Excerpt from the Alpha 9500 user manual
RF Concepts Alpha 9500 Tuning procedure

Table 5-2 Tuning modes

You can tune the amplifier in one of three tuning modes—Default, User 1, or User 2—and from any of these proceed to autotune mode..

Default

By default, when the amplifier is first powered on or QSYed, it retunes using factory supplied tuning values. These values are derived for a load with voltage standing wave ratio SWR = 1.0:1, so the amplifier will be tuned with a different tuning value from default memory for each segment of each band. For SWR ≤ 1.5:1, the default tuning values are usually appropriate. For SWR > 1.5:1, some manual tuning may be required using the tune and load controls. The antenna port last used in Default mode for a particular band and band segment is used.

User 1/User 2

In User 1 or User 2 mode, the amplifier tunes (auto selects) from values stored in User 1 or User 2 memory. As in Default mode, the amplifier retunes at power up or when it is QSYed to a different band segment. Initially (from factory), the user memories are programmed with factory-default values, which are retained until they are overwritten by new tuning values saved to a band segment. The antenna port is the last one used for that user memory on that band and segment. If for some reason the amplifier is not correctly tuned, you can tune it manually using tune and load controls, and the new value is then stored in user memory.

When you switch among Default and User 1/User 2 modes, the amplifier tunes to the values stored in the newly selected memory. Programming a user memory overwrites any previous values, and default values are lost from user memory for a specific band segment. You can view the default values through the computer connection to the amplifier.

If you have two antennas that operate on the same band, store separate values in User 1 and User 2 memories. The antenna port selection is determined by the last used antenna on that band segment.

Auto

In autotune mode, which you select when the amplifier is in User 1 or User 2 mode, the amplifier initially tunes from stored values and then automatically tweaks the tuning when power is applied. The amplifier tunes on the fly and hunts for an optimum tuning point as you change frequency. However, depending on load conditions, you may need to turn off autotune mode and tweak the tuning yourself with the load and tune controls. The currently selected antenna port is used.

Be sure to save the results of autotuning into the user memory by pressing the **SAVE** button. When you switch out of autotune mode, the amplifier holds the tuning unless you press Default or User 1/User 2, in which case it returns to the memory values for those modes.

Note that *autotuning* the amplifier is different from *autoselecting* a band and band segment. In normal operation, when the amplifier is keyed, it autoselects the correct band and segment without your intervention, although you can overrule it by manually selecting a band segment. Autotuning, on the other hand, is initiated only when you press the **Auto** button to put the amplifier in autotune mode.

Faults In the event of a fault, the tube biases off, the relays are placed in bypass mode, and RF from the amplifier goes directly to the antenna. The **FLT** (Fault) switch lights and the 7-segment display shows the number of the last recorded fault.

IMPORTANT Do not turn the amplifier off. To clear a fault:

- For a gain fault, wait for the amplifier to reset itself.
- For all other faults, resolve the fault as described in Section 8.2, "Fault Codes and Resolutions." Then press the left ON button to release the fault and press the OPER button to continue

5.2 Start Up the Amplifier

Procedure 5-1 Start up the amplifier

Step 1 Install and set up the amplifier as described in the preceding chapters.

Step 2 Power up the amplifier by pressing one of the two **ON** buttons:

ON/OFF (ANT SEL) button

This provides initial power to the metering, band, and segment selection circuits, which turns on the wattmeter and antenna-selection functionality (ON1 setting). When you then pass RF through and key the amplifier, the amplifier autoselects a band and segment. You can pass up to 1500 W through the amplifier in bypass or the ON1 setting.

ON (AMP) button

This duplicates the functions described above, and also applies high voltage to the tube. The amplifier begins its warm-up countdown sequence and the 7-segment display shows the seconds remaining in the countdown. The STBY switch light blinks.

Step 3 Monitor amplifier parameters:

Display amplifier parameters by pressing the associated button that controls the 7-segment display. For information on these buttons, see Section 2.3, "Controls and Display," page 2–3. Display the plate voltage by pressing the **Vp** button. The value should be about 3545 V. If the value is....

- <3300 V: Check your outlet, plug wiring, and equipment grounding in your shack. If power is variable or unstable, you can force the amplifier to always choose a particular tap setting. For information on how to do so, contact RF Concepts technical support.
- >3800 V: Ensure that the correct primary tap is being selected. If autotap-selection is disabled, try enabling it. If the highest tap is being used, your line voltage is likely >250V; talk to your power company about reducing it.

To return to the countdown display, press the **FLT** (Fault) button.

Step 4 Proceed to Section 5.3, "Tune the Amplifier," page 5–7.

NOTE During warm-up and operation, do not press the **MEMORY/AUTO** button. The amplifier performs automatic frequency detection, bandtuning, and antenna selection independently of this button. Rather, use this button to assist with initial tune and load settings as described in Section 5.3, "Tune the Amplifier," page 5–7.

5.3 Tune the Amplifier

IMPORTANT •

- Do not attempt to tune the amplifier until you read this entire section. Then follow instructions carefully.
- During any tuning operation, it is important that you monitor grid current and gain. Even at SWR >2:0:1, where full output may not be achieved, you must still keep grid current and gain within limits. You normally should not need over ~60 W input to drive the amplifier to full output.

The Alpha 9500 has an autotune feature for tuning to the desired frequency. You can use this feature or turn it off and manually tune the amplifier.

Your goal in tuning the amplifier is to maximize output power for a given input power. At SWR > 2.0:1, this normally becomes difficult. You can load a high SWR, but keep in mind as you approach full output that there is great stress on the transmission line, connectors, and antennas. If you use an

antenna tuner, also keep in mind that high voltages and circulating currents may exist between the tuner (also inside the tuner) and the antenna even though the amplifier sees a good load.

REMEMBER A properly tuned amplifier has the following properties:

- Full legal power output. For voltage SWR <2.0:1 this is 1500 W (with 40–60 W drive). For SWR > 2.0.1, full power may not be possible but the other tuning indications are the same.
- Grid current in green zone (normally 40 mA; at >100 mA, the system alarms)
- Gain indication in green zone
- Plate current in green zone (1 A at 1500 W; at >1.2 A, the system alarms)

(Optional) Changing antenna settings

You can optionally change to other than the default antenna or use two antennas simultaneously.

Procedure 5-2 (Optional) Change the antenna settings

Step 1 Start up the amplifier as described in "Start Up the Amplifier," page 5–5.

Step 2 To change the default antenna to a different port for all User 1/User 2 memory bank settings:

2a Press User 1 or User 2 so that the memory light is on.

2b Press the desired antenna port twice.

2c While the antenna light is blinking, press the **SAVE** button.

The new antenna port value is now spread across all bands and segments on User 1 or User *2*.

Step 3 To listen (and transmit) on two antennas simultaneously:

3a Press the **ANTENNA SELECT** button for the first desired antenna twice.
3b While the light is blinking, press the button for the second desired antenna.
Both antenna lights should now be on and both antennas open for listening and transmitting.
The SWR is determined by the parallel combination of the two antennas.

Step 4 Proceed to either "Autotuning," page 5–8 or "Manual tuning," page 5–9.

Autotuning Use autotune during initial setup to find correct tuning values.

NOTE •

- We recommend that you use user memories rather than Autotuning for normal operation.
- If you use Autotuning for normal operation, hunting behavior usually indicates instability in the antenna or feed system. Repair the antenna or feed system so that you can operate from fixed
- tuning.
- Autotuning may give slightly different tuning values when the amplifier is retuned due to the existence of a small tuning dead zone.

Procedure 5-3 Autotune the amplifier

Step 1 Start up the amplifier as described in "Start Up the Amplifier," page 5–5.
Step 2 If necessary, select the antenna port for the desired band.

NOTE: If you operate on other than the default antenna port (port 4) for one or more bands, you must manually select the port before keying the amplifier on that band. To select the port, press the **ANTENNA SELECT** button for the desired antenna port. The amplifier stays on that port until you change the band segment. If you wish to return to the same tuning settings, save the settings into memory.
When you return, the antenna port goes to the one last used for that
segment.

Step 3 Set the transceiver to the desired band/segment frequency.

Step 4 Select User 1 or User 2 mode (so that you can save the settings).

Step 5 Press the **MEMORY/AUTO** button to turn on autotune.

Step 6 Key the transceiver by applying input power of 10–20 W. The amplifier selects the specified band and autotunes.

Step 7 With the amplifier keyed, slowly advance the transceiver power. As you increase the power, the amplifier continues to tune.

Step 8 (For initial amplifier setup) When you reach the desired output power level, unkey the amplifier and press the **SAVE** button once.

The Save LED blinks on and off once. The tuning settings are now associated with the indicated band/segment. From now on, each time you are in User 1/User 2 memory, when you key the amplifier and apply RF in that range of frequencies, the amplifier autoselects these saved settings.

Step 9 Repeat the previous steps for all band segments.

Step 10 Press the **MEMORY/AUTO** button again to turn off autotune.

Step 11 (Optional) Verify the saved settings by returning to each frequency and confirming the power output. Make any necessary adjustments and save as before.

Step 12 Proceed to "Program the Amplifier Memory," page 5–10.

NOTE After you set up your amplifier with reasonable tune and load settings, do not press the **MEMORY/AUTO** button. Small changes in frequency and antenna performance are handled easily within the amplifier tuning range.

Manual tuning Use manual tuning as necessary to optimize amplifier performance.

Procedure 5-4 Manually tune the amplifier

Step 1 Start up the amplifier as described in "Start Up the Amplifier," page 5–5.

Step 2 Select a band segment either with autoselect or manually.

Step 3 If necessary, select an antenna port. If you operate on other than the default antenna port (port 4), you must manually select the port. The port that was last used is saved.

Step 4 Key the amplifier by applying input power of 10–20 W.

Step 5 Move the tune and load controls carefully, in small steps, until you maximize (that is, achieve full rated) output power.
As you do so, monitor grid current and gain to keep them in the proper ranges.

Step 6 Save the tuning values in one of the user memories.

Step 7 Continue the process for all band segments of interest.

Step 8 Proceed to “ Program the Amplifier Memory,” page 5–10.