HARRIS®
assuredcommunications®

3DX™ 100

100 kW Digital Solid State AM MW Transmitter that builds on industry standard 3DX Technology to provide a fully digital architecture and full compatibility with digital radio systems: DRM and HD Radio™.

drm HD Radio

3DX™ 100

The new standard.

The Harris DX100 transmitter has been the standard against which all other 100 kW AM MW transmitters are measured. Now, Harris is pleased to introduce the new 3DX™ 100 that offers enhanced performance and reliability to that offered by previous DX transmitters. The proven architecture used in the 3DX™ 25 and the 3DX™ 50 is now available at the 100 kW power level.

The 3DX™ 100 features 3D technology, Direct Digital Drive, which provides a whole host of new features and benefits. Some of the benefits of Direct Digital Drive are the world's best efficiency and a multitude of ways to keep you on the air at maximum power and performance should any difficulty occur. In addition, comprehensive diagnostics let you know exactly how your transmitter is performing at all times.

If you operate high power transmitters, the 3DX™ 100 is for you.

3DX™ 100 Control Panel

AM Radio's Digital Future is Here

User Interface

Like the 3DX™ 25 and the 3DX™ 50, the 3DX™ 100 is designed for easy use through the IntelliStat™, the ultimate in control and diagnostic user interfaces. This combination of large, internationally-identified control buttons, a status panel with selectable metering, and 1/4 VGA color display provides all important control and status parameters needed to know exactly how the transmitter is performing.

Reliability

The proven reliability of the DX transmitter is also present in the 3DX™ 100. Digital Serial Adaptive Modulation (DSAM) continuously monitors each serial modulation encoder and RF PA modules and makes automatic module reassignments should the need arise.

Digital Exciter

The 3DX™ 100 exciter uses direct digital synthesis to accurately produce the RF signal. A low level digital signal drives the Power Amplifiers (PA) eliminating the RF driver section therefore reducing complexity. This approach improves signal linearity, improves bandwidth for digital broadcasting; and, provides high overall efficiency. Additionally, it facilitates easier frequency changes.

Safety

3DX™ 100 transmitters are IEC 215-compliant. The 3DX™ 100 also offers a higher level of safety by the use of keylocks. This standard safety feature ensures that AC mains are disconnected, DC supply and RF output are mechanically earthed before access is allowed.

3DX™ 100 Transmitter

Power Supply Cabinet *RF Amplifier Cabinet 1* *RF Amplifier Cabinet 2* *Output Network Cabinet*

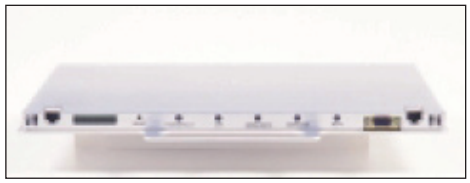
3DX™ 100 Features and Benefits

Serial Modulation Encoder

The 3DX™ 100 uses six plug-in serial modulation encoders. Each encoder provides the direct drive to 16 RF power amplifier modules, which are turned ON or OFF to produce the modulated RF signal. All serial modulation encoders are interchangable with the auto-servicing feature, the transmitter can still operate with less than six active encoders.

RF Power Amplifiers

The 3DX™ 100 uses 92 main and six binary solid-state RF power amplifiers. These modules protect themselves from over-temperature, loss of RF drive, loss of power and shorted RF output conditions, and are hot-pluggable for on-air servicing. These modules are of simple construction with easy access to the individual MOSFET transistors.



Serial Modulation Encoder Module

RF Power Amplifier

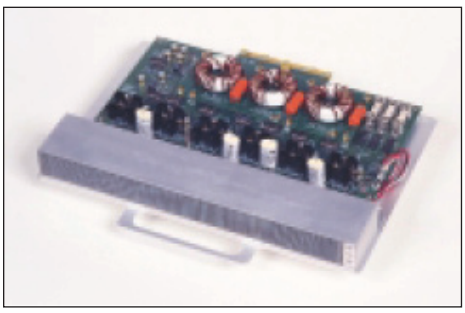
RF modules may be removed while on the air

RF Combiner

With the same RF combining architecture as the 3DX™ 25 and 3DX™ 50, the combiner assembly is readily accessible from the rear of the transmitter for easier servicing. This allows individual RF motherboards to be easily removed.

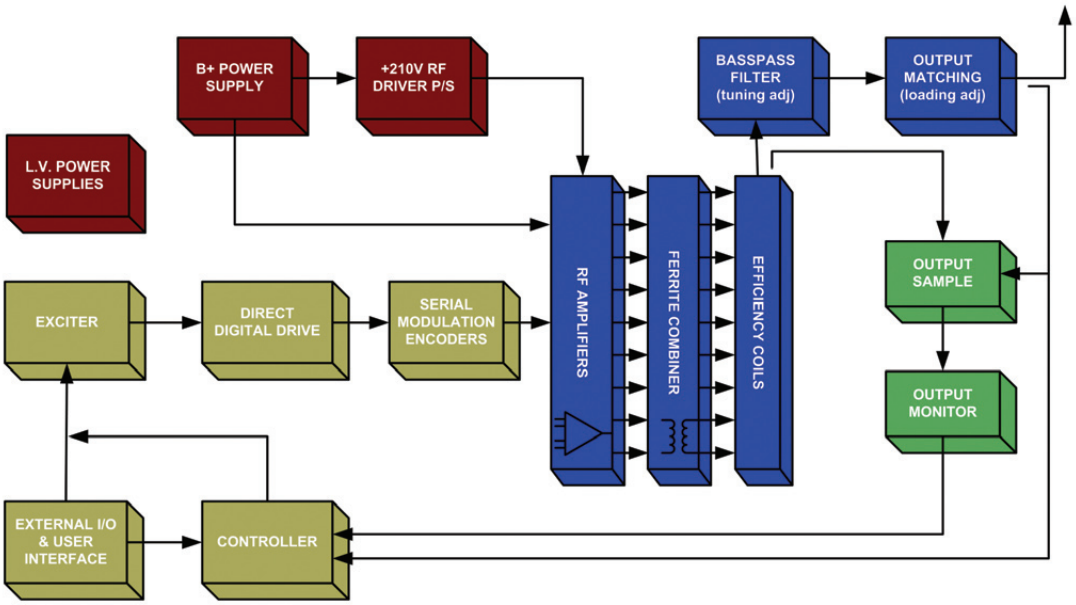
Output Network

The 50 ohm output network with internal variability ensures the transmitter is properly matched into the antenna and that all output meter readings are correct. An adjustable loading control is accessible from the front of the transmitter. The internal



Binary RF Amplifier

3DX™ 100 Block Diagram



bandpass filter provides VSWR protection in addition to improving turnaround loss. The transmitter uses a minimum of frequency-determined components for ease of frequency changes in the field. A VSWR detector, carbon arc gap, arc detector and static drain choke are all provided for protection against lightning, static electricity, and other transients.

Main DC Power Supply

A true 6-pulse SCR-controlled power supply maintains a high power factor and generates low AC line harmonic distortion. Voltage soft start protects the transmitter when it is turned on and eliminates separate step-start/run contactors and resistors. The power supply tolerates AC line fluctuations of +/-5% (full performance) and +10/-15% (operational).

HARRIS

3DX™ 100

The Next Level Standard 3DX™ 100 Design

Improved modulation accuracy and performance, now with auto-servicing

Make these 3DX Benefits Yours:

- Direct Digital Drive—Harris (3D) technology drives greater signal accuracy, better efficiency and IBOC-readiness

  Harris' 3D technology improves signal linearity and provides typical overall efficiency of 87%. Each power amplifier module is driven directly by a low-level signal, eliminating the RF driver section. This enhancement conserves energy, saves money and reduces complexity. The 3D modulation method improves modulation linearity and bandwidth which is especially important for the coming transition to Digital Audio Broadcasting.

- Auto-Serviceability offers more freedom

  Harris technology makes the 3DX™ 100 virtually auto-servicing. Patent-pending Digital Serial Adaptive Modulation (DSAM) continuously monitors each serial modulation encoder and RF power amplifier module and makes automatic module reassignments should any difficulty occur. Several modules can be out of service without affecting transmitter output power, signal accuracy, or normal modulation capability (+135%). DSAM keeps the transmitter running at peak performance until you are ready to perform maintenance.

- Intelligent User Interface

  The 3DX™ 100 is designed for easy operation through IntelliStat™, the diagnostic user interface. This combination of large, internationally-identified control buttons, a status panel with selectable metering, and ¼ VGA color display provides a comprehensive user interface, control and monitoring functions—including fault log—that shows exactly how the transmitter is performing.

- 3DX™ 100 makes service easy with "hot pluggeable" Power Amplifiers (PA)

  Like in the 3DX™ 25 and 3DX™ 50, hot serviceability is a key feature of the 3DX™ 100. An RF power amplifier or binary amplifier can be removed for service without taking the transmitter off the air. A module access and diagnostics card is provided with the transmitter for troubleshooting or safe removal of the module. Simply insert the card into the connector below the module to obtain module status information or use the disable switch for module removal.

- 3DX™ 100 takes transmitter redundancy to its next level

  In addition to the main RF power amplifier modules, the 3DX™ 100 has the capability for four spare modules. Six serial modulation encoders plug into the PA section, in a similar fashion as the RF power amplifier modules. The transmitter is also available with optional dual digital exciters, dual low voltage power supplies, dual binary amplifiers, and dual binary amplifier power supplies—all with automatic switchover. The fully configured system provides unprecedented redundancy and true hot serviceability.

- World-proven Digital Amplitude Modulation technology delivers unequaled peace of mind

  3DX™ transmitters are built on the benefits of Harris-patented Digital Amplitude Modulation and unprecedented DX transmitter reliability. This innovative modulation technology was introduced in 1987 and is operating in more than 1,500 DX transmitters and power blocks worldwide.

World Firsts in Digital Broadcast Transmitters

1987
Harris introduces Digital Amplitude Modulation technology used in DX Series Medium Wave broadcast transmitters.

1991
Harris demonstrates prototype digital FM exciter.

1993
Harris introduces DIGIT, world's first digital FM exciter.

1994
Harris DX successfully demonstrates IBOC amplification at the NAB Radio Show.

1996
Harris introduces first 1 megawatt digital AM transmitter.

1997
Harris premieres the CD Link, a 950 MHz digital STL, at NAB in Las Vegas.

2000
Harris introduces DX Destiny with Direct Digital Drive at NAB in Las Vegas.

2003
Harris introduces DAX, the first low power AM transmitter, digital ready without modification.

2006
Harris introduces 3DX™ 100 with Direct Digital Drive at NAB in Las Vegas.

General 3DX™100 Specifications

Type of Modulation
Harris patented Direct Digital Drive Amplitude Modulation.

Transmitter Type
Medium Wave, 100% solid-state.

Power Output Range
20 to100 kW. Transmitter capable of combined operation. Three adjustable power levels are provided.

Frequency Range
531 kHz to 1610 kHz. Supplied, tuned, and tested on one frequency as specified.

AC Mains Input
380, 430, 485 VAC, 50 or 60 Hz with ±18V taps.

Power Supply Variation
±5% voltage, ±5% frequency for full performance. +10/-15% voltage transmitter operational.

Transient Protection
Meets ANSI / IEEE C62.41-1980 requirements; includes high energy MOVs.

Power Factor
0.85; typically 0.9 at 100 kW, 95% modulation.

Frequency Stability
2 PPM over frequency range, 0 to 50° C standard; 0.25 PPM optional. Higher stability available with external reference.

Audio Input
-10 to +10 dBm, adjustable transformerless input; 600 and 20k terminators provided. AES3 optional.

RF Output
4-1/16″ EIA flange, standard; 6 1/8″ optional.

RF Load
50 ohms, fixed, unbalanced, resistive.

VSWR
1.3:1 minimum.

Cabinet & Harmonic / Spurious Radiation
Meets CCIR requirements.

Overall AC Efficiency
85% or better at 100 kW. 88% typical, 95% tone modulation.

Audio Performance

Audio Frequency Response
+0.2 / -0.8 dB at 95% modulation, 30 Hz to 10 kHz. Reference 1 kHz.

Audio Harmonic Distortion
0.8% or less at 95% modulation, 30 Hz to 10 kHz. 0.3% typical at 100 kW.

Intermodulation Distortion
1.0% or less 1:1 60/7000 Hz; 2% or less 4:1; SMPTE at 95% modulation. Typically 0.4% 1:1, 0.7% 4:1, no audio filters required.

Transient Intermodulation Distortion
0.2% or less at 95% modulation, 2.96/8.0 kHz, 4:1. Typically 0.3%.

Squarewave Overshoot
0.5% or less 400 Hz, 80% modulation. Measured peak to peak. Typically less than 0.3%.

Squarewave Tilt
1% or less at 40 Hz, 80% modulation.

Carrier Shift
Less than 1% at 95% modulation at 1 kHz independent of ±5% AC main voltage variation. Typically less than 0.5%.

Hum and Noise
-65 dB or better below 100% modulation, reference 1 kHz (unweighted). Typically -68 dB.

Positive Peak Capability
Max Peak Modulation 135% at 100 kW.

DAB Compatibility

Audio Frequency Response
+0.2/-1.5 dB max, 30 Hz to 15 kHz, reference 1 kHz, 95% modulation.

Audio harmonic Distortion
0.8% or less, 30 Hz to 15 kHz, reference 1 kHz, 95% modulation.

Group Delay Variation
+2 uS min, -2 uS max, 200 Hz to 15 kHz, reference 1 kHz, 95% modulation.

J3E Linearity Tests
-55dB, 4/5 kHz equal tones.
-55 dB, 4/5 kHz tones, 5 kHz -1 dB relative to 4 kHz.

Service Conditions

Power Consumption
117.6 kW or less at 100 kW, 0% modulation. 170.5 kW or less (typical) at 100 kW, 100% tone modulation.

Ambient Temperature
0° C to 50° C; derate 2° C per 1,000 feet (305 meters) of altitude AMSL.

Humidity Range
0 to 95% non-condensing.

Altitude
10,000 feet (3,048 meters).

Size
Without fan/filter assembly: 198 cm H (without combiner cross over, 206 cm with combiner cross over) x 389 cm W x 107 cm D; 78″ H (without combiner cross over, 81″ with combiner cross over) x 153″ W x 42″ D).
With fan/filter assembly: 198 cm H (without combiner cross over, 206 cm with combiner cross over) x 389 cm W x 137 cm D; 78″ H (without combiner cross over, 81″ with combiner cross over) x 153″ W x 54.2″ D).

Shipping
Shipped as three cabinets.

NOTES

1. All measurements made into test load at full rated power.
2. Noise may degrade if AC lines are unbalanced.
3. Audio performance measurements made with standard audio input, no special filters required to obtain these specifications. **Specifications subject to change without notice.**

Specifications are subject to change. For a complete listing of the most current specifications, please visit our website at www.broadcast.harris.com.

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