

Tuning Instructions for an Ameritron AL-80B amplifier, Icom 7300 radio, and LDG AT-600Pro II auto-tuner

REMEMBER: The health of your equipment depends on you not exceeding the power rating of the weakest device in your transmission path! Just as importantly, the way you tune your amplifier will determine how long and how effectively it remains in service.

DISCLAIMER: Use these instructions at your own risk. Your amplifier may require other tuning methods. Always check the amplifier manual and/or the manufacturer for correct tuning techniques! Always review your amplifier's power limits in all modes (SSB, CW, digital)!

Until February 2023 I had never owned an HF amplifier. Not only that, I had never even used a tube-based HF amplifier, much less tuned one.

In my shack I have set up my Icom 7300 so that it controls the transmit power relay and the ALC on my Ameritron tube amplifier.

In transmission sequence, my equipment is arranged as follows:

Icom 7300 -> Ameritron amplifier -> LDG antenna tuner -> antenna selector switch -> antennas

In my system the weakest link based on power capability is the LDG auto-tuner. It is rated for 600W PEP SSB but only 250W PEP in digital modes such as FT8.

My amplifier is rated for 1,000W PEP SSB, 850W PEP CW, and 500 W PEP FT8 and other digital modes.

If I were to crank up the amplifier to 1,000W in **any** mode, my LDG auto-tuner would start releasing lots of smoke and I would hear sizzles and crackles as components arced.

That is not a scenario I desire, so I developed the checklist below to help me keep my equipment healthy and reliable for as long as possible.

On the Ameritron AL-80B amplifier:

- Turn the ALC control down to zero
- Switch the amplifier to STB (Standby)
- Pre-set the Plate and Load dials for each separate band as indicated by the chart provided by Ameritron
- Ensure that the amplifier Band switch is on the same band that the radio is on

On the Icom 7300 radio with the LDG AT 600Pro II auto-tuner active:

- Switch to the desired band
- Reduce power to 20W on the IC-7300 and leave the power displayed
- Tune to an empty portion of the spectrum with SWR and waterfall shown together on the IC-7300
- Change the mode to RTTY
- OPTIONAL: Tune first into a 50-ohm dummy load, then connect back to the amplifier
- Press and hold the microphone key, then press the Tuner button on the 7300 or the Tune button on the LDG auto-tuner
- Wait until the auto-tuner matches the radio to the amplifier's massive tuning section. If you can't get below an SWR of 1.5, **STOP**. Do not proceed until you troubleshoot the problem and solve it

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On the amplifier:

- Set XMT switch to OPR (Operate)
- Press the microphone key. Try to keep your transmission less than 15 seconds, then keep the amplifier off for the same amount of time (or longer)
- Adjust the Plate knob until the Forward power needle rises to the inflection point. The needle will rise to a peak, then start to drop. Adjust the Plate knob until it stays on the peak
- The same way, adjust the Load knob until the Forward power needle rises to the inflection point
- Slowly increase the ALC control until the Forward power rises no further. Don't continue to increase the ALC control if the grid current increases while the Forward power is not increasing
- ALWAYS: monitor the grid current and the plate (anode) current. For my AL-80B:
 - Grid current cannot exceed 180mA (<=150mA desired)
 - Plate current cannot exceed 400mA (<= 375mA desired)

On the radio:

- Increase power in 20W increments to achieve the greatest amplifier power output **that does not damage any components in the system** (the amplifier's tube(s), other amplifier components, the external auto-tuner, baluns, wiring, antenna, etc.)
- Do **NOT** use more exciter (radio) power than needed to achieve the desired amplifier power

On amplifier:

- Repeat the tuning procedure until the desired amplifier power output is reached by increasing the ALC and/or the exciter (radio) power
 - Understand that if your antenna(s) are not tuned well or your antenna tuner doesn't work well, you may not reach your target output power from the amplifier
- Once your desired amplifier power is reached, slowly decrease the exciter (radio) power until the amplifier power just starts to drop, i.e., use only the exciter power needed, no more
- **NOTE:** As discussed, your amplifier power output may need to be limited based on the power capabilities of the external auto-tuner, antenna, wiring, etc.
- Monitor grid and plate currents periodically to ensure they stay within safe limits
- **VERIFY WHAT YOUR AMPLIFIER'S LIMITS ARE!**
 - On my amplifier, SSB power cannot exceed 1,000 W PEP without damage. CW power cannot exceed 800 W PEP. Digital (RTTY, FT8, etc.) cannot exceed 500 W PEP

On the radio:

- Change the mode back to USB, USB-D, or CW as appropriate
- Continue monitoring your Forward power, SWR, grid and plate currents as you transmit

Each time you change bands, start the tuning process again at the top of the list

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