



Radio Systems Products

DX DESTINY™

*50 kW Digital MW Transmitter
that builds on industry-standard
DX Technology to provide new
levels of performance, efficiency
and peace of mind*

next level solutions



AM Radio's Digital Destiny

DX Destiny - The Next Level DX Transmitter - the world's best linearity, efficiency and reliability—and now auto-servicing!

Harris proudly announces DX Destiny transmitters, the most innovative Medium Wave transmitters in the world. The new model 3DX-50 takes you to the next level of the famed DX Series transmitters, which introduced digital amplitude modulation. Not only does the 3DX-50 have all the great attributes of DX like super high efficiency, outstanding audio performance and rock solid reliability, it pushes the DX envelope with a new design from the ground up.

DX Destiny features 3D technology, Direct Digital Drive, which provides a whole host of new features and benefits for DX. 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 Medium Wave transmitters, your future destiny should be DX Destiny.

Unmatched Performance, Efficiency and Reliability



3DX-50 Control Panel

User Interface:

The DX Destiny 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 display provides all important control and status parameters needed to know exactly how the transmitter is performing.



The 3DX-50 is easy to operate.

Digital Exciter:

Based on a new 3D approach, the DX Destiny exciter uses direct digital synthesis to accurately produce the RF signal. The exciter combines the digital modulation and the RF drive signals for the first time. The transmitter also accepts analog or digital AES3 inputs. A frequency synthesizer is provided with the capability of accepting an external GPS 10 MHz lock ensuring the highest possible frequency stability.

Safety:

DX Destiny transmitters are IEC 215-compliant. The 3DX-50 also contains an internal AC mains disconnect switch that ensures all three phase power is turned off prior to power supply cabinet access. An earthing stick is also provided in the output cabinet to short the RF output conductor.

3DX-50 TRANSMITTER



Power Supply Cabinet

RF Amplifier Cabinet

Output Network Cabinet



Serial Modulation Encoder Module

Serial Modulation Encoder:

The 50 kW DX Destiny uses four 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 the exact same module and, with the auto-servicing feature, the transmitter can still operate with less than four active encoders.



RF Power Amplifier



RF modules may be removed while on the air.

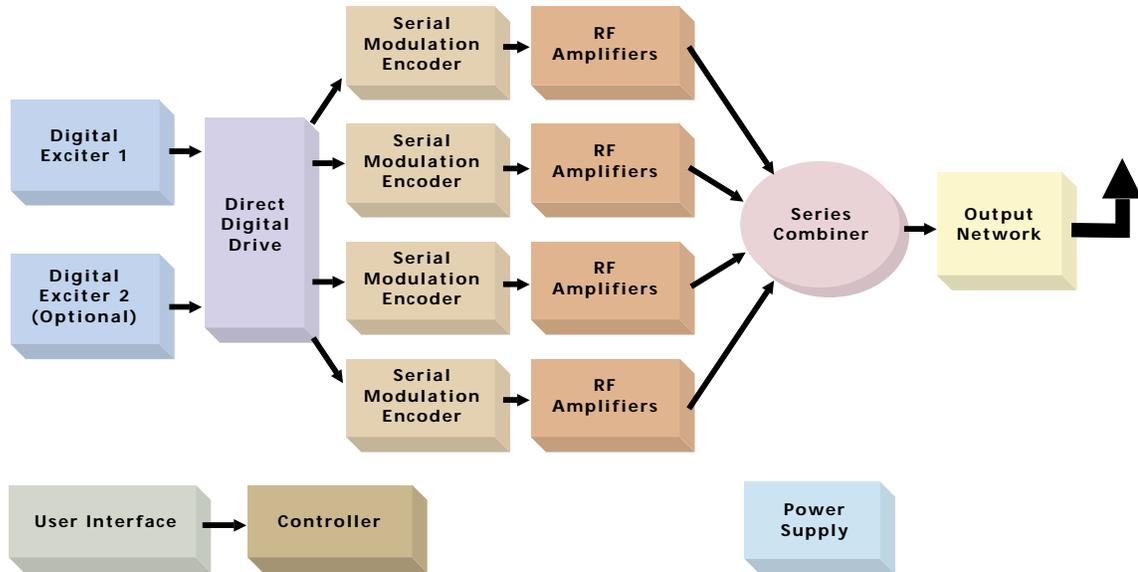
RF Power Amplifiers:

The 50 kW DX Destiny uses 62 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.



Binary RF Amplifier

3DX-50 BLOCK DIAGRAM



RF Combiner:

Output from RF power amplifiers is summed in a simple, field-proven combiner. The combiner assembly is readily accessible from the rear of the transmitter and redesigned for easier servicing. This allows individual RF motherboards to be easily removed.



Output Network (left), RF Combiner (right)

Output Network:

The 50 ohm fixed output network with internal variability ensures the transmitter is properly matched into the antenna and that all output meter readings are correct. The internal 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 12-pulse SCR-controlled power supply maintains a high power factor and generates low AC line harmonic distortion. Voltage ramp-up 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).

The Next Level DX 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' new 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-Servicability offers more freedom:**

New Harris technology makes the DX Destiny 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 (+125%). DSAM keeps the transmitter running at peak performance until you are ready to perform maintenance.
- **Intelligent User Interface:**

The DX Destiny 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 1/4 VGA display provides all important control and status parameters to show exactly how the transmitter is performing.
- **DX Destiny takes hot-pluggability to its next level--hot serviceability:**

Hot serviceability is a key new feature of the DX Destiny. 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.
- **DX Destiny takes transmitter redundancy to its next level:**

In addition to the main RF power amplifier modules, the DX Destiny has the capability for two spare modules. Four 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 unequalled peace of mind:**

DX Destiny transmitters build 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 1,000 DX transmitters 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.

3DX-50 Specifications

General

- Type of Modulation:** Harris patented Direct Digital Drive Amplitude Modulation.
- Transmitter Type:** Medium Wave, 100% solid-state.
- Power Output Range:** 10-55 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 $\pm 18V$ taps.
- Power Supply Variation:** $\pm 5\%$ voltage, $\pm 5\%$ frequency for full performance. $+10\%$ - 15% voltage transmitter operational.
- Transient Protection:** Meets ANSI/IEEE C62.41-1980 requirements; includes high energy MOVs.
- Power Factor:** 0.97 typical.
- Frequency Stability:** 2 PPM over frequency range, 0 to 50° C. Higher stability available with external reference.
- Audio Input:** -10 to +10 dBm, adjustable transformerless input; 600 and 20k terminators provided. AES3 digital input, 110 ohm, -20dBfs adjustable.
- RF Output:** 3-1/8" EIA flange, bullet provided.
- RF Load:** 50 ohms, fixed, unbalanced, resistive.
- VSWR:** 1.2:1 or better for full rated power. Typical 1.3:1.
- Cabinet & Harmonic/Spurious Radiation:** Meets or exceeds FCC, IC, and other world standards.
- Overall AC Efficiency:** 86% or better at 50 kW. 87% typical.

Audio Performance

- Audio Frequency Response:** +0.2/-0.8 dB at 95% modulation, 20 Hz to 10 kHz. Reference 1 kHz.
- Total Harmonic Distortion:** 0.7% or less at 95% modulation, 20 Hz to 10 kHz, 10 kW — 55 kW; 0.3% typical.
- Intermodulation Distortion:** 0.8% or less 1:1, 60/7000 Hz; SMPTE at 95% modulation. Typical 0.4% 1:1, 1.0% 4:1.

- Transient Intermodulation Distortion:** 0.5% 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:** 0.5% or less at 40 Hz, 80% modulation.
- Carrier Shift:** Less than 1% at 95% modulation at 1 kHz. Typically less than 0.5%.
- Hum and Noise:** -65 dB or better below 100% modulation (unweighted). Typically -70 dB.
- IQM:** -36 dB at 1 kHz, 95% modulation; -40 dB typical.
- Positive Peak Capability:** +145% or greater at 55 kW, audio program modulation, at nominal AC mains voltage.
- Duty Cycle:** Continuous 100% modulated sine wave.

Service Conditions

- Power Consumption:** 57.5 kW or less typical at 50 kW, 0% modulation; 86 kW or less typical at 50 kW, 100% tone modulation.
- Ambient Temperature:** 0° C to 50° C; derate 2° C per 1,000 feet (305 meters) of altitude.
- Temperature Rise:** Approximately 6° C (Inlet/Outlet Air) at 4000 CFM.
- Humidity Range:** 0 to 95% non-condensing.
- Altitude:** Up to 13,000 feet (3962 meters).
- Size:** 198 cm H x 260 cm W x 105 cm D (78" H x 102" W x 42" D) without fan/filter assembly. 198 cm H x 260 cm W x 137 cm D (78" H x 102" W x 54" D) with fan/filter assembly.
- Weight:** 1644 KG (3625 lbs.)

NOTES:

1. All measurements made into test load at 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.

