



FM-20T

*Solutions for
Tomorrow's Radio*

The Broadcast Electronics' 20kW high power transmitter sets the standards for audio quality, cost-efficiency, reliability, and long life. The FM-20T represents a new generation of high power tube transmitters and is backed by BE's commitment to quality. The T-Series FM transmitters represent just one of our many solutions to your radio needs.

20 kW High Power Transmitter



Features

- The patented folded half-wave cavity eliminates troublesome and unreliable DC plate blocking capacitors and all sliding RF contacts.
- True proportional (VSWR) foldback protects the transmitter under all antenna load conditions.
- Advanced transmitter controller design monitors virtually all operating parameters of the transmitter and facilitates remote monitoring and full connectivity.
- Equipped with the FX-50 Exciter which has easily become the standard for FM audio performance.
- Now available with optional Predator digital exciter.
- High volume low pressure air flow improves heat transfer while reducing ambient noise.
- Extensive metering of PA parameters eases tuning and adjustment which allows for more efficient operation as proper operating parameters can be monitored and maintained.
- Complete remote control interface built-in allows for convenient use of all current remote control systems.
- The latest MOSFET technology is used in IPAs.
- RTDS (Remote Transmitter Diagnostic System) option available.

Need Solutions?
www.bdcast.com

BROADCAST ELECTRONICS, INC.

4100 N. 24th Street • Quincy, IL 62301
Phone: (217)224-9600
Fax: (217)224-9607
e-mail: bdcast@bdcast.com



FM-20T

**Solutions for
Tomorrow's Radio**

20 kW High Power Transmitter

Performance Specifications

GENERAL

Power Output: 20 kW (7.5 kW to 22 kW).

PA Efficiency: 80% typical.

Frequency Range: 87.5 to 108 MHz, tuned to specific operating frequency. Exciter programmable in 10 kHz steps.

RF Output Impedance: 50 ohms (others on special request).

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

VSWR: 1.8:1 maximum. (Capable of operating into higher VSWR with automatic power reduction).

Frequency Stability: ± 300 Hz, 0 to 50° C.

Type of Modulation: Direct frequency modulation of carrier frequency.

Modulation Capability: Greater than ± 350 kHz.

Modulation Indication: Peak reading, color coded, LED display with baseband overmodulation indicator.

Exciter: Solid state, 50 watt output, Model FX-50, incorporating a digitally programmed synthesizer (10 kHz increments).

Pre-Emphasis: FCC 75 μ S, CCIR 50 μ S (where specified), 25 μ S (Dolby) or flat response, selectable.

Asynchronous AM S/N Ratio: 55 dB below equivalent reference carrier with 100% AM modulation @ 400 Hz, 75 μ S de-emphasis (no FM modulation present).

Synchronous AM S/N Ratio: 50 dB below equivalent 20 kW reference carrier with 100% AM modulation @ 1 kHz, no de-emphasis (FM modulation ± 75 kHz @ 1 kHz).

Tube Complement: (1) 8989/4CX12, 000A.

RF Harmonics: Suppression meets all FCC/DOC requirements and CCIR recommendations.

Power Supply Rectifiers: Silicon.

ELECTRICAL/MECHANICAL

AC Input Power: 208/240 V Delta or WYE, 60 Hz, three phase. (Taps for 196 to 252 V. Other voltages and line frequencies are available upon request).

Primary Power Consumption: 30 kW (at .97 pf) @ 20 kW RF output.

Overall Efficiency: Typically 67% (AC line input to RF output).

Altitude: 7500 ft. (2286 M) @ 50 Hz;

10,000 ft. (3048 M) @ 60 Hz.

Ambient Temperature Range: -10 to +50° C.

Size: (Transmitter) 50.5"W x 70"H x 31.5"D (128.3 x 177.8 x 80 cm). (Power Supply) 28.5"W x 70"H x 31.5"D (72.4 x 177.8 x 80 cm).

Weight & Cubage: (Transmitter) 1200 lbs. (545 kg) unpacked; 1450 lbs. (660 Kg) packed. 75 cu. ft. (2.1 cu. meters). (HV Power Supply) 1500 lbs. (681 kg) unpacked; 1750 lbs. (795 Kg) packed. 45 cu. ft. (1.3 cu. meters).

MONAURAL OPERATION

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

Audio Input Level: +10 dBm nominal for ± 75 kHz deviation @ 400 Hz.

Audio Frequency Response: ± 0.5 dB, 30 Hz to 15 kHz, selectable flat, 25, 50, 75 microsecond pre-emphasis.

Total Harmonic Distortion + Noise: 0.02% or less at 400 Hz.

SMPTTE Intermodulation Distortion: 0.02% or less, 60 Hz/7 kHz, 4:1 ratio.

CCIF Intermodulation Distortion: 0.02% or less, 15 kHz/14 kHz, 1:1 ratio.

Transient Intermodulation Distortion: 0.02% or less, sine wave/square wave.

FM S/N Ratio: 85 dB below ± 75 kHz deviation @ 400 Hz, measured in a 20 Hz to 30 kHz bandwidth with 75 μ S de-emphasis.

WIDEBAND COMPOSITE OPERATION

Composite Inputs: 3 total, (1) unbalanced and (1) balanced plus front panel test. All connectors BNC.

Balanced Composite Input Impedance: 10K ohm or 50 ohm, nominal, resistive, selectable.

Unbalanced Composite Input Impedance: 10K ohm, nominal, resistive.

Composite Input Level: 3.5V p-p nominal, for ± 75 kHz deviation.

FM S/N Ratio: 85 dB below ± 75 kHz deviation @ 400 Hz. Measured in a 20 Hz to 30 kHz bandwidth with 75 μ S de-emphasis.

Composite Total Harmonic Distortion + Noise: 0.02% or less @ 400 Hz.

Composite SMPTTE Intermodulation Distortion: 0.02% or less, 60 Hz/7 kHz, 1:1 ratio.

Composite CCIF Intermodulation Distortion: 0.02% or less, 15 kHz/14 kHz, 1:1 ratio.

Composite Transient Intermodulation Distortion: 0.02% or less, sine wave/square wave.

Composite Amplitude Response: ± 0.05 dB, 30 Hz to 53 kHz.

Composite Phase Response: ± 0.25 degrees from linear phase, 30 Hz to 53 kHz.

Composite Group Delay Variation: ± 10 nanoseconds, 30 Hz, 100 KHz.

Composite Slew Rate: 9 V/microsecond (symmetrical).

Subcarrier Inputs: (3) total, unbalanced, BNC connectors.

Subcarrier Input Impedance: 100K ohm, nominal, resistive.

Subcarrier Input Level: 3.5 V p-p, nominal, for ± 7.5 kHz deviation.

Subcarrier Amplitude Response: ± 0.2 dB, 40 kHz to 100 kHz.

STEREO OPERATION

Modulation Type: Digitally synthesized stereo, digitally synthesized pilot. No pilot phase adjustment required.

Audio Input Impedance: 600 ohms balanced, resistive, floating (adaptable to other impedances).

Audio Input Level: +10 dBm, ± 1 dB, for 100% modulation @ 400 Hz (adaptable to other input levels).

Audio Input Filters: 15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response: ± 0.5 dB, 30 to 15,000 Hz, 75 μ S pre-emphasis (flat, 25 or 50 μ S pre-emphasis selectable).

Total Harmonic Distortion + Noise: 0.05% or less @ 400 Hz.

SMPTTE Intermodulation Distortion: 0.05% or less, 60 Hz/7 kHz, 4:1 ratio.

CCIF Intermodulation Distortion: 0.05% or less, 15 kHz/14 kHz, 1:1 ratio.

Transient Intermodulation Distortion: 0.05% or less, sine wave/square wave.

FM S/N Ratio: 80 dB below ± 75 kHz deviation @ 400 Hz, measured in a 20 Hz to 30 kHz bandwidth with 75 μ S de-emphasis.

Stereo Separation: 50 dB or better, 30-15,000 Hz (sine wave).

Dynamic Stereo Separation: 50 dB or better, 30-15,000 Hz (normal program content).

Linear Crosstalk: Main to Sub/Sub to Main due to amplitude and phase matching of left and right channels. 30-15,000

Hz, 45 dB minimum below 100% modulation.

Non-Linear Crosstalk: Main to Sub/Sub to Main due to distortion products. 70 dB minimum below 100% modulation.

38 kHz Subcarrier Suppression: 80 dB minimum below 100% modulation.

Pilot Stability: ± 0.5 Hz, 0 to 50° C.

Modes: Stereo, Mono L+R, Mono (L) and Mono (R) remote controlled. (See FS-30 data sheet for full details.)

SCA OPERATION

Modulation: Direct FM.

Subcarrier Frequency: 67 kHz (39 to 95 kHz to order).

Subcarrier Frequency Stability: $\pm 0.5\%$ (330 Hz @ 67 kHz). 0 to 50° C.

Subcarrier Harmonic Content: Less than 0.3%.

Subcarrier Envelope Decay: Greater than 100 msec from 90% to 10% subcarrier levels.

Modulation Capability: $\pm 20\%$ of subcarrier frequency.

Audio Input Impedance: 600 ohm balanced, resistive.

Data Input Impedance: 75 ohm unbalanced, resistive, DC coupled.

Input Levels: (Audio) adjustable +10 dBm to -10 dBm for ± 6 kHz deviation @ 400 Hz. (Data) adjustable 1.0 to 4.0 V p-p for ± 6 kHz deviation (DC coupled).

Pre-Emphasis: (Audio) 150 microseconds standard (75 μ S with internal jumper). (Data) no pre-emphasis.

Frequency Response: (Audio) ± 0.5 dB, 10-10,000 Hz, exclusive of audio low pass filter. (Data) ± 0.5 dB, DC-10,000 Hz.

Audio Low Pass Filter: Sixth order, -3 dB @ 4.3 kHz, standard (resistor changes for other values).

Data Low Pass Filter: Same as AF filter or may be bypassed.

Total Harmonic Distortion: Less than 0.5% throughout AF passband.

SMPTTE Intermodulation Distortion: Less than 0.5%, 60 Hz/7 kHz, 1:1 ratio (audio pre-emphasis and LPF bypassed).

Crosstalk, SCA to Stereo: -60 dB or better below 100% modulation of left or right. 75 μ S de-emphasis.

Crosstalk, Stereo to SCA: -50 dB or better below ± 6 kHz deviation of SCA using 150 μ S de-emphasis and FS-30 stereo generator.

Crosstalk, SCA to SCA: -50 dB or better below ± 6 kHz deviation of either SCA using 150 μ S de-emphasis.

FM Noise: 62 dB below ± 6 kHz deviation @ 400 Hz (150 μ S de-emphasis).

Auto Muting Level: Adjustable from 10 to 30 dB below program level.

Auto Muting Delay: Adjustable, 0.5 to 10.0 seconds.

FM-20T system performance is specified using model FX-50 Exciter, FS-30 Stereo Generator, and FC-30 SCA Generator, where applicable, measured at rated transmitter power of 20 kW into a 50 ohm resistive load.