



Radio Systems Products

HT 20/25CD

20 and 25kW
FM Transmitters

Harris HT 20/25CD Series FM Transmitters are engineered to give you high efficiency, proven reliability and top performance.

Harris DIGIT®CD Digital FM Exciter: The Harris DIGIT CD with its digital input module generates the complete stereo FM waveform in the digital domain, using digital signal processing (DSP) circuits as a stereo generator/composite limiter and a numerically controlled oscillator (NCO) as a digital modulator. Digital techniques allow direct connection of standard AES3 stereo audio data to the FM exciter to eliminate distortion and alignment problems associated with analog program paths and analog FM exciters. DIGIT CD is also available with an analog interface module for stations with analog program paths. The Harris DIGIT CD provides true 16-bit digital audio quality with the best FM broadcast sound available today.

Features/Benefits

- ▶ Includes the field-proven Harris DIGIT CD Digital FM Exciter
- ▶ Power output range: 8 kilowatts through 25 kilowatts
- ▶ Quarter wave PA output cavity for best performance
- ▶ Low-noise air cooling system
- ▶ Broadband solid-state RF driver
- ▶ FlexPatch™ emergency RF patching
- ▶ Advanced operating features
- ▶ Efficient cabinet size
- ▶ Low cost of ownership
- ▶ Unsurpassed factory support
- ▶ Exceptional PA tube life



Power Amplifier

Harris HT 20/25CD uses a single 8990 (4CX20,000A) tetrode operating in a highly efficient quarter wave cavity. Harris' quarter wave cavity has twice the bandwidth of a folded half wave design for superior signal performance. It is fine-tuned without sliding, high-current RF contacts.

Low-Noise Air Cooling System

A highly efficient, low velocity direct drive air system provides ample cooling for the PA tube and RF drivers while maintaining extremely low ambient noise levels.

Broadband Solid-State RF Driver

A 150 watt modular RF preamp and 700 watt modular IPA are used to develop about 400 watts of drive for the PA tube. Both modules feature an advanced, ultra-reliable design that offers superior performance year after year with virtually no maintenance.

FlexPatch™ Emergency RF Patching

FlexPatch, an internal RF patch panel, makes it easy to bypass the preamp, IPA, or even the PA to stay on the air in the event of an emergency. It's almost like getting a standby transmitter free!

Other Advanced Operating Features

HT 20/25CD Series Transmitters include automatic RF power control, proportional VSWR foldback, auto-restart in the event of AC failure, loss of phase protection, soft start, adjustable/metered filament voltage control and a solid-state controller. Ten analog meters and 31 LEDs monitor all important circuits. A fully buffered remote control command and status interface are standard.

Efficient Cabinet Size

Featuring an efficient cabinet size, the HT 20/25CD Transmitter requires less floor space and is easier to install.

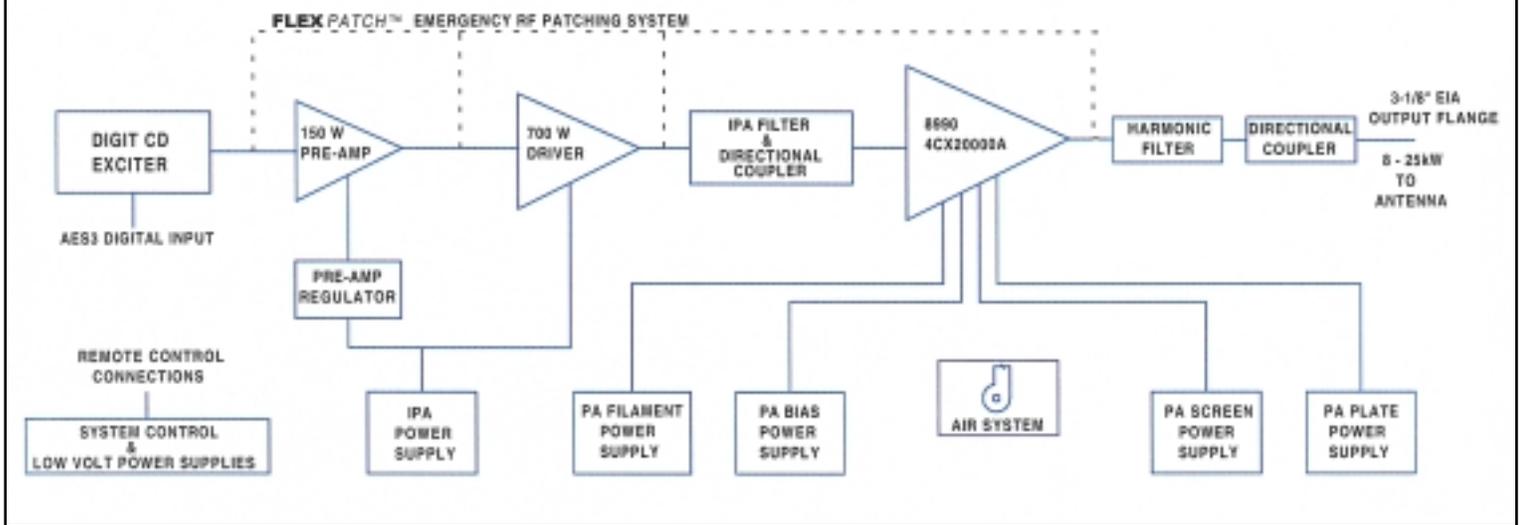
Low Cost of Ownership

The HT 20/25CD Transmitter typically costs less to operate year after year than competitive transmitters. Extremely conservative PA tube operation can provide tube life well in excess of the tube manufacturer's warranty - typically three to five years.

Factory Support

Like all Harris transmitters, the HT 20/25CD is fully backed with comprehensive service information, 24-hour technical assistance, and emergency parts support.

HT 20/25CD Block Diagram



General

Power Output: HT 20CD: 8 to 21kW
HT 25CD: 8 to 26kW

Excitation: Harris DIGIT® CD Digital FM Exciter (included).

Modulation Type: Direct Digital Synthesis using a 32-bit NCO (numerically controlled oscillator).

Frequency Range: 87.5 to 108MHz, digitally programmable in 50Hz increments. Tuned to single frequency.

Frequency Stability: ±150Hz, 0°C to 50°C ambient temperature range (using internal frequency reference).

External Frequency Control: Capable of locking to an external 10MHz reference for use in FM synchronous applications when fitted with optional DIGIT CD Sync Board (992-9850-001). Sync input requirement: 2.82Vp-p or TTL level. Sync input connector: BNC female.

Load Impedance: 50 ohms, coaxial.

Output Connector: 3-1/8" EIA flange (female).

Maximum Load VSWR: 1.7:1 for 100% power, automatically reduces power to maximum safe level into high VSWR (proportional VSWR foldback).

RF Harmonics/Spurious Emissions: Meet or exceed FCC/IC/CCIR requirements.

Asynchronous AM S/N Ratio: 55dB minimum below equivalent 100% amplitude modulation by 400Hz using 75µs de-emphasis (no FM modulation present).

Synchronous AM S/N Ratio: 52dB minimum below equivalent 100% amplitude modulation with 75µs de-emphasis and 400Hz highpass filter (FM deviation ±75kHz by a 1kHz sine-wave).

AC Input Power: 197 to 250VAC, 50 or 60Hz, 3 phase, 3 wire closed delta or WYE; or 360 to 415VAC, 50 or 60Hz, 3 phase, 4 wire WYE.

Power Consumption: HT 20CD: 30.8kW (0.95PF)
HT 25CD: 37.5kW (0.95PF)

Ambient Temperature Range: -20 to 50 degrees C at sea level, upper limit derated 2 degrees C per 1,000 feet (304.9m) altitude.

Maximum Altitude: 10,000 feet (3,049m).

Humidity: To 95%, non-condensing.

Cabinet Size: Main Cabinet: 33.3" (84.6cm) wide, 30.2" (76.7cm) deep, 72" (182.9cm) high; Power Supply: 48" (122 cm) wide, 24.1" (61cm) deep, 60" (152cm) high.

Weight: HT 20CD: 2,550 lbs. (1,159kg)
HT 25CD: 2,700 lbs. (1,227kg)

Stereo Performance with Digital Input Module

Input Data Format: AES3-1992 (reference standards: AES5-1984, ANSI S4.28-1984, AES3-1985, ANSI S4.40-1992, and AES3-1992).

Sample Rate: Any in range 32kHz to 56kHz (32, 44.1 or 48kHz typically output from AES3 devices).

Digital Stereo Generator: Complete digital composite stereo waveform generated in the digital domain from incoming AES3 stereo audio data, using a digital signal processor (DSP).

Digital Baseband Composite Limiting: Exclusive DSP "lookahead" techniques for control of peaks before overmodulation can occur. Active with on-board DSP stereo generator in stereo or monaural mode; pilot carrier and SCA signals unaffected. Limiter on/off and limit setting adjustable from 0-18dB either locally or by standard remote control systems.

Pre-emphasis: 0, 25, 50 or 75µs, locally selectable.

Stereo Separation (sinewave): 60dB or greater, 10Hz to 15kHz.

Dynamic Stereo Separation (complex waveform): 55dB or greater, 10Hz to 15kHz.

Amplitude Response (L or R): 10Hz to 15kHz ±0.2dB referenced to selected pre-emphasis curve.

FM Signal To Noise Ratio (L or R): 83dB below 100% modulation at 400Hz; measured in a DC to 22kHz bandwidth with 75µs de-emphasis and DIN "A" weighting. Does not exhibit the subsonic noise associated with analog exciters.

Stereo Total Harmonic Distortion: 0.009% or less at 5kHz, 0.015% or less for any modulating frequency from 10Hz to 15kHz; measured in DC to 22kHz bandwidth with 75µs de-emphasis.

Intermodulation Distortion (L or R): CCIF: 0.025% (14/15kHz 1:1), SMPTE: 0.025% (60 and 7000Hz 1:1).

Transient Intermodulation Distortion (DIM) (L or R): 0.005% (2.96kHz square wave/14kHz sinewave modulation).

Linear Crosstalk: L+R to L-R and L-R to L+R due to amplitude and phase matching of L&R channels (DC-15kHz): 76dB below 100% modulation reference.

Non-Linear Crosstalk: L+R to L-R and L-R to L+R due to distortion products: 80dB below 100% modulation reference at 400Hz.

RBDS/RDS Synchronizing Signal: 19kHz quasi-sinewave, nominal 5.6Vp-p, AC coupled, 100 ohm output impedance (unbalanced); for use by customer-supplied, external generator. BNC female connector.

Stereo/Monaural Mode Control: Selectable locally or by standard remote control systems. Zero amplitude pilot in monaural mode.

Emergency Analog Composite Mode: Switchable locally or by standard remote control systems to mute the on-board DSP stereo generator and accept analog composite stereo on SCA Port #2. Nominal input sensitivity (all SCA ports in this mode): 3.5Vp-p (1.24V RMS) for ± 75 kHz deviation. FM signal to noise ratio: 85dB below 100% modulation. Total composite harmonic distortion: 0.02%.

Composite Input Performance With Analog Input Module

Inputs: Two: XLR female balanced (switchable, composite or monaural), and BNC female unbalanced.

Input Impedance: Balanced/unbalanced: 10,000 ohms nominal, resistive.

Input Level: 3.5Vp-p (1.24V RMS) nominal for ± 75 kHz deviation.

FM Signal To Noise Ratio: 93dB below ± 75 kHz deviation at 400Hz; measured in a DC to 100kHz bandwidth with 75 μ s de-emphasis; DIN "A" weighting. Does not exhibit the subsonic noise associated with analog exciters.

Amplitude Response: ± 0.02 dB, DC to 53kHz; ± 0.25 dB, 53kHz to 100kHz.

Total Harmonic Distortion: 0.01% over stereo sub band (10Hz to 53kHz) referenced to ± 75 kHz deviation.

Intermodulation Distortion: CCIF: 0.008% (14/15kHz 1:1); SMPTE: 0.008% (60/7000Hz 1:1).

Transient Intermodulation Distortion (DIM): 0.005% (2.96kHz square wave/14kHz sine wave modulation). Slew Rate: 9V/ μ s, symmetrical.

Group Delay Variation: ± 10 ns, DC to 53kHz, ± 50 ns, 53kHz to 100kHz.

Phase Response Variation: $\pm 0.15^\circ$ from linear phase, DC to 53kHz.

Stereo Performance with Analog Input Module

NOTE: Analog stereo performance is defined mainly by the external stereo generator and program path. The following specifications are typical when using high quality source equipment.

FM Signal To Noise Ratio (L or R): 77dB below 100% modulation at 400Hz; measured in a DC to 100kHz bandwidth with 75 μ s de-emphasis (A-weighting). Does not exhibit the subsonic noise associated with analog exciters.

Amplitude Response (L or R): 10Hz to 15kHz ± 0.5 dB referenced to selected pre-emphasis curve.

Total Harmonic Distortion (L or R): 0.015% from 10Hz to 15kHz; measured in a DC to 22kHz bandwidth with 75 μ s de-emphasis.

Intermodulation Distortion (L or R): CCIF: 0.025%; SMPTE (60 and 7000Hz, 4:1): 0.025%.

Transient Intermodulation Distortion (DIM) (L or R): 0.005% (2.96kHz square wave/14kHz sinewave).

Stereo Separation (sinewave): Better than 60dB, 10Hz to 15kHz.

Non-Linear Crosstalk: L+R to L-R and L-R to L+R due to distortion products: 80dB below 100% modulation reference at 400Hz.

SCA (RBDS/RDS) Performance with Digital or Analog Input Module

NOTE: Analog SCA/RBDS/RDS performance is defined mainly by the external subcarrier generator and program path. The

following specifications are typical when using high quality source equipment.

Inputs: 3 total, BNC female connectors.

SCA Format: Externally generated, analog FM subcarriers in the range 57-100kHz.

SCA Input Impedance: Analog Module: 10,000 ohms unbalanced, nominal, resistive. Digital Module: 3,000 ohms unbalanced, nominal, resistive.

SCA Input Level: 1.5Vp-p nominal for ± 7.5 kHz deviation of main carrier.

SCA Subband Amplitude Response: ± 0.25 dB, 53kHz-100kHz.

SCA Channel Audio Response: Defined by response of SCA generator and SCA program path.

SCA Channel FM Signal To Noise Ratio: 74dB below ± 6 kHz subchannel deviation at 400Hz with 150 μ s de-emphasis.

SCA Audio Harmonic Distortion: 0.4% or less in audio passband of SCA generator.

SCA Audio Intermodulation Distortion: SMPTE (60 and 7000Hz, 1:1): 0.4% or less, no pre-de-emphasis, SCA generator lowpass filter bypassed.

Crosstalk, SCA to Stereo: 65dB below 100% modulation, L or R channel with 75 μ s de-emphasis.

Crosstalk, Stereo to SCA: 55dB below 100% modulation (referenced to ± 6 kHz deviation and 150 μ s de-emphasis in SCA demodulator).

Crosstalk, SCA to SCA: 55dB below 100% modulation (referenced to ± 6 kHz deviation and 150 μ s de-emphasis per channel).

Monaural Performance with Analog Input Module

Input: One, XLR female (switchable: composite balanced or monaural).

Audio Input Impedance: 600 ohms, balanced, floating, resistive; adaptable to other impedances. 60dB common mode suppression.

Audio Input Level: +10dBm nominal for ± 75 kHz deviation at 400Hz; locally adjustable from -9 to +14 dBm.

Amplitude Response: 10Hz to 15kHz ± 0.2 dB, referenced to selected pre-emphasis curve.

FM Signal to Noise Ratio: 93dB below ± 75 kHz deviation at 400Hz; measured in a DC to 100kHz bandwidth with 75 μ s de-emphasis and DIN "A" weighting. Does not exhibit the subsonic noise associated with analog exciters.

Pre-emphasis: 0, 25, 50 or 75 μ s, locally selectable.

Total Harmonic Distortion: 0.009% at 12.5kHz, 0.015% from 10Hz to 15kHz referenced to ± 75 kHz deviation, measured in a DC to 22kHz bandwidth with 75 μ s de-emphasis.

Intermodulation Distortion: CCIF: 0.008% (14/15kHz 1:1); SMPTE: 0.008% (60/7000Hz 1:1).

Transient Intermodulation Distortion (DIM): 0.005% (2.96kHz square wave/14kHz sinewave).

All specifications referenced to any single output frequency (87.5-108MHz), 20/25kW output power, and 50 ohm test load.

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

Specifications subject to change without notice.



HARRIS

next level solutions

Broadcast Communications Division | 4393 Digital Way | Mason, OH USA 45040
phone: 513-459-3400 | email: broadcast@harris.com | www.harris.com

Copyright © 2000 Harris Corporation
ADV. 838D 07/02