



XR12



12 kW AM Medium Wave Broadcast Transmitter

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XR Series Power Module

POWERFUL BUILDING BLOCKS

The building block for the XR12 is a power module integrating multiple RF amplifier units with a combined output rating in excess of 7.5 kW. Two power modules plug into the front of the transmitter, making service easy. A third spare power module provides full power operation in case of a power module failure.

The individual RF amplifier and modulator units are connected in the power modules using plug-in industry standard "D" connectors and bolted directly to the heat sink. Servicing consists of simple exchange, using only a screwdriver. Component level repair can be performed at the workbench or at a central service depot. These plug-in RF amplifier and modulator units are low cost, disposable components.

Ventilation is provided by redundant brushless DC-powered fans mounted in a removable tray below the power modules. Airflow is unaffected by AC supply variations, ensuring cool operation and long term reliability.

SIMPLY THE BEST ENGINEERED TRANSMITTERS

ON-AIR SERVICEABILITY

The XR12 transmitter is ruggedly engineered to provide easy on-air service and maintenance. Output from the two power modules are combined to yield a 15 kW capability. At all power and modulation levels, the modules contribute equally to the final output. If an amplifier fails, the XR12's spare power module ensures full power operation is maintained. If an amplifier fails in the spare module, operation continues at slightly reduced power. No stress is imposed on the remaining module and spectral integrity is not compromised. Repair or replacement can be performed whenever it is convenient.

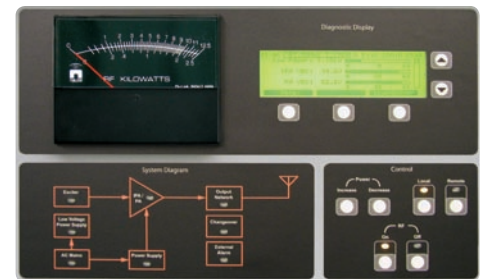
Nautel's patented parallel network combiner offers important advantages over conventional series or balanced hybrid combiners. The technique is efficient and provides superior failure isolation. No damage to the combiner can be caused by failure of a module in either short or open circuit mode. A power module can be removed from the transmitter while the remaining module continues to operate. This means that service may be performed during normal hours without a moment's interruption in broadcasting.

AUTOMATIC STANDBY

The most critical part of a transmitter is the exciter section, which provides coherent drive to the power modules. These low level circuits generate the RF carrier and modulation control signals. A unique feature of Nautel transmitters is the complete duplication of these circuits. Should a failure occur in the RF drive or modulator drive, the transmitter automatically switches over to the built-in standby DDS exciter and modulation encoder. This dramatically enhances the already high operational reliability inherent in the modular solid-state design.

UNATTENDED OPERATION

The XR12 transmitter is built to stay on the air without human supervision. The XR12 maintains 12 kW with 100% modulation even with an antenna mismatch of up to 1.5:1 VSWR. With more extreme VSWR, power is automatically reduced to a safe level. A unique circuit dynamically stabilizes power output against AC line voltage variations. After an AC power loss, over voltage or RF overload, prior operating status is automatically restored. The XR12 is ideally suited for unattended automatic or remote controlled operation.



OPERATING CONVENIENCE

The XR12's graphic user interface and soft-keys give you simple menu control of operating modes. Six power level selections are continuously adjustable over the full range using raise/lower commands. Programmable system profiles let you define schedules for changes to power and modulation settings. An LED diagnostic status flow diagram continually monitors the system, and an advanced control, alarm and 128 event time stamped logging system allows service personnel to easily identify problems.



EXTRA POWER

The XR12 is purposely designed for demanding AM broadcast applications that require reserve power. This extra power overcomes antenna system losses such as those encountered in complex directional arrays. It allows aggressive audio processing and high levels of asymmetrical modulation to produce more sideband energy and a stronger signal. Extra power also makes it possible to maintain full power AM transmission while also transmitting a digital signal or other simultaneous phase-coded data.



XR12 AM Transmitter

LOW COST OF OWNERSHIP

Very high efficiency and low maintenance overheads make this transmitter extremely cost effective to own and operate. Overall efficiency is typically 84% or better. This provides significant savings by reducing total power consumption and the peak demand. The high efficiency means less energy is wasted as heat, which reduces your cooling and ventilation costs. Redundancy features and protection systems maintain operation without reliance on an operator, reducing your operating costs even further.

DIGITAL PERFORMANCE ADVANTAGES

The XR12 has been specifically designed to support the digital transmission formats now available and being developed for use on existing AM channels. The Nautel Interphase Pulse Duration Modulator employs an ultra linear extended band filter that maintains an envelope bandwidth of 40 kHz. A special circuit optimizes IPM to ensure minimal phase error. This provides superior signal-to-noise ratio when transmitting a digitally encoded signal using digital modulation techniques such as HD Radio and DRM. The XR12's digital performance is outstanding, even with the limited bandpass performance of real-world antenna systems. It is compatible with all digital modulation systems on the market today, and all future modulation schemes. This combination of compatibility, performance and flexibility makes the XR12 an excellent choice for digital broadcasters.

Ready for digital. Ready for anything.

Nautel XR12 Quick Specs

- RF Output Power – 12 kW (rated)
15 kW (capable)
- 145% positive peak modulation
at 12 kW
- 1.5:1 VSWR at 12 kW,
100% modulation
- Dual hot-pluggable power
modules and redundant
standby module
- Dual DDS exciters with
automatic changeover
- Plug-and-play integration with
Nautel's NE IBOC AM HD Radio
signal generator
- Programmable user interface
facilitates custom profiles for
each preset
- Built-in power preset scheduler
allows for six preset power levels
- XR12 dimensions: 72 cm W x
184 cm H x 104 cm D
- New 25 kW and 50 kW
XR transmitters also available

The XR series is the fourth generation in an evolutionary process of design improvement that began in 1982, when Nautel introduced the world's first solid-state 10 kW to 50 kW AM transmitters. Tens of millions of hours of real-world operational experience have gone into the design and construction of the XR series. The result is unparalleled performance and reliability.

The XR12 is fully compatible with High Definition Radio (HD Radio™) and Digital Radio Mondiale (DRM), giving you a plug-and-play solution that simplifies your move into digital radio broadcasting.

The XR12 provides reserve power for aggressive signal processing and up to 145% positive peak program modulation at 12 kW. In fact, the XR12 barely idles at its nominal power level. Capable of up to 15 kW, the XR12 is ideal for delivering simultaneous full power AM digital and analog service.

Over-engineering gives the XR12 not only impressive performance but also incredible reliability. The XR12's spare power module ensures that you continue to operate at full power even if one of your power modules requires service. Modules are hot-pluggable, letting you service the transmitter without going off the air. For even greater on-air confidence, the XR12 includes a complete standby DDS exciter and modulation encoder that automatically takes over when it detects a problem. The XR12 even includes redundant cooling fans.

The XR12's intuitive control and monitoring system, with its easy to read graphic interface, sophisticated alarms and detailed logging makes it easy to set up and monitor transmitter operations. You can program transmitter profiles, giving you one touch control of power, modulation and other key parameters. You can even program an operating schedule to comply automatically with daytime authorized power levels. The XR12 also allows remote monitoring and control, letting you integrate it into your site control board.

Whether opening a new facility or updating an existing one, discriminating broadcasters demand the performance, excellence and reliability of Nautel's XR series AM transmitters.

For further information, please contact us at:

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ISO9001 Registered

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● Nautel AM 12, 25 and 50 kW installed transmitters



SIMPLY THE BEST ENGINEERED TRANSMITTERS

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GENERAL

Transmitter Type

Medium wave, 100% solid state

Configuration

Two RF power modules each including eight broadband RF amplifiers and four modulators

Dual DDS exciters and modulation encoders. Full automatic changeover

Third redundant spare module with full automatic changeover (optional)

RF Output Power

Maximum: 15 kW

Range: 1 kW to 15 kW

Six programmable preset power level profiles, selectable locally or remotely

RF Output Connection

7/8" or 1 5/8" standard

RF Output Impedance

50 ohms, unbalanced

Efficiency

84% typical

RF Load VSWR

2,000 peak reflected watts 1.5:1 VSWR at 12 kW, 100% modulation

Frequency Range

531 kHz to 1,710 kHz. Supplied, tuned and tested to one frequency as specified

Frequency Stability

±2 ppm over temperature range.
External GPS for increased stability

Modulation Type

Nautel Wideband Interphase Pulse
Duration Modulator

Modulation Capability

155% positive peak modulation at 10 kW

145% positive peak modulation at 12 kW

120% positive peak modulation at 15 kW

Spurious and Harmonic

Exceeds FCC, IC and ITU requirements

80 dB relative to carrier

AC INPUT

Voltage

187 V ac to 437 V ac, 3 phase, 50 Hz or 60 Hz to customer specifications

Power Supply Variation

±10% voltage, 47 Hz to 63 Hz

Power Consumption

11.9 kW typical at 10 kW, 0% modulation

17.9 kW typical at 10 kW, 100% modulation

14.3 kW typical at 12 kW, 0% modulation

21.4 kW typical at 12 kW, 100% modulation

Power Factor

0.95 typical

ENVIRONMENTAL

Temperature Range

0°C to +50°C

Derate 3°C per 500 m above sea level

(2°C per 1,000 ft)

Humidity Range

0% to 95% non-condensing

Altitude

0 m to 3,000 m (0 ft to 10,000 ft)

Cooling Air Requirements

1,000 m³/hr (600 CFM)

PHYSICAL

Size

72 cm W x 184 cm H x 104 cm D
(28.5" W x 72.5" H x 41" D)

Weight

329 kg (725 lbs)

AUDIO PERFORMANCE

Audio Input

600 ohms balanced

+10 dBm nominal (adjustable from 0 dBm to +12 dBm)

Frequency Response

+0.2 dB/-0.8 dB, 30 Hz to 10,000 Hz.
Referenced at 1 kHz, 95% modulation





Total Harmonic Distortion

Better than 0.8% (THD), 30 Hz to 10,000 Hz.
Referenced at 1 kHz, 95% modulation

Intermodulation Distortion

1.0% or less, 60/7000 Hz, 1:1 ratio
SMPTE standards at 95% modulation.

Transient Intermodulation Distortion

0.5% at 80% modulation, 2.96 kHz/8 kHz,
30 kHz BW

Square Wave Overshoot

1.0% or less at 400 Hz (100 μ S risetime)

Square Wave Tilt

0.5% or less at 40 Hz

Carrier Shift

0.5% or less

Hum and Noise

-65 dB or better below 12 kW, 100% modulation

DIGITAL COMPATIBILITY

HD Radio™

Compatible with NE IBOC - HD Radio
signal generator

Exceeds all regulatory requirements for AM
HD Radio operation

DRM

Compatible - Consult factory

Notes:

Specifications defined in a laboratory environment with high grade source and demodulation equipment. Standard factory measurement does not include all items

SPECIFICATIONS SUBJECT TO CHANGE
WITHOUT NOTICE.

