PRODUCT REVIEW

RF Concepts Alpha 9500 Linear Amplifier

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For decades, the name *Alpha* has stood for quality built, high power HF amplifiers. Rugged construction and proven designs combined with outstanding customer service are the things that make an Alpha amplifier very desirable. The Alpha brand has gone through several changes over the past 40 years, including an off-shore manufacturing venture and several different owners. Most recently, the Alpha brand was acquired in 2009 by RF Concepts, LLC.

One of the first things that the new owners did was to lower the price of the Alpha 9500, as well as the prices of all other products in the line. RF Concepts President Michael Seedman, AA6DY, said in a press release that the new company will continue producing amplifiers and accessories to the same high standard that has been the benchmark of the Alpha brand.

Another goal of the new management was to streamline the production process to be able to fill customer orders more quickly than previous production schedules had allowed. That goal has been met. As this review was being prepared, the RF Concepts Web site announced that amplifiers are in stock for immediate delivery, and that Alpha products are also available through Amateur Electronic Supply and Ham Radio Outlet.

Beauty, Brains and Brawn

The Alpha 9500 is the company's top-of-the-line auto-tune model that uses a single 8877 (3CX1500) ceramic triode tube to deliver 1500 W of continuous (no time limit) RF output from approximately 60 W of drive power. The RF deck is very similar to the venerable Alpha 87A, which used a pair of 3CX800 triodes instead of the single 8877.[1] The 8877 tubes are readily available from multiple sources, and replacement cost is lower than a pair of 3CX800s. Another welcome upgrade is the use of vacuum relays for RF switching and full break-in (QSK) CW operation. The PIN diode RF switch in the 87A proved problematic for more than a few owners.

The 9500 is a real heavy hitter that employs microprocessor control circuitry to handle band switching, antenna selection and tuning of the amplifier's output circuit, as well as for several types of amplifier protection. The user can override the automatic control for special situations or during initial configuration of the amplifier in your station with your various antennas. Once configured, band changes take place in milliseconds.

The exterior of the 9500 is very sharp looking with lots of LED bar graph displays to indicate parameters such as RF power output, voltage, current and gain. The multifunction numeric display is large and easy to read. It indicates numeric values for many of the bar graph parameters. For example, with the Lab's power meter indicating 1500 W output, this display showed 1545 W and the first red LED on the bar graph (1.5 kW) lit up.

The numeric display will also let the user know when there is a problem by displaying fault codes. When the controller senses a problem, it places the amp in standby mode and displays a number to indicate the fault. The fault codes and suggested resolutions are listed in the manual. For example, suppose that the amplifier automatically shifts to standby mode and the number 12 is displayed. A quick check of the fault codes in the manual shows that fault 12 indicates that reflected power is too high and you should check antennas and connections and make any necessary corrections or repairs.

Speaking of the manual, the Alpha 9500 *User Manual* is a very nice document. It is spiral bound to lay flat when open and to endure a lot of opening and closing. The information is clear and well written. Text is supported with photos, drawings and icons to indicate important items or notes or warnings. The pages are printed on coated paper that helps keep them clean. Schematics fold out to reveal nice large drawings that are easy to follow. Our amplifier arrived without a manual, but a call to RF Concepts quickly brought a replacement. A PDF version of the manual is also available for download from the RF Concepts Web site.

Bottom Line

The Alpha 9500 is worthy of its place at the top of the Alpha product line. Once configured for your station, automatic tune up is effortless and nearly instantaneous. It will operate at 1500 W output for long periods with no apparent effort and is ready to serve in the most demanding amateur applications.

Four Antenna Ports

The 9500 also has four antenna outputs that, after initial configuration, will automatically select the right antenna for the desired band. The 9500 has a pushbutton that activates the antenna switch circuitry to allow automatic antenna selection when you want to operate barefoot without using the amplifier.

Antenna switching is independent of the

[1] M. Wilson, AA2Z, "ETO Alpha 87A MF/HF Linear Amplifier," Product Review, *QST*, Jun 1992, pp 53-56. Past *QST* reviews are available to ARRL members at **www.arrl.org/product-review**.

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transceiver because it senses the RF input to determine the frequency, then the antenna that is set in memory for that band is selected for operation. This is all done at snap-of-a-finger speed. Manual antenna switching can be done simply by poking the appropriate button on the front panel.

Installation and Setup

In keeping with the Alpha tradition, the 9500 employs a robust power supply which means a very heavy transformer — in this case, 35 pounds. To avoid damage, the transformer, main chassis and power tube are shipped in separate cartons and strapped to a small pallet.

Installing the heavy duty power transformer is not difficult and only requires opening the cabinet, sliding the transformer into place, tightening a few ¼ inch bolts and plugging together a few electrical connectors. There are no tap connections to make because the 9500's microprocessor will sample the primary voltage then automatically trigger relays to select the correct high voltage tap for your line voltage. Power outlet types will vary from installation to installation, so the user must supply an appropriate plug for the line cord. The whole operation took about 30 minutes in the ARRL Lab.

With the transformer installed the desktop package weighs in at 82 pounds, so it is a good idea to perform the installation close to where you intend to use the amp. The manual cautions that the amplifier should not be transported with the transformer in place. Doing so risks damage to the chassis.

After installing the transformer and ensuring the 8877 tube and chimney are firmly seated, the covers are replaced and the amp is ready to go. Unless you are currently running a 1.5 kW station there are a few things that must be done before plugging in the amp and settling in to generate a pileup. These are but a few guidelines. The manual contains a section about preparing your station before installing the amplifier.

- While the Alpha 9500 can operate over a wide range of voltages, it is strongly recommended that you use a properly wired 240 V ac connection rated for 20 A or more. High power operation at 120 V is not really feasible, even with a dedicated line, as the current requirements exceed the typical 15 or 20 A house wiring.
- Position the amp so that it can get proper air flow on all sides of the cabinet. Don't block the intake or exhaust hole with papers, manuals or other equipment.
- Make sure that your antennas are tuned for minimum SWR and that all cables and feed lines are capable of handling 1500 W of power. Coax cable, PL-259 connectors, antenna switches, tuners and other items not rated for high power can break down and even cause a fire. If you spent the money to get an Alpha, don't be cheap on the back end of your station.

Table 1
RF Concepts, Alpha 9500, serial number 95009490143

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency range: All amateur frequencies in the range of 1.8 to 29.7 MHz.	Tested on 160, 80, 40, 30, 20, 17, 15, 12 and 10 meters. 60 meters not tested.
Power output: 1500 W minimum.	Tested to 1500 W output on all bands.
Driving power required: 65 W nominal.	50-75 W typical (max 90 W at 29.7 MHz).
Spurious and harmonic suppression: Not specified.	–45 dBc, worst case (10 meters), typically –61 to –66 dBc. Meets FCC requirements.
Third order intermodulation distortion (IMD): <–30 dBc.	3rd/5th/7th/9th: 45/49/56/57 dB below PEP (14 MHz, 1500 W output).
Primary power requirements: 100/120/120/200/220/240 V ac (automatic power tap).	
Size (height, width, depth): 7.5 × 17.5 × 19.75 inches; weight, 76 pounds.	
Price: $7950.	

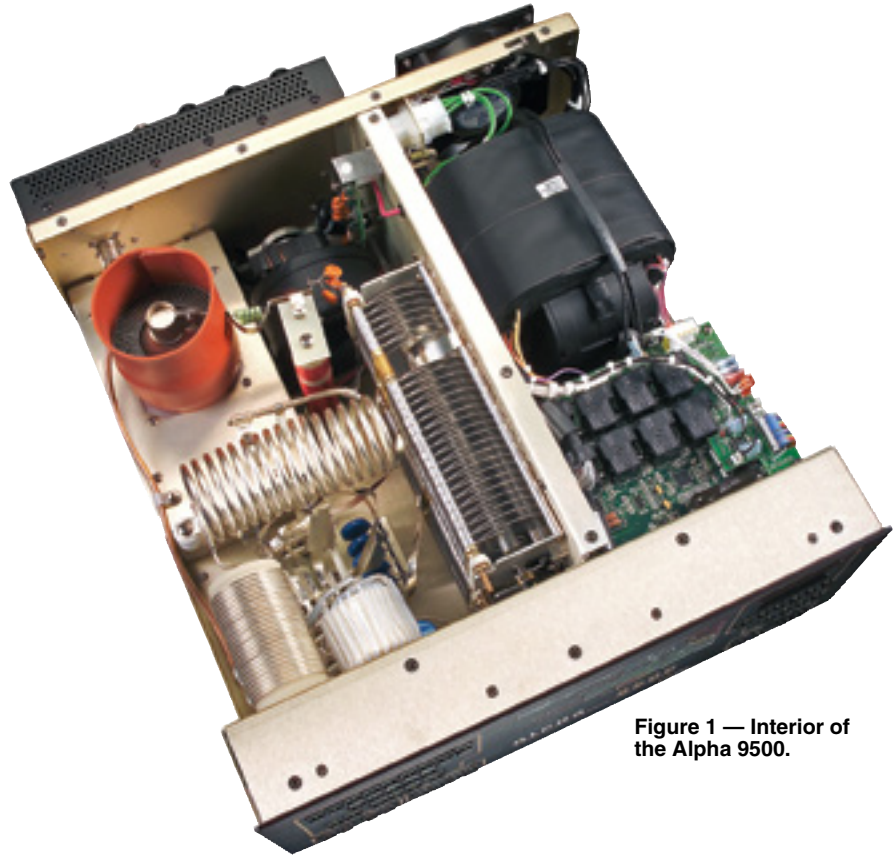

Figure 1 — Interior of the Alpha 9500.

Operation

Once everything is set and you have a resonant antenna connected to one of the four antenna outputs, turn the amp on and it comes to life with a whir of the capacitor motors and a clunk of the band switch as they set to nominal values. The cooling fan purrs away while the multifunction display counts down the 180 seconds required to warm up the 8877 tube. If you are listening to a DX pileup, this can be the longest three minutes of your life.

The amp is preset at the factory and the microprocessor will handle many minor adjustments. You may have to customize some of the settings to fit your station. This is easy to do and only involves pushing a button or two and then locking the new settings into the memory.

Operating the 9500 is easy and intuitive. Set your transceiver output to approximately 50 W. Press the amp's OPERATE button to move the amp from standby mode to operate mode. Key the transceiver and the amp will make a quick chunk and whir (don't be startled) and the display will indicate the RF output. The amp can be activated using any mode — CW, RTTY or even a few spoken syllables in SSB mode. It doesn't get any easier than that. The amplifier adjusts automatically to compensate for changes in drive

power without a separate ALC connection.

Whether band hopping in a contest, DX-ing or keeping that sked with your buddy, using the Alpha 9500 doesn't require much from the operator beyond powering it on.

Remote Operation

Because of advanced microprocessor control circuitry the Alpha 9500 amplifier can be controlled from a remote location. Remote can be from another room in the house or anywhere else in the world using an internet connection. To do this the user must download and install the *Alpha Remote AR9500* PC application. When I went to the RF Concepts Web site I naturally clicked on the link for DOWNLOADS AND SUPPORT then followed the next link for SOFTWARE AND FIRMWARE. The page had a number of files but not the *AR9500* that I was looking for. After a telephone call to RF Concepts I was able to download the file from the REPLACEMENT PARTS AND INFO section on their Web site. (The file is now available in the SOFTWARE AND FIRMWARE section as well.)

Using the instructions in the manual, the software installed quickly and easily. A USB cable connects the amplifier to the PC. The *AR9500* program displays a simulation of the 9500's front panel and all controls can be made with a click of the computer's mouse. Want to switch antennas? Mouse over the ANTENNA button and click. Key your transceiver to activate the amp and the output is displayed on your computer screen. Remote operation is really slick and can run in the background when using other programs. Yes, the Alpha 9500 is fully automatic but having the option for remote control greatly expands the possibilities of this amplifier.

The same USB connection can be used to upgrade firmware anytime a new version is released. The Lab tested this function with a firmware upgrade released after we received the review unit, and it worked as advertised.

Nits — There Must Be a Few

The Alpha 9500 is a solid performer and is rated to work with loads up to 3:1 SWR. In the Lab, it had no trouble finding a match on any band with a high power 25 Ω resistive load (2:1 SWR). I found operation a bit finicky with my 15 meter antenna, though. That antenna has higher than 2:1 in the phone band, and the autotune function could not find a solution there. Without manual adjustment the amplifier would display a high SWR fault code and switch to standby. After manual adjustment it worked fine.

The cooling fan seemed a bit noisy with the amplifier set in the usual location nearby on the operating desk. That proved not to be a distraction when I was using headphones. In addition, the amplifier is fully automatic so it can be set farther away from the operating position than a unit that requires attention from the operator.

There is little room to get fingers beneath the chassis to move or pick up the unit. At 82 pounds this would be designated a two man lift in any industry, so a set of recessed handles on the sides might be a nice addition.

Conclusion

Anyone who has seen the Alpha advertisements or who has seen the display at conventions with the brick on the key knows that Alpha amplifiers are built to deliver 1500 W of RF power at 100% duty cycle with no time limit. The Alpha 9500 lives up to the family tradition and with state-of-the-art microprocessor control the flagship 9500 can hammer away day and night without operator intervention.

Manufacturer: RF Concepts, 6185 Arapahoe Rd, Boulder, CO 80303; tel 303-473-9232; **www.rfconcepts.com**.

Yaesu FT-7900R Dual Band Mobile Transceiver

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The Yaesu FT-7900R dual band FM mobile is an update of the FT-7800R reviewed back in April 2004.[1] That was a long time ago! What got updated? Not really that much — it didn't need much. It's a very capable radio with a really good receiver. So what I'm going to do is dig deeper and use this radio to discuss some things about FM and repeater operation that affect day-to-day operation.

The first thing I want to do is introduce two acronyms: OBAAT and TWOBAAT. They stand for *One Band At A Time*, and *Two Bands At A Time*. Since I invented the words, I get to decide how to pronounce them. The *O* in OBAAT is more like the *oo* in boot, so it rhymes with the *two* in TWOBAAT.

The FT-7900 is an OBAAT. It can transmit on 2 meters or 70 centimeters, but you can listen to just one frequency at a time. Hence the name. The receiver covers 108 MHz to 1 GHz, skipping only the television channels at 500 and 600 MHz and the usual cell phone stuff at 800 MHz. No loss — all that's gone digital, so you couldn't decode it anyway. This receiver coverage is good, but it's not exceptional. Some handhelds cover the shortwave and AM and FM broadcast bands. Shouldn't mobile radios do more than handhelds? *That* would be exceptional in a dual band mobile radio.

What *is* exceptional is the radio's immunity to *intermod* — the mixing of two strong off-channel signals creates a new signal that appears on a third frequency where you don't want it. You'll hear hams say that any receiver with a "barn door" front end (that is, wide enough to tune the business and public safety frequencies far outside the ham bands) will be prone to intermod. But Yaesu's FT-7900 (and '8800 and '8900) have broad

[1]J. Carcia, NJ1Q, "The Yaesu FT-7800R Dual Band FM Transceiver," Product Review, *QST*, Apr 2004, pp 78-81.