FT -1000MP MKV and my ICOM IC-706MKIIG. What this means is that an optional transceiver-specific cable is available which plugs between your transceiver and the MFJ-994B. Then when you press either the TUNE button on the transceiver or the TUNE button on the MFJ-994B, the MFJ-994B causes the transceiver to drop to a low power CW tune mode before starting the tuning cycle. This ensures you never tune with high power. So, let's start by listing the basic tuner specifications .

Matching range: 12-800 ohms impedance from 1.8-30 MHz, unbalanced or single-wire  
RF Power Level: 600 watts PEP SSB/600 watts CW/500 watts constant carrier  
Memories: Over 10,000 non-volatile memories in four memory banks  
Tuning power necessary: 2-20 watts (100-watts with transceiver foldback protection)  
Tuning time: Less than 15 seconds, usually less than 1 -second  
Target tuned SWR: 1.5 or 2.0 (default is 1.5)  
SWR threshold to initiate auto-tune: 0.5, 1.0 or 1.5 (default is 0.5 above target SWR)  
Tuning initiation: Manual, Auto -tune, Sticky-tune  
Lighted cross-needle SWR/wattmeter with high, low and auto range options  
SO-239 and random wire antenna connectors  
Optional remote control and radio interface cables  
Power requirements: 12 - 15 volts DC at 850 milliamps or less  
Dimensions (approx.): 10.1 × 2.8 × 9.2 in. (257 × 71 × 234 mm) (width/height/depth)  
Weight (approx.): 3.7 lb (1.68 kg)

A few of the things I really like about the MFJ-994B are its low tuning power, its control of your transceiver during the tuning cycle with an optional radio interface cable, its large memory capacity, and its auto-metering mode – whereby the power meter range automatically adjusts based on the input power. And while the MFJ-994B only has an

unbalanced output, you can add an external high power balun should a balanced feed be desired.

MFJ-994B tuning is very fast. This is because the MFJ-994B uses internal MFJ antenna analyzer circuitry to first look at the impedance to be matched. Then it snaps-in the correct matching values after which it does a fine-tune if the target SWR hasn't been met. For protection, the MFJ-994B bypasses itself when just a little above 600 watts constant carrier is applied with even very light matching, if the voltage or current rating of the capacitors and inductors are exceeded, or if too much power is applied during tuning.

#### Testing the MFJ-994B

I tested the MFJ-994B with my two HF antennas: A Butternut HF-9V with 160 meter coil, and a MFJ-1775 40/20/15/10/6/2 meter rotatable dipole.

My most difficult band is 160 meters, where my short Butternut vertical has about a 10 KHz 2:1 SWR bandwidth. The Butternut is resonant at 1.815 MHz. So I started moving up the band until the MFJ-994B couldn't find a match. The highest I could go was 1.851 MHz, where the unmatched SWR was 13:1 (measurement made with a MFJ-259B). At this frequency, the MFJ-994B would trip out (protect itself by going into bypass) with 500 watts of constant carrier power applied. However, it operated just fine at 600 watts keyed CW. The MFJ-994B manual does state that power may need to be reduced on 160 meters when severe matching problems are encountered.

Next I went to 80 meters. My Butternut vertical is resonant at 3.56 mhz. I stepped up the band and found that the MFJ-994B could tune everywhere. I stopped at 3.95 MHz where the SWR was >25:1 (yes, that's correct), but the MFJ-994B was still able to find a match. I could put out full power with my ALS-600.

On to 40 meters where I switched to the MFJ-1775 rotatable dipole since this is much more narrow-banded than my Butternut vertical on this band. The MFJ-1775 is resonant at 7.011 MHz. I went to 7.280 mhz where the SWR measured 12:1. The MFJ-994B was able to successfully match the antenna, and I could put out the full 600 watts constant carrier with no problems.

Next I went to 20 meters, still using the narrow-band MFJ-1775 rotatable dipole. The antenna is resonant at 14.02 MHz (have you been able to determine that I'm a cw guy?). I went to 14.340 MHz where the SWR was 9:1. The MFJ-994B easily matched the antenna, and I could again put out the full 600 watts constant carrier CW with no problem.

My worst case SWR on 15- and 10- meters with the MFJ-1775, or on 15-, 12-, and 10-meters with my Butternut vertical was only 2.5:1. The MFJ-994B easily matched both antennas on these bands, and my ALS-600 could put out its full 600 watts constant carrier.

Bottom line: The MFJ-994B can handle just about any impedance you want to throw at it. Of course, high SWR can result in high cable losses unless quality coax cable is used.

### Using the MFJ-994B

I normally prefer to manually start the tune cycle by pushing the TUNE button on the unit. The unit also has an auto-tune mode where tuning starts automatically when the SWR goes above 2:1 (default), and a Sticky-Tune mode where tuning occurs the first time RF power is applied after power-up. Auto- and Sticky-Tune should only be enabled when you have the optional radio interface cable so that you don't attempt a tune at high power. These two modes should *never* be used when an amplifier is in-line, as enabling tuning at 600 watts could be damaging to an amplifier (the ALS-600 protects itself, but other amplifiers may not). *Note: There is a way around this – see my modification of the Ameritron ARB-704 in the “Equipment Modification” section of this website which permits automatic amplifier bypassing when tuning is enabled by TUNE, AUTO, or STICKY-TUNE.*

Using the MFJ-994B is very easy. First, bypass your amplifier. Then reduce your transmit power to 20 watts or less, key your transceiver, and press TUNE on the MFJ-994B. Or if you have a radio interface cable, bypass your amplifier (not necessary if you have a modified ARB-704) and press the TUNE button on the MFJ-994B since your transceiver will automatically be keyed in its low power CW tune mode (see why I like the radio interface cable?). Typically, you'll be tuned up in less than a second. Once you're tuned, flip your amplifier back on-line and you're ready to go!

### Conclusion

The MFJ-994B IntelliTuner is a great tuner to use with any transceiver from 2-watts and up, and with any HF amplifier that outputs up to 600 watts. So if you think you may one day buy a medium power amplifier such as the Ameritron ALS-500, ALS-600, or AL-811, this may be the auto-tuner you want to buy from day-one. It will certainly handle virtually all the antenna matching problems you might have. And tuning is fast and accurate, letting you put your amplifier on-line quickly so you can snag that rare one!



Author's compact (but efficient) station



MFJ-994B with transceiver & amp interface