



FX-50

*Solutions for
Tomorrow's Radio*

50 watt Exciter/Transmitter

The Broadcast Electronics' FX-50's performance can bring existing FM transmitters up to digital quality standards, and has the lowest distortion of any available exciter. As the acknowledged standard for FM audio performance, the FX-50's breakthrough technology remains unsurpassed by more costly and complex digital exciters. With the superb specifications available in this product, the FX-50 is totally transparent to your broadcast signal.



Features

- Optional: with the addition of an internal low pass filter, the FX-50 can serve as a reliable 50 watt stand-alone FM transmitter (FM-50).
- Computer-optimized phase locked loop greatly improves low frequency response.
- Contains a 50 watt MOSFET output power to drive the largest of transmitters.
- THD and IMD less than .003% typical for true digital capability.
- With a signal to noise ratio that is typically 93 dB, the FM-50 can handle all of the nuances and power of digital audio.
- Frequency range of 87-109 MHz - digitally programmable in 10 kHz increments.
- Performance specifications feature a dynamic range that rivals CD players with harmonic and intermodulation distortion values so low they are virtually unmeasurable.

Need Solutions?
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50 watt Exciter/Transmitter

Performance Specifications

GENERAL

Power Output: 3 to 50 W continuously variable (BNC connector) open and short circuit protected.

R.F. Output Impedance: 50 ohms

R.F. Harmonic and Spurious Suppression: Meets all FCC and DOC requirements and CCIR recommendations for a 50-watt transmitter with optional low pass filter.

Frequency Range: 87 MHz to 109 MHz digitally programmable in 10 kHz increments.

Frequency Stability: $\pm 300\text{Hz}$, $+32^\circ\text{F}$ to $+122^\circ\text{F}$ (0°C to $+50^\circ\text{C}$).

Modulation Type: Direct FM at the carrier frequency.

Modulation Capability: $\pm 350\text{kHz}$.

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

Asynchronous AM S/N Ratio: 80dB minimum below equivalent reference carrier with 100% amplitude modulation at 400Hz and 75 μs de-emphasis (no FM modulation present).

Synchronous AM S/N Ratio: 60dB minimum below equivalent 50W reference carrier with 100% AM modulation at 1kHz, no de-emphasis (FM modulation $\pm 75\text{kHz}$ and 1kHz).

Multimeter: 5 function LCD diagnostic aid $\pm 3\%$ accurate.

Test Metering: Internal high-input impedance multimeter with probe for point-to-point DC measurements.

Remote Metering: Buffered Forward and Reflected power outputs.

Exciter Status Display: Front panel status annunciators for +20V, -20V, +5V, Lock, RF, VSWR, and temp. Additional status LEDs are located on AFC/PLL assembly for Mod Osc Chain, Ref Osc Chain, +5V, +15V and -15V.

Front Panel Test Connections: Composite input and composite output.

Audio/Control Connections: 14 position barrier strip and (5) BNC connectors. Control connections are AFC Interlock (normally open/normally closed relay contacts), AFC indication (open collector and closure), +20V or remote power control (switch selectable), RF mute, Temperature overload (+18V at 15ma), buffered FWD and RFL meter samples, and two ground connections. All inputs/outputs RFI suppressed.

RF Mute Control: +3V to +40V DC or GND closure, switch selectable. Ima maximum.

AC Input Power: 97 to 133 VAC or 194 to 266 VAC, 50/60 Hz, 230 w maximum.

Ambient Temperature Range: $\pm 32^\circ\text{F}$ to $+122^\circ\text{F}$ (0°C to $+50^\circ\text{C}$).

Altitude: 15,000 feet (4,572 m) AMSL.

Dimensions: 17.70"W x 5.25"H x 19.00"D (44.96 x 13.33 x 48.26 cm).

Net Weight: 38lbs. (17.1 kg), packed 46lbs. (20.7 kg).

Finish: Black backlit center overlay with technical white upper and lower extrusions.

Construction: Modular sub-assemblies with pin-plug interconnection.

WIDEBAND COMPOSITE OPERATION

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

Composite Input Impedance:

Unbalanced: 10 k ohm, nominal, resistive.

Balanced: 10 k ohm or 50 ohm, programmable, jumper selected.

Composite Input Level: 3.5V p-p nominal, for $\pm 75\text{kHz}$ deviation.

Composite FM S/N Ratio: 90dB (94dB typical) below $\pm 75\text{kHz}$ deviation at 400Hz, measured in a 20Hz to 200kHz bandwidth with 75 μs de-emphasis, 94dB (96dB typical) with DIN "A" weighting.

Composite Harmonic Distortion: 0.003% or less.

Composite Intermodulation Distortion: 0.005% or less (0.003% typical).

Composite CCIF IMD: 0.005% or less (all products greater than -86 dB below 100% modulation. Twin tone, 15 kHz/14 kHz, 1:1 pair).

Composite Transient IMD: 0.01% or less (square wave/sine wave).

Composite Amplitude Response: $\pm 0.025\text{dB}$, 30Hz to 53kHz.

Composite Phase Response: ± 0.1 degree from linear phase, 30Hz to 53kHz.

Composite Group Delay Variation: ± 5 nanoseconds, 30Hz to 100kHz.

Subcarrier Inputs: 3 total, unbalanced, BNC connectors.

Subcarrier Input Impedance: 100 k ohm nominal, resistive.

Subcarrier Input Level: 3.5 V p-p nominal for $\pm 7.5\text{kHz}$ deviation (10% injection).

Subcarrier Amplitude Response: $\pm 0.2\text{dB}$, 40 kHz to 100 kHz, -3 dB at 7,500 Hz.

Stereophonic Separation: 60dB, 30Hz to 5kHz, 52dB, 5 to 15kHz (measured using BE FS30 Stereo Generator).

SCA Inputs: 3 total, unbalanced BNC connectors.

SCA Input Impedance: 100 k ohm nominal, resistive.

SCA Input Level: 3.5V p-p nominal for $\pm 7.5\text{kHz}$ deviation.

SCA Amplitude Response: $\pm 0.2\text{dB}$, 40 to 100kHz.

STEREO OPERATION

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

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

Audio Input Level: +10 dBm, $\pm 1\text{dB}$ for 100% modulation at 400 Hz (adaptable to other input levels).

Audio Input Filters: 15 kHz active L.P.F., 45 dB rejection at 19 kHz, delay compensated for minimum overshoot without clippers or other non-linear devices.

Audio Overshoot: 2 dB maximum.

Audio Frequency Response: $\pm 0.5\text{dB}$, 30 Hz to 15,000 Hz, 75 μs pre-emphasis (flat, 25 μs , 50 μs pre-emphasis selectable).

Total Harmonic Distortion Plus Noise (THD+N): 0.03% or less at $\pm 75\text{kHz}$ deviation, 400 Hz, using 75 μs de-emphasis.

Intermodulation Distortion: 0.03% or less, 60 Hz/7 kHz, 4:1 ratio.

CCIF Intermodulation Distortion: 0.01% or less (all products greater than -80 dB below 100% modulation. Left or right channel modulated 100%, twin tone, 15 kHz/14 kHz, 1:1 pair).

Stereo Separation: 52 dB; 30 Hz to 15,000 Hz 60dB; 30 Hz to 5000 Hz.

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

Linear Crosstalk: Main to Sub/Sub to Main due to distortion products. 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 Suppression: 80 dB minimum below 100% modulation.

57, 76, and 95 kHz Suppression: 80 dB minimum below 100% modulation.

Spurious and Sideband Suppression: 80 dB minimum below 100% modulation to 95 kHz, 75 dB minimum beyond 95 kHz.

FM Signal to Noise Ratio: -82 dB minimum below left or right channel, 100% modulation, 400 Hz, with 75 μs de-emphasis.

Pilot Stability: $\pm 0.5\text{Hz}$, 0 to 50 degrees C.

Operational Modes: Stereo, Mono L+R, Mono L, Mono R, remote controllable.

SUBCARRIER OPERATION

NOTE: Subcarrier operation is specified using BE Model FC-30 FM Subcarrier Generator.

Modulation: Direct coupled FM at subcarrier frequency.

Frequency of Operation: 67 kHz (39 to 95 kHz to order). Front panel adjustable.

Frequency Stability: $\pm 0.5\%$ of subcarrier frequency ($\pm 335\text{Hz}$ at 67 kHz).

Subcarrier Harmonic Content: Less than 0.3%.

Modulation Capability: $\pm 20\%$ of subcarrier frequency ($\pm 13.4\text{kHz}$ at 67 kHz).

Modulation Indicator: Color coded peak reading LEDs.

Frequency Response:

Audio: $\pm 0.5\text{dB}$ 10-10,000 Hz exclusive of audio L.P.F. selectable flat, 150 μs or 75 μs pre-emphasis.

Data: $\pm 0.5\text{dB}$ DC to 10,000 Hz, no pre-emphasis.

Input Impedance:

Audio: 600 ohms, balanced, resistive, transformerless, terminal strip connection. Adaptable to other impedances.

Data: 75 ohms, unbalanced, resistive, DC coupled, BNC connector. Adaptable to other impedances.

Input Level:

Audio: Adjustable, +10 dBm to -10 dBm for $\pm 6\text{kHz}$ deviation at 400 Hz.

Data: Adjustable, 1.0 to 4.0 V p-p for $\pm 6\text{kHz}$ deviation DC coupled.

Input Filters:

Audio: Sixth order, -3 dB at 4.3 kHz standard (adaptable to other cutoff frequencies), defeatable.

Data: Same as audio or may be bypassed.

Audio Overshoot: 2 dB maximum.

Total Harmonic Distortion Plus Noise (THD+N): 0.5% or less throughout the audio passband, $\pm 6\text{kHz}$ deviation.

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

FM Signal to Noise Ratio: -62 dB minimum below $\pm 6\text{kHz}$ deviation at 400 Hz (150 μs de-emphasis).

Crosstalk, Stereo to Subcarrier: -50 dB or better below $\pm 6\text{kHz}$ subcarrier deviation using 150 μs de-emphasis and FS-30 stereo generator.

Crosstalk, Subcarrier to Stereo: -60 dB or better below 100% modulation, left or right. 75 μs de-emphasis.

Crosstalk Subcarrier to Subcarrier: -50 dB demodulated with 150 μs de-emphasis.

Automatic Mute Level: Adjustable from 10 to 30 dB below program level.

Automatic Mute Delay: Adjustable, 0.5 to 10 seconds.

Subcarrier Envelope Decay: Greater than 100 mSec from 90% to 10% subcarrier levels. (Prevents receiver squelch noise.)

Subcarrier Injection Level: Continuously adjustable from 1% to 30% of total composite modulation.

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 $\pm 75\text{kHz}$ deviation @ 400Hz, adaptable to other levels.

Audio Common Mode Rejection Ratio: Greater than 60 dB.

Audio Frequency Response: $\pm 0.5\text{dB}$, 30Hz to 15kHz; selectable flat, 25, 50, or 75 μs pre-emphasis.

Total Harmonic Distortion Plus Noise (THD+N): 0.005% or less (0.003% typical) at $\pm 75\text{kHz}$ deviation and 50W RF power output, 400 Hz, using 75 μs de-emphasis.

Total Harmonic Distortion: + Noise (THD + N); 0.005% (0.003% typical).

Intermodulation Distortion: 0.005% or less (0.003% typical) 60Hz to 7kHz, 4:1 ratio

CCIF Intermodulation Distortion: 0.005% or less (all products greater than -86 dB below 100% modulation. Twin tone, 15 kHz/15 kHz 1:1 pairs).

Transient Intermodulation Distortion: 0.01% or less (square wave/sine wave).

F.M. S/N Ratio: 90dB below $\pm 75\text{kHz}$ deviation @ 400Hz (93 dB typical). Measured within a 20 Hz to 200kHz bandwidth with 75 μs de-emphasis. 94 dB (96 dB typical) with A weighting.

FRONT AND REAR PANEL DESCRIPTIONS

Front Panel Descriptions

True peak reading LED modulation display: Consists of 29 segments from 5% to 145% in 5% increments.

Composite test input: BNC connector.

Composite test output: BNC connector.

Status Panel: Backlit annunciators for +20V, -20V, +5V, Lock, RF, VSWR, Temp.

Contents: Five momentary, electronically interlocked switches which control the input to be monitored on the three segment LCD meter with minus sign. Functions are: Forward power, Reflected power, PA voltage, PA current, and AFC voltage.

LED indication of measured units: Watts, Volts, or Amps.

Rear Panel Description

RF output: BNC connector

AC Input: Fused AC line filter and voltage selector.

Subcarrier input connectors: Three unbalanced BNC connectors.

Composite input connectors: One unbalanced and one balanced BNC connectors.

Balanced monaural input: Terminal connections.

Exciter interconnection terminal strip: Control connections are AFC interlock, (normally open/normally closed relay) AFC indication (open collector gnd closure), +20V or Remote Power Control (switch selectable), Temperature Overload (+18V at 15ma), FWD AND RFL Meter Samples, and two ground connections. Also \pm and gnd connections for balanced monaural input.