



**BROADCAST
ELECTRONICS INC.**

FS-30

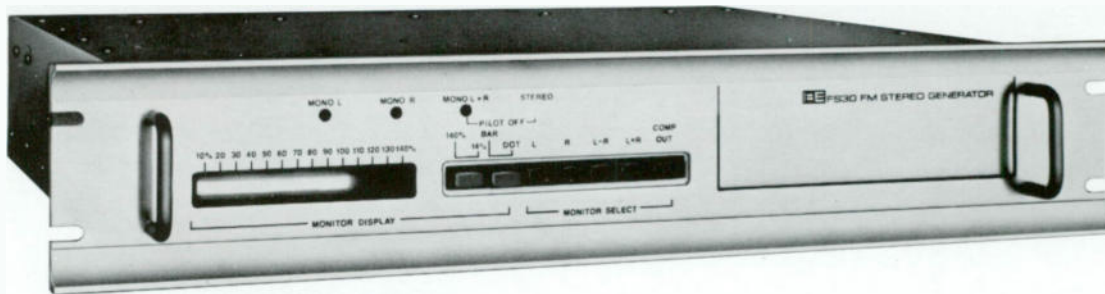
Stereo Generator



Stereo Separation: 60 dB mid-band
FM Noise: 85 dB below 100% modulation
THD and IMD: .03% or less
CCIF IMD: Less than .01% (14 kHz/15 kHz, 1:1)
First to specify TIM: 0.1% or less

FS-30 Stereo Generator

Engineered to Provide the Best in Audio Performance



FEATURES

- Ultrastable digital modulator and digital pilot generator
- Selectable baseband equalization
- LED peak modulation display: L, R, L + R, L - R and composite signals
- Floating 50 ohm output drives long coax
- Full remote control, optically-isolated control and status lines
- Delay-equalized audio low pass filters provide minimum overshoot without clippers or other non-linear circuits

Digital Design: The digital modulator and digital pilot generator offers absolute pilot phase stability without adjustment or PLL and eliminates troublesome distortion products. The result is a virtually perfect baseband that is an order of magnitude better than previous standards.

Baseband Equalization: The switchable composite baseband equalization allows for correction of baseband degradation introduced by the STL or exciter.

Low-Z Output: The output circuit can drive a 50 ohm terminated coaxial cable independent of length with no degradation of baseband.

Complete Monitoring: A peak-reading LED display and associated test jack may be used to monitor L, R; L + R; L - R; or Composite baseband signals. Each parameter may be monitored through the use of interlocked pushbutton

switches and the 1 to 14% or 10 to 140% display.

Full Remote Control: The opto-isolated remote mode control and status indication terminals are compatible with positive or negative logic. Memory retains mode setting during power interruptions without the use of batteries. Power-up mode is internally programmable.

RFI Protection: All connections to the internal circuitry are decoupled by a multisection network.

Easy Installation: The balanced instrumentation-amp audio inputs and SCA loop-thru simplify multiplex system installation. The circuit ground reference is low frequency isolated from the chassis to eliminate system ground loops. Externally programmable, four-range voltage selector, with detachable IEC standard power cord.

SPECIFICATIONS

Audio Input Impedance:

600 ohms balanced, resistive, floating.
(Adaptable to other impedances).
Transformerless.

Audio Input Level:

+10 dBm, ± 1 dB for 100% modulation @ 400 Hz. (Adaptable to other input levels).

Composite Output Level:

2.5-8.0 volts p-p, adjustable, into open circuit, 50 ohm source impedance.

Frequency Response:

± 0.5 dB, 30-15,000 Hz, 75 usec pre-emphasis (flat, 25 or 50 usec pre-emphasis selectable).

Audio Input Filtering:

15 kHz Active L.P.F., 45 dB rejection at 19 kHz, delay compensation for minimum overshoot.

Audio Overshoot:

2 dB maximum.

Total Harmonic Distortion:

0.01% or less, 30-15,000 Hz.
(RMS Summation)

Total Harmonic Distortion Plus Noise (THD + N):

0.03% or less, 30-15,000 Hz.

Intermodulation Distortion:

0.03%, 60 Hz/7 kHz; 4:1 ratio.

CCIF IMD .006% or less:

All products are at least 85 dB below 100% modulation. (Left or right channel modulated 100% with 14 kHz/15 kHz, 1:1 test tone pair)

Transient Intermodulation Distortion:

0.1% (Square wave/sine wave).

Stereo Separation:

52 dB; 30-15,000 Hz.
60 dB; 30-5000 Hz.

Dynamic Stereo Separation:

45 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 Suppression:

80 dB minimum below 100% modulation.

57, 76 and 95 kHz Suppression:

80 dB minimum below 100% modulation.

76 kHz Sideband Suppression:

80 dB minimum below 100% modulation.

Spurious and Sideband Suppression:

75 dB minimum below 100% modulation beyond 95 kHz.

Signal to Noise Ratio:

85 dB or better below 100% modulation @ 400 Hz, 75 usec de-emphasis.

Pilot Stability:

± 0.5 Hz, 0° to 50°C.

Power Requirements:

97/133/194/266 Vac, 50/60 Hz, 25 W.

Operating Temperature Range:

0° to 50°C. (Functional to -20°C)

Maximum Altitude:

15,000 feet (4,572 M).

Dimensions:

19" W x 3.5" H x 16.5" D (48.3 x 9 x 41.9 cm).

Net Weight:

17 lbs. (7.7 kg).

Ordering Information:

909-0050—FM Stereo Generator, single phase 97 to 133 VAC or 194 to 266 VAC, 50/60 Hz.

BE BROADCAST
ELECTRONICS INC.

4100 N. 24th ST., P. O. BOX 3606, QUINCY, IL 62305-3606, (217) 224-9600, TELEX: 25-0142, FAX: (217) 224-9607



Five plug-in cards for the optional microprocessor system are housed behind hinged Transmitter Controller panel. To left is CRT monitor for bar-graph and tabular information read out display, and keyboard for message programming and display page access.

FEATURES

- Converts multiple meter readings to bar-graph or tabular display.
- If preset limit is exceeded, reading is displayed in reverse video.
- Automatically displays location and nature of a malfunction.
- Bar-graph display of PA/IPA parameters.
- Provides back-up of main controller timers, logic circuits and transmitter control circuitry.
- Automatic logging output provided.
- Remote monitoring with modems and telco lines or SCA interconnection.

EASILY READ DIAGNOSTICS — The B/E Microprocessor Video Diagnostic System option (MVDS) expands the operation of the Broadcast Electronics Models FM-1.5A, FM-3.5A FM-5A, FM-10A, FM-20A, FM-30A, FM-35A, FM-60A and FM-70A transmitters.

This unique, microprocessor based, optional system continuously monitors and controls all major parameters of the transmitter, independent of the standard digital control circuitry provided in the transmitter. Video displays of the transmitter operating conditions are produced in either an analog tabular chart or digital bar-graph format. Each display includes day, date and real time readouts as well as transmitter model and serial number. Forty spaces are reserved for individualized customer-programmed titling.

VERSATILE KEYBOARD PROGRAMMING — The microprocessor hardware consists of: 1) five plug-in cards which are inserted into a card cage located in the compartment area behind the standard Transmitter Controller hinged front panel; 2) a keyboard; 3) a power supply; 4) a rear panel

filter board, and 5) a CRT monitor located behind a window panel to the left of the Transmitter Controller Panel. In addition, an air plenum is added to the chassis and a blower replaces the standard cooling fan. The separate power supply ensures completely independent operation of the microprocessor from that of the primary transmitter controller. The keyboard is outfitted with a plug-in cable which mates with a connector at the rear of the controller chassis. The keyboard allows the customer to set time, select the desired CRT screen display page, set or reprogram the limits of the monitored parameters and activate various system options. There are two analog chart type page displays.

NORMAL DISPLAY SCREEN — The first of these, shown as Figure 1, is designed as the normal display screen since it contains all of the basic transmitter operating information. It is presented in a sectionalized form separated into exciter, IPA, PA and TPO areas. It also displays the times and causes of carrier interruptions.

MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

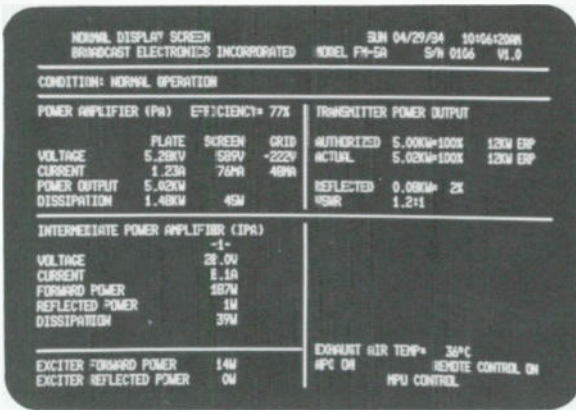


Figure 1 - Normal Display Screen

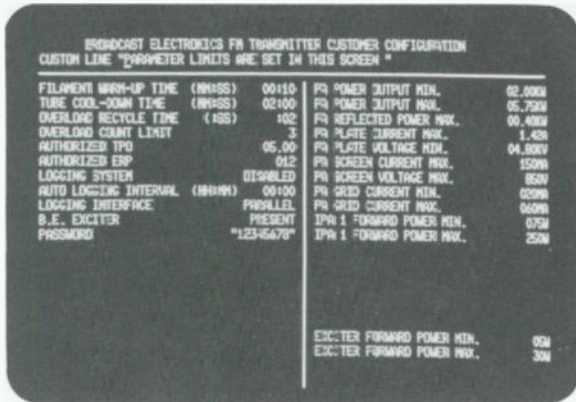


Figure 2 - Customer Configuration Screen

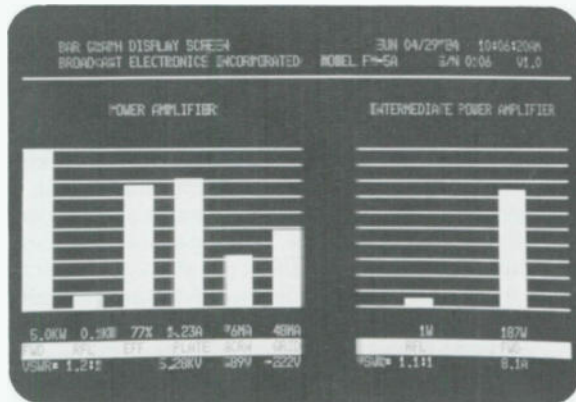


Figure 3 - Bar-graph Display Screen

TRANSMITTER STATUS READILY DISPLAYED — Of particular value is a condition/diagnosis line which, in the presence of an out-of-limit condition, not only identifies the section in which the abnormal condition exists, but also points out the cause of the malfunction. Whenever a parameter is at an out-of-limit level it is displayed in reverse video, immediately alerting the operator to the undesirable condition. No more hunting for the instruction manual for help in isolating and troubleshooting a malfunction!

CUSTOMER CONFIGURATION SCREEN — The second analog chart-type display, designated the customer configuration screen, is shown in Figure 2. Access to this screen is by entry of an eight-digit password. This is a security device which prevents unauthorized persons from changing user-set limits and options. This screen allows the user to tailor the diagnostics system to his specific requirements. System options and limits for monitored parameters are selected from this screen. The left hand column lists the system options including timing, power and function as applicable. The right hand column lists "min-max" values for various transmitter parameters. These may be changed by the user; however, limits have been preset at the factory. If a user-entered limit is greater than the factory limit, the cursor which had been positioned by the user to make the change will not move until a revised, acceptable value has been entered. With this feature the user cannot establish limits which violate the factory-set safe operating levels.

BAR-GRAPH DISPLAY SCREEN — The bar-graph display screen is shown in Figure 3. It is especially valuable in the set up and tuning of the transmitter for optimum overall performance. It continuously and simultaneously displays bar-graph readouts of PA forward and reflected powers, plate efficiency and PA plate, screen and grid currents along with IPA forward and reflected powers, driver power output and IPA module power output. Analog readout of associated PA VSWR, plate, screen and grid voltages, as well as IPA VSWR, module and driver currents is provided simultaneously. Thus, as tuning adjustments are made, their effect on overall transmitter operation are readily observed.

LOGGING BY PRINTER — The normal display screen information may be logged on an inexpensive home computer type printer. Logging may be initiated by simple keyboard command or may be programmed to occur at regular periodic intervals. The normal display screen may be viewed remotely by the utilization of modems and hardwire, telephone line or SCA subcarrier interconnection.

REMOTE VIDEO MONITORING — Additionally, the bar-graph display screen video information may be fed over coaxial cable interconnection up to 1000 feet in length to additional on-premise, extended local video monitors.

IMPROVED ON-AIR RELIABILITY — The addition of the MVDS option to a Broadcast Electronics transmitter provides not only the diagnostic system functions, but also redundant, automatic transmitter control which enhances overall on-air reliability. When the MVDS is selected to control the transmitter, it does so by communicating through the primary transmitter controller. If MVDS is disabled in any way, control automatically returns to the primary controller WITHOUT ANY INTERRUPTION IN TRANSMISSION. The MVDS option even has it's own independent power supply. This prevents any catastrophic MVDS failure from affecting the other transmitter systems—including the primary controller.

ORDERING INFORMATION

MODEL NO.	STOCK NO.	DESCRIPTION
MVDS	909-0091	Optional Microprocessor Video Diagnostic System, factory installed in FM-5A, FM-3.5A, FM-1.5A, FM-10A, FM-20A, FM-30A, FM-35A, FM-60A or FM-70A One Tube FM Transmitters only. (Must be ordered with transmitter)



4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305 U.S.A., TELEX: 250142, CABLE: BROADCAST, PHONE (217) 224-9600



SUPERIOR FOR DATA TRANSMISSION

- Direct coupled input
- Highly-stable, ultra-linear modulated oscillator ensures minimum distortion at 39 to 99 kHz

OTHER FEATURES

- Dual-mode, controlled-decay subcarrier attenuator ensures noise-free receiver muting

GENERAL DESCRIPTION

SUPERIOR FOR AUDIO AND DATA — The FC-30 SCA Generator incorporates the latest electronic technology in an advanced-design, suitable for either high-performance audio or dc-coupled data transmission on a multiplexed subcarrier.

Occupying only 1.75 inches of vertical rack space, the FC-30 may be mounted either in the FM transmitter cabinet or in a separate rack enclosure. Extensive RFI filtering permits trouble-free operation in high RF fields.

All operating controls are accessible from the front panel which also accommodates LED peak-modulation indicators.

Subcarrier muting is adjustable over a 0.5 to 10 second range, controlled by advanced, controlled-decay subcarrier attenuation circuitry which completely eliminates the annoying "squelch belch" effect, common to earlier designs.

SPECIFICATIONS

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

Subcarrier Frequency Stability:
±0.5% (330 Hz @ 67 kHz, 0° - 50°C).

Subcarrier Harmonic Content:
Less than 0.3%.

Subcarrier Output Level:
0.5 to 4.0 V, into 600 ohms peak-to-peak; adjustable.

Subcarrier Output Impedance:
600 ohms unbalanced, resistive.

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

Modulation Capability:
±20% of subcarrier frequency.

FM Noise:
72 dB below ±6 kHz deviation @ 400 Hz (150 usec deemphasis).

Audio Input Impedance:
600 ohms balanced, resistive

Data Input Impedance:
75 ohm unbalanced resistive, D.C. 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 (D. C. coupled).

Preemphasis:

(Audio) 150 useconds standard (75 usec 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 pass band.

Crosstalk SCA To Stereo:

-60 dB or better below 100% modulation of left or right, 75 usec de-emphasis, using FX-30 Exciter.

Crosstalk Stereo To SCA:

-50 dB or better below +6 kHz deviation of SCA using 150 usec de-emphasis and FS-30 stereo generator.

Intermodulation Distortion:

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

Auto Muting Level:

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay:

Adjustable, 0.5 to 10.0 seconds.

Operating Temperature Range:

0° to 50°C.

Maximum Altitude:

15,000 feet (4572 M)

AC Power Requirements:

97 to 133 Vac or 194 to 266 Vac, 50/60 Hz, 7 watts.

Dimensions:

19" W x 1.75" H x 9" D (48.3 x 4.5 x 22.9 cm).

Net Weight:

4.5 lbs. (2 kg).

Ordering Information:

FC-30, 909-0051, Single Phase, 97 to 133 VAC or 194 to 266 VAC.

FC-30, SCA GENERATOR USER LIST

ARIZONA

KKJJ, Payson
KTAR, Phoenix

ARKANSAS

KTHS, Berryville

CALIFORNIA

KEZC, Carnelian Bay
KCHO, Chico
KVLE, Los Angeles
KKGO, Los Angeles
KFAC, Hollywood
KPLM, Palm Springs
KDON, Salinas
KPBS, San Diego
KMPX, San Francisco
KSTN, Stockton

DISTRICT OF COLUMBIA

WWDC, Washington

FLORIDA

WYOR, Coral Gables
WMEZ, Pensacola
WPCS, Pensacola
WGYL, Vero Beach

GEORGIA

WMAZ, Macon
WWSA, Savannah

HAWAII

KHPR, Honolulu

IDAHO

KPKY, Pocatello

ILLINOIS

WAUR, Aurora
WSIU, Carbondale
WFMT, Chicago
WOJO, Evanston

IOWA

WOI, Ames

KENTUCKY

WSTO, Owensboro
WDCL, Purdy (2)

LOUISIANA

KTDY, New Iberia

MAINE

WDEA, Ellsworth

MARYLAND

WBJC, Baltimore
WPOC, Baltimore
WCRH, Williamsport

MASSACHUSETTS

WMJX, Boston (2)
WKPE, Orleans
WSRS, Worcester

MICHIGAN

WGMZ, Flint
WOOD, Grand Rapids
WSAQ, Port Huron

MINNESOTA

KQAD, Luvern
KEEZ, Mankato
WCAL, Northfield

MONTANA

KMTX, Helena
KCAP, Helena

NEBRASKA

KUCV, Lincoln
KIOS, Omaha

NEW HAMPSHIRE

WHEB, Portsmouth

NEW MEXICO

KCKN, Roswell

NEW YORK

WROW-FM, Albany
WFUV, New York
WNYC, New York
Muzak, New York (2)
WVOR, Rochester (2)
WTNY, Watertown

NORTH CAROLINA

WBT, Charlotte
WSJS, Winston-Salem

OHIO

WAUP, Akron
WCLV, Warrensville

OKLAHOMA

KTEN, Ada
KTFX, Tulsa
KCFO, Tulsa (2)

OREGON

KUPL, Portland

PENNSYLVANIA

WBYO, Boyertown
WKSZ, Media
WJAC, Johnstown

RHODE ISLAND

WPJB-FM, Providence
WSNE, Providence
WEAN, Providence (2)

SOUTH DAKOTA

KESD, Brookings
KOKK, Huron

TENNESSEE

WIVK, Knoxville

TEXAS

KIOU, Corpus Christi
KIKK, Houston
KODA, Houston (2)
KHOY, Laredo
KCRS, Midland

VIRGINIA

WETA, Arlington

WASHINGTON

KSEA, Seattle
KEZX, Seattle

WISCONSIN

WHAD, Delafield
WPNE-FM, Green Bay
WDLA, Green Bay
WHHI, Highland
WHLA, LaCrosse
WERN, Madison
WHWC, Menomonie
WHRM, Wausau
WBKV, West Bend

PUERTO RICO

WZAR, Ponce
WPRM, San Juan

VIRGIN ISLANDS

WIBS, Charlotte Amalie

ECUADOR

Radio Cadena

THAILAND

RTAF, Bangkok



**BROADCAST
ELECTRONICS INC**

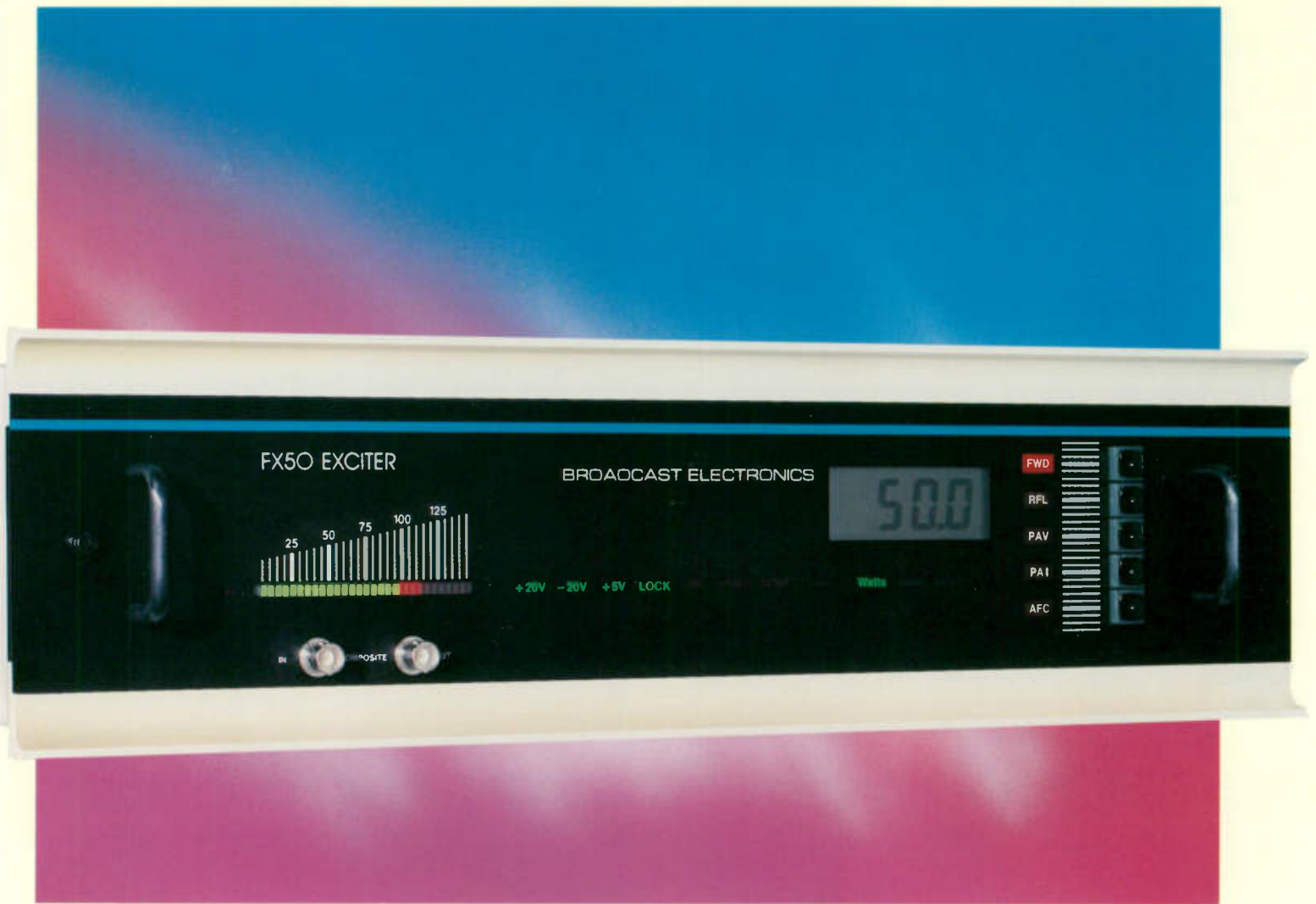
4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., TELEX: 250142, CABLE: BROADCAST, PHONE (217) 224-9600

New

BE® BROADCAST
ELECTRONICS INC.

FX 50 Exciter

93 dB S/N □ 0.003% THD and IMD □ 50 Watts



“Audio Performance That Rivals CD’s”

Audio Performance That Rivals CD's



FX50 Exciter

Features

- THD and IMD less than 0.003% typical for true CD sound
- Unmatched 93 dB S/N typical for widest dynamic range
- 50 watt MOSFET output power to drive the largest transmitter
- Stand-alone 50 watt FM transmitter
- Advanced linear modulated oscillator for unparalleled performance
- Computer-optimized phase locked loop greatly improves low frequency response
- Completely broadband for transparent performance
- Functional front panel controls with LCD displays

A New Design And Thoroughly Field Proven!

The new FX-50 FM Exciter provides performance that is an order of magnitude superior to its predecessor, the industry-standard FX-30. On air and in continuous use since the summer of 1988, you're assured of reaping the benefits of the new technology without taking chances on performance or reliability. Performance specifications feature a dynamic range that rivals CD players with harmonic and intermodulation distortion values so low that they are virtually unmeasurable.

The new FX-50 Exciter can bring existing FM transmitters up to CD quality standards and is the ideal retrofit for excitors now in use. The FX-50 is designed to exactly replace existing FX-30's, so it's especially easy to upgrade almost any transmitter system.

FX-50 In New "B" Series FM Transmitters

The FX-50 Exciter is now standard in every Broadcast Electronics new "B" Series FM transmitter. With the FX-50 Exciter, every new "B" model Transmitter from 100 watts to 35kW now provides digital quality transmission.

New Standard Of Audio Performance

The new FX-50 has the lowest distortion of any exciter available. THD and IMD are typically less than 0.003%! Transient Intermodulation Distortion is less than 0.01%!

With a signal to noise ratio that is typically 93 dB, the FX-50 can handle all of the nuances and power of compact discs. Taken together, these superb performance specifications make the FX-50 totally transparent to your broadcast signal. The FX-50 Exciter will be one of the noise-free components in your entire transmission system.



■ **Left** FX-50 Exciter is a standard component of the new "B" series of FM transmitters now offered by Broadcast Electronics. Shown here is the 30 kW model FM-30B.

■ **Right** The front panel digital LCD display can be used to monitor various selectable functions or as a built-in voltmeter with test probe. The indicator for each push-button switch shows which of the five functions is currently selected.

Advanced Linear Modulated Oscillator

The heart of the new FX-50 is the unique computer-designed linear modulated oscillator. It is responsible for the outstanding improvement in audio performance provided by the FX-50. It's unique resonator with hyper-abrupt tuning diodes provides lower distortion, extremely flat response and excellent signal-to-noise performance with less pre-correction compensation.

Computer-Optimized Phase Locked Loop Synthesizer

The advanced dual speed phase locked loop synthesizer is critical to the overall performance of the exciter, especially the transient and low frequency response. Broadcast Electronics used extensive computer modeling to develop the PLL design and to optimize its performance.

The FX-50 achieves lock from a cold start in less than five seconds and still has full modulation capability from less than 0.1 Hz to over 150 kHz.

High Power MOSFET Amplifier

The broadband RF power amplifier is a totally new design taking advantage of the latest solid state technology. Instead of using a bi-polar power device, the FX-50 uses a 60 watt MOSFET. Not only is higher output power available through this new device, it also improves the reliability of the amplifier. Heat is the enemy of solid state power devices and bi-polar transistors are more temperature sensitive. Bi-polar devices increase their power dissipation as they get hotter, which causes thermal runaway. This is not possible with a MOSFET device because it reduces its power dissipation as its temperature increases thereby greatly extending its life.

The broadband performance of the RF amplifier eliminates the need for tuning adjustments and is transparent to the signal generated by the modulated oscillator. The amplifier remains stable under varying load conditions and is completely short and open circuit protected.

Automatic Control Circuitry

The FX-50's automatic control circuitry eliminates the need for adjustments after the initial setup. The circuitry stabilizes the power output of the exciter and protects it from excessive temperature, VSWR, line voltage variations and short circuits.

New, Simplified LCD Metering

All monitoring of important parameters is displayed by the combination of a digital LCD multimeter and LED status panel.

Five parameters are selectable via push button switches and displayed on the LCD multimeter; forward power, reflected power, PA voltage, PA current and AFC voltage. In addition, this multimeter may be used as a built-in high impedance voltmeter for point-by-point measurements within the exciter or other equipment.

Additional status information provided on the status panel include +20, -20, and +5 volt supply voltages; frequency lock; RF amplifier malfunction; VSWR warning and RF amplifier temperature warning.

An LED modulation display provides a clear indication of short transient peaks exceeding 100% and includes automatic expanded scale (X10) expansion for convenient setting of stereo and SCA generator injection levels. This display is more accurate than a modulation monitor so operation at the highest allowable peak modulation levels is possible.

Easily Accessible Modular Construction

Building on the highly successful concept of the FX-30, the new FX-50 is designed to permit "on-air" adjustments without interruption. The easy to remove sub-assemblies avoid the complexity, RFI susceptibility and instability of plug-in modules.

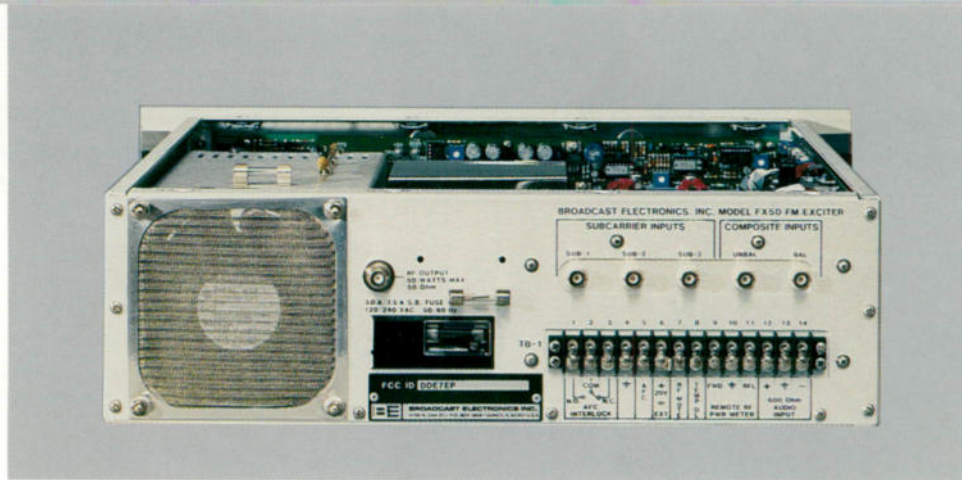
The entire chassis is mounted on slides so that the unit can be pulled out from the rack or transmitter to provide access while the FX-50 exciter continues to operate.

Composite signal measurements can be conveniently made via the front panel. Other connections are made to the rear panel.

Classic Elegant Styling

The classic elegant black appearance of the FX-50 gives this new exciter a distinctive appearance that will enhance any transmitter installation.





■ Rear view of the FX-50 shows the clearly labeled connections and terminal strip which simplify installation and maintenance.

FX-50 Exciter Specifications

GENERAL

Power Output: 3W to 50W 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: ± 300 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: ± 350 kHz.

Modulation Indication: Peak reading, color coded, LED display with baseband over-modulation indicator.

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

Synchronous AM S/N Ratio: 60 dB minimum, below 50-watt reference carrier with 100% AM modulation at 1 kHz, no de-emphasis (FM modulation ± 75 kHz and 1 kHz).

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

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

Front Panel Test Connections: Composite input and composite output.

Audio/Control Connections: 14-terminal barrier strip and (5) BNC connectors.

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

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

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

Dimensions: 17.70" (44.9 cm) wide \times 5.25" (13.3 cm) high \times 19.00" (48.3 cm) deep.

Net Weight: 38 lbs (17.2 kg); packed 46 lbs (20.8 kg).

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

Composite FM S/N Ratio: 90 dB below ± 75 kHz deviation @ 400 Hz (93 dB typical). Measured within a 20 Hz to 200 kHz bandwidth with 75 μsec . de-emphasis. 94 dB (96 dB typical) with DIN A weighting.

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

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

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

Composite Amplitude Response: ± 0.025 dB, 30 Hz to 53 kHz.

Composite Phase Response: $\pm 0.1^\circ$ from linear phase 30 Hz to 53 kHz.

Composite Group Delay: 125 nanoseconds.

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

SCA Inputs: 3 total, unbalanced BNC connectors.

SCA Input Impedance: 100 k ohm, nominal, resistive.

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

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

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, adaptable to other levels.

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

THD + Noise: 0.005% (0.003% typical).

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

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

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

Ordering Information

Model	Stock No.
FX 50 Exciter	909-1050-000
	909-0114

Description

FX 50 solid state 3-50 watt FM Exciter, for wideband, composite, or mono operation. For single phase 97/113 VAC or 194/266 VAC, 50/60Hz power source. 19" rack mount. Specify operating frequency with order.

Optional low pass filter assembly for FX 50. Converts FX 50 Exciter to 50 watt FM transmitter operation, factory installed and tested.

Note—Synchronous booster option for FX 50 Exciter available. For ordering information, contact Sales Department.





BROADCAST
ELECTRONICS INC.

FX-30

Synthesized FM Exciter *The Performance Leader*



Ultra-linear modulated oscillator for unsurpassed performance with all stereo and SCA generators.

Extremely low distortion — typical THD and IMD less than 0.02%.

First Exciter to specify Transient Intermodulation Distortion (TIM) at less than 0.1%.

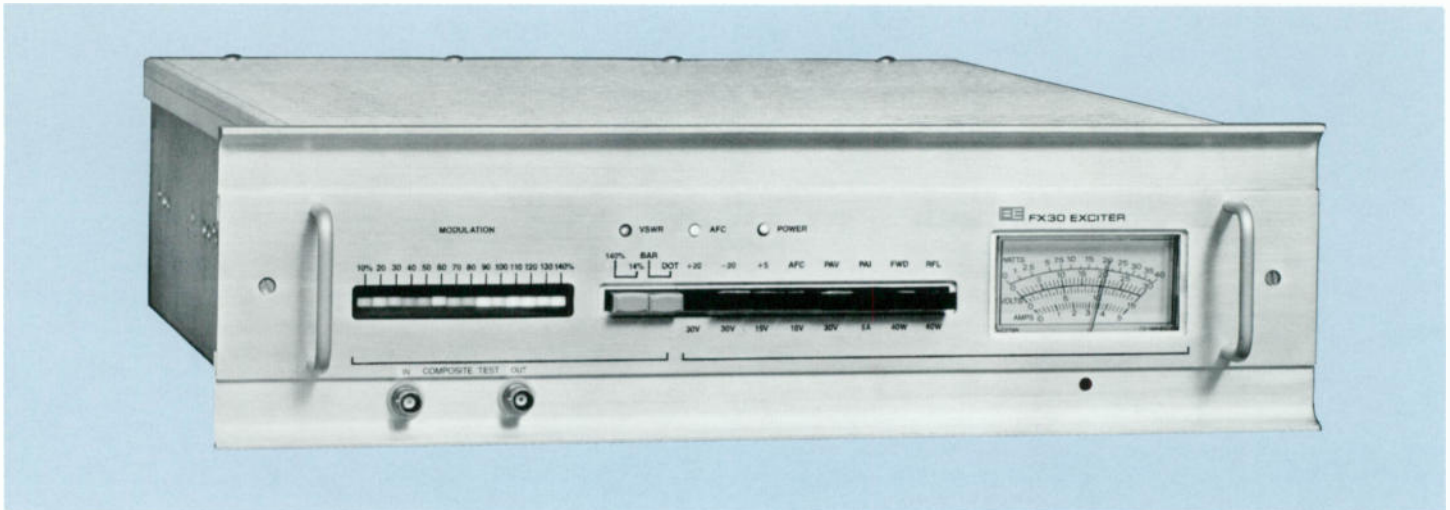
Advanced dual-speed phase locked loop greatly improves low frequency response.

Quiet operation — typical S/N ratio of 80 dB.

Completely broadband — requires no tuning adjustments.



Model FX-30 Exciter — The New Perf



Broadcast Electronics' FX-30 FM Exciter provides performance so superior that it rivals the best hi-fidelity tuners. Distortion in the FX-30 is extremely low, while programming is loud and clear. The elegant styling, with anodized aluminum front panel, complements the outstanding electronic design.

Whether it is used in one of the new Broadcast Electronics FM transmitters, as a replacement for an existing exciter, or as a stand alone 30 watt transmitter, the FX-30 is the new performance leader in FM broadcasting. In mid 1983 over 400 model FX-30 exciters were in use worldwide.

ULTRA-LINEAR MODULATED OSCILLATOR — The performance of any stereo multiplex and SCA FM transmitter system is highly dependent on the linearity of the modulated oscillator in the FM Exciter. The ultra-linear modulated oscillator design used in the FX-30 provides minimum intermodulation of base band frequency components, resulting in superior stereo and SCA performance.

TYPICAL S/N RATIO 80 dB — The FX-30 has extremely low distortion, with THD and IMD less than 0.05%, and it's the first exciter to specify Transient Intermodulation Distortion (TIM) at less than 0.1%. Programming is loud and sparkling clear with the FX-30, yet it's the quietest exciter of all, with a typical signal-to-noise ratio of 80 dB.

The FX-30 accepts multiple wideband composite inputs from any stereo or SCA generator, as well as a 600 Ohm balanced monaural input. When used for wideband, stereo, SCA, or monaural operation, the FX-30 Exciter produces a distinctively transparent FM sound.

ADVANCED DUAL-SPEED PHASE LOCKED LOOP SYNTHESIZER — The method of frequency control used in an FM exciter greatly influences the exciter's modulation fidelity. The FX-30 utilizes an advanced dual-speed phase locked loop to lock the frequency of the modulated oscillator to a precision reference oscillator, while greatly improving low frequency response. The FX-30 achieves lock from a cold start in less than 5 seconds and still allows full modulation capability from 1 Hz to 100 KHz.

A digitally programmed frequency synthesizer that permits field frequency changes in 10 KHz increments puts more than 2000 channels at your command, without requiring new crystals. The temperature compensated reference oscillator allows immediate on-frequency operation of the exciter without temperature controlled oven warm up. The 10 MHz reference frequency can be directly compared to worldwide frequency standards.

BROADBAND RF AMPLIFIER — The solid state FX-30 exciter is completely broadband and requires no tuning adjustments for a conservative 30 watt output. The RF output is continuously adjustable from 3 watts to 30 watts.

The broadband performance of the RF amplifier eliminates the need for adjustments to any particular frequency within the FM band. This assures that the exciter output is transparent to the signal generated by the modulated oscillator and enhances amplifier stability under varying load conditions.

A micro-strip directional coupler is incorporated into the RF amplifier output network. This coupler supplies information to the exciter control circuitry which provides automatic control of power output level and provides protection against operation under high VSWR conditions. The RF output is completely short/open circuit protected.

AUTOMATIC CONTROL CIRCUITRY — Automatic control circuitry in the FX-30 eliminates adjustments after the initial setup. The control circuitry automatically stabilizes the power output of the exciter, and protects it against excessive temperature, VSWR, voltages and short circuits.

EXTENSIVE METERING — Metering of the important operating parameters of the FX-30 is provided by a combination of analog metering and a digital LED display.

Eight steady state parameters are selected by a push-button switch and displayed on a conventional analog multimeter. In addition, this multimeter may be used as a built-in, high impedance test meter for point-by-point measurements within the exciter using the built-in test probe.

A color coded LED display constantly monitors the

Performance Leader In FM Broadcasting!



composite signal applied to the modulated oscillator, and provides a clear indication of short transient peaks exceeding 100% modulation. The ballistics and speed of this built-in modulation monitor make it more accurate and useful than ordinary modulation monitors.

MODULAR, SLIDE-OUT CONSTRUCTION —

The semi-modular mechanical construction of the FX-30 Exciter allows easy removal of sub-assemblies without the complexity and instability associated with plug-in modules. Each sub-assembly in the FX-30 is firmly attached to the main chassis and is electrically connected to the main wiring harness with high reliability pin/receptacle type connections.

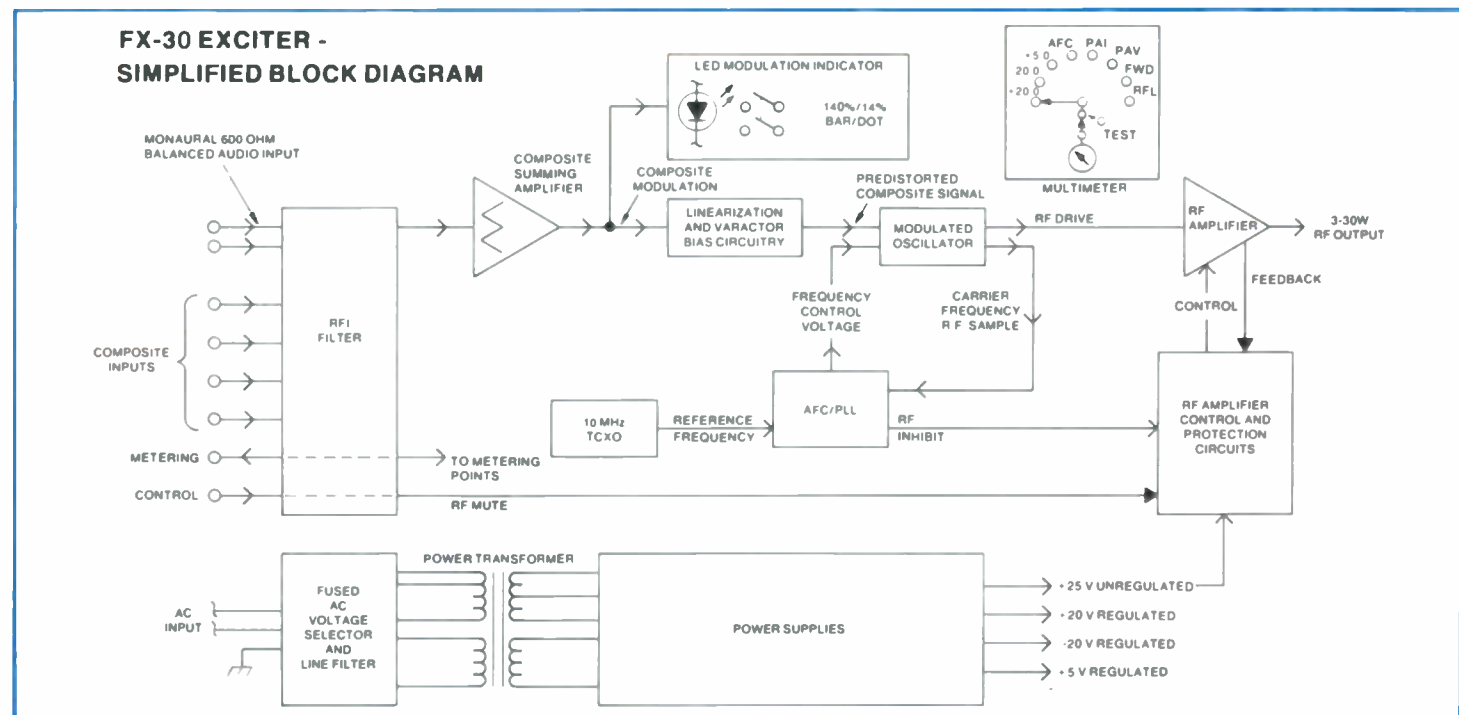
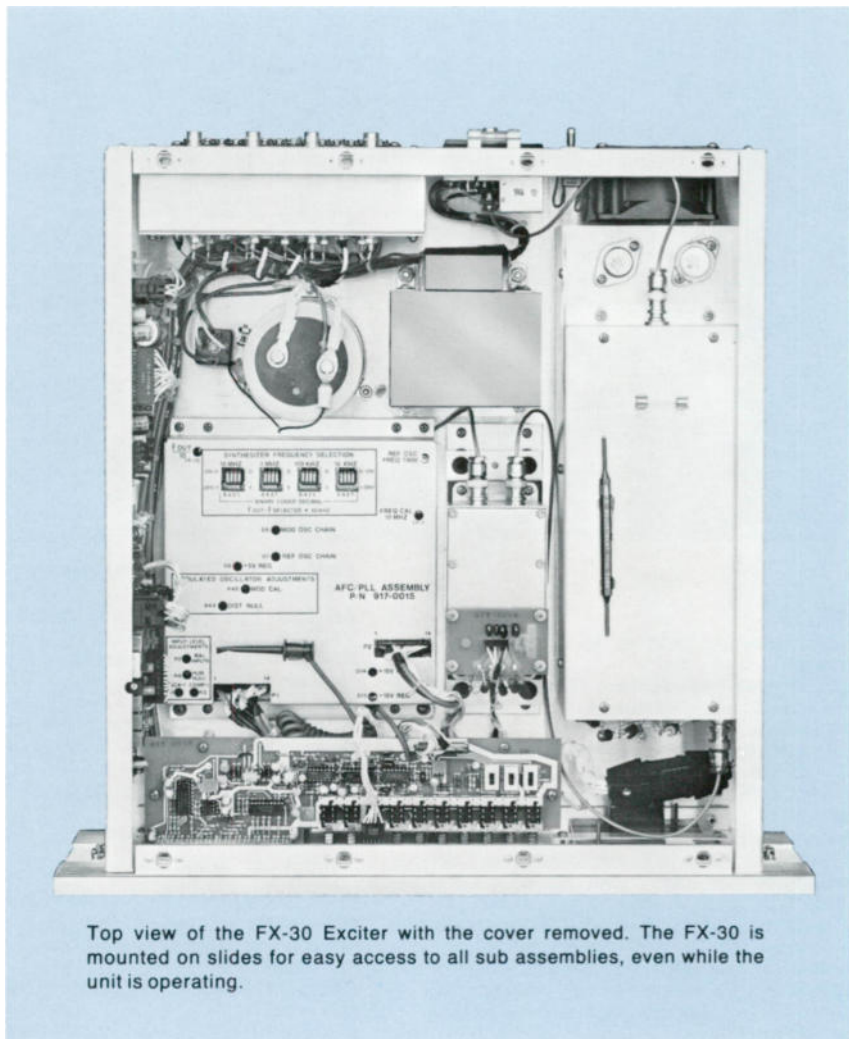
The entire chassis is mounted on slides, so when the unit is pulled out from the rack or transmitter, all sub-assemblies are easily accessible while the unit continues to operate.

Front panel test jacks allow measurements of the composite signal to be made without removing or opening the unit. Other connections are made to the rear panel via a clearly labeled terminal strip and BNC connectors.

ELEGANT STYLING —

The elegant styling of the FX-30 exciter is on an equal par with its superb electronic performance. Long term durability is provided by the anodized aluminum finish on the front panel, which also adds to the pleasing ultra-modern appearance.

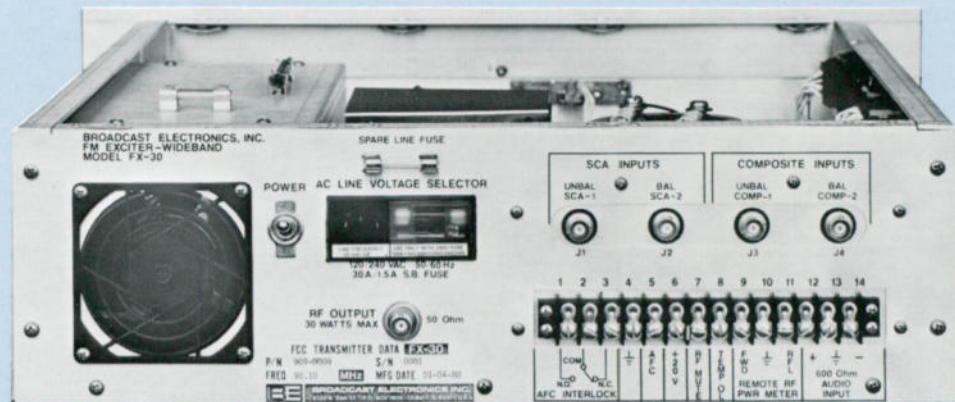
The FX-30 is 17.7 inches wide (44.96 cm) × 5.25 inches high (13.33 cm) × 19 inches deep (48.26 cm), and fits a standard 19-inch rack.



Model FX-30 Synthesized FM Exciter



Rear view of the FX-30 Exciter with the top cover removed. The clearly labeled rear panel and terminal strip simplify setup and maintenance.



FX-30 EXCITER SPECIFICATIONS

GENERAL

Power Output: 3 W to 30 W continuously variable
R.F. Output Impedance: 50 ohms, VSWR less than 2:1 for full output, (open and short circuit protected) BNC connector
R.F. Harmonic and Spurious Suppression: (Conducted) at least 58 dB below rated output. Meets CCIR/FCC requirements for low power transmitter.
Frequency Range: 87 MHz to 109 MHz digitally programmable in 10 kHz increments
Frequency Stability: ± 300 Hz, 0° to 50° C, TCXO
Modulation Type: Direct FM at the carrier frequency
Modulation Capability: ± 200 kHz
Modulation Indication: Peak reading, color coded, LED display with baseband overmodulation indicator
Asynchronous AM S/N Ratio: 70 dB below reference carrier with 100% AM modulation @400 Hz, 75 microsecond de-emphasis. (no FM modulation present)
Synchronous AM S/N Ratio: 60 dB below reference carrier with 100% AM modulation @400 Hz, 75 microsecond de-emphasis. (FM modulation ± 75 kHz @400 Hz)
Multimeter: 8 function diagnostic aid
Test Metering: Internal high input impedance multimeter with probe, for point by point measurements
Front Panel Composite Test Jacks: Composite input and composite output
Audio/Control Connections: 14 position barrier strip and (4) BNC connectors
Metering/Status Indication: LED Status indicators (8), remote metering/status of FWD PWR, RFL PWR, AFC, TEMP, MUTING.

AC Input Power: 97 to 133 VAC or 194 to 266 VAC, 50/60 Hz, 200 W max
Ambient Temperature Range: 0° C to 50° C (operational to -20° C)
Cabinet Size: 17.70" (44.96 cm) wide \times 5.25" (13.33 cm) high \times 19.00" (48.26 cm) deep. Standard 19" (48.26 cm) rack mounting with slide out feature for easy access
Net Weight: 36 lbs. (16.3 kg); packed 42 lbs. (19.1 kg)
Finish: Anodized aluminum

WIDEBAND COMPOSITE OPERATION

Composite Inputs: 3 total, (1) unbalanced and (1) balanced plus front panel test. BNC connectors
Composite Input Impedance: 10 k ohm, nominal, resistive
Composite Input Level: 3.5 V P-P nominal, for ± 75 kHz deviation
Composite FM S/N Ratio: 75 dB below ± 75 kHz deviation @400 Hz (80 dB typical). Measured in a 30 Hz to 100 kHz bandwidth with 75 microsecond de-emphasis
Composite Harmonic Distortion: 0.05% or less (.02% typical)
Composite Intermodulation Distortion: 0.03% or less. Typical 0.015% (60 Hz/7 kHz 1:1).
Composite CCIF IMD: All distortion products are at least 80 dB below 100% modulation. (Composite input modulated 100% with 14 kHz/15 kHz, 1:1, test tone pair).
Composite Transient IMD: 0.1% or less (square wave/sinewave)
Composite Amplitude Response: ± 0.1 dB 30 Hz to 100 kHz
Composite Phase Response: $\pm 0.5^\circ$ from linear phase 30 Hz to 53 kHz

Composite Group Delay: 390 nanoseconds ± 25 nanoseconds 30 Hz to 53 kHz
Composite Slew Rate: 12 V/microsecond (symmetrical)
Stereo Separation: Greater than 50 dB, 30 Hz to 15 kHz (when used with BE Model FS-30 Stereo Generator)
SCA Inputs: 2 total (1) unbalanced and (1) balanced, BNC connectors
SCA Input Impedance: 100 K ohm, nominal, resistive
SCA Input Level: 3.5 V P-P nominal for ± 7.5 kHz deviation
SCA Amplitude Response: ± 0.5 dB, 40 kHz to 100 kHz

MONAURAL OPERATION

Audio Input Impedance: 600 ohms balanced, resistive, adaptable to other impedances, 50 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 or 75 microsecond pre-emphasis
Harmonic Distortion: 0.05% or less 30 Hz to 15 kHz
Intermodulation Distortion: 0.03% or less, 60 Hz/7 kHz 4:1 ratio with 75 us pre-emphasis.
CCIF IMD: All distortion products are at least 80 dB below 100% modulation (Mono input modulated 100% with 14 kHz/15 kHz, 1:1, test tone pair).
Transient IMD: 0.1% or less (square wave/sine wave)
FM S/N Ratio: 75 dB below ± 75 kHz deviation @400 Hz (80 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 microsecond de-emphasis

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FX-30	909-0009	FX-30 Exciter, for wideband, composite or mono operation, with 19-inch rack mount
FX-30	909-0002	FX-30 Exciter, for wideband, composite or mono operation, with 21 inch front panel



BROADCAST ELECTRONICS INC.

AS 10

AM Stereo Modulation Monitor



AS 10 AM STEREO MODULATION MONITOR

FEATURES

- Second generation C-QUAM® modulation monitor
- RF AGC for optimum C-QUAM® decoder performance
- Minimal overshoot for accurate modulation level measurement
- Digital pilot detection for excellent long term stability
- Rapid carrier shift response
- Selectable MANUAL or AUTO-RANGING meters
- Advanced, modular design
- Front panel audio output for transmitter alignment and proof of performance
- 9 or 10 kHz channel spacing available



The Broadcast Electronics AS 10 AM Stereo Modulation Monitor represents a substantial improvement in C-QUAM® monitoring technology. The AS 10 offers state of the art design innovations coupled with convenience features not found on other C-QUAM® monitors. The advanced design and attractive styling of the AS 10 makes it the perfect companion for the Broadcast Electronics model AX 10 C-QUAM® AM Stereo Exciter.

RF AGC: Only the AS 10 features the accuracy of a single RF AGC system. This innovative design avoids the troublesome tracking errors that can appear in monitors utilizing a matrix AGC design.

A matrix design actually employs two AGC's: one for L+R, the other for L-R. If there are any tracking errors between the two AGC's, channel separation will be reduced and C-QUAM® decoder performance will suffer. With the AS 10's single RF

AGC, consistent decoder performance is guaranteed—even over a varying range of signal levels. The end result is unquestionable measurement accuracy!

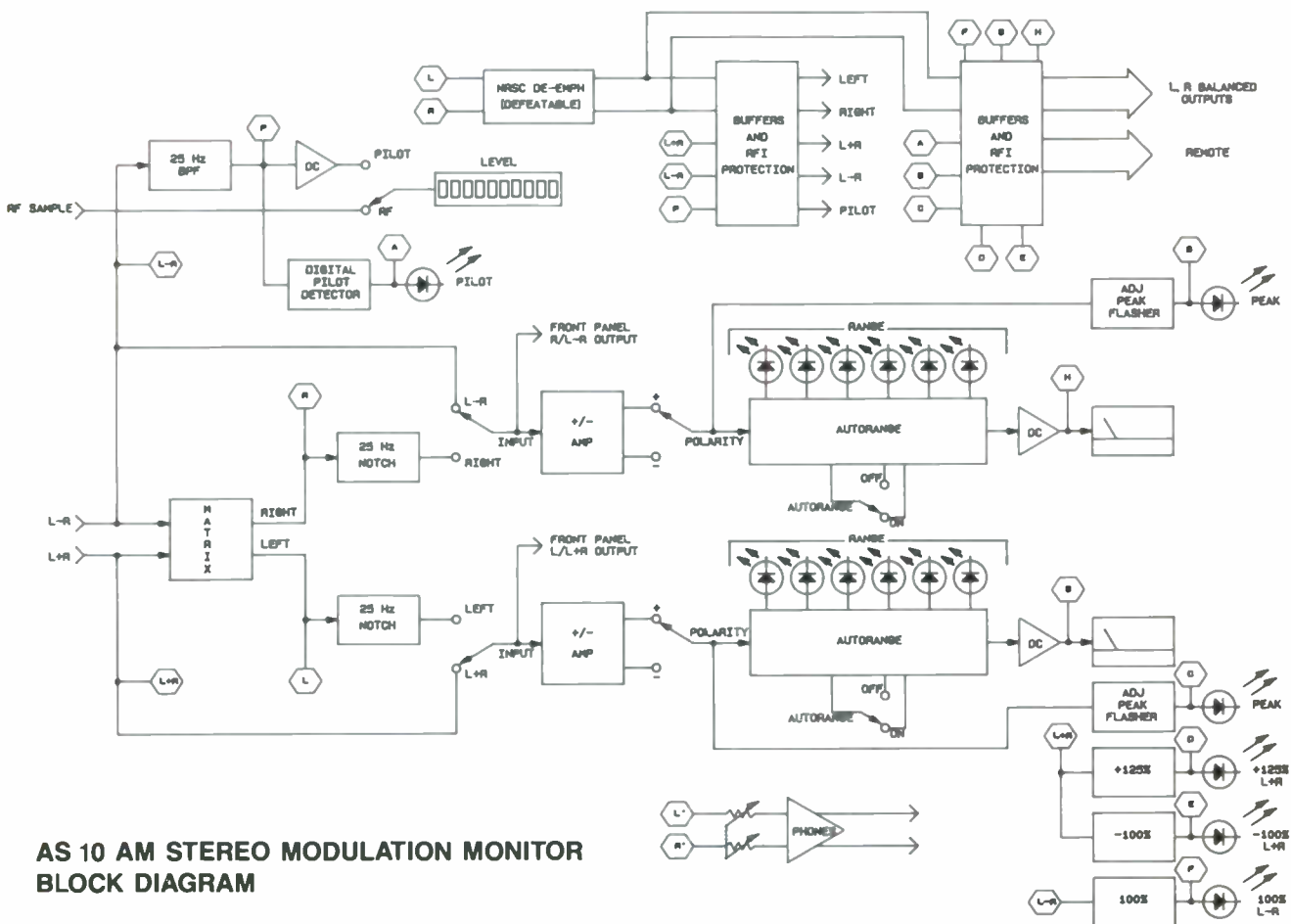
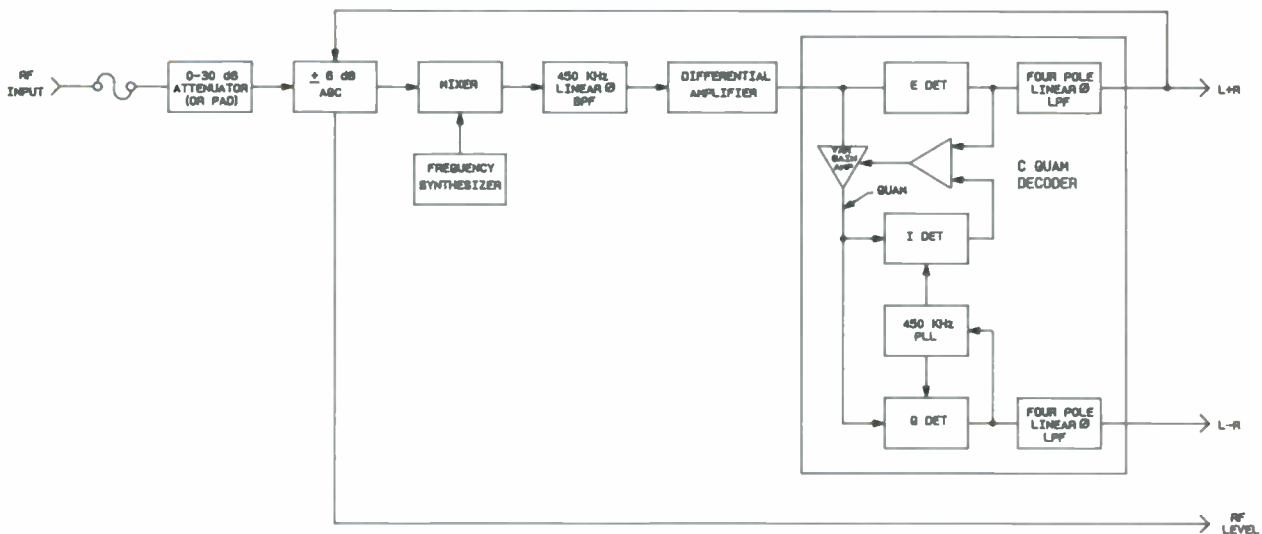
OVERSHOOT: The AS 10's carefully designed filtering circuitry keeps overshoot errors to the lowest levels possible. Overshoot in the AS 10 is maintained at less than 1%, while in other monitors it could range as high as ten percent or more. Reduced overshoot yields an extra margin of accuracy when making critical modulation level measurements. When the AS 10 indicates 100% modulation, you can be certain it IS one hundred percent!

DIGITAL PILOT DETECTION: The AS 10's digital pilot detector ensures perfect stability and outstanding long term reliability. Unlike PLL based circuits, the AS 10 digital pilot detector will not gradually drift out of lock—even after many years of service.

HIGH RESOLUTION CARRIER LEVEL INDICATOR: A multi-colored LED bar display provides high resolution carrier shift readings at a glance. The AS 10 carrier level indicator features a carrier shift reaction time of less than 300 milliseconds. This rapid reaction time permits easier, more accurate readings of the LED display.

MODULATION LEVEL METERING: Both the Left and Right channel meters offer 70 dB of indication range. Exclusive auto-ranging circuitry selects the proper range automatically in 10 dB steps. (This makes proof of performance measurements a snap!) The manual range function can also be used for range selection if desired.

Each meter features semi-peak response on the top ranges, changing to average response on lower ranges. This allows separation, crosstalk, and signal to noise measurements to be taken directly from the meters.

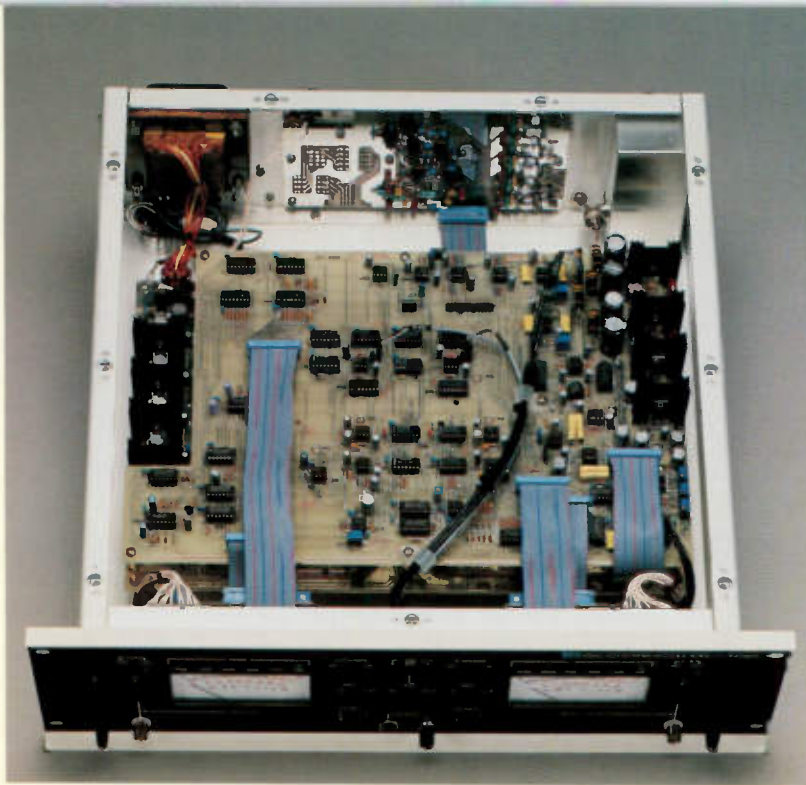


**AS 10 AM STEREO MODULATION MONITOR
BLOCK DIAGRAM**

NRSC DE-EMPHASIS: A built-in jumper selectable NRSC filter applies appropriate de-emphasis to the output signals. This provides convenient, high quality monitor signals.

DESIGNED FOR CONVENIENCE: The convenience features of the AS 10 include a front panel headphone output, front panel audio output ports and modular internal PC boards. Lighted switch indicators and large, easy to read meters make the AS 10 a pleasure to operate.

REMOTE MONITORING: Rear panel connections are provided for remote monitoring of peak meter readings and peak LED displays. The AS 10 remote output ports are compatible with twelve volt positive going CMOS logic.



SPECIFICATIONS

AS 10 AM STEREO MODULATION MONITOR

Size

5.25"H x 19"W x 17"D
(Fits standard EIA 19" racks)
(13.3H x 48.3W x 43.2D cm)

Weight

25 lbs. (11.3 kg)

Power Requirements

120 VAC (97-133 VAC), 50/60 Hz or 220/240 VAC (194-226 VAC), 50/60 Hz with appropriate line voltage card selection.

Power consumption = 60 watts, maximum.

Ambient Temperature Range

0 to 50°C

Humidity

95% non-condensing

Altitude

Up to 15,000 AMSL

Cooling

Natural convection and conduction

Operating Frequency Range

530-1620 kHz in 10 kHz increments or 522-1620 kHz in 9 kHz increments with internal crystal selection.

RF Input Level

500 mV to 15V RMS

RF Input Impedance

50 ohms

RF Attenuator

0 to 30 dB in 6 dB increments with a 0 to 6 dB AGC controlled fine adjustment.

Modulation Meter Calibration

0 to 133% (-20 dB to +2 dB)

Selectable Meter Range

0 dB to -50 dB, auto-ranging or manual

Modulation Meter Accuracy

400 Hz, ±2% at 100% modulation

Modulation Meter Functions

Left/L+R Right/L-R

Peak Flasher Function

+125% envelope, -100% envelope, 100% phase

Peak Flasher Indicator

Adjustable via thumbwheel switches for 0 to 133%. Selectable for + or - peak indication of meter function.

Rear Panel Outputs

(L, R, L+R, L-R) .775V RMS equals 100% BNC output connectors.

(L and R Line Output) 2.45 RMS at 100%, 600 ohms actively balanced. PC mounted quick disconnect terminal.

Selectable NRSC De-emphasis: (Pilot)

.775V RMS equals 5% pilot injection. BNC connector.

Headphone Output

2 watts minimum into 8 ohms impedance. Adjustable.

Specifications may be changed without notice.

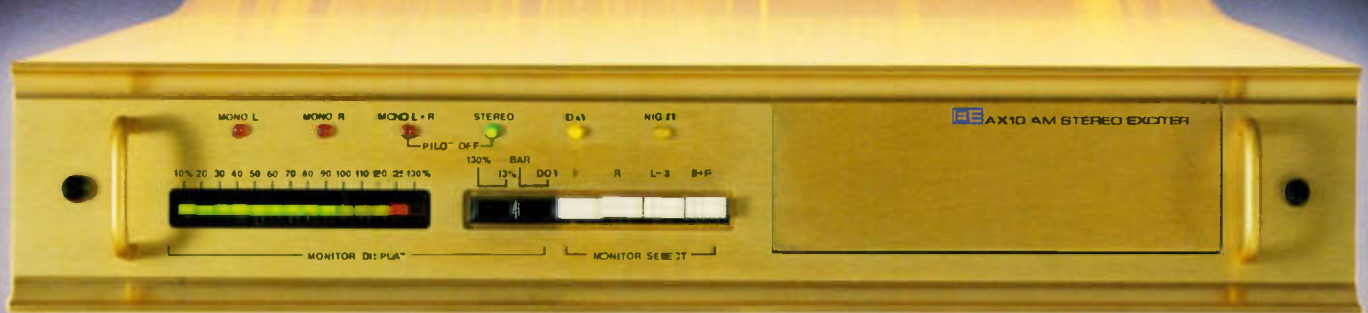
ORDERING INFORMATION

Model	Stock No.	Description
AS 10	907-0100-004	C-QUAM® AM Stereo Modulation Monitor. 117V, 50/60 Hz
AS 10	907-0100-304	Same as above, except for 220V, 50/60 Hz
	907-0104	9 kHz increment option



4100 N. 24th ST., P. O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., PHONE (217) 224-9600, TELEX: 250142, FAX: (217) 224-9607

AX-10



AM STEREO EXCITER

BE® BROADCAST
ELECTRONICS INC

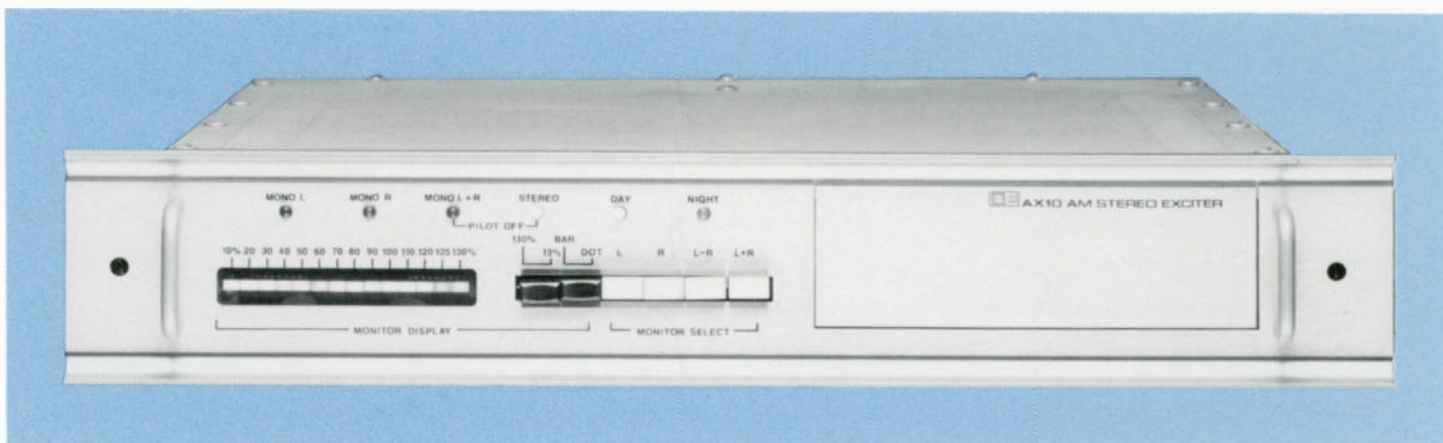
AX-10 AM STEREO EXCITER

FEATURES

- Synthesized Operation - 1 kHz increments
- Second generation C-QUAM® Digital Design
- Advanced-technology, independent channel modulation technique*
- Interfaces with virtually any existing AM transmitter

- Superior stereo performance, yet compatible with existing AM mono receivers
- Built-in LED bar graph, peak-reading modulation display
- Compact size - only 3½ inch rack space
- Independent equalization for two-transmitter or dual antenna pattern operation. Full remote control capability

*Patented



The Promise of AM Stereo

Once there was a time when AM was the undisputed king. AM captured the imagination of an entire nation with everything from sports, to news, to drama, to music. Ever since the beginning of broadcasting, AM was radio. The outlook for continued prosperity certainly seemed endless - but then something happened.

In 1961 the FCC authorized FM Stereo. Most broadcasters greeted it with a shrug, but a few farsighted individuals knew the potential and acted accordingly. Slowly at first, but with gathering speed, FM Stereo stations took to the air across the country. They offered high fidelity stereo programming that previously had been available only on record or tape. The public gradually became aware of this new innovation in

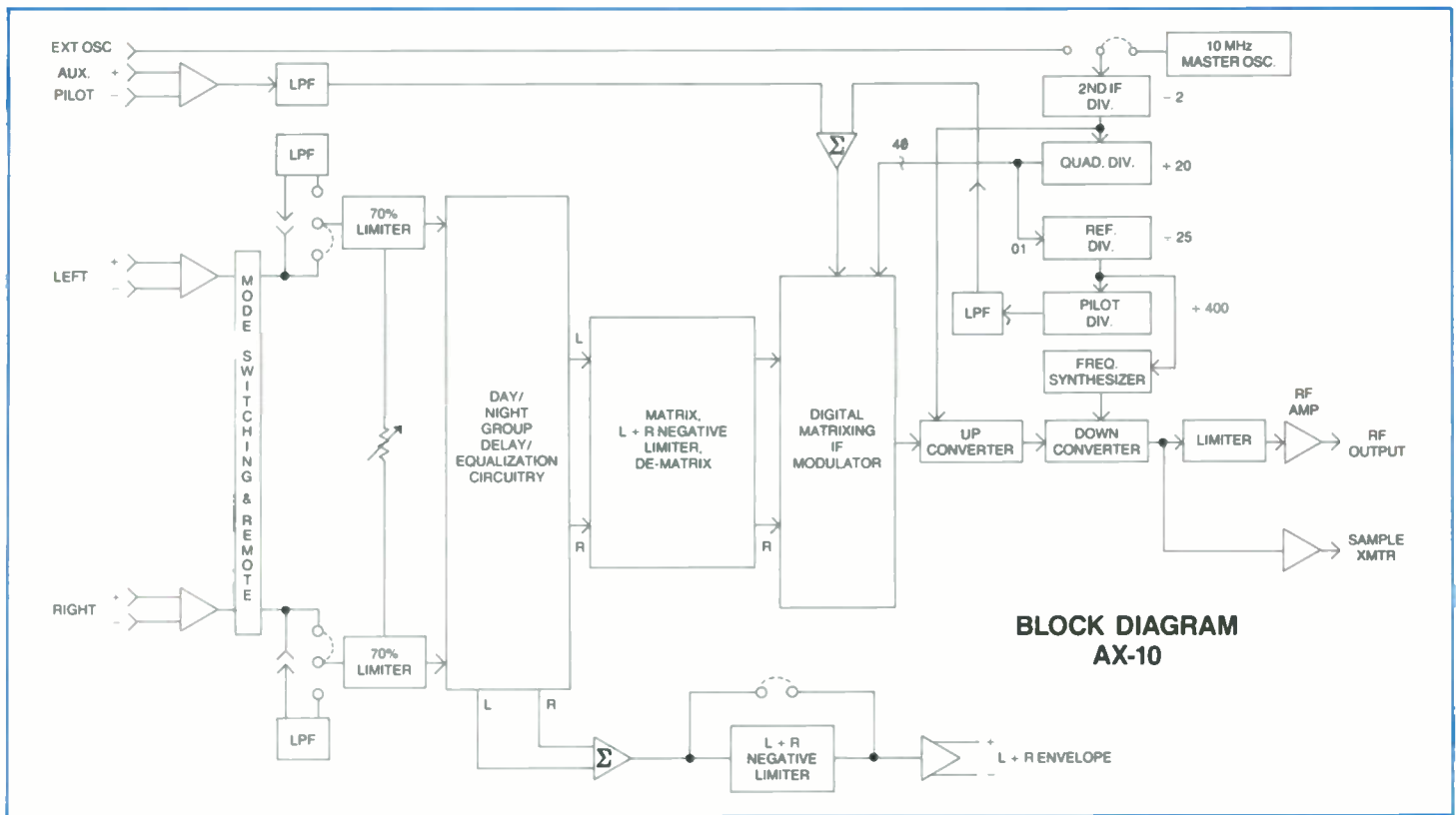
broadcasting. They listened. They compared. The advantages were instantly obvious and the inevitable shift to FM began.

Of course, AM in the eighties is far from dead. For many it has become a valuable, informative source in their daily lives. Still, listener surveys report that FM has become the medium of choice for high fidelity programming. If your AM station is typical, you are probably fighting the local FM's on a battleground that is heavily weighted in their favor. **But there is a way to even the odds.**

AM Stereo is rapidly becoming a powerful equalizer. The Motorola C-QUAM® Stereo System offers true stereo with richness and depth. That is why Broadcast Electronics chose

C-QUAM® as the nucleus for the AX-10 AM Stereo Exciter. AM Stereo with the AX-10 Exciter is truly a feast for the ears! Surprised listeners find the stereo fidelity to be virtually **indistinguishable** from FM. At the same time, C-QUAM® Stereo is fully compatible with mono receivers.

What is the real listener potential for AM Stereo? Every year, millions of C-QUAM® AM Stereo receivers are sold in the United States. When the owners of these new AM Stereo receivers tune to **your station**, what will they hear? Will they be content to listen to stale, mono AM - especially when they can find something better between 88 and 108 MHz? Give them a reason to choose the new era of AM Stereo. Convert your station **now** with the Broadcast Electronics AX-10.



DESCRIPTION

C-QUAM® COMPATIBLE DIGITAL MODULATION — The AX-10 Stereo Exciter is designed to produce C-QUAM® AM Stereo when interfaced with virtually any existing AM broadcast transmitter. The AX-10 assures superior stereo performance through an advanced IF modulation scheme employing independent, non-interfacing left and right channel digital modulators (patented). The result is exceptional AM Stereo with full mono receiver compatibility.

INNOVATIVE DESIGN — Since it is a second generation C-QUAM® exciter, the AX-10 incorporates the most advanced AM Stereo technology available. For example, its frequency agility is accomplished through a dual conversion technique utilizing a precision synthesis circuit and a highly stable 10 MHz temperature compensated crystal oscillator. In addition to its function as one of the primary frequency determining components, the oscillator also serves as the reference source for the 25 Hz pilot tone. Its accuracy can be easily checked and calibrated against the National Bureau of Standards station WWV. A provision for locking the AX-10 to an external 10 MHz source is also provided. IF modulation eliminates "on frequency" BPF filters for consistent performance across the AM band.

The left and right channel audio inputs employ fully balanced, transformerless instrumentation amplifiers capable of superior common mode rejection and excellent transient response. The balanced low impedance output level to the transmitter is variable from 0 to +20 dBm with independent level adjustments for day/night transmitter operation. Broadcasters employing high degrees of processing will appreciate the AX-10's built-in adjustable clipper which limits negative modulation peaks from -90 to -100%.

SELECTABLE EQUALIZATION — Selectable equalization is a critical feature for stations which employ dual day/night transmitters or varying antenna patterns. The adjustment system consists of individual group delay networks and low frequency/high frequency equalizers. Various network/equalizer combinations can be pre-selected and, by matrix switching, inserted into either the FM modulator circuitry or the L+R transmitter audio input path.

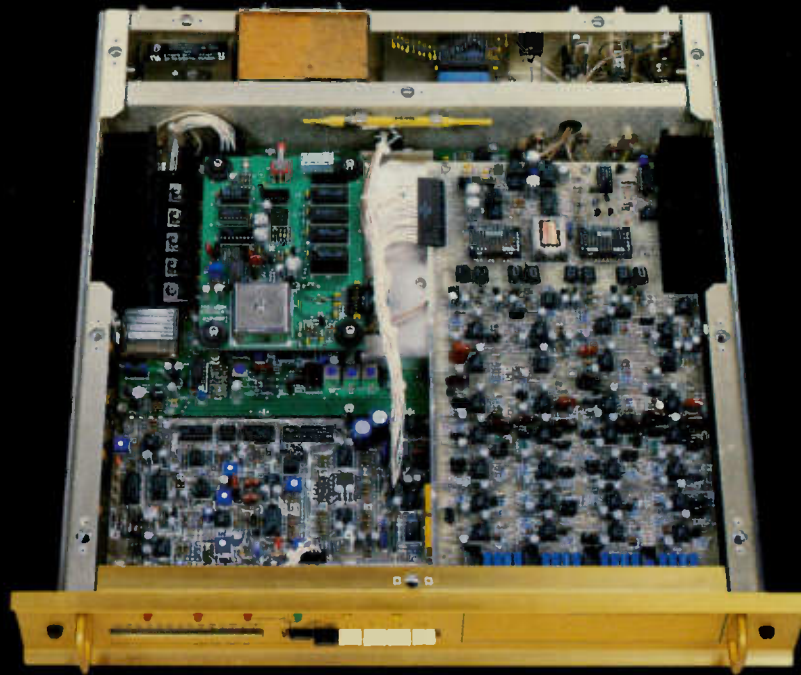
FLEXIBLE INTERFACING — The AX-10 delivers up to 10 watts of RF output and is compatible with virtually any AM broadcast transmitter. An optional TTL-compatible RF adapter is available for transmitters requiring asymmetrical duty cycle TTL inputs.

The AX-10 utilizes an extremely accurate front panel LED bar graph display to monitor modulation peaks. A 125% peak-hold indicator allows monitoring of asymmetrical modulation. Left, Right, L+R or L-R/pilot injection metering is pushbutton selectable.

OPERATIONAL FEATURES — The AX-10 is fully capable of remote operation. Control and status indicators confirm the four operating modes and the day/night equalization selection. Should one audio channel be lost for any reason, the mono left, mono right, mono L+R, or stereo modes can be remotely activated without decreasing overall signal loudness.

The AX-10 is elegant in design with a refined styling that harmonizes with any transmitter color scheme. Its precise mechanical construction and tasteful appearance is enhanced by a satin gold anodized front panel which blends into the internal exciter housing. The entire exciter occupies only 3½ inches of a standard 19 inch rack height.

C-QUAM® is registered trademark of Motorola, Inc.



SPECIFICATIONS — AX-10 AM STEREO EXCITER

Monaural Signal to Noise: -60 dB below 100% mod. @ 400 Hz.

Stereo Signal to Noise: L, R -50 dB below 100% mod. @ 400 Hz.

Audio Input Level: +10, ± 1 dBm, balanced, transformerless. Other levels accommodated by internal resistor selection.

Audio Input Impedance: 600 ohms, balanced resistive. Adaptable to other values by resistor selection.

Frequency Response: 0, -1 dB, 50 Hz to 15 kHz

Stereo Separation: 35 dB, 50 Hz to 7.5 kHz; 25 dB, 7.5 kHz to 15 kHz.

Ambient Temperature Range: 0° to 50°C (operational to -20°C)

Maximum Altitude: 15,000 ft. (4572 m) AMSL

Dimensions: 19" W x 3.5" H x 19" D (48.3 cm. W x 8.9 cm. H x 48.3 cm. D)

Note: The Model AS-10 AM Stereo Modulation Monitor is recommended for use with the AX-10.

RF Output Power: 0.1 to 10 watts rms into 50 ohms, continuously variable.

RF Output Impedance: 50 ohms. BNC connector.

Sample Transmitter Output: 2 V p-p, 50 ohms. BNC connector.

Frequency Range: 522 to 1620 kHz in 1 kHz increments.

Frequency Stability: Within 10 Hz of assigned carrier frequency.

L + R Audio Output: 0 to +20 dBm, adjustable.

L + R Audio Output Impedance: 300 ohms, balanced, transformerless.

Harmonic Distortion (85% modulation): L=R, Monaural, 0.25% max, 50 Hz to 15 kHz. (50% modulation: L, R, Single Channel, 0.5% max, 50 Hz to 7.5 kHz.)

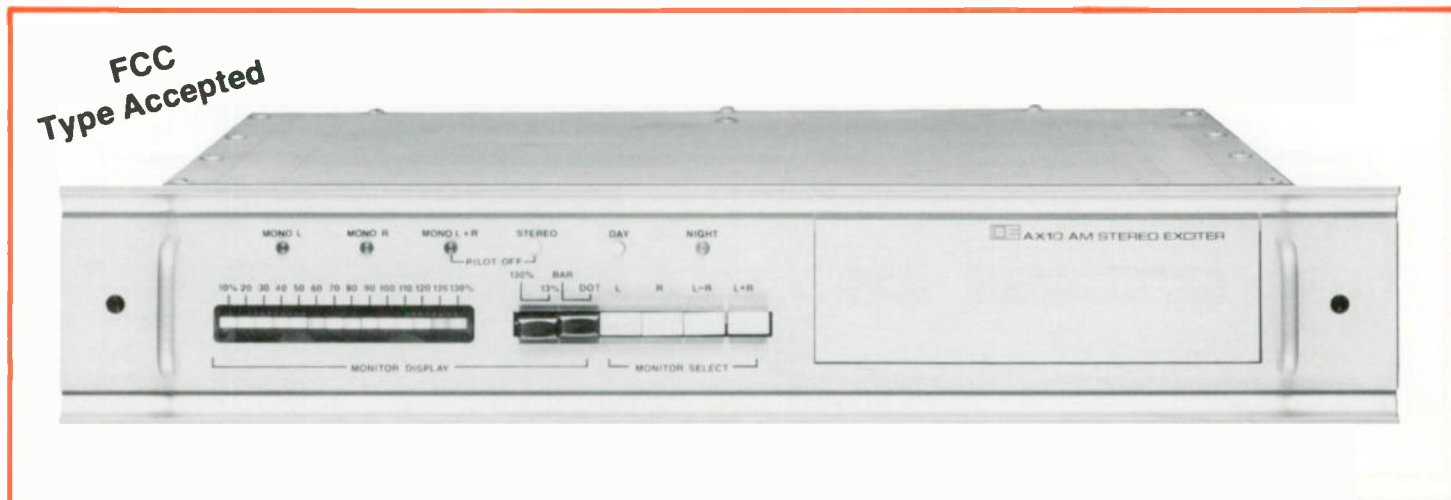
Power Requirements: 97-133 or 194-266 Vac, 50/60 Hz, 50 W.

ORDERING INFORMATION

Model	Stock No.	Description
AX-10	907-0010	AX-10 AM Stereo Exciter for C-QUAM system operation on a specified frequency in the 522 to 1620 kHz range. (117 V/60 Hz) (117 Vac/50 Hz, 220 Vac/50 Hz, 220 Vac, 60 Hz models available.)
	907-0058	TTL Interface Option Assy.
	907-0060	12 kHz Low Pass Filter option.
AS-10	907-0100-000	AM Stereo Modulation Monitor

BE [®] **BROADCAST ELECTRONICS INC**

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., TELEX: 250142, CABLE: BROADCAST, PHONE (217) 224-9600



FEATURES

- FCC Type Accepted
- Synthesized Operation
- Second generation C-QUAM® Digital Design
- Advanced-technology, independent right and left channel IF modulation technique
- Interfaces with virtually any existing AM transmitter

- Superior stereo performance, yet compatible with existing AM mono receivers
- Built-in LED bar graph, peak-reading modulation display
- Compact size - only 3½ inch rack space
- Independent equalization for two-transmitter or dual antenna pattern operation. Full remote control capability

DESCRIPTION

Following the same superb product design concepts pioneered in the FX-30 FM Exciter, Broadcast Electronics now offers radio broadcasters the technologically advanced Model AX-10 Exciter for superb AM stereo transmission.

C-QUAM® COMPATIBLE DIGITAL MODULATION — The totally new Model AX-10 AM Stereo Exciter is designed to produce C-QUAM® system AM stereo modulation for interface with virtually any existing AM broadcast transmitter.

Through an advanced engineering approach which utilizes independent, non-interacting left-and right-channel digital modulators in an IF modulation configuration, the AX-10 exciter assures superior stereo performance and compatible mono reception.

ADVANCED DESIGN — This second generation C-QUAM® compatible exciter incorporates the most advanced AM stereo technology available. Frequency agility is accomplished through frequency synthesis in conjunction with a dual conversion scheme employing a single high stability 10 MHz temperature compensated crystal oscillator. This oscillator is readily calibrated to WWV Standards. It serves also as the reference source for the 25 Hz pilot tone. A facility for locking the AX-10 to an external 10 MHz source is provided to eliminate night time co-channel interference (platform motion).

The left and right channel audio inputs employ fully-balanced, transformerless instrumentation amplifiers capable of superior common mode rejection and excellent transient response. Balanced, 600 ohm output level to the transmitter is variable from -10 to +20 dBm with independent level adjustments for day/night transmitter operation. Broadcasters employing high degrees of processing may utilize a built-in adjustable clipper to limit negative modulation peaks from -90 to -100%.

SELECTABLE EQUALIZATION — For dual day/night transmitters, or changing antenna patterns, completely separate switch-selectable equalization adjustments are provided.

These each consist of individual group delay networks and low-frequency and high-frequency equalizers, combinations of which may be pre-selected, combined, and by matrix switching, inserted into either the RF modulator circuitry or the L + R transmitter audio input path.

FLEXIBLE INTERFACING — The AX-10 delivers up to 10 watts of RF output. A separate optional TTL-compatible RF adapter permits interfacing transmitters requiring asymmetrical duty cycle TTL inputs.

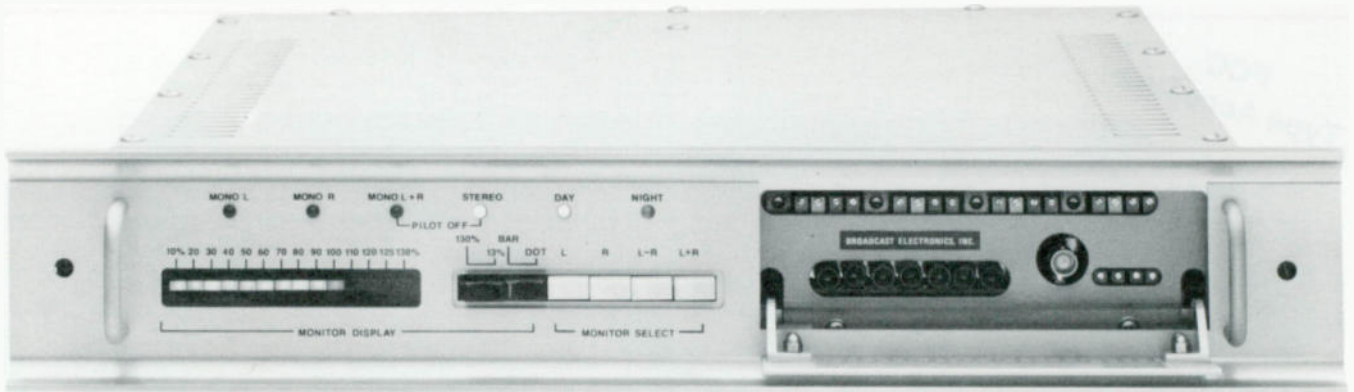
An extremely accurate front panel, peak-reading LED bar graph display monitors modulation peaks. A 125% peak-hold detector allows monitoring of asymmetrical modulation. Left, Right, L + R or L - R/pilot injection metering is pushbutton-selectable, with the selected meter function terminated in a BNC monitoring jack located under the hinged front panel door.

OPERATIONAL FEATURES — The AX-10 is fully capable of remote operation. Control and status indicators confirm the four operating modes and day/night equalization selection. Mono left, mono right, mono L + R or stereo modes are selectable without decreased signal loudness, in the event one audio feed is lost.

As another feature, the Model AX-10 AM Stereo exciter is capable of accepting an external pilot/subsonic phase modulated AM SCA signal.

Styled to harmonize with any transmitter color scheme, the Model AX-10 represents elegance in design and in appearance. The precision mechanical construction and elegant appearance is enhanced by the satin-gold anodized front panel which blends with the internal exciter housing. The entire Model AX-10 AM stereo exciter occupies only 3½ inches of standard 19" rack height.

AX-10 AM Stereo Exciter



Hinged access door facilitates equalization adjustments and mode selection.

AX-10 AM STEREO EXCITER SPECIFICATIONS

RF Output Power: 0.15 to 10 watts rms into 50 ohms, continuously variable

RF Output Impedance: 50 ohms. BNC connector

Sample Transmitter Output: 2 V p-p, 50-ohms. BNC connector

Frequency Range: 530 to 1710 kHz

Frequency Stability: within 10 Hz of assigned carrier frequency

L + R Audio Output: 0 to +20 dBm, adjustable

L + R Audio Output Impedance: 600 ohms, balanced, transformerless

Monaural Signal to Noise: -60 dB below 100% mod. @ 400 Hz.

Stereo Signal to Noise: L, R -50 dB below 100% mod. @ 400 Hz.

Audio Input Level: +10, +1 dBm, balanced, transformerless. Other levels accommodated by internal resistor selection

Audio Input Impedance: 600 ohms, balanced resistive. Adaptable to other values by resistor selection.

Frequency Response: 0, -1 dB, 50 Hz to 15 kHz

Stereo Separation: 35 dB, 50 Hz to 7.5 kHz; 25 dB, 7.5 kHz to 15 kHz

Harmonic Distortion (85% modulation): L = R, Monaural, 0.25% max, 50 Hz to 15 kHz

(70% modulation): L, R, Single Channel, 0.5% max, 50 Hz to 7.5 kHz

Power Requirements: 97-133 or 194-266 Vac, 50/60 Hz, 50 W

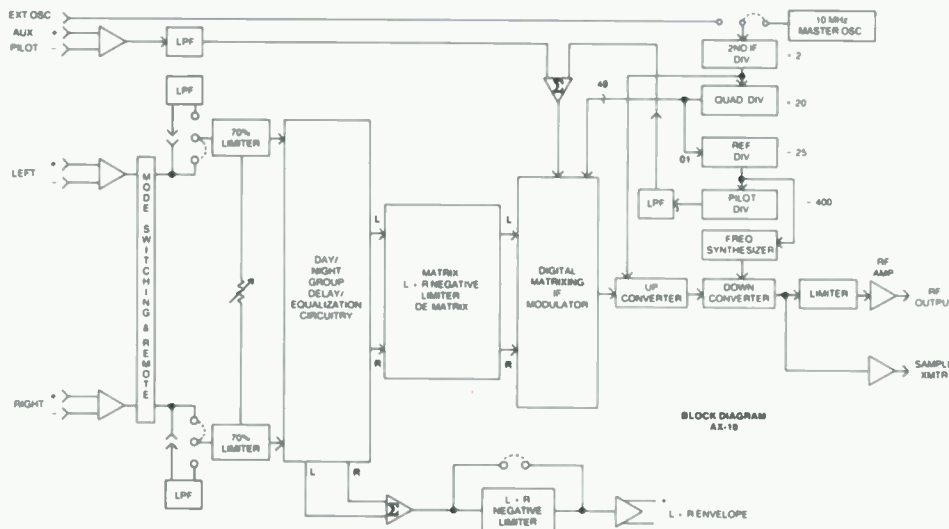
Ambient Temperature Range: 0° to 50°C (operational to -20°C)

Maximum Altitude: 15,000 ft. (4572 m) AMSL

Dimensions: 19" W x 3.5" H x 19" D (48.3 x 8.9 x 48.3 cm)

Note: The Model MA-1 AM Stereo Modulation Monitor is recommended for use with the AX-10.

Specifications subject to change without notice.



ORDERING INFORMATION

Model	Stock No.	Description
AX-10	907-0010	AX-10 AM Stereo Exciter for C-QUAM system operation on a specified frequency in the 522 to 1620 kHz range. (117 V/60 Hz) (117 Vac/50 Hz, 220 Vac/50 Hz, 220 Vac, 60 Hz models available.)
	907-0058	TTL Interface Option Assy.
	907-0060	12 kHz Low Pass Filter option.
MA-1	807-1001	C-QUAM system AM Stereo Modulation Monitor



4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305 U.S.A., TELEX: 250142, CABLE: BROADCAST, PHONE (217) 224-9600



SUPERIOR FOR DATA TRANSMISSION

- Direct coupled input
- Highly-stable, ultra-linear modulated oscillator ensures minimum distortion at 39 to 95 kHz

OTHER FEATURES

- Dual-mode, controlled-decay subcarrier attenuator ensures noise-free receiver muting

GENERAL DESCRIPTION

SUPERIOR FOR AUDIO AND DATA — The FC-30 SCA Generator incorporates the latest electronic technology in an advanced-design, suitable for either high-performance audio or dc-coupled data transmission on a multiplexed subcarrier.

Occupying only 1.75 inches of vertical rack space, the FC-30 may be mounted either in the FM transmitter cabinet or in a separate rack enclosure. Extensive RFI filtering permits trouble-free operation in high RF fields.

All operating controls are accessible from the front panel which also accommodates LED peak-modulation indicators.

Subcarrier muting is adjustable over a 0.5 to 10 second range, controlled by advanced, controlled-decay subcarrier attenuation circuitry which completely eliminates the annoying "squelch belch" effect, common to earlier designs.

SPECIFICATIONS

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

Subcarrier Frequency Stability:
± 0.5% (330 Hz @ 67 kHz, 0° - 50°C).

Subcarrier Harmonic Content:
Less than 0.3%.

Subcarrier Output Level:
0.5 to 4.0 V, into 600 ohms peak-to-peak; adjustable.

Subcarrier Output Impedance:
600 ohms unbalanced, resistive.

Subcarrier Envelope Decay:
Greater than 100 msec. from 90% to 10% sub-carrier levels.

Modulation Capability:
± 20% of subcarrier frequency.

FM Noise:
72 dB, below ± 6 kHz deviation @ 400 Hz (150 usec deemphasis).

Audio Input Impedance:
600 ohms balanced, resistive

Data Input Impedance:
75 ohm unbalanced resistive, D.C. 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 (D. C. coupled).

Preemphasis:
(Audio) 150 useconds standard (75 usec 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 pass band. (Typical .06%, 1 kHz).

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

- DC coupled data
- Front panel LED peak modulation indicators and control adjustment access
- Memory logic retains mode of operation during power interruption up to one hour, with automatic restart
- Unique, optically-isolated remote control operation
- Recommended by the leading SCA data transmission equipment manufacturers.

In the event of power interruption, the FC-30 will retain its operating mode for up to a one-hour period, automatically returning to operation when power is restored.

STABLE LOW DISTORTION OSCILLATOR — The FC-30 features an extremely stable oscillator, with excellent FM-noise characteristics. The high linearity affords outstanding low distortion. A 4.3-kHz programmable active low-pass filter ensures minimum crosstalk. The filter cut-off frequency is easily field-convertible to other frequencies by resistor substitution.

The FC-30 is designed for full remote control operation utilizing unique optically-isolated interface which accepts either positive or negative polarity control logic. Mode status outputs are also optically-isolated. A front panel subcarrier test jack allows easy frequency measurement.

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

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

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

Auto Muting Delay:
Adjustable, 0.5 to 10.0 seconds.

Operating Temperature Range:
0° to 50°C.

Maximum Altitude:
15,000 feet (4572 M)

AC Power Requirements:
115 or 230 Vac, 50/60 Hz, 7 watts.

Dimensions:
19" W x 1.75" H x 9" D (48.3 x 4.5 x 22.9 cm).

Net Weight:
4.5 lbs. (2 kg).

FC-30, SCA GENERATOR USER LIST

ARIZONA
KTAR, Phoenix

CALIFORNIA
Dataspeed, Inc., Burlingame (3)
KEZC, Carnelian Bay
KKGQ, Los Angeles
KPBS, San Diego
KMPX, San Francisco
Atari, Sunnyvale

DISTRICT OF COLUMBIA
WWDC, Washington

FLORIDA
Johnson Electronics, Inc., Casselberry (3)
WMEZ, Pensacola
WPCS, Pensacola
WGYL, Vera Beach

GEORGIA
WWSA, Savannah

HAWAII
KHPR, Honolulu

ILLINOIS
WAUR, Aurora
WSIU, Carbondale
WFMT, Chicago
WOJO, Evanston

INDIANA
Regency Electronics, Indianapolis

IOWA
WOI, Ames

MAINE
WDEA, Ellsworth

MARYLAND
WPOC, Baltimore

MASSACHUSETTS
WSRS, Worcester

MINNESOTA
KQAD, Luvern (2)
WCAL, Northfield

NEBRASKA
KUCV, Lincoln

NEW HAMPSHIRE
WHEB, Portsmouth

NEW YORK
WROW-FM, Albany
WFUV, New York
WNYC, New York
WVOR, Rochester (2)

NORTH CAROLINA
WBT, Charlotte

OHIO
WAUP, Akron

OKLAHOMA
KTEN, Ada
KTFX, Tulsa

PENNSYLVANIA
WKSZ, Media

RHODE ISLAND
WPJB-FM, Providence
WSNE, Providence

SOUTH DAKOTA
KESD, Brookings
KOKK, Huron

TEXAS
KIOU, Corpus Christi
KODA, Houston (2)

WASHINGTON
KSEA, Seattle

WISCONSIN
WHAD, Delafield
WPNE-FM, Green Bay
WHHI, Highland
WHLA, La Crosse
Pridham Electronics, Inc., Madison
WERN, Madison
WHWC, Menomonie
WHRM, Wausau

PUERTO RICO
WZAR, Ponce

ARIZONA
KLFF, Phoenix
KNIX-FM, Tempe
KXCI, Tucson

ARKANSAS
KLAZ, Little Rock

CALIFORNIA
Dataspeed, Inc., Burlingame
KVMR, Nevada City
GSA, Sacramento (2)

FLORIDA
WMEZ, Pensacola
WPCS, Pensacola

GEORGIA
WPCH, Atlanta

ILLINOIS
WFMT, Chicago
WOJO, Evanston
WSSR, Springfield

MASSACHUSETTS
WMHC, S. Hadley
WINQ, Winchendon

MARYLAND
WWIN, Baltimore

MICHIGAN
WQRS-FM, Detroit
WDRQ, Detroit

MINNESOTA
WCCO, Minneapolis
KSTP-FM, St. Paul

MISSOURI
KEZK, St. Louis (2)

NEW YORK
WFUV, New York

OHIO
WOBO, Cincinnati

RHODE ISLAND
WSNE, Providence

TENNESSEE
WMBW, Chattanooga

TEXAS
KIOU, Corpus Christi
KOUL, Corpus Christi

WISCONSIN
WHAD, Delafield
WPNE-FM, Green Bay
WHHI, Highland
WHLA, La Crosse
WERN, Madison
WHWC, Menomonie
WHRM, Wausau

WYOMING
KGWY, Gillette

CANADA
CBC, Montreal, Quebec

BRAZIL
Radio Jornal Ltda., Rio de Janeiro, R.J.

INDONESIA
Radio Ariesta, Bangduny

ITALY
Hi Communications

KOREA
Munhwa Broadcasting Corp. (MBC) (8)

PERU
Radio Melodia, Arequipa
Radio Sur Peruano, Arequipa



**BROADCAST
ELECTRONICS INC**

BE TZ-30 TV Stereo Generator

Engineered to Provide the Best in Stereo Performance for TV Sound



FEATURES

- Digital modulator and digital pilot generators
- Genuine dbx manufactured encoder PCB insures precise L-R encoding
- Dual audio filtering in left and right as well as L+R and L-R
- Baseband amplitude/delay equalization for transmitter/system deficiencies
- Built-in deviation calibration system
- Installation flexibility with separate 1 7/8 inch rack mount SAP and PRO generators
- Peak-reading L, R, L+R, L-R and composite baseband signal displays
- Optically-isolated remote control interface
- Superior pilot, SAP and PRO subcarrier protection
- Drives long interconnecting cables without signal degradation

Broadcast Electronics' Model TZ-30 TV Stereo Generator features high reliability, stereo operation in conformance with the Zenith/dbx Television Multichannel Sound System standards.

The TZ-30 is designed to interface with Broadcast Electronics' Second Audio Program (SAP) generator and Professional (PRO) generator for subchannel audio/data information. The SAP and PRO generators are independent self contained units each requiring only 1 7/8 inch rack mounting space.

DIGITAL DESIGN — The TZ-30 incorporates the unique modulator and pilot generator design used in the field-proved, widely-acclaimed B/E FS-30 FM Stereo Generator. This ensures absolute pilot phase stability and a virtually perfect baseband signal. The pilot frequency and the harmonically related stereo subchannel frequencies are established by a highly stable internal crystal oscillator which is phase-locked to the TV horizontal sweep frequency.

CRITICAL COMPANDING CIRCUITS — The L-R channel is companded in order to provide an improved signal-to-noise ratio for stereo operation. This is achieved with the dbx encoder which represents the most critical and complex circuitry of the Zenith/dbx system. To ensure optimum compliance with those system standards, the TZ-30 incorporates genuine dbx encoder printed circuit boards supplied to Broadcast Electronics by dbx Incorporated.

DUAL AUDIO FILTERING — Left and right channel audio signals are first band-limited by lowpass input filters to suppress out-of-band signal components which could overload the high-gain dbx compressor circuitry. They are complemented by traps at the pilot frequency (H) and the (2H) stereo subcarrier frequency.

Additional sharp cutoff lowpass filters are used in the L+R and L-R signal paths to prevent crosstalk into the baseband composite stereo signal and contamination of the pilot frequency spectrum space. They are accurately matched in both phase and amplitude so as to preserve stereo separation. To insure minimum L+R and L-R interference, both the passband and stopband characteristics of these lowpass filters are accurately controlled.

COMPOSITE BASEBAND EQUALIZATION — When used with an STL or with an exciter which exhibits baseband degradation, such as deviation from flat phase or amplitude response, a built-in switchable composite baseband equalization circuit in the TZ-30 allows for correction.

COMPLETE MONITORING — The peak-reading LED bar-graph display and associated test jack may be used to monitor L, R, L+R, L-R or composite baseband signals. Each parameter may be monitored by interlocked pushbutton switch selection. A built-in deviation calibration system ensures the accuracy of modulation level setup with the aural exciter.

LOW-Z OUTPUT — The TZ-30 output circuit can drive a terminated 75-ohm coaxial cable independent of length, without signal degradation.

FULL REMOTE CONTROL — An optically-isolated remote control and status indication system is compatible with either positive or negative polarity logic. Memory retains mode setting during power interruption without battery backup. Power-up mode is internally programmable.

RFI PROTECTION — All connections to internal circuits are decoupled by multisection networks for excellent high-field RFI immunity.

BE TZ-30 TV Stereo Generator

TECHNICAL SPECIFICATIONS

Audio Input Impedance:

600 ohms balanced, resistive, floating
(adaptable to other impedances)

Audio Input Level:

+ 10 dBm for 100% modulation at 400 Hz (adaptable to other levels from -10 dBm to +20 dBm)

SAP and PRO Inputs:

Unbalanced 10K ohms; 3.5 V P-P equals 10% injection

Composite Output Level:

1.5 to 8.0 volts P-P adjustable into open circuit.
75 ohm source impedance

Frequency Response:

± 0.5 dB, 50 to 15,000 Hz; (no dbx encoding)
± 1 dB, 50 to 15,000 Hz (including dbx encoding)

Total Harmonic Distortion:

0.05% or less, 50 to 15,000 Hz (no dbx encoding)
0.5% or less, 50 to 15,000 Hz (including dbx encoding)

Stereo Separation:

40 dB minimum from 50 to 15,000 Hz (no dbx encoding)

Full system including dbx encoding

26 dB minimum, 50 to 100 Hz
30 dB minimum, 100 to 8000 Hz
20 dB minimum, 8000 to 15,000 Hz

Signal to Noise Ratio:

L + R: greater than 65 dB below the composite level representing ±25 kHz deviation @ 300 Hz with de-emphasis.

L - R: greater than 60 dB below the composite level representing ±50 kHz deviation @ 300 Hz with de-emphasis.

Linear Crosstalk:

(L + R to L - R), (L - R to L + R) due to amplitude and phase matching of left and right channels, 50-15,000 Hz, 40 dB minimum below 100% modulation.

Non-Linear Crosstalk:

(L + R to L - R), (L - R to L + R) due to distortion products, 60 dB minimum below 100% modulation.

Pilot Frequency:

15,734 Hz, frequency locked to Fh sync

Pilot Stability:

± 1.5 Hz, unlocked from sync

2 (Fh) Suppression:

70 dB minimum, below 100% L - R modulation

3, 4 and 5 (Fh) Suppression:

60 dB minimum, below 100% L - R modulation

Spurious and Sideband Suppression (above 95 kHz):

60 dB minimum below L - R modulation

Power Requirements:

100/120/200/240 Vac, 50/60 Hz, 50 W

Operating Temperature Range:

0° to 50° C (functional to -20° C)

Maximum Altitude:

15,000 ft (4572 m) AMSL

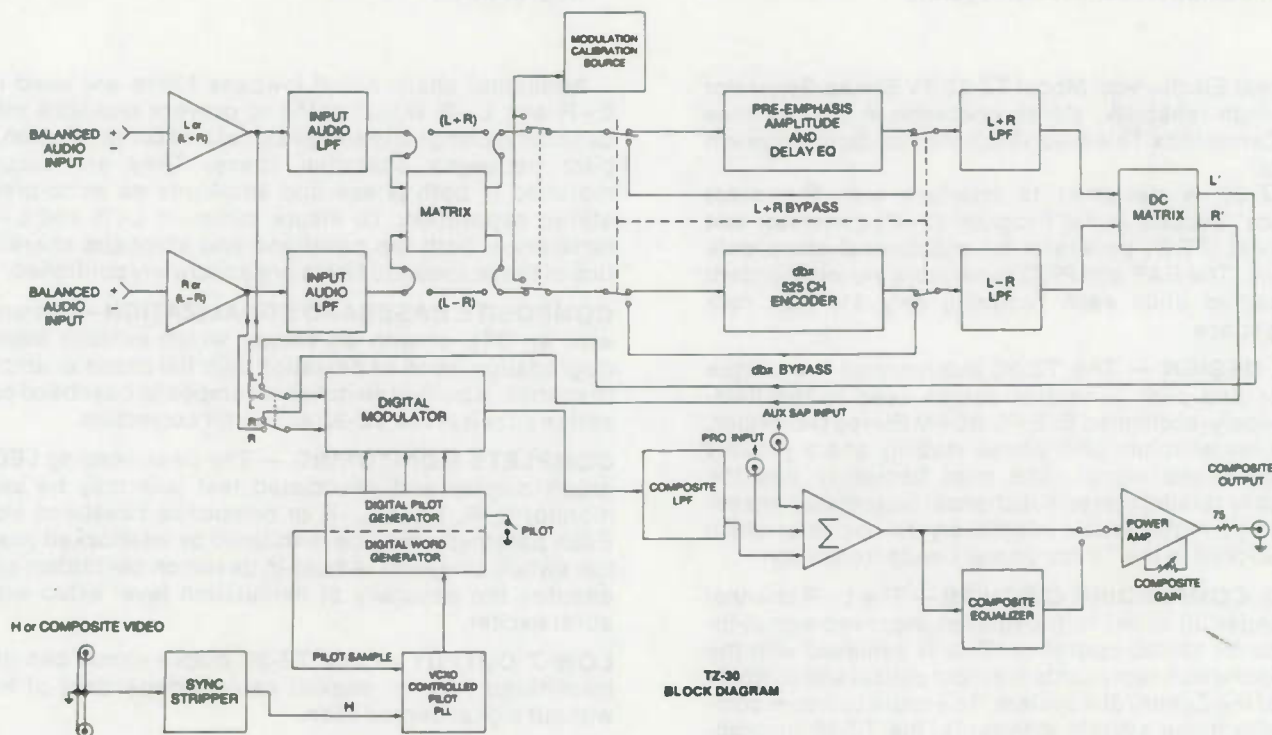
Dimensions:

19" W x 3.5" H x 19" D (48.3 x 8.9 x 48.3 cm)

Net Weight:

20 lbs.

These specifications are preliminary and are subject to change without notice.



ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TZ-30	906-0030	TV Stereo Generator
TS-30	906-0031	TV Second Audio Program (SAP) Channel Generator, with encoder
TP-30	906-0032	TV Professional (PRO) channel generator
	916-0004	dbx Encoder PCB

BE BROADCAST ELECTRONICS INC

4100 N. 24th St., P.O. BOX 3606, QUINCY, IL 62305 U.S.A., TELEX: 250142, CABLE: BROADCAST, PHONE: (217) 224-9600

TZ-30

TV STEREO GENERATOR



with companion
TP-30 PRO GENERATOR
TS-30 SAP GENERATOR



BROADCAST ELECTRONICS, INC.
4100 N. 24th STREET • P.O. BOX 3606 • QUINCY, IL 62305



TZ-30 TV Stereo Generator



Technical superiority is one reason why the Broadcast Electronics TZ-30 TV Stereo Generator is helping television stations from coast to coast broadcast the finest stereo sound possible.

Broadcast Electronic's expertise in designing stereo RF products for FM including the highly acclaimed FX-30 FM Exciter and FS-30 Stereo Generator, created customer demand to design a technically superior TV Stereo Generator. The very first TV Stereo Generator to go on the air in the USA on a full time basis, WTTW, Chicago, was pioneered by Broadcast Electronics. It is from all this experience that we have now developed the second generation TZ-30 TV Stereo Generator for superb multi-channel sound transmission.

GENERAL: Broadcast Electronics' Model TZ-30 TV Stereo Generator features highly reliable stereo operation in conformance with the Zenith/dbx Television Multichannel Sound System standards. (EIA and OST-60)

The TZ-30 is designed to interface with Broadcast Electronics' Second Audio Program (SAP) generator and Professional (PRO) generator for subchannel audio/data information.

DIGITAL DESIGN: The TZ-30 incorporates the unique modulator and pilot generator design used in the field-proven, widely-acclaimed B/E FS-30 FM Stereo Generator. This ensures absolute pilot phase stability and a virtually perfect baseband signal. Both the pilot and the L-R subcarrier sidebands are digitally synthesized simultaneously, eliminating any phase error. Digital synthesis also eliminates the distortion products produced by the linear modulation schemes used in competitive products and provides superior protection of the SAP and PRO channels from harmonics of the STEREO channel.

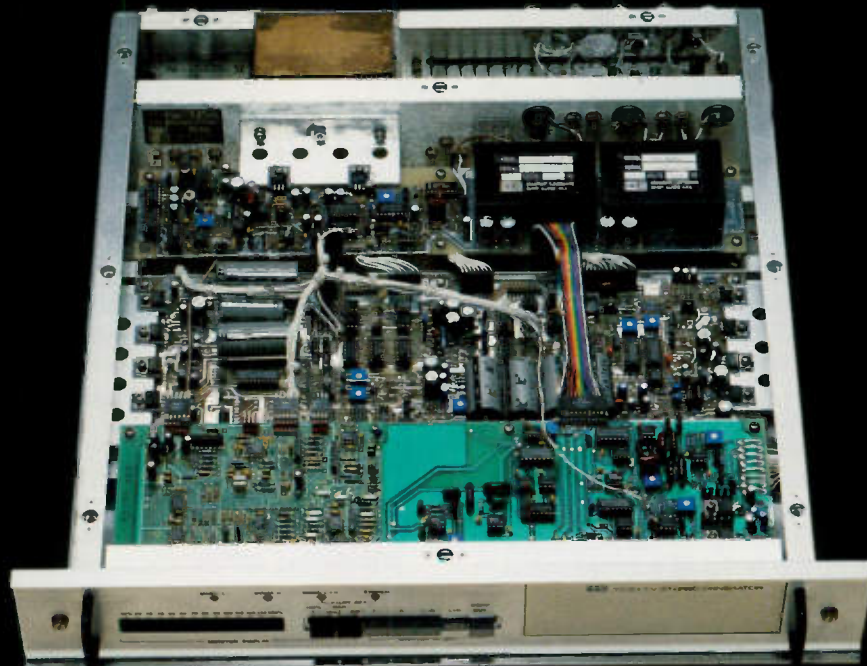
CRYSTAL CONTROLLED SYNC LOCK: The pilot frequency and the harmonically related stereo subchannel frequencies are established by a highly stable internal crystal oscillator which is phase-locked to the TV horizontal sweep frequency. The use of a crystal timebase insures a maximum frequency error of only $\pm 1.0\text{Hz}$ even with loss of sync. The slow time constant of the sync-lock PLL eliminates abrupt shifts in the stereo image during changes in sync source. Automatic and noiseless switching to mono is selectable after loss of sync.

CRITICAL COMPANDING CIRCUITS: The L-R channel is companded to provide an improved signal-to-noise ratio for stereo operation. This is achieved with the dbx encoder which represents the most critical circuitry of the Zenith/dbx system. To ensure accurate compliance with those system standards, the TZ-30 incorporates a genuine dbx encoder supplied to Broadcast Electronics by dbx Incorporated.

FEATURES:

- Audiophile Quality Precision Encoder for TV Stereo
- Extended Frequency response ($\pm 0.5\text{ dB}$) to 15 kHz Utilizing Superior Audio Filtering.
- Independent of Audio Processing.
- Unique *Digital* Modulator and *Digital* Pilot Generator with Crystal Controlled Sync Lock.
- Utilizes GENUINE dbx Encoder Card to Assure Correct Encoding of L-R.
- Baseband Amplitude and Delay Equalization to Compensate for Transmission System Deficiencies.
- Flat Composite Baseline Mode for Easy System Optimization.
- Built-in Aural Deviation Calibration for Easy Set-up of Composite Level.

TZ-30 TV Stereo Generator



DUAL AUDIO FILTERING — Left and right channel audio signals are first band-limited by low-pass input filters to suppress out-of-band signal components which could overload the high-gain dbx compressor circuitry. They are complemented by traps at the pilot frequency (H) and the (2H) stereo subcarrier frequency.

Additional sharp cutoff lowpass filters are used in the L+R and L-R signal paths to prevent crosstalk and contamination of the pilot frequency, SAP and PRO spectrums.

To insure minimum L+R and L-R interference, both the passband and the stopband characteristics of these lowpass filters are accurately controlled.

EXTENDED FREQUENCY RESPONSE — The TZ-30 incorporates high performance 17 section, computer designed, lowpass filters in the sum (L+R) and difference (L-R) channels to provide extended frequency response of $\pm 0.5\text{db}$ to 15,000Hz. These active filters are accurately phase matched and delay equalized to maximize stereo separation and minimize overshoot.

AURAL DEVIATION CALIBRATION — Unlike non-companded FM stereo, the TV stereo system requires precise adjustment of aural deviation for optimum stereo separation and frequency response.

Like tape noise reduction systems, encoder to decoder levels must be carefully matched for good system performance. An aural deviation error of only a few percent will drastically degrade received

stereo separation and frequency response.

Installation and set-up of the TZ-30 is simplified by the built-in front panel selectable deviation calibration system and LED bargraph display. This allows the aural deviation to be set within $\pm 0.1\%$ to insure optimum system performance.

EXCLUSIVE COMPOSITE BASEBAND EQUALIZATION — The built-in switchable composite baseband amplitude/delay equalizer circuit in the TZ-30 will improve the stereo separation of any (TV-MCS) system by providing optimum overall flat phase and amplitude response. A flat composite baseline (1:1 ratio) test mode is provided for easy equalization.

COMPLETE MONITORING — The peak-reading LED bargraph display and associated test jack may be used to monitor L, R, L+R, L-R or composite baseband signals.

LOW-Z OUTPUT — The TZ-30 composite output circuit can drive a terminated 75-ohm coaxial cable independent of length, without signal degradation. The output connector can be floated from chassis ground to eliminate ground loops.

FULL REMOTE CONTROL/RFI PROTECTION — The optically isolated remote control and status indication system is compatible with either positive or negative logic. The power-up mode is internally programmable. Other mode settings are retained in memory without the need for battery backup. In addition, excellent RFI immunity is obtained through the use of multi-section decoupling networks.



TZ-30 TV Stereo Generator

Independent of Audio Processing

The Broadcast Electronics TZ-30 is independent of audio processing. Its second generation circuit design has not been restricted by integrated audio processing or limited by matched multiband audio processing. It is the one TV Stereo Generator totally independent of audio processing.

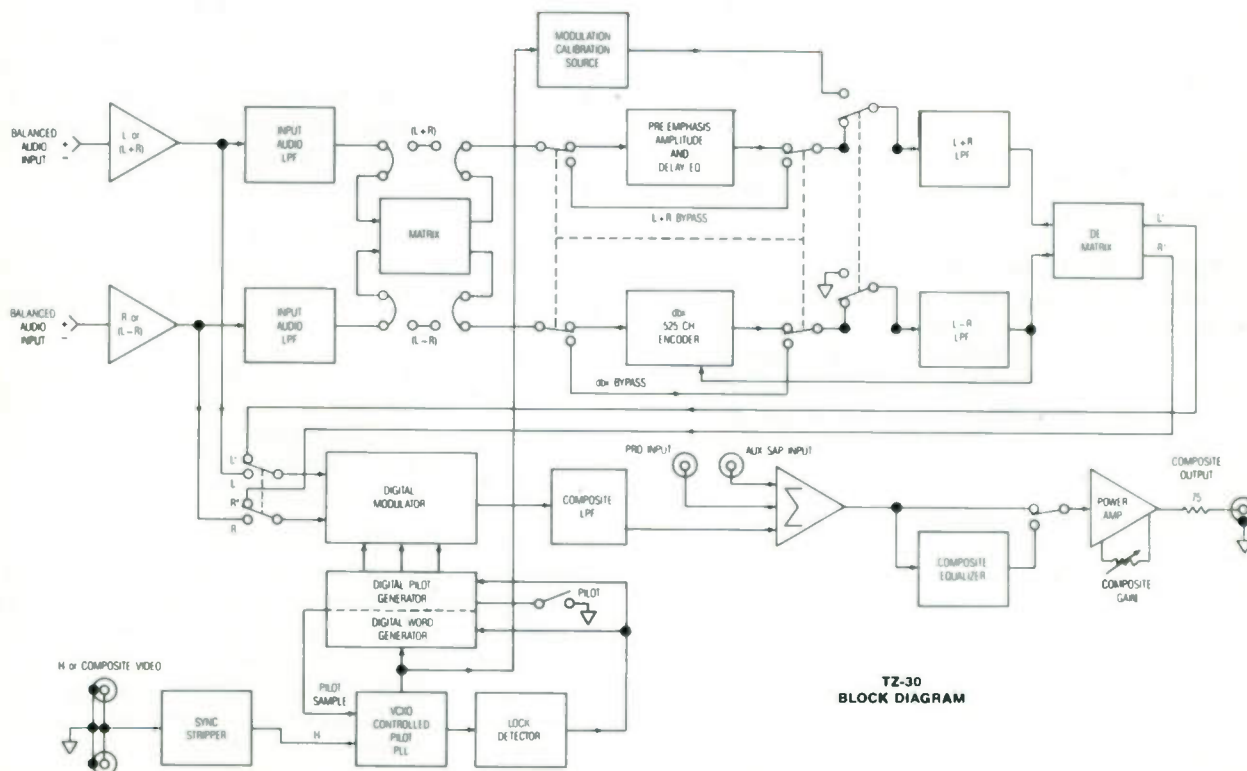
FLEXIBILITY — Broadcast Electronics' TZ-30 Stereo Generator for Television offers the flexibility to choose the type and location of audio processing independent of the stereo encoder. Because the main product being delivered to the viewer by television is the video programming, the need to achieve maximum audio modulation density, as in radio broadcasting, does not exist. Stereo generators which offer multi-band audio processing or composite clipping integrated into the stereo encoder package may not be appropriate for TV stereo use.

SPLIT-SITE CAPABILITY — Major networks and group operators indicate that it may not be desirable to locate the audio processing at the transmitter with the stereo encoder. The audio level should

follow the video scene and not be automatically adjusted by processing outside of the creative control of the director. Therefore, most audio processing will be tailored to suit the particular program and added at the time of studio production or during video-taping. Most operators find that the only processing necessary for the transmitter feed is light peak limiting, preferably before the STL, for overmodulation protection.

A SECURE FUTURE — Most television industry professionals feel that new approaches to TV audio processing will be developed specifically for TV stereo broadcasting as this new medium matures. Thus, it is likely that the original audio processing will be replaced before the optimum configuration is attained. Since the TZ-30 is independent of processing, it will not become obsolete as audio processing changes. All major brands of stereo audio processing can be used with the TZ-30. Television stations satisfied with their existing audio processing may find it possible to obtain an identical second unit and to strap the two together for stereo operation.

TZ-30 BLOCK DIAGRAM



TZ-30 Technical Specifications



TZ-30 Technical Specifications

Meets all EIA and OST-60 recommendations for TV Stereo.

AUDIO INPUT IMPEDANCE:

600 ohms balanced, transformerless, resistive, floating. Accepts discrete left and right channels or (L+R) and (L-R) (Adaptable to other impedances)

AUDIO INPUT LEVEL:

+10 dEm nominal for 100% modulation at 400 Hz (Adaptable to other levels from -10 dBm to +20 dBm)

SAP AND PRO INPUTS:

SAP (± 15 kHz deviation of aural carrier) @ 3.5 V P-P
PRO (± 3 kHz deviation of aural carrier) @ 3.5 V P-P
10k ohm, unbalanced BNC (2), (easily adaptable to other levels)

COMPOSITE OUTPUT:

1.0 to 8.0 volts P-P continuously adjustable into open circuit.
75 ohm resistive source impedance unbalanced, floatable, BNC connector.

DEVIATION CALIBRATOR:

Reference test tone frequency locked to (FH) sync produces 100% ($\pm 0.1\%$) L+R modulation (± 25 kHz deviation) @ first Bessel null of the aural carrier.

FREQUENCY RESPONSE:

± 0.5 dB, 50 to 15,000 Hz, including all audio filters, dbx encoding bypassed.
 ± 1.0 dB, 50 to 15,000 Hz, including all audio filters, with dbx encoding.

PRE-EMPHASIS:

L+R; 75 microsecond curve
L-R; BTSC/dbx encoder curve

AUDIO FILTERING:

Audio input lowpass filters; ± 0.2 dB 50 to 15,000 Hz, 40 dB rejection @ (FH).
(L+R)/(L-R) lowpass filters; ± 0.2 dB 50 to 15,000 Hz, 80 dB rejection @ (FH), 60 dB stopband attenuation above (FH), 17 section, active, delay equalized.

TOTAL HARMONIC DISTORTION:

0.1% or less, 50 to 15,000 Hz, dbx encoding bypassed.
0.5% or less, 50 to 15,000 Hz, with dbx encoding

SIGNAL TO NOISE RATIO:

L+R better than 80 dB below ± 25 kHz deviation @ 400 Hz with 75 microsecond de-emphasis.
L-R better than 80 dB below ± 50 kHz deviation @ 400 Hz, dbx decoded.

STEREO SEPARATION:

50 dB minimum 50 to 15,000 Hz baseband generator only.
40 dB minimum 50 to 14,000 Hz, including all audio filters, (dbx encoding bypassed).
30 dB min. 50 to 12,000 Hz, decreasing to 24 dB at 15 kHz. (Full system including dbx encoding)
Reference 10% L+R modulation at 300 Hz.

LINEAR CROSSTALK:

(L+R to L-R), (L-R to L+R) due to amplitude and phase matching of left and right channels.
50 dB minimum 50 to 15,000 Hz below 100% (L-R) baseband generator only.
40 dB minimum to 50 to 15,000 Hz below 100% (L-R) including all audio filters.

NON-LINEAR CROSSTALK:

(L+R to L-R), (L-R to L+R) due to distortion products.
70 dB minimum 50 to 15,000 Hz, below 100% (L-R), including all audio filters.

SYNC LOCK:

Floating BNC (2) loop-thru, 10K bridging input, 1V P-P nominal composite video or (FH) sync. Front panel lock indicator with selectable auto switching to mono when unlocked.

PILOT FREQUENCY:

15,734 Hz, frequency locked to sync input.
Crystal controlled 15,734 ± 1.0 Hz unlocked.

2 (FH) SUPPRESSION:

70 dB minimum, below 100% (L-R).

3, 4, AND 5 (FH) SUPPRESSION:

75 dB minimum, below 100% (L-R).

SPURIOUS SUPPRESSION:

75 dB minimum, below 100% (L-R).

MODULATION DISPLAY:

Color coded, peak reading led display with 1 second peak hold @ 100% Dual range, 14% full scale and 140% full scale for subcarrier set-up.

OPERATING MODE SELECTIONS:

(4) Stereo, Mono left, Mono right, Mono L+R

TEST MODES:

(6) Normal BTSC/1:1 composite test, dbx IN/OUT, Modulation calibration ON/OFF.

REMOTE CONTROL:

Operating mode selection via rear panel barrier strip.
5-24V DC positive or negative logic, optically isolated.

OPERATING TEMPERATURE:

32-113 degrees F (0-45 degrees C) Functional to -20 degrees C

HUMIDITY:

95% non-condensing.

MAXIMUM ALTITUDE:

15,000 ft. (4,572 m) AMSL.

DIMENSIONS:

19"W x 3.5" x 19"D (48.3 x 8.9 x 48.3 cm).

POWER REQUIREMENTS:

100/120/200/240 Volts AC, 50/60 Hz, 50 Watts.

NET WEIGHT:

20 lbs. (9.1 kg)

FINISH:

Anodized aluminum front panel.

ORDERING INFORMATION

TZ-30	906-0030	TV Stereo Generator
TS-30	906-0031	TV SAP Second Audio Program Channel
TP-30	906-0032	TV PRO Professional Audio Program Channel

TS-30 TV SAP Generator



FEATURES:

- Excellent modulation linearity
- Subcarrier oscillator unconditionally phase locked to sync
- Extended frequency response
- Dual audio lowpass filtering with notch at horizontal sweep frequency
- Genuine dbx encoder card
- Defeatable output bandpass filter
- Adjustable automatic mute level and delay time
- Optically-coupled remote control interface
- Sync-lock with bridging video loop-thru
- Front Panel LED Modulation Display

SECOND AUDIO PROGRAM (SAP) GENERATOR —

The Broadcast Electronics Model TS-30 Second Audio Program (SAP) Generator provides broadcast quality subcarrier performance on a frequency of 78.670 kHz (5fH).

SUPERB STABILITY — The ultimate in stability is provided by the TS-30 modulated oscillator which is unconditionally phase locked to the horizontal sweep frequency under all modulating conditions. Operation is in accordance with EIA Broadcast Television System Committee and OST-60 Standards for TV Multichannel Sound Systems.

DUAL AUDIO LOW PASS FILTERING — An audio bandwidth of 10 kHz is assured by sophisticated audio filtering with excellent attenuation characteristics to prevent interference to the stereo subchannel.

OUTPUT BANDPASS FILTERING — SAP to stereo subchannel and SAP to PRO crosstalk is further prevented by a bandpass filter which incorporates a notch to protect the PRO channel.

ADJUSTABLE AUTOMATIC MUTING — The controlled delay subcarrier muting system eliminates receiver squelch noise, a frequent annoyance in subcarrier generator designs and incorporates automatic subcarrier muting with adjustable delay times.

GENUINE dbx ENCODER CARD — The use of a genuine dbx encoder card in the TS-30 provides an excellent signal to noise ratio and assures compliance with EIA and OST-60 standards.

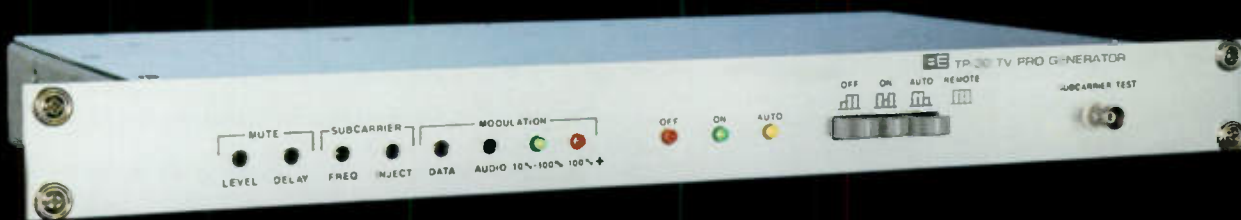
OPTICALLY COUPLED REMOTE CONTROL — The optically isolated remote control and status indication system interfaces easily with either positive or negative logic configurations. Mode settings are retained in memory — all without the need for battery backup.

RFI PROTECTION — The TS-30 features multi-section decoupling networks for superb RFI immunity.

Designed for 19" rack mounting, the TS-30 occupies only 1¾" of vertical space.



TP-30 TV PRO Generator



PROFESSIONAL CHANNEL (PRO) GENERATOR — The Broadcast Electronics Model TP-30 TV PRO Generator is high-quality subcarrier generator suited for transmission of audio or digital data on a 102.271 kHz FM subcarrier in accordance with the EIA and OST-60 TV-MCS Standards.

DIRECT FM DESIGN — High modulation linearity and low FM noise are provided by the extremely stable voltage controlled oscillator directly modulated at the subcarrier frequency.

DATA TRANSMISSION CAPABILITY — The DC coupled input allows direct NRZ FSK of the subcarrier as well as conventional AFSK for paging applications or other digital data transmission. This capability offers the TV broadcaster additional revenue producing opportunities by leasing of the subcarrier. In addition to conventional audio applications, the PRO channel may be used for transmission of stock market quotations, commodity trading information or direct delivery of information to professional groups.

ADJUSTABLE AUTOMATIC MUTING — The controlled delay subcarrier muting system eliminates receiver squelch noise, a frequent annoyance in subcarrier generator designs and incorporates automatic subcarrier muting with adjustable delay times.

REMOTE CONTROL CAPABILITY — The TP-30 offers a fully compatible (negative or positive logic), optically isolated remote control and status indication system. In addition, the mode settings are retained in memory without the need for battery backup.

RFI IMMUNITY — Multi-section decoupling networks assure maximum protection even in high RF environments.

USER FRIENDLY — Front panel adjustment of: mute level and delay time; subcarrier frequency and level; data and audio input level and on/off/auto/remote mode selection. Indication of normal or excessive modulation and standby or unmuted "on" conditions are provided by LED displays. A subcarrier output test connector is located on the front panel for convenient frequency and modulation measurements.

COMPACT, SELF CONTAINED, EASY INSTALLATION — The TP-30 is housed in a compact, fully shielded rack mount enclosure occupying only 1¾ inches of vertical 19-inch rack space. Input and output interconnections are made to a convenient rear panel terminal strip and BNC connectors.

FEATURES:

- Excellent modulation linearity
- Audio and AC or DC coupled digital data transmission capability
- Active programmable audio input lowpass filter
- Adjustable automatic mute level and delay time
- Optically-coupled remote control interface
- Front Panel LED Modulation Display



TS-30/TP-30 Technical Specifications

TS-30 TV SAP GENERATOR

Meets all EIA and OST-60 recommendations for TV MCS SAP Channel

AUDIO INPUT:

-10 dBm to +10 dBm adjustable for ± 10 kHz deviation @ 2 kHz. 600 or 20K ohms, transformerless, active, balanced, resistive.

AUDIO MUTING LEVEL:

10 to 30 dB below program level, adjustable (defeatable)

AUDIO MUTING DELAY:

0.5 to 10 seconds, adjustable

AUDIO PRE-EMPHASIS:

Follows dbx encoding curve

DUAL AUDIO LOW PASS FILTERING:

(1) Active, 4th order plus notch in audio input (-0.3 dB @ 10 kHz, -60 dB @ fH)

(2) Active, 7th order elliptic after dbx encoding (-0.3 dB @ 10 kHz, Combined attenuation greater than 60 dB beyond fH)

FREQUENCY RESPONSE:

± 1 dB, 50-7500 Hz, -3 dB at 10,000 Hz (with dbx encoding and decoding)

TOTAL HARMONIC DISTORTION:

Less than 2%, 50-10,000 Hz (with dbx encoding including subcarrier BPF)

INTERMODULATION DISTORTION:

Less than 2%, 4:1 ratio, 60 Hz / 7 kHz (with dbx encoding including subcarrier BPF)

SIGNAL TO NOISE:

75 dB below ± 10 kHz deviation (with dbx encoding and decoding)

MODULATION METHOD:

Direct FM at the subcarrier frequency utilizing a linearized VCO phase-locked to 5 times the horizontal sync frequency.

MODULATION CAPABILITY:

Greater than ± 20 kHz

SUBCARRIER BANDPASS FILTER:

6th order plus notch at PRO, BW3=40 kHz, -17 dB @ 46.5 kHz (defeatable for reduced audio distortion)

STEREO CROSSTALK:

Better than 80 dB below 100% (L-R) with subcarrier BPF

Better than 60 dB below 100% (L-R) without subcarrier BPF

SYNC LOCK:

Floating BNC (2) loop-thru, 10K bridging input, 1V P-P nominal composite video or (fH) sync. Front panel lock indicator.

SUBCARRIER FREQUENCY:

78.67 kHz (5 x horizontal sweep frequency)

Unconditionally phase locked to sync under all modulating conditions.

SUBCARRIER HARMONIC CONTENT:

Less than 0.1% (Better than 60 dB below unmodulated subcarrier level)

SUBCARRIER SPURIOUS COMPONENTS:

Better than 70 dB below unmodulated subcarrier level

SAP OUTPUT LEVEL:

0.5 to 8.0 Volts P-P continuously adjustable into open circuit. 75 ohms, resistive, unbalanced, BNC connector.

SAP SUBCARRIER ENVELOPE DECAY:

Greater than 100 ms from 90% to 10% subcarrier level. Eliminates squelch noise at the receiver during muting.

MODULATION DISPLAY:

Color coded peak reading LED's for greater than 10% and 100% deviation.

OPERATING MODE SELECTIONS:

(3) OFF, ON, Automatic ON/OFF switching controlled by audio input

REMOTE CONTROL:

Mode selection via rear panel barrier strip.

5-24V DC positive or negative logic, optically isolated

OPERATING TEMPERATURE RANGE:

32 - 122 degrees F (0 - 50 degrees C) Operational to -20 degrees C

HUMIDITY:

95% non-condensing

MAXIMUM ALTITUDE:

15,000 ft. (4,572 m) AMSL

DIMENSIONS:

1.75"H x 19"W x 14"D (4.5 x 48.3 x 22.9 cm)

POWER REQUIREMENTS:

100/120/200/240 Vac, 50/60 Hz, 15W

NET WEIGHT:

8 lbs. (3.6 kg)

FINISH:

Anodized aluminum front panel

TP-30 TV PRO GENERATOR

Meets all EIA and OST-60 recommendations for TV MCS PRO Channel

AUDIO INPUT:

-10 dBm to +10 dBm adjustable for ± 3 kHz deviation @ 400 Hz. 600 ohms, transformerless, active, balanced, resistive

AUDIO MUTING LEVEL:

10 to 30 dB below program level, adjustable (defeatable)

AUDIO MUTING DELAY:

0.5 to 10 seconds, adjustable

AUDIO INPUT PRE-EMPHASIS:

150 microseconds (75 usec by internal jumper)

AUDIO LOW PASS FILTER:

Sixth order, -3 dB @ 3.4 kHz (programmable to other frequencies, defeatable)

AUDIO FREQUENCY RESPONSE:

± 0.5 dB, 50-10,000 Hz (exclusive of audio LPF)

DATA INPUT LEVEL:

1.0 to 4.0 V P-P for ± 3 kHz deviation, DC coupled, 10K ohm, unbalanced BNC, supplied with 75 ohm terminating resistor

DATA FREQUENCY RESPONSE:

± 0.5 dB, DC to 10 kHz (no pre-emphasis)

TOTAL HARMONIC DISTORTION:

Less than 0.5% throughout passband

INTERMODULATION DISTORTION:

Less than 0.5% throughout passband

FM NOISE:

60 dB below ± 3 kHz deviation @ 400 Hz (with 150 usec de-emphasis)

MODULATION METHOD:

Direct FM at the subcarrier frequency utilizing a linearized VCO

MODULATION CAPABILITY:

Greater than ± 20 kHz

SUBCARRIER FREQUENCY:

102.271 kHz (6.5 x horizontal sweep frequency)

SUBCARRIER FREQUENCY STABILITY:

$\pm 0.5\%$ (± 500 Hz @ 102.271 kHz)

SUBCARRIER HARMONIC CONTENT:

Less than 0.3% (Better than 50 dB below unmodulated subcarrier level)

SUBCARRIER SPURIOUS COMPONENTS:

Better than 70 dB below unmodulated subcarrier level

PRO SUBCARRIER OUTPUT LEVEL:

0.5 to 4.0 Volts P-P continuously adjustable into open circuit. Resistive, unbalanced, BNC connector

SUBCARRIER TEST OUTPUT LEVEL:

5.0 V P-P into 10K ohms, resistive, unbalanced, BNC connector

SUBCARRIER ENVELOPE DECAY:

Greater than 100 ms from 90% to 10% subcarrier level

Eliminates squelch noise at the receiver during muting

MODULATION DISPLAY:

Color coded peak reading LED's for greater than 10% and 100% deviation.

OPERATING MODE SELECTIONS:

(3) OFF, ON, Automatic ON/OFF switching controlled by audio input

REMOTE CONTROL:

Mode selection via rear panel barrier strip. 5-24V DC positive or negative logic, optically isolated.

OPERATING TEMPERATURE RANGE:

32 - 122 degrees F (0 - 50 degrees C) Functional to -20 degrees C

HUMIDITY:

95% non-condensing

MAXIMUM ALTITUDE:

15,000 ft. (4,572 m) AMSL

DIMENSIONS:

1.75"H x 19"W x 14"D (4.5 x 48.3 x 22.9 cm)

POWER REQUIREMENTS:

100/120/200/240 Vac, 50/60 Hz, 7W

NET WEIGHT:

4.5 lbs. (2 kg)

FINISH:

Anodized aluminum front panel



**BROADCAST
ELECTRONICS INC.**

FS-30

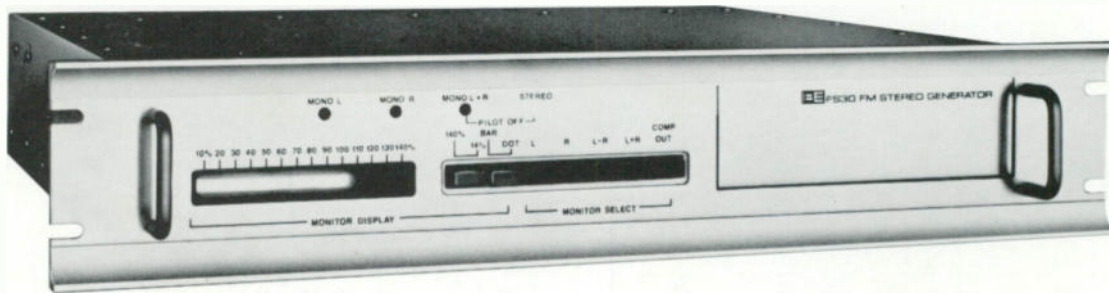
Stereo Generator *Separates the DB from the Noise*



Stereo Separation: 60 dB mid-band
FM Noise: 85 dB below 100% modulation
THD and IMD: .03% or less
CCIF IMD: Less than .01% (14 kHz/15 kHz, 1:1)
First to specify TIM: 0.1% or less

FS-30 Stereo Generator

Engineered to Provide the Best in Audio Performance



FEATURES

- Ultrastable digital modulator and digital pilot generator
- Selectable baseband equalization
- LED peak modulation display: L, R, L + R, L - R and composite signals
- Floating 50 ohm output drives long coax
- Full remote control, optically-isolated control and status lines
- Delay-equalized audio low pass filters provide minimum overshoot without clippers or other non-linear circuits

Digital Design: The digital modulator and digital pilot generator offers absolute pilot phase stability without adjustment or PLL and eliminates troublesome distortion products. The result is a virtually perfect baseband that is an order of magnitude better than previous standards.

Baseband Equalization: The switchable composite baseband equalization allows for correction of baseband degradation introduced by the STL or exciter.

Low-Z Output: The output circuit can drive a 50 ohm terminated coaxial cable independent of length with no degradation of baseband.

Complete Monitoring: A peak-reading LED display and associated test jack may be used to monitor L, R; L + R; L - R; or Composite baseband signals. Each parameter may be monitored through the use of inter-

locked pushbutton switches and the 1 to 14% or 10 to 140% display.

Full Remote Control: The opto-isolated remote mode control and status indication terminals are compatible with positive or negative logic. Memory retains mode setting during power interruptions without the use of batteries. Power-up mode is internally programmable.

RFI Protection: All connections to the internal circuitry are decoupled by a multisection network.

Easy Installation: The balanced instrumentation-amp audio inputs and SCA loop-thru simplify multiplex system installation. The circuit ground reference is low frequency isolated from the chassis to eliminate system ground loops. Externally programmable, four-range voltage selector, with detachable IEC standard power cord.

SPECIFICATIONS

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).

Composite Output Level:

2.5-8.0 volts p-p, adjustable, into open circuit, 50 ohm source impedance.

Frequency Response:

± 0.5 dB, 30-15,000 Hz, 75 usec pre-emphasis (flat, 25 or 50 usec pre-emphasis selectable).

Audio Overshoot:

2 dB maximum.

Total Harmonic Distortion:

0.03% or less, 30-15,000 Hz.

Intermodulation Distortion:

0.03%, 60 Hz/7 kHz; 4:1 ratio.

CCIF IMD:

All products are at least 85 dB below 100% modulation. (Left or right channel modulated 100% with 14 kHz/15 kHz, 1:1 test tone pair)

Transient Intermodulation Distortion:

0.1% (Square wave/sine wave).

Stereo Separation:

52 dB; 30-15,000 Hz.

60 dB; 30-5000 Hz.

Dynamic Stereo Separation:

45 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 Suppression:

75 dB minimum below 100% modulation.

57, 76 and 95 kHz Suppression:

80 dB minimum below 100% modulation.

76 kHz Sideband Suppression:

80 dB minimum below 100% modulation.

Spurious and Sideband Suppression:

75 dB minimum below 100% modulation beyond 95 kHz.

FM Noise:

85 dB or better below 100% modulation @ 400 Hz, 75 usec de-emphasis.

Pilot Stability:

± 0.5 Hz, 0° to 50°C.

Power Requirements:

100/120/200/240 Vac, 50/60 Hz, 25 W.

Operating Temperature Range:

0° to 50°C. (Functional to -20°C)

Maximum Altitude:

15,000 feet (4,572 M).

Dimensions:

19" W x 3.5" H x 16.5" D (48.3 x 9 x 41.9 cm).

Net Weight:

17 lbs. (7.7 kg).



**BROADCAST
ELECTRONICS INC.**

4100 N 24th ST., P.O. BOX 3606, QUINCY, IL 62305-3606, (217)224-9600, TELEX 25-0142

BE 1572.5M 383



FEATURES

- Ultrastable digital modulator and pilot generator
- Selectable baseband equalization
- LED modulation display: L, R, L + R, L - R and composite signals
- Floating 50 ohm output
- Full remote control, optically-isolated control and status lines
- Fully RFI protected

GENERAL DESCRIPTION

DIGITAL DESIGN — The digital modulator and pilot generator offers absolute pilot phase stability without adjustment and eliminates troublesome distortion products. The result is a virtually perfect baseband that is an order of magnitude better than previous standards.

BASEBAND EQUALIZATION — The switchable composite baseband equalization allows for correction of baseband degradation introduced by the STL or exciter.

LOW-Z OUTPUT — The output circuit can drive a 50 ohm terminated coaxial cable independent of length with no degradation of baseband.

COMPLETE MONITORING — A peak-reading LED display and associated test jack may be used to monitor L, R; L + R; L - R; or Composite baseband signals. Each parameter may be monitored through the use of in-

terlocked pushbutton switches and the 1 to 14% or 10 to 140% display.

FULL REMOTE CONTROL — The opto-isolated remote mode control and status indication terminals are compatible with positive or negative logic. Memory retains mode during power interruptions. Power-up mode is internally programmable.

RFI PROTECTION — All connections to the internal circuitry are decoupled by a multisection network.

EASY INSTALLATION — The balanced instrumentation-amp audio inputs and SCA loop-thru simplify multiplex system installation. The circuit ground reference is low frequency isolated from the chassis to eliminate system ground loops. Externally programmable, four-range voltage selector, with detachable IEC standard power cord.

SPECIFICATIONS

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).

Composite Output Level:
2-8 volts p-p, adjustable, into open circuit, 50 ohm source impedance.

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

Total Harmonic Distortion:
0.03% or less, 30-15,000 Hz.

Intermodulation Distortion:
0.05%, 60 Hz/7 kHz; 4:1 ratio.

Transient Intermodulation Distortion:
0.1% (Square wave/sine wave).

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

Dynamic Stereo Separation:
45 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 Suppression:
70 dB minimum below 100% modulation.

76 and 114 kHz Sideband Suppression:
80 dB minimum below 100% modulation.

FM Noise:
85 dB or better below 100% modulation @ 400 Hz, 75 usec deemphasis.

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

Power Requirements:
100/120/200/240 Vac, 50/60 Hz, 50 W.

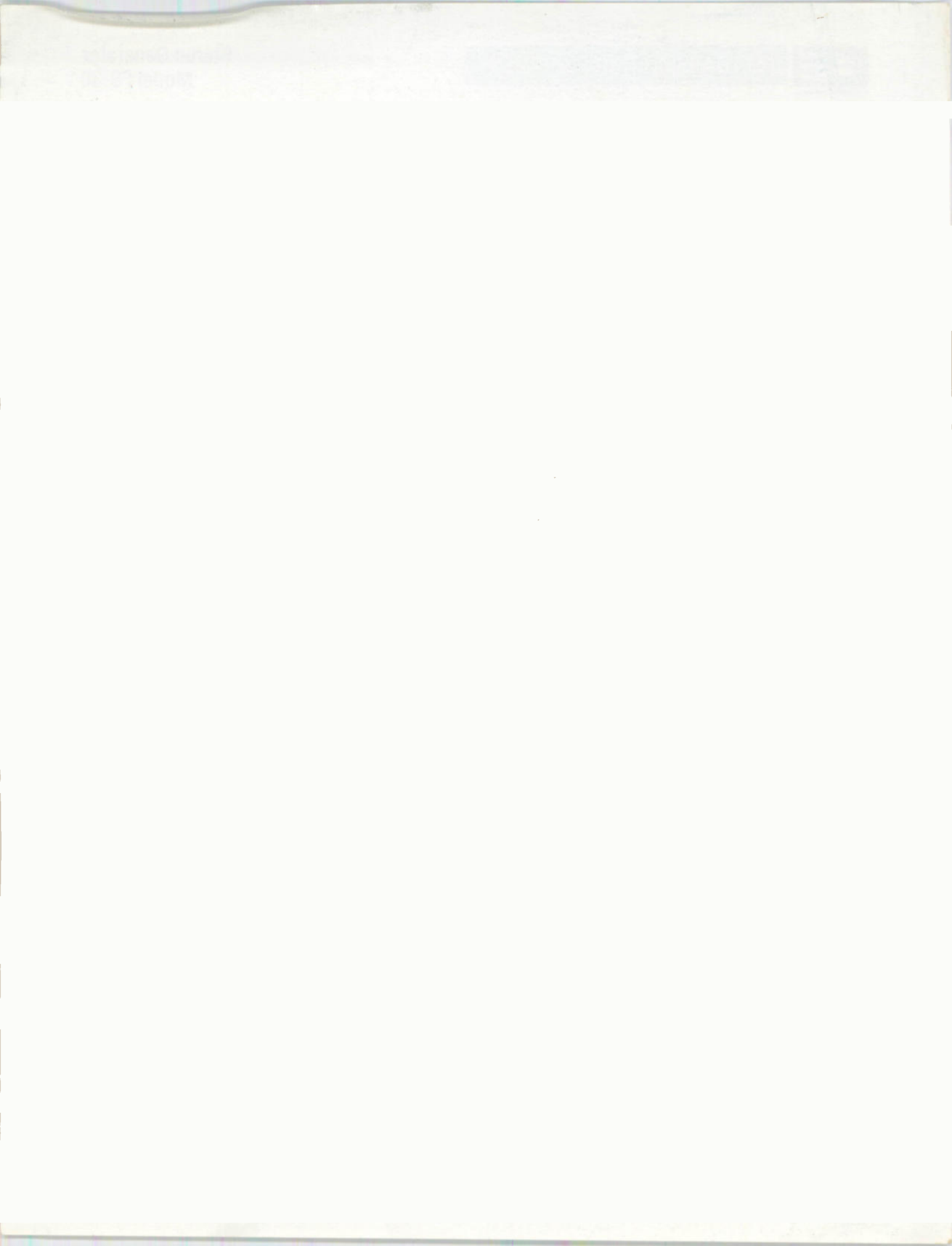
Operating Temperature Range:
0° to 50°C. (Functional to -20°C)

Maximum Altitude:
15,000 feet (4,572 M).

Dimensions:
19" W x 3.5" H x 16.5" D (48.3 x 9 x 41.9 cm).

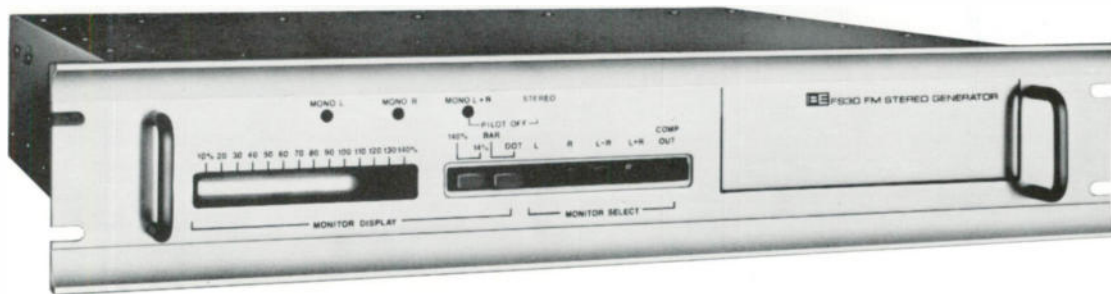
Net Weight:
20 lbs. (9.1 kg).





FS-30 Stereo Generator

Engineered to Provide the Best in Audio Performance



FEATURES

- Ultrastable digital modulator and digital pilot generator
- Selectable baseband equalization
- LED peak modulation display: L, R, L + R, L - R and composite signals
- Floating 50 ohm output drives long coax
- Full remote control, optically-isolated control and status lines
- Delay-equalized audio low pass filters provide minimum overshoot without clippers or other non-linear circuits

Digital Design: The digital modulator and digital pilot generator offers absolute pilot phase stability without adjustment or PLL and eliminates troublesome distortion products. The result is a virtually perfect baseband that is an order of magnitude better than previous standards.

Baseband Equalization: The switchable composite baseband equalization allows for correction of baseband degradation introduced by the STL or exciter.

Low-Z Output: The output circuit can drive a 50 ohm terminated coaxial cable independent of length with no degradation of baseband.

Complete Monitoring: A peak-reading LED display and associated test jack may be used to monitor L, R; L + R; L - R; or Composite baseband signals. Each parameter may be monitored through the use of interlocked pushbutton

switches and the 1 to 14% or 10 to 140% display.

Full Remote Control: The opto-isolated remote mode control and status indication terminals are compatible with positive or negative logic. Memory retains mode setting during power interruptions without the use of batteries. Power-up mode is internally programmable.

RFI Protection: All connections to the internal circuitry are decoupled by a multisection network.

Easy Installation: The balanced instrumentation-amp audio inputs and SCA loop-thru simplify multiplex system installation. The circuit ground reference is low frequency isolated from the chassis to eliminate system ground loops. Externally programmable, four-range voltage selector, with detachable IEC standard power cord.

SPECIFICATIONS

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).

Composite Output Level:

2.5-8.0 volts p-p, adjustable, into open circuit, 50 ohm source impedance.

Frequency Response:

± 0.5 dB, 30-15,000 Hz, 75 usec pre-emphasis (flat, 25 or 50 usec pre-emphasis selectable).

Audio Input Filtering:

15 KHz Active L.P.F., 45 dB rejection at 19 KHz, delay compensation for minimum overshoot.

Audio Overshoot:

2 dB maximum.

Total Harmonic Distortion:

0.03% or less, 30-15,000 Hz.

Intermodulation Distortion:

0.03%, 60 Hz/7 kHz; 4:1 ratio.

CCIF IMD:

All products are at least 85 dB below 100% modulation. (Left or right channel modulated 100% with 14 kHz/15 kHz, 1:1 test tone pair)

Transient Intermodulation Distortion:

0.1% (Square wave/sine wave).

Stereo Separation:

52 dB; 30-15,000 Hz.
60 dB; 30-5000 Hz.

Dynamic Stereo Separation:

45 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. 50 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.

76 kHz Sideband Suppression:

80 dB minimum below 100% modulation.

Spurious and Sideband Suppression:

75 dB minimum below 100% modulation beyond 95 kHz.

FM Noise:

85 dB or better below 100% modulation @ 400 Hz, 75 usec de-emphasis.

Pilot Stability:

± 0.5 Hz, 0° to 50°C.

Power Requirements:

100/120/200/240 Vac, 50/60 Hz, 25 W.

Operating Temperature Range:

0° to 50°C. (Functional to -20°C)

Maximum Altitude:

15,000 feet (4,572 M).

Dimensions:

19" W x 3.5" H x 16.5" D (48.3 x 9 x 41.9 cm).

Net Weight:

17 lbs. (7.7 kg).

Ordering Information:

909-0050—FM Stereo Generator, single phase 97 to 133 VAC or 194 to 266 VAC, 50/60 Hz.



**BROADCAST
ELECTRONICS INC.**

FS-30

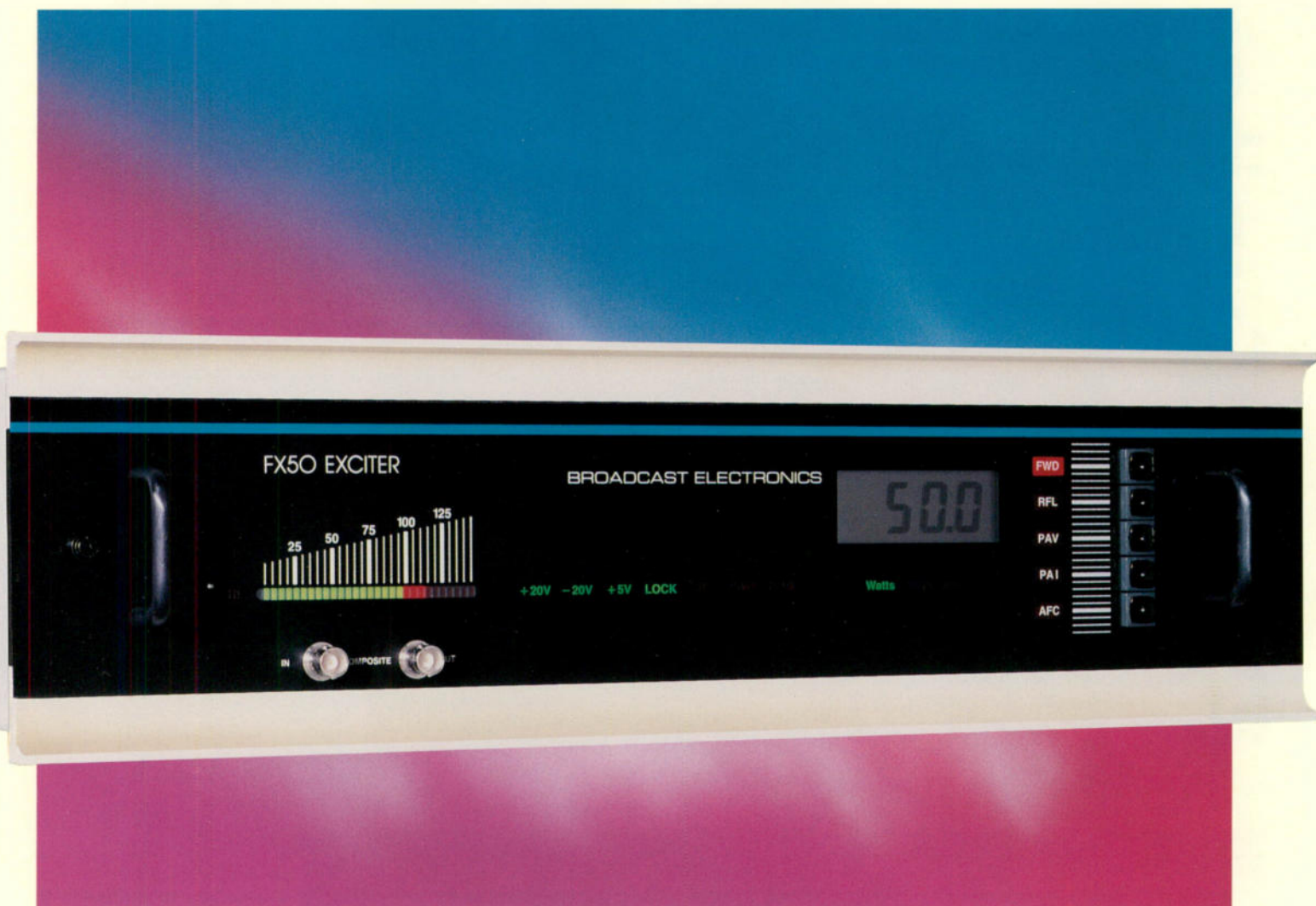
Stereo Generator *Separates the DB from the Noise*



Stereo Separation: 60 dB mid-band
FM Noise: 85 dB below 100% modulation
THD and IMD: .03% or less
CCIF IMD: Less than .01% (14 kHz/15 kHz, 1:1)
First to specify TIM: 0.1% or less

FX 50 Exciter

93 dB S/N □ 0.003% THD and IMD □ 50 Watts



“Audio Performance That Rivals Digital”

Audio Performance That Rivals Digital



FX50 Exciter

Features

- THD and IMD less than 0.003% typical for true digital capability
- Unmatched 93 dB S/N typical for widest dynamic range
- 50 watt MOSFET output power to drive the largest transmitter
- Stand-alone 50 watt FM transmitter
- Advanced linear modulated oscillator for unparalleled performance
- Computer-optimized phase locked loop greatly improves low frequency response
- Completely broadband for transparent performance
- Functional front panel controls with LCD displays

A New Design And Thoroughly Field Proven!

The FX50 FM Exciter provides performance that is an order of magnitude superior to its predecessor, the industry-standard FX30. With the field-proven FX50, you're assured of reaping the benefits of the new technology without taking chances on performance or reliability. Performance specifications feature a dynamic range that rivals CD players with harmonic and intermodulation distortion values so low that they are virtually unmeasurable.

The FX50 Exciter can bring existing FM transmitters up to digital quality standards and is the ideal retrofit for excitors now in use. The FX50 is designed to exactly replace existing FX30's, so it's especially easy to upgrade almost any transmitter system.

FX50 In "B" Series FM Transmitters

The FX50 Exciter is standard in every Broadcast Electronics "B" Series FM transmitter. With the FX50 Exciter, every "B" model Transmitter from 100 watts to 35kW provides digital quality transmission.

New Standard Of Audio Performance

The FX50 has the lowest distortion of any exciter available. THD and IMD are typically less than 0.003%! Transient Intermodulation Distortion is less than 0.01%!

With a signal to noise ratio that is typically 93 dB, the FX50 can handle all of the nuances and power of digital audio. Taken together, these superb performance specifications make the FX50 totally transparent to your broadcast signal. The FX50 Exciter will be one of the noise-free components in your entire transmission system.



■ **Left** FX50 Exciter is a standard component of the "B" series of FM transmitters offered by Broadcast Electronics. Shown here is the 30 kW model FM30B.

■ **Right** The front panel digital LCD display can be used to monitor various selectable functions or as a built-in voltmeter with test probe. The indicator for each push-button switch shows which of the five functions is currently selected.

Outperforms Them All!



Advanced Linear Modulated Oscillator

The heart of the FX50 is the unique computer-designed linear modulated oscillator. It is responsible for the outstanding improvement in audio performance provided by the FX50. It's unique resonator with hyper-abrupt tuning diodes provides lower distortion, extremely flat response and excellent signal-to-noise performance with less pre-correction compensation.

Computer-Optimized Phase Locked Loop Synthesizer

The advanced dual speed phase locked loop synthesizer is critical to the overall performance of the exciter, especially the transient and low frequency response. Broadcast Electronics used extensive computer modeling to develop the PLL design and to optimize its performance.

The FX50 achieves lock from a cold start in less than five seconds and still has full modulation capability from less than 0.1 Hz to over 150 kHz.

High Power MOSFET Amplifier

The broadband RF power amplifier is a totally new design taking advantage of the latest solid state technology. Instead of using a bi-polar power device, the FX50 uses a 60 watt MOSFET. Not only is higher output power available through this new device, it also improves the reliability of the amplifier. Heat is the enemy of solid state power devices and bi-polar transistors are more temperature sensitive. Bi-polar devices increase their power dissipation as they get hotter, which causes thermal run-away. This is not possible with a MOSFET device because it reduces its power dissipation as its temperature increases thereby greatly extending its life.

The broadband performance of the RF amplifier eliminates the need for tuning adjustments and is transparent to the signal generated by the modulated oscillator. The amplifier remains stable under varying load conditions and is completely short and open circuit protected.

Automatic Control Circuitry

The FX50's automatic control circuitry eliminates the need for adjustments after the initial setup. The circuitry stabilizes the power output of the exciter and protects it from excessive temperature, VSWR, line voltage variations and short circuits.

New, Simplified LCD Metering

All monitoring of important parameters is displayed by the combination of a digital LCD multimeter and LED status panel.

Five parameters are selectable via-push button switches and displayed on the LCD multimeter; forward power, reflected power, PA voltage, PA current and AFC voltage. In addition, this multimeter may be used as a built-in high impedance voltmeter for point-by-point measurements within the exciter or other equipment.

Additional status information provided on the status panel include +20, -20, and +5 volt supply voltages; frequency lock; RF amplifier malfunction; VSWR warning and RF amplifier temperature warning.

An LED modulation display provides a clear indication of short transient peaks exceeding 100% and includes an automatic expanded scale (X10) for convenient setting of stereo and SCA generator injection levels. This display is more accurate than a modulation monitor so operation at the highest allowable peak modulation levels is possible.



Easily Accessible Modular Construction

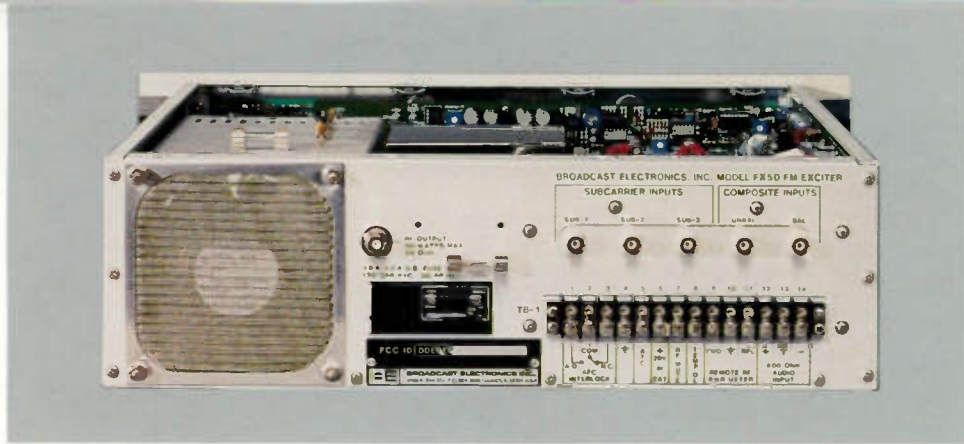
Building on the highly successful concept of the FX30, the FX50 is designed to permit "on-air" adjustments without interruption. The easy to remove sub-assemblies avoid the complexity, RFI susceptibility and instability of plug-in modules.

The entire chassis is mounted on slides so that the unit can be pulled out from the rack or transmitter to provide access while the FX50 Exciter continues to operate.

Composite signal measurements can be conveniently made via the front panel. Other connections are made to the rear panel.

Classic Elegant Styling

The classic elegant black appearance of the FX50 gives this exciter a distinctive appearance that will enhance any transmitter installation.



■ Rear view of the FX50 shows the clearly labeled connections and terminal strip which simplify installation and maintenance.

FX50 Exciter Specifications

GENERAL

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

R.F. Output Impedance: 50 ohm

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

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

Frequency Stability: ± 300 Hz, $+32^\circ$ to $+122^\circ$ F (0 to 50° C)

Modulation Type: Direct FM at the carrier frequency

Modulation Capability: ± 350 kHz

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

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

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

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

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

Front Panel Test Connections: Composite input and composite output

Audio/Control Connections: 14 terminal barrier strip and 5 BNC connectors

AC Input Power: 97 to 133 Vac or 194 to 266 Vac, 50/60 Hz, 230 W maximum

Ambient Temperature Range: $+32^\circ$ to $+122^\circ$ F (0° C to 50° C)

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

Dimensions: 17.70" W \times 5.25" H \times 19.00" D (44.96 \times 13.33 \times 48.26 cm)

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

WIDEBAND COMPOSITE OPERATION

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

Composite Input Impedance: Unbalanced: 10K ohm, nominal, resistive
Balanced: 10K ohm or 50 ohm, programmable, jumper selected

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

Composite FM S/N Ratio: 90 dB (94 dB typical) below ± 75 kHz deviation at 400 Hz; measured in a 20 Hz to 200 kHz bandwidth with 75 μ sec de-emphasis; 94 dB (96 dB typical) with DIN "A" weighting

Composite Harmonic Distortion: 0.003% or less

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

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

Composite Amplitude Response: ± 0.025 dB, 30 Hz to 53 kHz

Composite Phase Response: $\pm 0.1^\circ$ from linear phase, 30 Hz to 53 kHz

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

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

SCA Inputs: 3 total, unbalanced BNC connectors

SCA Input Impedance: 100K ohm nominal, resistive

SCA Input Level: 3.5 V p-p nominal for ± 7.5 kHz deviation

SCA Amplitude Response: ± 0.2 dB, 40 to 100 kHz

MONAURAL OPERATION

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

Audio Input Level: +10 dBm nominal for ± 75 kHz deviation @ 400 Hz, adaptable to other levels

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

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

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

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

FM S/N Ratio: 90 dB (94 dB typical) below ± 75 kHz deviation at 400 Hz; measured in a 20 Hz to 200 kHz bandwidth with 75 μ sec de-emphasis; 94 dB (96 dB typical) with "A" weighting

Published specifications are subject to change without notice. Due to varying measurement techniques, care should be observed when comparing the specifications of different manufacturers. For assistance in clarifying or interpreting product specifications, contact Broadcast Electronics' headquarters in Quincy, Illinois.

Ordering Information

Model	Stock No.
FX 50 Exciter	909-1050-000

909-0114

Description

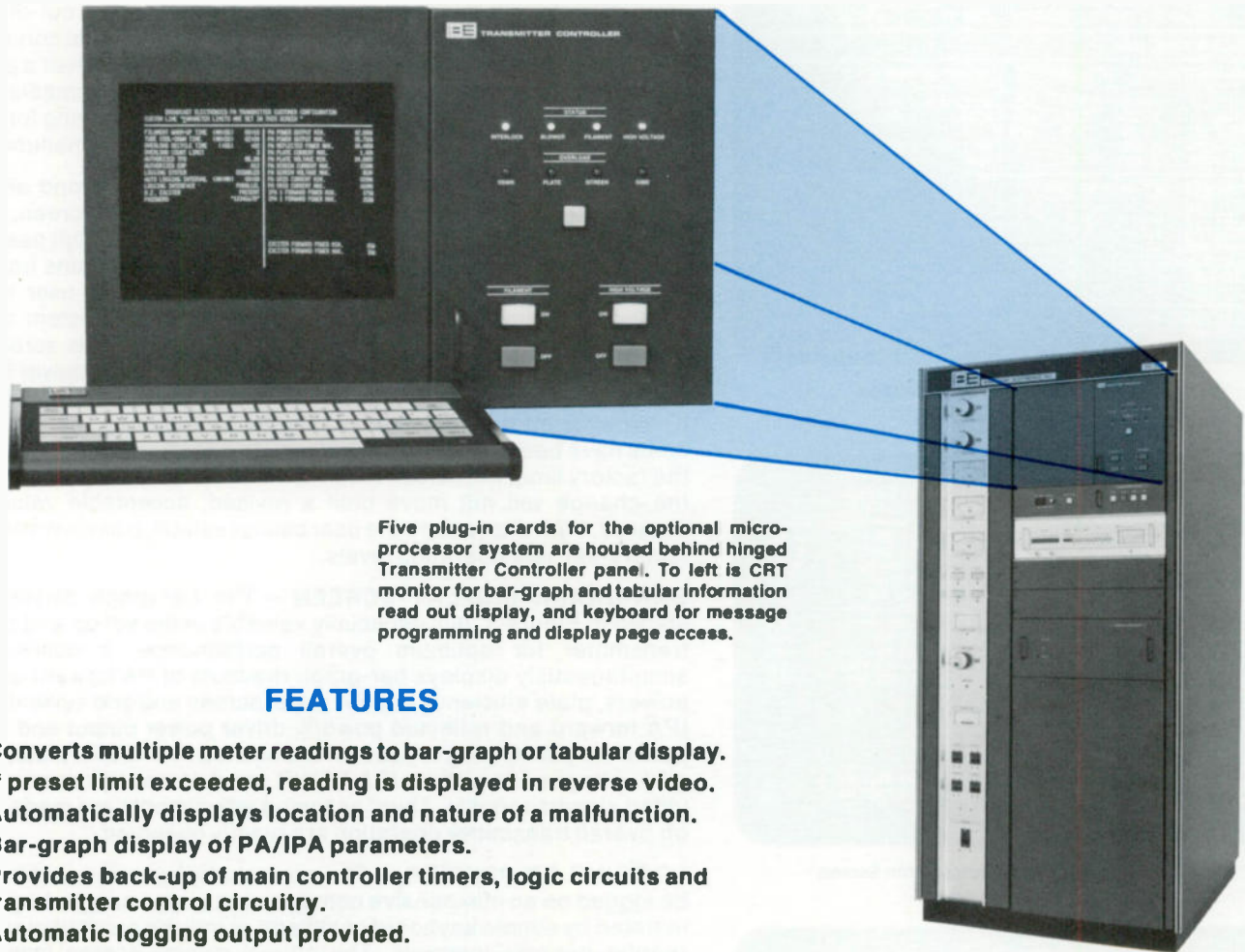
FX 50 solid state 3 to 50 W FM Exciter for wideband, composite or mono operation. For single phase 97 to 113 Vac or 194 to 266 Vac, 50/60 Hz power source. 19" (48.26 cm) rack mount. Specify operating frequency with order.

Optional low pass filter assembly for FX 50. Converts FX 50 FM Exciter to 50 W FM transmitter operation, factory installed and tested.

Note—Synchronous booster option available for FX 50 Exciter. For ordering information, contact the Broadcast Electronics Sales Department.

BE BROADCAST ELECTRONICS INC

4100 N. 24th ST., P. O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., PHONE (217) 224-9600, TELEX: 250142, FAX (217) 224-9607



Five plug-in cards for the optional microprocessor system are housed behind hinged Transmitter Controller panel. To left is CRT monitor for bar-graph and tabular information read out display, and keyboard for message programming and display page access.

FEATURES

- Converts multiple meter readings to bar-graph or tabular display.
- If preset limit exceeded, reading is displayed in reverse video.
- Automatically displays location and nature of a malfunction.
- Bar-graph display of PA/IPA parameters.
- Provides back-up of main controller timers, logic circuits and transmitter control circuitry.
- Automatic logging output provided.
- Remote monitoring with modems and telco lines or SCA interconnection.

EASILY READ DIAGNOSTICS — The B/E Microprocessor Video Diagnostic System option expands the operation of the Broadcast Electronics Models FM-1.5A, FM-3.5A and FM-5A transmitters.

This unique, microprocessor based, optional system continuously monitors and controls all major parameters of the transmitter, independent of the standard digital control circuitry provided in the transmitter. Video displays of the transmitter operating conditions are produced in either an analog tabular chart or digital bar-graph format. Each display includes day, date and real time readouts as well as transmitter model and serial number. Forty page spaces are reserved for individualized customer-programmed titling.

VERSATILE KEYBOARD PROGRAMMING — The microprocessor hardware consists of: 1) five plug-in cards which are inserted into a card cage located in the compartment area behind the standard Transmitter Controller hinged front panel; 2) a keyboard; 3) a power supply; 4) a rear panel

filter board, and 5) a CRT monitor located behind a window panel to the left of the Transmitter Controller Panel. In addition, an air plenum is added to the chassis and a blower replaces the standard cooling fan. The separate power supply ensures completely independent operation of the microprocessor from that of the primary transmitter controller. The keyboard is outfitted with a plug-in cable which mates with a connector at the rear of the controller chassis. The keyboard allows the customer to set time, select the desired CRT screen display page, set or reprogram the limits of the monitored parameters and activate various system options.

There are two analog chart type page displays.

NORMAL DISPLAY SCREEN — The first of these, shown as Figure 1, is designed as the normal display screen since it contains all of the basic transmitter operating information. It is presented in a sectionalized form separated into exciter, IPA, PA and TPO areas. It also displays the times and causes of carrier interruptions.

MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM

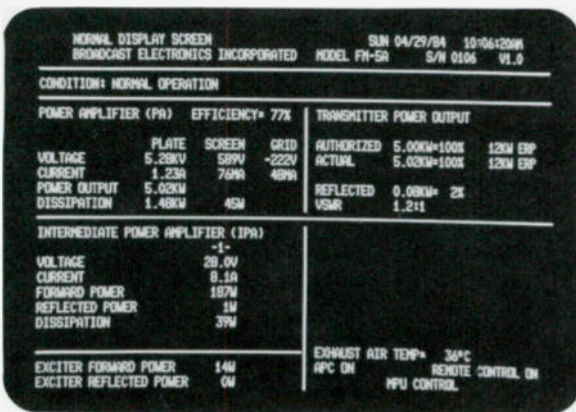


Figure 1 - Normal Display Screen

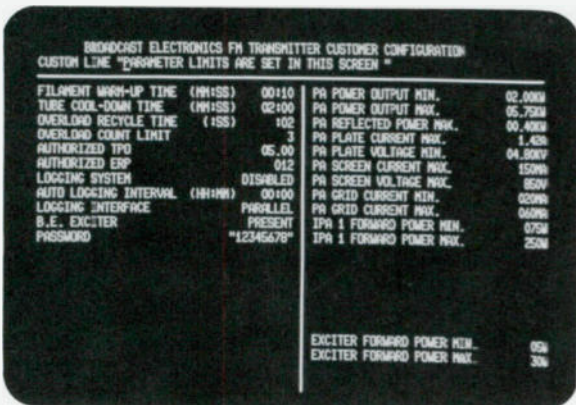


Figure 2 - Customer Configuration Screen

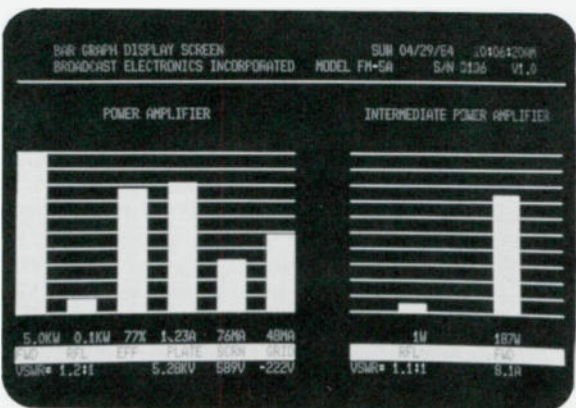


Figure 3 - Bar-graph Display Screen

TRANSMITTER STATUS READILY DISPLAYED — Of particular value is a condition/diagnosis line which, in the presence of an out-of-limit condition, not only identifies the circuit in which the abnormal condition exists, but also points out the cause of the malfunction. Whenever a parameter is at an out-of-limit level it is displayed in reverse video, immediately alerting the operator to the undesirable condition. No more hunting for the instruction manual for help in isolating and troubleshooting a malfunction!

CUSTOMER CONFIGURATION SCREEN — The second analog chart-type display, designated the customer configuration screen, is shown in Figure 2. Access to this screen is by entry of an eight-digit password. This is a security device which prevents unauthorized persons from changing user-set limits and options. This screen allows the user to tailor the diagnostics system to his specific requirements. System options and limits for monitored parameters are selected from this screen. The left hand column lists the system options including timing, power and function as applicable. The right hand column lists "min-max" values for various transmitter parameters. These may be changed by the user; however, limits have been preset at the factory. If a user-entered limit is greater than the factory limit, the cursor which had been positioned by the user to make the change will not move until a revised, acceptable value has been entered. With this feature the user cannot establish limits which violate the factory-set safe operating levels.

BAR-GRAPH DISPLAY SCREEN — The bar-graph display screen is shown in Figure 3. It is especially valuable in the set up and tuning of the transmitter for optimum overall performance. It continuously and simultaneously displays bar-graph readouts of PA forward and reflected powers, plate efficiency and PA plate, screen and grid currents along with IPA forward and reflected powers, driver power output and IPA module power output. Analog readout of associated PA VSWR, plate, screen and grid voltages, as well as IPA VSWR, module and driver currents is provided simultaneously. Thus, as tuning adjustments are made, their effect on overall transmitter operation are readily observed.

LOGGING BY PRINTER — The normal display screen information may be logged on an inexpensive home computer type printer. Logging may be initiated by simple keyboard command or may be programmed to occur at regular periodic intervals. The normal display screen may be viewed remotely by the utilization of modems and hardwire, telephone line or SCA subcarrier interconnection.

REMOTE VIDEO MONITORING — Additionally, the bar-graph display screen video information may be fed over coaxial cable interconnection up to 1000 feet in length to additional on-premise, extended local video monitors.

IMPROVED ON-AIR RELIABILITY — In essence the addition of the microprocessor option to a standard FM transmitter provides not only the diagnostic system functions, but also redundant, automatic transmitter control, enhancing the "on-air" reliability. When the microprocessor option is selected for operation, it takes complete control of the transmitter. It monitors the transmitter front panel switches and status indicators and is in complete control. If it is disabled in any way, control reverts automatically to the primary transmitter controller.

ORDERING INFORMATION

MODEL NO.	STOCK NO.	DESCRIPTION
MVDS	909-0091	Optional Microprocessor Video Diagnostic System, factory installed in FM-5A, FM-3.5A or FM-1.5A One Tube FM Transmitters only. (Must be ordered with transmitter)
	979-0037	Same as above except for field installation in FM-5A, FM-3.5A and FM-1.5A transmitters only.



BROADCAST ELECTRONICS INC

AS 10

AM Stereo Modulation Monitor



BE® BROADCAST
ELECTRONICS INC.

AS 10 AM STEREO MODULATION MONITOR

FEATURES

- Second generation C-QUAM® modulation monitor
- RF AGC for optimum C-QUAM® decoder performance
- Minimal overshoot for accurate modulation level measurement
- Digital pilot detection for excellent long term stability
- Rapid carrier shift response
- Selectable MANUAL or AUTO-RANGING meters
- Advanced, modular design
- Front panel audio output for transmitter alignment and proof of performance
- 9 or 10 kHz channel spacing available



The Broadcast Electronics AS 10 AM Stereo Modulation Monitor represents a substantial improvement in C-QUAM® monitoring technology. The AS 10 offers state of the art design innovations coupled with convenience features not found on other C-QUAM® monitors. The advanced design and attractive styling of the AS 10 makes it the perfect companion for the Broadcast Electronics model AX 10 C-QUAM® AM Stereo Exciter.

RF AGC: Only the AS 10 features the accuracy of a single RF AGC system. This innovative design avoids the troublesome tracking errors that can appear in monitors utilizing a matrix AGC design.

A matrix design actually employs two AGC's: one for L+R, the other for L-R. If there are any tracking errors between the two AGC's, channel separation will be reduced and C-QUAM® decoder performance will suffer. With the AS 10's single RF

AGC, consistent decoder performance is guaranteed—even over a varying range of signal levels. The end result is unquestionable measurement accuracy!

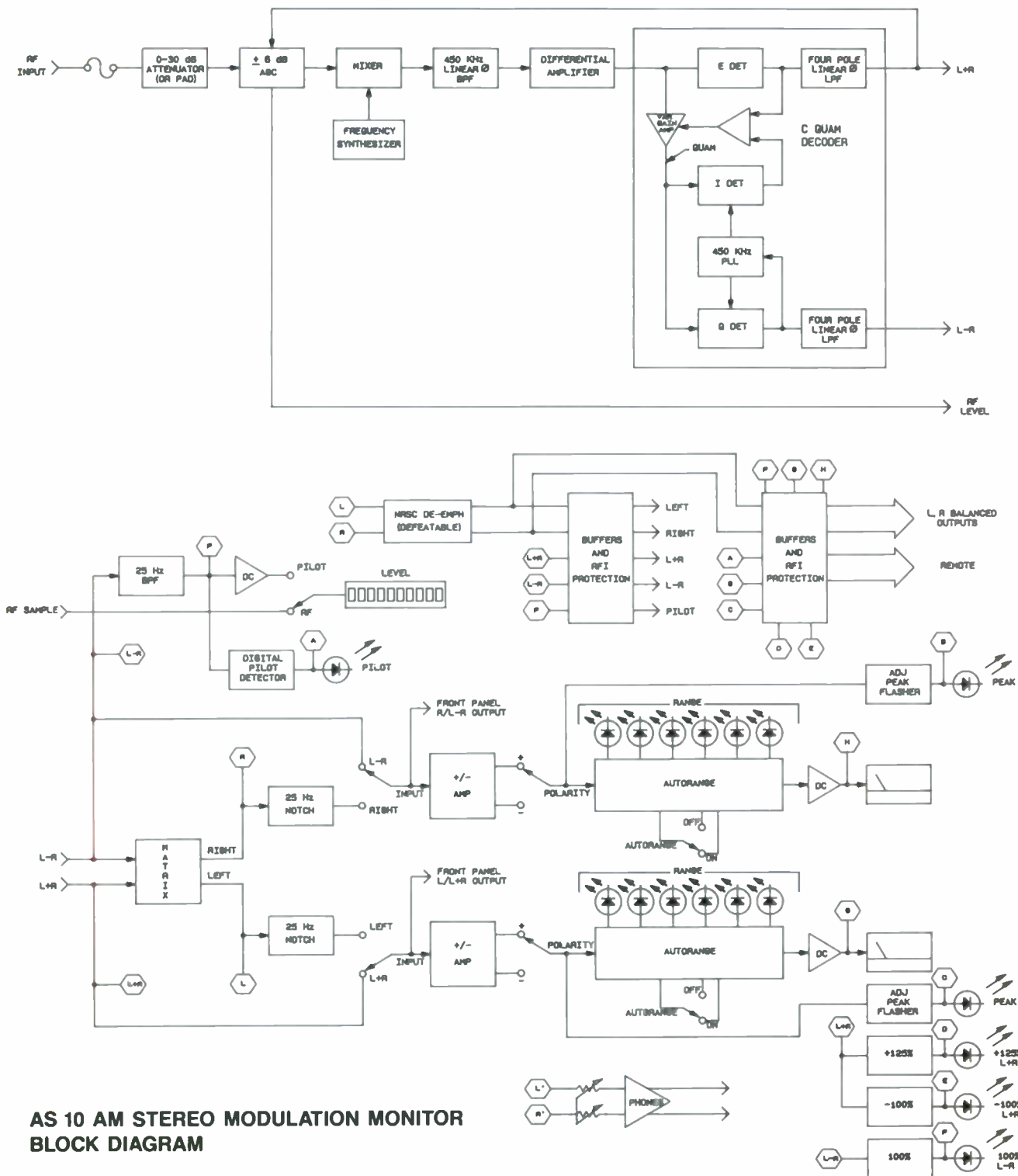
OVERSHOOT: The AS 10's carefully designed filtering circuitry keeps overshoot errors to the lowest levels possible. Overshoot in the AS 10 is maintained at less than 1%, while in other monitors it could range as high as ten percent or more. Reduced overshoot yields an extra margin of accuracy when making critical modulation level measurements. When the AS 10 indicates 100% modulation, you can be certain it IS one hundred percent!

DIGITAL PILOT DETECTION: The AS 10's digital pilot detector ensures perfect stability and outstanding long term reliability. Unlike PLL based circuits, the AS 10 digital pilot detector will not gradually drift out of lock—even after many years of service.

HIGH RESOLUTION CARRIER LEVEL INDICATOR: A multi-colored LED bar display provides high resolution carrier shift readings at a glance. The AS 10 carrier level indicator features a carrier shift reaction time of less than 300 milliseconds. This rapid reaction time permits easier, more accurate readings of the LED display.

MODULATION LEVEL METERING: Both the Left and Right channel meters offer 70 dB of indication range. Exclusive auto-ranging circuitry selects the proper range automatically in 10 dB steps. (This makes proof of performance measurements a snap!) The manual range function can also be used for range selection if desired.

Each meter features semi-peak response on the top ranges, changing to average response on lower ranges. This allows separation, crosstalk, and signal to noise measurements to be taken directly from the meters.

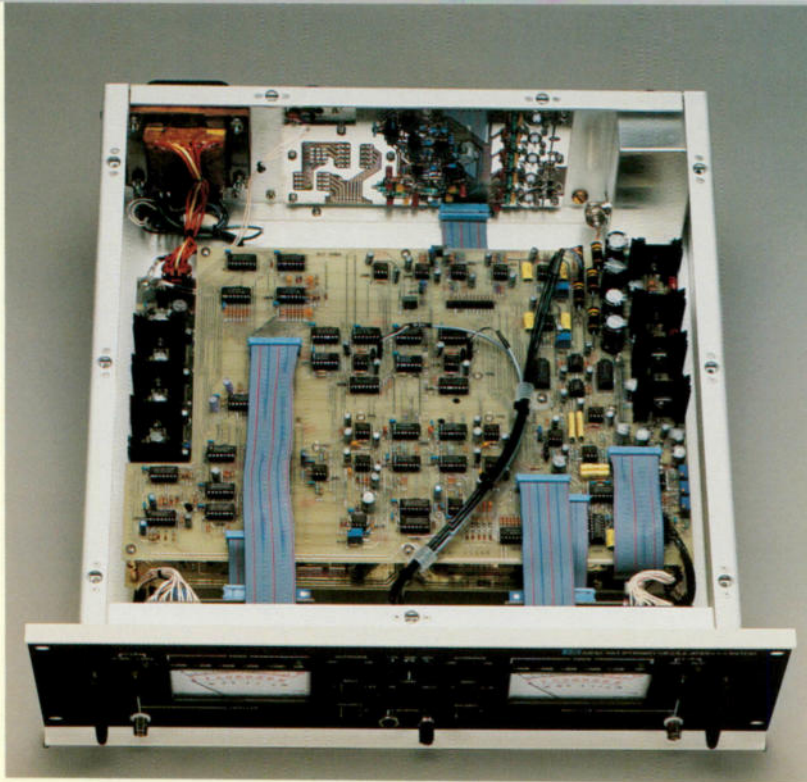


AS 10 AM STEREO MODULATION MONITOR BLOCK DIAGRAM

NRSC DE-EMPHASIS: A built-in jumper selectable NRSC filter applies appropriate de-emphasis to the output signals. This provides convenient, high quality monitor signals.

DESIGNED FOR CONVENIENCE: The convenience features of the AS 10 include a front panel head-phone output, front panel audio output ports and modular internal PC boards. Lighted switch indicators and large, easy to read meters make the AS 10 a pleasure to operate.

REMOTE MONITORING: Rear panel connections are provided for remote monitoring of peak meter readings and peak LED displays. The AS 10 remote output ports are compatible with twelve volt positive going CMOS logic.



SPECIFICATIONS

AS 10 AM STEREO MODULATION MONITOR

Size

5.25"H x 19"W x 17"D
(Fits standard EIA 19" racks)
(13.3H x 48.3W x 43.2D cm)

Weight

25 lbs. (11.3 kg)

Power Requirements

120 VAC (97-133 VAC), 50/60 Hz or 220/240
VAC (194-226 VAC), 50/60 Hz with
appropriate line voltage card selection.

Power consumption = 60 watts, maximum.

Ambient Temperature Range

0 to 50°C

Humidity

95% non-condensing

Altitude

Up to 15,000 AMSL

Cooling

Natural convection and conduction

Operating Frequency Range

530-1620 kHz in 10 kHz increments or
522-1620 kHz in 9 kHz increments with
internal crystal selection.

RF Input Level

500 mV to 15V RMS

RF Input Impedance

50 ohms

RF Attenuator

0 to 30 dB in 6 dB increments with a 0 to
6 dB AGC controlled fine adjustment.

Modulation Meter Calibration

0 to 133% (-20 dB to +2 dB)

Selectable Meter Range

0 dB to -50 dB, auto-ranging or manual

Modulation Meter Accuracy

400 Hz, ±2% at 100% modulation

Modulation Meter Functions

Left/L+R Right/L-R

Peak Flasher Function

+125% envelope, -100% envelope, 100%
phase

Peak Flasher Indicator

Adjustable via thumbwheel switches for 0
to 133%. Selectable for + or - peak
indication of meter function.

Rear Panel Outputs

(L, R, L+R, L-R) .775V RMS equals 100%
BNC output connectors.

(L and R Line Output) 2.45 RMS at 100%,
600 ohms actively balanced. PC mounted
quick disconnect terminal.

Selectable NRSC De-emphasis: (Pilot)

.775V RMS equals 5% pilot injection. BNC
connector.

Headphone Output

2 watts minimum into 8 ohms impedance.
Adjustable.

Specifications may be changed without
notice.

ORDERING INFORMATION

Model	Stock No.	Description
AS 10	907-0100-004	C-QUAM® AM Stereo Modulation Monitor. 117V, 50/60 Hz
AS 10	907-0100-304	Same as above, except for 220V, 50/60 Hz
	907-0104	9 kHz increment option



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