

Review: The Ameritron ALS-1300 1200-Watt HF Power Amplifier
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Introduction

The new Ameritron ALS-1300 is a 160-10 meter 1200 watt output all solid-state amplifier with manual band switching or auto-band switching using the optional ARI-500. And while not full legal limit, 1200 watts is less than 1-dB down from 1500 watts.

The ALS-1300 Amplifier

The ALS-1300 is a basic, yet rugged solid-state amplifier. There are no internal micro-processors and all metering is via analog meters. The ALS-1300 consists of a separate amplifier and switching power supply which can be separated by up to 6-feet with the supplied power cable. The basic specifications are as follows:

Output Power:	Typically 1200 Watts PEP SSB/CW, 600 Watts continuous.
Input SWR:	1.5:1 or less
Operate/Standby Switch:	Selects exciter or full amplifier power instantly.
T/R Switching:	Typically 5ms relay switching
T/R Relay Drive:	12VDC at 15ma, ground to enable
Indicators:	ALC, SWR, PA and TX LED indicators
Metering:	
Current:	Simultaneous monitors individual 600-watt module current
Multi-Meter:	FWD/REF Power, PA Unbalance, ALC, HV1, HV2
Inrush Current Protection:	Step-start extends life of power supply components.
Power Requirements:	240VAC/12 amps (default), 120VAC 20 amps
Dimensions (ALS-1300):	7"H x 10.5"W x 17.5"D
Dimensions (ALS-1300SPS):	7"H x 10.5"W x 14"D
Weight, Amplifier Section:	23 pounds
Weight, Power Supply:	13 pounds

The ALS-1300SPS power supply consists of two identical 25-amp 50 volt switching power supplies mounted back to back as you can see in Photos A and B. A back panel-mounted single 4" fan keeps the power supply cool.

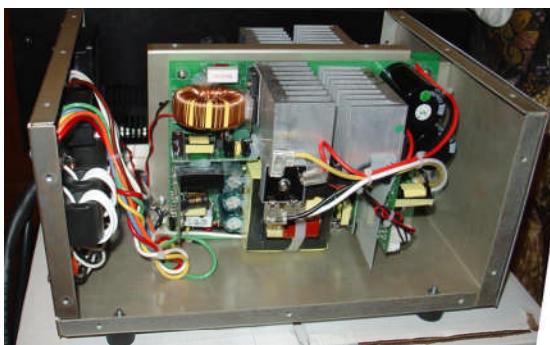


Photo A: Left side of the power supply

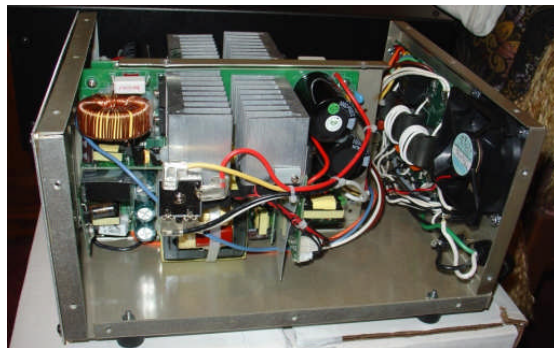


Photo B: Right side of the power supply

The ALS-1300 RF amplifier consists of two 600 watt amplifiers with four FETs each which are combined to achieve 1200 watts. For thermal integrity, each amplifier module spreads their four FETs out on a large 6" x 7" heatsink. Four 3" temperature-controlled fans cool the amplifier modules by drawing air through the heatsink fins. Photo C shows an edge view of the heatsink, and Photo D highlights the four cooling fans.



Photo C: Individual 600-watt amplifier heatsinks. Left-side view.

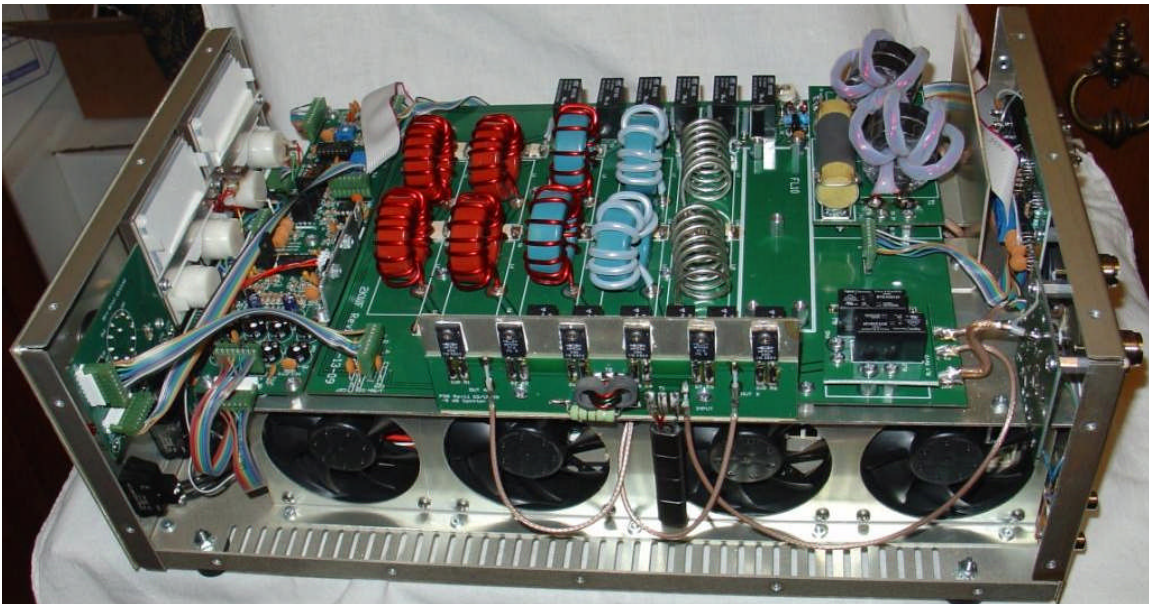


Photo C: Internal view of the ALS-1300. Note the four 3" cooling fans. The 12/10 meter filter assembly has not been added.

The ALS-1300 includes effective protection circuitry to prevent damage to the amplifier. A mismatch between the amplifier and transceiver's band settings, an incorrectly selected antenna, or an antenna system problem resulting in reflected power in excess of 130 watts causes the amplifier to fault (130 watts reflected power corresponds to a 2:1 SWR at 1200 watts output power). The amplifier heat sink temperature is also monitored, and the amplifier faults if this temperature exceeds a safe value. Finally, RF balance between the two 600 watt amplifiers is monitored and the ALS-1300 faults if significant unbalance between the two occurs. Whenever the amplifier faults, it is automatically bypassed.

You can restore the amplifier to normal operation by first clearing the fault and then simply switching from “Operate” to “Standby” and then back to “Operate”. Normally, an RF-unbalanced fault indicates a failure within the amplifier which will require repair.

Amplifier metering consists of two cross-needle meters as you can see in Photo E. The meters use LEDs for backlighting – so no more burned-out meter lamps! The left meter simultaneously monitors the FET drain currents of the two 600 watt amplifier modules. The right meter is set up as a multi-meter. You can select between the following:

- REF: Amplifier forward and reflected power, and SWR
- PAB: Amplifier balance. This is scaled to read the same as REF, which indicates proper balance.
- ALC: When ALC is used, this displays ALC activity between the amplifier and transceiver
- HV1: Drain voltage applied to one of the two internal power amplifiers
- HV2: Drain voltage applied to the second internal power amplifier

Note: HV1 and HV2 monitor the output voltage of each of the individual 50VDC/25 amp switching power supplies located within the ALS-1300SPS.



Photo E: ALS-1300 Front Panel

There are also several LED indicators. The frequency band indicators show the band selected, whether it is manually selected by the BAND switch or automatically selected by the optional ARI-500 Amplifier Radio Interface. The ALC LED flickers when ALC is active, the TX LED lights when the amplifier is keyed, and the SWR and PA LEDs indicate fault conditions.

When the ALC cable is connected between the ALS-1300 and your transceiver, you can adjust the amplifier output power from the front panel ALC control. When properly adjusted, the ALC control also prevents you from accidentally overdriving the amplifier. According to Ameritron the use of the ALC interface is not really necessary as long as your transceiver is incapable of outputting more than about 100 watts. However as the ALS-1300 requires less than 100 watts to drive it to full output, you can overdrive the amplifier resulting in non-linear operation unless you properly adjust your drive level.

Let's Fire-Up the Amplifier

The ALS-1300 comes wired for 240VAC operation, and even includes the correct 240VAC connector. Besides the RF IN/OUT cables, you'll also need a ground wire from the amplifier to your station's single-point ground connection point, and ALC and amp keying (RELAY) cables (typically RCA cables) to interface with your transceiver. Photo E shows the ALS-1300 back panel connectors.



Photo E: Rear panel of the ALS-1300.

The amplifier keying input (RELAY) has an open circuit voltage of 12VDC and only requires your transceiver's amplifier keying output circuitry to sink 15ma. Therefore the ALS-1300 can be keyed from any transceiver without requiring a special interface. And with a relay enable/disable time of 5ms, full QSK operation is supported. And indeed, I enjoyed operating QSK with this amplifier up to my maximum CW speed of about 35WPM. Further, the lifetime spec on the T/R relays is 10 million operations. Compare this to the 2-million operational life-time spec of vacuum relays used in many QSK amplifiers. And finally, the T/R relay sub-board is easily replaced should either of the relays ever fail (see Photo F). Ameritron doesn't mention QSK operation with the basic ALS-1300, but instead recommends the optional QSK-5 PIN-diode QSK switch.

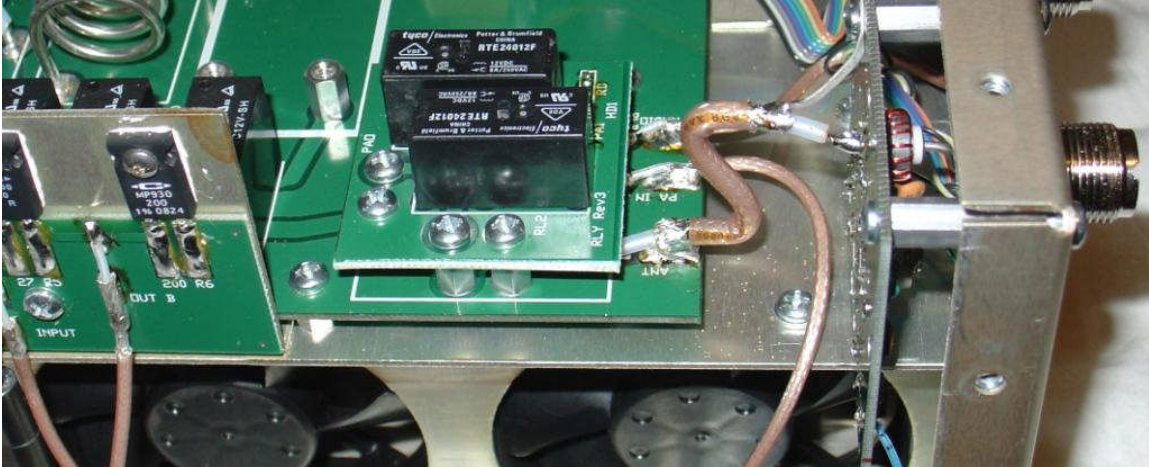


Photo F: T/R relay subboard

Performance Measurement

My first tests included measuring amplifier power output and checking the amplifier's internal power meter against an Array Solutions PowerMaster NIST-traceable digital peak-hold wattmeter. I adjusted the drive until the output power of the amplifier stopped increasing, but never exceeded 1200 watts. This particular amplifier will put out more power than 1200 watts on all bands except 80-, 30- and 12-meters. As Table 1 shows, the ALS-1300 does a good job meeting its typical power output specifications. Note the drive necessary to get the US limit of 200 watts on 30 meters. I also found the ALS-1300 peak-reading wattmeter to be quite accurate for an analog meter. As you can see from my measurements, the ALS-1300 power meter reads within 10% of the PowerMaster over the full HF spectrum – and is very accurate on most of the ham bands.

TABLE 1: Amplifier Power Output Measurements (external digital wattmeter)

<u>Band</u>	<u>Drive</u>	<u>Output Power</u>	<u>Wattmeter</u> <u>PM/ALS-1300</u>
160M	70W	1200W	1000/950
80M	75W	1100W	1000/1000
40M	50W	1200W	1000/1000
30M	13W/72W	200W/1060W	1000/1000
20M	55W	1200W	1000/1000
17M	55W	1200W	1000/1000
15M	55W	1200W	1000/1000
12M	95W	1165W	1000/1100
10M	80	1200W	1000/1100

On the Air

I'll have to admit, I really like the ease of operation of a solid-state amplifier. It is very nice not to have to worry about tuning the amplifier when it is needed. Just set the band switch, select "Operate", and transmit. And in these days of low sunspot activity I find that the amplifier comes in handy more often than not. When conditions degrade, I just flip the mode switch to "Operate" and continue with the contact. As all of my antennas

are resonant in the band segment I'm interested in (CW end of the HF bands), high SWR isn't a problem. For the rare occasions when I move out of the CW bands, I use a MFJ-998 auto-tuner to instantly trim the SWR. The MFJ-998 is nice in that it interrupts the amplifier keying input before it starts tuning. There is a detailed review of the MFJ-998 in the "Equipment Reviews" section of this website.

Finally – A Few Options

There are currently three options available for the ALS-1300. The first option, the MOD-10MK 12/10 meter low-pass filter assembly, is more of a small \$29.95 cost adder rather than an option as most will purchase this. While the FCC rules now permit an amplifier to be equipped with 12- and 10-meter capability, the ability to transmit on the 11-meter CB band must be inhibited. As the ALS-1300 has no internal processor or other means of determining the actual frequency being transmitted, Ameritron cannot ship domestic amplifiers with the capability to transmit in the CB band. However, since properly licensed amateur radio operators can modify their equipment you can purchase the MOD-10MK with proof of your license and install the filter yourself. Installation requires just a few minutes as the filter attaches in place with five mounting screws. You must also strap jumper J2 on the front band-switch pc board to AUX. It takes longer to remove and re-install the cover than it does to install the MOD-10MK!

A convenient second option is the ARI-500 Amplifier Radio Interface (\$119.95). This unit provides auto band-switching by reading band data from most modern transceivers, and then provides this frequency band information to the ALS-1300. A transceiver-specific cable connects your transceiver to the ARI-500, and a pair of RJ45 cables connects the ARI-500 to the A/B REMOTE connectors on the back of the ALS-1300. The BAND switch on the ALS-1300 is then set to the REM position, and the ALS-1300 will track your transceiver's band changes automatically under control of the ARI-500. Check the "new" ALS-600 review on this website for more details on the ARI-500. The "Equipment Modifications" section of this website also details some modifications to the ARI-500 for improved flexibility.

And finally there is the external QSK-5 pin-diode switch. As I mentioned earlier, the internal relays work just fine for QSK. However if you are a contester, the silent-operating QSK-5 may be more to your liking.

Conclusion

If you've been looking for a solid-state near-legal-limit amplifier, the Ameritron ALS-1300 is worthy of your consideration. 1200 watts of output power, well-protected no-tune operation, compact and light-weight packaging, and the ability to add auto band-switching makes this amplifier an attractive and useful addition for your ham shack.