FlexRadio

Aurora FAQ

AU-510
AU-510M
AU-520
AU-520M

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What is Aurora?

FlexRadio has developed a new HF transceiver with a 500W output on 160-10m HF bands (200W on 6m). This radio does not use a legacy RF exciter followed by a linear amplifier. Instead, it uses a transmitter that employs Polar Modulation (PM).

Having a 500-watt transceiver with an integrated automatic antenna tuner (ATU) in a single unit offers a few clear advantages, especially for seasoned operators who value simplicity and efficiency. First, it reduces the need for interconnecting multiple devices, which cuts down on cabling, potential RFI issues, and the complexity of station setup. This integration can also streamline operation, as the ATU and amplifier are designed to work in harmony, often offering faster tuning and better protection for both the radio and the amplifier. Another big plus is the space-saving aspect—ideal for both compact home stations and portable setups where minimizing gear is a priority

Aurora provides significant benefits over transceivers with linear amplifiers. The polar modulation technique used (details below) is significantly more efficient than linear amplification. This change to the transmitter yields significant power savings, generates less heat resulting in the need for a much smaller heat sink which also reduces size and weight. It is the most significant advancement in amateur radio transmitter technology in the last 50 years.

By adopting the proven architecture of the FLEX-6000 and FLEX-8000 series and maintaining compatibility with SmartSDR, Aurora offers a familiar yet powerful upgrade path for today's FlexRadio operators.

Introduction to Polar Modulation:

Polar modulation is a highly efficient signal transmission technique that separates a radio frequency (RF) signal into two fundamental components: amplitude (envelope) and phase (angle) components, allowing each to be amplified independently and more efficiently.

Unlike legacy linear amplification methods, which require power-hungry and heat-intensive amplifiers to preserve signal integrity, polar modulation enables the use of switching-mode amplifiers (such as Class D, E, or F) that operate with significantly higher efficiency.

Originally proposed in the 1950s by Leonard Kahn through his Envelope Elimination and Restoration (EER) technique, polar modulation has seen renewed interest with modern digital signal processing (DSP) capabilities.

It offers a compelling path forward for amateur radio, enabling cleaner, smaller, and more energy-efficient transmitters that challenge the long-standing dominance of legacy linear amplifier designs.

Why is the Aurora transmitter so efficient?

The Polar Explorer © 2025 transmitter is so efficient because it replaces legacy linear amplification with switch-mode amplification—specifically Class D amplifiers—and leverages digital signal processing (DSP) to separate and handle the signal's envelope (amplitude) and phase components independently.

Why is the Aurora radio so small for 500W?

The transmitter is extremely efficient which results in the need for a much smaller heat sink. The reduced heat sink size and transmitter all fit inside the same space as a traditional 100W amplifier.

I see the radio weighs only 18 pounds (8kg). This doesn't include the 500W transmitter and associated power supply, right?

Actually, it does. Because of the high efficiency of the Aurora transmitter a small power supply, small heat sink and transmitter all fit into a very small space. The Aurora radio has it all: receiver, 500W transmitter, AC to DC supply!

I understand that Aurora is around 80% efficient.

I checked and my current radio is about 40-50% efficient. This means that I'm saving about half the power, with Aurora, right?
Actually, no! The math around efficiency is a little weird. A 100W transmitter that is 40% efficient generates 150W of heat (100/0.4 = 250W of input power. 250W - 100W output = 150W of heat). A 100W transmitter at 80% efficiency generates only 25W of heat (100/0.8 = 125W. 125W - 100W output = 25W).

The heat generation of the 80% efficient transmitter is only 17% of that of the 40% efficient amplifier. This is a 6x reduction in the heat generated! This allowed FlexRadio to put a 500W transmitter in the space of a 100W linear amplifier!

Is this radio compatible with digital modes like FT8 and RTTY?

Yes!

Always monitor temperature and follow the manufacturer's duty-cycle recommendations. The Aurora transceivers rated for Intermittent Commercial and Amateur Service (ICAS) which is 25-50% duty-cycle.

What is the maximum power on FT8, RTTY, etc.

We have tested 100% transmission for a continuous 2 hours. While we do not recommend you doing that, we are confident in how robust this transceiver is.

Aurora looks fantastic! When can I add an Aurora amplifier to my Brand X radio?

Unfortunately, you cannot. The Polar Explorer technology that Aurora is built upon requires inputs not of low level composite RF like a legacy amplifier, but of an RF carrier and an envelope waveform. No radios on the market output these components expecting an external transmitter that uses polar modulation.

The Aurora transmitter must be tightly integrated with the host transceiver. Therefore this is available only as a FlexRadio integrated transceiver.

Can I integrate this radio into a remote station setup?

Absolutely—Aurora models are built on the same amazing remote platform that all FLEX-8000 radios are built on. The same API, with extensions for Aurora, is available as well as SmartLink capabilities. Aurora is the perfect high power remote HF hardware.

Will I need an external tuner with this radio?

The radio comes with an internal antenna matching unit capable of matching up to an SWR of 3:1. The core Aurora technology is more sensitive to impedance mismatches than a linear amplifier.

As a result, all Aurora models come with an integrated tuner to ensure the impedance presented to the transmitter is close to 50Ω. Use of the integrated tuner will be required for any non-resonant antennas.

How efficient is the Aurora transmitter compared to legacy linear HF amplifiers?

This radio boasts **80% efficiency**, thanks to its use of polar modulation and high-efficiency transmitter architecture. Legacy linear amps often run around 40-60%, so this design cuts waste heat by 70-80%.

What does 80% efficiency mean in practical terms?

It means that out of every 100 watts of supply power drawn from the wall, about 80 watts go to your actual RF signal, and only 20 watts are lost as heat. That’s a major improvement over typical HF rigs and amps.

What is the difference between an Aurora AU-510 and an AU-520 model radio?

The AU-510 is built on a FLEX-8400 with ATU design so it has one internal Spectral Capture Unit (SCU) whereas the AU-520 is built on the FLEX-8600 design so it contains two SCUs and competition grade preselectors.

As a result, the AU-510 has four antenna connectors (two that can output 500W), has two internal receivers and can place those receivers on one antenna at a time.

The AU-520 has six antenna connectors (two that can output 500W), has four internal receivers and can place those receivers on either of two antennas at the same time.

I already have a radio at home. What would the Aurora buy me?

The most obvious addition if you have a 100W radio is an increase in power to 500W. In addition to this, the Aurora radios are 80% efficient so the electricity required to make 500W is less than half of what it would be with a traditional radio and an external amplifier.

As a result, you save on operating costs. Also, since the heat generated is about one-fifth to one-sixth that of a legacy 500W amplifier, it lowers cooling requirements on your house and can help keep an even temperature in your shack.

Finally, because Aurora is completely integrated, your shack with Aurora is much cleaner with less wires, cabling and devices.

I like to operate POTA or other portable operations.

Isn't 500W overkill? What would the Aurora buy me?

The input power required for a legacy 500W linear amplifier is 1,000-1,250W to make that 500W output. This is on top of the 100W radio sending power to the amplifier which will draw around 250W itself during transmit.

This means your legacy 500W amplifier set up would need 1,250–1,500W of input power to make that 500W output. Aurora needs 650-700W of input power to make 500W of output power. On top of that, a legacy 100W/500W configuration weighs about 47 pounds. Compare that to the 18 pound Aurora transceiver!

That's a more than 50% reduction in input power and a 62% reduction in weight for a 500% increase in power output! Aurora also eliminates all the cabling to connect a legacy 500W station together.

Finally, if you're using a generator, solar or any other off-grid power system, the system itself can be significantly smaller or use less fuel.

I'm planning a DXpedition.

Would there be any benefit of using an Aurora radio?

DXpeditions are fraught with logistical challenges. Aurora provides a 500W transmit capability in an 18-pound integrated radio that uses half the electricity (and therefore fuel) of a legacy 500W configuration.

Aurora is a 500W station that can literally be put inside a carry-on bag. The advantages are similar to the POTA discussion above, but cannot be underestimated for a DXpedition.

Do I need a big cooling setup or fans for this?

Not at all. With far less heat being generated, cooling requirements are dramatically reduced. It still includes active cooling, but it's much quieter and more compact than you might expect for 500W output.

Will this reduce the need for external heat dissipation in my shack?

Yes. Less waste heat means your shack stays cooler, especially important for smaller or poorly ventilated rooms.

Does high efficiency mean better reliability?

Generally, yes. Less thermal stress on components leads to longer life, fewer thermal shutdowns, and overall more stable performance during long operating sessions.

Can I operate outside the Amateur Radio bands for MARS, SHARES, etc?

No. This transmitter is designed strictly for the amateur bands and the hardware is not capable of transmission outside of normal amateur HF/6m bands.

What supply voltage is required?

The radio can operate from 100 to 240VAC thanks to its autosensing built-in AC power supply, allowing it to deliver its full power. This means that for those operators with only 120VAC line voltage, the radio can still develop 100% of its maximum output.

Can I operate the radio at 13.8V DC?

No. You must use 80 to 264 VAC as a supply voltage.

What is the maximum power on 6m?

The maximum power on 6m is 200 watts.

Is the ATU included?

Yes, the ATU is included in every model that handles up to a 3:1 SWR.

Can I hook up an external ATU?

All Aurora transceivers include an integrated 3:1 500W tuner. An external tuner can be used instead if preferred. Note that the tuner needs to be capable of at least a 500W input and care should always be taken when dealing with high-power RF.

Can I use the radio with an external amplifier?

Yes, you can—**but proceed with caution.** It's critical to avoid overdriving the connected amplifier. Doing so can cause serious damage, not just to the external amplifier but also to the transmitter inside the radio itself. This may impact your radio and amplifier warranty.

How much does it cost?

Please see our website for the most current pricing. www.flexradio.com

When will my Aurora radio be available?

The Aurora radio line is currently in field testing and the first production run has been ordered. FlexRadio is taking deposits for the first production run which we expect to be available in 4Q25.

Orders that exceed the first production run will be moved into the second production run which will be available after 4Q25.

Will there be an M Model?

Yes. The AU-510 and AU-520 are also available as an AU-510M and AU-520M.

Can I trade in my radio to aid the purchase of the AU-500 Series Radio?

Not at this time.

Does this radio support SmartLink, multiFLEX, etc?

Yes, the broad feature set offered in the FLEX-8000 is also provided in all Aurora radios. The AU-510 is essentially a FLEX-8400 with an 500W Aurora transmitter and the AU-520 is a FLEX-8600 with an Aurora transmitter.

Does Aurora support transverters?

Yes, transverters can be attached to the XVTR ports in the same fashion as the FLEX-6000 and FLEX-8000 series.

Aurora Series Comparison

Feature	AU-510	AU-510M	AU-520	AU-520M
Transmitter Power	1–500W HF, 1–200W 6m	1–500W HF, 1–200W 6m	1–500W HF, 1–200W 6m	1–500W HF, 1–200W 6m
Efficiency (Peak)	Up to 80%	Up to 80%	Up to 80%	Up to 80%
Spectral Capture Units (SCUs)	1	1	2	2
Slice Receivers / Panadapters	2 / 2	2 / 2	4 / 4	4 / 4
RX Antenna Ports	1	1	2	2
Transverter Ports (0 - +10dBm)	1	1	2	2
Frequency Coverage	30kHz–54MHz	30kHz–54MHz	30kHz–54MHz	30 kHz–54 MHz
Full Duplex	Yes	Yes	Yes	Yes
Display	None	8" 1920×1200 IPS Touchscreen	None	8" 1920×1200 IPS Touchscreen
Maestro Front Panel	No	Yes	No	Yes
SmartSignal™ (Adaptive Predistortion)	✔	✔	✔	✔
CESSB (RF Compression)	✔	✔	✔	✔
MultiFlex™ (Dual Client Support)	✔	✔	✔	✔
Integrated Tuner	✔	✔	✔	✔
Integrated Power Supply	✔	✔	✔	✔
Remote Operation (SmartLink™)	✔	✔	✔	✔

External Display Support (HDMI®)	—	✔	—	✔
GNSS / GPSDO Support	✔ / Optional	✔ / Optional	✔ / Optional	✔ / Optional
SO2R Ready	—	—	✔	✔
Power Input	80–264VAC	80–264VAC	80–264VAC	80–264VAC
Dimensions (H × W × D)	6.74" × 14" × 13.25"	6.74" × 14" × 13.25"	6.74" × 14" × 13.25"	6.74" × 14" × 13.25"