

Broadcast Equipment Catalog 105



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BROADCAST ELECTRONICS INC.

INTRODUCTION

The staff of Broadcast Electronics has prepared this catalog to serve as both a reference volume and a buying guide. Whether you are planning a new installation or replacing older equipment, you will find the comprehensive selection of equipment in this catalog to be without equal. If your need is for a cartridge machine you can select from one of our technically advanced *Phase Trak 90* models or choose one of our other single or multi-deck cartridge machines. If you are searching for just the right console, there are 18 attractively styled models to choose from in addition to the incomparable *Mix Trak 90* modular series. FM transmitters from 30 watts to 70 kilowatts, companion RF accessories, the renowned FX-30 exciter, program automation equipment, AM stereo exciter/modulation monitor and even our own manufactured turntables combine to illustrate the complete "TOTAL PACKAGE" concept from Broadcast Electronics.

Broadcast Specialists: Equipment produced by Broadcast Electronics is noted for its craftsmanship, reliability and excellence of design. I believe that our specialization in broadcast equipment makes us unique in the industry. It allows us to design and manufacture quality products that are precisely suited to the needs of broadcasters. In addition, our company is staffed with an abundance of technically trained and experienced personnel in all departments, always anxious to do their utmost to be of service to our valued customers.

To Order: It's easy to order Broadcast Electronics equipment. You can simply call upon any of our 120 conveniently located dealers and distributors in the United States and Canada. They can supply all Broadcast Electronics products with the exception of larger transmitters and program automation systems. High power FM transmitters and companion Broadcast Electronics antennas are sold through our technically oriented RF representative organization in 18 defined territorial regions in the USA and Canada. Our international sales are handled by local representatives in virtually every country in the world. Through the expertise of this specialized selling organization, we've made it convenient for you to order Broadcast Electronics products.

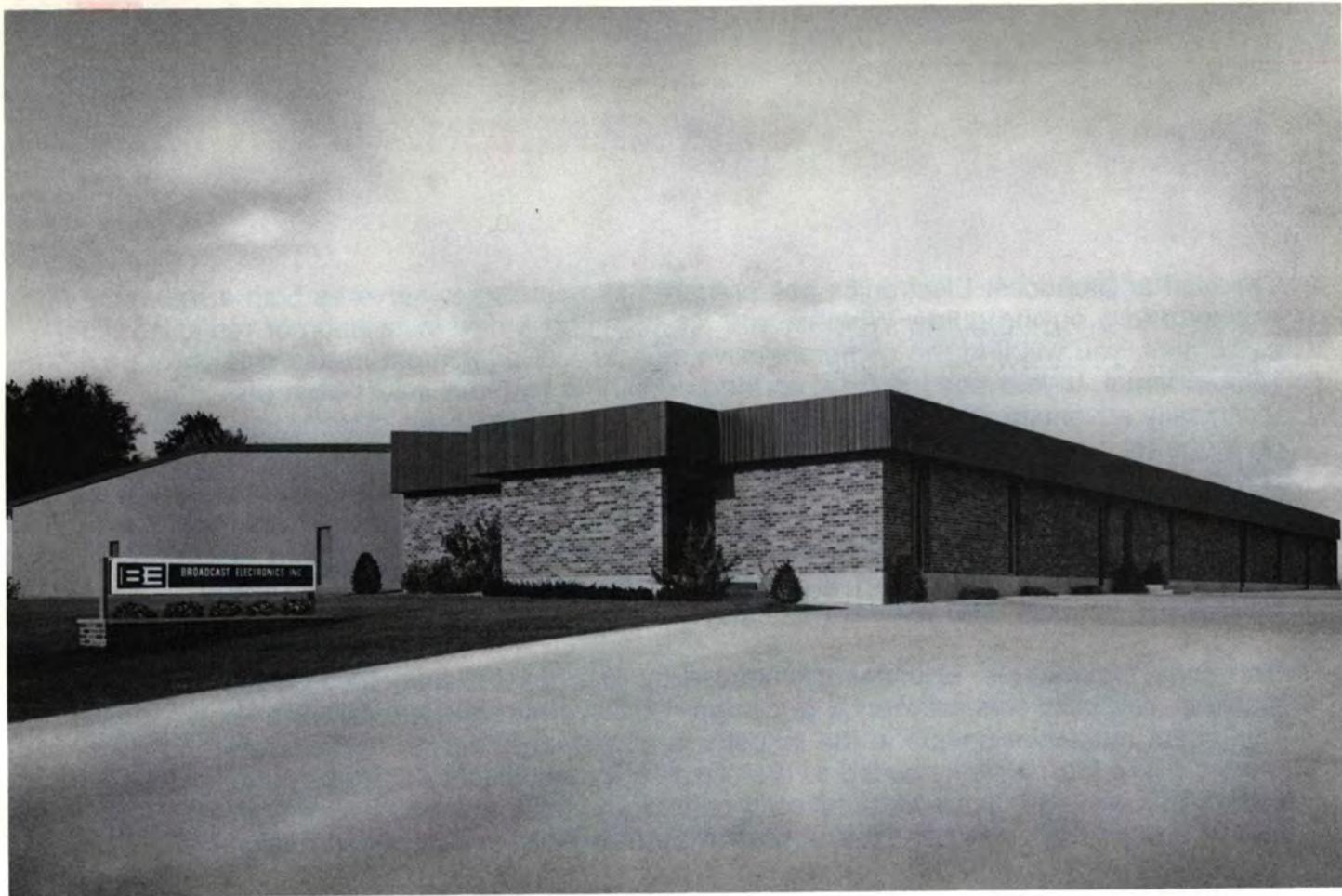
For Broadcast Equipment, Think of Broadcast Electronics: I trust that you will find this new catalog to be helpful and that you'll keep it handy for reference in the future. Whether it's a "TOTAL PACKAGE" or a single cartridge machine, bring your equipment needs to Broadcast Electronics. Each and every member of the Broadcast Electronics organization will do his or her best to justify your continuing confidence.

Broadcast Electronics is people, dedicated to serving you.

Sincerely,



Lawrence J. Cervon
President



The designing, manufacturing and worldwide marketing activities of Broadcast Electronics originate in this modern 70,000 square foot (7000m²) facility located in Quincy, Illinois, USA. Audio, automation and RF products leave this building for use by radio and TV broadcasting organizations and other media in every state of the union and in most countries around the globe.



Broadcast Electronics Inc.

Catalog 105

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All specifications contained within this catalog are subject to change without notice.



PHASE TRAK 90 PLAYBACK

- Automatic Stereo Phase Correction*
- Superb Audio Performance
- Dynafex® Noise Reduction
- Optical Tape Level Sensing
- Non-repeat Lockout
- Cart-Not-Cued Lockout
- Automatic Audio Muting
- Phase Lok V Precision Adjustment Head Block

AUTOMATIC PHASE CORRECTION

The phase correction circuit of the Phase Trak 90 continually monitors and corrects the phase relationship between the playback audio of the right and left channels. The output of ANY cartridge will undergo automatic phase correction when it is played through the Phase Trak 90 - REGARDLESS OF WHAT MACHINE WAS USED TO PRODUCE THE CARTRIDGE ORIGINALLY.

The phase correction capability of the Phase Trak 90 is essentially invisible to the operator, requiring no user adjustments. A front panel LED bar-graph indicator is provided to show the amount of relative phase correction taking place during the play cycle.

EXCELLENT AUDIO PERFORMANCE

The Phase Trak 90 boasts a Signal to Noise Ratio of better than 80 dB (stereo, with Dynafex® noise reduction operational). At ± 2

- Innovative Cartridge Guidance System
- True Modular Design With Plug-in Assemblies
- All Cue Tones Standard - Including FSK Detection
- Reliable DC Servo Motor
- Back Lighted Front Panel Status Indicators
- Optional Digital Timer
- Digital Cue Filtering

*Patent Pending

dB, 40 Hz to 16 kHz, the excellent frequency response of the Phase Trak 90 delivers "audiophile" quality in any application. Wow and Flutter specifications are also excellent at less than .12%.

OPERATIONAL FEATURES

Automatic High/Low Level Sensing

Provides automatic level switching for cartridges recorded at higher levels (typically 250 nW/m) through the application of optical sensing tabs on the front of the cartridge.

Automatic Audio Muting

No outboard audio switcher is required for multi-machine applications. When a particular machine is started, all others in the chain are automatically muted. When using EOM switching, the automatic muting provides smooth audio overlapping.

Four Standard Cue Circuits

The Phase Trak 90 comes equipped with four standard digital cue sensor circuits including an FSK (3.5 kHz) decoder which provides an RS-232 compatible data output for automatic logging. Digital cue filters allow the three standard cue tones to track the servo motor speed automatically - even in Vari Speed mode!

Non-Repeat Lockout

After a cartridge has played and has re-cued, the STOP indicator will begin to flash at a rate of one flash per second. The machine will not start again until the operator removes and replaces the cartridge, or resets the lockout mode by pressing the STOP switch. (The lockout mode is defeatable with an internal jumper.)

Cart-Not-Cued Lockout

If a cartridge is stopped before it can re-cue, the STOP indicator will flash twice per second to warn the operator. The cartridge cannot be started again until the lockout mode is reset in the manner mentioned above. (Defeatable)

Hall Effect Switches

All three function switches on the front panel of the Phase Trak 90 are Hall Effect switches for the ultimate in silent, reliable operation.

Automatic/Manual Fast Forward

One depression of the Fast Forward switch will lock the machine into the fast forward mode until the cartridge re-cues or is manually stopped.

"Clean" Function

Momentarily pressing both the STOP and START switches will activate the motor and pull the pinch roller into position for cleaning. Pressing the STOP switch alone will turn on the motor for about 90 seconds to facilitate easier cleaning of the capstan shaft.

PHASE LOK V HEAD BLOCK

The Phase Lok V head block utilized in the Phase Trak 90 is one of the only head block assemblies in the industry to offer a locking azimuth adjustment that is independent of the height and zenith adjustments. This allows the user to achieve near-perfect head alignment quickly and easily. Head block assemblies can be removed and replaced without re-alignment.

CARTRIDGE GUIDANCE SYSTEM

Right and left side guides grip the cartridge as it enters the deck and applies just enough force to ensure proper positioning. At the same time, two spring loaded top guides apply downward pressure. The result is silky-smooth cartridge insertion and excellent positioning regardless of variations in cartridge size!

MODULAR CONSTRUCTION

The Phase Trak 90 is completely modular for the ultimate in servicing convenience. All modules are easily removed from the back of the cabinet. Test points and adjustments are reached by removing the top cover. In addition, all modules feature gold-to-gold pin and socket contacts to enhance long term reliability.

OPTIONAL TIMER

An optional timer is available for the Phase Trak 90. This count-up timer is always synchronized to the motor speed for an accurate reading of "tape time" regardless of the actual elapsed "real time". The timer will re-set to zero whenever a cartridge is inserted and will stop counting when the cartridge stops playing. The display can also be set to freeze when an EOM (End of Message) tone is detected. This allows the operator to determine the actual length of the message.



PHASE TRAK 90 PLAYBACK
DC Servo Motor Assembly



PHASE TRAK 90 PLAYBACK
Modular Construction



PHASE LOK V
Head Block



SPECIFICATIONS

Power

105V to 132V or 210V to 264 VAC, 50 or 60 Hz.

Tape SpeedStandard: 7.5 IPS with 22.5 IPS Fast Forward.
Optional: (1) 3.75 IPS with 11.25 IPS Fast Forward.
(2) 15 IPS with no Fast Forward.**Motor**

DC servo with a hard chromed, stainless steel non-magnetic shaft.

Solenoid

Low voltage, constant current solenoid with highly increased pulling power.

Speed Accuracy

± .2%.

Wow and Flutter

Maximum 0.12% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformerless: True electronic balanced and floating.

Audio Output Level

+24 dBm before clip.

Audio Output Impedances

Transformerless: 600 ohm termination. Less than 75 ohm source.

System Distortion

(see notes 1 and 2) Reproduce Amplifier: Less than 0.5% THD. Playback system: Less than 1.5% THD (tape dependent).

Signal to Noise

Measured with reference to 250 nW/m and a bandwidth of 30 Hz to 20 kHz.

Pulling Tape: -56 dB Mono -54 dB Stereo

No Tape: -60 dB Mono -58 dB Stereo

With Dynafex®: -80 dB Mono -80 dB Stereo

Squelch Noise: -80 dB (without Dynafex)

Crosstalk

Limited to -50 dB between any two adjacent channels.

Frequency Response

(see note 3) ±2 dB, 40 Hz to 16 kHz.

Transport Stop Time

80 mSec maximum at 7.5 IPS.

Transport Start Time

120 mSec (minimum damping with servo motor operating when start command is initiated).

Equalization

1975 NAB standard. I.E.C. CCIR (customer specified options).

Cartridge Size

A and AA.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122 F).

Remote Control

All front panel indicators and controls (except metering).

Mounting

Table top with optional rack mount also available.

Dimensions

Table Top: 5.62" H x 5.875" W x 15.5" D (14.3 x 14.9 x 39.4 cm). Rack Mount: 5.25" H x 5.75" W x 15.5" D.

Weight

28 lbs (packed), 12.7 Kgs.

NOTE 1: Reference 1 kHz at 250 nWb/m.

NOTE 2: Using Capital Magnetics SGS-4 tape.

NOTE 3: Specification measured using the 1975 NAB Standard.

ORDERING INFORMATION

117/220 VAC, 50/60 Hz Table Top Mounting, 7.5 IPS (3.75 and 15 IPS selectable).

MODEL	STOCK NO.	DESCRIPTION
PT90P	900-9000-000	Phase Trak 90 Playback - Mono (A and AA cartridges).
PT90PS	900-9002-000	Phase Trak 90 Playback - Stereo (A and AA cartridges).
PT90R	900-9009-000	Record Amplifier, Mono with Cues.
PT90RS	900-9010-000	Record Amplifier, Stereo with Cues.

OPTIONS AND ACCESSORIES

900-9013	Rack Shelf for 19" EIA rack, 7 "H.
900-9014	Rack Shelf Filler Panel, 1/3 rack for 9013.
900-9015	Rack Shelf Filler Panel, 1/2 rack for 9013.
910-9007	Test Extender PC Board.
900-9016	Tape Timer, 4 digit, factory installed.
970-0099	Tape Sensor Foil Tab Kit (package of 100).
970-0088	Record Head Connector kit for PT90P/PS when used with record amplifier.
597-9000	Service Manual for Series 9000.

Dynafex® is a registered trademark of Circuit Research Laboratories Inc.



Model PT90RPS

- Automatic Stereo Phase Correction*
- Superior Audio Performance
- Dynafex® Noise Reduction
- Automatic Tape Analysis with "Learn" mode
- Built-in Splice Finder
- Built-in Test Oscillator
- Optical Tape Level Sensing
- Non-repeat Lockout
- Automatic Audio Muting
- Phase Lok V Precision Adjustment Head Block

AUTOMATIC PHASE CORRECTION*

The phase correction circuit of the Phase Trak 90 Record/Play continually monitors and corrects the phase relationship between the playback audio of the right and left channels. The output of ANY cartridge will undergo automatic phase correction when it is played through the Phase Trak 90 Record/Play—REGARDLESS OF WHAT MACHINE WAS USED TO PRODUCE THE CARTRIDGE ORIGINALLY.

SUPERIOR AUDIO PERFORMANCE

The Phase Trak 90 Record/Play offers a Signal to Noise Ratio of better than 80 dB (stereo, with Dynafex® noise reduction operational). At ± 2 dB, 40 Hz to 16 kHz, its record to playback frequency response exceeds the most exacting standards. Wow and Flutter specifications are also excellent at less than .12%.

OPERATIONAL FEATURES

FRONT PANEL METERING

The Phase Trak 90 Record/Play provides two 18 segment LED meters. In the record mode the meter indicates Left and Right channel input audio. In the playback mode the meter indicates

- LED Metering of Left/Right Channel Audio, Cue, and Bias
- True Modular Design With Plug-in Assemblies
- All Cue Tones Standard — Including FSK Detection
- FSK Data Encoder
- Cue Erase Function
- Reliable DC Servo Motor

*Patent Pending

Left and Right channel output audio. When the front panel MTR switch is depressed, Cue audio is displayed on the left channel LED's while the overall bias level is displayed on the right channel LED's.

AUTOMATIC TAPE ANALYSIS

Introducing a new brand of tape is easy with the Phase Trak 90 Record/Play! Through its microprocessor-assisted automatic tape analysis system, the Phase Trak 90 will completely evaluate a new tape and "learn" all of the bias, level and EQ settings necessary to obtain optimum performance. These settings are then stored in memory, ready for selection.

OPTICAL HIGH/LOW SENSING

Provides automatic switching for cartridges employing various bias, level, and EQ settings (record or playback) through the application of optical sensing tabs on the front of the cartridge.

AUTOMATIC AUDIO MUTING

No outboard audio switcher is required for multi-machine applications. When a particular machine is started, all others in the chain are automatically muted.

DIGITAL TIMER — STANDARD

An easy to read digital timer is standard in the Phase Trak 90 Record/Play. This count-up timer is synchronized to the motor speed for an accurate reading of actual tape time regardless of the elapsed "real time". The timer will re-set to zero whenever a cartridge is inserted and will cease counting when the cartridge stops playing. Through an internal jumper selection, the timer can be set to freeze when an EOM (End Of Message) tone is detected. This allows the operator to determine the actual message length.

FOUR STANDARD PLAYBACK CUE CIRCUITS

The Phase Trak 90 Record/Play comes equipped with four standard digital cue sensor circuits including an FSK (3.5 kHz) decoder which provides an RS-232 compatible data output for automatic logging.

FOUR STANDARD RECORD CUE CIRCUITS

Record cue circuits include 150 Hz, 1 kHz, 8 kHz and an RS232 to FSK encoder. The Phase Trak 90 Record/Play also offers a handy external cue provision as well as pushbutton-activated 1 kHz record defeat and cue erase functions.

NON-REPEAT LOCKOUT

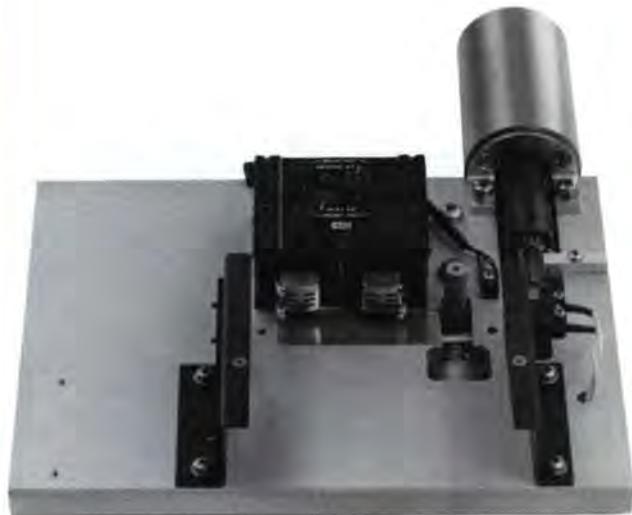
After a cartridge has played and has re-cued, the STOP indicator will begin to flash at a rate of one flash per second. The machine will not start again until the operator removes and replaces the cartridge, or resets the lockout mode by pressing the STOP switch.

AUTOMATIC/MANUAL FAST FORWARD

One depression of the Fast Forward switch will lock the machine into the fast forward mode until the cartridge re-cues or is manually stopped.



Phase Trak 90 Record/Play power supply illustrates advanced modular design.



Phase Trak 90 Record/Play deck assembly

AUTOMATIC SPLICE FINDER

With a single push of the front panel SPL switch, the Phase Trak 90 Record/Play will enter the splice finding mode. The cartridge will run at 22.5 IPS until the splice detector precisely locates the tape splice.

BUILT-IN TEST OSCILLATOR

Maintaining your Phase Trak 90 Record/Play is made easier with its built-in test oscillator. Eight tones are selectable through the front panel switches: 50 Hz, 125 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 12 kHz and 16 kHz. A convenient "sweep mode" is also available.

MECHANICAL DESIGN FEATURES**PHASE LOCK V HEAD BLOCK**

The Phase Lok V head block utilized in the Phase Trak 90 Record/Play is one of the only head block assemblies in the industry to offer a locking azimuth adjustment that is independent of the height and zenith adjustments. This allows the user to achieve near-perfect head alignment quickly and easily.

CARTRIDGE GUIDANCE SYSTEM

Right and left side guides grip the cartridge as it enters the deck and applies just enough force to ensure proper positioning. At the same time, two spring loaded top guides apply downward pressure. The result is silky-smooth cartridge insertion and excellent positioning regardless of variations in cartridge size!

RELIABLE DC SERVO MOTOR

The Phase Trak 90 Record/Play utilizes a crystal-controlled, brushless DC servo motor. This provides dependable operation with low wow and flutter, high efficiency and low acoustic noise. Through the Vari Speed control it is possible to adjust the motor speed $\pm 10\%$ with an external oscillator.

SPECIFICATIONS (referenced to 7.5 IPS)**POWER:**

105V to 132V or 210V to 264 VAC, 50 or 60 Hz

TAPE SPEED:

Standard: 7.5 IPS with 22.5 IPS Fast Forward

Optional: (1) 3.75 IPS with 11.25 IPS Fast Forward

(2) 15 IPS with no Fast Forward

MOTOR:

DC servo with a hard chromed stainless steel non-magnetic shaft

SOLENOID:

Low voltage, constant current solenoid with highly increased pulling power.

SPEED ACCURACY:

± 2%

WOW AND FLUTTER:

Maximum 0.12% DIN, WTD. at 7.5 IPS

AUDIO OUTPUT CONFIGURATION:

Transformerless: True electronic balanced and floating.

AUDIO OUTPUT LEVEL:

+24 dBm before clip.

AUDIO OUTPUT IMPEDANCES:

Transformerless: 600 ohm termination

Less than 75 ohm source

AUDIO INPUT CONFIGURATION:

Transformerless: True instrumentation amplifier input with common mode rejection of -60 dB at 60 Hz

AUDIO INPUT IMPEDANCE:

600 ohms

AUDIO INPUT LEVEL:

continuously adjustable -18 to +20 dBm

DISTORTION:

(see Notes 1 and 2)

Reproduce Amplifier — Less than 0.5% THD.
Record/Play System: Less than 1% THD (tape dependent)**SIGNAL TO NOISE:**

Measured with reference to 250 nW/M and a bandwidth of 30 Hz to 20 kHz

PULLING TAPE:

-56 dB Mono -54 dB Stereo

NO TAPE:

-60 dB Mono -58 dB Stereo

WITH DYNAFEX® :

-80 dB Mono -80 dB Stereo

SQUELCH NOISE:

-80 dB (without Dynafex)

CROSSTALK:

limited to -50 dB between any two adjacent channels

FREQUENCY RESPONSE:

(see note 3)

±2 dB, 40 Hz to 16 kHz

TRANSPORT STOP TIME:

80 mSec maximum at 7.5 IPS

TRANSPORT START TIME:

120 mSec (with servo motor operating when start command is initiated)

BIAS OSCILLATOR:

128 kHz

EQUALIZATION:(Playback and Record) 1975 NAB standard.
I.E.C. CCIR (customer specified options)**CARTRIDGE SIZE:**

A and AA, B and BB

AMBIENT OPERATING TEMPERATURE:

0 to 50 degrees C (32 to 122 F)

REMOTE CONTROL:

All front panel indicators and controls (except metering)

MOUNTING:

Table top with optional rack mount also available

DIMENSIONS:

Table Top: 5.25" H x 8.625" W x 16.5" D

Rack Mount: 7" H x 8.625" W x 16.5" D

WEIGHT:

30 lbs. (packed)

Note 1: Reference 1 kHz at 250 nW/m**Note 2:** Using Capital Magnetics SGS-4 tape**Note 3:** Specification measured using the 1975 NAB Standard**ORDERING INFORMATION**

117/220 VAC, 50/60 Hz Table Top Mounting, 7.5 IPS (3.75 and 15 IPS selectable)

MODEL	STOCK NO.	DESCRIPTION
PT90RPS	900-9003-000	Phase Trak 90 Record/Playback - Stereo (A and AA, B and BB cartridges)

OPTIONS AND ACCESSORIES

900-9013	Rack Shelf for 19" EIA rack, 7" H
900-9014	Rack Shelf Filler Panel, ½ rack for 9013
900-9015	Rack Shelf Filler Panel, ½ rack for 9013
900-9113	Rack Shelf for 19"EIA rack, 5⅓" H
900-9114	Rack Shelf Filler Panel, ½ rack for 9113
900-9115	Rack Shelf Filler Panel, ½ rack for 9113
910-9007	Test Extender PC Board
970-0099	Tape Sensor Foil Tab Kit (package of 100)
597-9000	Service Manual for Series 9000 (One manual shipped with each unit)

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Model 2100CRPS

The Series 2100C's are the most cost effective professional tape cartridge machines in the industry today. No other cart machine combines the value and economy of the 2100C's. For example, the Series 2100C's include two cue tones (1 kHz and 150 Hz) as standard features. The construction is modular for easy maintenance.

PHASE LOK V HEAD ASSEMBLY

The Series 2100C features flat response, long life heads and the exclusive Broadcast Electronics Phase Lok V head block. The Phase Lok V offers a locking azimuth adjustment that is independent of the height and zenith adjustments. Precise head positioning requires an azimuth adjustment that can be manipulated easily without affecting height and zenith. This permits quick, accurate positioning with a minimum of difficulty. (For correct stereo tracking, a dummy head is included in each stereo playback model.)

The head assembly also includes extensive shielding to prevent AC pickup. The underside of the deck is also covered with a steel plate. Additional shielding is provided by a mu-metal plate which is located directly under the head.

PRECISION TRANSPORT AND DECK ASSEMBLY

The 2100C tape transport features a powerful, direct drive hysteresis synchronous motor, a large air damped solenoid and a 1/2 inch thick aluminum deck.

The solenoid control circuit applies 36 volts at the beginning of the start cycle (for a fast, sure start) and then drops to 18 volts. Unlike cart machines that utilize a 110 volt solenoid, the low voltage

- New Flat Response Long Life Heads
- New Phase Lok V Head Block
- Improved Cartridge Guidance System
- Advanced Electronics - Meets or Exceeds 1975 NAB Standards
- Two Cue Tones Standard (1 kHz and 150 Hz)
- Precision Machined Deck
- Exclusive Mono/Stereo Switching
- Direct Drive Transport

design of the 2100C ensures cooler, transient-free operation.

The improved cartridge guidance system permits very precise cart positioning. The cartridge is directed to the head block area by right and left side guides. In addition, two spring loaded top guides apply firm pressure to hold the cart in place. The result is smooth, positive cart insertion regardless of variations in cartridge thickness.

MONO/STEREO SWITCHING

The Series 2100C's employ Broadcast Electronics' exclusive mono/stereo switching system. This innovative feature allows mono cartridges (which have been previously recorded on another machine) to play on a 2100C stereo machine WITH PROGRAM MATERIAL AVAILABLE AT BOTH THE LEFT AND RIGHT OUTPUT. The switching will take place automatically if the cartridge has a 150 Hz and a 1 kHz cue tone recorded simultaneously at the beginning of the message.

PLAYBACK CIRCUITRY

The playback amplifier consists of wideband IC operational amplifiers, advanced analog switching, and differentially balanced output amplifiers. The amplifiers have an exceptionally wide equalization adjustment range to compensate for head wear. The output amps will deliver +20 dBm before clipping to minimize potential distortion at high signal levels. The improved response characteristics of the playback amplifier meets or exceeds 1975 NAB standards.



Model 2100CRP



Model 2100CP

RECORD CIRCUITRY

The record circuitry features differentially balanced inputs followed by high performance operational amplifiers. This input design permits an extremely wide dynamic operating range. In fact, the 2100C can handle a greater range of signals than any competitive machine. This superior signal handling capability, which is inherent throughout the design, contributes significantly to the excellent reproduction quality of the Series 2100C. Like the playback circuitry, the response characteristics of the 2100C record electronics meet or exceed the 1975 NAB standards.

The stereo 2100C's can be used to record carts that will be compatible with mono machines. A front panel LED indicates when the machine is in the mono recording mode. In the mono mode, the left and right channels are summed together and recorded on the left channel. In addition, the mono encode tone (150 Hz and 1 kHz) is recorded on the cue track.

VU meters are automatically switched between playback and record modes.

DURABILITY AND EXCELLENT STYLING

Nothing was spared to make the Series 2100C the most durable and attractive cart machine in the industry. The front panels feature crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or wear the lettering. The professional elegance of the Series 2100C styling reflects Broadcast Electronics' careful attention to proven design principles.

MODEL 2100C/PA MONITOR/PLAYBACK

The model 2100C/PA is a special playback unit with full monitoring capability. It features the same outstanding mechanical and electronic performance of the other Series 2100C machines.

The 2100C/PA incorporates a built-in amplifier, front panel speaker, volume control, and headphone jack - everything necessary to monitor any pre-recorded NAB A or AA sized carts!

The 2100CPA has a variety of applications. It can be used in virtually any location since it does not require an external mixer, amplifier, or other production equipment.

SPECIFICATIONS**Power**

105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter

Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Record/Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Active Balanced (Transformerless) 600 ohms selectable impedance.

Audio Output Level

(see Note 1) Continuously variable from -20 dBm to +10 dBm (clip level +20 dBm).

System Distortion

(see Notes 1 and 2) Record/Play system distortion including tape is less than 2%.

Noise

(see Notes 1 and 3) Hum and noise with no tape running: -54 dB Mono, -52 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

limited to -50 dB or better, program to program or cue to program at 1,000 Hz. (see Note 1).

Frequency Response

(see Note 3) ±2 dB, 50 Hz to 15 kHz.

Equalization

1975 NAB standard. I.E.C. CCIR (customer specified options).

Audio Input Level

Line input: -20 dBm to +20 dBm.

Audio Input Configuration

75K ohm active balanced bridging input.

Cartridge Size

A and AA.

Cue Signals

Relay contact closure for external control (150 Hz)

External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 132 F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS. 3.75 IPS optional (other parameters affected).

Mounting

Table top with optional rack mount also available.



Model 2100CPA

Dimensions

5.25" H x 5.875" W x 15.5" D (13.5 x 14.9 x 39.4 cm)

Allow three inches for connectors at the rear of the machine. Allow an additional $\frac{1}{8}$ " in height for rubber feet.

Weight

28 lbs. (Packed), (12.7 kgs.)

NOTE 1:

Reference 1 kHz at 250 nWb/m.

NOTE 2:

Using Capital Magnetics SGS-4 tape.

NOTE 3:

Specification measured using the 1975 NAB Standard.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
117/220 VAC/50Hz TABLE TOP MOUNTING		
2100CP	900-2110-001	Mono, Playback Only
2100CRP	900-2111-001	Mono, Record/Playback
2100CPS	900-2112-001	Stereo, Playback Only
2100CRPS	900-2113-001	Stereo, Record/Playback
2100CPA	900-2114-001	Mono, Playback with Audition/Speaker
117/220 VAC/50Hz TABLE TOP MOUNTING		
2100CP	900-2110-301	Mono, Playback Only
2100CRP	900-2111-301	Mono, Record/Playback
2100CPS	900-2112-301	Stereo, Playback Only
2100CRPS	900-2113-301	Stereo, Record/Playback
2100CPA	900-2114-301	Mono, Playback with Audition/Speaker

OPTIONS AND ACCESSORIES

900-2013	Rack Mount Shelf for EIA 19" Rack 5 $\frac{1}{4}$ " high Holds up to three series 2100C
900-2010	Top Cover for 2013 Shelf
900-2014	Rack Shelf Filler Panel, $\frac{1}{2}$ Rack for 2013 Shelf
900-2016	Rack Shelf Filler Panel, $\frac{3}{4}$ Rack for 2013 Shelf
919-2100	Test Extender P.C. Board
900-2002	Adjustment for Equalization to IEC/CCIR, MONO
900-2003	Adjustment for Equalization to IEC/CCIR, STEREO
900-2104	Adjustment for Equalization to NAB 1964
900-2009	Additional cost for 3.75 IPS Tape Speed
597-2100-001	Service Manual for Series 2100C (One manual supplied with each unit)



- New Phase Lok V Head Block
- Improved cartridge guidance system
- Three Cue Tones/Automatic - Manual Fast Forward Standard In Every Machine

- More Powerful, Air Damped Solenoid
- Direct Drive Hysteresis Synchronous Motor
- Gold to Gold Contacts

FIELD PROVEN DEPENDABILITY OF THE SERIES 3000

The Series 3000 tape cartridge machine is the workhorse of the broadcast world. Tens of thousands of Series 3000's are in regular service, performing millions of flawless operations every day. It's hard to improve on this kind of reliability, but we have!

INTRODUCING THE SERIES 3000A

The new Series 3000A retains the features that made its predecessor famous and adds new improvements that all users are sure to appreciate. These new improvements include automatic/manual fast forward and three cue tones in every machine as well as the addition of the Phase Lok V head block, an innovative cartridge guidance system and a powerful air damped solenoid. The styling has changed also to include a new front panel layout.

PHASE LOK V HEAD BLOCK

The new Phase Lok V head block is unique in the world of tape cartridge machines. No other head block assembly offers its type of smooth, precise head adjustment. The azimuth adjustment, for example, is completely independent of the height and zenith adjustments. This allows extremely precise control for the most perfect head alignment possible. The Phase Lok V features superb electromagnetic shielding and is completely removable for easy cleaning or service.

CARTRIDGE GUIDANCE SYSTEM

Cartridge positioning is absolutely critical to playback quality. However, in many cart machines a compromise must be made between the desire for easy cartridge insertion and the need for firm, correct positioning.

The 3000A's unique cartridge guidance system features right and left hand tension guides to keep the cart in exact horizontal position as it enters the head block area. At the same time, two spring loaded top guides apply even downward pressure to hold the cartridge in place. The result is silky smooth insertion and accurate positioning - every time.

PRECISION MACHINED DECK

Each Series 3000A tape deck is made of solid aluminum, precision machined and protected by a clear anodized finish. This half inch thick deck provides rigid support and creates a stable reference for head mounting and cartridge positioning. A mu-metal plate inlaid in the deck surface as well as other additional shielding helps isolate the heads from stray magnetic fields.

POWERFUL AIR DAMPED SOLENOID

The Series 3000A employs a new air damped solenoid that is much more powerful than its predecessor. Even so, the solenoid features silent, cool operation. It is controlled by a current regulated low-voltage DC source which reduces current after initial turn-on. This guarantees firm pressure roller engagement while reducing power consumption, radiated noise and heat build-up.



TAPE CARTRIDGE EQUIPMENT

THERE'S A SERIES 3000A FOR EVERY APPLICATION!

Model 3100A Slim Line: For use with NAB A and AA cartridges. Available in mono and stereo playback models. Three units can mount side-by-side in a 19 inch rack shelf.

Model 3200A Compact: For use with NAB A, AA, BB and B cartridges. Available in mono or stereo record/playback and playback only models. Two 3200A units can mount side-by-side in a 19 inch rack shelf.

SERIES 3000A OPTIONS AND ACCESSORIES

Voltage Option

60 Hz Models - 208 to 230 Volts
50 Hz Models - 120 to 150 Volts and 208 to 230 Volts (Standard voltage is 105 to 120 Volts, 50 Hz)

Equalization Option

NAB or CCIR/IEC

Tape Speed Option

7.5 IPS (19.05 cm/s) Standard
3.75 IPS (9.53 cm/s) Optional



RACK MOUNTING

Two different rack mounting arrangements are available for the Series 3000A machines. Through the use of a rack shelf or filler panels, virtually any combination of units can be adapted to a rack mount configuration.

AUDIO SWITCHING

Switchers are available in two versions: three input (SW5E) and five input (SW5F). The three input model accommodates three Series 3000A machines. The five input model accommodates up to five audio input signals from all machines and provides a single

balanced output from the last started unit.

Starting a new machine automatically deletes audio from the previously played unit and turns on the audio from the newly started cartridge. Up to three switchers may be used in cascade to provide a single audio output from up to 15 cart machines.

REMOTE CONTROLS

Audio and remote connections are quick and easy with our rugged Cinch-Jones connectors. Available in four models, optional remote panels duplicate all essential front panel controls.

SPECIFICATIONS

Power:

105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter

Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.
Record/Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformer coupled, selectable 600 ohms or 150 ohms impedance.

Audio Output Level

(see Note 1) Continuously variable from -54 dBm to +10 dBm (clip level +18 dBm).

System Distortion

(see notes 1 and 2) Record/Play system distortion is less than 2%. (tape limited)

Noise

(see notes 1 and 3) Hum and noise with no tape running: -54 dB Mono, -52 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

Limited to -50 dB or better, program to program or cue to program at 1,000 Hz.

Frequency Response

(see note 3) ±2 dB, 50 Hz to 15 kHz.

Equalization

1965 NAB standard. I.E.C. CCIR (customer specified options).

Audio Input Level

Line input: -20 dBm to +20 dBm.

Audio Input Confirmation

Line-transformer coupled 50K ohm balanced bridging input.

Cartridge Size

Model 3100A: A, AA
Model 3200A: A, AA, B, BB

Cue Signals

Relay contact closure for external control (150 Hz)
External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122 F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS. 3.75 IPS optional (other parameters affected).

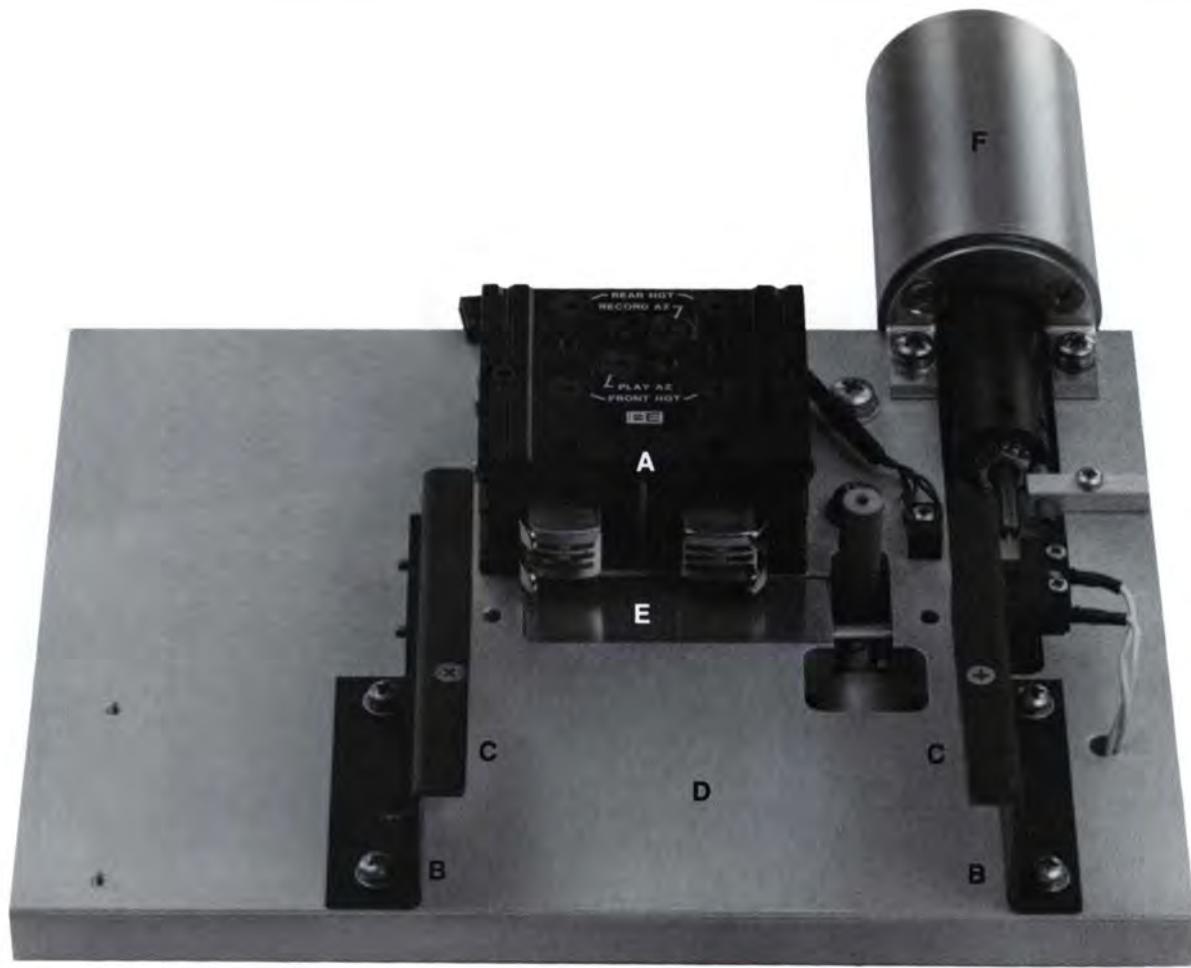
Mounting

A. Table Top Models (3100A, 3200A).
B. Rack Mount Models (optional for all models except 3400A).

Note 1: Reference 1 kHz at 185 nWb/m.

Note 2: Using Capital Magnetics SGS-4 tape.

Note 3: Specification measured using the 1965 NAB Standard.



The new Series 3000A Tape Transport - Includes (A) the new Phase Lok V head block; (B) right and left hand side guides for proper horizontal cartridge positioning; (C) spring loaded top guides for firm vertical positioning; (D) precision one-half inch thick aluminum deck; (E) under-the-head magnetic shielding provided by a mu-metal plate which is recessed into the deck itself; (F) and a new, more powerful air damped solenoid with extra reliable cam and cable linkage.

ORDERING INFORMATION

STOCK NO. MODEL/DESCRIPTION (STANDARD MODELS. 117 VAC/60 Hz)

900-3100-001	3100AP Mono, Playback, A sized cartridges
900-3102-001	3100APS Stereo, Playback, A sized cartridges
900-3200-001	3200AP Mono, Playback, A & B sized cartridges
900-3201-001	3200ARP Mono, Rec/Play, A & B sized cartridges
900-3202-001	3200APS Stereo, Playback, A & B sized cartridges
900-3203-001	3200ARPS Stereo, Rec/Play, A & B sized cartridges

STOCK NO. MODEL/DESCRIPTION (STANDARD MODELS 220 VAC/50 Hz)

900-3100-301	3100AP Mono, Playback, A sized cartridges
900-3102-301	3100APS Stereo, Playback, A sized cartridges
900-3200-301	3200AP Mono, Playback, A & B sized cartridges
900-3201-301	3200ARP Mono, Rec/Play, A & B sized cartridges
900-3202-301	3200APS Stereo, Playback, A & B sized cartridges
900-3203-301	3200ARPS Stereo, Rec/Play, A & B sized cartridges

NOTE: FACTORY OPTIONS CANNOT BE INSTALLED AFTER EQUIPMENT HAS BEEN MANUFACTURED OR SHIPPED.

FACTORY INSTALLED OPTIONS

900-3002	Adjustment of Equalization to IEC/CCIR Specifications, Mono
900-3003	Adjustment of Equalization to IEC/CCIR Specifications, Stereo
900-3009	Additional cost for alternate 3.75 IPS tape speed

ACCESSORIES

900-3013	Rack Mount Shelf for EIA 19" rack
900-3010	Top Cover for 906-3013 shelf

NOTE: If Series 3000A machines are to be mounted in 900-3013 Rack Shelf, order machines less Top Covers and order Rack Shelf 900-3010 top cover. Deduct price of cover from price of each machine ordered for rack mounting.

900-3014	Rack Shelf filler panel, 1/2 rack
900-3015	Rack Shelf filler panel, 1/2 rack
919-1504	Extender, PC Boards

See page 28 for Audio Switchers and Remote Control Panels

Model	Width	Depth	Height	Shipping Weight (packed)
3100A	5.87"	15.5"	5.25"*	28 lbs (12.7 kg)
3200A	8.75"	15.5"	5.25"*	38 lbs. (15.0 kg)

*add .375 inch for rubber feet



3400A Rack Mount Cartridge Machine

- Convenient Rack Mount Design
- Handles A, B, and C Size Cartridges
- Same Performance Specifications as the 3000A Machines
- Full Range of Available Options

The 3400A comes standard as a rack mount unit with no shelf or filler panels necessary. The 3400A has all the features of the standard Series 3000A cartridge machines and handles all cart

sizes. It is available in monaural or stereo models and in record or record/playback configurations. All of the Series 3000A options are available for the 3400A.

SPECIFICATIONS

Power:
105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter

Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.
Record/Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformer coupled, selectable 600 ohms or 150 ohms impedance.

Audio Output Level

(see Note 1) Continuously variable from -54 dBm to +10 dBm (clip level +18 dBm).

System Distortion

(see notes 1 and 2) Record/Play system distortion is less than 2%. (tape limited)

Noise

(see notes 1 and 3) Hum and noise with no tape running: -54 dB Mono, -52 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

Limited to -50 dB or better, program to program or cue to program at 1,000 Hz.

Frequency Response

(see note 3) ±2 dB, 50 Hz to 15 kHz.

Equalization

1965 NAB standard. I.E.C. CCIR (customer specified options).

Audio Input Level

Line input: -20 dBm to +20 dBm.

Audio Input Configuration

Line-transformer coupled 50K ohm balanced bridging input.

Cartridge Size

All NAB cartridge sizes.

Cue Signals

Relay contact closure for external control (150 Hz)
External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122 F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS 3.75 IPS optional (other parameters affected) Fast Forward, 22.5 IPS

Mounting

Rack Mount Only.

Note 1: Reference 1 kHz at 185 nWb/m.

Note 2: Using Capital Magnetics SGS-4 tape.

Note 3: Specification measured using the 1965 NAB Standard.

ORDERING INFORMATION

STOCK NO. MODEL/DESCRIPTION (STANDARD MODELS. 117 VAC/60 Hz)

900-3400-001 3400AP Mono, Playback only, rack mount, A, B & C sized cartridges

900-3401-001 3400ARP Mono, Rec/Play, rack mount, A, B & C sized cartridges

900-3402-001 3400APS Stereo, Playback only, rack mount, A, B & C sized cartridges

900-3403-001 3400ARPS Stereo, Rec/Play, rack mount, A, B & C sized cartridges

STOCK NO. MODEL/DESCRIPTION (STANDARD MODELS. 220 VAC/50 Hz)

900-3400-301 3400AP Mono, Playback only, rack mount, A, B & C sized cartridges

900-3401-301 3400ARP Mono, Rec/Play, rack mount, A, B & C sized cartridges

900-3402-301

3400APS Stereo, Playback only, rack mount, A, B & C sized cartridges

900-3403-301

3400ARPS Stereo, Rec/Play, rack mount, A, B & C sized cartridges

NOTE: FACTORY OPTIONS CANNOT BE INSTALLED AFTER EQUIPMENT HAS BEEN MANUFACTURED OR SHIPPED.

FACTORY INSTALLED OPTIONS

900-3002 Adjustment of Equalization to IEC/CCIR Specifications, Mono

900-3003 Adjustment of Equalization to IEC/CCIR Specifications, Stereo

900-3009 Additional cost for alternate 3.75 IPS tape speed

See page 28 for Audio Switchers and Remote Control Panels

Model	Width	Depth	Height	Shipping Weight (packed)
3400A	17"	15.5"	5.25"	42 lbs. (19.0 kg)



Model 3200A RP/DL Delay Cartridge Machine

- Same Performance Specifications as the Series 3000A Machines
- Rugged, Reliable Design
- Wide Range of Delay Intervals Possible
- Several Useful Options Available

In addition to providing normal playback and record functions, delay units allow the use of the machine whenever a delay might be required. From a six minute delay (for live talk show editing) to a 30 minute network programming delay, these machines can handle any delay length required. The time span of the delay is determined by the length of the tape in the cartridge.

ORDERING INFORMATION

NOTE: Delay Programmer machines are standard with 1 kHz and 150 Hz cue tones and cannot be supplied with 8 kHz cue tone. Automatic/Manual fast forward can be added without 8 kHz. Delay machines cannot be used for stereo operation.

MODEL	STOCK NO.	DESCRIPTION
900-3004		Mono Delay Programmer option added to model 3200ARP or 3400ARP

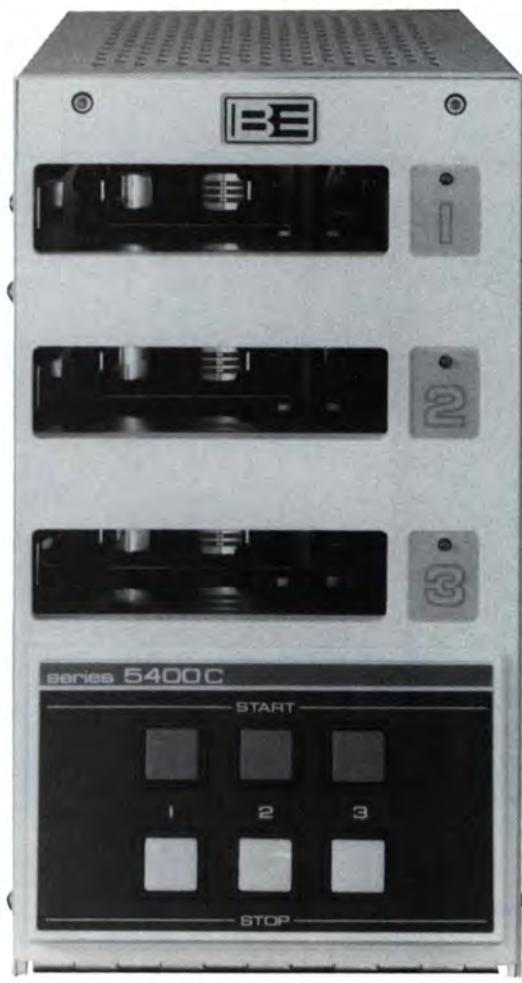
NOTE: FACTORY OPTIONS CANNOT BE INSTALLED AFTER EQUIPMENT HAS BEEN MANUFACTURED OR SHIPPED.

906-3002	Adjustment of Equalization to IEC/CCIR Specifications, Mono.
906-3003	Adjustment of Equalization to IEC/CCIR Specifications, Stereo.
906-3009	Additional cost for alternate 3.75 IPS tape speed.

Like the other Series 3000A machines, the Delay Programmers feature the new Phase Lok V precision head block, a powerful air damped solenoid, an improved cartridge guidance system and a reliable hysteresis-synchronous motor. The primary performance specifications are identical to those shown for the other Series 3000A tape cartridge machines.

ACCESSORIES

MODEL	STOCK NO.	DESCRIPTION
906-3014		Rack Shelf filler panel, ½ rack.
906-3015		Rack Shelf filler panel, ½ rack.
919-1504		Extender, PC Boards.
RC3000	906-3016	Remote Control Panel, Start for 5 units.
RC3000	906-3019	Remote Control Panel, Single Unit.
RC3000	906-3028	Remote Control Panel with start/stop and fast forward switches for 5 units.



5400C

- Non-repeat Lockout
- Advanced Electronics (meets 1975 NAB Specifications)
- New Phase Lok V Head Block
- Heavy Duty Solenoid
- Torodial Transformer
- Improved Cartridge Guidance System

INNOVATIVE DESIGN FEATURES

Non-repeat Lockout

Non-repeat Lockout prevents any tape cartridge from being played more than once unless the operator resets the "lockout mode" by pressing the flashing STOP button or by removing and re-inserting the cart. This feature substantially reduces the possibility of on-air mistakes during commercial breaks! The Non-repeat Lockout mode can be disabled through an internal jumper connection if desired.

Torodial Transformer

The new 5400C incorporates a torodial transformer in the primary power supply for cool, efficient operation with a significant reduction in stray magnetic fields.

Phase Lok V Head Assembly

The removable Phase Lok Five head assembly provides tight alignment control with a locking azimuth adjustment independent of height or zenith adjustments.



5410C RECORDER

Powerful, Air Damped Solenoid

The 5400C utilizes a new air damped solenoid that guarantees reliable pressure roller engagement. The solenoid control circuit utilizes solid-state switching and a regulated current source for cool, quiet operation.

Advanced Electronics

The state-of-the-art circuit design of the 5400C is immediately evident in its exceptional dynamic range. (± 2 dB 40 Hz to 16 kHz) Stereo signal to noise ratio is better than 56 dB. With its improved electronic design, the 5400C meets or exceeds 1975 NAB specifications.

RECORDING UNIT

The optional recording amplifier (mono model 5409 or stereo model 5410) is available for recording on deck three independent of the other remaining decks. This allows the 5400C to be utilized as a three deck playback only machine, or as a two deck playback with record/play capability on deck three.

Each unit has the standard 1 kHz cue tone as well as the Secondary (8 kHz) and Tertiary (150 Hz) tones. The standard recorder has a single high level 50K ohm balanced transformer input.

PLUG-IN DECKS

Maintaining the 5400C couldn't be easier. The front panel is hinged, the top two decks slide out, and all electrical connections are made through a connector that is part of the deck unit itself.

AUDIO SWITCHER

The optional model SW5E audio switcher selects the last deck started and mutes the other decks automatically. This is a handy feature for on-air studios. If one of the decks has been activated incorrectly (out of sequence, wrong cart, etc.), the operator can press another start button which will instantly mute the undesired deck and place the newly started deck on the output. The first deck will continue to run and will re-cue itself. Upon re-cueing, the operator can remove the cart completely or reset the lockout mode for later play. The SW5E switchers can be tied together to provide a single balanced output for up to three 5400C machines.

COOL DRIVE SYSTEM

The 5400C uses a super-quiet, direct drive hysteresis/synchronous motor for low wow and flutter, long term reliability, and cool operation without the use of troublesome fans. Operating speed in the hysteresis/synchronous motor is established and maintained by the stable AC power line frequency.

CARTRIDGE GUIDANCE SYSTEM

The left and right cartridge guides aid in securing the cart in position horizontally. In addition, two spring loaded top guides apply firm, even pressure to seat the cart precisely within the deck. Cartridge insertion is always extremely smooth regardless of variations in cartridge size.

PLUG-IN BOARDS WITH GOLD TO GOLD CONTACTS

Deck electronics are mounted on individual plug-in PC cards with gold to gold connectors for maximum reliability. Gold to gold contacts are utilized on the deck connectors as well. Service is simplified through the use of LED status indicators located on the PC cards. These provide an indication of the function being performed by the machine when the front panel is not visible.



5400C TOP VIEW WITH DECK PARTIALLY REMOVED



PHASE LOK V HEAD BLOCK

SPECIFICATIONS

Power

105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter

Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Record/Playback: (with 5409C or 5410C recorder) maximum 0.15% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformer coupled, 600 ohms impedance.

Audio Output Level

(see note 1) Continuously variable from -20 dBm to +10 dBm (clip level +17 dBm).

System Distortion

(see notes 1, 2, and 4) Record/Play system distortion including tape is less than 2%.

Noise

(see notes 1 and 3) Hum and noise with no tape running: -58 dB Mono, -56 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

Limited to -50 or better, program to program or cue to program at 1,000 Hz. (see note 1).

Frequency Response

(see note 3) ±2 dB, 40 Hz to 16 kHz.

Equalization

1975 NAB standard. I.E.C. CCIR (customer specified options).

Audio Input Level

(see note 4) Line input: -20 dBm to +20 dBm.

Audio Input Configuration

(see note 4) Line input: transformer coupled, 50K ohm balanced bridging input.

Cartridge Size

A, AA NAB Cartridge.

Cue Signals

(see note 4) Relay contact closure for external control (150 Hz/8 kHz) External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122 F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS. 3.75 IPS optional (other parameters affected).

Mounting

Table top with optional rack mount also available.

DIMENSIONS**Model 5400C Three Deck**

10 5/8" H x 5 3/4" W x 17" D (27 x 14.6 x 43.2 cm)
Allow three inches for connectors at the rear of the machine. Allow an additional 1/8" in height for rubber feet.

Model 5409C or 5410C Recorder

5 1/4" H x 5 3/4" W x 17" D (13.3 x 14.6 x 43.2 cm).

WEIGHT**Model 5400C Three Deck**

42 lbs. (packed), 19 Kgs.

Model 5409C or 5410C Recorder

16 lbs. (packed), 7.25 Kgs.

NOTE 1: Reference 1 kHz at 250 nWb/m.

NOTE 2: Using Capital Magnetics SGS-4 tape.

NOTE 3: Specification measured using the 1975 NAB Standard.

NOTE 4: With model 5409C or model 5410C recorder.

ORDERING INFORMATION

(117 VAC/60 Hz)

MODEL	STOCK NO.	DESCRIPTION
5401C	900-5401-001	Mono Playback
5402C	900-5402-011	Mono Playback with Cue Tones
5403C	900-5403-001	Stereo Playback
5404C	900-5404-011	Stereo Playback with Cue Tones

(220 VAC/50 Hz)

MODEL	STOCK NO.	DESCRIPTION
5401C	900-5401-301	Mono Playback
5402C	900-5402-311	Mono Playback with Cue Tones
5403C	900-5403-301	Stereo Playback
5404C	900-5404-311	Stereo Playback with Cue Tones

OPTIONS AND ACCESSORIES

MODEL	STOCK NO.	DESCRIPTION
5409C	900-5409-011	Recorder, Mono with Cue I and II for 5400C Series, 117V, 60 Hz
5410C	900-5410-011	Recorder, Stereo with Cue I and II for 5400C Series, 117V, 60 Hz
5409C	900-5409-311	Recorder, Mono with Cue I and II for 5400C Series, 220V, 50 Hz
5410C	900-5410-311	Recorder, Stereo with Cue I and II for 5400C Series, 220V, 50 Hz
	900-5406	Rack shelf for mounting 1 to 3 units
	900-5408	1/2 filler panel for 5406 shelf
	900-5405	Four position cart storage rack for 5406 rack shelf
	900-5407	Ten position cart storage rack for 5406 rack shelf
SW5E	904-5000	Audio switcher
	919-1806	Test extender PC board



5300C Three Deck Cart Machine



5310C Recorder

- Repeat Play Lockout
- Phase Lok V Head Block
- Advanced Electronics - Meets 1975 NAB Standards

- Powerful, Air Damped Solenoids
- Torodial Transformer
- Precision Machined Deck

The 5300C cart machine from Broadcast Electronics incorporates many of the popular innovations of its cousin, the 5400C, but adds the capability to handle A, AA, B, and BB cartridge sizes. The 5300C is an advanced three deck machine for the serious operator. Its performance specifications are outstanding and its unique features make it a pleasure to use.

UNIQUE DESIGN FEATURES:

Repeat Play Lockout

Repeat Play Lockout prevents any tape cartridge from being played more than once unless the operator resets it from the "lockout mode" by pressing the appropriate STOP button, or by removing and re-inserting the cart. The illuminated STOP switches for each deck will flash on and off to indicate that a cart is in the lockout mode. The Repeat Play Lockout feature may be disabled through an internal jumper if desired.

Torodial Transformer

The new 5300C incorporates a torodial transformer in the primary power supply for cool, efficient operation with a significant reduction in stray magnetic fields.



Phase Lok V Head Block

Phase Lok V Head Assembly

The removable Phase Lok V head assembly provides tight alignment control with a locking azimuth adjustment independent of height or zenith adjustments.

Powerful, Air Damped Solenoids

The 5300C utilizes new air damped solenoids that guarantee firm, reliable pressure roller engagement. The solenoid control circuit utilizes solid-state switching and a regulated current source for cool, quiet operation.

Advanced Electronics

The innovative circuit design of the 5300C yields exceptional dynamic range (± 2 dB 40 Hz to 16 kHz). The stereo signal to noise ratio is better than 56 dB while total system distortion is minimized to less than 2%. A balanced transformer output with relay switching permits easy paralleling of machines. The performance specifications of the 5300C meet or exceed the 1975 NAB standards.

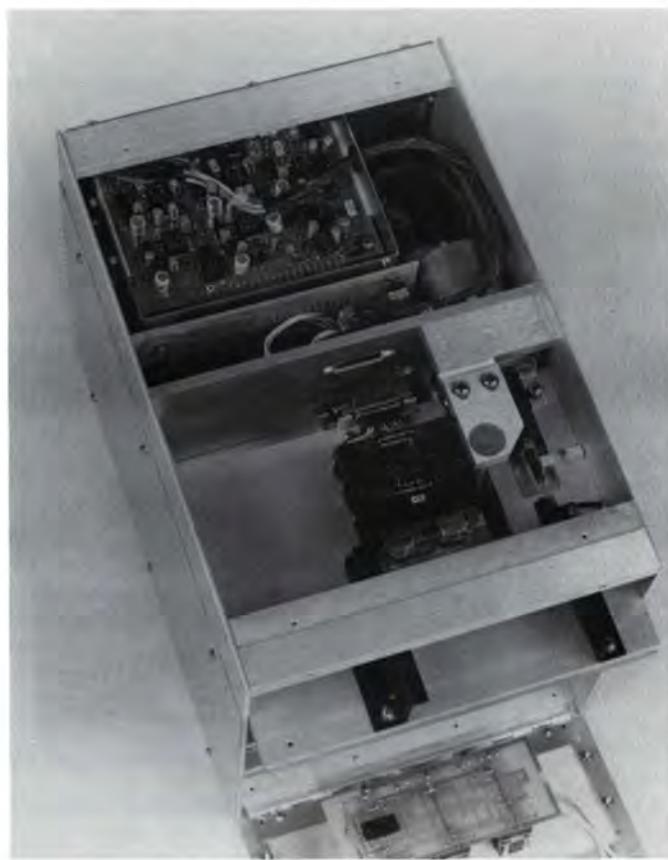
RECORDING UNIT

The optional recording amplifier (mono model 5309C or stereo model 5310C) is available for recording on deck three independent of the other remaining decks. In this manner the 5300C can be utilized as a three deck playback only machine or a two deck playback only with record/play capability on deck three.

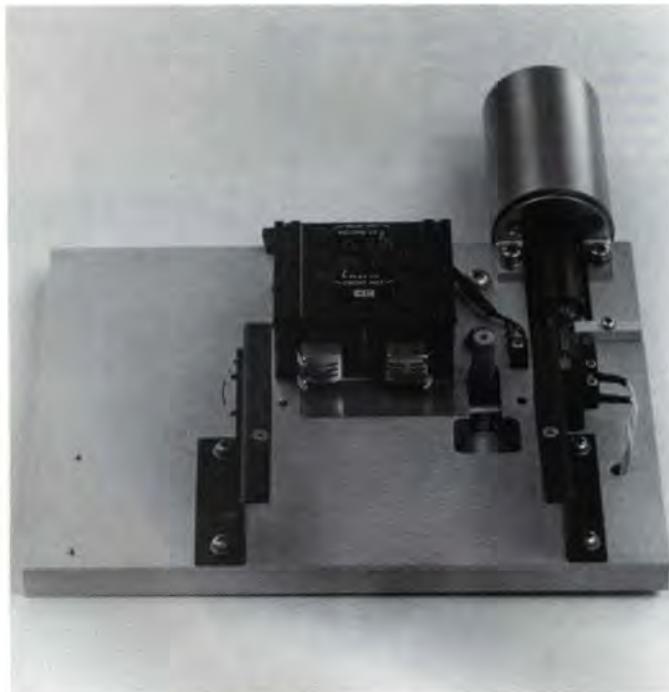
Each unit has the standard 1 kHz cue tone as well as the Secondary (8 kHz) and Tertiary (150 Hz) tones. The standard recorder has a single, high level 50K ohm balanced transformer input.

PLUG-IN DECKS

Maintaining the 5300C couldn't be easier. The front panel is hinged, the top two decks slide out, and all electrical connections are made through a connector that is part of the deck itself.



Plug-in/Plug-out decks for easy servicing.



5300C Deck Assembly

AUDIO SWITCHER

The optional model SW5E audio switcher selects the last deck started and mutes the other decks automatically. This is a handy feature for on-air studios. If one of the decks has been activated incorrectly (out of sequence, wrong cart, etc.), the operator can press another start button which will instantly mute the undesired deck and place the newly started deck on the output. The first deck will continue to run and will re-cue itself. Upon re-cueing, the operator can remove the cart completely, or reset the lockout mode for later play. The SW5E switchers can be tied together to provide a single balanced output for up to three 5300C machines.

COOL DRIVE SYSTEM

The 5300C uses a super-quiet, direct drive hysteresis/synchronous motor for low wow and flutter, long term reliability, and cool operation without the use of troublesome fans. Operating speed in the hysteresis/synchronous motor is established and maintained by the precise AC power line frequency. This eliminates the need for the complex tachometer sensing and reference frequency generating circuitry used in DC servo drive systems.

CARTRIDGE GUIDANCE SYSTEM

The left and right cartridge guides aid in placing the cart into position horizontally. Also, two spring loaded top guides apply even downward pressure as the cartridge is inserted into the deck. This improved guidance system provides smooth, accurate insertion regardless of variations in cartridge size.

SPECIFICATIONS**Power**

105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter

Playback: maximum 0.15% DIN. WTD. at 7.5 IPS.

Record/Playback: (With 5309C or 5310C recorder) maximum 0.15% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformer coupled, 600 ohms selectable impedance.

Audio Output Level

(see Note 1) Continuously variable from -20 dBm to +10 dBm (clip level +17 dBm).

System Distortion

(see notes 1, 2, and 4) Record/Play system distortion including tape is less than 2%.

Noise

(see notes 1 and 3) Hum and noise with no tape running: -58 dB Mono, -56 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

limited to -50 dB or better, program to program or cue to program at 1,000 Hz. (see note 1).

Frequency Response

(see note 3) ±2 dB, 40 Hz to 16 kHz.

Equalization

1975 NAB Standard. I.E.C. CCIR (customer specified options).

Audio Input Level

(see note 4) Line input: -20 dBm to +20 dBm.

Audio Input Configuration

(see note 4) Line input: transformer coupled, 50K ohm balanced bridging input.

Cartridge Size

AA, A, BB, B NAB Cartridges.

Cue Signals

(see note 4) Relay contact closure for external control (150 Hz/8 kHz). External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122 F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS 3.75 IPS optional (other parameters affected).

Mounting

Table top with optional rack mount also available.

DIMENSIONS**Model 5300C Three Deck**

10½" H x 8½" W x 13¾" D (27 x 22 x 34 cm). Allow three inches for connectors at the rear of the machine. Allow an additional ½" in height for rubber feet.

Model 5309C or 5310C Recorder

5½" H x 8½" W x 13½" D (13.3 x 22 x 34 cm).

WEIGHT**Model 5300C Three Deck**

43 lbs. (packed), 19 Kgs.

Model 5309C or 5310C Recorder

16 lbs. (packed), 7.25 Kgs.

Note 1: Reference 1 kHz at 250 nWb/m.

Note 2: Using Capital Magnetics SGS-4 tape.

Note 3: Specification measured using the 1975 NAB Standard.

Note 4: With model 5309C or model 5310C recorder.

Specifications subject to change without notice.

ORDERING INFORMATION

(117 VAC/60Hz)

MODEL	STOCK NO.	DESCRIPTION
5301C	900-5301-001	Mono Playback.
5302C	900-5302-011	Mono Playback with Cue Tones.
5303C	900-5303-001	Stereo Playback.
5304C	900-5304-011	Stereo Playback with Cue Tones.

(220 VAC/50Hz)

MODEL	STOCK NO.	DESCRIPTION
5301C	900-5301-301	Mono Playback.
5302C	900-5302-311	Mono Playback with Cue Tones.
5303C	900-5303-301	Stereo Playback.
5304C	900-5304-311	Stereo Playback with Cue Tones.

OPTIONS AND ACCESSORIES

MODEL	STOCK NO.	DESCRIPTION
5309C	900-5309-011	Recorder, Mono with Cue I and II for 5300C Series, 117V, 60 Hz.
5310C	900-5310-011	Recorder, Stereo with Cue I and II for 5300C Series, 117V, 60 Hz.
5309C	900-5309-311	Recorder, Mono with Cue I and II for 5300C Series, 220V, 50Hz.
5310C	900-5310-311	Recorder, Stereo with Cue I and II for 5300C Series, 220V, 50 Hz.
	900-5406	Rack shelf for mounting 1 to 2 units.
	900-5415	½ rack filler panel for 5406 shelf.
SW5E	904-5000	Audio switcher.
	919-1806	Test extender PC board.



SW5E Audio Switcher



- New Phase Lok V Precision Head Block
- Advanced Electronics - meets or exceeds 1975 NAB standards
- Powerful, Air Damped Solenoid
- Non-repeat Lockout
- Torodial Transformer

INNOVATIVE DESIGN FEATURES

Non-repeat Lockout

This is a feature that any operator is sure to appreciate. With Non-repeat Lockout, a tape cartridge cannot be played more than once unless the operator resets the "lockout mode" by pressing the STOP switch, or by removing and re-inserting the cart.

Phase Lok V Head Assembly

The new Phase Lok Five head assembly provides tight alignment control with a locking azimuth adjustment independent of height or zenith adjustments.

Powerful, Air Damped Solenoid

The 5500C utilizes a new air damped solenoid that guarantees firm, reliable pressure roller engagement. The solenoid control circuit utilizes solid-state switching and a regulated current source for cool, quiet operation.

RECORDING UNIT

The optional recording amplifier (mono model 5409C or stereo model 5410C) is available for recording on deck five independently of the other remaining decks. Through the use of the optional record amplifier, deck five (the bottom deck) gains the capability to record as well as play. The other four decks are not affected.

SPECIFICATIONS

Power

105V to 125V or 210V to 240 VAC, 50 or 60 Hz (as specified).

Wow and Flutter (Playback)

maximum 0.18% DIN. WTD. AT 7.5 IPS.

Wow and Flutter (Record/Playback)

(with 5409C or 5410C recorder) maximum 0.18% DIN. WTD. at 7.5 IPS.

Audio Output Configuration

Transformer coupled, 600 ohms impedance.

Audio Output Level

(see note 1) Continuously variable from -20 dBm to +10 dBm (clip level +17 dBm).

System Distortion

(see notes 1, 2, and 4) Record/Play system distortion including tape is less than 2%.

Noise

(see notes 1 and 3) Hum and noise with no tape running: -50 dB Mono, -56 dB Stereo. Squelch noise -70 dB or better.

Crosstalk

limited to -50 dB or better, program to program or cue to program at 1,000 Hz.

Frequency Response

(see note 3) ±2 dB, 40 Hz to 16 kHz.

Equalization

1975 NAB standard. I.E.C. CCIR (customer specified options).

Audio Input Level

(see note 4) Line input: -20 dBm to +20 dBm.

Audio Input Configuration

(see note 4) Line input: transformer coupled, 50K ohm balanced bridging input.

Cartridge Size

AA NAB Cartridge.

Cue Signals

(see note 4) Relay contact closure for external control (150 Hz/8 kHz) External cue input/output available at remote control for other control functions.

Ambient Operating Temperature

0 to 50 degrees C (32 to 122F).

Remote Control

All front panel indicators and controls (except metering).

Standard Tape Speed

Record/Play, 7.5 IPS. 3.75 IPS optional (other parameters affected).

Mounting

Table top with optional rack mount also available.

DIMENSIONS

Model 5500C Five Deck

14 3/4" H x 5 3/4" W x 17" D (37.5 x 14.6 x 43.2 cm) Allow three inches for connectors at the rear of the machine. Allow an additional 3/8" in height for rubber feet.

Model 5409C or 5410C Recorder

5 1/4" H x 8 5/8" W x 13 1/2" D (13.3 x 22 x 34 cm).

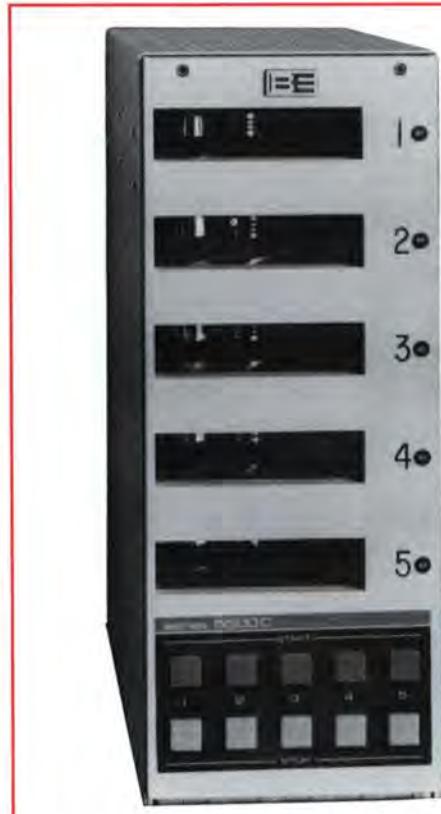
WEIGHT

Model 5500C Five Deck

52 lbs. (packed), 23.6 Kgs.

Model 5409C or 5410C Recorder

16 lbs. (packed), 7.25 Kgs.



5500C Five Deck Cart Machine

NOTE 1: Reference 1 kHz at 250 nWb/m.

NOTE 2: Using Capital Magnetics SGS-4 tape.

NOTE 3: Specification measured using the 1975 NAB Standard.

NOTE 4: With model 5409C or model 5410C recorder.

ORDERING INFORMATION

(117 VAC/60 Hz)

MODEL

STOCK NO.

5501C	900-5501-001
5502C	900-5502-011
5503C	900-5503-001
5504C	900-5504-011

(220 VAC/50 Hz)

MODEL

STOCK NO.

5501C	900-5501-301
5502C	900-5502-311
5503C	900-5503-301
5504C	900-5504-311

ACCESSORIES

A choice of options allow the broadcaster to customize his unit to meet his specific needs in stereo or mono, with or without cue tones. The cue tone option package includes the 150 Hz and 8 kHz sensors for sequential switching or other cueing assignments in addition to the 1 kHz stop tone provided on each machine.

MODEL

STOCK NO.

5409C	900-5409-011
5410C	900-5410-001
5409C	900-5409-311
5410C	900-5510-311
SW5F	904-5001
	906-5506
	906-5507
	919-1806

DESCRIPTION

Mono Playback.

Mono Playback with Cue Tones.

Stereo Playback.

Stereo Playback with Cue Tones.

DESCRIPTION

Mono Playback.

Mono Playback with Cue Tones.

Stereo Playback.

Stereo Playback with Cue Tones.

DESCRIPTION

Mono recorder for 5500C Series 117 VAC/60 Hz.

Stereo recorder for 5500C Series 117 VAC/60 Hz.

Mono recorder for 5500C Series 220 VAC/50 Hz.

Stereo recorder for 5500C Series 220 VAC/50 Hz.

Audio switcher.

Rack shelf, (1) to (3) units.

1/2 rack filler panel.

Test extender PC board.



DV-2

- Completely solid state - no moving parts
- Over six minutes of available recording time
- Extended 20 to 6500 Hz frequency response
- Multiple message recording capability
- Informative Time/Selection display
- Choice of message repeat or sequential play
- Random Message Access capability
- Internal battery backup

The DV-2 "Digitalk" from Broadcast Electronics is the first unit of its kind to offer digital voice recording and reproduction capability in a broadcast quality design.

The reliability of the DV-2 is nothing short of phenomenal. Unlike cart machines, there are no moving parts in the DV-2. All recordings are stored DIGITALLY in random access memory. The large memory capacity of the DV-2 allows up to six minutes and twenty-nine seconds of total recording time. One long message or several short messages can be stored and accessed at will. With the DV-2 you'll never have to worry about tape breakage, motor failure or the other problems that often plague mechanical tape cartridge machines.

LATEST DIGITAL TECHNOLOGY

The DV-2 uses 256K dynamic RAM chips for digital memory and incorporates some of the most advanced data compaction techniques available. Also, the DV-2 incorporates the Dynafex® noise reduction system to further enhance the broadcast quality of the reproduced audio signal.

MULTIPLE MESSAGE RECORDING

Up to ninety-nine individual messages can be recorded within the six minute and twenty-nine second memory capacity of the DV-2. All stored messages can be re-played sequentially or individually by pressing the front panel STOP switch until the desired message number appears in the Time/Selection display. Outdated messages can be selectively replaced by new messages at any

- Instant advance to next message for auditioning or editing
- Record audio input indicator
- EOM (End Of Message) signaling
- Full featured remote control capability
- Balanced audio inputs and outputs with XLR connectors
- Dynafex® Noise Reduction System

time. A battery backup system is included in the DV-2 to maintain message memory in the event of a momentary (up to 10 minute) power failure. A larger battery backup system may be utilized through connections provided on the DV-2's rear panel barrier strip.

INSTANT RANDOM ACCESS

With the addition of a simple interface (or by means of computer control), any DV-2 message can be played in any desired order. For example, a program automation system could utilize this capability for random access of jingles, ID's, etc. A broadcast station employing a satellite programming service could also use this random access function to play ID's or "liners" whenever a control signal is received on the satellite downlink. With the appropriate computer control and software, the DV-2 could even be used in sophisticated "message assembly" applications such as time and temperature announcements.

TIME/SELECTION DISPLAY

When the DV-2 is in the RECORD or START mode, a three digit display will show the selection index number of the current message. In the STOP mode, the display indicates the NEXT available message number. While in the STOP mode the operator can also press a front panel switch and see the total amount of unrecorded free memory remaining. (This available memory capacity is displayed in minutes and seconds.) When the switch is released, the message index number display will reappear.



APPLICATIONS

The applications for the Broadcast Electronics DV-2 "Digitalk" are limited only by your imagination! Here are just a few...

- Capture and Time Shifting of Network Audio Feeds
- Call-in Information Services (Concerts, sports, etc.)
- Company/Employee Information Services
- Cable System Announcements & Schedules
- Park Information
- Weather Information

- Production Sound Effects
- Call-in Stock/Investment Information
- Airport Announcements & Information
- Theme Park Exhibits and Animation Audio
- Airline Flight & Weather Announcements
- Time and Temperature Information
- Call-in Medical Information
- Road Information
- Simulator and Sound Effects

SPECIFICATIONS

Playback Time:

Six minutes and twenty-nine seconds

***Frequency Response:**

20 to 6500 Hz, +1/-4 dB using pink noise

Distortion:

Less than 1.5% at 400 Hz, +8 dBm output level into 600 ohms resistive load, record to playback.

Signal to Noise Ratio:

56 dB below +8 dBm into 600 ohms

Audio Input:

Mic. Level -55 to -25 dBv with AGC
Line Level -15 to +20 dBv with AGC
-0 to +20 dBv without AGC

Input Impedance:

Balanced 20K ohm bridging. Adaptable to other input impedance requirements.

Input Connectors:

Standard three-pin XLR

Output Connectors:

Standard three-pin XLR

Audio Output Level:

+8 dBm nominal into 600 ohms. Maximum output
+18 dBm (50 Hz to 6500 Hz)

Power Requirements:

117 VAC or 230 VAC, 50 or 60 Hz

Internal Battery Backup:

(Batteries not included)

6 "D" cells will provide approximately 10 minutes of memory retention.

Operating Temperature:

0 to 55°C

Storage Temperature:

-65 to +55°C

Relative Humidity:

Up to 95%, non-condensing

Dimensions:

19" standard rack width
3.5 inches high
18.75 inches deep

Remote Control:

All front panel functions fully remote controllable

Mounting:

Fits in a standard 19" EIA rack

Weight:

16 lbs. 5 oz. (unpacked)

*The proprietary data compaction process used in the DV-2 is optimized for complex, dynamic program material. Distortion and frequency response measurements taken using traditional single-frequency sine wave tones are not representative of the overall performance of the DV-2.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
DV-2	900-1000	Solid state digital record/play

Dynafex® is a registered trademark of Circuit Research Laboratories



PC-1

- Automatic Gain Control Circuitry
- Simple Installation
- Jumper Selectable Logic - Interfaces With Virtually Any Cart Machine
- Run/Ready Indicators
- Automatically Answers When Cart Machine Is Ready
- Standard RJ11C Modular Telephone Jack
- Phantom-powered From Cart Machine

The PC-1 Telephone Interface provides answer-only access to pre-recorded information. Typically this might be weather forecasts, sports scores, school closings, social function schedules, etc.

Designed to operate in conjunction with virtually any NAB tape cartridge playback unit (or with any remote-start, remote-run playback system) the PC-1 detects an incoming call and relays a "start" signal to the cart machine's remote start input. If the cartridge is cued and ready, the cart machine sends a "run" signal back to the PC-1. Upon receiving a valid "run" signal, the PC-1 seizes the telephone line and connects it to the cart machine's audio output, feeding the pre-recorded message to the caller.

When the message is over, the cartridge cues up and stops sending its "run" signal to the PC-1. The termination of the "run" signal directs the PC-1 to hang up the telephone line and await the next call.

The PC-1 incorporates automatic gain control circuitry which permits audio levels ranging from -20 to 0 dBm to be legally fed into the telephone line. The PC-1 may be powered from the host cartridge machine with positive polarity voltages from 15 to 30 volts. It can operate with either positive or negative logic with control voltages from +5 to +30 volts.

The PC-1 is an FCC Part 68 registered terminal device.

SPECIFICATIONS

Audio Input Impedance:

600 ohms

Audio Input Level:

-20 to +8 dBm

Audio Frequency Response:
Per FCC Part 68.308

Ringer Equivalence:

0.9B

Supply Voltage:

+5 to +30 Vdc

Control Signal Voltages:
+15 to +30 Vdc (125 mA)

USOC Jack Number:

RJ11C

Dimensions:

3 1/4" W x 1 7/8" H x 5 5/8" D

FCC Registration Number:
DDE7EP-15556-AN-N

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
PC-1	900-0010	PC-1 Telephone Coupler



Model SW5E Switcher

AUDIO SWITCHERS

Audio switchers are used with multiple cart machines or multiple deck machines to provide a single balanced output. The switcher selects the last deck started and mutes the other decks. If a wrong deck is started, pressing another start button will immediately mute the first deck and put the newly started deck on the output. The first deck started will continue to run, and will re-cue itself.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
SW5E	904-5000	Audio Switcher for 2100C, 3000A, and Series 5300C and 5400C. Switchers can be tied together to provide a single balanced output from up to three machines.
SW5F	904-5001	Audio Switcher for Series 5500C

REMOTE CONTROL UNITS

Remote control units are available for practically all of the Broadcast Electronics Cartridge machines. These remote controls are mounted on flat panels for convenient installation. All units are shipped unwired to facilitate mounting at any reasonable distance or location relative to the controlled equipment.

SERIES 3000A REMOTE CONTROL PANEL for record/playback unit with cue tones and fast forward option. Also available for playback only.

SERIES 5300C/5400C REMOTE CONTROL PANEL for use with 5300C and 5400C Series with companion record amplifier. Also available for playback only.

SERIES 3000A EXPANDED REMOTE CONTROL PANEL with start/stop and fast forward switches for 5 Series 3000A machines.



Series 5300C/5400C Remote Control Panel



Series 3000A Expanded Remote Control Panel

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
RC3000	906-3016	Remote Control Panel, START for 5 Units for Series 3000A
RC3000	906-3019	Remote Control Panel, Single Record/Playback Model
RC3000	906-3020	Remote Control Panel, Single Playback (with cue tones) for Series 3000A
RC3000	906-3021	Remote Control Panel, Single Playback (without cue tones) for Series 3000A

MODEL	STOCK NO.	DESCRIPTION
RC3000	906-3028	Remote Control Panel, START/STOP and FAST FORWARD for 5 Units for Series 3000A
RC5300	927-0047	Remote Control Panel for Series 5300C and 5400C
RC5300	927-0048	Remote Control Panel Series 5300C and 5400C with companion record amplifier
BE-210	907-2115	Remote Control Panel for Series 2100C

TAPE CARTRIDGE WINDER MODEL TW-120

This rugged Tape Cartridge Winder is available in four models; with or without tape timer, for operation in 117 V, 60 Hz or for 240 V, 50 Hz AC power.

Broadcast Electronics' Model TW-120 is a dependable and field tested tape cartridge winder which fills a need in every organization using cartridge equipment. It is no longer necessary to limit your cartridge operation by using only stock sizes or to tie up your conventional tape equipment to load tape cartridges. The tape cartridge winder will handle all reel sizes and runs at 22½" per second. Worn tapes can be replaced easily and economically. New or old cartridges may be wound smoothly and evenly to any length with just the right tension.

The TW-120T model (with Tape Timer) permits operation in forward or backward direction. This capability is not normally possible with preset digital timers.

SPECIFICATIONS

Size:
10" W x 20" L x 6¾" H

Weight:
9½ lbs.

Power Requirements:
117 Vac, 50/60 Hz, 30 watts

Winding Speed:
22½ IPS

Drive Motor:
4 pole induction

Take Up Reel:
Up to 7¼" dia.

Capacity:
Handles supply reel up to 3600'
1 mil lubricated tape

TW-120T
(with timer)

**ORDERING INFORMATION**

MODEL	STOCK NO.	DESCRIPTION
TW-120	900-0100	Tape Cartridge Winder 117 V, 50/60 Hz
TW-120T	900-0110	Tape Cartridge Winder w/timer 117 V, 60 Hz
TW-240	900-0200	Tape Cartridge Winder 220 V, 50 Hz
TW-240T	900-0210	Tape Cartridge Winder w/timer 220 V, 50 Hz

**DEMAGNETIZER HAN-D-KIT K20/B5**

One convenient package with everything needed to measure levels quickly, along with a handy, powerful unit to demagnetize components completely before they can spoil valuable tapes.

**TAPE ERASER MODEL TD-1B**

Obtain positive results every time from this heavy duty table top bulk eraser for cartridges. Equipped with spindle for reels up to 10.5 inches in diameter, 1 inch wide. Has automatic overheat thermal protection and transient protection.

Net weight: 9.5 lbs. Packed weight: 10 lbs.

Dimensions: 5.25"W x 7.25"L x 3.0"H (13.3 x 18.4 x 7.6 cm)

**MODEL 200-3T HAND HELD TAPE ERASER**

The Model 200-3T is a hand held bulk tape eraser. Furnished with an eight-foot, three-conductor line cord and safety pushbutton switch. The Model 200-3T is equipped with a built in thermostat which automatically cuts AC power if the eraser exceeds proper operating temperature. Model 200-3T operates on 115 V, 50/60 Hz. The Model 200-3T operates on 220 V, 50/60 Hz.

Weight: 3.5 lbs.

Size: 2½" H x 4" Diameter.



Audiopak Cartridges

MODEL A-2, AA-3 AND AA-4 AUDIOPAK BROADCAST TAPE CARTRIDGES

Designed to meet all NAB specifications for the type "A" continuous loop tape cartridge, Audiopak Model A-2 offers quality, reliability, and consistently high performance. Available empty or loaded with Formula 17 lubricated tape from 20 seconds to 10.5 minutes playtime.

The Audiopak AA-3 stereo phase cartridges meet or exceed NAB specifications and have a superior dynamic range due to a new high output/low noise tape formulation. Available in "A" size from 10 seconds to 10.5 minutes playtime.

The AA-4 cartridges use new SGS-4 broadcast mastering tape with nearly 5 dB higher saturation headroom at 16 kHz (7.5 ips) as compared to AA-3 cartridges.

LUBRICATED TAPE

World-renowned Recording Tapes specifically recommended by Broadcast Electronics for tape cartridge use...heavy-duty tape featuring a special lubricated surface for cleaner, longer tape life...Audiopak Q17, 1800 ft. reel.

TEST TAPES

Peak cartridge machine performance is assured by using proper maintenance techniques. Test tapes provide a basic reference from which optimum head azimuth adjustment can be attained. The following test tapes will assist you in keeping your Broadcast Electronics machines in top condition.

STL-C0031-AF	808-0004	Reproduce Alignment Test Tape
STL-0234-2-AF	808-0005	Reproduce Alignment Test Tape, level, CCIR-IEC
STL-X-1235-AF	808-0008	Wow & Flutter Test Tape

CARTRIDGE LABELS

Handy self-adhesive labels especially die-cut and color-coded for cartridge cataloging...and are easy to remove...Room for three typewritten lines...Sheets of 8 tags each...Eight distinctive colors.

Black	Orange	Blue
Brown	Yellow	Purple
Red	Green	

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics



LS-200



RS-25 Rack Section



DM-40

DM-20

MODULAR UNITS

DM-40 WALNUT WOODGRAIN FINISHED CABINET

Lazy Susan designed for tabletop operation; holds 40 "A" cartridges. 9½"W x 8"D x 11¾"H. Weight 6½ lbs.

DM-20 WALNUT WOODGRAIN FINISHED CABINET

Holds 20 "A" cartridges. Units may be stacked; 9½"W x 4"D x 10⅞"H. Weight 3¼ lbs.



RM-20H

Designed for standard 19" rack installation. Put vacant rack space to good use. Holds 20 "A" size cartridges in only 5¼" vertical space. Made of brushed anodized aluminum.



DM-72

DM-200

DESK MOUNT MODULES

Rotating racks present four-sided storage in attractive Walnut Formica. DM-72 holds 72 cartridges, measures only 22"H x 11"W x 11"D. DM-200 provides 200 storage slots. 29½"H x 15¾"W x 15¾"D. Weight: DM-72, 30 lbs.; DM-200, 60 lbs.



RM-100

RM-100 WALL MOUNT RACK

Holds 100 "A" size cartridges in minimum space. Walnut Formica trim. 2'H x 2'W x 4¾"D. Weight: 27 lbs.



Mix Trak 90

Mix Trak 90 Modular Console

- Advanced, modular design
- Available in 12 or 18 channel mainframes
- Individual Line and Microphone input modules
- Automatic Source Sequencer
- Penny & Giles linear faders
- Silent Hall Effect module switching
- Versatile Talk-Back system option
- "Monitor Dim" function for easier cueing
- Balanced Patch Points
- Independent Program and Audition metering
- VCA control of audio
- Three Mix-Minus Busses
- Separate MUSIC and SPEECH Program Busses
- Optional Peak Program Metering (PPM)
- Optional Clock/Timer Module
- Optional Mono Module with Metering and Phase Reversal Indication

Only the Broadcast Electronics Mix Trak 90 on-air console offers the versatility of state-of-the-art modular engineering in an attractive, easy to use package. The Mix Trak 90 gives you the ability to literally "create" the console you want now, and expand it later as your needs change. You can select a 12 or 18 channel mainframe and equip it with the exact type and number of input modules you desire.

The audio performance of the Mix Trak 90 is nothing less than superb. Typical Signal to Noise is better than 85 dB below nominal output level with Total Harmonic Distortion (THD) at less than .05%.

MICROPHONE AND LINE INPUT MODULES — STANDARD FEATURES

(1) Penny & Giles Linear Faders — Each input module offers the smooth precision of Penny & Giles conductive plastic linear faders for a lifetime of reliable service. Each control is equipped with a detent "drop cue" at the bottom limit of its travel. (An alternate "Cue switch" is also included immediately below each fader. It too can be used to place the module in "Cue" and will illuminate to indicate cue status.)

(2) Dual Inputs — Every Mix Trak 90 module features two inputs per channel selectable by a simple pushbutton switch.

(Remote control functions follow selected input.)

(3) Input Mode Switching (Line Module Only) — A four position input selection switch enables the Line Module to handle virtually any source. The four input options are: Stereo, Mono, Mono Left, Mono Right.

(4) Six Outputs — There are six (6) available outputs per module. These are comprised of three stereo busses and three mono busses.

(5) Source Sequencer Arming Switch (Line Module Only) — The Source Sequence arming switch is located immediately above each fader. By pressing this switch, the operator can add a module's primary On/Off function to a series of events that will be executed in sequence upon his or her command. See the "Source Sequencer" section for more details.

(6) Overload Indicator — All modules feature a pre-fader LED status indicator which illuminates RED when the input level becomes excessive.

(7) Gain Trim — Each module contains recessed, front panel screwdriver adjustments.

(8) Module On/Off Switching — Silent, electronic Hall Effect switches provide On and Off switching for each module.

(9) Panorama Control (Microphone Module Only) — A continuously variable control permits easy left to right channel "panning".

(10) Balanced Patch Points — All modules feature pre-fader, pre-pan patch points with balanced 600 ohm outputs and balanced differential inputs.

MICROPHONE AND LINE INPUT MODULE OPTIONS

1) Remote Control Card — Installation of the Remote Control Card will allow a Microphone or Line Input module to be controlled from one or two remote locations corresponding to the source (A or B) selected on the module itself.

2) Source Remote Control Card — The Source Remote Control card basically reverses the function of the Remote Control card. With the Source Remote Control card installed in a Microphone or Line Input module, the console operator will have the ability to control any remote device.

NOTE: A Source Remote Control Card MUST be installed in every Line Input module that will utilize the Line Source Sequencer. (see below)

LINE SOURCE SEQUENCER

Every Mix Trak 90 console offers an advanced Line Source Sequencer to provide the ultimate in operator convenience.

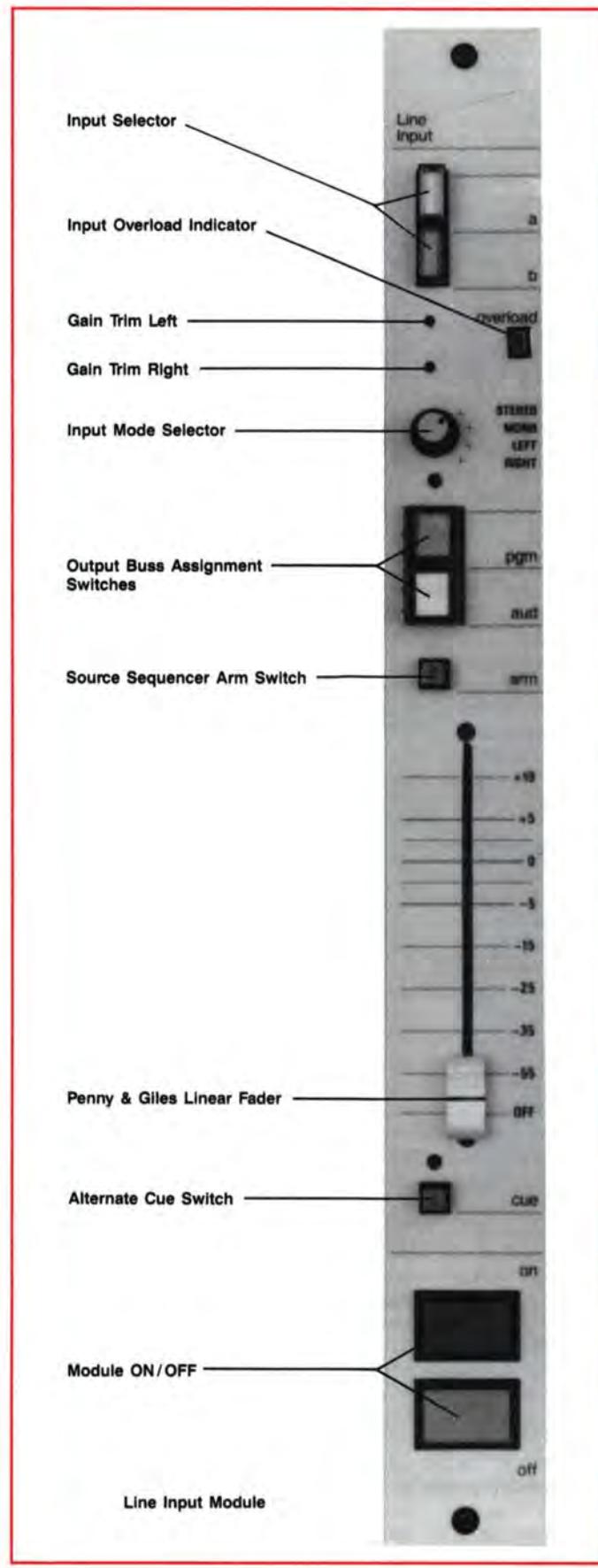
For example, if an operator has three carts to play in the next spot break, he or she can arm the modules by pressing the "ARM" switches located just above the fader controls. The ARM switch will glow amber to indicate that the module is now part of the upcoming source sequence. When the moment arrives to start the spot break, the operator merely has to press the ON switch for the first module in the sequence. After the first source has played, the other sources will be automatically activated in sequence without any further intervention from the operator. Other modules can be added or removed from the sequence at any time.

The operator can quickly regain manual control at any point in the sequence by depressing the ARM switch on the module that is currently active. This action will disarm the module and stop the sequence. The active source will continue to play unless, of course, the operator depresses the module OFF switch as well.

If a given source is not ready for play at the appointed time, the Sequencer will skip that source and continue to the next.

If the last module in the sequence is not ready, the sequence will end and the module will remain armed.

NOTE: A Source Remote Control card MUST be included with each Line Input module that will utilize the Source Sequencer function.



CONTROL ROOM MONITOR MODULE

All versions of the Mix Trak 90 console are equipped with a versatile Control Room Monitor module.

1) The module provides a color-coded, ten position switch to select the input source to be monitored through the studio loudspeakers. The operator can monitor four internal bus sources and six external inputs.

2) A front panel control is provided to adjust the module output level to the external power amplifier. In addition, the Control Room Monitor module features an innovative "Monitor Dim" function. Whenever any channel activates the Cue bus, the Monitor Dim function will immediately reduce the monitor output level.

3) The Control Room Monitor module also supports a full featured headphone section. A ten position, color-coded switch selects headphone monitoring of internal bus sources or external inputs. In addition, tone controls are provided as well as a handy split-cue function.

4) A separate Cue Amplifier section is included in the Control Room Monitor module. An internal five watt amplifier is used to drive a cue speaker. A Cue Level control is provided on the Control Room Monitor module to permit easy adjustment of the cue amplifier level.

STUDIO MONITOR MODULE (OPTIONAL)

The optional Studio Monitor module is ideal for those applications that include auxiliary studios separate from the main control room.

For example, Studio A might be occupied by a talk show guest while Studio B is functioning as a news studio. The operator in the main control room can use the Studio Monitor module to send Air Monitor audio to the guest in Studio A and Network audio to the newscaster in Studio B. The operator does this through the use of two rows of 10 interlocking pushbutton switches. (One row for Studio A, the other for Studio B) This switch selection arrangement is essentially the same as that offered on the Control Room Monitor module. It allows the operator to send internal bus audio (Program, Audition, Mono or Cue) or external input audio (Air Monitor, Net, External 1 ... 4) to either studio.

A "Talkback" circuit is also included in the Studio Monitor Module. There are two front panel Talk buttons: one for Studio A and the other for Studio B. Pressing and holding either button will dump the control room microphone audio into the monitor loudspeakers in the desired studio.

Two Monitor Level controls are included on the Studio Monitor Module. These controls permit the console operator to adjust the audio level being sent to each auxiliary studio. In addition, a front panel Talk Level control gives the main control room operator the ability to adjust the level of microphone "Talk" audio that is sent to the auxiliary studios. Remote control of studio levels from the studios is also possible through VCA gain control.

PROGRAM METERING

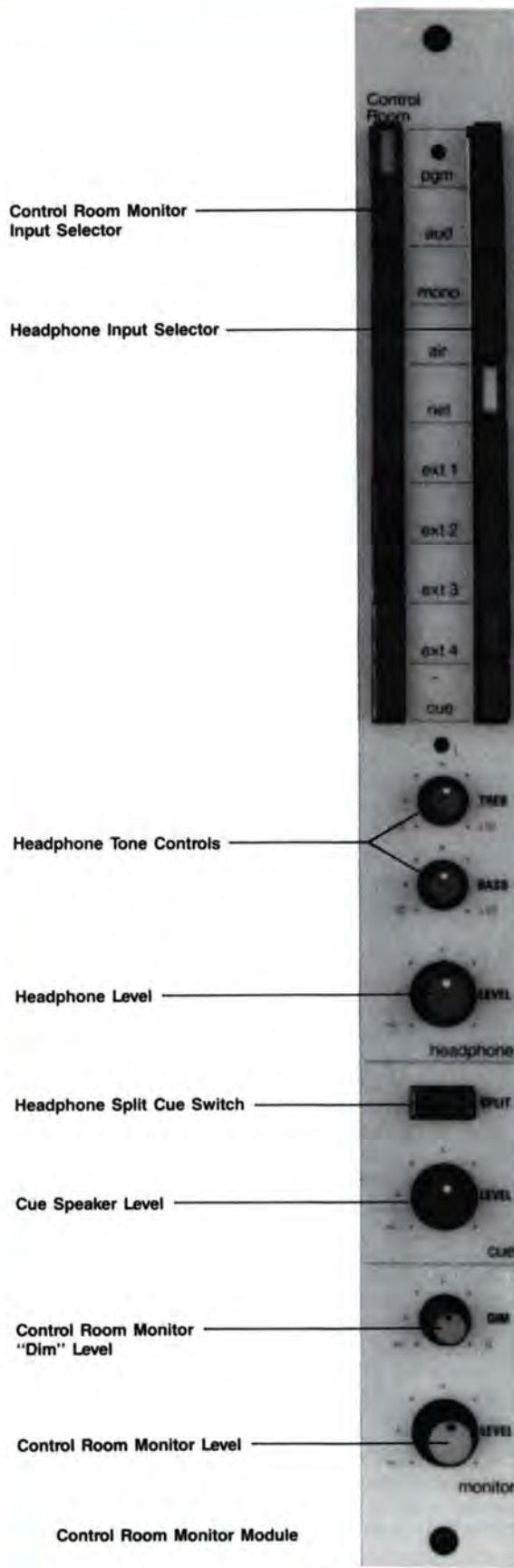
The Mix Trak 90 console features large 3½ inch VU meters as standard equipment. All meters are illuminated for easy reading and include an integral LED clipping indicator.

The 12 channel mainframes feature four meters. Two meters indicate Program audio level. The remaining two function as Utility meters. A row of interlocking pushbutton switches on the meter bridge is used to select the indication mode for the Utility meters.

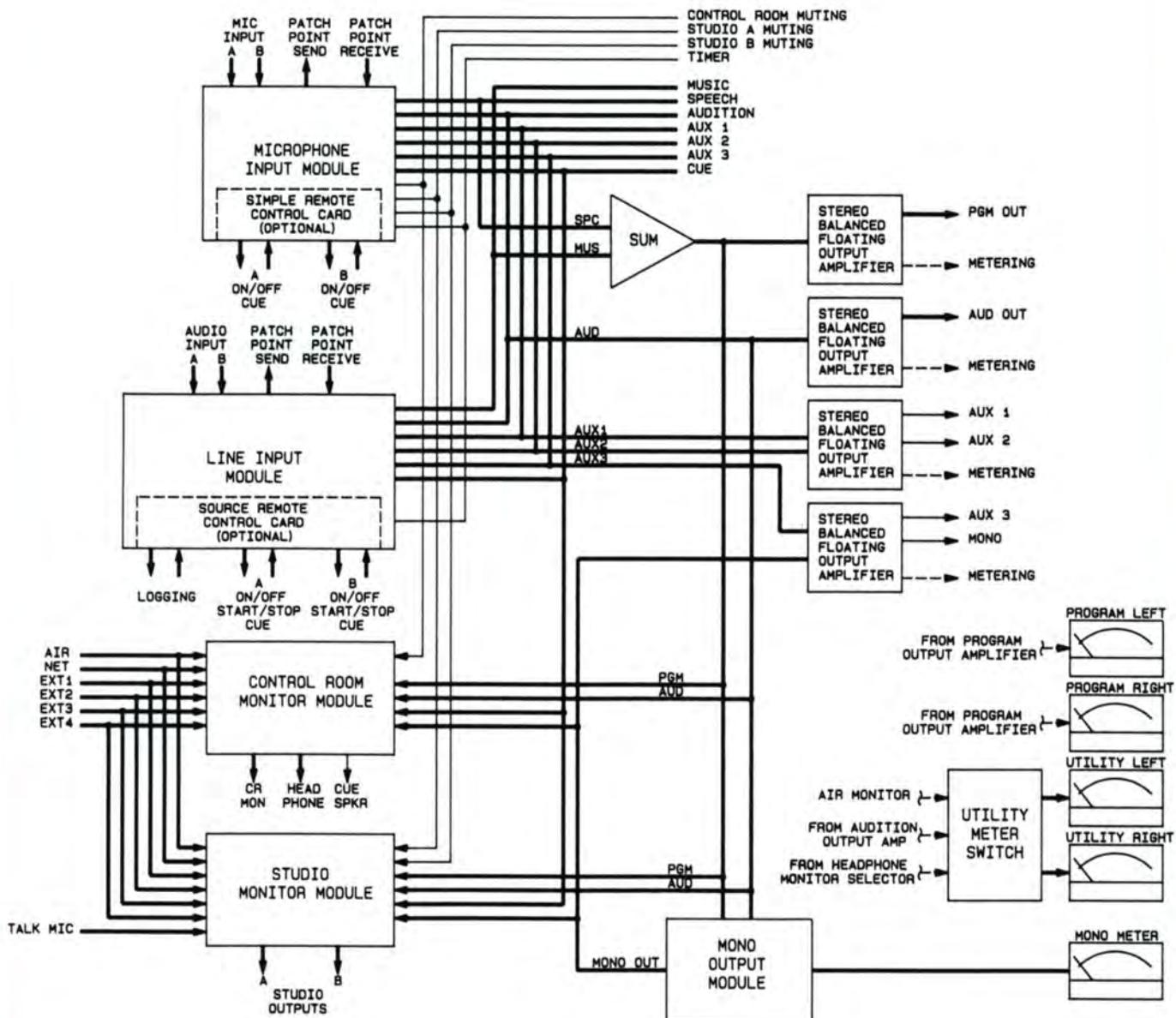
The 18 channel mainframes offer a total of seven VU or PPM meters:

Program Audio (2)	Utility (2)
Audition Audio (2)	Mono (1)

Peak Program Meters (PPM) and 3½ inch stereo or dual LED bargraph meters are also available as optional equipment for the Mix Trak 90.



12 CHANNEL MIX TRAK 90 BLOCK DIAGRAM



NOTES:

1. Patch points for the Speech and Music busses are not shown in this diagram. These two separate busses are summed after passing through the Speech and Music patch points and become the main Program buss. This architecture allows easy interfacing to separate audio processing or equalization for announcer microphone and music source.
2. The 18 channel Mix Trak 90 console is configured as above with the elimination of the utility meter switch and the addition of an extra set of meters for the Audition buss outputs. This allows a total of seven meters with two utility meters available to monitor a console output or air monitor external input.
3. VU meters come standard with integral LED clipping indicators. Peak program meters (PPM's) are available as options. Optional LED bargraph meters are also available to provide stereo metering in the same panel space as a single VU or PPM meter.
4. Two mono output modules may be used simultaneously with the Program or Audition buss selected on either module. When a second mono output module is installed, the Aux 3 buss output amplifier is used as a line driver.

ADDITIONAL MIX TRAK 90 OPTIONS

Console Clock/Timer: The console clock/timer is a dual function module. It is crystal controlled and displays hours, minutes, and seconds in a six digit format. An internal jumper option will enable the 24 hour military format. The easy to read "count up" timer offers a minutes and seconds display. Any module ON command can be jumpered to automatically reset and start the timer. If manual control is desired, an optional Timer Control Module is available. (see below)

Timer Control Module: The console mounted Timer Control Module will provide the following control functions when used with the Console Timer:

RESET: Sets timer to 00:00

START: Starts timer count-up

STOP: Stops timer count

PROG/AUD: Selects timer control from either Program or Audition bus

MANUAL: Defeats automatic Start/Reset functions.

Studio Remote Module: The Studio Remote Module is an optional remote switch panel that provides several control functions for operators in auxiliary studios:

ON: Turns studio microphone (and its Microphone Input module) ON

OFF: Turns studio microphone (and its Microphone Input module) OFF

COUGH: Turns the microphone off momentarily

TALK: Dumps the studio microphone audio onto the main console Cue bus and mutes the studio loudspeakers.

MONITOR LEVEL: Allows adjustment of the studio monitor loudspeaker level

Placing Studio Remote Modules in auxiliary studios will pro-

vide full duplex talkback capability with the main control room. In addition, the auxiliary studio operators will have the convenience of direct microphone ON/OFF and monitor level control.

Source Remote Switch Panel: The Source Remote Switch panel is a half-height module with five momentary pushbutton switches. Its primary function is to provide expanded machine control for the console operator. (Reel-to-reel tape record/play decks are a typical example) Each switch is color coded and labeled.

Input Expander Module: The addition of the Input Expander Module can greatly enhance the function of any Line Input module. It permits the pushbutton selection of up to 8 different stereo line sources for routing to the A or B input of the Line Input module. Such stereo line sources might typically include special network audio feeds, EBS, live remote broadcast links, etc.

FSK Decoder Module: This optional module offers the capability to decode FSK data from any Line Input Module. Its serial ASCII output can drive a serial ASCII printer or video display. Applications include use with cartridge machines employing an FSK data track.

Redundant Power Supply: An optional redundant power supply and automatic switching panel are available for the Mix Trak 90. In the unlikely event of a primary power supply failure, the switching panel will instantly (and automatically) connect the secondary power supply to the console. This switching will occur without any disruption of the console's functions. LED status indicators show the failure condition.

Monaural Output Module: The Monaural Output module is used to select the buss (Program or Audition) that will appear at the mono output. Stereo busses are summed to mono and a phase reversal switch is available to aid in phase checking. An LED phase error indicator glows red when the input source is out of phase and green when it is in phase. Two Monaural Output modules may be used in either a 12 or 18 channel mainframe.

MIX TRAK 90 TECHNICAL SPECIFICATIONS**OVERALL CONSOLE SPECIFICATIONS***

(Mic or Line Input to Program or Audition output)

Input Headroom:

Better than 25 dB above nominal

Total Harmonic Distortion:

Less than .05%, 20 Hz to 20 kHz. Nominal input and output levels

SMPTE Intermodulation Distortion:

Less than 0.05%, 60 Hz to 7 kHz. 4:1 amplitude ratio Nominal input and output levels

Crosstalk:

(Program to Audition, Audition to Program. Aux bus 1, 2 or 3 into Program, Aux bus 1, 2, or 3 into Audition)

Better than 80 dB from 20 Hz to 20 kHz, any input module position to selected output, all inputs on. Measured below 0 dBu nominal output.

Separation:

(Program left into Program right, Program right into Program left. Audition left into Audition right, Audition right into Audition left.)

Better than 70 dB from 20 Hz to 20 kHz, any input module position. Measured below 0 dBu nominal output, +4 dBu nominal input on "Line Input" module

Stereo Gain Matching:

Within 0.5 dB, any fader position

Frequency Response:

+0 dB, -0.5 dB 20 Hz to 20 kHz, 1 kHz reference

Gain In Hand:

12 dB

Nominal Output Level:

0 dBu to +8 dBu adjustable

Output Impedance:

Less than 100 ohms balanced and floating, 50 ohms single ended

Maximum Output Level:

+28 dBu into high impedance load
+26 dBu, +26 dBm into 600 ohm load
+20 dBu, +28 dBm into 150 ohm load

Output Noise:

Better than 85 dB below 0 dBu output level, all inputs off

Load Impedance:

150 ohms minimum

Patch Points:

(each module) Output Level: -5 dBu nominal
Gain: 0 dB
Output Impedance: 600 ohms balanced, 300 ohms single ended
Input Impedance: 20,000 ohms minimum
Maximum Output Level: +24 dBu unloaded,
+18 dBu loaded
Maximum Input Level: +24 dBu

Power Requirements:

115/230 Vac, 50/60 Hz, 400 watts maximum

Dimensions: (12 channel) Depth: 25", Width: 38 1/4", Depth Below Table: 5", Height Above Table: 8 1/2"
(18 channel) Depth: 25", Width: 50 1/4", Depth Below Table: 5", Height Above Table: 8 1/2"

Microphone Input Module Specifications**Vernier Gain Range:**

±20 dB, single front panel control for both channels

Nominal Input Levels:

-60 to -30 dBu

Equivalent Input Noise:

-128 dBu with 150 ohm source, 20 Hz to 20 kHz bandwidth, RMS meter response, no weighting

Input Impedance:

Greater than 1500 ohms

Line Input Module Specifications**Vernier Gain Range:**

±5 dB from nominal, individual control for each channel

Nominal Input Levels:

-10, -5, 0, +4, +8 dBu

Equivalent Input Noise:

Better than 80 dB below nominal input level, 20 Hz to 20 kHz bandwidth with 600 ohm source impedance. RMS meter response, no weighting

Input Impedance:

Greater than 10,000 ohms bridging

*All measurements referenced to Program and Audition signal paths in a 12 channel fully loaded mainframe with a single module active. Noise measurements made over a 20 Hz to 20 kHz bandwidth with a true RMS responding meter and no weighting filters. Note: 0 dBu = 0 dBm into 600 ohms.

MIX TRACK 90 ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information



MODEL 10S350A STEREO

- 22 inputs to 10 sliding faders**
- Penny & Giles Precision Faders**
- Modular Plug-in Circuitry**
- Dual Channel Output**
- Elegant Styling**
- Mono or Stereo Models**
- Contact-free, FET Bus Selection**
- Economical Price**
- Durable Front Panel Overlay**
- Simultaneous Audition and Program metering**

PENNY & GILES VERTICAL-FADER CONSOLES

Broadcast Electronics offers ten channel, Penny & Giles vertical fader consoles with multiple meters at a price that almost anyone can afford! If budget considerations have kept you away from vertical attenuator designs, you should consider the 10S350A (Stereo) or 10M350A (Monaural) consoles.

MULTIPLE METERS/PENNY & GILES FADERS

We've designed the 350A Series consoles with quality and convenience in mind. The Penny & Giles faders offer smooth, reliable level control for each channel. They are considered to be the very best in vertical attenuator technology. The 350A's also offer the convenience of multiple metering with SEPARATE Program and Audition meters. This allows the operator to observe the Audition or Program levels simultaneously without having to manually switch the meter inputs. The model 10M350A monaural console features two meters. The stereo 10S350A console has four meters.

ATTRACTIVE, DURABLE STYLING

The 350A Series consoles feature a new two-tone technical

white and gray finish that will add a touch of elegance to any studio. The front panels feature crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface is virtually impervious to scratching or wearing. After years of use these consoles will look just as good as the day they were installed.

COMPLETE INPUT FLEXIBILITY

Broadcast Electronics pioneered the widely accepted modular input preamplifier technique in rotary consoles. The same design using integral module pre-setting is also applied in the vertical attenuator 350A Series. This allows you to designate each individual channel for either low impedance microphone or line level input service. (The stereo model 10S350A also features mono/stereo selection.) Mixers #1 through #8 accept two inputs per mixer. Mixers #9 and #10 accept three inputs each. Input pre-selection is accomplished through the use of interlocking pushbuttons. Mixer outputs may be fed separately or simultaneously to the dual output channels through the use of advanced FET switching.

PRE-FADER PREVIEW

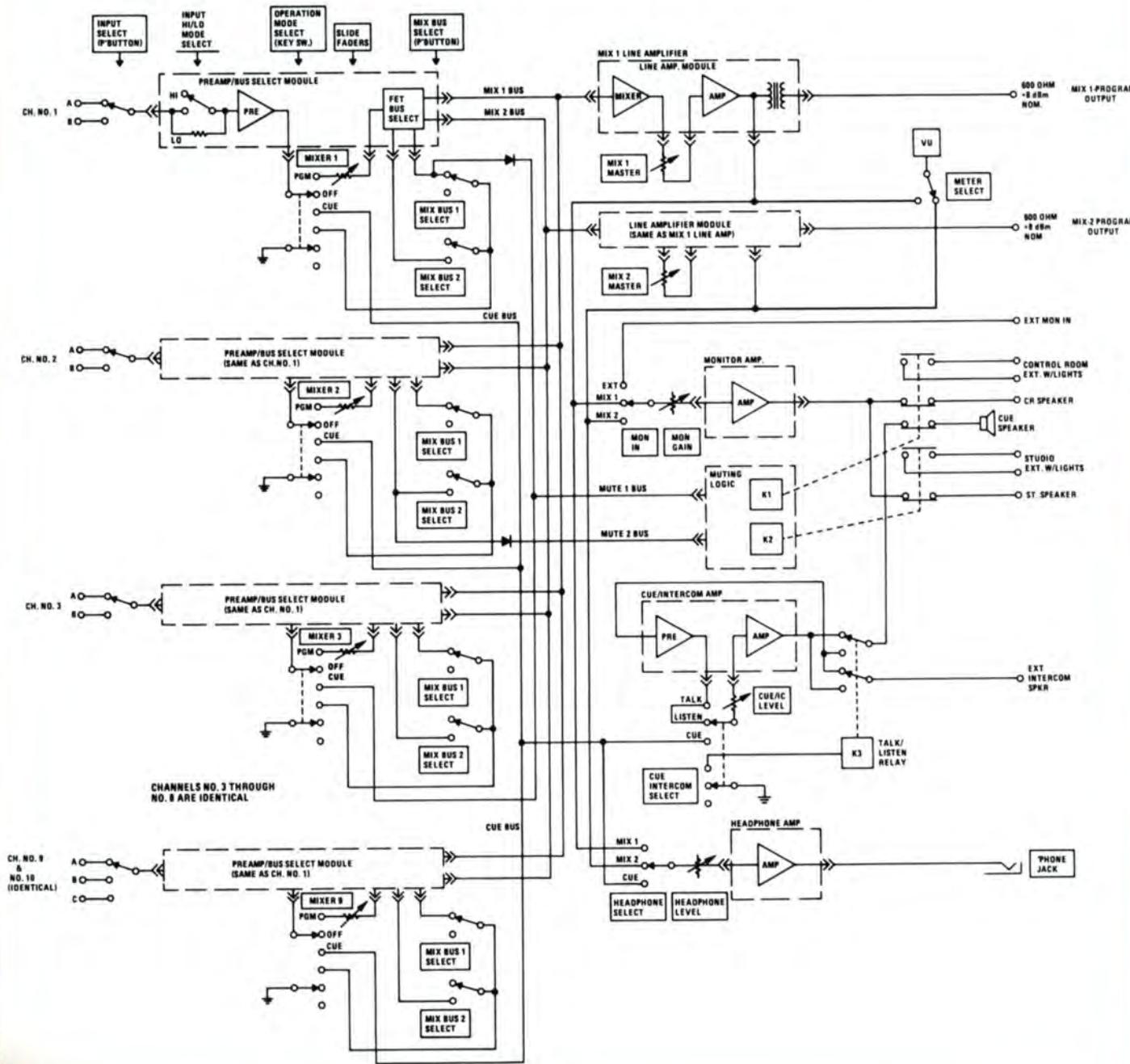
The 350A consoles provide a handy pre-fader preview capability that any operator is sure to appreciate! There is a mode select switch immediately above each fader which determines CUE, MIX, or OFF assignments. The CUE mode operates independently of the fader position and allows easy input monitoring without disturbing the preset fader level. The desired input (at the preset level)

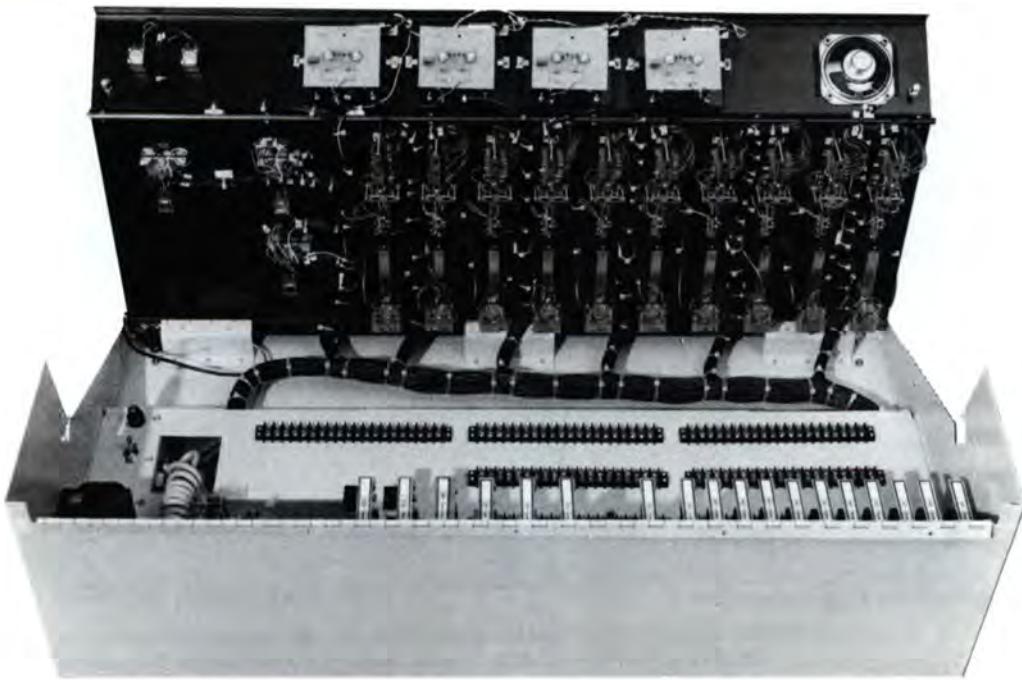
can be subsequently added to the output mix by simply switching to the PGM-AUD position.

There is also a "drop cue" detent position at the bottom travel of each fader control. Pre-fader previewing can be accomplished through the use of the CUE/MIX/OFF switch or the detent "drop cue", whichever is more convenient.

BLOCK DIAGRAM — MODEL 10M350A MONO

(10S350A STEREO: Basic System Essentially Identical with Individual Left-and Right-Channel Capability)





Internal view of Model 10S350A shows ready access to terminal boards for installation, and to attenuators, switches, modules and all components for easy maintenance. Note full complement of plug-in amplifiers.

SPECIFICATIONS

PROGRAM CHANNELS

(Mono: two/ Stereo: four).

Inputs

Two per mixer, channels 1-8; Three per mixer, channels 9 and 10 (22 total).

Input/Impedances/Levels (Switchable)

Low mode 150 ohms, balanced. -65 dBv nominal, -38 dBv maximum. High model 54K ohms, balanced bridging -20 dBv nominal, +20 dBv maximum.

Mono/Stereo Select (10S350A only)

In-phase stereo outputs from mono source.

Frequency Response

+0, -1 dB, 30 Hz to 20 kHz.

Distortion

.075% IM & THD, 30 Hz to 20 kHz at +18 dBm output.

Signal-to-Noise (unweighted)

68 dB below +18 dBm output. -50 dBv input, 20 kHz bandwidth.

Output Impedance Level

600 ohms balanced, +8 dBm for zero-VU deflection. +18 dBm capability.

Monaural Output Channel (optional on 10S350A only)

Same performance specification as program channels.

MONITOR CHANNELS

Inputs

Pushbutton select. Program output channels and an external source.

Frequency Response

+0, -1 dB, 50 Hz - 20 kHz.

Distortion

.75% or less, 30 Hz - 20 kHz at rated output and load.

Output Power Load

8 watts RMS per channel, 8 ohm load.

VU Meters

10M350A - two meters (Program & Audition). 10S350A - four meters (Program Right & Left plus Audition Right & Left).

HEADPHONE AMPLIFIER

One watt RMS per channel. Pushbutton selection of output channels and cue bus.

CUE/INTERCOM AMPLIFIER

One watt RMS mono output to built-in speaker. Input mono (or summed L & R, 10S350A) Front panel intercom talk/listen/cue switching.

MUTING

Two relays standard. As wired, Relay 1 mutes monitor/cue speakers with Mixer 1 operation. Mixer 2 controls Relay 2. Other combinations field assignable. Relays include 1A/125 Vac contacts for external warning light operation.

POWER REQUIREMENTS

115 Vac, 50/60 Hz (optional 230 Vac operation).

10M350A - 75 watts.

10S350A - 110 watts.

DIMENSIONS

36" W, 10.75" H, 19" D (91.4 x 27.3 x 48.2 cm).

WEIGHT (packed)

10M350A 80 lbs. (36.4 Kg).

10S350A 85 lbs. (38.6 Kg).

NOTE: 0 dBv = 0.7746 V.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
10M350A	901-1051-000	10-mixer, slide fader, dual-channel MONAURAL console supplied with 10 preamps; two line amps; one monitor amp; one cue amp; one headphone amp.
10S350A	901-1050-000	10-mixer, slide fader, dual-channel STEREO console supplied with 10 stereo preamps; four line amps; two monitor amps; one cue amp; one headphone amp
	918-3602	Mono matrix module, 10S350A
	838-0200	230 Vac power conversion



Model 10S250A

- Ten Mixing Channels
- Twenty Stereo Inputs
- Ladder Step Attenuators
- Modular Plug-In Electronics
- Contact-Free Bus Selection

TEN MIXER STEREO CONSOLE

The Broadcast Electronics' Model 10S250A stereo console accommodates twenty inputs into ten mixing channels. The console features identical line-level output stereo program and audition channels, with VU meter switching to either stereo channel pair. Mixing controls are step-type, dual ladder attenuators. Telephone-type channel select switches are used for silent operation.

SUPERB STYLING, DURABLE GRAPHICS

With its two-tone technical white and gray finish and solid oak end panels, the model 10S250A console will enhance any studio. Front panel graphics are protected by a laminated polycarbonate overlay. This tough surface makes it virtually impossible to scratch or to wear away the lettering beneath. The front panel should look as clean and fresh after years of normal use as it did the day it was purchased!

MONO MIX-DOWN OPTION

For applications requiring a summed L+R mono signal in addition to the stereo program outputs, the consoles are prewired to accept an optional plug-in module for this purpose.

INTEGRAL HIGH/LOW LEVEL AND MONO/STEREO MODE SELECTION

Identical stereo preamplifier modules are used in all mixing channels. Modules may be pre-programmed for either low impedance microphone, or line-level input service. The user can thus assign mixing channel functions to meet current operating requirements and can readily change them to satisfy future combinations.

DUAL CHANNEL DESIGN

600-ohm balanced audition channels are equal in performance to the program channels.

TALK-BACK CAPABILITY

The 10S250A console provides a push-button selectable talk-back capability for two studios and one non-muted location such as a station lobby.

- Telephone-Type Channel Key Switches
- Talk-Back Capability
- Four Line-Level Outputs
- Mono Mix-Down Option
- Durable Front Panel Graphics

STEREO MONITOR AND HEADPHONE AMPLIFIERS

High-quality control room and studio stereo monitoring of program, audition, or an external input is provided by two 8-watt monitor amplifier modules. A front panel jack permits headphone monitoring of stereo program and audition channels, plus a summed L+R cue bus signal and insures full aural access to the console system.

PREFADER PREVIEW, ALL INPUTS

A built-in cue amplifier-speaker system is fed from a summed L+R cue bus. Bus signals are applied by cue switches on each mixer control, actuated in the detented closed-fader position.

NO EXPOSED EXTERNAL CABLING

With labeled, screw-type barrier strips and adjacent cable access openings, the Series 250A consoles are easy to install. The completed installation is free from exposed wires and cables with a truly professional appearance.

ELECTRONIC BUS SELECTION

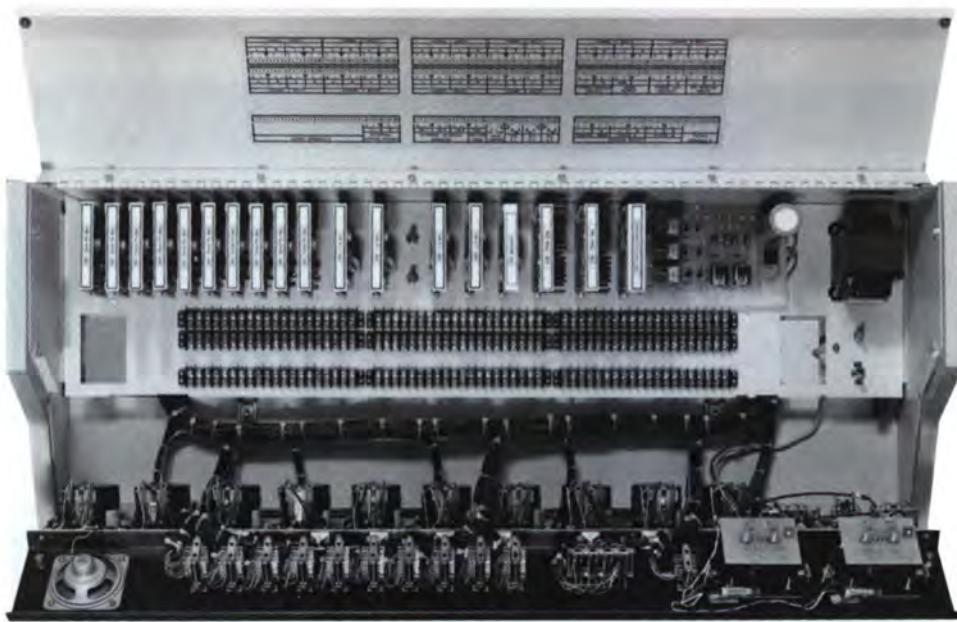
Initiated by remote DC voltage, fast-acting, low noise selection of mixing busses is accomplished by contact-free FET switching, with no mechanical closures in the audio bus paths.

MUTING

Three muting relays have terminated contact closures for external warning light operation. The relay circuit is wired for individual operation in conjunction with the first three mixers. However, the muting logic is accessible for additional relay interlock arrangements.

HUMAN ENGINEERED FOR LONG-TERM SERVICE

Special attention has been focused on control and switch locations to insure minimum error and maximum operating ease. The 250A Series consoles produce the sound that satisfies the most demanding stereo programming standards.



INTERNAL VIEW, MODEL 10S250A. Shows ready access to terminal boards for installation, and to attenuators, switches, modules and all components for service and maintenance.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
10S250A	901-1040-000	10 Mixer Deluxe Stereophonic Console, Step Type Attenuators, supplied with three muting relays. Includes preamp (stereo) for each mixer; four line amps, two monitor amps, and one cue/headphone amp
	838-0200	Additional Cost for 230 Vac/50 Hz Power Source
	918-3602	Mono matrix PC board

SPECIFICATIONS

PROGRAM AND AUDITION CHANNELS

Stereo Inputs:
20 into 10 mixers

Input Impedances/Levels (Selectable):
Low Mode: 150 ohms balanced. -65 dBv min., -38 dBv max.
High Mode: 54K ohms balanced, bridging. -20 dBv min., +20 dBv, max.

Frequency Response:
+0, -1 dB, 30 Hz - 20 kHz.

Distortion:
.075% or less IM & THD at +18 dBm output, 30 Hz - 20 kHz.

Signal-to-Noise:
Noise (unweighted), 70 dB below +18 dBm output with -50 dBv signal into any low-level input. 20 kHz Bandwidth.

Output Impedance/Level:
600 ohms balanced. +8 dBm for zero-VU meter reading. +18 dBm output capability.

Overall Gain:
105 dB.

Monaural Output (Optional L & R):

Same performance specifications as program/audition output channels. Mix ratio adjustable, ± 6 dB.

STEREO MONITOR CHANNELS

Stereo Inputs:
Pushbutton selectable, program/audition/external.

Frequency Response:
+0, -1 dB, 50 Hz - 20 kHz.

Distortion:
0.75% or less, 30 Hz - 20 kHz at 8 watts rms into 8 ohm load.

Output Power/Impedance:
8 watts rms per channel into 8 ohm load.

STEREO HEADPHONE AMPLIFIERS:
1.0 watt rms per channel into front panel phone jack.
Program, audition and cue pushbutton input select (8 ohm load).

VU METERS:
Two meters: L & R switchable to Audition and Program.

CUE AMPLIFIER:

1.0 watt rms into built-in 8 ohm speaker. Input is summed L + R signal. Functions as intercom amplifier.

MUTING:

Three muting relays standard. Mutes monitor and cue speakers when Mixer No. 1, 2 or 3 activated. Relays have terminated contact closures (1A at 125 Vac) for warning light operation.

POWER REQUIREMENTS:

115 Vac. 50/60 Hz (230 Vac, 50/60 Hz optional)
85 watts max.

DIMENSIONS:

39"W, 15.75"D, 8.25"H (88.9 x 40 x 20.9 cm)

WEIGHT (PACKED):

69 lbs. (31.3 kg.)

NOTE:

0 dBv = .7746V



10M250A

- Ten Mixing Channels
- Twenty Mono Inputs
- Ladder Step Attenuators
- Modular Plug-In Electronics

- Telephone-Type Channel Key Switch
- Talk-Back Capability
- Two Line-Level Outputs
- Contact-Free Bus Selection

TEN MIXER MONO CONSOLE

Broadcast Electronics' Model 10M250A Mono Console accommodates twenty inputs into ten mixing channels. This dual channel console features identical line-level output mono program and audition channels, with VU meter switching to either mono channel. Mixing controls are maintainable, step-type ladder attenuators. Quiet-operating, telephone-type channel select switches are used.

INTEGRAL HIGH/LOW LEVEL MODE SELECTION

Identical mono preamplifier modules are used in all mixing channels. Modules may be pre-programmed for either low impedance microphone, or line-level input service. The user can thus assign mixing channel functions to meet current operating requirements and can readily change them to satisfy future combinations, without obsolescence.

DUAL CHANNEL DESIGN

The 10M250A console has a 600 ohm balanced audition channel which is equal in performance to the program channel.

TALK-BACK CAPABILITY

A push-button selectable talk-back capability for two studios is an important operational feature in the Model 10M250A console.

MONITOR AND HEADPHONE AMPLIFIERS

High-quality control room and studio mono monitoring of program, audition or an external input is afforded by 8-watt monitor amplifier modules. Headphone monitoring of mono program and audition channels insures full aural access to critical portions of the console system. A front panel jack is provided for monitoring purposes.

PREFADER PREVIEW, ALL INPUTS

A built-in cue amplifier-speaker system is fed from a mono bus. Bus signals are applied by cue switches on each mixer control, actuated in the detented closed-fader position.

NO EXPOSED EXTERNAL CABLING

With labeled, screw-type barrier strips and adjacent cable access opening, the 10M250A Mono Console is easy to install. The completed installation is free from exposed incoming wires and cables, and provides a truly professional appearance.

ELEGANT, DURABLE STYLING

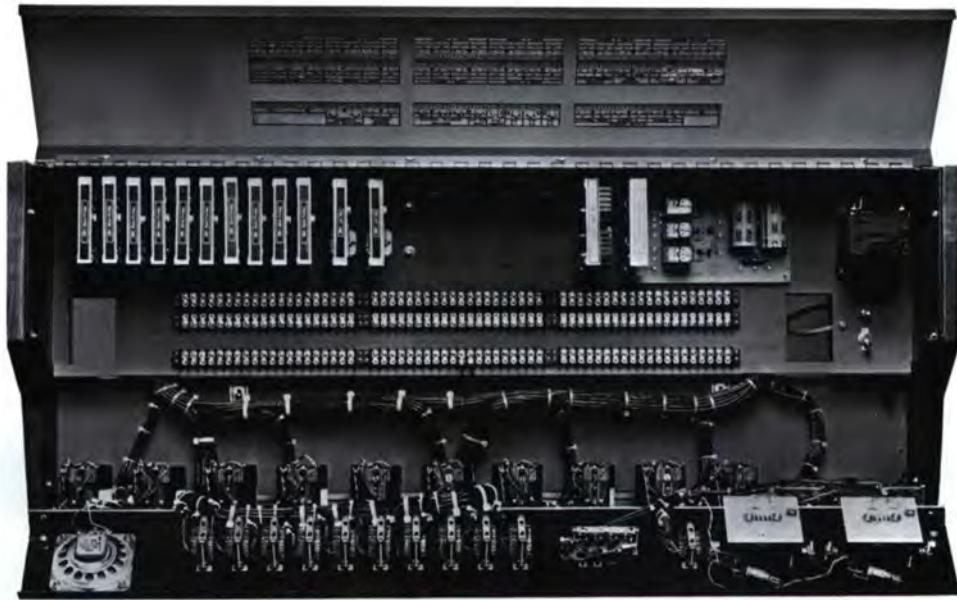
Elegant styling adds durability and enhances the attractiveness of the 10M250A console. The front panel features crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or wear the lettering away. The front panel should look as clean and fresh after years of normal usage as it did the day it was purchased!

ADVANCED ELECTRONIC BUS SELECTION

Initiated by remote dc voltage, fast-acting, low-noise selection of mixing busses is accomplished by gated-FET, contact-free switching, with no mechanical closures in the relatively low-level audio bus paths.

MUTING

Three muting relays are supplied, each with terminated contact closures for external warning light operation. The relay circuit is wired for individual operation in conjunction with the first three mixers, however the muting logic is simple and accessible for other, or expanded, relay interlock arrangements.



INTERNAL VIEW, MODEL 10M250A. Shows ready access to terminal boards for installation, and to attenuators, switches, modules and all components for service and maintenance.

SPECIFICATIONS

PROGRAM AND AUDITION CHANNELS

Mono Inputs:

2 inputs per mixer, total of 20 inputs.

Input Impedance/Levels (Selectable):

Low Mode: 150 ohms balanced. -65 dBv min., -38 dBv max.

High Mode: 54K ohms balanced, bridging. -20 dBv min., +20 dBv, max.

Frequency Response:

+0, -1 dB, 30 Hz - 20 kHz.

Distortion:

.075 or less IM & THD at +18 dBm output, 30 Hz - 20 kHz.

Signal-to-Noise:

Noise (unweighted), 68 dB below +18 dBm output with -50 dBv signal into any low-level input. 20 kHz Bandwidth.

Output Impedance/Level:

600 ohms balanced. +8 dBm for zero-VU meter reading. +18 dBm output capability.

Overall Gain:

105 dB.

MONO MONITOR CHANNELS

Mono Inputs:

Pushbutton selectable, program/audition/external.

Frequency Response:

+0, -1 dB, 50 Hz - 20 kHz.

Distortion:

0.75% or less, 30 Hz - 20 kHz at 8 watts rms into 8 ohm loads.

Output Power/Impedance:

8 watts rms per channel into 8 ohm loads.

MONO HEADPHONE AMPLIFIER:

1.0 watts rms into front panel phone jack. Program, audition and cue pushbutton input select. (8 ohm load)

VU METERS:

2 meters: Audition and Program.

CUE AMPLIFIER:

1.0 watts rms into built-in 8 ohm speaker.

MUTING:

Three muting relays standard. Mutes monitor and cue speakers when Mixer No. 1, 2 and 3 activated. Relays have terminated contact closures (1A at 125 Vac) for warning light operation.

POWER REQUIREMENTS:

115 Vac. 50/60 Hz (230 Vac, 50/60 Hz optional) 85 watts max.

DIMENSIONS:

39"W, 15.75"D, 8.25"H (88.9 x 40 x 20.9 cm)

WEIGHT (PACKED):

69 lbs. (31.3 kg.)

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
10M250A	901-1041-000	10 Mixer Deluxe Mono Console, Step Type Attenuators, supplied with 3 muting relays. Includes preamp for each mixer; 2 line amp, 2 monitor amp, and 1 cue/headphone amp
	838-0200	Additional Cost for 230 VAC/50 Hz Power Source



MODEL 5S250A

- Step Type Ladder Attenuators
- Telephone Type Channel Key Switches
- Modular, Plug-In Electronics
- Cue Switches, All Mixers
- High/Low Level Input Selection
- Durable Front Panel Graphics



MODEL 8S250A

FLEXIBILITY

Complete flexibility in mixing channel function is a feature of the 250A Series, five- and eight-mixer dual-channel monaural and stereo consoles. All plug-in input preamplifier modules are identical. They may be preset to accept either balanced, high-level sources or balanced, low-level microphones. Mixing channel assignments may be geared precisely to individual programming requirements with pushbutton preselection of two inputs per mixer.

ATTRACTIVE, DURABLE STYLING

A two-tone technical white and gray finish with solid oak end panels enhances the attractiveness of the 250A consoles. The front panel features crisp, clean graphics under a laminated polycarbonate overlay. This protective surface makes it virtually impossible to scratch or wear away the lettering. The front panel should look as clean and fresh after years of normal use as it did on the day it was purchased!

LADDER STEP ATTENUATORS AND TELEPHONE-TYPE SWITCHES

The quality features of the 250A Series consoles include ladder-type step attenuators (with cue detent) for long life and easy maintenance, roller-cam key switches for channel selection, and FET bus switching.

DUAL CHANNEL DESIGN

A 600 ohm balanced audition channel is equal in performance to the program channel.

PLUG-IN ELECTRONICS

All active circuitry (excluding the power supply/relay assembly) is mounted on plug-in modules with gold plated contact fingers. Each of the plug-in preamplifiers permits selection of either a microphone or high level input for each mixing channel.

HUMAN ENGINEERED

The uncluttered control panel arrangement affords convenient, error-free operation. Input pushbutton switches are logically grouped for mixer input preselection; program, audition or external source inputs to the monitor amplifier; and program, audition and cue bus inputs to the headphone amplifier. Masters, plus monitor, headphone and cue gain controls are panel mounted. Illuminated, 3½" VU meters continuously display both program and audition channel output levels.

FOUR EXTRA INPUTS

Each model has four extra unwired switches to aid the broadcaster with any future expansion plans.

NEAT AND SIMPLE INSTALLATION

Completely free from exposed wiring, incoming cables are connected to internal, labeled, screw-type barrier strips with cable access through the base of the cabinet. An outstandingly neat installation results.

FULL MONITORING

An 8-watt monitor amplifier and individual 1-watt headphone and cue amplifiers afford complete operational and preview monitoring capability. Three muting relays equipped with terminated warning light contacts (1A @ 125 Vac) are controlled by channel activation of the first three mixer channel select keys. Muting logic

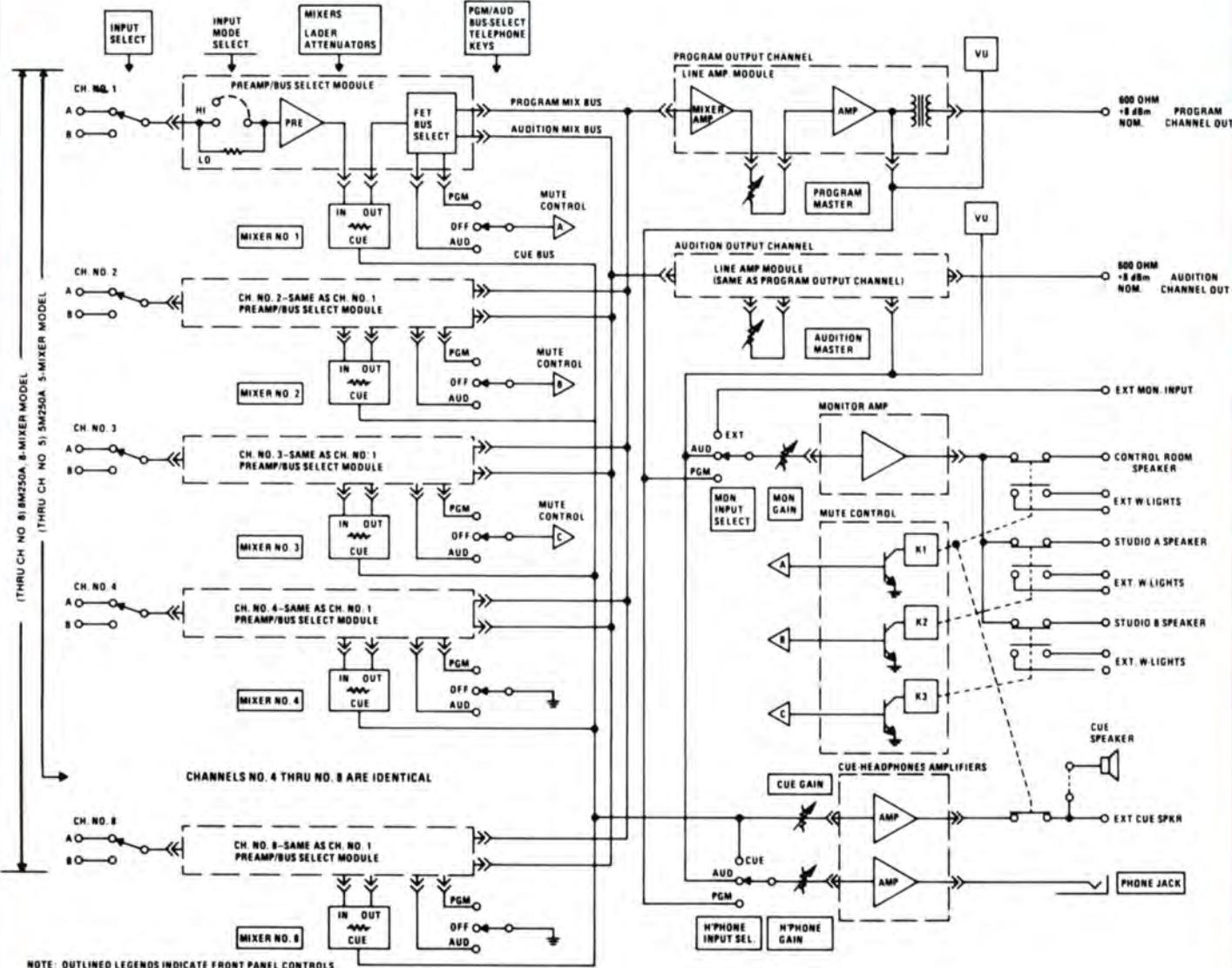
is straightforward and readily field modified for alternative or expanded muting assignments.

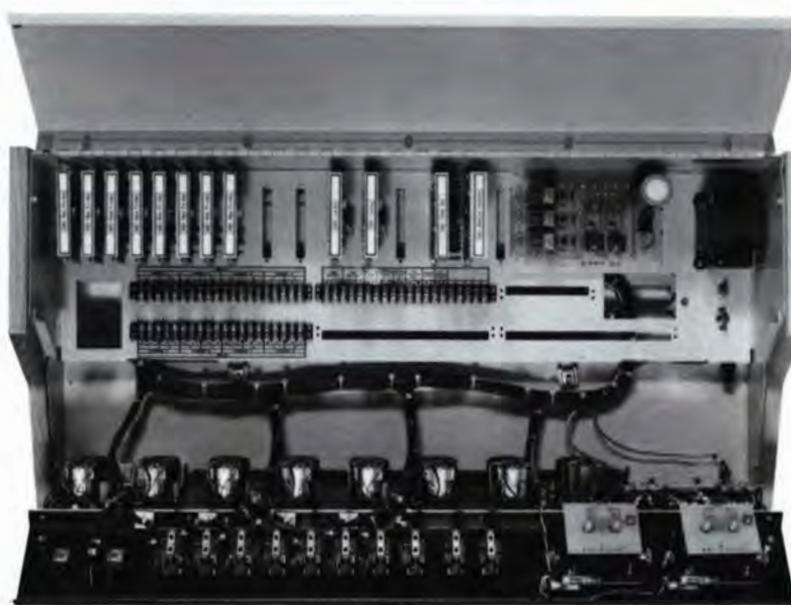
FULL BUS SELECTION

Output channel bus selection is controlled electronically by remote FET DC switching, eliminating mechanical contact closures from the low-level audio bus switching system.

SUPERB PERFORMANCE

Guaranteed electrical specifications and logically-positioned operating controls, complemented by attractive modern styling, make the Broadcast Electronics 250A Series Consoles the clear choice to satisfy the most demanding operating requirements.

BLOCK DIAGRAM



MODEL 8M250A Inside view, shows the same close attention to detail as the "human-engineered" front panel. Installation, service and maintenance are a pleasure!

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
5M250A	901-0541-000	5-mixer, Monaural Console Step Attenuators and telephone type channel keys, dual mono output channels, supplied with 3 muting relays. Includes preamp for each mixer channel; 2 line amp, 1 monitor amp, and 1 cue/headphone amp
8M250A	901-0841-000	8-mixer, Monaural Console Step Attenuators and telephone type channel keys, dual mono output channels, supplied with 3 muting relays. Includes preamp for each mixer channel; 2 line amp, 1 monitor amp, and 1 cue/headphone amp
	838-0200	230 Vac, 50/60 Hz power conversion.
5S250A	901-0540-000	5-Mixer Deluxe Stereophonic Console, Step Attenuators, supplied with 3 muting relays. Includes preamp (stereo) for each mixer; 4 line amp, 2 monitor amp, and 1 cue/headphone amp
8S250A	901-0840-000	8-Mixer Deluxe Stereophonic Console, Step Attenuators, supplied with 3 muting relays. Includes preamp (stereo) for each mixer; 4 line amp, 2 monitor amp, and 1 cue/headphone amp
	838-0200	Additional Cost for 230 VAC/50 Hz Power Source
	918-3602	Mono Matrix Module for 5S250A and 8S250A

SPECIFICATIONS

PROGRAM AND AUDITION CHANNELS

Inputs:

5S250A/5M250A: 10 into 5 mixers
8S250A/8M250A: 16 into 8 mixers
(Each model has 4 extra unwired inputs)

Input Impedance/Levels (Selectable)

Low Mode: 150 ohms, balanced. -65 dBv min., -38 dBv max.
High Mode: 54K ohms balanced bridging.
-20 dBv min., +20 dBv, max.

Frequency Response:

+0, -1 dB, 30 Hz - 20 kHz.

Distortion:

.075% or less IM & THD at +18 dBm output,
30 Hz - 20 kHz.

Signal-to-Noise:

Noise (unweighted), 70 dB below +18 dBm output with -50 dBv signal into any low-level input. 20 kHz bandwidth.

Output Impedance/Level:

600 ohms balanced. +8 dBm for zero-VU meter reading, +18 dBm output capability.

Overall Gain:

105 dB.

MONITOR CHANNEL

Inputs:

Pushbutton Selectable; Program/Audition/External.

Frequency Response:

+0, -1 dB, 50 Hz - 20 kHz.

Distortion:

0.75% or less, 30 Hz - 20 kHz at 8 watts rms into 8 ohm load.

Output Power/Impedance:

8 watts rms into 8 ohm load.

CUE AND HEADPHONE AMPLIFIERS:

1.0 watt rms into 8 ohm load. Internal cue speaker. Front panel headphone jack and program/audition/cue pushbutton selection.

VU Meters:

8M/5M250A: Two Meters; Audition & Program.
8S/5S250A: Two meters - L+R switchable to Audition and Program

MUTING:

Three relays provided. Prewired for monitor/cue muting through Mixer No. 1. Relays No. 2 and No. 3 controlled by Mixers No. 2 and No. 3 respectively. Other combinations by simple field strapping. Relays have terminated 1A, 125 Vac warning light contacts.

POWER REQUIREMENTS:

115 Vac, 50/60 Hz (230 Vac, 50/60 Hz optional). 85 watts maximum.

DIMENSIONS:

5S/5M250A: 29"W, 15.75"D, 8.25"H (73.7 x 40 x 20.9 cm)
8S/8M250A: 33"W, 15.75"D, 8.25"H (83.8 x 40 x 20.9 cm)

Weight (packed):

5S/5M250A: 55 lbs. (25 kg).
8S/8M250A: 60 lbs. (27.3 kg).

Note:

0 dBv = .7746v



10S150A

- Ten Mixing Channels**
- Twenty Stereo Inputs**
- Modular Plug-In Electronics**
- Contact-Free Bus Selection**
- Telephone-Type Channel Key Switch**

- Talk-Back Capability**
- Four Line-Level Outputs**
- Mono Mix-Down Option**
- Durable Front Panel Graphics**

TEN MIXER STEREO CONSOLE

Broadcast Electronics' 10S150A Stereo Console accommodates twenty inputs into ten mixing channels. The console features identical line-level output stereo program and audition channels, with VU meter switching to either stereo channel pair. Quiet-operating, telephone-type channel select switches are used.

ELEGANT STYLING, DURABLE GRAPHICS

The front panel of the 10S150A Console features crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or to wear the lettering away. The front panel will look as clean and fresh after years of normal usage as it did the day it was purchased!

MONO MIX-DOWN OPTION

For applications requiring a summed L+R mono signal in addition to the stereo program outputs, the consoles are prewired to accept an optional plug-in module for this purpose.

INTEGRAL HIGH/LOW LEVEL AND MONO/STEREO MODE SELECTION

Identical stereo preamplifier modules are used in all mixing channels. Modules may be pre-programmed for either low impedance microphone, or line-level input service. The user can thus assign mixing channel functions to meet current operating requirements and can readily change them to satisfy future combinations, without obsolescence.

DUAL CHANNEL DESIGN

A 600 ohm balanced audition channel is equal in performance to the program channel.

TALK-BACK CAPABILITY

The 10S150A Console provides a push-button selectable talk-back capability for two studios and one non-muted location such as a station lobby.

STEREO MONITOR/HEADPHONE AND SUMMED L+R CUE AMPLIFIERS

Stereo monitoring of program and audition channels, or an external source, is pushbutton selected and fed to stereo monitor amplifiers. Stereo headphone amplifier outputs, with pushbutton input selection of program, audition and cue busses, appear on a front panel jack. Through a summed L+R cue bus signal any input may be previewed through the built-in cue amplifier speaker system.

LONG-LIFE, LOW-NOISE MIXING CONTROLS

Dual potentiometers of sealed, high-reliability, long-life design are used for mixing controls. Dual cue switches are actuated in a detented CCW control position.

NO EXPOSED EXTERNAL CABLING

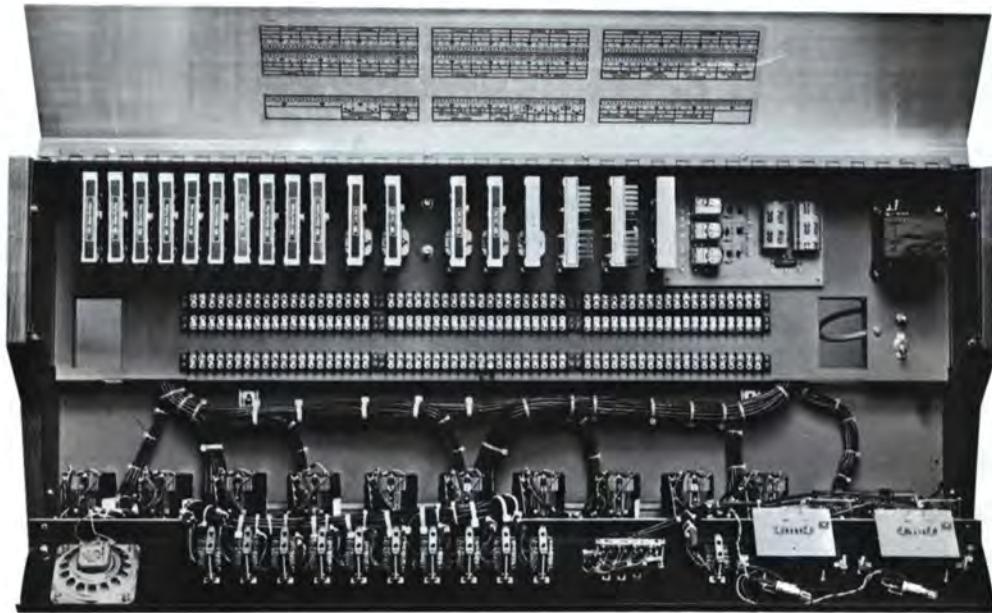
With labeled, screw-type barrier strips and adjacent cable access openings, the 10S150A console is a pleasure to install. The completed installation is free from exposed incoming wires and cables, with a truly professional appearance.

ADVANCED ELECTRONIC BUS SELECTION

Initiated by remote dc voltage, fast-acting, low noise selection of mixing busses is accomplished by gated-FET, contact-free switching, with no mechanical closures in the relatively low-level audio bus paths.

SIMPLE MUTING LOGIC

Muting of monitor and cue speakers is by transistor-switched relay operation, initiated by the Mixer #1 channel-select key switch. The consoles are prewired for a second optional relay. The relays include terminated contact closures for operation of external warning lights.



INTERNAL VIEW, MODEL 10S150A. Shows ready access to terminal boards for installation, and to modules and all internal components for service and maintenance.

SPECIFICATIONS

PROGRAM AND AUDITION CHANNELS

Stereo Inputs:

20 into 10 mixers

Input Impedances/Levels (Selectable):

Low Mode: 150 ohms balanced. -65 dBv min., -38 dBv max.

High Mode: 54K ohms balanced, bridging. -20 dBv min., +20 dBv, max.

Frequency Response:

+0, -1 dB, 30 Hz - 20 kHz.

Distortion:

.05% or less IM & THD at +18 dBm output, 30 Hz - 20 kHz.

Signal-to-Noise:

Noise (unweighted), 70 dB below +18 dBm output with -50 dBm signal into any low-level input. 20 kHz bandwidth.

Output Impedance/Level:

600 ohms balanced. +8 dBm for zero-VU meter reading. +18 dBm output capability.

STEREO MONITOR CHANNELS

Stereo Inputs:

Pushbutton selectable, program/audition/external.

Frequency Response:

±0.75 dB, 50 Hz - 20 kHz.

Distortion:

0.75% or less, 30 Hz - 20 kHz at 1.5 watts rms into 8 ohm loads.

Output Power/Impedance:

1.5 watts rms per channel into 8 ohm loads.

STEREO HEADPHONE AMPLIFIERS:

1.0 watts rms per channel into front panel phone jack. Program, audition and cue pushbutton input select.

Overall Gain:

105 dB.

Monaural Output (Optional L & R):

Same performance specifications as program/audition output channels. Mix ratio adjustable, ±6 dB.

VU METERS:

2 meters: L & R switchable to Audition and Program.

CUE AMPLIFIER:

1.0 watts rms into built-in 8 ohm speaker. Input is summed L+R signal.

MUTING:

One muting relay standard. Mutes monitor and cue speakers when Mixer No. 1 activated. Relay has terminated contact closures (1A at 125 Vac) for warning light operation. (Optional second relay available.)

POWER REQUIREMENTS:

115 Vac. 50/60 Hz (230 Vac, 50/60 Hz optional) 85 watts max.

DIMENSIONS:

39"W, 15.75"D, 8.25"H (88.9 × 40 × 20.9 cm)

WEIGHT (PACKED):

65 lbs. (29.5 kg.)

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
10S150A	901-1032-000	10 Mixer Stereophonic Console. Supplied with one muting relay. Includes preamp (stereo) for each mixer; 2 line amp, 2 monitor amp, and 1 cue/headphone amp.
	971-0021	Second muting relay
	838-0200	Additional Cost for 230 VAC/50 Hz Power Source



10M150A

- Ten Mixing Channels
- Twenty Mono Inputs
- Modular Plug-In Electronics
- Contact-Free Bus Selection
- Telephone-Type Channel Key Switch
- Talk-Back Capability
- Two Line-Level Outputs
- Durable Front Panel

TEN MIXER MONO CONSOLE

Broadcast Electronics' Model 10M150A Mono Console accommodates twenty inputs into ten mixing channels. This dual channel console features identical line-level output program and audition channels, with VU meter monitoring of both channels. Quiet-operating, telephone-type channel select switches are used.

INTEGRAL HIGH/LOW LEVEL MODE SELECTION

Identical preamplifier modules are used in all mixing channels. Modules may be pre-programmed for either low impedance microphone, or line-level input service. The user can thus assign mixing channel functions to meet current operating requirements and can readily change them to satisfy future combinations, without obsolescence.

DUAL OUTPUT CHANNELS AND VU METERING

The output channels are identical in performance. Each plug-in line amplifier module delivers 600 ohm, transformer-isolated, balanced output at a +8 dBm level. Illuminated 3½" VU meters afford continuous visual monitoring of the individual channel outputs. Contact fingers on all plug-in modules are gold-plated.

TALK-BACK CAPABILITY

A push-button selectable talk-back capability for two studios is an important operational feature in the Model 10M150A console.

MONITOR AND HEADPHONE AMPLIFIERS

High-quality control room and studio monitoring of program, audition or an external input is afforded by an 8-watt monitor amplifier module. Headphone monitoring of program and audition channels insures full aural access to critical portions of the console system. A front panel jack is provided for monitoring purposes.

PREFADER PREVIEW, ALL INPUTS

Bus signals are applied by cue switches on each mixer control, actuated in the detented closed-fader position to a built-in cue amplifier-speaker system.

NO EXPOSED EXTERNAL CABLING

With labeled, screw-type barrier strips and adjacent cable access opening, the 10M150A Mono Console is easy to install. The completed installation is free from exposed incoming wires and cables, and provides a truly professional appearance.

ELEGANT, DURABLE STYLING

Elegant styling adds durability and enhances the attractiveness of the 10M150A console. The front panel features crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or wear the lettering away. The front panel should look as clean and fresh after years of normal usage as it did the day it was purchased!

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
10M150A	901-1033-000	10 Mixer Mono Console. Supplied with one muting relay. Includes preamp for each mixer; 2 line amp, 2 monitor amp, and 1 cue/headphone amp.
	971-0021	Second muting relay
	838-0200	Additional Cost for 230 VAC/50 Hz Power Source



MODEL 5S150A



MODEL 8S150A

- Elegant Styling**
- Modular, Plug-in Electronics**
- Preset High/Low Input Sensitivity**
- Cue Switches, All Mixers**

- Mono Mixdown And Dual Channel Options**
- 0.05% IMD And THD**
- +0, -1 dB, 30 Hz - 20 kHz Response**
- Durable Front Panel**

FIVE- AND EIGHT-MIXER MODELS

Series 150A stereo consoles are available in five-mixer and eight-mixer configurations. Two inputs per mixer, at either microphone or line input levels, are pushbutton selectable. They are human engineered for error free production or on air use.

ELEGANT, DURABLE STYLING

Durable Series 150A front panels feature crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or wear the lettering away. The elegant front panel will look as clean and fresh after years of normal usage as it did the day it was purchased!

PROGRAMMABLE MONO/STEREO, HIGH/LOW LEVEL INPUTS

Identical modules are used in each stereo mixer input channel. Modules may be preset for mono/stereo and (or) high/low level to permit the user to gear individual mixing channel operation functions precisely to his programming requirements.

+18 dBm LEFT AND RIGHT CHANNEL OUTPUT CAPABILITY

Left and right channel plug-in line amplifier modules deliver +18 dBm balanced stereo outputs, visually-monitored on dual, 3½", illuminated VU meters. Adequate "headroom" is insured by the +18 dBm output capability of the line amplifiers.

FET BUS SELECTION

Electronic bus switching, using gated FET techniques, insures fast and silent operation. Switching is effected by simple, remote application of dc control voltages to the FET circuitry, eliminating mechanical contact closures from low-level audio bus paths.

STEREO MONITOR/HEADPHONE AND SUMMED L+R CUE AMPLIFIERS

Stereo monitoring of program and audition channels, or an external source, is pushbutton selected and fed to the stereo monitor amplifier. Stereo headphone amplifier outputs, with pushbutton input selection of program, audition and cue busses, appear on a front panel jack. Through a summed L+R cue bus signal, any input may be previewed through the built-in cue amplifier speaker system.

LONG-LIFE, LOW-NOISE MIXING CONTROLS

Dual potentiometers of sealed, high-reliability, long-life design are used for mixing controls. The cue switch, actuated in a detented CCW control position, produces a summed L&R cue bus signal source.

SIMPLE MUTING LOGIC

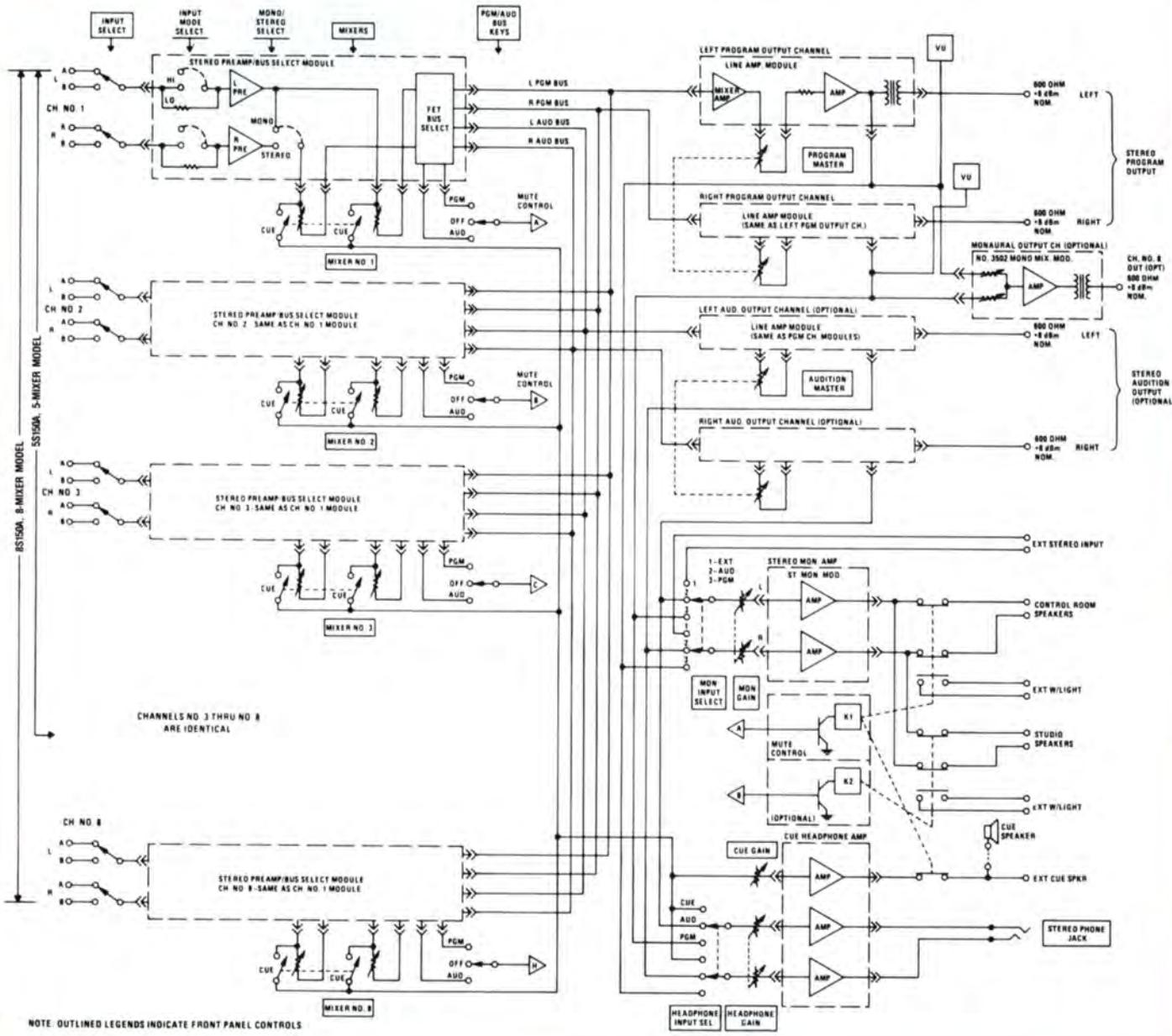
Muting of monitor and cue speakers is by transistor-switched relay operation, initiated by the Mixer #1 channel-select key switch. The consoles are prewired for a second optional relay. The relays include terminated contact closures for operation of external warning lights.

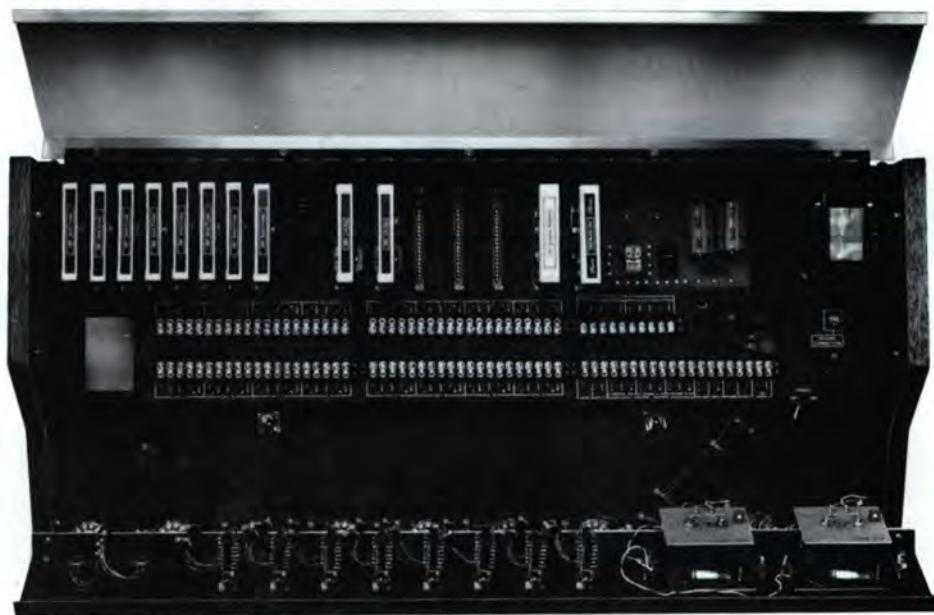
CLEAN, STRAIGHTFORWARD INSTALLATION

External connections are made to labeled screw-type barrier strips located in the cabinet bottom with adjacent cable access openings. This permits an installation completely free from unattractive exposed cables.

MONO MIXDOWN/LINE LEVEL AUDITION OPTIONS

The consoles are prewired to accept optional plug-in modules for line-level monaural or stereo audition outputs where either of these additional operating functions are required. An optional mono program output is also available for simultaneous mono/stereo broadcasting.

BLOCK DIAGRAM



MODEL 8S150A Internal View. As neat inside as outside. Easy to install and maintain. Supplied with stereo preamp for each mixer, two line amps, one monitor amp and one cue/headphone amp. Mono matrix is optional.

SPECIFICATIONS

PROGRAM AND AUDITION (OPTIONAL) CHANNELS

Stereo Inputs:

5S150A: 10 into 5 mixers
8S150A: 16 into 8 mixers

Input Impedances/Levels (Selectable):

Low Mode: 150 ohms balanced. -65 dBv min., -38 dBv max.
High Mode: 54K ohms balanced, bridging.
-20 dBv min., +20 dBv, max.

Frequency Response:

+0, -1 dB, 30 Hz - 20 kHz.

Distortion:

0.05% or less IMD & THD at +18 dBm output,
30 Hz - 20 kHz.

Signal-to-Noise:

Noise (unweighted), 68 dB below +18 dBm output
with -50 dBm signal into any low-level input. 20 kHz
bandwidth.

Output Impedance/Level:

600 ohms balanced. +8 dBm for zero-VU meter
reading. +18 dBm output capability.

Overall Gain: 105 dB.

Monaural Output (Optional):

Same performance specifications as program/audition
output channels. Mix ratio adjustable, ±6 dB.

STEREO MONITOR CHANNELS

Stereo Inputs:

Pushbutton selectable, program/audition/external.

Frequency Response:

±0.75 dB, 50 Hz - 20 kHz.

Distortion:

0.75% or less, 30 Hz - 20 kHz at 1.5 watts rms into
8 ohm loads.

Output Power/Impedance:

1.5 watts rms per channel into 8 ohm loads.

STEREO HEADPHONE AMPLIFIERS:

1.0 watts rms per channel into front panel phone
jack. Program, audition and cue pushbutton input
select.

CUE AMPLIFIER:

1.0 watts rms into built-in 8 ohm speaker. Input is
summed L+R signal.

MUTING:

One muting relay standard. Mutes monitor and cue
speakers when Mixer No. 1 activated. Prewired for
second optional relay. Relays have terminated con-
tact closures (1A at 125 Vac) for warning light
operation.

POWER REQUIREMENTS:

115 Vac, 50/60 Hz (230 Vac, 50/60 Hz optional) 85
watts max.

DIMENSIONS:

5S150A: 29" W, 15.75" D, 8.25" H (73.7 x 40 x
20.9 cm)
8S150A: 29" W, 15.75" D, 8.25" H (73.7 x 40 x
20.9 cm)

Weight (packed):

5S150A: 54 lbs. (24.5 kg).
8S150A: 55 lbs. (25 kg).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
5S150A	901-0530-000	5-Mixer Stereophonic Console, sealed Pots
8S150A	901-0830-000	8-Mixer Stereophonic Console, sealed Pots
	838-0200	Additional Cost for 230 Vac/50 Hz Power Source
	918-3602	Mono Matrix Card for 5S150A or 8S150A
	918-3604	Line Amplifier for Stereo Audition Channel 5S150A or 8S150A (two Required)
	971-0021	Second Muting Relay for 5S150A or 8S150A



5M150A

- Elegant Styling**
- Plug-In Amplifiers**
- .05% IM and THD Distortion**
- +0, -1 dB, 30 Hz - 20 kHz Response**
- High or Low Level Input**
- 8 Watt Monitor Amp**
- Durable Front Panel**



8M150A

VERSATILITY/ECONOMY

Operational convenience at an economical cost has made the Series 150A consoles a popular choice. Modern circuit design on plug-in amplifiers permit Broadcast Electronics' 150A Series consoles to provide excellent audio performance.

FIVE OR EIGHT MIXER MODELS

The Series 150A dual-channel consoles are available in either five- or eight-input mixer models. They are human engineered for error free production or on-air use.

ELEGANT, DURABLE STYLING

Contemporary design adds durability and enhances the attractiveness of the 150A Series consoles. The front panel features crisp, clean graphics under a laminated polycarbonate overlay. This tough protective surface makes it virtually impossible to scratch or wear the lettering away. The front panel should look as clean and fresh after years of normal usage as it did the day it was purchased!

SELECTABLE MICROPHONE/LINE LEVEL INPUTS

Identical plug-in preamplifier modules are used in each mixing channel. These modules can be preset to operate either as low-impedance microphone preamplifiers or to accommodate high-level sources. This feature affords complete flexibility in mixing assignments to meet existing operating requirements or to readily adapt to future changes.

TWO INPUTS PER MIXER

Interlocked, pushbutton selection of two sources per mixer is provided.

FET BUS SELECTION

The preamplifier module circuitry includes modern FET output bus selection, permitting silent channel bus assignment of the mixer preamp output. Dry-contact mechanical switching of low-level audio bus signals is eliminated.

SPEAKER MUTING

The Series 150A consoles are supplied with one speaker muting/warning light relay, with two additional relays as an option. The consoles are prewired for relay operation in conjunction with Mixer #1, #2 and #3. Muting assignment is easily field-modified for other mixer assignments or extensions.

DUAL OUTPUT CHANNELS AND VU METERING

The output channels are identical in performance. Each plug-in line amplifier module delivers 600 ohm, transformer-isolated, balanced output at a +8 dBm level. Illuminated 3½" VU meters afford continuous visual monitoring of the individual channel outputs. Contact fingers on all plug-in modules are gold-plated.

COMPLETE SYSTEM MONITORING

Monitoring at levels up to 8 watts, rms, affords an aural check of the program or auditon channels.

Headphone monitoring of program, audition or cue busses, selectable by pushbutton operation, is standard. A front panel jack and headphone gain control permit monitoring up to a 1.0 watt level with 8 ohm headphones.

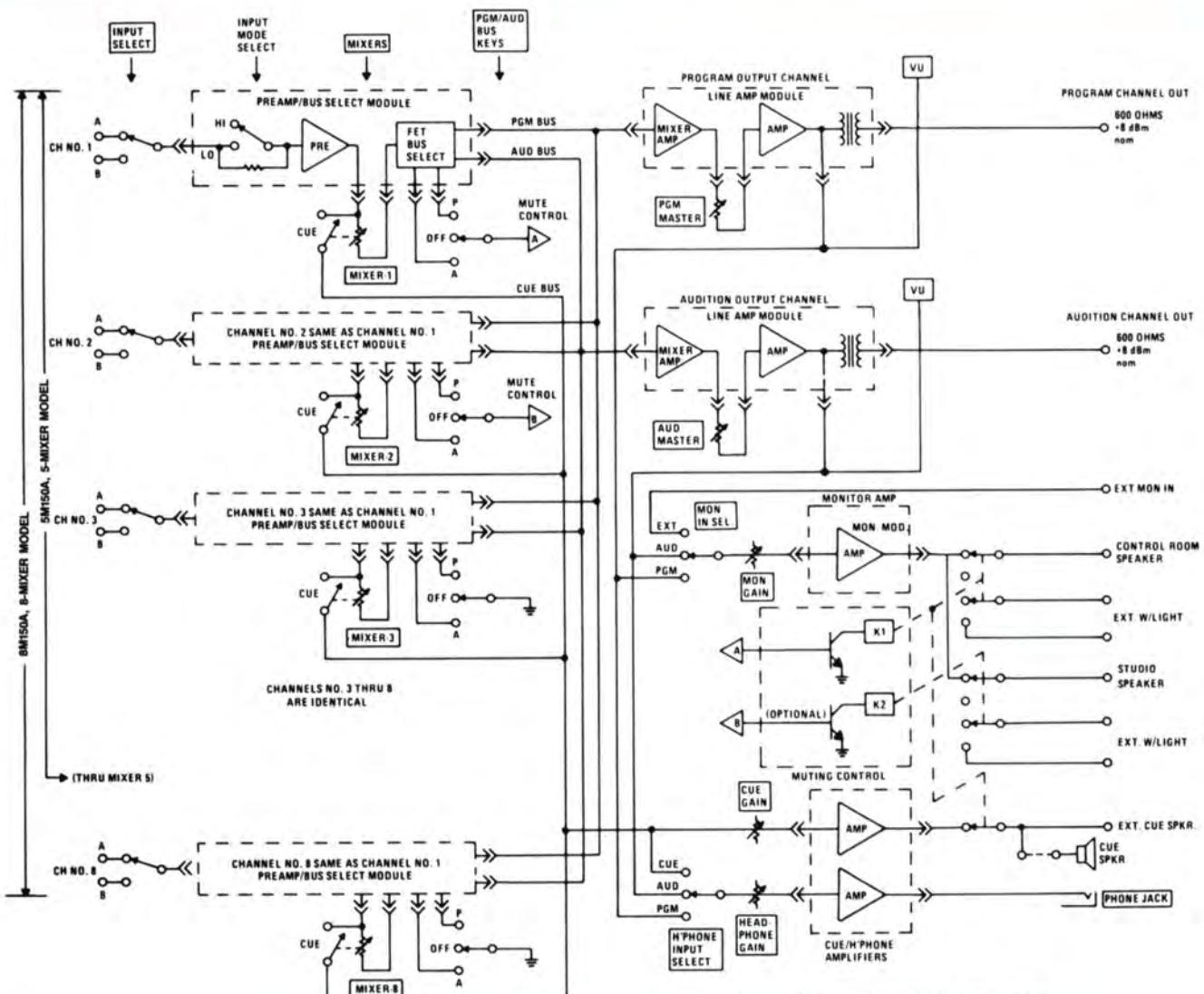
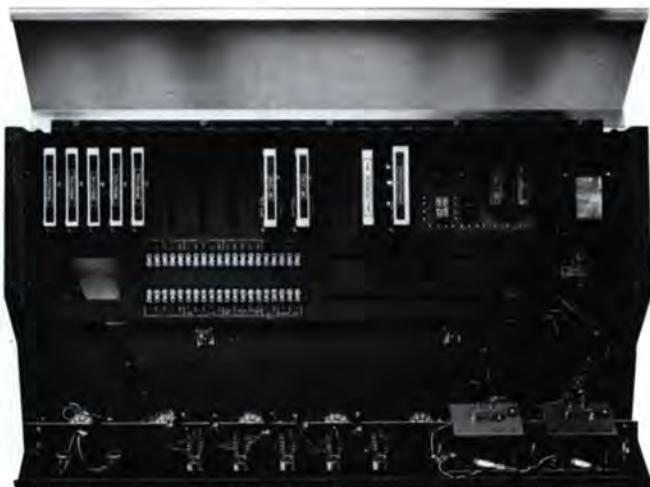
CLEAN SIMPLE INSTALLATION

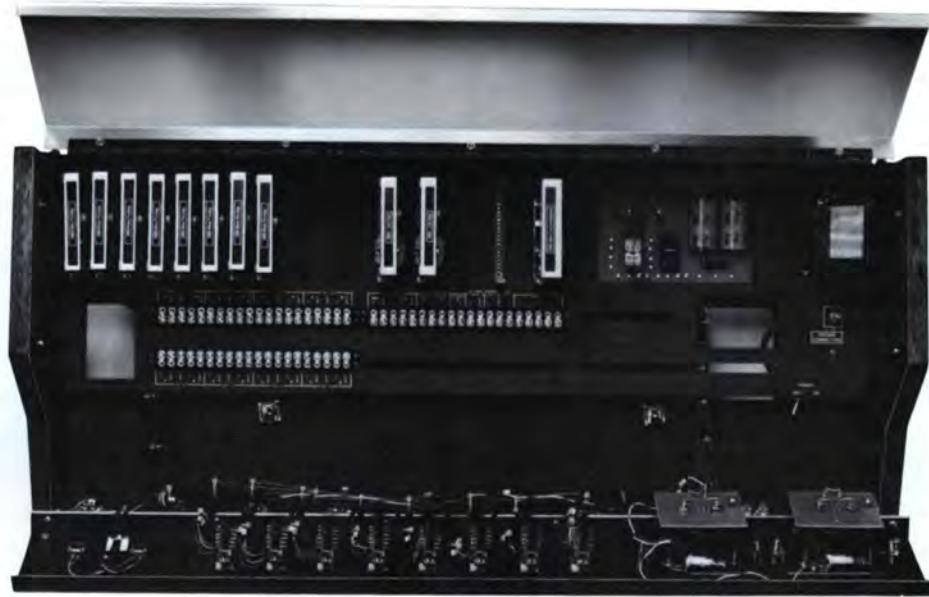
All external wiring is made to clearly labeled screw-type barrier strips, eliminating unattractive exposed cables. Cable access is through openings in the base of the console housing. These features insure simple, neat installation.

HIGHLY RELIABLE, FUNCTIONAL OPERATION

The Series 150A consoles provide reliable, long-term operation with careful attention to human engineering factors for ease of operation and maintenance. They are further enhanced by an elegant, yet functional styling to insure the Series 150A console user of a highly-professional, economically-practical audio console.

MODEL 5M150A
Internal view shows complete
access to controls, switches,
modules and terminal blocks.





Model 8M150A with top lid and front panel open. Note neat cabling and clear access to all components and modules for maintenance. Includes preamp for each mixer, 2 line amps, 1 monitor amp and 1 cue/headphone amp.

SPECIFICATIONS

PROGRAM AND AUDITION CHANNELS

Inputs

5M150A: 10 into 5 mixers.
8M150A: 16 into 8 mixers.

Input Impedances (Selectable)/Levels

Low Mode: 150 ohms, -65 dBv min. -38 dBv max.
High Mode: 54 K ohms, bal., bridging: -20 dBv min.
+20 dBv max.

Frequency Response

+0, -1 dB, 30 Hz to 20 kHz.

Distortion

0.5% or less IM & THD at +18 dBm output, 30 Hz to 20 kHz.

Signal-to-Noise Ratio

68 dB below +18 dBm output with -50 dBm into any low level input. 20 kHz Bandwidth.

Output Impedance/Level

600 ohms balanced, +8 dBm for zero-VU meter reading; +18 dBm max.

Overall Gain

105 dB.

MONITOR CHANNEL

Inputs

Program/Audition/External. Pushbutton selectable.

Frequency Response

±0.75 dB, 50 Hz to 20 kHz.

Distortion

0.75% or less, 30 Hz to 20 kHz, @ rated rms output and load.

Output Power/Impedance

8 watts rms into 8 ohm load.

CUE AND HEADPHONE AMPLIFIERS

1.0 watt rms. Internal cue speaker. Front panel headphone jack and pushbutton program/audition/cue bus selection.

MUTING

One muting relay standard. Two additional relays optional. Standard relay mutes monitor and cue speakers when Mixer 1 activated. Includes terminated contact closure (1A, 125 Vac) for warning light operation.

POWER REQUIREMENTS

115Vac, 50/60 Hz (230Vac, 50/60 Hz optional) 50 watt max.

DIMENSIONS

5M150A: 29" W, 15.75" D, 8.25" H (73.7 x 40 x 20.9 cm).

8M150A: 33" W, 15.75" D, 8.25" H (83.8 x 40 x 20.9 cm).

WEIGHT (packed)

5M150A: 49 lbs. (22.3 kg.).
8M150A: 55 lbs. (25 kg.).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
5M150A	901-0531-000	5-Mixer Monophonic Console, sealed Pots, Dual Channel.
8M150A	901-0831-000	8-Mixer Monophonic Console, sealed Pots, Dual Channel.
	838-0200	Additional Cost for 230 VAC/50 Hz Power Source.
	971-0021	Second Muting Relay For 5M150A and 8M150A.



4S50A

- High/Low Input Sensitivity Selection
- Cue Switches, All Mixers
- Excellent Performance-Reasonable Cost
- 12 Stereo Inputs

ACCOMMODATES 12 STEREO INPUT SOURCES

The Broadcast Electronics 4S50A four-mixer stereo console features performance at a practical price. This versatile console allows preselection of eight stereo input sources with intermix and level control of four of these simultaneously.

INPUT SELECTION

Two stereo inputs, either high or low level, can be accommodated by each of the first three channels. Channel four can be preselected to a single high or low level stereo input or to one of five high level remote/utility stereo inputs.

DUAL VU METERS AND STEREO MONITORING

Visual monitoring of left and right channel outputs is by 3½" VU meters. Aural monitoring at 3 watt rms level, per channel, for operating position and studio loudspeakers, plus stereo headphone .5 watt per channel amplifier outputs (terminated in a front panel jack), insure close surveillance of program quality. In addition to stereo program channel information, an external stereo source and mono cue bus material may be monitored by headphones.

CUE-SWITCHES ON ALL FADERS

The high reliability, low-noise sealed dual potentiometers used for mixer level control are fitted with cue switches so that each

- Ideal For Stereo Production, Discotheque Or On Air
- Individual Monitor, Cue, Headphone Amplifiers

source can be previewed through the self-contained cue amplifier speaker system.

MUTING LOGIC

Monitor and cue speakers are relay-muted through contact closures on the mixer A-B input select key switches. Normally wired for muting in conjunction with Mixer #1 operation, other assignments are readily made in the field by strapping.

IDEAL FOR STEREO PRODUCTION OR ON-AIR USE

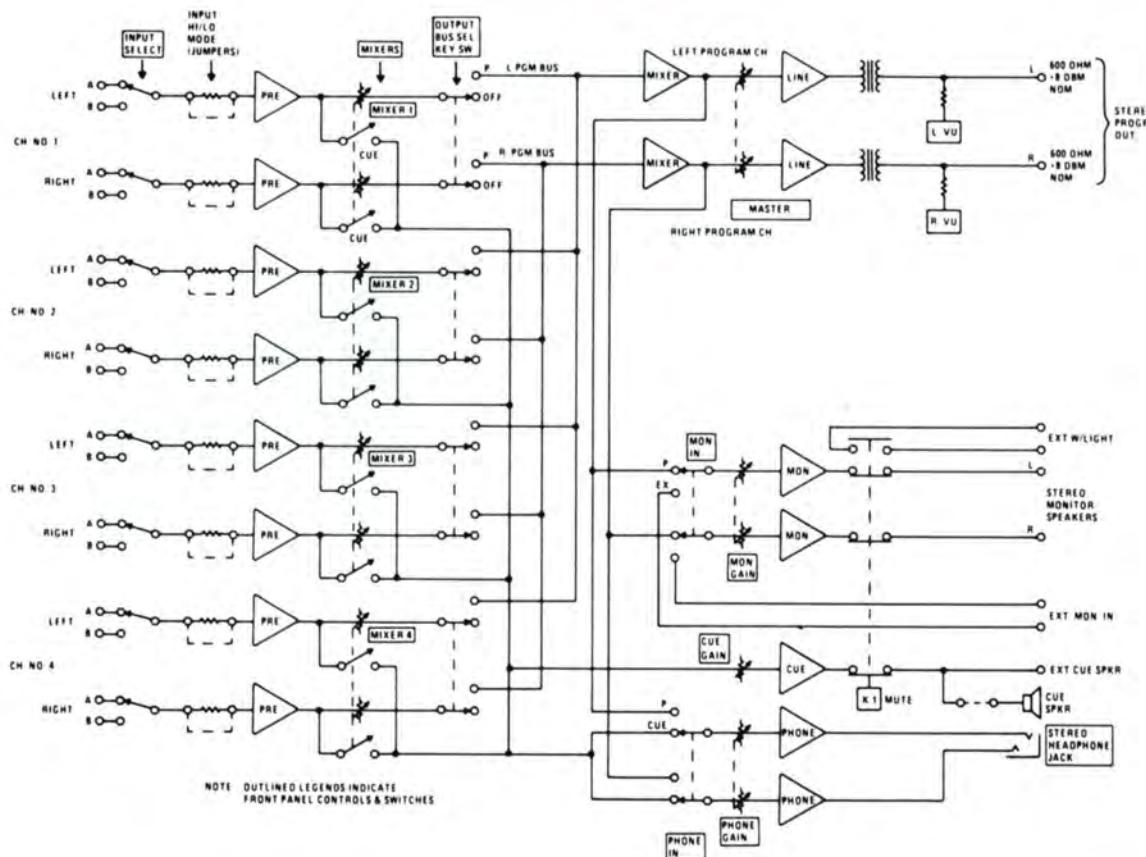
The stereo performance characteristics of the 4S50A are excellent and make it an ideal tool in the production of stereo taped material or, where a modest, yet flexible control room/studio operation is involved, totally suited for on-air stereo FM broadcast use.

4S50AP PORTABLE OPTION

The "P" or portable option in the 4S50A enables the user to install and remove the console quickly. The prewired rear panel provides 3 input connectors, a program output connection, (both on XLR type connections), and monitor speaker output using a ¼-inch phone jack. This makes the unit ideal for remotes or any other application that requires frequent or occasional removal of the console.

With the pre-wired, pre-labeled assembly, the "portable" option can be added at a later date in the field.

BLOCK DIAGRAM



SPECIFICATIONS

STEREO PROGRAM CHANNELS

Stereo Inputs:

Two per mixing channels 1-3. Ch 4:6 Total 12.

Input Impedance/Levels:

Low Mode: 150 ohms balanced. -65 dBm, nominal, -38 dBm max.

High Mode: 20K ohms balanced bridging. -20 dBm, nom., +20 dBm max.

Above modes preset by internal strapping.

Frequency Response:

+0, -1 dB, 30 Hz-20 kHz.

Distortion:

.1% THD .15% IMD, 30 Hz - 20kHz @ +18 dBm output.

Signal-to-Noise:

-65 dB (unweighted) below +18 dBm out with -50 dBm low level input signal, 20 kHz bandwidth.

Output Impedance/Level:

600 ohms balanced. +8 dBm for zero-VU meter readings. +16 dBm max.

STEREO MONITOR AMPLIFIERS

Frequency Response:

+0, -1 dB, 30 Hz-20 kHz.

Distortion:

.75% THD and IM, 30 Hz-20 kHz at 3.0 watts rms per channel into nominal 8 ohm load.

Output Power/Impedance:

3.0 watts rms per channel into 8 ohm loads.

STEREO HEADPHONE AMPLIFIERS:

.5 watt rms per channel into front panel jack. Program/cue inputs.

MUTING:

As wired, monitor and cue speakers muted by Mixer 1 A-B input select switch. Assignable, by strapping, to any channel input. Muting relay includes 1A, 125 Vac warning light contacts.

POWER REQUIREMENTS:

115 Vac, 60 Hz (230 Vac, 50/60 Hz optional) 50 watts maximum.

DIMENSIONS:

19"W, 13"D, 7.5"H (48.26 x 33 x 19.1 cm).

WEIGHT (PACKAGED):

24 lbs. (10.8 kg).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
4S50A	901-0452-000	Stereo Four 4-Mixer Stereo Console
4S50AR	901-0453-000	Rack Mount Stereo Four 4-Mixer Stereo Console
4S50AP	901-0452-021	Stereo 4-Mixer Console with XLR Connectors
	838-0202	230 VAC 50/60 Hz Power Conversion



Model 4M50A

- Selectable Hi/Lo Sensitivity, All Channels
- Individual Monitor, Headphone And Cue Amplifiers

COMPACT, PROFESSIONAL PERFORMANCE

Incorporating modern solid-state technology, the Broadcast Electronics Model 4M50A 4-Mixer Monaural Console affords professional performance at reasonable cost. Compact, yet uncluttered, the 4M50A, with two inputs per mixer, can handle the selection and level control/mix of up to eight sources.

MICROPHONE OR LINE LEVEL INPUT SELECTION

Flexibility is a feature. Each mixing channel uses identical input preamplifier circuitry which can be prewired for either low-impedance microphone service or for use with high-level input equipment.

COMPLETE MONITORING AND CUE CAPABILITY

Individual monitor, headphone and cue amplifiers with front panel input and level control insure aural monitoring capability of all critical functions.

RUGGED, LOW-NOISE MIXER CONTROLS

Sealed, high-reliability potentiometers are used for mixing. These are of special design, intended for applications where continual use is required. All mixers are equipped with cue switches.

MONITOR/CUE SPEAKER MUTING

Monitor amplifier output and the built-in cue loudspeaker are

- Straightforward, Neat Installation
- Excellent For On-Air, Newsroom, Remote And Production Use

automatically muted whenever Mixer #1 is used. Muting assignment to other mixing channels is easily effected by strapping. Terminated relay contacts (1A, 125 Vac) for warning light operation are included.

EASY TO INSTALL. NO EXPOSED CABLE

All incoming cables connect to labeled screw-type barrier strips with adjacent access openings in the bottom of the cabinet. This eliminates exposed wiring.

EFFICIENT, PROFESSIONAL OPERATION

High quality performance and clean functional operation highlight the ideal console for production, on-air, newsroom or remote broadcast purposes—or for educational and industrial applications.

MODEL 4M50AP PORTABLE OPTION

The "P" model version, or portable option in the 4M50A enables the user to install and remove this console quickly. The pre-wired rear panel provides 7 input connectors, a program output connection, both on XLR type connections, and monitor speaker output using a 1/4" phone jack. This makes the unit ideal for remotes or any other applications that require frequent or occasional removal of the console. With the pre-wired, pre-labeled assembly the "portable" option can be added at a later date in the field.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
4M50A	901-0450-000	Mono 4-Mixer Monophonic Console
4M50AR	901-0451-000	Mono 4-Mixer Console, Rack Mount
4M50AP	901-0450-021	Mono 4-Mixer Console with Rear Panel Plug-in Connectors
Factory Installed Options		
838-0201		Additional cost for 220VAC/50Hz Power Source, 4M50A Series
901-00003-001		Rear Panel Plug-in connector panel assembly for 4M50A, XLR

SPECIFICATIONS

PROGRAM CHANNEL

Inputs:

Two per mixer, total: 8

Input Impedance/Levels (Strappable):

Low Mode: 150 ohms balanced. -62 dBm nom.,
-45 dBm max.High Mode: 36K ohms balanced bridging:
-20 dBm nom., 0 dB max.

Frequency Response:

+0, -2 dB, 80 Hz - 20 kHz.

Distortion:

Less than .5%, 30 Hz - 20 kHz.

Signal-to-Noise:

60 dB (unweighted) below +8 dBm output.

-50 dBm signal to any low-level input.

Overall Gain:

90 dB minimum.

Output Impedance/Level:

600 ohm balanced. +8 dBm for zero-VU meter
reading. +16 dBm max.

MONITOR AMPLIFIER

Frequency Response:

+0, -2 dB, 40 Hz - 20 kHz.

Distortion:

.75% or less, 40 Hz - 20 kHz at rated output and
load.

Output Power/Impedance:

1.5 watts rms into 8 ohms load.

HEADPHONE AMPLIFIER:

.9 watt rms into 8 ohms load. Front panel jack. Prog/
cue/external input.

CUE AMPLIFIER:

1.0 watt rms into built-in 8 ohm speaker.

MUTING:

Assignable by strapping to any channel input
combination.

POWER REQUIREMENTS:

115 Vac, 50/60 Hz (230 Vac, 50/60 Hz optional)
40 watts max.

Hinged top cover and front panel give full access to
the barrier strips for installation, and all control
switches and components for maintenance.

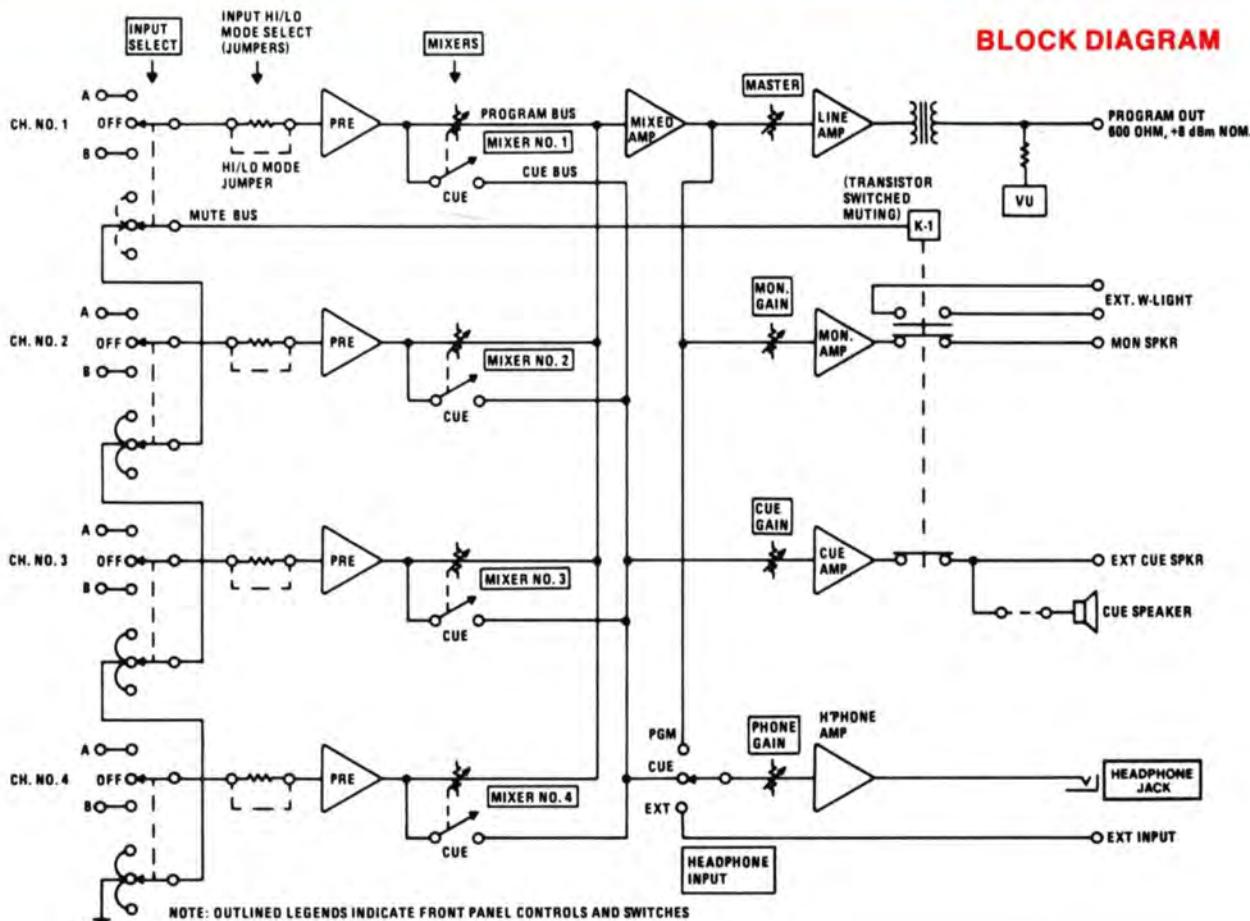
DIMENSIONS:

18" W, 13" D, 7.5" H (45.8 x 33 x 19.1 cm)

SHIPPING WEIGHT:

23 lbs. (10.4 kg).

BLOCK DIAGRAM





4R50

- Transformer Balanced Inputs
- Cue Switches, All Mixers
- Ideal For Broadcast, Mobile, CCTV and CATV Applications

- Switchable Microphone/High Level Inputs
- Integral Tone Generator
- Rack Mounting, 3½"

BROADCAST, MOBILE, CCTV AND CATV APPLICATIONS

Broadcast Electronics Model 4R50 rack-mount, four mixer audio console is a self-contained, compact audio console system. The Model 4R50 is useful for production and semi-permanent broadcast remote originations. Its multi-input flexibility makes it a desirable component in industrial and educational CCTV systems or for CATV studio origination.

ACCOMMODATES WIDE CHOICE OF INPUT SOURCES

The first three mixing channels are identical, accepting either low-impedance microphone or high-level inputs through rear panel preset switching. Two inputs may be selected for each mixer by adjacent switch operation. Mixer 4 has additional high-level input capability. It will accept one low-level input or three pushbutton-selected high-level inputs. Thus, a total of ten sources may be selected for up to four simultaneous "mixes."

SEALED MIXER CONTROLS WITH CUE SWITCHING

Mixers are long-life sealed potentiometers, each equipped with cue switches. This permits preview of input sources through the built-in cue amplifier and speaker. The latter is automatically muted whenever input 1 is activated.

1 KHZ TONE GENERATOR

An internal tone generator facilitates quick and accurate output level adjustment.

HEADPHONE MONITORING/EXTERNAL AMPLIFIER FEED

Either program output or cue bus information may be monitored through the headphone amplifier with front panel jack output. Program material appears on a rear panel high-impedance output terminal for feeding external PA or monitoring equipment.

DESIGNED FOR SIMPLE INSTALLATION

External wiring connections are made to labeled rear-panel screw-type barrier strips or for program output and ground, to binding posts.

COMPACT, COMPLETE, CONTROL CENTER

Astoundingly versatile for its size, the Model 4R50 Console is an outstanding unit where selection and mixing of many inputs of either microphone-level or line-level nature are involved. Rack space required is only 3½ inches (8.9 cm).



THREE SPEED DESIGN

Manufactured by Broadcast Electronics, a series of subtle, precision improvements to this pioneer QRK design have made the 12C an industry standard.

The 12C is a rugged, reliable turntable which comes up to speed in a fraction of a second, and performs with minimum rumble, wow and flutter. Low rumble, wow and flutter is further ensured by the use of an acoustic-absorbing, high-memory rubber idler.

Carefully designed motor isolation mounts and a statically balanced motor/counterweight assembly also help reduce rumble.

Models 12C and 16C

- Three standard speeds, 33⅓, 45 & 78 rpm
- Instant start (Full speed in less than 1/8th revolution)
- Rugged construction, Only three moving parts
- Rim drive assures minimum rumble, maximum starting torque
- Stereo rumble less than -38 dB (Exceeds NAB Standards)



MODEL 16C - A 16" Platter and 3 standard speeds.

SPECIFICATIONS - 12C TURNTABLE

Speeds:
33⅓, 45 & 78 rpm.

Standard Color:
Gray with black felt pad.

Line Voltage:
115 VAC, 60 Hz, standard (230 VAC, 50 Hz, optional).

Start-up Time:
1/8th revolution at 33⅓ rpm.

Stereo Rumble:
-38 dB. (NAB standard, -35 dB)

Wow and Flutter:
Less than 0.1%.

Speed Regulation:
+1%, -0%.

Drive:
Outer rim through idler.

Capstan Concentricity:
.0004".

Platter Weight:
5 lbs.

Dimensions:
15" W x 15½" D.

Depth Below Frame:
5".

Weight:
21 lb. net, 25 lb. packed.

Note: Two speed turntable model 12C2 for 33⅓, and 45 rpm is also available.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
(Turntables - 12")		
12C/U	902-0008	12C Turntable, 3 speed, undrilled, AC Motor, 117V/60Hz
12C/320	902-0009	Same as 902-0008 except drilled for S-320
12C/O	902-0010	Same as 902-0008 except drilled for other brand tone arm (Specify brand arm)
12C/U	902-0011	12C Turntable, 3 speed, undrilled, AC Motor, 220V/240V, 50Hz
12C/320	902-0012	Same as 902-0011 except drilled for S-320
12C/O	902-0013	Same as 902-0011 except drilled for other brand tone arm (Specify brand arm)
12C/U	902-0001	12C Turntable, 3 speed, undrilled, AC Motor, 117V/50Hz
12C/320	902-0002	Same as 902-0001 except drilled for S-320
12C/O	902-0003	Same as 902-0001 except drilled for other brand tone arm (Specify brand arm)
(Turntables - 16")		
16C/U	902-0069	16C Turntable, 3 speed, 16" platter, undrilled, AC Motor, 117V/60Hz
16C/260	902-0070	Same as 902-0069 except drilled for S-260
16C/O	902-0071	Same as 902-0069 except drilled for other brand tone arm (Specify brand arm)
16C/U	902-0073	16C Turntable, 3 speed, 16" platter, undrilled, AC Motor, 220V/240V, 50Hz
16C/260	902-0074	Same as 902-0073 except drilled for S-260
16C/O	902-0075	Same as 902-0073 except drilled for other brand tone arm (Specify brand arm)

**Model 12C2**

- Two speeds: 33½ & 45 rpm
- Instant start (full speed in less than ¼th revolution)
- Hysteresis synchronous motor
- Rugged construction. Only three moving parts
- Rim drive assures minimum rumble, maximum starting torque
- Stereo rumble less than -38 dB (Exceeds NAB Standards)

TWO SPEED DESIGN

The Model 12C2 is Broadcast Electronics' two speed turntable engineered for performance and dependability. This rim drive turntable utilizes the proven design and quality of the popular three speed version, the Model 12C.

The 12C2 is a rugged, reliable turntable which comes up to speed in a fraction of a second, and performs with minimum rumble, wow and flutter.

The use of an acoustic-absorbing, high-memory rubber idler further assists in achieving low rumble, wow and flutter. This new rubber idler is of a material specially blended for Broadcast Electronics.

Newly designed motor isolation mounts and a statically balanced motor/counterweight assembly also help reduce rumble.

PRECISION MACHINED PLATTER

A redesigned platter achieves maximum kinetic flywheel energy, with improved dynamic balance. The idler is specially designed to transmit the motor torque to the inside rim of a perfectly concentric platter.

Outer rim drive has been demonstrated in over 35 years of usage as the best method for achieving "instant start" with a minimum of vibration effects.

Attractively styled, the 12C2 turntable has a gray matte finish with black felt pad and a durable polycarbonate overlay on the speed shift plate extrusion.

SPECIFICATIONS

Speeds:	Speed Regulation:	Depth Below Frame:
33½ and 45 rpm.	+1%, -0.	5".
Line Voltage:	Drive:	Standard Color:
115 Vac, 60 Hz, standard (230 V/50 Hz optional).	Outer rim through idler.	Gray with black felt pad.
Start-up Time:	Capstan Concentricity:	Weight:
¼th revolution at 33½ rpm.	.0004" T.I.R.	21 lb. net, 25 lb. packed. (11.4 kg. packed)
Stereo Rumble:	Platter Weight:	Cubage:
-38 dB (NAB Standard, -35 dB).	5 lb.	1.7 cu. ft. packed.
Wow and Flutter:	Dimensions:	
Less than 0.1%.	15" W x 15½" D.	

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
12C2/U	902-0063	12C2 Turntable, 2 speed, undrilled, AC Motor, 117V/60Hz
12C2/320	902-0064	Same as 902-0063 except drilled for S-320
12C2/O	902-0065	Same as 902-0063 except drilled for other brand tone arm (Specify brand arm)
12C2/U	902-0066	12C2 Turntable, 2 speed, undrilled, AC Motor, 220V/240V, 50Hz
12C2/320	902-0067	Same as 902-0066 except drilled for S-320
12C2/O	902-0068	Same as 902-0066 except drilled for other brand tone arm (Specify brand arm)

NOTE: One manual is shipped with each turntable. To order additional manuals, order P/N 597-0089



**Model S-320, 12 inch
Model S-260, 16 inch**

- Tubular Construction, Clean Rek-O-Kut Design**
- Tracks At Less Than 1 Gram**
- Tracking Error Under 1° — Horizontal Movement**
- 100% Shielding**
- Cartridge Shell Accepts All Standard Stereo or Mono Cartridges**
- Meets or Exceeds The Critical Requirements of Ultra-High Compliance Cartridges**
- Vertical Height Adjustment Permits Setting Tone Arm Parallel To Record Surface**
- Resonance Below 10 Hertz With Average Pick-Up Virtually Dampened Out**
- Separate Balance And Stylus Pressure Adjustment Easily Obtained By Rotation Of The Counter Weight Or Micropoise Knob**
- Removable Shell For Easy Stylus Replacement**

SUPERB STEREO PERFORMANCE

Optimum tracking ability of the tonearm plays a vital role in achieving superior reproduction from the modern stereo record. Balance, low resonance, low friction and tangential relation of stylus to groove are the fundamental considerations that must be answered by the total tonearm design. All these elements are combined in both S-320 and S-260 tonearms which were designed by Rek-O-Kut.

PERFECT BALANCE

Perfect balance is achieved in two simple steps:

(a) STATIC BALANCE - Obtained with cartridge installed and counter-weight positioned to poise the arm horizontally. (b) TRACKING BALANCE - By dialing the cushioned spring-tension

Micropoise Balance Control, the arm is balanced and set for proper stylus pressure.

PRECISION CONSTRUCTION

Exclusive gimbal assembly incorporates individual double sets of five, 1 mm. ball bearings providing the freest vertical and lateral motion found in any tonearm today! The low-friction, silicon-damped horizontal bearing elements horizontal oscillation of the arm! True tracking (the maintenance of even force on both channels of the stereo groove) is assured at minimum stylus pressures. Use of lightweight alloys throughout, results in low inertia.

Positive electrical contact assured by four spring-loaded, silver-plated, corrosion-resistant pin terminals in the all aluminum plug-in shell. EIC terminal and wire color standards are used.

SPECIFICATIONS

Resonance:

Varies from 9-12 Hertz, depending on Cartridge.

Tracking Error:

Under 1°.

Tracking Force:

1 gram or less.

Static Balance:

Acoustically isolated counter weight.

Dynamic Balance:

Omni-Balance provides perfect lateral dynamic balance with any cartridge.

Vertical Weight Adjustment:

Permits setting tonearm parallel to record surface.

Horizontal Movement:

Bearing made of inner and outer races and two rows of hardened steel balls into which shaft of arm fits.

Vertical Movement:

Friction-free movement by suspending arm in gimbal using a cross-shaft at each end of which are five 1 mm. chrome steel balls.

Cartridge Shell:

accepts all standard cartridges, secured by twist lock.

Cartridge Connection:

EIC terminals and wire color.

Tonearm Pivot Center to Center Pin of Turntable:

MODEL S-320 - 8.284" (21.04 cm.),
MODEL S-260 - 11.135" (28.28 cm.).

Overall length with Cartridge Shell and Counter Weight:

MODEL S-320 - 12 1/4" (31.1 cm.),
MODEL S-260 - 15 3/4" (40 cm.).

Back Clearance from Pivot Center to End of Counter Weight:
MODEL S-320 - 3 1/4" (8.3 cm.),
MODEL S-260 - 3 1/2" (8.9 cm.).

Weight (packed):

MODEL S-320 - 2 lb. (0.9 kg.),
MODEL S-260 - 3 lb. (1.4 kg.).

Ordering Information:

MODEL S-320 - BE Part No. 950-0061 - 12" tonearm.
MODEL S-260 - BE Part No. 950-0062 - 16" tonearm.



EP-1

Models EP-1, EP-2

- Exceptional RFI immunity
- Superb Electrical Performance
- ±0.5 dB response; .010% THD (EP-1)
- Ultra low noise
- +21 dBm output capability

LOW DISTORTION - S/N PERFORMANCE

There just isn't any broadcast preamplifier better than the EP-1 and EP-2. These RIAA-equalized stereo phono preamplifiers combine a super-matched input transistor pair with high slew-rate operational amplifiers to provide extremely low intermodulation and transient intermodulation distortion at high output levels and an excellent signal-to-noise ratio.

EXCELLENT CHANNEL SEPARATION

70 dB channel separation permits these units to be operated as individual monophonic preamplifiers. The EP-1 and EP-2 include self-contained, well regulated power supplies with a special low flux power transformer.

RFI IMMUNITY

Particular attention has been given to afford high immunity to RF fields encountered in AM/FM/TV environments. Each audio and power conductor includes independent RF filter networks.

Extensive RF shielding minimizes both conducted and radiated interference. Multi-section networks filter RF from power line and audio connections. Floating inputs eliminate ground loops.

OPTIONAL OUTPUT TRANSFORMERS

The EP-1 provides 600-ohm electronically balanced resistive outputs. The EP-2 incorporates high-quality output transformers for 150/600-ohm, balanced outputs.

SPECIFICATIONS**Input Impedance:**

47k ohms (shunted by 110 pF). Adaptable to other load requirements.

Input Stage Overload:

320 mV @ 1 kHz.

Maximum Input Sensitivity:

1.0 mV input for 1.0 V output @ 1 kHz.

Output Impedance:

(EP-1) 600 ohms, electronic balanced, resistive.

(EP-2) 150/600 ohms, balanced, transformer-isolated.

Maximum Output Level:

+21 dBm into 600 ohms.

Frequency Response:

(EP-1) ±0.5 dB of RIAA Curve, 30-20,000 Hz, 6 dB per octave high-pass below 30 Hz.

(EP-2) ±1 dB of RIAA Curve, 30-20,000 Hz, 6 dB per octave high-pass below 30 Hz.

Total Harmonic Distortion:

(EP-1) Less than 0.010%, 30-20,000 Hz @ +8 dBm.
(EP-2) Less than .2%, 30-20,000 Hz @ +8 dBm.

Intermodulation Distortion:

Less than 0.008%, 60 Hz/7 kHz, 4:1 ratio @ +8 dBm.

Transient Intermodulation Distortion:

(EP-1) Less than 0.1% (square/sine wave-method).

Signal-to-Noise Ratio:

82 dB below reference 10 mV input (un-weighted).
88 dB below reference 10 mV input (A weighted).

Equivalent Input Noise:

0.8 uV rms, 20-20,000 Hz.

Gain:

40-60 dB, continuously variable.

Channel Separation:

70 dB or greater, 30-20,000 Hz. (90 dB @ 1 kHz, typical).

AC Power Requirements:

115 or 230 Vac, 50/60 Hz, 6 W (Connector: IEC Standard, RF filtered).

Audio Input Terminations:

RCA phono jacks.

Audio Output Terminations:

Screw-type barrier strip.

Mono/Stereo Switching:

Internal jumper.

Dimensions:

10.4" W × 2.9" H × 6.75" D (26.4 × 7.4 × 17.1 cm).

Net Weight:

4.5 lbs. (2 kg).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
EP-1	903-0020	Equalized Turntable Preamplifier
EP-2	903-0021	Equalized Turntable Preamplifier, w/transformer output.

BETMS-100/BETMS-200

- Five Operating Modes
- Phase Reversal Capability
- +8 dBm Output
- Monaural Or Stereo



BETMS-100

The Broadcast Electronics Turntable Preamplifier models BETMS-100 and BETMS-200 have been designed for today's professional studios. Employing the latest integrated circuit techniques, these preamplifiers provide accurate reproduction, outstanding reliability, and versatile operation.

OPERATING MODES

Both the BETMS-100 and BETMS-200 are dual channel units for use with monophonic or stereophonic phono cartridges. Either model operates in five modes:

1. As a single stereo preamplifier with stereo in/stereo out.
2. As a dual monophonic unit with two mono in/two mono out.
3. As a single monophonic preamp with one mono in/one mono out.
4. As a stereo to mono converter with stereo in/one composite mono out.
5. As a dual stereo to mono converter with stereo in/two composite mono out.

This operational versatility means the BETMS preamplifier is never obsolete. It also provides a true composite mono signal mixed from a stereo pick-up required for many records.

HIGH PERFORMANCE STANDARD

The BETMS does not sacrifice performance. Specifications are conservatively rated at the intended operating figures to truly reflect the unit's performance. As an example, the BETMS is rated for +8 dBm output with a 5 millivolt-input signal, the output level of today's high compliance stereophonic phono cartridges. Noise, cross talk, and distortion are all specified from this operating condition.

PHASE REVERSAL FEATURE

The right channel phase reversal capability simplifies installation in stereo facilities. In monophonic facilities this feature permits correction of improperly mixed records.

INTEGRATED CIRCUIT DESIGN

The integrated circuitry of the BETMS provides trouble-free operation for the life of the unit. This circuitry also provides stable operation which ensures rated operation without field adjustment.

SPECIFICATIONS**Output Level:**

+8 dBm nominal, +16 dBm peak, into 600 ohms.
Each output continuously adjustable.

Output Impedance:

BETMS-100: 150 ohms unbalanced.

BETMS-200: 600 ohms balanced, 150 ohms balanced (wiring option).

Input Sensitivity:

5mV for +8 dBm output, at 1 kHz, full output.

Input Impedance:

47,000 ohms resistive (50 pf parallel).

Signal-to-Noise:

65 dB or better for 5mV input, +8 dBm output,
1 kHz.

Equivalent Input Noise:

2.8 microvolts (116 dB below output with 600 ohm load).

Channel Separation:

60 dB or better for +8 dBm output, 1 kHz into 600 ohms, with 5mV input.

Frequency Response:

±1 dB of RIAA equalization curve, 50-10,000 Hz.
±2 dB, 10 kHz - 15 kHz.

Distortion:

Less than 0.25% THD at 1 kHz, +8 dBm output into 600 ohms.

Equalization:

Standard NAB/RIAA Disc Reproduction.

Front Panel Controls:

Power on/off, Left Output Level, Right Output Level, Mono/Stereo Mode Switch, Right Channel Phase Reversal Switch.

Rear Panel Connections:

Right input, Left input, Right output, Left output, Ground terminal, 3-wire Power Cord.

AC Power:

100 to 135 VAC, 50/60 Hz, 200 to 270 VAC, 50/60 Hz (optional), 6 watts max.

Dimensions:

9.5" W x 6.5" D x 3" H (24.1 x 16.5 x 7.62 cm).

Weight:

3.5 lbs. (1.6 kg).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
BETMS-100	903-0100	Monaural/Stereo Equalized Pre-amplifier (less transformer output) with phase reversal feature
BETMS-200	903-0200	Monaural/Stereo Equalized Pre-amplifier (w/transformer output) with phase reversal feature
	827-0220	220 VAC/50 Hz Power Conversion Installed



Stanton cartridges have been designed to enhance the performance of today's modern turntables and tonearms when called upon to play modern discs with their high levels of modulation. These cartridges feature increased compliance and lower mass to give superb tracking ability and extended high frequency response.

Today's tonearms are far superior because they have practically no friction in their bearings and have extremely low mass even in automatic models. Thus, Stanton cartridges offer the ideal solution to match all of the best qualities of modern tonearms by using these pickups in today's hi-fi systems.

SPECIFICATIONS

MODEL	600A	681SE	500A MK II*	500AL
Frequency Response ¹ :	20 Hz to 20 kHz	10 Hz to 10 kHz	10 Hz to 20 kHz	20 Hz - 17 kHz ±2½ dB
Output:	1.0mV/cm/sec. ±2 dB	1.1mV/cm/sec. ±2 dB	1.0mV/cm/sec. ±2 dB	1.0mV/cm/sec. ±2 dB
Channel Separation				
Nominal:	35 dB	35 dB	35 dB	28 dB
Load Resistance:	47,000 ohms	47,000 ohms	47,000 ohms	47,000 ohms
Load Capacitance:	275 pF	275 pF	275 pF	275 pF
DC Resistance:	810 ohms approx.	1300 ohms approx.	750 ohms approx.	750 ohms approx.
Inductance:	550 mH approx.	930 mH approx.	465 mH approx.	465 mH approx.
Channel Balance:	Within 2 dB	Within 2 dB	Within 2 dB	Within 2 dB
Stylus Tip:	0.7 mil	0.4 x 0.7 mil	0.7 mil	0.7 mil
Tracking Force ² :	Elliptical Diamond	Spherical Diamond	Spherical Diamond	Spherical Diamond
Cartridge Weight:	2 - 4 grams	2 - 4 grams	1 - 2 grams	2 - 5 grams
Compliance m/mN	5.5 grams	6.3 grams	5.5 grams	5 grams
Mounting Dimensions:	12.5 m/mN	14 m/mN	12.5 m/mN	10 m/mN
Replacement Stylus:	1/2" mounting centers	1/2" mounting centers	1/2" mounting centers	1/2" mounting centers
	D6071A		D50A MK II	D5107AL

Notes: 1. When the cartridge is terminated in the recommended load of 47k ohms and 275 pF.

2. Recommended by manufacturer for optimum performance.

*For those requiring a higher tracking force (2-5 grams) the 500A cartridge and its replacement stylus, the D5107A, are still available.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
500AL	821-5000	Stanton cartridge, .7 mil spherical stylus
D5107AL	821-5001	Stylus for 500AL cartridge
500A MKII	802-1004	Stanton cartridge, .7 mil spherical stylus
D50A MKII	802-1008	Replacement stylus for 500A MKII cartridge
600A		Stanton cartridge, .7 mil spherical stylus
D6071A		Stylus for 600A cartridge
681SE		Stanton cartridge, .7 mil elliptical stylus
D6800SE		Stylus for 681SE cartridge
D6807A	821-6811	Stylus for 681A cartridge
D5127	821-6815	78 RPM stylus for 500 Series cartridges



ATP-1



ATP-2



ATP-3

Audio-Technica Cartridges

SPECIFICATIONS	ATP-1	ATP-2	ATP-3
Frequency Response	20 to 20,000 Hz	15 to 22,000 Hz	15 to 25,000 Hz
Tracking Force	3 to 5 grams	3 to 5 grams	2 to 3 grams
Channel Separation at 1 kHz at 10 kHz	21 dB minimum 16 dB minimum	23 dB minimum 17 dB minimum	23 dB minimum 17 dB minimum
Channel Balance	1.5 dB	1.5 dB	1.5 dB
Output at 5cm/sec	5.3 mV	5.3 mV	5.3 mV
Stylus	0.6-mil* Spherical Diamond	0.4 x 0.7-mil Elliptical Diamond	0.3 x 0.7-mil Nude Elliptical Diamond
Vertical Tracking Angle*	20°	20°	20°
Load Impedance	47,000 Ohms	47,000 Ohms	47,000 Ohms
Cartridge Inductance	600 mH	600 mH	600 mH
DC Resistance	500 Ohms	500 Ohms	500 Ohms
Mounting	Standard 1/2-inch centers		
Cartridge Weight	7.2 Grams	7.2 Grams	7.2 Grams
Replacement Stylus	ATP-N1 Red/White	ATP-N2 Blue/White	ATP-N3 Bronze/White

*New DIN/IEC Standards.

Audio-Technica Dual Magnet cartridges are protected by U.S. Patent Nos. 3,720,796, 3,761,647, and 4,075,418.

ORDERING INFORMATION

AUDIO TECHNICA CARTRIDGES FOR TONE ARMS

MODEL	STOCK NO.	DESCRIPTION
ATP-1	821-0051	Cartridge, .6 spherical
ATP-2	821-0052	Cartridges, .4 x .7 elliptical
ATP-3	821-0053	Cartridges, .3 x .7 nude elliptical
ATP-N1	821-0054	Replacement stylus for ATP-1
ATP-N2	821-0055	Replacement stylus for ATP-2
ATP-N3	821-0056	Replacement stylus for ATP-3
ATP-H	821-0058	Replacement head shell

Shure Cartridges

SPECIFICATIONS

MODEL

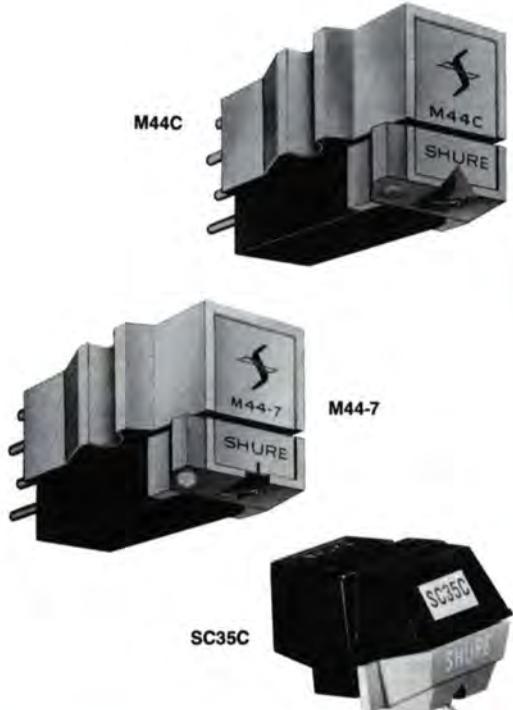
	Stylus Grip Color	Output (1 kHz at 5 cm/sec recorded velocity)*	Frequency Response	Channel Balance	Channel Separation (minimum)	Tracking Force	Trickle Peak (cm/sec peak recorded velocity)
M44-7, 18.4 μ (.0007 in.) Spherical, N44-7 Replacement Stylus	White	95 mV	20 to 20,000 Hz	Within 2 dB	20 dB at 1 kHz	1-1/2 to 3 grams	400 Hz-14.3 cm/sec at 1-1/2 grams
M44C, 18.4 μ (.0007 in.) Spherical, N44C Replacement Stylus	Light Blue	95 mV	20 to 20,000 Hz	Within 2 dB	20 dB at 1 kHz	3 to 5 grams	400 Hz-14.3 cm/sec at 3 grams
SC35C, 15.4 μ (.0006 in.) Spherical. Cutaway grip for visibility of iridescent orange colored tip	Light Blue	5.0 mV	20 to 20,000 Hz	Within 2 dB	20 dB at 1 kHz, 10 dB at 10 kHz	4 grams minimum, 4.5 grams optimum 5 grams maximum	400 Hz-14 cm/sec 1,000 Hz-27 cm/sec 5,000 Hz-33 cm/sec 10,000 Hz-20 cm/sec at 4 grams
SS78E, 13 x 64.4 μ (.0005 x .0025 in.) Bidirectional (elliptical) MONO 78 rpm stylus	Green	5.0 mV	20 to 20,000 Hz	—	—	4 to 5 grams	—

*Output voltages given for stereo cut record; for MONO cut record, output voltage at both left channel and right channel cartridge terminals will be 71% of figures above.

ORDERING INFORMATION

SHURE CARTRIDGES FOR TONEARMS

MODEL	STOCK NO.	DESCRIPTION
SC35C	821-4350	Professional broadcast cartridge
SC35C	821-4352	Spherical stylus for SC35C
M44C	821-0031	.7 mil spherical stylus cartridge
M44-7	821-4470	Stereo broadcast cartridge with N44-7 spherical .7 mil stylus
SS78E	821-0032	Stylus, elliptical for 78 RPM
N44-7	821-4471	Replacement .7 mil stylus for M44-7
N44-C	821-0033	Stylus, .7 mil heavy duty - 3-5 gram
N44-3	821-4472	Replacement 78 RPM stylus for M44 cartridge



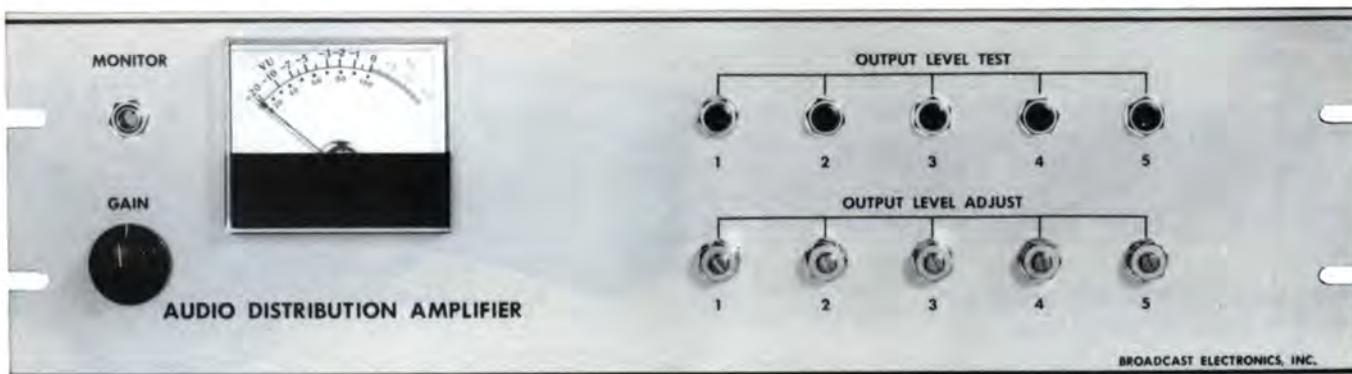
M44C



M44-7



SC35C



AD-1B

Model AD-1B

FIVE OUTPUT CHANNELS

The AD1B Audio Distribution Amplifier distributes an audio input to multiple points within a studio system or to telephone lines. Facilities for visual and aural monitoring of the incoming signal are provided on the front panel by means of a VU meter and a headphone monitor jack. The meter and headphone jack also monitor the output from each channel. Locking-type controls are provided for adjusting each output channel.

Five highly isolated output channels are provided on the basic AD1B. Frequency response is essentially flat from 40 to 20,000 Hz. Distortion is well below 1% at rated output and peak overload handling capacity is in excess of 12 dB. Noise is better than 60 dB below rated output with 60 dB isolation between channels.

FIVE CHANNEL EXTENDER

The AD1B-X Extender is designed to expand the number of output channels provided by the basic AD1B unit if more than five

output channels are needed. Each AD1B-X Extender provides five additional output channels and up to four Extenders may be added to each basic AD1B unit. Metering and audio monitoring are automatically provided to the AD1B-X Extenders by strapping between the basic AD1B unit and the AD1B-X Extenders.

INPUT AND OUTPUT IMPEDANCE

Both the AD1B and AD1B-X standard units are shipped with 600 ohm unbalanced emitter follower outputs for operation into 600 ohm or higher load impedances. If ordered with balanced transformer outputs, units are shipped with transformers connected for operation into 600 ohm or higher load impedances. Transformers may be reconnected for operation into 150 ohm load impedances, if desired.

Input transformers are standard on all units. Input circuitry may be operated either bridging or matching, balanced or unbalanced.

SPECIFICATIONS

AD1B (BASIC UNIT)

Input Impedance:
600 ohms matching, 10 k ohms bridging.

Output Load Impedance:
Emitter-Follower—600 ohms or higher. Optional transformer output 600/150 ohm.

Maximum Input Level:
+30 dBm.

Minimum Input Level:
-26 dBm matching, -10 dBm bridging.

Output Level Per Channel:
+4 dBm (+14 dBm max.).

Gain:
30 dB (matching), 14 dB (bridging).

Frequency Response:
±2 dB 20-20,000 Hz.

Distortion:
Less than 1%.

Noise:
65 dB or better below rated output.

Channel Separation:
60 dB @ 400 Hz.

Maximum Ambient Temperature:
55°C.

Power:
115V, 50/60 Hz, 50 watts or optional 220V, 50/60 Hz,
50 watts.

Dimensions:
19" W x 5 1/4" H x 7 1/8" D.

Weight:
9 1/2 lbs.

Mounting:
19" rack.

AD1B-X (5 CHANNEL EXTENDER):

Input Impedance:
1200 ohms, unbalanced.

Input Level:
+4 dBm.

Gain:
Unity.

Output Level Per Channel:
+4 dBm.

Power:
115V, 50/60 Hz, 40 watts or optional 220V, 50/60 Hz,
40 watts.

Dimensions:
19" W x 5 1/4" H x 7 1/8" D.

Weight:
8 lbs. (3.6 kg.)

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AD1B	903-0010	Audio D.A.; 1 in, 5 out, rack mounting, Emitter Follower Output
AD1B/T	903-0011	Audio D.A.; 1 in, 5 out, rack mounting, Transformer Outputs
AD1BX	903-0012	5-Channel Extender for AD1B, rack mount, Emitter Follower Output
AD1BX/T	903-0013	5-Channel Extender for AD1B, rack mount, Transformer Output

MODEL CT-80-S1 CONSOLE TABLE

- Top: Full 1 1/2" thick
32" x 96"
- Panel base: 4 panels 24" x 29" high
When assembled as shown, becomes a sturdy console table.
- Assembly shown in typical arrangement with pedestal cabinets.
- Vanity shield: (VS-80-S4) (not shown)
Available between panel base.
- "Summer Pecan" wood grain formica on vertical surfaces. White formica on cabinet top.

**MODEL SP-80-S2 SINGLE PEDESTAL CABINET**

- 22" x 24" x 29" high
- 21" front rack space (with standard E.I.A. tapped rails)
- Blank panels available for front (BP-80-S21)
- Accommodates single turntable
- "Summer Pecan" wood grain formica finish on vertical surfaces. White formica on top.

MODEL DP-80-S3 DOUBLE PEDESTAL CABINET

- 24" x 42" x 29" high
- Two 21" front rack spaces (with standard E.I.A. tapped rails)
- Blank panels available for front (2) BP-80-S21
- Accommodates two turntables
- "Summer Pecan" wood grain formica finish on vertical surfaces. White formica on top.

**ORDERING INFORMATION**

MODEL	STOCK NO.	DESCRIPTION
RUSLANG STUDIO FURNITURE		
SP-80-S2	802-2000	Single pedestal cabinet for one turntable 22" x 24" x 29"H, white top
DP-80-S3	802-2001	Double pedestal cabinet for two turntables 24" x 42" x 29"H, white top
BP-80-S21	801-2000	Blank front panel, 19" x 21"
CT-80-S1	801-2001	Console table top, white 32" x 96" w/2 base supports 24" x 29"H
VS-80-S4	801-2002	Console vanity shield, 12"W



Quartzmatic Studio Clock

- Large 12" diameter face (glass lens protected) with 1½" numerals and red sweep second hand.
- Precision accuracy ±1 minute in one year
- Battery powered (one year battery life)

The quartzmatic studio clock combines quartz crystal technology with sophisticated electronic circuitry to create one of the world's most accurate clocks.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
BECL-100	835-0100	Quartzmatic clock



ESE Model ES-754E Thumbwheel Programmer/Comparator

When programming up to eight time events, the ESE model ES-754E is recommended for economy and ease of use. Thumbwheel switches are set to compare the time information from another ESE Clock or Timer. An output (event) occurs each time the thumbwheel switch setting agrees with the time display. Output is maintained for the duration of the time during which they both agree. This output is usually a single pole, form A, one amp reed contact closure. (Other outputs may be specified.) The ESE ES-754E's are ideal for starting, stopping or otherwise controlling equipment on a time-dependent basis.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
ES751E	829-0104	Thumbwheel programmer/comparator, single event
ES754E	829-0103	Thumbwheel programmer/comparator, two event



ESE Model ES-302AE Timer

The ES-302AE is a four digit, 100 minute timer that features an easy to read elapsed time indicator and provides both count-up and count-down capability. Minutes and seconds can be advanced simultaneously or independently to preset for a specified countdown. The ES-302AE also includes user pre-settable timing sequences through the use of lever-wheel type switches. The ES-302AE can drive 80 series and 90 series slaves.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
ES302AE	829-0302	Timer, elapsed time indicator, 117V, 60 Hz
ES302AEJ	801-8003	Timer, elapsed time indicator, 220V, 50 Hz



ESE Model ES-510E Timer

The ES-510E is a sixty minute timer with start, stop and reset controls mounted on the front panel for easy use. (single pole, momentary push-button) The ES-510E runs continuously unless stopped or reset. In the STOP mode, the display will freeze and when re-started will continue the count from the last displayed figure. Displays are .55" bright orange gas discharge digital indicators. Remote control capability is provided.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
ES510E	829-0510	Timer, sixty minutes, four digit, 117V, 60 Hz
ES510EJ	801-8002	Timer, sixty minutes, four digit, 220V, 50 Hz



Crown model D-150A Series II audio power amplifier

CROWN MODEL D-150A SERIES II STEREO POWER AMPLIFIER

Retaining the D-150A's tradition for sonic accuracy and reliability, the restyled Crown D-150A Series II is rated at 125 watts per channel into 4 ohms (250 watts into 8 ohms mono.) The D-150AII continues to incorporate the Crown AB+B circuit design, a Crown

development based on concepts which reduce distortion to negligible levels in all output ranges and is capable of providing all-day, reliable amplification for any input (DC to 30 kHz). Packed weight: 29 lbs. Power source: 120-240V, 50-400 Hz.



Crown model D-75 audio power amplifier

CROWN MODEL D-75 STEREO POWER AMPLIFIER

Extremely compact; fits into only 1 3/4" of rack space. Amplifier is invulnerable to short or open circuits, mismatch and RF energy. Power output: 35 watts RMS per channel at 8 ohms. Frequency response: ±0.1 dB, 20-20,000 Hz at one watt into 8 ohms (stereo). Harmonic distortion: Below 0.05%, 20-20,000 Hz. Cabinet optional. Packed weight: 15 lbs. Power source: 100-240V, 50-400 Hz.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
D-150AII	827-0150	Stereo Power Amplifier, 80 watts per channel, 8 ohm
D-75	827-0075	Stereo Power Amplifier, 35 watts per channel, 8 ohm

Warning Lights

- Horizontal or vertical formats
- English or Spanish
- Unique design—readily adaptable to any office/studio decor



The STUDIO WARNING LIGHT is designed to mount to a flush wall or ceiling surface in a vertical or horizontal plane. The silkscreened globe housing fastens to a steel mounting plate. Ideally suited for control rooms, studios and above restricted entrances to live studios. Supplied complete with 25 watt red bulb and "Attention-Getter" flasher. Rated at 120V, 100 watts; UL approved. Available in Spanish, Portuguese or other languages. Special lettering also available.

STOCK NO.	DESCRIPTION
835-0001	ON-AIR Light, Vertical Format
835-0002	ON-AIR Light, Horizontal Format
835-0003	AUDITION Light, Vertical Format
835-0004	AUDITION Light, Horizontal Format
835-0006	En Aire Light, Vertical Format
835-0009	En Aire Light, Horizontal Format
835-0007	Rehearsal Light, Vertical Format
835-0008	Rehearsal Light, Horizontal Format
835-0005	Record Light, Vertical Format
835-0010	Record Light, Horizontal Format
835-0013	Special Lettering, Vertical or Horizontal Format

Electro-Voice Professional Microphones

MODEL 635A DYNAMIC OMNIDIRECTIONAL

The 635A is the most durable microphone available for broadcast use. The 635's moderately high output level (-55 dB) is appropriate for a broad range of applications. Its response has been specially shaped for up-close vocals. A slow roll-off below 200 Hz (-8 dB at 50 Hz) with a broad rise of several dB from 2,000 to 12,000 Hz results in bright yet natural voice quality. Broadcast Electronics stock #825-0635.

MODEL RE-11 VARIABLE-D® DYNAMIC SUPER-CARDIOID

Electro-Voice's RE-11 is a superb microphone for broadcast sound reinforcement. It is moderately priced and includes a built-in blast filter, Memraflex grille screen, a high degree of directional control, minimal off-axis coloration and a bass roll-off switch. See current Broadcast Electronics price list or contact Broadcast Electronics for ordering information.

MODEL DO56 SHOCK-MOUNTED DYNAMIC OMNIDIRECTIONAL

For hand-held broadcast applications, the shock-mounted DO56 microphone is ideal. All handling noises and cord vibration are isolated from the microphone element. Frequency response extends to 18,000 with a slow roll-off below 200 Hz and a slight emphasis in the 2,000 to 12,000 range. Broadcast Electronics stock #825-0016.

MODEL 649B MINIATURE, DYNAMIC OMNIDIRECTIONAL

Small size and light weight make the 649B the most popular dynamic lavalier microphone available. The turned aluminum case and nested mechanical parts offer traditional E/V ruggedness. Frequency response is tailored for best performance in the lavalier chest position. Broadcast Electronics stock #825-0649.

RE-10 VARIABLE-D® DYNAMIC SUPER CARDIOID

A fine, moderate cost microphone for broadcast use. The RE-10 is similar in design to the RE-15, but meet requirements where somewhat more unit-to-unit variability is acceptable. It has effective directional control, little off-axis coloration, greatest rejection of unwanted sounds at 150 degrees off-axis and a bass roll-off switch. Broadcast Electronics stock #825-0010.

RE-15 VARIABLE-D® DYNAMIC SUPER CARDIOID

The performance and reliability of the RE-15 have made it the workhorse directional microphone for broadcast sound reinforcement. Two nulls at 150 degrees off-axis provide greater average rejection over the microphone's rear hemisphere than a traditional single null cardioid pattern. Frequency response is unusually independent of the angular location of sound with essentially flat response in the 150 to 15,000 Hz range. Broadcast Electronics stock #825-0015.

RE-20 VARIABLE-D® DYNAMIC CARDIOID

The RE-20 was designed specifically for critical broadcast applications where broad frequency response is a must. Besides its extended performance characteristics, the RE-20 provides undistorted output at high sound pressure levels found in up-close vocal miking. See current Broadcast Electronics price list or contact Broadcast Electronics for ordering information.

RE-50 SHOCK MOUNTED MINIATURE DYNAMIC OMNIDIRECTIONAL

For hand-held news gathering work, nothing can top the RE-50. The RE-50 rubber shock mount "mike-within-a-mike" design achieves a degree of shock isolation unique in the industry. It features the same frequency response and high output level as the famous 635A. See current Broadcast Electronics price list or contact Broadcast Electronics for ordering information.

Other Electro-Voice products available. See current Broadcast Electronics price list or contact Broadcast Electronics.



Shure Professional Microphones



SM-5B



SM-58LC



SM-11CN



SM-82LC



SM-63LC



SM-57LC

SHURE SM-5B UNIDIRECTIONAL DYNAMIC MICROPHONE

Specifically designed to minimize boom microphone problems, the Shure SM-5B is excellent for broadcast use. A smooth, broad range frequency response with moderate presence rise makes the SM-5B especially suitable for vocal pickup. The SM-5B has a cardioid pickup pattern with off-axis uniformity, even at the extreme low end, to give minimal coloration and maximum rejection of unwanted sounds.

SHURE SM-58LC UNIDIRECTIONAL DYNAMIC MICROPHONE

The Shure model SM-58 has established itself as the world standard professional microphone. Its distinctive upper middle range presence peak provides an intelligible, lively sound. The SM-58 is a durable, dependable microphone that is often imitated but never duplicated. A built-in spherical windscreens takes the pop out of close-up use and minimizes breath and wind noise distortion.

SHURE SM-11CN OMNIDIRECTIONAL LAVELIER MICROPHONE

Tiny, rugged, with wide-range frequency response — the SM-11 is the world's smallest dynamic element lavalier microphone. Less than half the size of a standard microphone connector, it is ideal for any broadcast application. It has a smooth, natural sound quality that's optimized for lavalier use. The SM-11's dynamic cartridge and aluminum case are extremely rugged and reliable with superb humidity and heat resistance.

SHURE 8M-82LC LINE LEVEL CONDENSER MICROPHONE

The SM-82LC is a hand-held, self-contained, unidirectional microphone with a built-in line level amplifier, peak limiter and battery. The exceptional performance and unique features of the SM-82LC make it an excellent choice for on-the-spot broadcasting and sound reinforcement. It is also ideal for applications involving long cable runs (up to one mile). Its balanced line level output permits the SM-82 to drive telephone lines or other line level inputs directly.

SHURE SM-63LC OMNIDIRECTIONAL DYNAMIC MICROPHONE

Shure's SM-63 is a small, elegant microphone with very high output — up to 6 dB higher than comparable omnidirectional microphones. The smooth, extended frequency response provides clear, crisp sound and a low frequency roll-off gives natural sounding pickup with the absence of any "boominess". The Shure-designed and patented mechano-pneumatic shock mount isolation system cuts handling noise to an unobtrusive level.

SHURE SM-57LC UNIDIRECTIONAL DYNAMIC MICROPHONE

Outstanding performance and rugged reliability have made the SM-57LC famous in the broadcast world. Its wide frequency response with a fixed bass rolloff and slight midrange presence boost makes it exceptional for clean, intelligible voice pickup. The well-controlled cardioid polar pattern minimizes background noise in all planes and permits higher amplifier gain before feedback.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information.

NOTE: All microphone model numbers with an "LC" suffix are supplied without cable. All microphone model numbers with a "CN" suffix are supplied with a professional three pin audio connector at the equipment end.



MICROPHONE STANDS

ATLAS MODEL SB-36. Professional boom stand. Boom length 62". Adjustable vertical height from 48" to 72". With cable hangers for guiding mike cable. Weight: 36 lbs.

ATLAS MODEL SB-36W. Same as Model SB-36 but with rubber casters for mobility. Weight: 40 lbs.

ATLAS MODEL MS-4. Special height stand, adjusts from standard to extra low heights for seated performers or children. Height: 25" - 65". Weight: 11 lbs.

LUXO MIKE ARMS

MODEL LM-1-41A. For mikes weighing up to 2 lb. "C" clamp mount, 41" extension. Weight: 2.5 lb.

MODEL LM-1-41C. For mikes weighing up to 2 lb. Screw down mount, 41" extension. Weight: 2.5 lb.

SHURE DESK STANDS

MODEL S33P MODERN DESK STAND. Black finish. For use with Microphone Models 330, 415, 430, 533, 545, 546, 548, 556S, 566, 571, 576, 578, 579, 580, 585, and 588. Weight: 2.5 lb.

MODEL S39A VIBRATION-ISOLATION STAND. For all applications where vibration is a problem. Fits all Shure microphones. Weight: 2.125 lb.

ELECTRO-VOICE DESK STANDS

MODEL 400. Non-reflecting gray with foam rubber base pads; for most microphone whether clamp mounted or fitted with switch stud.

MODEL 422. Low profile desk stand with rubber shock mount, accepts E-V stand clamps into which mike is placed.

Ordering Information: Atlas, Luxo, Shure, EV - See current Broadcast Electronics price list.

BELDEN MICROPHONE CABLE AND AUDIO WIRE

MODEL	STOCK NO.	DESCRIPTION
8412	829-4200	Microphone cable, 2 conductor, stranded, 20 AWG braided shield, cotton wrap, heavy rubber jacket, 500 ft. roll. Weight 25 lb.
8428	829-4201	Microphone cable, 2 conductor, stranded, 18 AWG braided shield, heavy duty neoprene jacketed, 500 ft. roll. Weight 35 lb.
8437	829-4202	Audio wire, 2 conductor, solid, 22 AWG w/drain wire and braided shield, black vinyl jacket, 500 ft. roll. Weight 14 lb.
8450	829-4203	Audio wire, 2 conductor, solid, 22 AWG w/drain wire, foil shield, vinyl jacket, 500 ft. roll. Weight 12 lb.
8451	829-4204	Audio wire, 2 conductor, miniature, 22 AWG, stranded, w/drain wire, foil shield, vinyl jacket, 500 ft. roll. Weight 14 lb.



Electro-Voice Speakers

SENTRY 100EL—WITH AN INTEGRAL POWER AMPLIFIER:

The Sentry 100EL combines the reproduction components of the Sentry 100A with an integral high-performance 50 watt power amplifier that's perfectly matched to the requirements of the speaker system. In addition to the practical benefits of conserving space and eliminating the need for a separate amplifier, the Sentry 100EL provides a power source ideally mated to the characteristics of the speaker system. There's no power loss from a connecting cable between the amplifier and speaker and the electrical damping of the system remains optimum in all installations. The amplifier power has been calculated to provide optimum acoustic levels while minimizing the possibility of speaker damage due to inadvertent signal overload.

SENTRY 100A: This monitor system was designed with the professional in mind and meets users specific requirements. It combines high efficiency with extended low end response. The Sentry

100A has high power handling capability across the band as proven by the super-dome tweeter, which is capable of handling 25 watts of input power. Its uniform frequency response ± 3 dB 45 Hz to 18 kHz along with the compact, no frills packaging make it one of the best monitoring systems available.

Size-17.25" H x 12" W x 11.125" D. Weight-(Unpacked) 28 lbs.

SENTRY 500: The no-nonsense design of this speaker meets the needs of professionals by combining these characteristics: High efficiency with extended low-frequency response, high-power capacity across the entire frequency range, uniform frequency response and constant directivity, all in a well thought-out, attractive package.

The Sentry 500 employs a Super-Dome tweeter capable of handling 25 watts of input power while faithfully reproducing program material with response out to 18 kHz.

Size-23.75" H x 27" W x 13" D. Weight: (Unpacked) 70 lbs.

Sennheiser Headphones

HD430: An exclusive design advance with adjustable suspension strap for custom fit and comfort...and unique ear cushions which separate the ear from contact with the pad, yet permit a total open-air environment. Frequency range: 16-20,000 Hz. Distortion: less than 0.5%. Impedance: 600 ohms per channel. Weight: 7 oz.

HD 420: Unbelievable combination of comfort and sound. Frequency range: 18-20,000 Hz. Harmonic Distortion: Less than 1%. Impedance: Less than 600 ohms per channel. Weight: 4 oz.

HD 424 DELUXE: Frequency Range: 15-20,000 Hz. Distortion at 1,000 Hz; less than 1% at a sound pressure level of 126 dB. Impedance: 2000 ohms per channel.

HD 414: Frequency Range: 20-20,000 Hz. Distortion at 1000 Hz; less than 1% at a sound pressure level of 126 dB. Impedance: 2000 ohms per channel. Weight: 5 oz.

HD 400: Frequency Range: 20-18,000 Hz. Impedance: 600 ohms per channel. Weight: 5 oz.

Other speakers and headphones available. See current Broadcast Electronics price list or contact Broadcast Electronics.





BJF-105-4



Single Jack Panel



Double Jack Panel

ADC PRE-WIRED JACK PANELS

BJF-105-4 - Prewired audio patch panel, 48 jacks, long frame 1 3/4" panel 19" mtg, 6 ft. cable with terminal block, normals at panel, tip-ring-sleeve.

P-KIT-3 - Audio patch panel kit unwired, includes PJ-391 jack panel cover, front panel, 48 PJ339L jacks, brackets and cable ties.

ADC UNWIRED JACK PANELS

Molded of solid phenolic, reinforced with steel to provide maximum rigidity and strength. Jacks are spaced to permit use of any standard double plug with 5/8" spacing. Mounting brackets furnished with each panel.

Specifications

Panel: Molded, thermoset plastic per Mil-M-14F, Type CFG, black.

ADC PATCH CORDS

Length	Cord w/ PJ-1 Plugs
1 foot	PJ-11
2 feet	PJ-12
3 feet	PJ-13
4 feet	PJ-14
6 feet	PJ-16

**THREE CONDUCTOR SHIELDED,
SINGLE PLUG
CORD ASSEMBLIES**

Two tinsel wire conductors plus a braided shield. Overall jacket braided nylon. Black nylon standard. Single PJ-2 plug on each end of cord.



PJ-318



PJ-2

ADC PLUGS — TWO AND THREE CONDUCTOR

PJ-1—Equivalent WE-241. Two conductor. Heavy duty die cast frame. Black phenolic shell. Has self-aligning plug sleeves on 5/8" centers for use with all standard jack panels. Double jack.

PJ-2 — Equivalent WE-291A. Three conductor. Cone shaped tip prevents momentary tip/ring shorting of jack during insertion. Mates w/all 3 conductor jacks, single jack.

ADC JACKS — TWO & THREE CONDUCTOR

PJ-318 — Equivalent WE-218A. Two conductor. Coin silver contacts welded to nickel silver springs. High grade phenolic insulation.

PJ-339 — Equivalent WE-239A. Three conductor. Coin silver contacts welded to nickel silver springs. High grade phenolic insulation.

**TWO CONDUCTOR SHIELDED,
DOUBLE PLUG
CORD ASSEMBLIES**

Two tinsel wire conductors plus a braided shield. Overall jacket braided nylon. Black nylon standard. Double PJ-1 plug on each end of cord.

Length	Cord w/ PJ-2 Plugs
1 foot	PJ-71
2 feet	PJ-72
3 feet	PJ-73
4 feet	PJ-74
6 feet	PJ-76



The ADC 20-Pin Terminal Blocks are molded of durable, black, thermoset plastic per Military specifications MIL-F-14F. Terminals are brass with a tin allow plating for lasting solderability. The PJ-101 series blocks have terminals graduated in length for ease of wiring. All Terminal Blocks are numbered along the top row for easy terminal identification.

ADC MOLDED TERMINAL BLOCKS

Catalog No.	No. Rows	No. Terminals	Height
PJ-102	2	40	2.250
PJ-103	3	60	2.593
PJ-104	4	80	2.937
PJ-106	6	120	3.625
PJ-108	8	160	4.312

NOTE: See current Broadcast Electronics price list for full listing of available items.

PR99 MKII

The Revox PR99 MKII Made by Studer incorporates all the features required for virtually any broadcast application. For special needs, a wide variety of options are available. Now equipped with Zero Locate, Address Locate and Vari Speed, the PR99 MKII provides audio production possibilities unknown in its price range just a few years ago.

**Model B77**

The B77 features an extremely stable 3-motor tape transport which can be easily adapted to individual applications because of its top quality construction. All tape transport functions can be controlled remotely. Of course, the tape speed can be varied by an implemented control by $\pm 10\%$, or via an external control across a wide range of ± 7 semitones.

Operational controls are arranged for maximum convenience. The logically interlocked tape command keys, as well as the record

PR99 FEATURES

- Connections for faderstart, remote control (serial and parallel), external vari-speed, and monitor panel.
- Balanced and floating inputs and outputs.
- Sound heads mounted above flat faceplate for easy editing.
- Tape cutter and splicing block.
- TAPE DUMP button for waste basket mode. (right take-up motor off)
- ASA Standard VU meters with LED peak indicators. (Thresholds individually adjustable)
- READY/SAFE switch protects against accidental erasures. Status indicator readily visible.
- Full logic transport control with contactless motion sensing. Tapes protected from damage due to operator errors.
- Selector switch for high and low impedance microphone, line input, off (input short) and track transfer. Multiple production possibilities when used in conjunction with Self-Sync.
- Calibrated input levels. In the calibrated mode, input levels are set to an internally adjustable level. In the uncalibrated mode, an extra 10 dB of gain is available through the front panel control.
- Microphone inputs, switchable for high or low impedance. Balanced XLR inputs available as option.

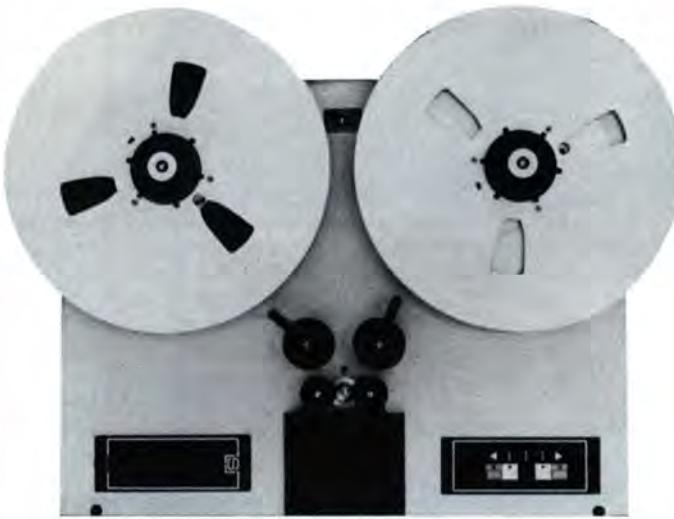
preselection facility, also contribute to high operating reliability. The B77 standard tape speed version (3 $\frac{3}{4}$ and 7 $\frac{1}{2}$ IPS) is available as a two track or four track machine with NAB equalization. The B77 also includes Revodur alloy heads for the ultimate in performance and long term dependability.

With its sophisticated transport and audio electronics, the B77 is a flexible and efficient tape recorder with excellent application potential in the broadcast industry.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
MODEL PR99 MKII SERIES		
13502	808-1014	Recorder/Reproducer, $\frac{1}{2}$ track, stereo, 3.75/7.5 IPS, chassis version for installation in cabinet or 19" rack
13506	808-1015	Same as 13502 except 7.5/15 IPS
13501	808-1016	Same as 13502 except full track, mono
13503	808-1017	Same as 13502 except full track, mono, 7.5/15 IPS
13203	808-1026-010	Reproducer, $\frac{1}{2}$ track, stereo, 3.75/7.5 IPS chassis version for mounting in cabinet or 19" rack
13303	808-1026	Same as 13203 except 7.5/15 IPS
OPTIONS FOR PR99 SERIES		
34502	808-1018	Carrying case
34500	808-1019	Console cabinet without utility shelf
885	808-1020	Balanced/floating microphone inputs
34506	808-1021	Monitor panel with speaker, mono
34509	808-1022	Monitor panel with speaker, stereo
34227	808-1023	Remote control w/32 ft. cable

MODEL	STOCK NO.	DESCRIPTION
MODEL B77 SERIES		
14102	822-4102	Revox 10 $\frac{1}{2}$ " Recorder/Playback, 3.75-7.5 IPS, mounted in black plastic cabinet, stereo half track
14302	822-4302	Same as model 14102, except in metal cage for rack mount. Does not include Revox 54099 rack attachment.
14106	822-4106	Revox 10 $\frac{1}{2}$ " Recorder/Playback, 7.5-15 IPS, mounted in black plastic case, stereo half track
14306	822-4306	Same as Model 14106, except in metal cage for rack mount. Does not include Revox 54099 rack attachment
OPTIONS FOR REVOX B-77 SERIES		
34237	822-4237	Vari speed control for B-77
34227	822-4227	Remote control for B-77 with 30-foot cable
34099	822-1021	Rack mount adapter for B-77 (cage models)
ACCESSORIES FOR REVOX B-77 SERIES		
45240	822-5240	Revox editing kit/splicing kit
39000	822-9000	Revox cleaning kit
9865	822-9865	Operating manual for B-77
9860	822-9860	Service manual for B-77



Scully LJ-10

LJ-10 Series

Engineered for performance and maintenance-free operation, the LJ-10 is built to exacting specifications by L.J. Scully craftsmen. This model offers unique advantages that have previously been unavailable to the broadcast industry. These features include:

- Closed loop drive offering substantially improved wow and flutter**
- Linear actuated pressure rollers for a fast, smooth start**
- Ability to gently handle 1 mil tap on 10" and 14" reels**
- Built in foil sensing**
- Solid state logic control circuitry**
- Motion sensing for smooth control of fast and stop operations**
- Fault detection for early signaling of a potential malfunction**
- Front panel plug-in printed circuit construction for easy alignment and maintenance**
- Automatic equalization change with capstan speed selection**
- Cue mode for easy loading and service**

SPECIFICATIONS**Tape Speed:**3 $\frac{3}{4}$ - 7 $\frac{1}{2}$ ips (other speeds upon request)**Head Configuration (1/4 inch):**

Monophonic - full or half track

Stereophonic - two or quarter track

Reel Size:

Up to 14 inches

Rewind Time:

Approximately 160 seconds for 7200 ft.

Power Requirements:

117 VAC, 50/60 Hz, 350 watts

Transport Controls:

Direction, play, fast, stop, cue, speed selection, power

Frequency Response:±2 dB 50 Hz to 7.5 kHz at 3 $\frac{3}{4}$ ips±2 dB 50 Hz to 15 kHz at 7 $\frac{1}{2}$ ips**Signal to Noise Ratio (30 Hz to 18K Hz band-width, Referenced to 510 nW/M):**

Mono full track 68 dB; Mono half track 65 dB

Stereo two track 65 dB; Stereo 1/4 track 62 dB

Flutter and Wow:3 $\frac{3}{4}$ ips less than .12% RMS-NAB, .17 DIN7 $\frac{1}{2}$ ips less than .08% RMS-NAB, .12 DIN**Amplifier Distortion:**

Less than .2% THD at operating level. Maximum output before clipping +24 dBm into 600 ohms

Line Output:

Balanced output 600 ohms.

Remote Connections:

Direction, play, fast, stop, fault, ready and ground

Size:19" x 24 $\frac{1}{2}$ " x 9 $\frac{1}{2}$ "**Shipping Weight:**

100 lbs.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
LJ-10-1	822-2503	Mono, half-track, bi-directional, .25" tape, 14" reels, 3.75-7.5 IPS, 117 VAC/60 Hz
LJ-10-2	822-2504	Stereo, two track, .25" tape, 14" reels, 3.75-7.5 IPS, 117VAC/60Hz
LJ-10-4	822-2505	Stereo, quarter-track, bi-directional, .25" tape, 14" reels, 3.75-7.5 IPS, 117VAC/60Hz



Model MX5050B-II

The **MX5050BQ-II** $\frac{1}{4}$ " four channel, quarter track recorder/reproducer. DC-servo capstan with $\pm 7\%$ vari-speed. 15- $\frac{1}{2}$ ips speed. +4 or -10 dB input/output level select. Real time tape counter with LED display. Zero return. Headphone output with channel select. Test oscillator (1 kHz or 10 kHz). Microprocessor controlled transport logic. Dynamic braking. Integral splicing block. External machine control interface connector for synchronizers.

The **MX5050-Mark III-4** is a $\frac{1}{2}$ " four channel recorder/reproducer. Tabletop console. $\frac{1}{2}$ " configuration of the BQ-II. External machine control interface connector for synchronizers or the optional CB-116 auto-locker. Otherwise identical to BQ-II.

The **OTARI MX5050B-II** is a $\frac{1}{4}$ " two channel half track recorder/reproducer with extra quarter track reproduce head. DC-servo capstan, with $\pm 7\%$ vari-speed. Three speeds in 15- $\frac{1}{2}$ or $\frac{3}{2}$ - $\frac{3}{4}$ ips field selectable pairs. Transformerless balanced inputs and outputs. +4 or -10 dB output level select. Real time tape counter with LED display. Headphone output. Test oscillator (1 kHz or 10 kHz). NAB/IEC equalization select. 185/250/320 nWb/m calibration select. Integral splicing block. The world's most popular recorder. Available in $\frac{1}{4}$ track stereo or full track versions. Optional rack mount available.

The **MX5050-Mark III-8** is a $\frac{1}{2}$ " eight channel recorder/reproducer. DC-servo capstan with $\pm 7\%$ vari-speed. 15- $\frac{1}{2}$ ips speed. +4 or -10 dB input/output level select. Real time tape counter with LED display. Zero return. Test oscillator (1 kHz or 10 kHz). Microprocessor controlled transport logic and dynamic braking. Full function channel status select panel with individual or master control. Automatic monitor switching. Headphone output with channel select. External test input. Integral splicing block. External machine control interface connector for synchronizers or the optional CB-116 auto locator.

The **MX5050-Mark III-2** is a $\frac{1}{4}$ " two channel, half track recorder/reproducer with extra quarter track playback head. Includes microprocessor transport logic and dynamic braking. Zero return. External machine control interface connector for synchronizers or the optional CB-116 auto-locator.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
MX-5050B-II	822-5055	$\frac{1}{4}$ " two-channel half-track recorder/reproducer with extra quarter-track reproduce head. DC-servo capstan, with $\pm 7\%$ vari-speed, three speeds in pairs 15/7.5 or 7.5/3.75 IPS field selectable. Transformerless balanced inputs and outputs, +4 or -10 dB output level select, real time tape counter with LED display and integral splicing block.
MX-5050B-II-1/4	808-1028	$\frac{1}{4}$ " two-channel, quarter-track recorder/reproducer with extra two-channel half-track reproduce head. Otherwise identical to the B-II.
MX-5050B-II-F	808-1027	$\frac{1}{4}$ " one-channel, full-track recorder/reproducer with extra two-channel half-track reproduce head. Otherwise identical to the B-II.
MX-5050MK-III-2	822-5051	$\frac{1}{4}$ " two-channel, half-track recorder/reproducer with extra quarter-track playback head. Includes microprocessor transport logic, and dynamic braking, zero return, external machine control interface connector for synchronizers or the option CB-116 auto locator. Otherwise identical to the B-II.
ARS-1000-DC	822-5058	$\frac{1}{4}$ " two-channel, half-track reproducer with 25Hz tone sensor, end-of-message and cuetone relays with adjustable delay (100 ms to 15s), 7.5/3.75 IPS speeds, 19" rack mount.
OPTIONAL ACCESSORIES		
RK-2B	822-5064	Rack mounting adapter for MX-5050B, BQ-II
RK-32	822-5065	Rack mounting adapter for Mark III-2
ZA-52Y	808-1029	7" reel hold down, EIA hub (set of two)
TW-670	822-5076	Reel hold down knobs, $\frac{1}{4}$ ", each
TW-671	822-5077	Reel hold down knobs, $\frac{1}{2}$ ", each
CB-102	822-5070	Remote Control
Manual	822-5083	Extra service manual (one supplied with recorder)



Revox model B226

REVOX B226 COMPACT DISC PLAYER

In designing the B226 Compact Disc player, Revox has clearly demonstrated the development and production experience which has made the company world famous as audio specialists.

The thoughtful arrangement of the B226's operating controls allows unequalled ease of operation. An LC display shows the status of all functions at a glance: title number and number of titles, title playing time and programming steps as well as status of pause, autopilot and loop functions. The B226 can, of course, also be operated with the B201 infrared remote control.

Almost every conceivable feature has been realized in the B226: professional programming capacity with 19 program steps, extremely short cueing times, calibration tone for adjustment of system levels, adjustable headphone output and two audio outputs. The "oversampling" technique developed in Europe eliminates distortion of frequencies above half of the sampling rate

without affecting phase relationship and guaranteeing highest sound resolution.

Three newly developed large-scale integrated circuits* are responsible for all demodulation, error correction, basic and enhanced interpolation, filtering (digital and phase linear) as well as 16-bit digital-to-analog conversion. This highly developed technology prevents quantization noise and provides for an audio signal with very high resolution.

Even with the most advanced electronics for digital-to-analog conversion and error correction, a stable transport chassis remains one of the most important requirements for optimum reproduction. The B226 features a die-cast drive mechanism on damped suspension to prevent resonance and diminish the need to rely on the error correction circuitry.

*SAA 7210, SAA 7220, TDA 1541

SPECIFICATIONS

FREQUENCY RESPONSE:

20 Hz - 20 kHz, +0/-0.1 dB, phase linear

HARMONIC DISTORTION:

Less than 0.005% (20 Hz to 20 kHz)

S/N RATIO:

Greater than 100 dB (20 Hz to 20 kHz)

CHANNEL SEPARATION:

Greater than 90 dB (20 Hz to 20 kHz)

WOW AND FLUTTER:

Quartz crystal precision

MAXIMUM PLAYING TIME:

74 minutes

START DELAY FROM PAUSE:

Less than 0.6 seconds

SEARCH TIME FOR ANY LOCATION:

Less than 4 seconds (over 15,000 tracks per second)

NUMBER OF PROGRAM STEPS:

19

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

REVOX B215 CASSETTE RECORDER/REPRODUCER

The Revox B215 cassette recorder/reproducer is fully professional in the design of its transport, control and memory systems, not to mention its outstanding audio performance characteristics.

The Model B215 features four direct drive motors: two for the direct drive of the capstan shafts and two for spooling. There are no troublesome belts, pulleys, friction clutches or mechanical brakes in the B215. The tape transport, counter, clock and memory are microprocessor controlled as well. Start/stop positions (tape counter and clock time) can be set and cancelled electronically.

Dolby B® and C® noise reduction as well as Dolby HX Pro Headroom® extension is utilized in the record and reproduction channels. A four digit front panel LCD timer display is included along with LCD peak indicators for audio level. The B215 also features automatic tape alignment.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information



Revox model B215 Cassette Recorder/Reproducer



Tascam model 133B Cassette Recorder/Reproducer

TASCAM MODEL 133B CASSETTE RECORDER/REPRODUCER

The Tascam model 133B stereo plus Cue cassette recorder/reproducer was specifically designed to meet exacting broadcast standards. The 133B's list of quality features include:

- Three tracks, each individually recordable, erasable and controllable
- +4 dBm balanced/ -10 dBv unbalanced inputs and outputs
- 2 motor, soft-touch logic control transport
- On-demand play logic
- Automatic Accessory Timer Start
- A choice of two tape speeds: 1 1/8 and 3 3/4 IPS
- Dolby® NR built-in on audio tracks. Patch points and logic output provided for optional RX-8 outboard dbx® unit
- Ultra-accurate electronic four-digit tape counter
- Microprocessor control

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information

TASCAM MODEL 122MKII STUDIO CASSETTE RECORDER/REPRODUCER

Any studio environment can be enhanced with the Tascam 122MKII Cassette Recorder/Reproducer. The 122MKII offers uncompromising quality not commonly found in professional grade cassette units. While the 122MKII is priced for the cost-conscious customer, its features rival those of more expensive machines:

- 3 Heads - Erase, Record, Play
- Dual Input/Output with +4 dBm balanced XLR connectors and -10 dBv unbalanced RCA connectors
- Direct driven capstan
- Dolby HX-PRO® extension circuits and Dolby B® /C®
- Adjustable Bias and EQ select
- Front panel line inputs
- Memory rewind and replay

The 122MKII's performance is superb with THD rated at 1% at 0 VU (audio tracks) and a Signal to Noise Ratio of 59 dB (weighted) at 1 1/8 IPS.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information



Tascam model 122MKII Cassette Recorder/Reproducer

- Available in one-, two-, three- and four-bay configurations
- Identical to Control 16 automation racks for attractive, uniform installations
- Pleasing blue and black color scheme
- Louvered back door, top plate, side panels, cowlings and front mounting channels standard
- Heavy duty construction

B/E Series 4000 rack cabinets provide a convenient means for arranging equipment and at the same time give a neat appearance to the surrounding facility. They are especially desirable when used in a radio station containing a B/E Control 16x or Econo-Control 16 program automation system, since the same racks are used in those products. This gives an attractive, uniform appearance to the installation.

These heavy duty rack cabinets can be ordered in one-, two-, three- and four-bay configurations, depending on your current and future needs. Each rack cabinet, whether a single or multiple bay model, comes with the following standard components: louvered back door(s), top plate(s), side panels, cowling(s), and front mounting channels. Door locks, rear mounting channels, plugmolds and blank panels can be ordered as options if needed.

The rack frames are black, with light blue side panels, top panels and doors. Trim strips and cowlings are brushed aluminum with black inserts.

All B/E supplied Series 4000 rack cabinets undergo a modern prefinsihing and painting process to assure a top quality finish. The units are sanded, phosphatized, painted, bake cured, and then carefully inspected before being shipped. A quality product in all ways, B/E Series 4000 rack cabinets are a pleasing addition to any facility with rack-mountable equipment.

ORDERING INFORMATION

STOCK NO.	DESCRIPTION
958-4001-001	ONE RACK with louvered back door, top plate, side panels, cowlings and front mounting channels. Dimensions 69 $\frac{3}{4}$ " high, 23 $\frac{1}{4}$ " wide and 25" deep. 35 rack units per rack. Unwired rack. Weight (packed): 222 lb.
840-0001	ONE RACK BAY, same as above except less side panels. Weight (packed): 148 lb.
958-4002-001	TWO RACK BAY with louvered back doors, top plates, side panels, cowlings, and front mounting channels. Dimensions 69 $\frac{3}{4}$ " high, 45 $\frac{1}{4}$ " wide and 25" deep. 35 rack units per rack. Unwired rack. Weight (packed): 346 lb.
958-4003-001	THREE RACK BAY with louvered back doors, top plates, side panels, cowlings and front mounting channels. Dimensions 69 $\frac{3}{4}$ " high, 67 $\frac{1}{4}$ " wide and 25" deep. 35 rack units per rack. Unwired rack. Weight (packed): 494 lb.
958-4004-001	FOUR RACK BAY with louvered back doors, top plates, side panels, cowlings and front mounting channels. Dimensions 69 $\frac{3}{4}$ " high, 89 $\frac{1}{4}$ " wide and 25" deep. 35 rack units per rack. Unwired rack. Weight (packed): 642 lb.
840-4006	Pair of "L" type rear mounting channels. (One pair required per rack) MXL-61



Single Bay, Front

Single Bay, Rear

Four bay
rack cabinet

978-0000	3' Plugmold with 6 AC outlets. PM-36-6
978-0001	5' Plugmold with 10 AC outlets. PM-60-10
506-0175	1 $\frac{1}{4}$ " Blank Panel - Black, 1 rack unit
506-0350	3 $\frac{1}{2}$ " Blank Panel - Black, 2 rack units
506-0525	5 $\frac{1}{4}$ " Blank Panel - Black, 3 rack units
506-0700	7" Blank Panel - Black, 4 rack units
506-0875	8 $\frac{3}{4}$ " Blank Panel - Black, 5 rack units



Control 16x

- Full featured, expanded software
(Everything you need for a winning system!)**
- Simple "Goof-Proof" keyboard operation
(Anyone can learn to use it)**
- Automatic Re-start with format re-sync
(Quick recovery from power outages)**
- Exclusive monitor display of the last 24
aired events (Check system performance at
a glance)**
- Versatile "Live Assist" capability with ex-
clusive "Direct Start" (The Control 16x
adapts to YOUR format!)**
- Full two-way business system interfacing
(Connect the Control 16x to your station
computers)**
- Innovative technical design (Reliability that
is second to none)**



Audio Control Processor — Internal View

A PROVEN PERFORMER

The Broadcast Electronics' Control 16x has proven itself in over 200 installations around the world. In fact, the superb performance of the Control 16x has made it the industry standard for program automation systems. The Control 16x has achieved this honored status by incorporating all of the most desirable automation system features in one reliable package.

A FULL RANGE OF UNIQUE CAPABILITIES

Broadcast Electronics has designed the Control 16x to fulfill every anticipated need. For example, the Control 16x features automatic system re-sync following a power failure. (If you have ever struggled with a manual system re-set, you know how handy this feature can be.) The Control 16x also includes an expanded video log display and an easy processor re-setting procedure that eliminates the need for memory re-programming.

If you have a computer, you're sure to appreciate the Control 16x's easy interfacing capability. By utilizing its standard RS232 port, the Control 16x can "talk" to your computer and your computer can "talk" to it. Just imagine being able to totally integrate the Control 16x's logging output with a computer-based billing system!

The Live Assist feature allows you to utilize live announcers on a full or part time basis as you desire. In the Live Assist mode, the Control 16x becomes the live announcer's most dedicated partner. It maintains the proper music/spot rotation and leaves the announcer free to devote more attention to communicating with the audience. The Control 16x can even handle satellite music formats with its innovative Direct Start capability. (The satellite announcer controls the automation system via special cue signals)

SPECIAL PROGRAM/BULLETIN INSERTION

With the Control 16x, you have the complete freedom to make last minute program alterations as the need arises. News bulletins and other unexpected program changes can be easily inserted into the normal sequence by utilizing the Control 16x's convenient Special Event Insertion technique.

EASY SOURCE SUBSTITUTION

This is one of the most popular features of the Control 16x. Let's say that one of the reel-to-reel machines suddenly became defective. (An unlikely event in the Control 16x, but possible none the less.) In most other automation systems you would have to MANUALLY RE-PROGRAM THE ENTIRE MEMORY to by-pass the defective source and/or substitute another in its place. Such a task would be incredibly time consuming, but absolutely necessary. Without re-programming, the system will continually attempt to start the defective source machine every time it encounters an instruction to do so. This usually results in large amounts of dead air or, in some cases, a total system collapse.

With the Control 16x, however, ONE KEYBOARD ENTRY will automatically re-program the memory for you! Within seconds you can "re-route" the program flow to by-pass the faulty machine completely or substitute with another source.

SOURCE STATUS MONITORING

The Control 16x keeps a watchful eye on all of its program sources. It knows if the source has "power on", if the source is "ready to play", if the "source card is in place", if the source has been "disabled", or if the source has a "machine error defect". All of this extensive sensing is possible through the advanced circuitry provided on the Control 16x's Universal Source Cards.

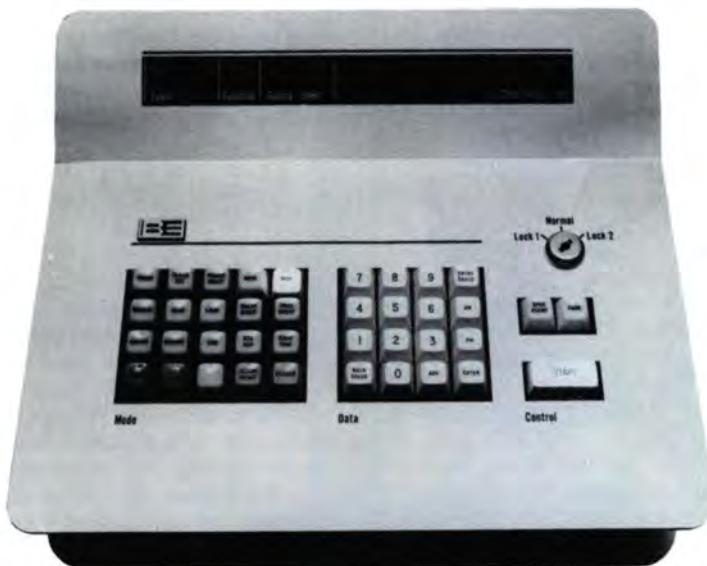
The Control 16x's source status monitoring is always looking one event ahead of whatever is currently on the air. You will always receive advance warning if the next source is not ready to play.

The Control 16x's source status monitoring permits a source to "air" ONLY if it is DESIGNATED AND READY for play at the chosen time. This eliminates the embarrassment of playing a reel-to-reel tape on the air while the machine is in fast wind. (You often hear this unfortunate mistake on those "other" automation systems.) This also eliminates the dead air that results from attempting to play an unloaded source.

FULL COMMAND KEYBOARD

The Control 16x features a straightforward keyboard that has been specially engineered for logical, easy operation. The keyboard is your terminal for communication with the system. Its illuminated switches clearly indicate the specific modes of operation. (Each switch is labeled according to its purpose.) With the Control 16x keyboard, you will never be confused by vague descriptions or cryptic characters. Within the first hour of operation, you'll be programming the Control 16x with complete confidence.

The Control 16x includes four video displays in addition to the normal program display. These displays provide all of the information necessary to make quick, intelligent, programming decisions.



Control 16x Keyboard



Control 16x Monitor

ASSIGNMENT TABLE DISPLAY

The Assignment Table provides an easy way to set the Control 16x's initial system assignments from the keyboard. "Source numbers" that will be used for Time Announce, Back Time, Dead Roll, Net Join, or Voice Track are all entered directly from the keyboard and displayed on the video monitor. These source numbers are used to label the various devices (cart machines, reel-to-reel decks, etc.) that will be accessed by the program.

You have the complete flexibility to change source assignments at any time. With the Control 16x, you won't be burdened with wiring changes or hardware modifications. For example, if you decide to place your #1 Voice Track tape on a different source machine, just access the Assignment Table display and "tell" the Control 16x to go to the new source whenever the program calls for that voice track. The switch will be made instantly!

PROGRAM LOG DISPLAY

The last 24 lines of logging data are easily reviewed on the system monitor. You can quickly check your programming on the video monitor from virtually any location in the station.

EVENT DISPLAY

This display permits you to view any "page" of 96 events in the program memory. Each event number is shown along with the function and source/shelf data programmed for the event. You can move forward or backward through the memory, reviewing each "page" as you do so.

COMPARE TIME DISPLAY

Up to 72 Compare Time entries can be displayed in chronological order. Each entry is shown by date, hour, minute, and second along with brief description of the action designated to take place at that time.

ORDERING INFORMATION

Broadcast Electronics will custom design each system to fit your station programming needs. Contact Broadcast Electronics for more information.



Econo 16

- Microprocessor based system at economical price
- Field expandable to full Control 16x
- Perfect for "live assist" programming
- 2000 program events, 10 repetitive compare times
- Full data error sensing
- Completely interchangeable universal source cards
- Same superior technical performance as full Control 16x

The Econo 16 is an economy version of Broadcast Electronics' highly successful, top of the line Control 16x. Many of Control 16x's unequalled features such as simplicity of operation and superior technical performance are retained in this new smaller program controller. Econo 16 meets the broadcaster's demand for a small control system with a modest degree of sophistication.

WHAT'S THE DIFFERENCE?

Putting it quite simply, Econo 16 does not use a CRT video monitor. It does, however, include the same portable lightweight Keyboard and the unique Audio Control unit as the full Control 16x. This design concept makes Econo 16 the only small microprocessor controller that can be expanded to include all the features of the top of the line video monitor systems.

Should your later needs require full two way communication, simply plug in the CRT video monitor and associated electronics to expand your Econo 16 to include all the features of the full Control 16x. Since the same Keyboard is used, the time required for operator retraining is minimized when expanding later.

HOW ABOUT LIVE ASSIST?

In conjunction with the optional Live Assist Remote Control, the Econo 16 offers the simplest and yet most powerful approach to live assist programming ever devised for a program control system. In addition to remote control functions such as AUTO, MANUAL and FADE, the Live Assist Remote Control provides 12 switches which may be customer assigned and labeled for "direct starting" any source within the system or selecting specific system functions WITH NO PROGRAMMING REQUIRED!

The operator can control the progress of his live show by pressing buttons labelled CURRENT HITS or JINGLES; all at his own pace and in response to the specific needs of his format. Spot breaks can be pre-programmed and called for at the press of a single button. And logging requirements are further simplified with the use of the optional "Intelog" logging package; providing immediate hard copy verification of everything played on the air.

IS THE ECONO 16 EXPANDABLE TO FULL CONTROL 16x CAPABILITIES?

YES. The Econo 16 is especially attractive to those broadcasters whose present needs do not justify the capabilities of the full Control 16x but who may want to expand to the full Control 16x at a later date.

If you decide to expand, simply add the CRT video monitor and Main Processor chassis to have all the benefits of the full Control 16x.

2000 PROGRAM EVENTS

You can use SEQUENTIAL, MAIN FORMAT/SUB FORMAT, or TIME INSERTION programming, with 2000 events standard. All 3 methods are included to provide the flexibility needed to meet your changing needs.

12 EVENT FUNCTIONS

Each event can be programmed with a function along with source and shelf data for positive program control. Functions include:

LINK - to link events together to prevent interruption by time update.

MULTI-START - for smoothly playing time announcements over music.

BACK-TO-BACK - for playing the same reel-to-reel source without stopping between selections.

STOP - to take manual control.

RETURN - for inserting commercials into a repetitive format.

PREROLL - for updating the voice track.

RELAY - for firing optional relays for switching on or off devices external to your system.

UPDATE - the event which the memory will go to when a time jump command takes place.

PLAY - tells the system to play this event normally.

AVAIL - leaves this event blank and available for later use.

GO TO - which commands the memory to go to a specific event in memory.

AUTO - to return to automatic programming.

BUILT-IN SELF CORRECTING CLOCK AND COMPARE TIME MEMORY

This crystal reference digital clock has many advanced self correcting features. The time memory has capacity for storing 10 entries which repeat on an hourly basis. Any one of 14 functions can be programmed with each time entry.

When the teal time clock coincides with a time entry, the system will execute the function. Functions include: STOP, AUTO, RETURN, PREROLL, RELAY (with optional relay panel), START, JUMP, FADE & START, FADE & STOP, DEAD ROLL START, DEAD ROLL LIMIT, NETWORK EOM, SPECIAL EVENT 1 INSERTION and SPECIAL EVENT 2 INSERTION.

DATA ERROR SENSING

The operator instantly knows when invalid data is being programmed by a pleasant sounding beep emitted from the Keyboard. Programming a nonexistent source or shelf will be sensed immediately and cause automatic reset for accepting valid data.

Programming a source to play back-to-back without the Back-to-Back function will cause a repeated source error. This feature prevents the common mistake of programming two commercial announcements back-to-back from the same random access machine.

Econo 16's DATA ERROR SENSING makes it virtually impossible to enter erroneous event or time data which would otherwise disrupt your on-air sound.

UNIVERSAL SOURCE CARD

Econo 16's source cards are truly universal. Only one type is used for all sources—reel-to-reel sources, single deck cartridge sources, random access sources, etc., and each is fully interchangeable with the other source cards. Each universal source card features:

- 25 Hz sensing for reel-to-reel sources
- Voice track update control
- On-air tally signal
- End-of-tape (reel-to-reel tape) alerting signal
- System Silence Sense extend or defeat
- 8 LED diagnostic indicators

SIMPLE SPECIAL EVENT INSERTION

News bulletins or last minute program changes can be easily inserted into the normal program sequence either manually or by time. Two "Special Event Insertions" can be pre-programmed and inserted and reinserted in the program sequence as often as you like without having to reprogram each time.

UNIQUE ASSIGNMENT TABLE

The unique assignment table means sources no longer have to be hard wired and dedicated to specific use such as Time Announce, Back Time/Dead Roll, or Voice Track. You simply assign, via the keyboard, the sources you want to use for Time Announce, etc. in the assignment table.

FULL AUTOMATIC RESTART AND PROGRAM RE-SYNC

Econo 16 has the intelligence to automatically restart itself following a main AC power failure. In addition, the Econo 16 can even re-sync itself to proper programming without any operator involvement whatsoever. Power failures are no longer a threat to your station's sound.

**DIAGNOSTIC PRINTOUT OF ABORTED EVENTS
(WITH OPTIONAL PRINTER)**

Aborted events are instantly printed with an English description of exactly what occurred. There are 8 conditions that will cause an aborted event:

- Source Power Off
- Source Card Out
- Power Failure
- Machine Error
- (Source) Disabled
- Source Not Ready
- Repeated Source
- Silence Sense

Say, for example the log printout reads:

02:05:02P 0005 PLAY 01-00 ***SOURCE
POWER OFF***

From the description you can tell that source number 01 did not play at event 0005 when called upon at two seconds after 2:05 P.M., because the source power was not on.

TECHNICAL SPECIFICATIONS**Program Output:**

+8 dBm stereo balanced 600 ohms.

Headroom:

+12 dB.

Frequency Response:

± 1 dB from 40 Hz to 20 kHz with reference of 1 kHz at +8 dBm output and including 25 Hz filters.

Total Harmonic Distortion:

Less than .5% at +18 dBm output from 40 Hz to 20 kHz. Typically less than .1% from 50 Hz to 20 kHz.

Signal To Noise:

70 dB or more below +8 dBm output. (Not including source noise).

Stereo Separation:

55 dB or more below +8 dBm output from 40 Hz to 20 kHz.

Cut to Program Separation:

70 dB or greater for "0" dBm input to source.

25 Hz Filter Attenuation:

55 dB or more (typically 60 dB) at 25 Hz below reference output of 1 kHz at +8 dBm.

Mono Mix Program Output (L+R):

"0" dBm mono balanced 600 ohms following 25 Hz filters.

Headroom Mono Mix:

+12 dB.

Source Audio Input:

"0" dBm at 600 ohms unbalanced for +8 dBm output.

Network Audio Input:

"0" to -20 dBm (adjustable) mono 600 ohms balanced.

Off-Air Audio Input (To Off-Air Silence Sensor and Monitor Panel):

-10 to +8 dBm (adjustable) stereo 600 ohms balanced.

Monitor Amp Output:

Stereo, 10 watts RMS/channel at less than .5% distortion.

Remote On-Air Tally (from each source card):

Open collector 60 ma max.

Clock reference output for external use:

One PPS contact closure or TTL output.

ORDERING INFORMATION

Broadcast Electronics will custom design each system to fit your station programming needs. Contact Broadcast Electronics for more information.



SAT-16

- Exclusive "Direct Start" capability**
(Utilize your satellite format to its fullest potential)
- Large Memory Capacity**
(Program the memory for a full twenty-four hours at one sitting)
- Quick and simple programming**
(Anyone can do it)
- Reliable Operation**
(It earns your trust day after day)
- Expandable at any time**
(The SAT-16 grows with you)

A RIGHT WAY AND A WRONG WAY . . .

The Manual Method: As you might guess, this is definitely the **WRONG** way to handle a satellite format. Why? Well, just imagine the plight of the human operator in the studio. This unfortunate person must spend his or her on-duty hours listening to the incoming program, constantly on the alert for the cue tone that will signal them to start a local commercial or ID break. Even an individual with exceptional powers of concentration is bound to succumb to such a mind numbing environment. The results can manifest themselves in poor on-air performance. (What if the wrong cart is played at the wrong time? What if a scheduled cart isn't played at all?) Errors like these will come back to haunt you and eventually they will hit you where it hurts the most—in your pocket!

The Automated Method: Automation offers the ideal solution to the "Manual Method" dilemma. The SAT-16 Satellite Program Control is an automated system specifically designed to handle satellite formats. Once the SAT-16 is placed in control, it immediately becomes your most dedicated employee. It is constantly attentive, never needs a break, is infinitely patient and never gets sick. At the heart of the SAT-16's amazing capabilities is a unique feature known as "Direct Start".

"DIRECT START" CAPABILITY

The SAT-16 pioneered the "direct start" capability in satellite program automation systems. Basically, "direct start" allows the satellite programmer to play your local ID, weather, commercials, and other program elements at his or her choosing. When the SAT-16 is in control, the announcer can simply press his button labeled "Local ID" (for example) and send a special signal over the satellite channel which is "heard" by the SAT-16. The SAT-16 recognizes this signal as the "Local ID" signal and automatically

starts your ID cart. This gives the satellite programmer unrestricted flexibility in running his and your format.

The SAT-16 can provide this "direct start" capability for up to fifteen different sources. Furthermore, the SAT-16 will automatically log all direct start activity on its diagnostic printer, providing you with an up to date record of what sources have been played.

SIMPLE TO PROGRAM

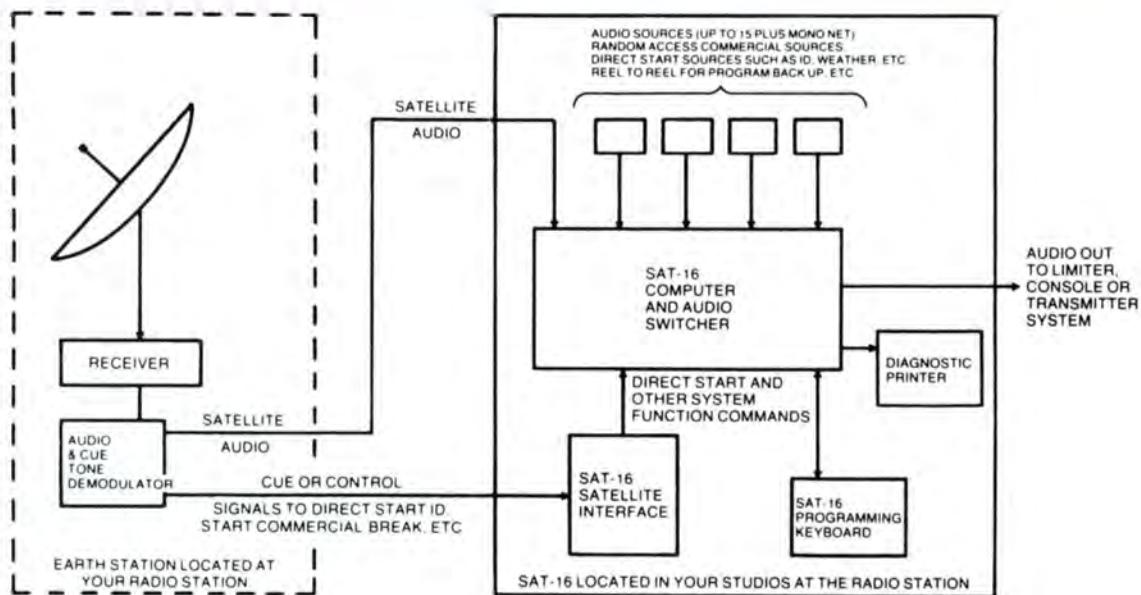
Programming the SAT-16 is quick and simple since its memory is used only for storing your commercials. You don't have to worry about programming the station ID or any other "direct start" source. The programming method is very straightforward and can be easily learned by any of your station personnel.

PROGRAM IT JUST ONCE A DAY

With its two thousand event memory, the SAT-16 has more than enough programmable capacity for a full twenty-four hour period of operation. This permits you to program all the events for a regular broadcast day in one sitting. In fact, with the SAT-16's ample memory you can program several days in advance if you wish. (Program it just once for an entire three day weekend/holiday!) With the SAT-16 you won't waste your time constantly programming and re-programming the system.

RELIABLE OPERATION

Of course, human mistakes can always happen, but with the SAT-16 you can rest assured that you will have the most reliable system available. Imagine how much better your station would sound without dead air, early cart starts, etc. When you use the SAT-16 with your favorite satellite format, the result is a smooth, professional sound that is sure to be reflected in your station's ratings.



TYPICAL INSTALLATION OF A SATELLITE DELIVERED FORMAT

EXPANDABILITY

The SAT-16 includes additional software features similar to those found in the Broadcast Electronics Econo 16 program controller. Therefore, should you decide to operate "live" during portions of your broadcast day (morning drive, for example), the SAT-16 will allow you to easily suspend the satellite format and re-join it whenever you desire.

If you later decide to go to a full local automation system, simply add the additional source equipment and your SAT-16 will be ready to go! You can even upgrade your SAT-16 to the sophistication of a Control 16X by simply adding a video monitor and a new primary processor. The software is changed by plugging in a new PC card. That's all there is to it! With the SAT-16 your horizons are unlimited.

DIAGNOSTIC PRINTOUT (INFORMATION AT YOUR FINGERTIPS)

As every good broadcast businessman knows, you must have records to substantiate your claims of which commercials played on the air and when. The SAT-16's diagnostic printer gives you that record in an easy to read format. It also provides a full English printout of ten diagnostic messages along with six diagnostic codes to let you know exactly what is happening at all times. You can even expand to full English logging by merely adding the proper encoding equipment.

TYPICAL SAT-16 SYSTEMS

SAT-16 SYSTEM A

...is all you really need for full automation of a satellite format. This economical single rack configuration gives you:

- 48 random select slots for commercials

- 3 separate slots for your station ID, local weather, etc. These can be directly started via satellite or programmed manually into the memory sequence.
- BE's exclusive satellite interface featuring "direct start" satellite control of up to 15 sources.
- Printer notation for all source activity including those sources that are "directly started" by satellite command. This provides a permanent record for all program activity.
- Space saving single rack configuration. Expandable to a Control 16X.

SAT-16 SYSTEM B

...provides added flexibility for pre-loading 50% more commercial cartridges and adds a reel-to-reel deck for back-up programming. This low profile, two rack configuration give you:

- 72 random select slots for commercials
- 3 separate slots for your station ID, local weather, etc. Any of these can be "direct started" via satellite or manually programmed into the memory sequence.
- Reel-to-reel playback for back-up programming during outages caused by technical difficulties or biannual "sun fades".
- BE's exclusive satellite interface featuring 15 source direct start capability
- Printer notation for all source activity including those sources that are "directly started" by satellite command. This provides a permanent record for all program activity.
- Space saving dual rack configuration. Expandable to a Control 16X.

In addition to the SAT-16 systems shown above, we can configure special SAT-16 systems to meet any particular need.



System "A"



System "B"

SPECIFICATIONS

"Direct Start" Source Capability:
up to 15

Program Output:
+8 dBm stereo, balanced into 600 ohms

Headroom:
+12 dB

Frequency Response:
±1 dB from 40 Hz to 20 kHz with 1 kHz reference
at +8 dBm output including 25 Hz filters

Total Harmonic Distortion:
Less than .5% at ±18 dBm output from 40 Hz to 20
kHz. (Typically less than .1% from 50 Hz to 20 kHz)

Signal to Noise:
70 dB or more below +8 dBm output. (Not including
source noise)

Stereo Separation:
55 dB or more below +8 dBm output from 40 Hz to
20 kHz.

Cut to Program Separation:
70 dB or greater for 0 dBm input to source.

25 Hz Filter Attenuation:
55 dB or more (typically 60 dB) at 25 Hz, below
reference output of 1 kHz at +9 dBm.

ORDERING INFORMATION

Broadcast Electronics will custom design each system to fit your station programming needs. Contact Broadcast Electronics for more information.

- Electronic tab setting
- 32-line buffer memory
- Automatic error detection
- Full editing capability
- Automatic printout of encoding instructions
- Exclusive "Message Restore"
- Fast, reliable microprocessor encoding

02:05:39P	0008	PLAY	03-00	***SOURCE CARD OUT***		
02:05:39P	----	PLAY	02-00	EMERGENCY FILL		
02:08:34P	0011	PLAY	02-00	***REPEATED SOURCE***		
02:08:34P	0506	LINK	06-01	SIRLOIN STOCKADE #2	:30	CA
02:09:03P	0507	LINK	05-34	COKE "GOLDSBORD"	:30	CA
02:09:33P	0508	LINK	06-16	CONTROL 16	:15	CA
02:09:50P	0014	PLAY	11-00	ID/JINGLE BILL ROBINSON	:09	
02:09:59P	0016	PLAY	03-00	***MACHINE ERROR***		
02:09:59P	0018	PLAY	01-00			
02:12:50P	0511	LINK	06-28	FORD DEALERS	:60	CA
02:13:24P				XMTR SYSTEM "OFF" THE AIR		
02:13:50P	0512	LINK	05-19	SUNBEAM BREAD #3	:30	CA
02:14:22P	0513	LINK	06-13	WESTERN AUTO	:30	CA
02:14:51P	0020	PLAY	13-00	***DISABLED***		
02:14:51P	0021	PLAY	03-00			
02:15:29P				XMTR SYSTEM "ON" THE AIR		
02:18:46P	0022	PLAY	99-00			
02:18:46P	0023	MLT ST	02-00			
SS 02:19:05P				POWER FAILURE		
02:19:21P	0024	PLAY	13-00	***DISABLED***		
02:19:21P	----	PLAY	01-00	EMERGENCY FILL		
02:22:53P	0022	PLAY	99-00	***DISABLED***		
02:22:53P	0023	MLT ST	02-00			
SE 02:25:17P	----	PLAY	11-00			
02:25:28P	0024	PLAY	13-00			
02:25:35P	0025	PLAY	03-00			
SE 02:29:12P	2900	PLAY	11-00	ID/JINGLE BILL ROBINSON	:09	
SE 02:29:23P	2901	PLAY	05-34	COKE "GOLDSBORD"	:30	CA
SE 02:29:53P	2902	PLAY	99-00			

Typical InteLog display

Broadcast Electronics' high speed InteLog represents the first real advance in operational convenience and printout of diagnostic messages in English logging since the early 1970's. It is designed for use with Broadcast Electronics "intelligent" automatic program control systems—Control 16x and Econo-16—and is another example of BE's solid, reliable and advanced-design automation products.

ENCODING

InteLog's encoder is microprocessor controlled, and includes many unique features for fast, reliable encoding of cartridges with logging data. The typical encoding setup includes a data terminal, a cartridge recorder and the InteLog encoder.

Electronic Tab Setting - The Electronic Tab Setting feature is just like the tab stops on a typewriter, for ease in preparing your messages for neat, columnized printout...just like your manually kept log.

InteLog further simplifies the encoding process by printing step-by-step instructions guiding the operator through the encoding procedure. This two-way communications between the encoder and operator makes InteLog a truly "intelligent" logging system.

Full Editing Capability - Messages stored in memory can be fully edited, not only for minor errors such as spelling, but also to add or delete several words at a time. Messages can therefore be changed without re-entering the entire message.

Exclusive Automatic Error Detection - InteLog automatically compares the message being encoded on the tape with the message as stored in memory, and upon completion of the encoding process, tells the operator if there are any mistakes. This saves the operator time in verifying the encoded messages.

Message Restore - When updating a client's commercial, there is no need to re-type the logging message into the memory. With InteLog simply play the old commercial on the encoder cart machine, storing in memory the logging message on that cart. Next erase the cart. Then the new commercial is recorded on the

cart and the old logging message encoded back onto the cart from memory.

32-Line Buffer Memory - InteLog's encoder memory provides convenient storage of 32 single line messages, or any combination of multiple line messages up to a total of 32 lines. This capacity allows the storing of a complete log heading in many cases. Several messages may also be entered for systematic encoding.

InteLog's encoder includes a five-position transfer switch for switching the data terminal used for encoding to other uses such as printing information from Control 16's memory. This provides a hard copy printout of any selective group of events for convenient review. Control 16's time entries used for time updates can also be printed out for review.

DECODING

InteLog provides an FCC acceptable log, complete with log heading, space for the operator to sign on and off, and exact start time for each event, along with the event and source number. It also prints six diagnostic codes and nine diagnostic descriptions indicating abnormal program operation.

The six diagnostic codes tell you if an on-air event did not play to completion, and the reason why. For instance, the designation "FO" means the event was **Faded OFF** the air; "@" means this event played while the transmitter system was off the air.

The nine diagnostic descriptions tell you if an event did not go on the air as scheduled, and the reason it did not play. They are:

SOURCE, POWER OFF, SOURCE NOT READY, DISABLED, SOURCE CARD OUT, REPEATED SOURCE, MACHINE ERROR, XMTR SYSTEM OFF THE AIR, XMTR SYSTEM ON THE AIR, POWER FAILURE.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics.



TG-2A Dual Tone Generator

- Ultra Stable, Low Distortion 25 Hz Generator for Cue Tones
- Active 25 Hz Filters In Left & Right Channels
- Left or Right Channel 25 Hz Record And Detection

The new Broadcast Electronics TG-2A Dual Tone Generator is used in the production of reel-to-reel tapes for use with broadcast program control systems.

The TG-2A incorporates a 25 Hz oscillator, 1000 Hz oscillator, two 25 Hz sensors (for left and right channels), audio filters, logic circuitry and power supply in one single compact unit for the utmost in versatility. Its many useful features, modern electronic design and attractive styling make it a welcome addition to any radio station, music service or production facility.

SIMPLE, STRAIGHTFORWARD OPERATION

Operation of the Dual Tone Generator is simple and straightforward. As a reel of music or program material is recorded, it is first filtered by the Dual Tone Generator to remove all audio in the spectrum below 50 Hz on both left and right channels. Then a low distortion, frequency stable 25 Hz "cue tone" is recorded on either the left channel, right channel, or both channels simultaneously. The duration of the tone can be pre-set (from 0.1 sec to 2 sec)

- 1 kHz Tone For Recording Reference Level Tone
- 25 Hz Sensors For Recorder Stop And/Or External Switching
- Full Remote Control

for the exact length of time desired.

When the reel of tape is played back on a program control system, the 25 Hz "cue tones" on the left channel (stereo) will signal the program control system to start the next event. The use of the 25 Hz signal on the right channel can indicate the beginning of the next block of programming for synchronized voice track machines.

1 kHz REFERENCE TONE

The Dual Tone Generator can also be used to record a 1 kHz tone on both left and right channels as a reference level tone on the beginning of a tape. When the tape is then cued up on the reel-to-reel machine in the program control system, it is a simple matter to set the audio levels on that machine to the 1 kHz reference. There are many additional applications for the Broadcast Electronics Dual Tone Generator other than mastering reel tape with cue tones. Contact Broadcast Electronics for information on these applications.

SPECIFICATIONS

DETECTORS

Input:
44 K ohm, balanced bridging at 0 dBm.

Sensitivity:
Detects 25 Hz tones as low as -17 dBm.

Selectivity:
Rejects tones outside of the 20 Hz to 30 Hz range at +8 dBm input level.

FILTERS

Input:
44 K ohm, balanced bridging at 0 dBm.

Output:
Balanced low impedance capable of driving a 600 ohm load.

Output Level:
0 dBm output into 600 ohm with 0 dBm input level.
20 dB overhead (+20 dB output before clipping).
-45 dB or more at 25 Hz.

Noise:
70 dB below 0 dBm output.

Distortion:
THD .05% or less 50-20,000 Hz.
IMD .01% or less, 60 Hz/7 kHz; 4:1 ratio.

Frequency Response:
-1.0 to +0.25 dB 50 Hz to 20 kHz.
-45 dB or more at 25 Hz.

Crosstalk: (Channel Separation)
Better than 70 dB separation at 1 kHz; 55 dB
at 20 kHz.

OSCILLATORS

1 kHz - Frequency: ± 10 Hz; Distortion: Less than .5%; Output Level: Adjustable, -20 to +3 dBm.
25 Hz - Frequency: $\pm .25$ Hz; Distortion: Less than .75%; Output Level: Adjustable, -20 to 0 dBm.

Stop Delay:
Adjustable, 0-10 seconds.

Fixed Tone Length:
Adjustable, .1 to 2 seconds.

Operating Temperature Range:
0 - 50°C.

Power Requirements:
115V/230Vac, 50/60 Hz, 20 watts.

Dimensions:
19" Wide x 3½" High, 8½" Deep.
Weight:
5 lbs., 4 oz.; (packed - 8 lbs.).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TG-2A	908-6860-001	Dual Tone Generator



Model AR-1

- Automatically rewinds and recues tape after last song
- Automatically fast forwards tape onto take-up reel
- Front panel alarm indicator/reset switch

The Broadcast Electronics AUTO REWIND eliminates the need for human intervention when rewinding a reel-to-reel music tape for replay in an automated station. Should your format require a tape to repeat itself, such as the "current hit" reel, it can be done automatically with the AUTO REWIND. The AUTO REWIND can also be used to fast forward a tape (tails out) onto the take-up reel after the last music selection has played.

The AUTO REWIND senses foil on the backing side of the tape to trigger the rewind operation. The AUTO REWIND will interface with almost any modern broadcast type reel-to-reel playback

- Quick, simple operation
- For use with most broadcast tape machines and program control systems

machine. It can also be used with most program automation systems.

A front panel alarm indicator and reset switch provides indication of the automatic rewind mode. Should the tape fail to go into the play/recue mode following rewind, the alarm indicator remains on. Contacts for a remote alarm indicator are also provided.

The Broadcast Electronics AUTO REWIND mounts in a standard 19" rack and takes up only 1 3/4" of rack space. Each AUTO REWIND provides automatic rewind control for one reel-to-reel playback machine.

SPECIFICATIONS

Relay Contacts:

Bifurcated, rated at .1 amp @ 250V AC or DC.

Tally Signal:

A ground connection capable of sinking .5ma @ 24V is required to indicate when source is "on the air".

Foil Sense:

A ground connection capable of sinking .5ma @ 24V is required to indicate the presence of foil.

Power Requirements:

105 to 130V AC or 210 to 240V AC, 50 or 60 Hz, 10 watts.

Temperature:

0° to 55°C.

Humidity:

10% to 95%, non-condensing.

Dimensions:

1.75"H x 19"W x 9.5"D.

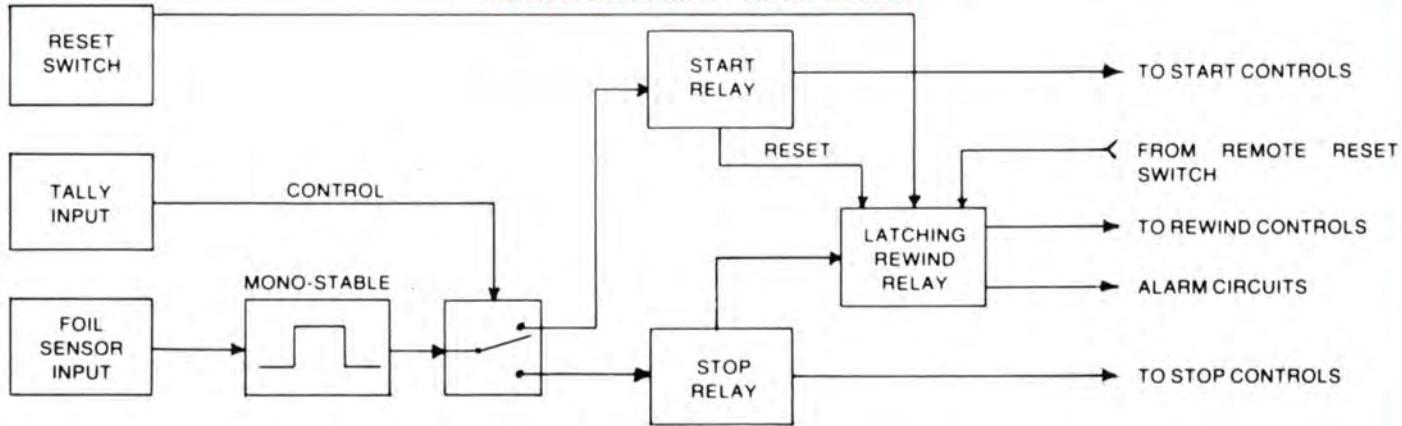
Weight:

3 lb. 5 oz.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AR-1	908-6850	Auto Rewind

BLOCK DIAGRAM - AUTO REWIND





Live Assist Remote Control

This compact, attractive control panel occupies even less space on an already crowded studio desk than our standard system keyboard, yet it provides features specific to Live Assist programming that even our keyboard (much less any other automation system) cannot provide.

Broadcast Electronics' Live Assist Remote Control consists of two groups of system switches. The SYSTEM CONTROL group covers actual automation control functions such as AUTO, MANUAL, START, FADE and SPECIAL EVENT. These switches are lighted to indicate the status of the system. In addition, four LED indicators are provided to show alarm conditions. The second group, labelled LIVE CONTROL, consists of 12 switches arranged as 3 rows of 4 switches. Each switch holds a unique clear plastic cap with a removable insert, so that every switch can be custom-labelled for its particular use.

LIVE CONTROL switches are the key to the operation of the Live Assist Remote Control. Inside the unit, a small selector switch (one for each front panel Live Control switch) allows the station to select the function that each switch will perform when pressed. This non-dedicated arrangement allows the station to customize the Live Assist Remote Control for its own unique requirements.

The real power of the Live Assist Remote Control lies in the system functions that can be initiated by depressing one of the Live Control switches. Any of these 12 buttons can be selected to perform any of the following operations in the automation system...

DIRECT START. Direct Start is a key feature of Live Assist programming. It allows a particular source to be played through the automation system and logged—just as if it had been programmed in the memory!

OVERSTART. (Sources 01-30) Similar to Direct Start. When activated, however, it fades down the current on-air source, plays the Overstart selection over it, and then fades up the current source once again.

JUMP. Causes the system to skip through memory until an UPDATE function is found. It is commonly used to skip an upcoming block of programming.

FADE JUMP. Like a JUMP, except that the audio on the air is faded down as the system performs the JUMP. At the bottom of the fade, the event programmed immediately after the UPDATE is automatically started and programming proceeds from there.

RETURN. Causes the system to switch between Main and Sub-routines in memory.

NET EOM. Used to take the system out of a network source.

NTR ADVANCE. Skips one event in memory for each press of the button.

SPECIAL EVENT #2. Provides access to calling up the Special Event #2, which otherwise is only available from the system keyboard.

START & AUTO. This function will start and place the system in the AUTO mode. This mode is ideal for starting and executing entire commercial clusters.

LOG DISPLAY. Successive presses of this button will switch the video monitor display from the regular Program Display to the Log Display and back.

The Live Assist Remote Control may be ordered for use with the Control 16x, Econo 16 or the SAT-16. Contact Broadcast Electronics for full details.

REVOX PR99 REEL-TO-REEL RECORDER/PLAYER

Revox offers one of its best for automation in the PR99 MKII. The PR99 MKII offers balanced inputs and outputs; XLR type connections with calibrated and uncalibrated levels; and ASA-VU metering with LED peak indicators. See page 78 for more detailed information.

MODEL	STOCK NO.	DESCRIPTION
13502	808-1014	PR99 MKII, ½ track stereo with 3¾ and 7½ IPS tape speed, Record-Play
13506	808-1015	PR99 MKII, ½ track stereo with 7½ and 15 IPS tape speed, Record-Play
13501	808-1016	PR99 MKII, full track mono with 3¾ and 7½ IPS tape speed, Record-Play
13503	808-1017	PR99 MKII, full track mono with 7½ and 15 IPS tape speed, Record-Play
13203	808-1026-010	PR99 reproduce only, ½ track stereo with 3¾ and 7½ IPS tape speed
13303	808-1026	PR99 reproduce only, ½ track stereo with 7½ and 15 IPS tape speed



Revox PR99 MKII



Otari ARS-1000



Scully LJ-10



SMC "Carousel"



IGM Go-Cart 24

Microprobe
"Digisound"**OTARI ARS-1000DC REEL-TO-REEL REPRODUCER**

The Otari ARS-1000DC is the most widely accepted two-speed (7½ and 3¾ IPS) reproduce-only tape machine which is specifically designed to meet the needs of broadcast automation systems. The ARS-1000 is engineered for heavy duty, continuous operation with special emphasis placed on long term reliability, simple operation and consistent performance. The ARS-1000DC also features a 25 Hz sensor, end of message and cue tone relays.

Broadcast Electronics stock #822-5058

SCULLY LJ-10 REEL-TO-REEL REPRODUCER

When it comes to the exacting demands of program automation, the L.J. Scully model LJ-10 is the professional choice. The dependable LJ-10 features closed loop drive, linear actuated pressure rollers, built-in foil sensing, and solid state logic control circuitry. Tape speed is selectable 3¾ and 7½ IPS in mono or stereo models. See page 79 for more detailed information.

MODEL	STOCK NO.	DESCRIPTION
LJ-10-1	822-2503	LJ-10 Reproducer - mono, half track
LJ-10-2	822-2504	LJ-10 Reproducer - stereo, two track
LJ-10-4	822-2505	LJ-10 Reproducer - stereo, quarter track

SONO-MAG MODEL 450/452 CARTRIDGE CAROUSELS

The name Carousel has become synonymous with automated tape cartridge players. The model 450 (mono) and model 452 (stereo) bi-directional carousel features the reliability of cast aluminum drum construction, steel cartridge trays and a ball bearing cross shaft. Microprocessor flexibility provides dependable bi-directional operation and front panel indicators give complete status readings at a glance.

IGM COMMUNICATIONS GO-CART 24

The bi-directional logic of the IGM Go-Cart 24 has reduced travel time between cartridge selections to no more than 8 seconds. This is a result of the Go-Cart's microprocessor control which automatically determines the shortest route to the next required cartridge. Other Go-Cart features include exceptional audio quality, rugged construction, easy loading trays, self-diagnosing error detectors, and extremely quiet operation.

MEI ELECTRONICS "DIGISOUND" DIGITAL AUDIO STORAGE UNIT

Digisound from MEI Electronics is the new digital alternative to mechanical cartridge players in program automation systems. With the Digisound unit and its 280 MegaByte hard disk drive, all music and commercial messages can be digitally stored and accessed instantly. Playback audio quality is as good or better than the latest CD unit available today. Digisound provides up to 65 minutes of monaural storage capability, practically the equivalent of four 24 tray mechanical playback systems!

ORDERING INFORMATION: SONO-MAG/IGM/MEI

See current Broadcast Electronics price list or contact Broadcast Electronics for more information

The items shown on this page can be integrated into any of our custom designed program automation systems. Contact Broadcast Electronics for full details.



Model FX-30

- 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%.

Whether it is used in a Broadcast Electronics FM transmitter, as a replacement for an existing exciter, or as a stand alone 30 watt transmitter, the FX-30 is the performance leader in FM broadcasting. In mid 1987 over 1,500 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's 80 dB signal-to-noise ratio.

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 greatly improves low frequency response.
- Quiet operation—typical S/N ratio of 80 dB.
- Completely broadband—requires no tuning adjustments.

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 CIRCUITY

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 pushbutton 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 composite signal applied to the modulated oscillator, and provides a clear and accurate indication of short transient peaks exceeding 100% modulation.

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

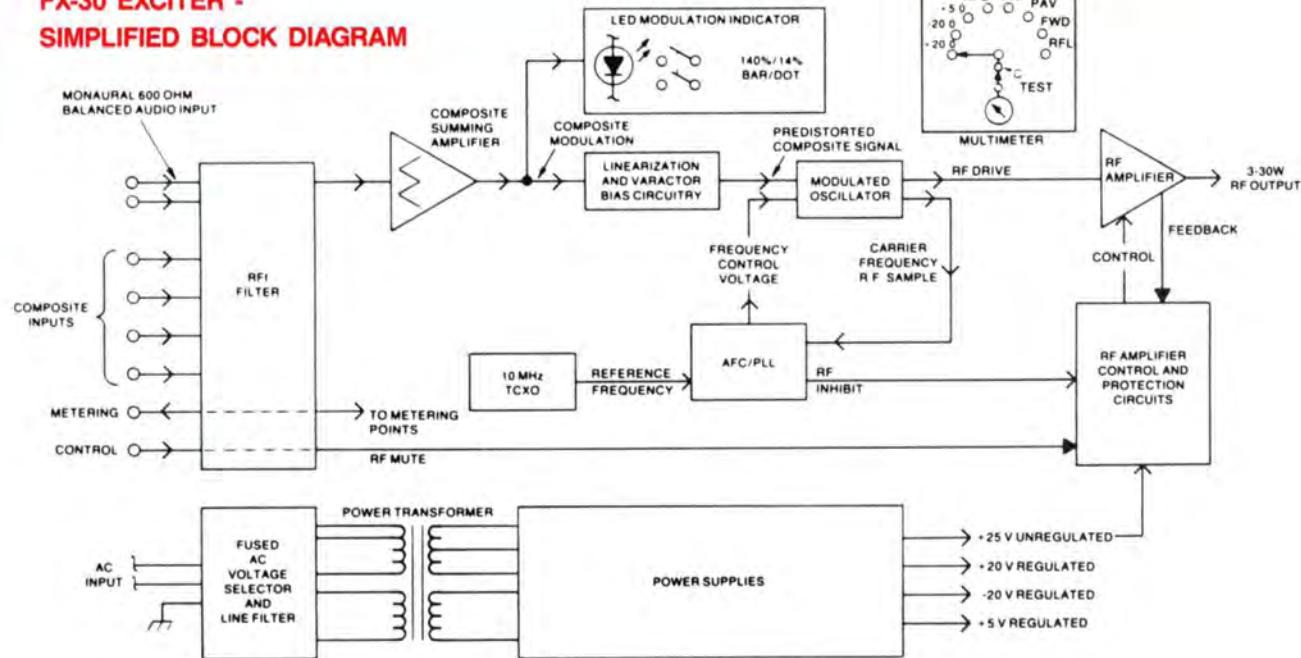


Top view of the FX-30 Exciter with the cover removed. The FX-30 is mounted on slides for easy access to all sub assemblies, even while the unit is operating.

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 or BNC connectors.

FX-30 EXCITER - SIMPLIFIED BLOCK DIAGRAM



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



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 with optional LPF. 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

+2000 kHz.

Modulation Indication

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

Asynchronous AM S/N Ratio

79 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.

Meterin/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 (operation to -20°C).

Cabinet Size

17.70" (44.96 cm) wide x 5.25" (13.33 cm) high x 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

±0.5° from linear phase 30 Hz to 5.3 kHz.

Composite Group Delay

390 nanoseconds ±25 nanoseconds 30 Hz to 53 kHz.

Composite Slew Rate

12 V/microsecond (symmetrical).

Stereo Separation

Greater than 45 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 (.02% typical).

Intermodulation Distortion

0.03% or less, 60 Hz/7kHz 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/sinewave).

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.
	909-0114	Optional Low Pass Filter assembly for FX-30. Converts FX-30 to 30 watt FM transmitter operation. Factory installed and tested.



FS-30

- Ultrastable digital modulator and digital pilot generator
- Selectable baseband equalization
- LED peak modulation display: L, R, L+R, L-R and composite signals

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.

- 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

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 (THD):

.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

MODEL	STOCK NO.	DESCRIPTION
FS-30	909-0050	FM Stereo Generator, single phase 97 to 133 VAC or 194 to 266 VAC, 50/60 Hz.



FC-30

- DC coupled VCO for direct NRZ FSK of the subcarrier
- High-stable, ultra-linear modulated oscillator ensures minimum distortion at 39 to 99 kHz
- Dual-mode, controlled-decay subcarrier attenuator ensures noise-free receiver muting
- DC coupled data input and AC coupled audio input

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 "squench belch" effect, common to earlier designs.

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 de-emphasis).

Audio Input Impedance:

600 ohms balanced, resistive.

Data Input Impedance:

75 ohm unbalanced resistive, DC coupled.

- 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.

SPECIFICATIONS

Input Levels:

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

Preamplification:

(Audio) 150 microseconds 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 FM 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:

-60 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 (4,572 M).

AC Power Requirements:

97-133 or 194-266 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.



FM-70A

- 70,000 watt (or 60 kW) Dual System
- *Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)
- Twenty-nine meters including eight multi-function meters
- Automatic proportional VSWR foldback

ADVANCED RELIABILITY TRANSMITTERS

The FM-70A and FM-60A from Broadcast Electronics offer the ultimate in high level output capability in a dependable, dual transmitter system.

The 70,000 watt FM-70A is comprised of two FM-35A transmitters. The FM-60A system delivers 60,000 watts from two combined FM-30A transmitters. As shown in Figure 1, both the FM-60A and FM-70A utilize a single FX-30 synthesized exciter. The output of the FX-30 is fed into a hybrid splitter which supplies equal RF drive to the solid-state IPA stages. A phase shifter is provided to allow independent control of phase balance without the need to re-tune the transmitters.

- Optional Microprocessor Video Diagnostic System. (MVDS)
- Synthesized, transparent FX-30 exciter
- Advanced transmitter controller

*Patented

The RF outputs from the twin FM-35A (FM-70A system) or FM-30A (FM-60A system) transmitters are summed in a hybrid combiner to deliver the total output, less combiner losses. The hybrid combiner includes a reject load which dissipates any energy resulting from an imbalance in the system. Consequently, should either transmitter malfunction, transmission will still continue uninterrupted at a reduced power level through the combiner.

EXCITER SWITCHING OPTION

Where complete redundancy of equipment is desired, a dual exciter option is available. (See Figure 2).

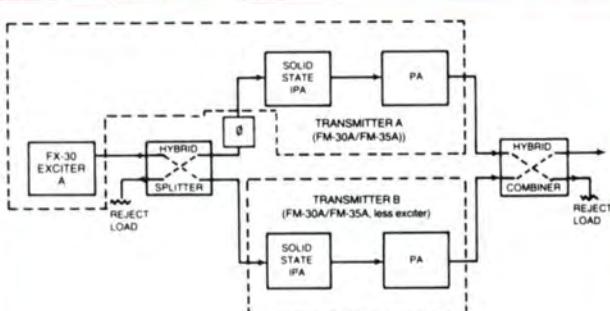


FIGURE 1 - BLOCK DIAGRAM, FM-70A/FM-60A

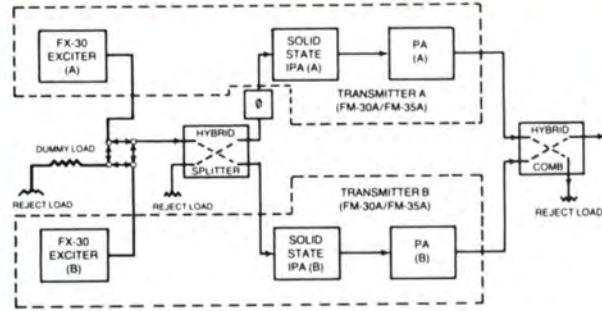


FIGURE 2 - BLOCK DIAGRAM, FM-70A/FM-60A WITH DUAL-EXCITER OPTION

By utilizing the optional FW-30 Exciter Switcher, two FX-30 exciters can be switched manually or automatically. In automatic operation, the FW-30 monitors the output of the on-air exciter and maintains the backup on "hot stand-by". If the FW-30 detects a failure in the on-air unit, it will automatically switch to the backup exciter.

OUTPUT SWITCHING OPTION

An automatic/manual output switching option is also available. By using the optional FO-2 Automatic Output Switcher with the appropriate coaxial switches (not supplied), rapid transmitter switching can be accomplished manually or automatically. The FO-2 offers four operating modes:

1. Transmitters A+B to Air
2. Transmitters A+B to Load
3. Transmitter A to Air, B to Load
4. Transmitter B to Air, A to Load

If automatic operation is selected, the FO-2 will monitor the outputs of both transmitters continuously. If it detects a failure, the FO-2 automatically switches the defective unit to the dummy load and places the remaining transmitter directly on-line to the antenna.

POWER AMPLIFIER DESIGN

Both the FM-30A transmitters used in the FM-60A system, and

the FM-35A transmitters in the FM-70A system employ a state-of-the-art power amplifier section. At the heart of this advanced PA design is the patented folded half-wave cavity. This unique innovation completely eliminates troublesome plate blocking capacitors and sliding contacts. The result is exceptional reliability and lower maintenance costs.

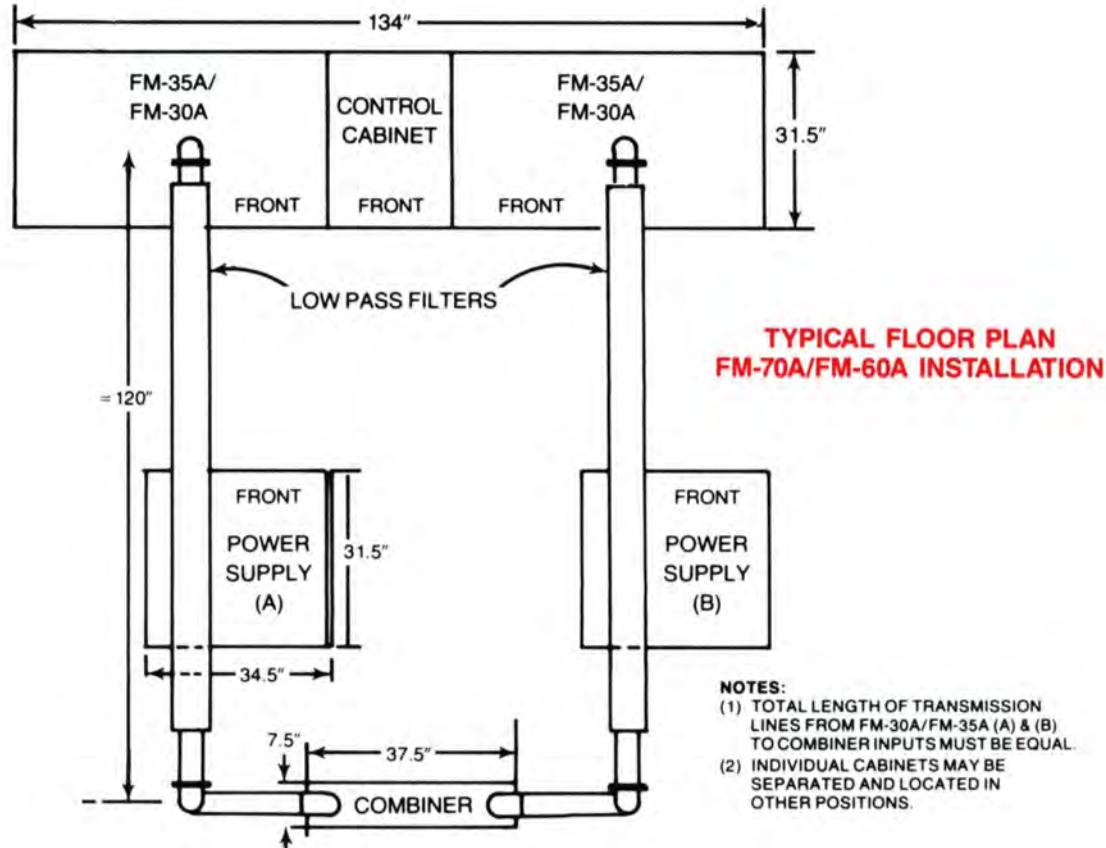
The FM-30A transmitters utilize a single Eimac 8990/4CX20,000A tetrode to provide 30 kW output. The 4CX20,000A has a field proven record of long life and high output efficiency in the FM-30A's.

The FM-35A transmitters feature a single Eimac 4CX20,000C. This rugged tetrode offers the largest filament and anode to be found in any 35 kW FM transmitter.

BROADBAND SOLID-STATE DRIVER/IPA

Both the FM-30A and FM-35A transmitters include an advanced Driver/IPA system.

A solid-state Power FET pre-driver stage in each transmitter is used to boost the output of the FX-30 to approximately 60 watts. A hybrid splitter network feeds two identical solid-state IPA modules, the outputs of which are combined in phase, to produce the drive level necessary to power the PA stage. Each of the IPA/Driver assemblies are self-contained and accessible through front access, slide-out drawers. LED indicators display forward power, VSWR, and overtemperature conditions. This updated IPA is broadband, requires no output tuning over the entire FM band, and features excellent stability under all operating conditions.



TECHNICAL SPECIFICATIONS

GENERAL

POWER OUTPUT: FM-60A 15-60 kW including combiner losses; FM-70A 20-70 kW including combiner losses.

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

RF OUTPUT IMPEDANCE: 50 ohms (others on special request)

OUTPUT CONNECTOR: 6 1/2 inch EIA flange

VSWR: 1.8:1 maximum. (will operate into higher VSWR with automatic power reduction).

FREQUENCY STABILITY: ±300 Hz., 0 to 50 Degrees C.

TYPE OF MODULATION: Direct frequency modulation of carrier frequency.

MODULATION CAPABILITY: Greater than ±200 kHz.

MODULATION INDICATION: Peak reading, color coded, LED display with baseband overmodulation indicator.

EXCITER: Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz. increments)

PRE-EMPHASIS: FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby)

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

SYNCHRONOUS AM S/N RATIO: 45 dB below reference carrier with 100% AM modulation @ 400 Hz., 75 uS de-emphasis. (FM modulation ±75 kHz. @ 400 Hz.)

TUBE COMPLEMENT: FM-60A (2) 8990/4CX20000A; FM-70A (2) 4CX20000C

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

POWER SUPPLY RECTIFIERS: Silicon

ELECTRICAL/MECHANICAL

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

OVERALL EFFICIENCY: Typically 66% FM-60A and FM-70A (AC line input to RF output).

PRIMARY POWER CONSUMPTION: (FM-60A) 91 kW @ 60 kW output, 94 pf; (FM-70A) 106 kW @ 70 kW output, 94 pf

SIZE: Transmitters (2) 56.5" W x 31.5" D x 70" H (143.5" W x 80 D x 177.8 H cm); Power Supplies (2) 34.5" W x 31.5" D x 70" H (87.6 W x 80 D x 177.8 H cm)

WEIGHT & CUBAGE: Transmitters (2) 1500 lbs. (682 Kg); packed 1750 lbs. (795 Kg) 72 cu. ft. (2 cu. meters); HV Power Supplies (2) 1750 lbs (794 Kg); packed 1800 lbs (816 Kg) 44 cu. ft. (1.25 cu. meters)

ALTITUDE: 10,000 feet @ 60 Hz (3048 m), 7500 ft. @ 50 Hz (2286 M)

AMBIENT TEMPERATURE RANGE: -10 degrees C to +50 degrees C.

FINISH: B/E blue with anodized aluminum control center panel and anodized aluminum trim.

*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, 75 microsecond pre-emphasis

HARMONIC DISTORTION: 0.08% or less (.04% typical)

INTERMODULATION DISTORTION: 0.08% or less, 60 Hz/7 kHz., 4:1 ratio

TRANSIENT IMD: 0.1% or less (square wave/sine wave)

FM S/N RATIO: 72 dB below ±75 kHz. deviation @ 400 Hz. (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis

*WIDEBAND COMPOSITE OPERATION

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

COMPOSITE INPUT IMPEDANCE: 10K ohm, nominal, resistive

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

COMPOSITE FM S/N RATIO: 72 dB below ±75 kHz deviation @ 400 Hz. (75 dB typical) Measured in a 30 Hz. to 100 kHz. bandwidth with 75 uS de-emphasis

COMPOSITE HARMONIC DISTORTION: 0.08% or less (.04% typical)

COMPOSITE INTERMODULATION DISTORTION: 0.08% or less (.04% typical)

COMPOSITE TRANSIENT IMD: 0.1% or less (square wave/sine wave)

COMPOSITE AMPLITUDE RESPONSE: ±0.1 dB, 30 Hz to 100 kHz

COMPOSITE PHASE RESPONSE: ±0.5 degrees from linear phase, 30 Hz to 53 kHz

COMPOSITE GROUP DELAY: 390 nanoseconds, ±25 nanoseconds 30 Hz to 53 kHz

COMPOSITE SLEW RATE: 12V/microsecond (symmetrical)

*STEREO OPERATION

AUDIO INPUT IMPEDANCE: 600 ohms balanced, resistive, floating. (Adaptable to other impedances)

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

AUDIO INPUT FILTER: 15 kHz LPF with delay equalization for minimum overshoot

FREQUENCY RESPONSE: ±0.5 dB, 30-15,000 Hz, 75 uS pre-emphasis (flat, 25 or 50 uS pre-emphasis selectable)

TOTAL HARMONIC DISTORTION: 0.08% or less

INTERMODULATION DISTORTION: 0.08%, 60 Hz/7 kHz; 4:1 ratio

TRANSIENT INTERMODULATION DISTORTION: 0.1% (square wave/sine wave)

FM NOISE: 72 dB or better below 100% modulation @ 400 Hz, 75 uS de-emphasis

STEREO SEPARATION: 45 dB or better; 30-15,000 Hz (sine wave)

DYNAMIC STEREO SEPARATION: 40 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

PILOT STABILITY: ±0.5 Hz, 0 to 50 degrees C.

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

*STEREO OPERATION

MODULATION: Direct FM

SUBCARRIER FREQUENCY: 67 kHz (39 to 95 kHz to order)

SUBCARRIER FREQUENCY STABILITY: ±0.5% (330 Hz @ 67 kHz), 0 to 50 degrees C.

SUBCARRIER HARMONIC CONTENT: Less than 0.3%

SUBCARRIER ENVELOPE DECAY: Greater than 100 msec. from 90% to 10% subcarrier levels.

MODULATION CAPABILITY: ±20% of subcarrier frequency

AUDIO INPUT IMPEDANCE: 600 ohm balanced, resistive

DATA INPUT IMPEDANCE: 75 ohm unbalanced, resistive, DC couples

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

PRE-EMPHASIS: (Audio) 150 microseconds standard (75 uS 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

INTERMODULATION DISTORTION: Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%

CROSSTALK, SCA TO STEREO: -60 dB or better below 100% modulation of left or right. 75 uS de-emphasis.

CROSSTALK, STEREO TO SCA: -50 dB or better below ±6 kHz deviation of SCA using 150 uS de-emphasis and FS-30 stereo generator

FM NOISE: 72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis)

AUDIO MUTING LEVEL: Adjustable from 10 to 30 dB below program level

AUDIO MUTING DELAY: Adjustable, 0.5 to 10.0 seconds

(See FC-30 data sheet for full details)

*Through FM-30A or FM-35A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-60A	909-2030-200	FM-60A 60,000 watt FM transmitter system with two FM-30A transmitters, one FX-30 exciter, control cabinet, hybrid splitter, and combiner.
FM-70A	909-2035-200	FM-70A 70,000 watt FM transmitter system with two FM-35A transmitters, one FX-30 exciter, control cabinet, hybrid splitter, and combiner.
(Factory installed options)		
MVDS	909-0091-001	Optional Microprocessor Video Diagnostic System for the FM-60A or FM-70A. (two required)
FO-2	909-0117	Optional Transmitter Output Switcher for use with the FM-60A or FM-70A systems.
FW-30	909-0120	Optional FW-30 Exciter Switcher for use with the FM-60A or FM-70A systems.
FX-30	909-0009 909-0112 909-0113	Extra FX-30 exciter for use in dual-exciter FM-60A or FM-70A systems Filament voltage regulator (60 Hz), factory installed in either the FM-30A's or the FM-35A's. (two required) Three phase AC voltmeter option for FM-30A or FM-35A, factory installed. (two required)



Model FM-35A

- Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)*
- Single tube design
- Broadband solid-state IPS's
- Eleven meters including two multi-function meters
- Quiet operation
- Automatic proportional VSWR foldback
- Optional microprocessor video diagnostic system (MVDS)
- Synthesized, low distortion FX-30 exciter
- Advanced transmitter controller
- High efficiency for low operating cost

**patented*

THE MODEL FM-35A TRANSMITTER

Broadcast Electronics' FM-35A single tube, thirty-five kilowatt transmitter represents a true technological advancement in FM transmitter design. The FM-35A is a full featured transmitter including state of the art innovations such as the folded half-wave output cavity*, modular slide-out IPA's, a modular Automatic Power Control, an extremely quiet air cooling system, and an optional Microprocessor Video Diagnostic System (MVDS).

INNOVATIVE POWER AMPLIFIER DESIGN

The power amplifier section of the FM-35A employs a patented folded half-wave output cavity. This unique design innovation completely eliminates troublesome plate blocking capacitors and sliding contacts.

A patented second harmonic suppressor is also integrated into the folded half-wave cavity. An external low pass filter (with directional output couplers) ensures compliance with FCC, Canadian DOC, and CCIR recommendations.

All PA adjustments are performed through front panel controls with counters. A grounded bellows provides the fine tuning while a grounded loop couples to the antenna. This careful attention to grounding yields the added benefit of improved lightning immunity.

EFFICIENT SINGLE TUBE (4CX20,000C) DESIGN

The FM-35A uses a single, high gain Eimac 4CX20,000C tetrode to produce 35 kW of RF power on any frequency between



The FM-35A utilizes the Eimac 4CX20,000C. This powerful tetrode features the largest filament and largest plate anode of any tube in the 20,000 family.

87.5 and 108 MHz. The 4CX20,000C is fundamentally identical to the 4CX20,000A/8990 with the exception of its higher anode voltage rating. The 4CX20,000C features the largest filament and the largest anode of ANY tube in the Eimac 20,000 family. This translates into longer operating life and overall durability in the FM-35A.

In addition, the high plate efficiency of the 4CX20,000C at the 35 kW output level results in surprisingly low power consumption. In fact, the 4CX20,000C has a lower overall cost of operation and maintenance than other triodes and tetrodes of the same power class.

A new grid circuit in the FM-35A design takes advantage of the power gain capability of the Eimac tetrode while providing maximum signal bandwidth. Installation or removal of the power tube can be performed from the front of the transmitter and is easily accomplished within minutes. With the FM-35A's broadband screen neutralizing technique, neutralization re-adjustment is normally unnecessary when changing tubes.

BROADBAND SOLID-STATE DRIVER/IPA

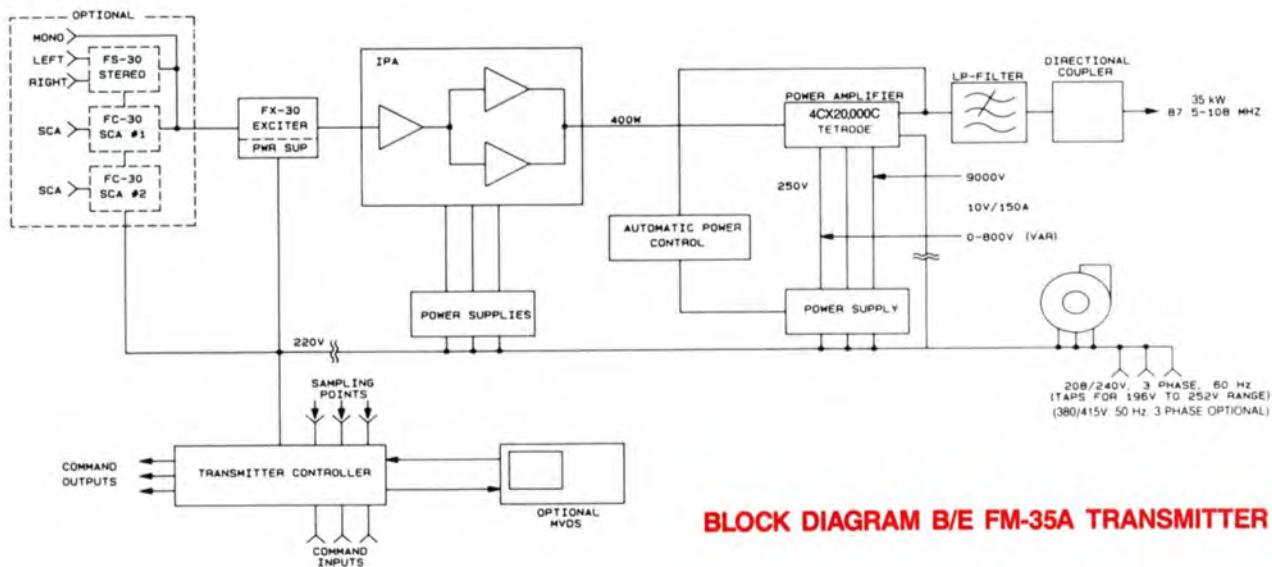
The output of the FX-30 exciter is boosted to about 70 watts by a solid-state Power FET pre-driver stage. A hybrid splitter network feeds two identical solid-state IPA modules, the outputs of which are combined to produce the drive level necessary for the PA stage (approximately 400 watts at the 35 kW level). Each of the IPA/Driver assemblies are self-contained and accessible through front access, slide-out drawers. LED indicators display forward power, VSWR, and overtemperature conditions. The IPA design is broadband, requires no tuning over the entire FM band, and features excellent stability under all operating conditions.

AUTOMATIC POWER CONTROL

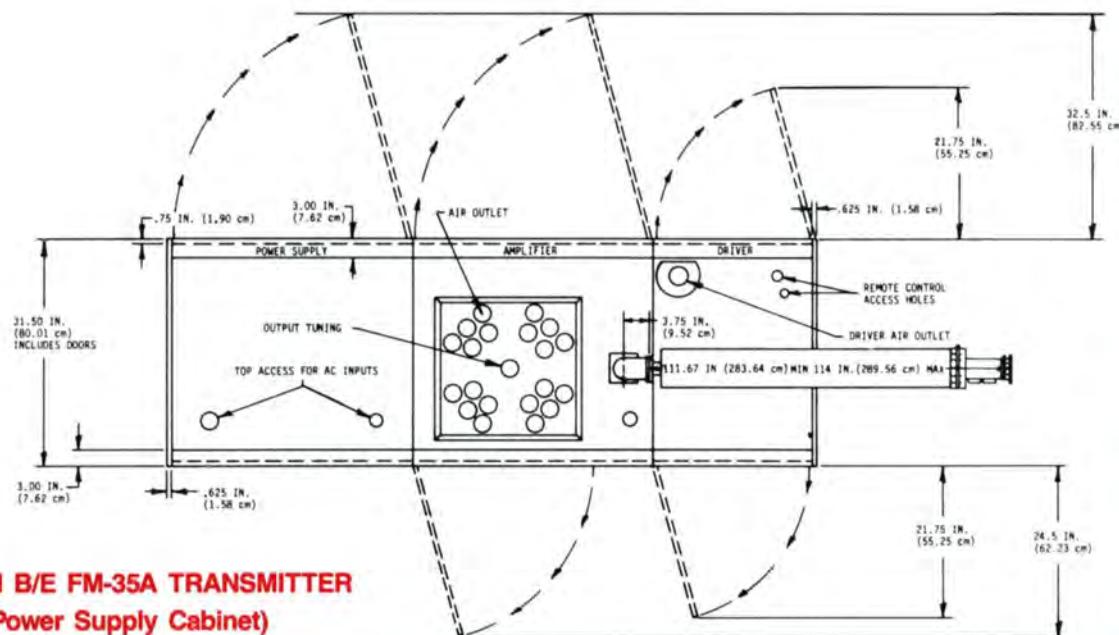
An advanced automatic power control (APC) system maintains constant RF output power with limited fluctuations of AC line voltage or RF drive level.



Front view of FM-35A half wave cavity assembly.



BLOCK DIAGRAM B/E FM-35A TRANSMITTER



The regulated set point can be changed by remote control and is retained in non-volatile memory. In addition, an external signal can be used to switch the FM-35A into a separate "Preset Power" mode for lower power consumption during emergencies. A sophisticated proportional servo system provides fast correction of output power changes without overshoot.

The entire APC system is mounted in slide-out drawers with non-volatile memory maintained by a battery backup.

PROPORTIONAL VSWR FOLDBACK

A proportional VSWR foldback system protects the PA by automatically reducing power to safe levels until the mismatch condition can be corrected.

Each time the transmitter is activated, a "soft start" circuit gradually increases power from zero to nominal. This allows the FM-35A to assume a safe operating level under high VSWR conditions without overloading. This field proven proportional VSWR foldback system was originally pioneered by Broadcast Electronics in 1980.

THE OPTIONAL MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

- Calculates efficiency, dissipation, and ERP
- Converts multiple meter readings to bar-graph or tabular display
- Preset limit violations clearly indicated in reverse video
- Automatically displays the location and nature of a malfunction
- Bar-graph display of PA/IPA parameters
- Automatic logging output capability
- Remote monitoring via modem, telco lines, or SCA
- Operates independently of primary controller - cannot affect basic "on-air" support systems.

SPECIFICATIONS

GENERAL

Power Output

35 kW (10 kW to 38.5 kW).

Frequency Range

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

RF Output Impedance

50 ohms (others on special request).

Output Connector

3 1/8 inch EIA flange.

VSWR

1.8:1 maximum. (will operate into higher VSWR with automatic power reduction).

Frequency Stability

±300 Hz, 0 to 50 Degrees C.

Type of Modulation

Direct frequency modulation of carrier frequency.

Modulation Capability

Greater than ±200 kHz.

Modulation Indication

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

Exciter

Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments).

Pre-emphasis

FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby).

Asynchronous AM S/N Ratio

55 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (no FM modulation present).

Synchronous AM S/N Ratio

45 dB below 35 kW reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ±75 kHz @ 400 Hz).

Tube Complement

(1) 4CX20,000C.

RF Harmonics

Suppression meets all FCC/DOC requirements and CCIR recommendations.

Power Supply Rectifiers

Silicon.

SPECIFICATIONS (CONT'D.)

ELECTRICAL/MECHANICAL**AC Input Power**

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

Primary Power Consumption

Typically 51 kW (@ .94 pf) at 35 kW RF output.

Overall Efficiency

Typically 68% (AC line input to RF output).

Size

(Transmitter) 56.5" W x 31.5" D x 70" H (143.5 W x 80 D x 177.8 H cm).

(Power Supply) 34.5" W x 31.5" D x 70" H (87.6 W x 80 D x 177.8 H cm).

Weight & Cubage

(Transmitter) 1500 lbs. (682 Kg); packed 1750 lbs.

(795 Kg) 72 cu. ft. (2 cu. meters).

(HV Power Supply) 1750 lbs. (794 Kg); packed 1800 lbs. (816 Kg) 44 cu. ft. (1.25 cu. meters).

Altitude

7500 ft.

Ambient Temperature Range

-10 degrees C to +50 degrees C.

Sound Level

61 dB (A-weighted), 48 dB (SIL), (Ref. 0 dB = .0002 microbar) @ one meter front center.

Finish

B/E blue with anodized aluminum control center panel and anodized aluminum trim.

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, 75 microsecond pre-emphasis.

Harmonic Distortion

0.08% or less (.04% typical).

Intermodulation Distortion

0.08% or less, 60 Hz/7 kHz, 4:1 ratio.

Transient IMD

0.1% or less (square wave/sine wave).

FM S/N Ratio

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis.

WIDEBAND COMPOSITE OPERATION*Composite Inputs**

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

Composite Input Impedance

10K ohm, nominal, resistive.

Composite Input Level

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

Composite FM S/N Ratio

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) Measured in a 30 Hz to 100 kHz bandwidth with 74 uS de-emphasis.

Composite Harmonic Distortion

0.08% or less (.04% typical).

Composite Intermodulation Distortion

0.08% or less (.04% typical).

Composite Transient IMD

0.1% or less (square wave/sine wave).

Composite Amplitude Response

±0.1 dB, 30 Hz to 100 kHz.

Composite Phase Response

±0.5 degrees 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 OPERATION*Audio Input Impedance**

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

Audio Input Level

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

Audio Input Filters

15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response

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

Total Harmonic Distortion

0.08% or less.

Intermodulation Distortion

0.08%, 60 Hz/7 kHz; 4:1 ratio.

Transient Intermodulation Distortion

0.1% (square wave/sine wave).

FM Noise

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

Stereo Separation

45 dB or better; 30 - 15,000 Hz (sine wave).

Dynamic Stereo Separation

40 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.

Pilot Stability

±0.5 Hz, 0 to 50 degrees C.

Modes

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

SCA OPERATION*Modulation**

Direct FM

Subcarrier Frequency

67 kHz (39 to 95 kHz to order).

Subcarrier Frequency Stability

±0.5% (330 Hz @ kHz), 0 to 50 degrees C.

Subcarrier Harmonic Content

Less than 0.3%.

Subcarrier Envelope Decay

Greater than 100 msec. from 90% to 10% subcarrier levels.

Modulation Capability

±20% of subcarrier frequency.

Audio Input Impedance

600 ohm balanced, resistive.

Data Input Impedance

75 ohm unbalanced, resistive, DC coupled.

Input Levels

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

Pre-emphasis

(Audio) 150 microseconds standard (75 uS 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.

Intermodulation Distortion

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%.

Crosstalk, SCA to Stereo

-60 dB or better below 100% modulation of left or right, 75 uS de-emphasis.

Crosstalk, Stereo to SCA

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

FM Noise

72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis).

Auto Muting Level

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay

Adjustable, 0.5 to 10.0 seconds.

(See FC-30 data sheet for full details).

*Through FM-35A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-35A	909-0035-200	FM-35A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz 208 V / 240 V, 60 Hz 3-wire three phase power source. HV power supply cabinet ATTACHED to PA cabinet. Includes FX-30 Exciter.
FM-35A	909-0035-380	Same as above, except for 380/415 V, 50 Hz 3 phase.
FM-35A	909-0035-201	FM-35A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz 208 V / 240 V, 60 Hz 3-wire three phase power source. REMOTE HV power supply cabinet. Includes FX-30 Exciter.
FM-35A	909-0035-381	Same as above, except for 380/415 V, 50 Hz. 3 phase.
Factory Installed Options		
MVDS	909-0091-006	Optional Microprocessor Video Diagnostic system, factory installed in FM-35A transmitter. (Must be ordered with transmitter).
	909-0112	Optional filament voltage regulator (60 Hz) Factory Installed.
	909-0113	Optional three phase AC voltmeter. Factory Installed.



FM-30A Front View

- *Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)
- Field proven high performance design
- New high stability, broadband solid-state IPA
- Extremely long tube life
- Eleven meters including two multi-function meters
- Amazingly quiet operation
- Automatic proportional VSWR foldback
- Optional Microprocessor Video Diagnostic system. (MVDS)
- Synthesized, transparent FX-30 exciter
- Advanced transmitter controller

*patented

THE MODEL FM-30A TRANSMITTER

Broadcast Electronics' single tube FM-30A thirty kilowatt transmitter evolved from the field proven design of a well known predecessor - the FM-30! The FM-30A incorporates features suggested by the over one hundred and twenty-five FM-30 users nationwide.

Included in the FM-30A standard design are state of the art enhancements such as the modular slide-out IPA's, a modular Automatic Power Control, a super quiet air cooling system, and the optional Microprocessor Video Diagnostic system (MVDS).

INNOVATIVE POWER AMPLIFIER

The power amplifier section of the FM-30A employs a patented folded half-wave cavity*. This unique design innovation completely eliminates troublesome plate blocking capacitors and sliding contacts. The result is exceptional reliability and lower maintenance costs.

A patented second harmonic suppressor is also integrated into the folded half-wave cavity. This minimizes second harmonic energy at the source without wasting fundamental frequency power. An external low pass filter (with directional output couplers) ensures compliance with FCC, Canadian DOC, and CCIR recommendations.

All PA adjustments are performed through smooth operating front panel controls with counters. A grounded bellows provides the fine tuning adjustment while a grounded loop couples to the antenna. This careful attention to grounding yields the added benefit of improved lightning immunity.

EFFICIENT SINGLE TUBE DESIGN

The FM-30A uses a single, high gain Eimac 8990/4CX20,000A tetrode to produce 30 kW of RF power on any frequency between 87.5 and 108 MHz.

The 4CX20,000A tube has been used in 30 kW FM transmitters since 1980. Its reliable, consistent performance is well established by the more than 150 units presently in service. Tube life in excess of 20,000 hours is not uncommon at the 25 kW to 30 kW output level. At output levels below 25 kW, the overall tube life of the 4CX20,000A in the FM-30 transmitter has been phenomenal.

The high plate efficiency at the 30 kW output level results in surprisingly low power consumption. This single tube design saves money in both operation and maintenance.

A new grid circuit optimizes the impedance transformation between the solid-state IPA and the power tube grid. This novel design takes advantage of the power gain capability of the Eimac tetrode while providing maximum signal bandwidth. Installation or removal of the power tube is easily accomplished from the front of the transmitter. Thanks to a broadband screen neutralizing technique, neutralization re-adjustment is normally unnecessary when changing tubes.

BROADBAND SOLID-STATE DRIVER/IPA

The output of the FX-30 exciter is boosted to approximately 60 watts by a solid-state Power FET pre-driver stage. A hybrid splitter network feeds two identical solid-state IPA modules designed and manufactured by Broadcast Electronics. The outputs are combined to produce the drive level necessary to power the PA stage

(approximately 400 watts at the 30 kW level). Each of the IPA/Driver assemblies are self-contained and accessible through front access, slide-out drawers. LED indicators display forward power, VSWR, and overtemperature conditions. This updated IPA is broadbanded, requires no output tuning over the entire FM band, and features excellent stability under all operating conditions.

AUTOMATIC POWER CONTROL

An advanced automatic power control (APC) system maintains constant RF output power with limited fluctuations of AC line voltage or RF drive level. An external signal can be used to switch the FM-30A into a separate "Preset Power" mode for lower power consumption during an emergency.

PROPORTIONAL VSWR FOLDBACK

The FM-30A is protected by the same proportional VSWR foldback system pioneered by Broadcast Electronics in 1980. This highly reliable system protects the PA by automatically reducing power in the event of a sudden antenna mismatch condition. If there is a high level, instantaneous mismatch (such as a lightning strike), the transmitter will re-cycle and return to the air immediately.

Each time the transmitter is activated, a "soft start" circuit gradually increases power from zero to nominal. This allows the transmitter to assume a safe operating level under high VSWR conditions without overloading.

THE OPTIONAL MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

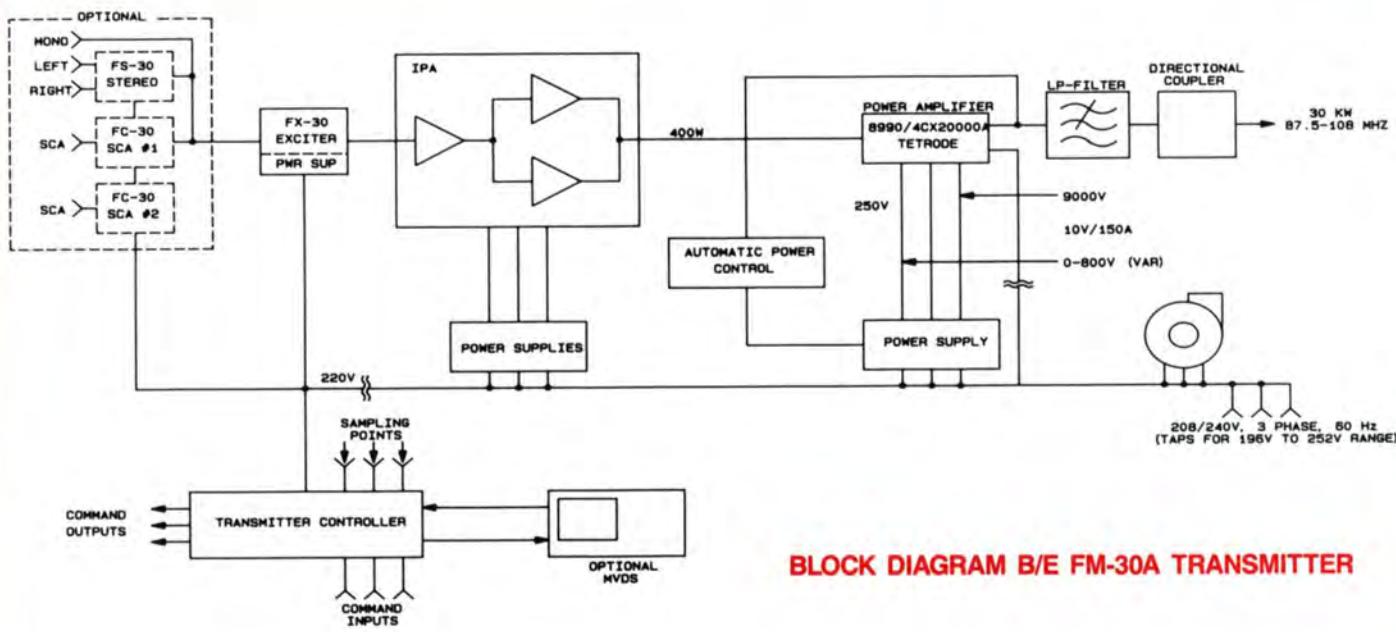
Broadcast Electronics' Microprocessor Video Diagnostic System (MVDS) is available as an add-on option to the FM-30A. Its features include:

- Calculates efficiency, dissipation, and ERP
- Converts multiple meter readings to bar-graph or tabular display
- Preset limit violations clearly indicated in reverse video



FM-30A with RF door open and IPA drawers partially pulled out.

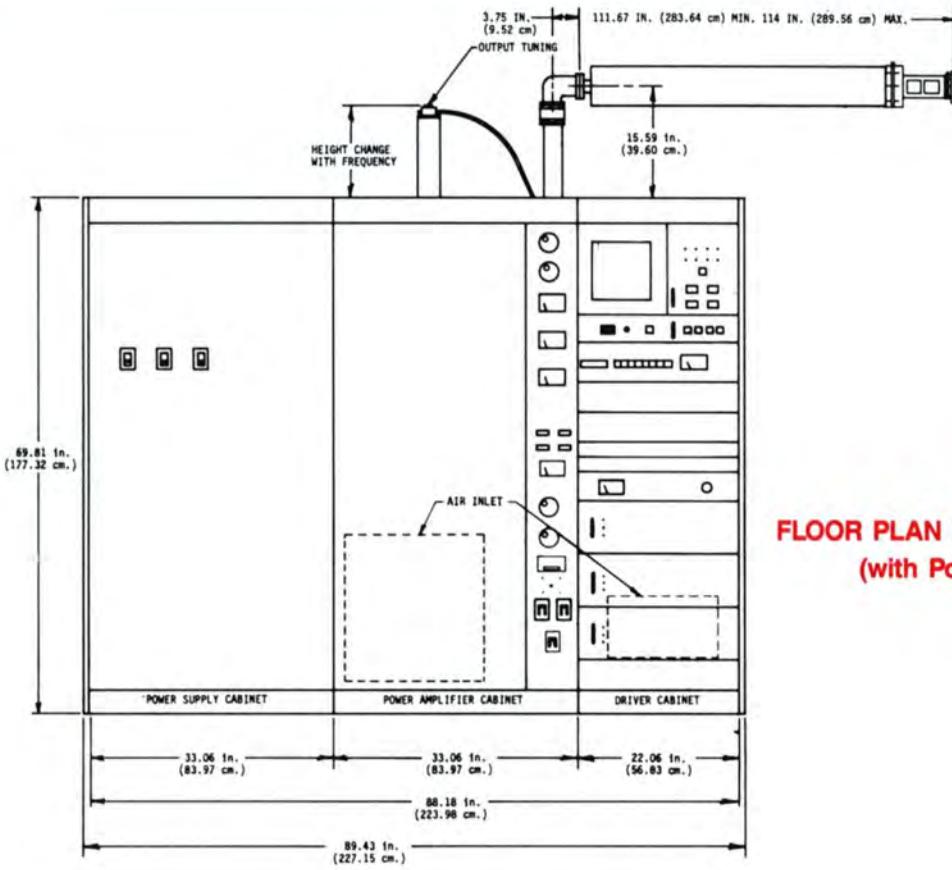
- Automatically displays the location and nature of a malfunction
- Bar-graph display of PA/IPA parameters
- Automatic logging output capability
- Remote monitoring via modem, telco lines, or SCA
- Operates independently of primary controller - cannot affect basic "on-air" support systems



BLOCK DIAGRAM B/E FM-30A TRANSMITTER



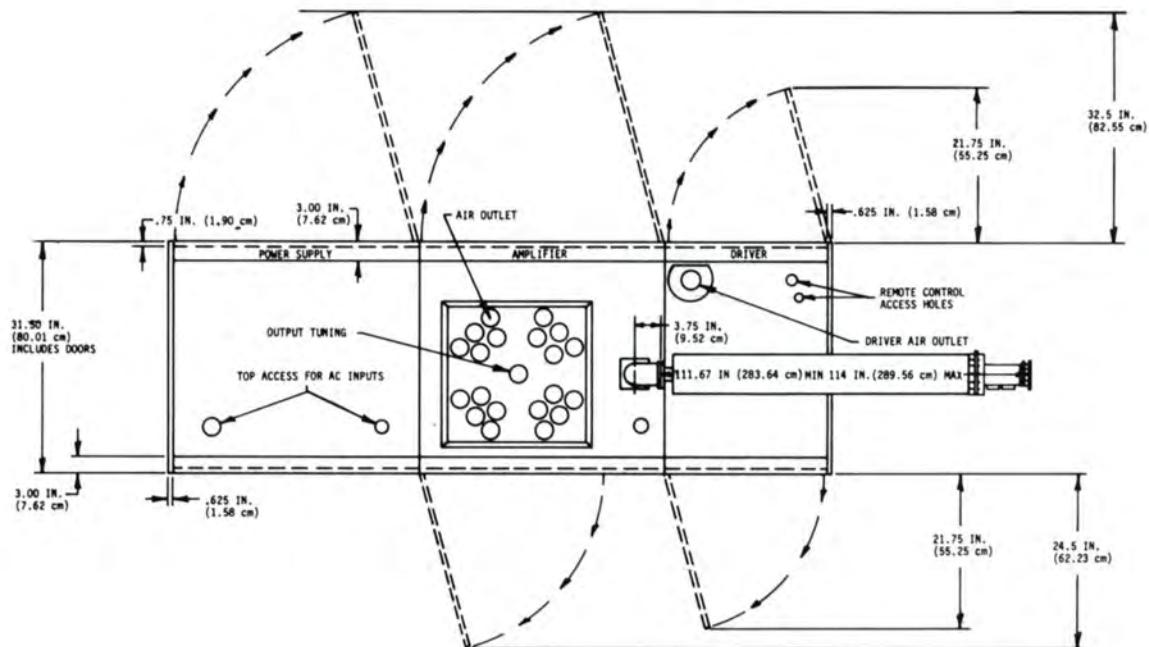
FM TRANSMITTING EQUIPMENT



FLOOR PLAN B/E FM-30A TRANSMITTER
(with Power Supply Cabinet)

NOTE:
FOR INSTALLATION DETAILS REQUEST
DRAWING NO. 909-0000-200

OUTLINE - FM-30A TRANSMITTER



SPECIFICATIONS

GENERAL

Power Output

30 KW (7.5 KW to 30.0 KW).

Frequency Range

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

RF Output Impedance

50 ohms (others on special request).

Output Connector

3 1/8 inch EIA flange.

VSWR

1.8:1 maximum. (will operate into higher VSWR with automatic power reduction.)

Frequency Stability

±300 Hz, 0 to 50 Degrees C.

Type Of Modulation

Direct frequency modulation of carrier frequency.

Modulation Capability

Greater than ±200 kHz.

Modulation Indication

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

Exciter

Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz. increments).

Pre-emphasis

FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby).

Asynchronous AM S/N Ratio

55 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (no FM modulation present).

Synchronous AM S/N Ratio

45 dB below 30 KW reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ±75 kHz @ 400 Hz).

Tube Complement

(1) 8990/4CX20,000A.

RF Harmonics

Suppression meets all FCC/DOC requirements and CCIR recommendations.

Power Supply Rectifiers

Silicon.

ELECTRICAL/MECHANICAL

AC Input Power

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

Primary Power Consumption

Typically 44 KW (@ .94 pF) at 30 KW RF output.

Overall Efficiency

Typically 68% (AC line input to RF output).

Size

(Transmitter) 56.5" W x 31.5" D x 70" H (143.5 W x 80 D x 177.8 H cm).

(Power Supply) 34.5" W x 31.5" D x 70" H (87.6 W x 80 D x 177.8 H cm).

Weight & Cubage

(Transmitter) 1500 lbs. (682 Kg); packed 1750 lbs. (795 Kg) 72 cu. ft. (2 cu. meters).

(HV Power Supply) 1750 lbs. (794 Kg); packed 1800 lbs. (816 Kg) 44 cu. ft. (1.25 cu. meters).

Altitude

10,000 feet @ 60 Hz (3048 m), 7500 ft. @ 50 Hz (2286 M).

Sound Level

61 dB (A-weighted), 48 dB (SIL), (Ref. 0 dB = .0002 microbar) @ one meter front center.

Ambient Temperature Range

-10 degrees C to +50 degrees C.

Finish

B/E blue with anodized aluminum control center panel and anodized aluminum trim.

*MONAURAL OPERATION

600 ohms balanced, resistive, adaptable to other impedances, 50 dB common mode suppression.

Audio Input Impedance

+10 dBm nominal for ±75 kHz deviation @ 400 Hz.

Audio Frequency Response

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

Harmonic Distortion

0.08% or less (.04% typical).

Intermodulation Distortion

0.08% or less, 60 Hz/7 kHz, 4:1 ratio.

Transient IMD

0.1% or less (square wave/sine wave).

FM S/N Ratio

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis.

*WIDEBAND COMPOSITE OPERATION

Composite Inputs

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

Composite Input Impedance

10K ohm, nominal, resistive.

Composite Input Level

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

Composite FM S/N Ratio

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) Measured in a 30 Hz to 100 kHz bandwidth with 75 uS de-emphasis.

Composite Harmonic Distortion

0.08% or less (.04% typical).

Composite Intermodulation Distortion

0.08% or less (.04% typical).

Composite Transient IMD

0.1% or less (square wave/sine wave).

Composite Amplitude Response

±0.1 dB, 30 Hz to 100 kHz.

Composite Phase Response

±0.5 degrees 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 OPERATION

Audio Input Impedance

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

Audio Input Level

+10 dBm, ±1 dBm, for 100% modulation @ 400 Hz.

(Adaptable to other input levels).

Audio Input Filter

15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response

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

Total Harmonic Distortion

0.08% or less.

Intermodulation Distortion

0.08%, 60 Hz/7 kHz; 4:1 ratio.

Transient Intermodulation Distortion

0.1% (square wave/sine wave).

FM Noise

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

Stereo Separation

45 dB or better; 30 - 15,000 Hz (sine wave).

Dynamic Stereo Separation

40 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.

Pilot Stability

±0.5 Hz, 0 to 50 degrees C.

Modes

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

*SCA OPERATION

Modulation

Direct FM.

Subcarrier Frequency

67 kHz (39 to 95 kHz to order).

Subcarrier Frequency Stability

±0.5% (330 Hz @ 67 kHz), 0 to 50 degrees C.

Subcarrier Harmonic Content

Less than 0.3%.

Subcarrier Envelope Decay

Greater than 100 msec. from 90% to 10% subcarrier levels.

Modulation Capability

±20% of subcarrier frequency.

Audio Input Impedance

600 ohm balanced, resistive.

Data Input Impedance

75 ohm unbalanced, resistive, DC coupled.

Input Levels

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

Pre-emphasis

(Audio) 150 microseconds standard (75 uS 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.

Intermodulation Distortion

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%.

Crosstalk, SCA to Stereo

-60 dB or better below 100% modulation of left or right, 75 uS de-emphasis.

Crosstalk, Stereo to SCA

-50 dB or better below ±6 kHz deviation of SCA using 150 uS de-emphasis and FS-30 Stereo Generator.

FM Noise

72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis).

Auto Muting Level

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay

Adjustable, 0.5 to 10.0 seconds.

(See FC-30 data sheet for full details).

'Through FM-30A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-30A	909-0000-200	FM-30A One Tube 30,000 watt FM broadcast transmitter complete with FX-30 exciter, Eimac 4CX20,000A output tube, and low pass filter for operation from a 208 V / 240 V, 60 Hz three phase power source. HV power supply cabinet in-line with PA cabinet.
FM-30A	909-0000-201	FM-30A One Tube 30,000 watt FM broadcast transmitter same as 909-0000-200 except HV power supply cabinet is separate from PA cabinet.
FM-30A	909-0000-380	FM-30A One Tube 30,000 watt FM broadcast transmitter same as 909-0000-200 (HV power supply In-line) except to operate from a 380/415, 50 Hz, 3 phase power supply.
FM-30A	909-0000-381	FM-30A One Tube 30,000 watt FM transmitter same as 909-0000-201 (HV power supply cabinet separate) except to operate from 380/415 3 phase power supply.
(Factory installed options)		
MVDS	909-0091-001	Optional Microprocessor Video Diagnostic System, option for use with FM-30A transmitter, factory installed.
	909-0112	Filament voltage regulator (60 Hz), factory installed.
	909-0113	Three phase AC voltmeter option for FM-30A, factory installed.



FM-20A

- *Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)
- Single tube high performance design
- High efficiency - low operating cost
- Broadband solid-state IPA
- Eight meters
- Quiet operation

THE MODEL FM-20A TRANSMITTER (available 1988)

The single tube, twenty thousand watt FM-20A is the latest addition to the Broadcast Electronics line of full-featured FM transmitters. The FM-20A utilizes field proven design innovations that were developed through years of intensive testing and investigation. The final result is a 20 kW FM transmitter that is guaranteed to provide the utmost in reliable, consistent service.

Among the unique features of the FM-20A is the patented folded half-wave output cavity, the modular slide-out IPA's, the modular Automatic Power Control, the ultra-quiet air cooling system, and the optional Microprocessor Video Diagnostic System (MVDS).

POWER AMPLIFIER DESIGN

The power amplifier section of the FM-20A employs a patented

- Automatic proportional VSWR foldback
- Optional Microprocessor Video Diagnostic System (MVDS)
- Synthesized exciter
- Advanced transmitter controller

*patented

folded half-wave cavity. This design innovation completely eliminates troublesome plate blocking capacitors and sliding contact, providing exceptional reliability and lower maintenance costs.

A patented second harmonic suppressor is also integrated into the folded half-wave cavity. The suppressor minimizes second harmonic energy at the source without wasting fundamental frequency power. A low pass filter (with directional output couplers) ensures compliance with FCC, Canadian DOC, and CCIR recommendations.

All PA adjustments are performed through smooth operating front panel controls with counters. A grounded bellows provides the fine tuning adjustment while a grounded loop couples to the antenna. This careful attention to grounding yields the added benefit of improved lightning immunity.

EFFICIENT SINGLE TUBE DESIGN

The FM-20A uses a single, high gain Eimac 8989/4CX12,000A tetrode to produce 20 kW of RF power on any frequency between 87.5 and 108 MHz.

A new grid circuit optimizes the impedance transformation between the solid-state IPA and the power tube grid. In this way the power gain capability of the Eimac tetrode is maximized without compromising signal bandwidth.

BROADBAND SOLID-STATE DRIVER/IPA

The output of the exciter drives the IPA's through a hybrid splitter network that feeds two identical solid-state IPA modules in-phase. Their outputs are combined to produce the drive level necessary to power the PA stage. (approximately 350 watts at the 20 kW level) Each of IPA assembly is self contained and accessible through slide-out drawers. LED indicators display forward power, VSWR, and overtemperature conditions. This IPA is broadbanded, requires no output tuning over the entire FM band, and features excellent stability under all operating conditions.

AUTOMATIC POWER CONTROL

An advanced automatic power control (APC) system maintains constant RF output power with limited fluctuations of AC line voltage or RF drive level. An external signal can be used to switch the FM-20A into a separate "Preset Power" mode for lower power consumption during an emergency. A proportional servo system provides fast correction of output power variations without overshooting.

PROPORTIONAL VSWR FOLDBACK

The FM-20A is protected by a proportional VSWR foldback system. This highly reliable system protects the PA by automatically reducing power in the event of a sudden antenna mismatch condition. If there is a high level, instantaneous mismatch (such as a lightning strike), the transmitter will re-cycle and return to the air immediately.

Each time the transmitter is activated, a "soft start" circuit gradually increases power from zero to nominal. This allows the transmitter to assume a safe operating level under high VSWR conditions without overloading.

HIGH VOLTAGE POWER SUPPLY

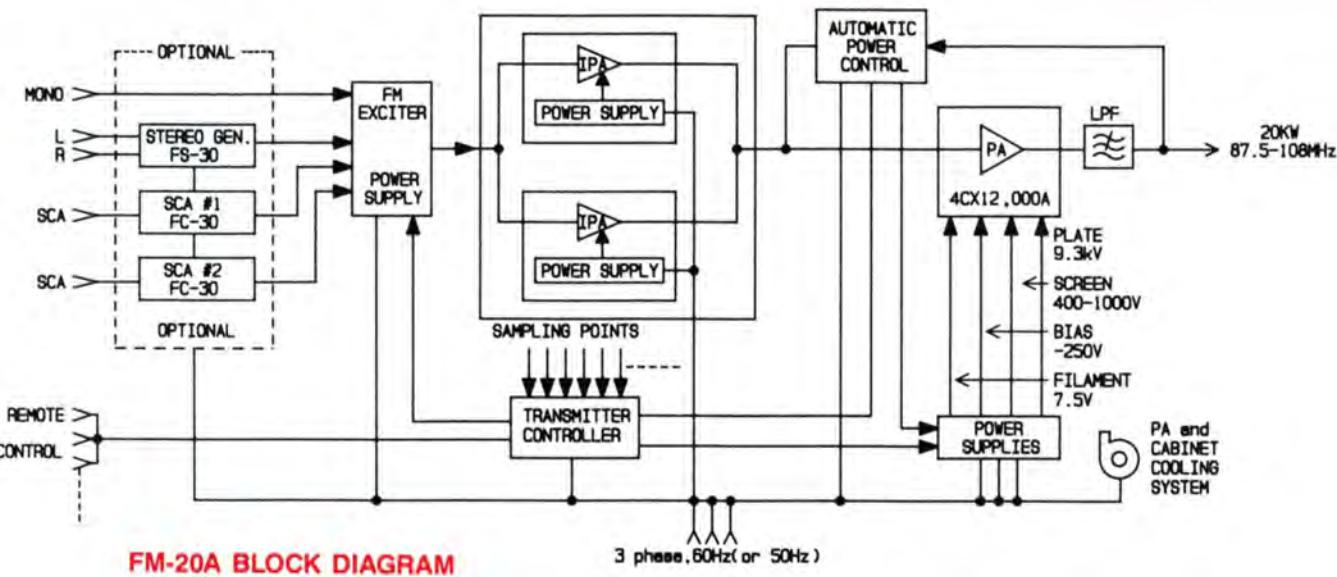
The HV plate supply for the FM-20A is contained in a matching cabinet. The three phase plate transformer has multiple taps to accommodate a wide range of AC inputs (195V to 433V, 50 or 60 Hz as ordered). The power supply also features "step-start" to minimize peak in-rush currents.

THE OPTIONAL MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

Broadcast Electronics' Microprocessor Video Diagnostic System (MVDS) is available as an add-on option to the FM-20A. Its features include:

- Calculates efficiency, dissipation, and ERP
- Converts multiple meter readings to bar-graph or tabular display
- Preset limit violations clearly indicated in reverse video
- Automatically displays the location and nature of a malfunction
- Bar-graph display of PA/IPA parameters
- Automatic logging output capability
- Remote monitoring via modem, telco lines, or SCA
- Operates independently of primary controller—cannot affect basic "on-air" support systems

Broadcast Electronics' Microprocessor Video Diagnostic System (MVDS) is available as an add-on option to the FM-20A. See the MVDS section of this catalog for complete details.



FM-20A TECHNICAL SPECIFICATIONS

General:**Power Output:**

20 kW (7.5 kW to 22.0 kW)

Frequency Range:

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

RF Output Impedance:

50 ohms (others on special request)

Output Connector:

3 1/8 inch EIA flange

VSWR:

1.8:1 maximum. (will operate into higher VSWR with automatic power reduction)

Frequency Stability:

±300 Hz, 0 to 50 Degrees C.

Type Of Modulation:

Direct frequency modulation of carrier frequency

Modulation Capability:

Greater than ±200 Hz

Modulation Indication:

Peak reading, color coded, LED display with baseband overmodulation indicator

Exciter:

Model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments)

Pre-emphasis:

FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby)

Asynchronous AM S/N Ratio:

55 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (no FM modulation present)

Synchronous AM S/N Ratio:

40 dB below 20 kW reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ±75 kHz @ 400 Hz)

Tube Complement:

(1) 8989/4CX12,000A

RF Harmonics:

Suppression meets all FCC/DOC requirements and CCIR recommendations

Power Supply Rectifiers:

Silicon

Electrical/Mechanical:**AC Input Power:**

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

Primary Power Consumption:

29.4 kW @ 20.0 kW output, 0.92 pf

Typical Overall Efficiency:

68% AC line input to RF output

Size:Three cabinets - (1) 22"W x 30"D x 70"H
(1) 27"W x 30"D x 70"H
(1) 27"W x 30"D x 70"H**Altitude:**10,000 feet @ 60 Hz (3048 m), 7500 ft. @ 50 Hz
(2286 M)**Ambient Temperature Range:**

-10 degrees C to +50 degrees C.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-20A	909-0020-200	FM-20A One Tube 20,000 watt FM broadcast transmitter complete with exciter, Elmac 8989/4CX12,000A output tube, and low pass filter for operation from a 208V/240V, 60 Hz three phase power source. HV power supply cabinet in-line with PA cabinet
FM-20A	909-0020-201	FM-20A One Tube 20,000 watt FM broadcast transmitter same as 909-0020-200 except HV power supply cabinet is separate from PA cabinet
FM-20A	909-0020-380	FM-20A One Tube 20,000 watt FM broadcast transmitter same as 909-0020-200 (HV power supply in-line) except to operate from a 380/415, 50 Hz, 3 phase power supply
FM-20A	909-0020-381	FM-20A One Tube 20,000 watt FM transmitter same as 909-0020-201 (HV power supply cabinet separate) except to operate from 380/415 3 phase power supply
(Factory installed options)		Optional Microprocessor Video Diagnostic System, option for use with FM-20A transmitter, factory installed
MVDS	909-0091-001	Filament voltage regulator (60 Hz), factory installed
	909-0112	Three phase AC voltmeter option for FM-20A, factory installed
	909-0113	

Intermodulation Distortion:

0.08%, 60 Hz/7 kHz; 4:1 ratio

Transient Intermodulation Distortion:

0.1% (square wave/sine wave)

FM Noise:72 dB or better below 100% modulation @ 400 Hz,
75 uS de-emphasis**Stereo Separation:**

45 dB or better; 30-15,000 Hz (sine wave)

Dynamic Stereo Separation:

40 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

Pilot Stability:

±0.5 Hz, 0 to 50 degrees C.

Modes:

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

SCA Operation:*Modulation:**

Direct FM

Subcarrier Frequency:

67 kHz (39 to 95 kHz to order)

Subcarrier Frequency Stability:

±0.5% (330 Hz @ 67 kHz), 0 to 50 degrees C.

Subcarrier Harmonic Content:

Less than 0.3%

Subcarrier Envelope Decay:

Greater than 100 msec from 90% to 10% subcarrier levels

Modulation Capability:

±20% of subcarrier frequency

Audio Input Impedance:

600 ohm balanced, resistive

Data Input Impedance:

75 ohm unbalanced, resistive, DC coupled

Input Levels:

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

Pre-emphasis:

(Audio) 150 microseconds standard (75 uS 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

Intermodulation Distortion:

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%

Crosstalk, SCA to Stereo:

-60 dB or better below 100% modulation of left or right. 75 uS de-emphasis

Crosstalk, Stereo to SCA:

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

FM Noise:

72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis)

Auto Muting Level:

Adjustable from 10 to 30 dB below program level

Auto Muting Delay:

Adjustable, 0.5 to 10.0 seconds

(See FC-30 data sheet for full details)

*Through FM-20A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable

Specifications subject to change without notice.



FM-10A

- Single Tube Transmitter**
- ***Folded half-wave output cavity — no plate blocking capacitors or sliding contacts**
- ***Broadband input matching network**
- Advanced digital control system**
- Optional microprocessor video diagnostic system (MVDS)**
- Synthesized FX-30 Exciter**
- Solid state broadband IPA**
- Automatic power control (APC) with proportional VSWR foldback**
- High overall efficiency for low operating cost**
- Extensive metering (10 meters)**

*patented

The FM-10A is a unique single tube 10,000 watt FM broadcast transmitter incorporating an innovative folded half-wave cavity power amplifier, broadband solid state intermediate power amplifier (IPA), ultra-linear synthesized exciter, and a digital control system. The primary RF amplifier assembly is housed in a low profile cabinet only five feet, eight inches high (177.3 cm) with easy access to all components. The PA plate voltage power supply is contained in a matching enclosure only twenty-three inches wide and thirty-seven inches deep. (57.6 cm. x 94.6 cm.)

SINGLE TUBE DESIGN

Reliability is the most important factor in the FM-10A transmitter. The single tube design offers a high level of transmitter dependability despite such adverse conditions as lightning, output mismatch or operator error.

The FM-10A utilizes a single Eimac 4CX7500A tetrode to produce over 10 kW of RF power on any 10 kHz frequency increment between 87.5 and 108 MHz. It operates in a grounded cathode configuration with grid drive provided by a solid state broadband IPA. Installation or removal of the power tube is accomplished quickly and easily from the rear of the transmitter.

INNOVATIVE POWER AMPLIFIER

Broadcast Electronics' new computer optimized coaxial cavity employs a patented folded half-wave tank circuit. This unique output circuit design eliminates the high voltage blocking capacitor

and high current sliding contacts found in conventional cavities. The result is exceptional reliability with reduced maintenance costs. (Typical PA efficiency greater than 80%).

A patented second harmonic suppressor is integrated within the cavity to minimize harmonic energy at the source. A separate distributed coaxial low pass filter (with directional couplers) is located external to the transmitter to insure compliance with FCC and DOC regulations as well as CCIR recommendations.

SIMPLIFIED INPUT CIRCUIT

The patented PA input circuit provides excellent impedance matching between the IPA and the power tube grid over the entire FM band. This broadband circuit maximizes bandwidth and stability while eliminating the input loading control.

SOLID STATE IPA

A high efficiency solid state IPA assembly in the FM-10A is contained in a slide-out drawer for convenience in maintenance.

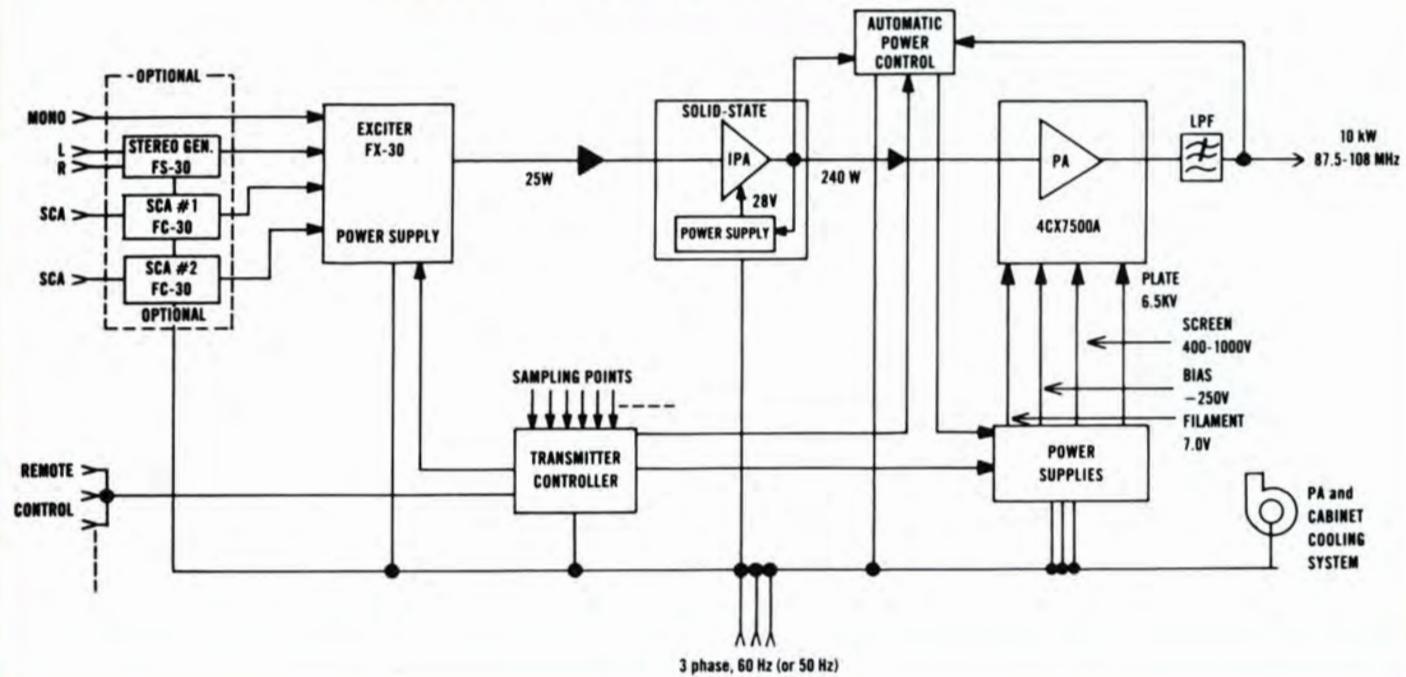
The broadband amplifier and regulator modules are easily removed—no de-soldering is necessary.

Both RF output transistors are automatically protected against output mismatch. The self-contained IPA unit can be operated directly into an antenna as a low power transmitter during emergencies. The IPA power supply operates from 97 to 133 VAC, or 194 to 266 VAC.

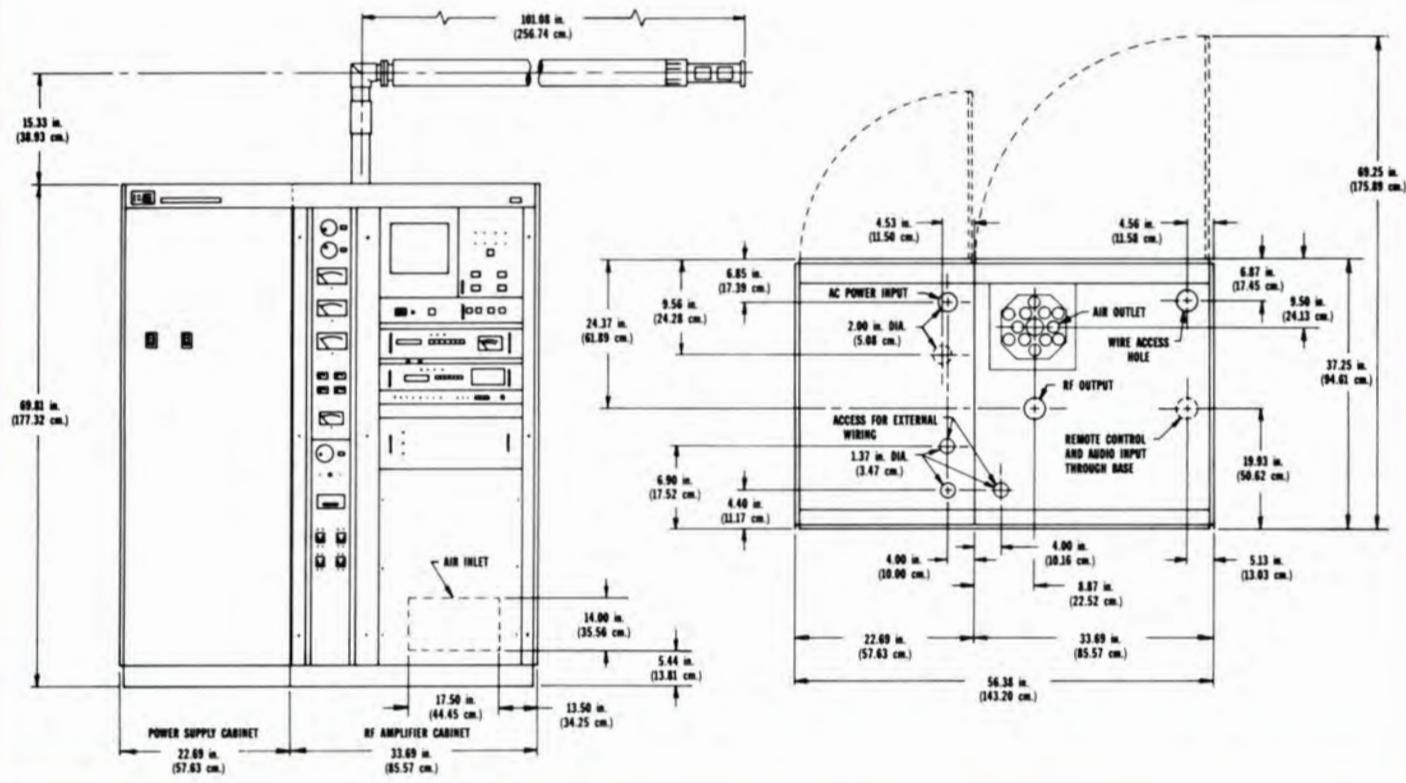


FM TRANSMITTING EQUIPMENT

BLOCK DIAGRAM B/E MODEL FM-10A TRANSMITTER



FLOOR PLAN B/E FM-10A TRANSMITTER (with Power Supply Cabinet)



TECHNICAL SPECIFICATIONS

GENERAL

POWER OUTPUT: 10 kW (4.5 kW to 11.0 kW)

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

RF OUTPUT IMPEDANCE: 50 ohms (others on special request)

OUTPUT CONNECTOR: 3 1/2 inch EIA flange. (1 1/2 inch EIA on request)

VSWR: 1.8:1 maximum. (will operate into higher VSWR with automatic power reduction).

FREQUENCY STABILITY: ± 300 Hz, 0° to 50°C.

TYPE OF MODULATION: Direct frequency modulation of carrier frequency.

MODULATION CAPABILITY: Greater than ± 200 kHz.

MODULATION INDICATION: Peak reading, color coded, LED display with baseband overmodulation indicator.

EXCITER: Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments)

PRE-EMPHASIS: FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby)

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

SYNCHRONOUS AM S/N RATIO: 45 dB below 10 kW reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ± 75 kHz @ 400 Hz)

TUBE COMPLEMENT: (1) 4CX7500A

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

POWER SUPPLY RECTIFIERS: Silicon

ELECTRICAL/MECHANICAL

AC INPUT POWER: 208 V WYE/240 V Delta, 380 V four wire WYE, 50 or 60 Hz (as ordered), three phase. (Taps for 196 to 252 V. Other voltages are available upon request.)

POWER CONSUMPTION: 15.8 kW @ 0.94 PF @ 10 kW output.

OVERALL EFFICIENCY: Typically 63% (AC line input to RF output).

SIZE & WEIGHT: (Transmitter) 33.7" W x 37.2" D x 69.8" H (85.6 cm. W x 94.6 cm. D x 177.3 cm. H) Weight = 800 lbs. (363 kg.)

(Power Supply) 22.7" W x 37.2" D x 69.8" H (57.6 cm. W x 94.6 cm. D x 177.3 cm. H) Weight = 1000 lbs. (453.6 kg.)

ALTITUDE: 7500 ft. @ 50 Hz (2286 M) - 10,000 ft. @ 60 Hz (3048 M)

AMBIENT TEMPERATURE RANGE: -10°C to +50°C.

FINISH: B/E blue with anodized aluminum control center panel and anodized aluminum trim.

*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, 75 microsecond pre-emphasis.

HARMONIC DISTORTION: 0.08% or less (.04% typical)

INTERMODULATION DISTORTION: 0.08% or less, 60 Hz/7 kHz, 4:1 ratio

TRANSIENT IMD: 0.1% or less (square wave/sine wave)

FM S/N RATIO: 72 dB below ± 75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis.

*WIDEBAND COMPOSITE OPERATION

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

COMPOSITE INPUT IMPEDANCE: 10K ohm, nominal, resistive.

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

COMPOSITE FM S/N RATIO: 72 dB below ± 75 kHz deviation @ 400 Hz (75 dB typical). Measured in a 30 Hz to 100 kHz bandwidth with 75 uS de-emphasis.

COMPOSITE HARMONIC DISTORTION: 0.08% or less (.04% typical)

COMPOSITE INTERMODULATION DISTORTION: 0.08% or less (.04% typical)

COMPOSITE TRANSIENT IMD: 0.1% or less (square wave/sine wave)

COMPOSITE AMPLITUDE RESPONSE: ± 0.1 dB, 30 Hz to 53 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 OPERATION

AUDIO INPUT IMPEDANCE: 600 ohms balanced, resistive, floating. (Adaptable to other impedances)

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

AUDIO INPUT FILTER: 15 kHz LPF with delay equalization for minimum overshoot.

FREQUENCY RESPONSE: ± 0.5 dB, 30 - 15,000 Hz, 75 uS pre-emphasis (flat, 25, or 50 uS pre-emphasis selectable)

TOTAL HARMONIC DISTORTION: 0.08% or less

INTERMODULATION DISTORTION: 0.08%, 60 Hz/7 kHz, 4:1 ratio.

TRANSIENT INTERMODULATION DISTORTION: 0.1% (square wave/sine wave)

FM NOISE: 72 dB or better below 100% modulation @ 400 Hz, 75 uS de-emphasis.

STEREO SEPARATION: 45 dB or better; 30 - 15,000 Hz (sine wave)

DYNAMIC STEREO SEPARATION: 40 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.

PILOT STABILITY: ± 0.5 Hz, 0° to 50°C.

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

*SCA OPERATION

MODULATION: Direct FM.

SUBCARRIER FREQUENCY: 67 kHz (39 to 95 kHz to order).

SUBCARRIER FREQUENCY STABILITY: $\pm 0.5\%$ (330 Hz @ 67 kHz), 0° to 50°C.

SUBCARRIER HARMONIC CONTENT: Less than 0.3%.

SUBCARRIER ENVELOPE DECAY: Greater than 100 msec. from 90% to 10% subcarrier levels.

MODULATION CAPABILITY: $\pm 20\%$ of subcarrier frequency

AUDIO INPUT IMPEDANCE: 600 ohm balanced, resistive

DATA INPUT IMPEDANCE: 75 ohm unbalanced, resistive, DC coupled

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

PRE-EMPHASIS: (Audio) 150 microseconds standard (75 uS 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.

INTERMODULATION DISTORTION: Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%

CROSSTALK, SCA TO STEREO: -60 dB or better below 100% modulation of left or right. 75 uS de-emphasis.

CROSSTALK, STEREO TO SCA: -50 dB or better below ± 6 kHz deviation of SCA using 150 uS de-emphasis and FS-30 stereo generator.

FM NOISE: 72 dB below ± 6 kHz deviation @ 400 Hz (150 uS de-emphasis)

AUTO MUTING LEVEL: Adjustable from 10 to 30 dB below program level.

AUTO MUTING DELAY: Adjustable, 0.5 to 10.0 seconds (See FC-30 data sheet for full details)

*Through FM-10A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-10A	909-1110-200	FM-10A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz. 208 V/240 V, 60 Hz 3-wire three phase power source. HV power supply cabinet ATTACHED to PA cabinet. Includes FX-30 Exciter.
FM-10A	909-1110-201	FM-10A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz. 208 V/240 V, 60 Hz 3-wire three phase power source with REMOTE HV power supply cabinet. Includes FX-30 Exciter.
FM-10A	909-1110-380	FM-10A single tube broadcast transmitter with HV power supply cabinet attached to PA cabinet for 380/220 V., 50 Hz, 4 wire WYE, 3 phase power source, with provision for safety conductor.
FM-10A	909-1110-381	FM-10A transmitter, same as above except with remote HV power supply cabinet.
MVDS	909-0091-005	Optional Microprocessor Video Diagnostic System, factory installed in FM-10A transmitter. (Must be ordered with transmitter)
	909-0115	Optional filament voltage regulator (60 Hz)
	909-0098	Optional three phase AC voltmeter



FMD-10A

The FMD-10A offers the advanced reliability possible only in a dual transmitter system as two FM-5A transmitters are combined to yield ten thousand watts of dependable power. Should one of the transmitters fail, total system output will be maintained at a reduced power level through the combiner. The redundant output capability of the FMD-10A can be enhanced even further through the use of the optional FO-2 Output Switcher. The FO-2 will monitor both transmitters continuously. If it detects a failure in either transmitter, the FO-2 will connect the remaining transmitter directly to the antenna (bypassing the combiner). The FO-2 can also toggle the Preset Power mode of the on-air transmitter, raising its output level to full power if desired.

A dual exciter option for the FMD-10A permits the FMD-10A to utilize two FX-30 synthesized exciters. One FX-30 is designated as the primary driving unit while the other FX-30 assumes the role of backup. The exciter assignment status can be changed by manual or remote control. In addition, the optional FW-30 Exciter Switcher is available for AUTOMATIC switching in the event of a failure.

ADVANCED DUAL TRANSMITTER CONTROL

At the heart of the FMD-10A system is the Broadcast Electronics FD-2 Dual Transmitter Controller. The FD-2 permits full control of the FMD-10A from a single, central panel. Three large meters provide measurement of Total Output Power, Reject Load Power/VSWR, and Plate Voltage/Plate Current for each transmitter. Illuminated switches permit separate or combined control of both transmitters at the push of a button. (The output RAISE/LOWER switches operate separately for each transmitter or can be "locked together" for combined power adjustment) The FD-2 also provides combined output VSWR protection IN ADDITION to the VSWR foldback protection in each FM-5A transmitter.

POWER AMPLIFIER CAVITY DESIGN

Both FM-5A transmitters in the FMD-10A system feature the patented folded half-wave cavity which eliminates troublesome plate blocking capacitors and sliding contacts. Each PA utilizes a single Eimac 4CX3500A tetrode to provide 5 kW output on any frequency in the 87.5 to 108 MHz range. Plate efficiency ap-

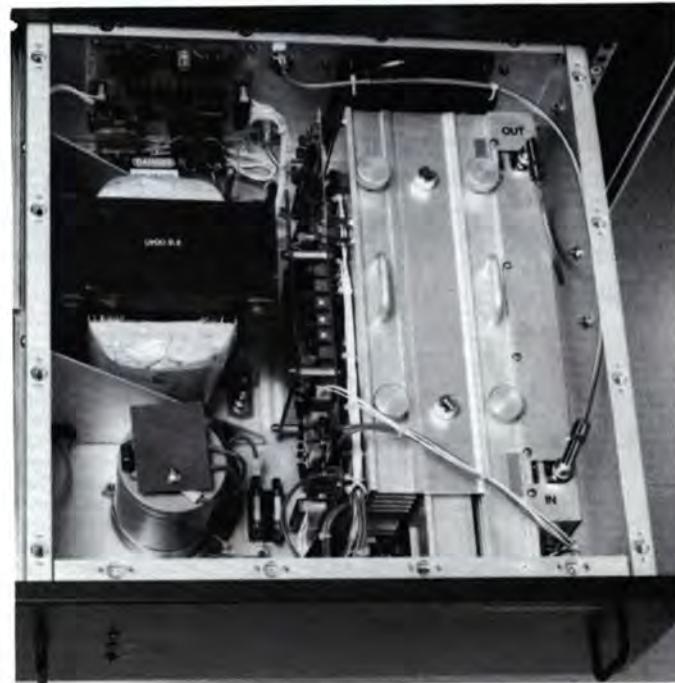
- Reliable dual transmitter system (two FM-5A transmitters combined)
- *Folded half-wave cavities (no plate blocking capacitor or sliding contacts)
- *Broadband input matching network
- Advanced FD-2 Dual Transmitter Controller
- Low distortion, synthesized FX-30 exciter
- Solid State IPA's
- Optional Microprocessor Video Diagnostic System (MVDS)
- FCC type accepted

*Patented

proaches 75% at full output, resulting in comparatively low power consumption. The 4CX3500A PA tubes can be installed or removed from the rear of the transmitters within minutes.

SOLID STATE IPA's

Each FM-5A transmitter employs a solid state IPA assembly contained in a convenient slide-out drawer. The broadband amplifier and regulator modules can be removed easily without de-soldering. The RF output transistors are automatically protected against an output mismatch.



Slide-out IPA's

SPECIFICATIONS

GENERAL

POWER OUTPUT:

10 kW (4.9 kW to 11.0 kW)

FREQUENCY RANGE:

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

RF OUTPUT IMPEDANCE:

50 ohms (others on special request)

OUTPUT CONNECTOR:

3/4 inch EIA flange.

VSWR:

1.8:1 maximum. (will operate into higher VSWR with automatic power reduction).

FREQUENCY STABILITY:

±300 Hz, 0° to 50°C.

TYPE OF MODULATION:

Direct frequency modulation of carrier frequency.

MODULATION CAPABILITY:

Greater than ±200 kHz.

MODULATION INDICATION:

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

EXCITER:

Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments)

PRE-EMPHASIS:

FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby)

ASYNCHRONOUS AM S/N RATIO:

55 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (no FM modulation present)

SYNCHRONOUS AM S/N RATIO:

45 dB below 10 kW reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ±75 kHz @ 400 Hz)

TUBE COMPLEMENT:

(2) 4CX3500A

RF HARMONICS:

Suppression meets all FCC/DOC requirements and CCIR recommendations.

POWER SUPPLY RECTIFIERS:

Silicon

ELECTRICAL/MECHANICAL

AC INPUT POWER:

208 V WYE/240 V Delta, 50 or 60 Hz, three phase. (Taps for 196 to 252 V. Other voltages are available upon request.)

PRIMARY POWER CONSUMPTION:

17.3 kW @ 0.92 PF @ 10 kW output.

OVERALL EFFICIENCY:

Typically 60% (AC line input to RF output)

SIZE & WEIGHT:

(Each FM-5A Transmitter) 33.69" W x 37.25" D x 69.81" H (85.57 cm. W x 94.6 cm. D x 177.3 cm. H) Weight = 700 lbs. (317.5 kg.)

(Each FM-5A Power Supply) 22.69" W x 37.25" D x 69.81" H (57.63 cm. W x 94.6 cm. D x 177.3 cm. H) Weight = 900 lbs. (408.2 kg.)

ALTITUDE:

7500 ft. @ 50 Hz (2286 M) - 10,000 ft. @ 60 Hz (3048 M)

AMBIENT TEMPERATURE RANGE:

-10°C to +50°C.

*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, 75 microsecond pre-emphasis.

HARMONIC DISTORTION:

0.08% or less

INTERMODULATION DISTORTION:

0.08% or less, 60 Hz/7 kHz, 4:1 ratio

TRANSIENT IMD:

0.1% or less (square wave/sine wave)

FM S/N RATIO:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis.

*WIDEBAND COMPOSITE OPERATION

COMPOSITE INPUTS:

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

COMPOSITE INPUT IMPEDANCE:

10k ohm, nominal, resistive.

COMPOSITE INPUT LEVEL:

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

COMPOSITE FM S/N RATIO:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical). Measured in a 30 Hz to 100 kHz bandwidth with 75 uS de-emphasis.

COMPOSITE HARMONIC DISTORTION:

0.08% or less (.04% typical)

COMPOSITE INTERMODULATION DISTORTION:

0.08% or less (.04% typical)

COMPOSITE TRANSIENT IMD:

0.1% or less (square wave/sine wave)

COMPOSITE AMPLITUDE RESPONSE:

±0.1 dB, 30 Hz to 53 kHz

COMPOSITE PHASE RESPONSE:

±0.5° 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 OPERATION

AUDIO INPUT IMPEDANCE:

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

AUDIO INPUT LEVEL:

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

AUDIO INPUT FILTER:

15 kHz LPF with delay equalization for minimum overshoot.

FREQUENCY RESPONSE:

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

TOTAL HARMONIC DISTORTION:

0.08% or less

INTERMODULATION DISTORTION:

0.08%, 60 Hz/7 kHz; 4:1 ratio.

TRANSIENT INTERMODULATION DISTORTION:

0.1% (square wave/sine wave)

FM NOISE:

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

STEREO SEPARATION:

45 dB or better; 30 - 15,000 Hz (sine wave)

DYNAMIC STEREO SEPARATION:

40 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.

PILOT STABILITY:

±0.5 Hz, 0° to 50°C.

MODES:

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

*SCA OPERATION

MODULATION:

Direct FM.

SUBCARRIER FREQUENCY:

67 kHz (39 to 95 kHz to order).

SUBCARRIER FREQUENCY STABILITY:

±0.5% (330 Hz @ 67 kHz), 0° to 50°C.

SUBCARRIER HARMONIC CONTENT:

Less than 0.3%.

SUBCARRIER ENVELOPE DECAY:

Greater than 100 msec. from 90% to 10% subcarrier levels.

MODULATION CAPABILITY:

±20% of subcarrier frequency

AUDIO INPUT IMPEDANCE:

600 ohm balanced, resistive

DATA INPUT IMPEDANCE:

75 ohm unbalanced, resistive, DC coupled

INPUT LEVELS:

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

PRE-EMPHASIS:

(Audio) 150 microseconds standard (75 uS 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.

INTERMODULATION DISTORTION:

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%

CROSSTALK, SCA TO STEREO:

-60 dB or better below 100% modulation of left or right, 75 uS de-emphasis.

CROSSTALK, STEREO TO SCA:

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

FM NOISE:

72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis)

AUTO MUTING LEVEL:

Adjustable from 10 to 30 dB below program level.

AUTO MUTING DELAY:

Adjustable, 0.5 to 10.0 seconds

(See FS-30 data sheet for full details)

*Through FMD-10A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FS-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FMD-10A	909-2005-200	FMD-10A, dual FM-5A transmitter system for operation on one specified frequency between 87.5 and 108 MHz 208 V/240 V, 60 Hz 3-wire three phase power source. Includes one FX-30 Exciter.
FMD-10A	909-2005-300	Same as above except for 208/240V, 50 Hz power source
MVDS	909-6091-0007	Optional Microprocessor Video Diagnostic System, factory installed in FMD-10A transmitter. (Must be ordered with transmitter)
FO-2	909-0117	Optional dual transmitter Output Switcher
FW-30	909-0120	Optional FW-30 Exciter Switcher
	909-0115	Optional filament voltage regulators (60 Hz)
	909-0098	Optional three phase AC voltmeter



- Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)***
- Broadband input circuit***
- Single tube design**
- Modular slide-out IPA**
- Extensive metering - 10 meters**
- Optional microprocessor video diagnostic system. (MVDS)**
- Synthesized, low distortion FX-30 exciter**
- Advanced transmitter controller**
- High overall efficiency for low operating cost**

*Patented

Broadcast Electronics' FM-5A single tube, five kilowatt transmitter represents the finest in medium power FM transmitter design. The FM-5A is a full featured transmitter including state of the art innovations such as the folded half-wave output cavity*, a modular slide-out IPA, a modular Automatic Power Control and an optional MVDS (Microprocessor Video Diagnostic System).

INNOVATIVE POWER AMPLIFIER

The power amplifier section of the FM-5A employs a patented folded half-wave output cavity. This unique design innovation completely eliminates troublesome plate blocking capacitors and sliding contacts.

A patented second harmonic suppressor is also integrated into the folded half-wave cavity. An external low pass filter (with directional output couplers) ensures compliance with FCC, Canadian DOC, and CCIR recommendations.

A new grid circuit design uses a patented broadband matching PCB assembly to maximize bandwidth and stability, while eliminating the input loading control. Installation or removal of the power tube can be performed from the rear of the transmitter and is easily accomplished within minutes. With the FM-5A's broadband screen neutralizing technique, neutralization re-adjustment is not necessary when changing tubes.

EFFICIENT SINGLE TUBE (4CX3500A) DESIGN

The FM-5A uses a single, high gain Eimac 4CX3500A tetrode to produce 5 kW of RF power on any frequency between 87.5 and 108 MHz. The single tube design of the FM-5A assures the utmost in reliability. Unlike solid state devices, the 4CX3500A output tube can withstand repeated overloads without substantial

damage. The result is a transmitter that can remain on the air despite such adverse conditions as lightning strikes, output mismatches, or operator error. The ruggedness of the FM-5A's output stage is enhanced further through a highly reliable PA cavity and an automatic protection system.

SOLID-STATE IPA

The solid state IPA assembly is contained in a slide-out drawer for easy maintenance. The broadband amplifier and regulator modules can be removed quickly without de-soldering.

Both RF output transistors are automatically protected against output mismatch. The self-contained IPA unit can be operated directly into an antenna as a 250 watt transmitter during emergencies. The IPA power supply operates from 97 to 133 VAC, or 194 to 266 VAC.

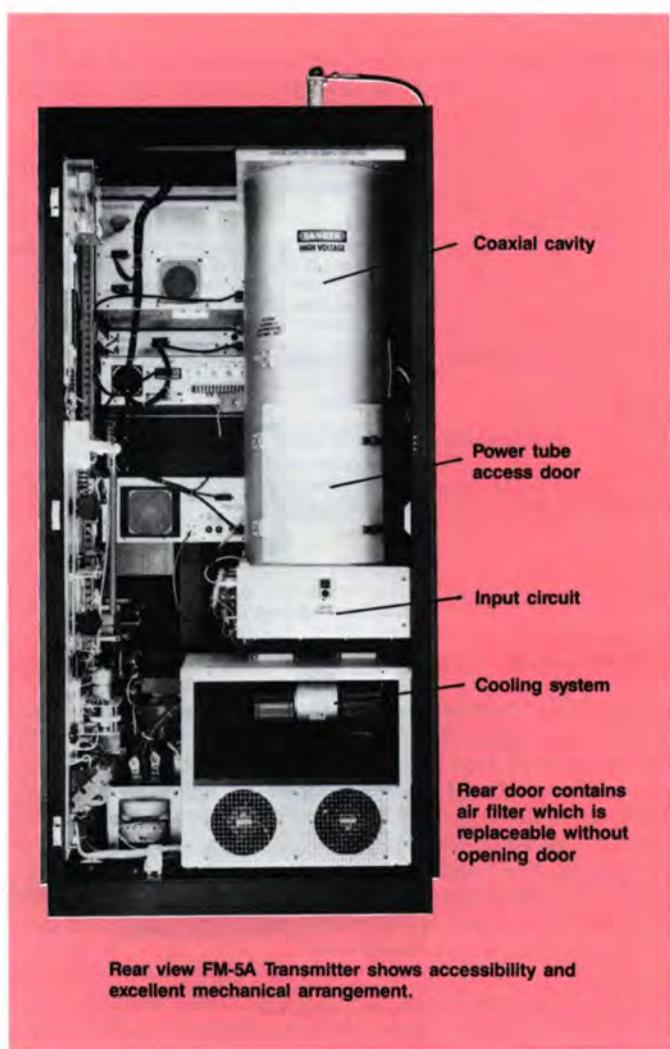
SOLID-STATE CONTROL/DIAGNOSTICS

Transmitter protection and control functions in the FM-5A use state-of-the-art CMOS logic. Great care has been taken to build-in extensive input/output control line filtering and optical isolation for trouble-free operation - even in high level RF environments.

The MVDS (Microprocessor Video Diagnostic System) is available as an option for the FM-5A. MVDS is a "smart" diagnostic system designed to give extremely informative operational status and fault condition reports on an eye-level video display.

AUTOMATIC POWER CONTROL

An advanced automatic power control (APC) system maintains constant RF output power with limited fluctuations of AC line



voltage or RF drive level. The regulated set point can be changed by remote control and is retained in non-volatile memory. In addition, an external signal can be used to switch the FM-5A into a separate "Preset Power" mode for lower power consumption during emergencies. A sophisticated proportional servo system provides fast correction of output power changes without overshoot.

A proportional VSWR foldback system protects the PA by automatically reducing power to safe levels until the mismatch situation can be corrected.

Each time the transmitter is activated, a "soft start" circuit gradually increases power from zero to nominal. This allows the FM-5A to assume a safe operating level under high VSWR conditions without overloading.

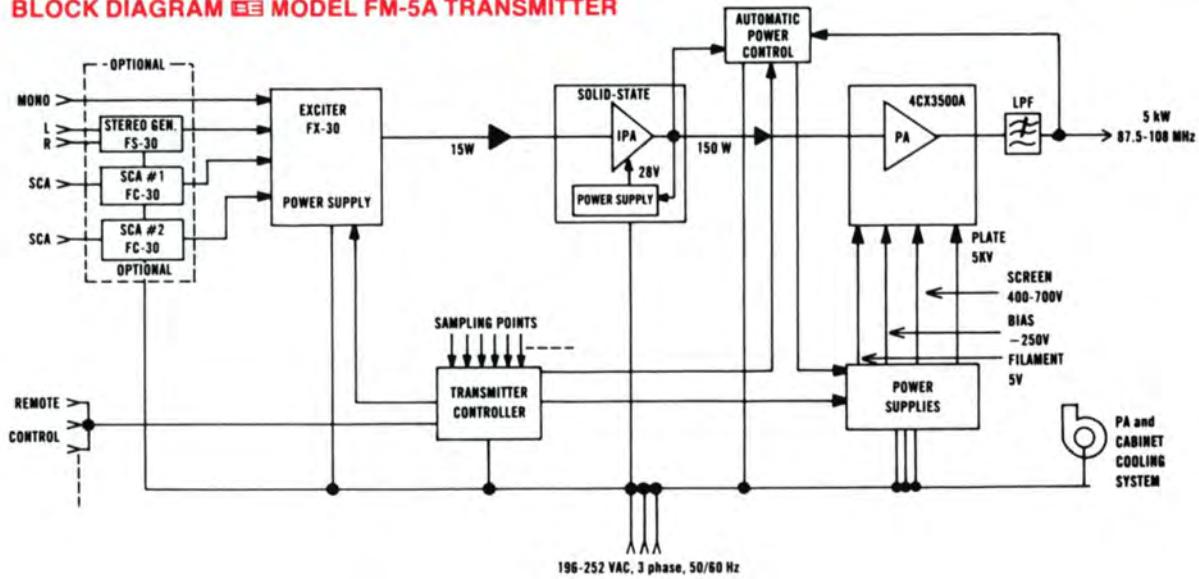
THE OPTIONAL MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

- Calculates efficiency, dissipation, and ERP
- Converts multiple meter readings to bar-graph or tabular display
- Preset limit violations clearly indicated in reverse video
- Automatically displays the location and nature of a malfunction
- Bar-graph display of PA/IPA parameters
- Automatic logging output capability
- Remote monitoring via modem, telco lines, or SCA
- Operates independently of primary controller - cannot affect basic "on-air" support systems.

IMPROVED ON-AIR RELIABILITY

The addition of the MVDS to the FM-5A 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 its own independent power supply. This prevents any MVDS failure from affecting the other transmitter systems - including the primary controller.

BLOCK DIAGRAM ■■■ MODEL FM-5A TRANSMITTER





SPECIFICATIONS

GENERAL

Power Output:

5 kW (2.5kW to 5.5kW).

Frequency Range:

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

RF Output Impedance:

50 ohms (others on special request).

Output Connector:

1&#34; EIA flange.

VSWR:

1.8:1 maximum. will operate into higher VSWR with automatic power reduction).

Frequency Stability:

±300 Hz, 0 to 50 Degrees C.

Type of Modulation:

Direct frequency modulation of carrier frequency.

Modulation Capability:

Greater than ±200 kHz.

Modulation Indication:

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

Exciter:

Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments).

Pre-emphasis:

FCC 75 uS, CCIR 50 uS (where specified) or 25 uS (Dolby).

Asynchronous AM S/N Ratio:

55 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (no FM modulation present).

Synchronous AM S/N Ratio:

40 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 uS de-emphasis. (FM modulation ±75 kHz @ 400 Hz).

Tube Complement:

(1) 4CX3500A.

RF Harmonics:

Suppression meets all FCC/DOC requirements and CCIR recommendations.

Power Supply Rectifiers:

Silicon.

ELECTRICAL/MECHANICAL:

AC Input Power:

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

Primary Power Consumption:

8.3 kW @ 5 kW output, 0.92 pf.

Overall Efficiency

Typically 60% (AC line input to RF output).

Size:

34.5" W x 37.25" D x 70" H (87.63 W x 94.61 D x 177.8 H cm).

Weight & Cubage:

1000 lbs. (455 Kg) unpacked; 1200 lbs. (545 Kg) packed 53 cu. ft. (1.5 cu. meters).

Altitude:

7500 ft. @ 50 Hz (2286 M), 10,000 ft. @ 60 Hz (3048 M).

Ambient Temperature Range:

-10 degrees C to +50 degrees C.

Finish:

B/E blue with anodized aluminum control center panel and anodized aluminum trim.

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, 75 microsecond pre-emphasis.

Harmonic Distortion:

0.08% or less (.04% typical).

Intermodulation Distortion:

0.08% or less, 60 Hz/7 kHz, 4:1 ratio.

Transient IMD:

0.1% or less (square wave/sine wave).

FM S/N Ratio:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 uS de-emphasis.

*WIDEBAND COMPOSITE OPERATION:

Composite Inputs:

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

Composite Input Impedance:

10K ohm, nominal, resistive.

Composite Input Level:

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

Composite FM S/N Ratio:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) Measured in a 30 Hz to 100 kHz bandwidth with 75 uS de-emphasis.

Composite Harmonic Distortion:

0.08% or less (.04% typical).

Composite Intermodulation Distortion:

0.08% or less (.04% typical).

Composite Transient IMD:

0.1% or less (square wave/sine wave).

Composite Amplitude Response:

±0.1 dB, 30 Hz to 53 kHz.

Composite Phase Response:

±0.5 degrees 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 OPERATION:

Audio Input Impedance:

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

Audio Input Level:

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

Audio Input Filters:

15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response:

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

Total Harmonic Distortion:

0.08% or less.

Intermodulation Distortion:

0.08%, 60 Hz/7 kHz, 4:1 ratio.

Transient Intermodulation Distortion:

0.1% (square wave/sine wave).

FM Noise:

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

Stereo Separation:

45 dB or better; 30 - 15,000 Hz (sine wave).

Dynamic Stereo Separation:

40 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.

Pilot Stability:

±0.5 Hz, 0 to 50 degrees C.

Modes:

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

*SCA OPERATION:

Modulation:

Direct FM.

Subcarrier Frequency:

67 kHz (39 to 95 kHz to order).

Subcarrier Frequency Stability:

+0.5% (330 Hz @ 67 kHz), 0 to 50 degrees C.

Subcarrier Harmonic Content:

Less than 0.3%.

Subcarrier Envelope Decay:

Greater than 100 msec. from 90% to 10% subcarrier levels.

Modulation Capability:

±20% of subcarrier frequency.

Audio Input Impedance:

600 ohm balanced, resistive.

Data Input Impedance:

75 ohm unbalanced, resistive, DC coupled.

Input Levels:

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

Pre-emphasis:

(Audio) 150 microseconds standard (75 uS 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.

Intermodulation Distortion:

Less than 0.5%, 60 Hz/7 kHz, 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%.

Crosstalk, SCA to Stereo:

-60 dB or better below 100% modulation of left or right, 75 uS de-emphasis.

Crosstalk, Stereo to SCA:

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

FM Noise:

72 dB below ±6 kHz deviation @ 400 Hz (150 uS de-emphasis).

Auto Muting Level:

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay:

Adjustable, 0.5 to 10.0 seconds.

(See FC-30 data sheet for full details).

*Through FM-5A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-5A	909-5000-200	FM-5A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz 208 V / 240 V, 60 Hz 3-wire three phase power source. Includes FX-30 Exciter.
FM-5A	909-0035-300	Same as above except for 208/240 VAC, 50 Hz power source.
FM-5A	909-5000-380	Same as above except for 380 VAC, WYE, 50 Hz three phase power source.
MVDS	909-0091-003	Optional Microprocessor Video Diagnostic System, factory installed in FM-5A transmitter. (Must be ordered with transmitter)
	243-3500	Spare 4CX3500A power tube

- Folded half-wave output cavity (no plate blocking capacitors or sliding contacts)*
- Broadband input circuit*
- Single tube design
- Modular slide-out IPA
- Extensive metering - 10 meters
- Optional microprocessor video diagnostic system. (MVDS)
- Synthesized, low distortion FX-30 exciter
- Advanced transmitter controller
- FCC type accepted

*Patented

THE MODEL FM-3.5A TRANSMITTER

The thirty-five hundred watt FM-3.5A transmitter is ideal for Class "A" stations. The FM-3.5A is a full featured, single tube transmitter. It includes state of the art innovations such as a folded half-wave output cavity*, an optional MVDS (Microprocessor Video Diagnostic System), modular slide-out IPA, a modular Automatic Power Control, and the industry acclaimed FX-30 exciter. The entire 3,500 watt transmitter is contained in a single, low profile cabinet only 5' 10" high (177.8 cm) with easy access to all components. Only 8.5 square feet (0.8 square meters) of floor space is required.

INNOVATIVE POWER AMPLIFIER

The power amplifier section of the FM-3.5A employs a patented folded half-wave output cavity. This unique design innovation completely eliminates troublesome plate blocking capacitors and sliding contacts.

A patented second harmonic suppressor is also integrated into the folded half-wave cavity. An external low pass filter (with directional



Computer optimized coaxial cavity employs BE's patented folded half wave tank circuit which eliminates the plate blocking capacitor and all sliding contacts in the output circuit.



FM-3.5A

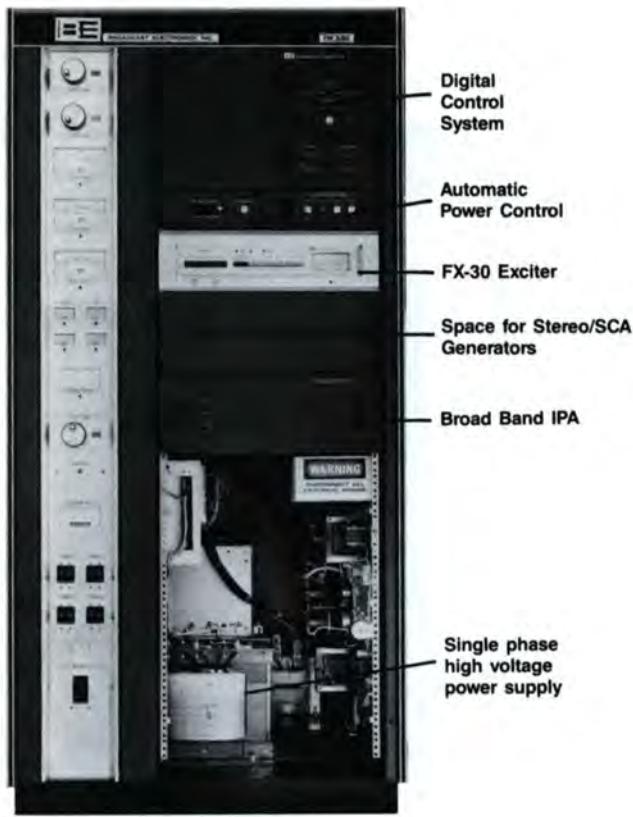
output couplers) ensures compliance with FCC, Canadian DOC, and CCIR recommendations.

A new grid circuit design uses a patented broadband matching PCB assembly to maximize bandwidth and stability, while eliminating the input loading control. Installation or removal of the power tube can be performed from the rear of the transmitter and is easily accomplished within minutes. With the FM-3.5A's broadband screen neutralizing technique, neutralization re-adjustment is not necessary when changing tubes.

All PA adjustments are performed through front panel controls with counters. A grounded bellows provides the fine tuning while a grounded loop couples to the antenna. This careful attention to grounding yields the added benefit of improved lightning immunity.

EFFICIENT SINGLE TUBE DESIGN

The FM-3.5A uses a single, high gain Eimac 4CX3500A tetrode to produce 3.5 kW of RF power on any frequency between 87.5 and 108 MHz. The single tube design of the FM-3.5A assures the utmost in reliability. Unlike solid state devices, the 4CX3500A output tube can withstand repeated overloads without substantial damage. The result is a transmitter that can remain on the air despite such adverse conditions as lightning strikes, output mismatches, or operator error. The ruggedness of the FM-3.5A's output stage is enhanced further through a highly reliable PA cavity and an automatic protection system.



Front view Model FM-3.5A Transmitter.

SOLID-STATE DRIVER/IPA

The solid state IPA assembly is contained in a slide-out drawer for easy maintenance. The broadband amplifier and regulator modules can be removed quickly without de-soldering.

Both RF output transistors are automatically protected against output mismatch. The self-contained IPA unit can be operated directly into an antenna as a 250 watt transmitter during emergencies. The IPA power supply operates from 97 to 133 VAC, or 194 to 266 VAC.

SOLID-STATE CONTROL/DIAGNOSTICS

Transmitter protection and control functions in the FM-3.5A use state-of-the-art CMOS logic. Great care has been taken to build-in extensive input/output control line filtering and optical isolation for trouble-free operation - even in high level RF environments.

AUTOMATIC POWER CONTROL

An advanced automatic power control (APC) system maintains constant RF output power with limited fluctuations of AC line voltage or RF drive level. The regulated set point can be changed by remote control and is retained in non-volatile memory. In addition, an external signal can be used to switch the FM-3.5A into a separate "Preset Power" mode for lower power consumption during emergencies. A sophisticated proportional servo system provides fast correction of output power changes without overshoot.

A proportional VSWR foldback system protects the PA by automatically reducing power to safe levels until the mismatch condition can be corrected.

Each time the transmitter is activated, a "soft start" circuit gradually increases power from zero to nominal. This allows the FM-3.5A to assume a safe operating level under high VSWR conditions without overloading.

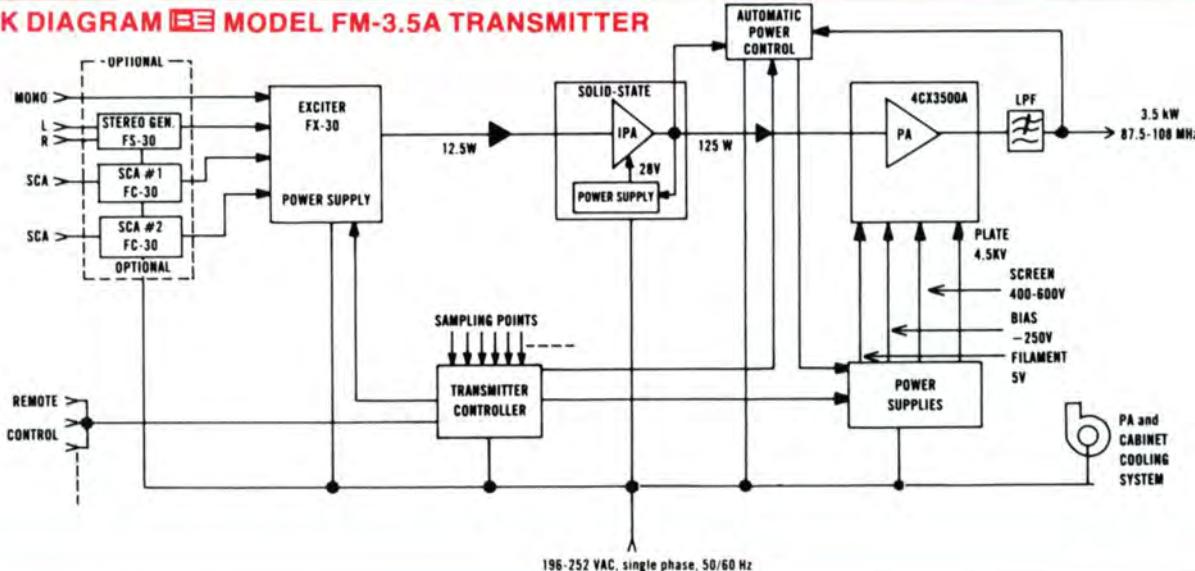
THE OPTIONAL MICROPROCESSOR VIDEO DIAGNOSTIC SYSTEM (MVDS)

Features:

- Calculates efficiency, dissipation, and ERP
- Converts multiple meter readings to bar-graph or tabular display
- Preset limit violations clearly indicated in reverse video
- Automatically displays the location and nature of a malfunction
- Bar-graph display of PA/IPA parameters
- Automatic logging output capability
- Remote monitoring via modem, telco lines, or SCA
- Operates independently of primary controller - cannot affect basic "on-air" support systems

Broadcast Electronics' Microprocessor Video Diagnostic System (MVDS) is available as an add-on option to the FM-3.5A. See the MVDS section of this catalog for more information.

BLOCK DIAGRAM **FM-3.5A TRANSMITTER**



TECHNICAL SPECIFICATIONS

GENERAL

Power Output:
3.5 kW (1.5 kW to 3.8 kW).

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

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

Output Connector:
1 1/8" EIA flange.

VSWR:
2:1 maximum. (will operate into higher VSWR with automatic power reduction).

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

Type Of Modulation:
Direct frequency modulation of carrier frequency.

Modulation Capability:
Greater than ±200 kHz.

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

Exciter:
Solid state, 30 watt output, model FX-30; incorporating a digitally programmed synthesizer. (10 kHz increments).

Pre-emphasis:
FCC 75 μ s, CCIR 50 μ s (where specified) or 25 μ s (Dolby).

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

Synchronous AM S/N Ratio:
40 dB below reference carrier with 100% AM modulation @ 400 Hz, 75 μ s de-emphasis. (FM modulation ±75 kHz @ 400 Hz).

Tube Complement:

(1) 4CX3500A.

RF Harmonics:

Suppression meets all FCC/DOC requirements and CCIR recommendations.

Power Supply Rectifiers:

Silicon.

ELECTRICAL/MECHANICAL:

AC Input Power:

208/240 V, 60 Hz, single phase. (Taps for 196 to 252 V. Other voltages and line frequencies are available upon request).

Power Consumption:

6.5 kW @ 3.5 kW output, 0.92 pf.

Overall Efficiency:

Typically 54% (AC line input to RF output).

Size:

34.5" W x 37.25" D x 70" H (87.63 W x 94.61 D x 177.8 H cm).

Weight & Cubage:

1050 lbs. (477 Kg) unpacked; 1210 lbs. (550 Kg) packed 53 cu. ft. (1.5 cu. meters).

Altitude:

7500 ft. @ 50 Hz (2286 M), 10,000 ft. @ 60 Hz (3048 M).

Ambient Temperature Range:

-10 degrees C to +50 degrees C.

Finish:

B/E blue with anodized aluminum control center panel and anodized aluminum trim.

***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, 75 microsecond pre-emphasis.

Harmonic Distortion:

0.08% or less (.04% typical).

Intermodulation Distortion:

0.08% or less, 60 Hz/ 7 kHz, 4:1 ratio.

Transient IMD:

0.1% or less (square wave/sine wave).

FM S/N Ratio:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 15 kHz bandwidth with 75 μ s de-emphasis.

***WIDEBAND COMPOSITE OPERATION:**

Composite Inputs:

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

Composite Input Impedance:

10K ohm, nominal, resistive.

Composite Input Level:

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

Composite FM S/N Ratio:

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical) measured in a 30 Hz to 100 kHz bandwidth with 75 μ s de-emphasis.

Composite Harmonic Distortion:

0.08% or less (.04% typical)

Composite Intermodulation Distortion:

0.08% or less (.04% typical).

Composite Transient IMD:

0.1% or less (square wave/sine wave).

Composite Amplitude Response:

±0.1 dB, 30 Hz to 53 kHz.

Composite Phase Response:

±0.5 degrees 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 OPERATION:

Audio Input Impedance:

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

Audio Input Level:

±10 dBm, ±1 dBm, for 100% modulation @ 400 Hz.

(Adaptable to other input levels).

Audio Input Filters:

15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response:

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

Total Harmonic Distortion:

0.08% or less.

Intermodulation Distortion:

0.08%, 60 Hz/7 kHz; 4:1 ratio.

Transient Intermodulation Distortion:

0.1% (square wave/sine wave).

FM Noise:

72 dB or better below 100% modulation @ 400 Hz, 75 μ s de-emphasis.

Stereo Separation:

45 dB or better; 30 - 15,000 Hz (sine wave).

Dynamic Stereo Separation:

40 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.

Pilot Stability:

±0.5 Hz, 0 to 50 degrees C.

Modes:

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

***SCA OPERATION:**

Modulation:

Direct FM.

Subcarrier Frequency:

67 kHz (39 to 95 kHz to order).

Subcarrier Frequency Stability:

±0.5% (330 Hz @ 67 kHz), 0 to 50 degrees C.

Subcarrier Harmonic Content:

Less than 0.3%.

Subcarrier Envelope Decay:

Greater than 100 msec. from 90% to 10% subcarrier levels.

Modulation Capability:

±20% of subcarrier frequency.

Audio Input Impedance:

600 ohm balanced, resistive.

Data Input Impedance:

75 ohm unbalanced, resistive, DC coupled.

Input Levels:

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

Pre-emphasis:

(Audio) 150 microseconds standard (75 μ s with internal jumper) (Data) no pre-emphasis.

Frequency Response:

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

Audio Low Pass Filter:

Sixth order, -3 dB @ 4.3 kHz, standard (resistor changes for other values).

Data Low Pass Filter:

Same as AF filter or may be bypassed.

Total Harmonic Distortion:

Less than 0.5% throughout AF pass band.

Intermodulation Distortion:

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis and LPF bypassed) Typically 0.1%.

Crosstalk, SCA to Stereo:

-60 dB or better below 100% modulation of left or right. 75 μ s de-emphasis.

Crosstalk, Stereo to SCA:

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

FM Noise:

72 dB below ±6 kHz deviation @ 400 Hz (150 μ s de-emphasis).

Auto Muting Level:

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay:

Adjustable, 0.5 to 10.0 seconds.

(See FC-30 data sheet for full details).

*Through FM-3.5A Transmitter using model FX-30 Exciter, model FS-30 Stereo Generator, and model FC-30 SCA Generator as applicable.

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-3.5A	909-3500-200	FM-3.5A single tube broadcast transmitter for operation on one specified frequency between 87.5 and 108 MHz. 196 V / 252 V, 60 Hz single phase power source. Includes FX-30 Exciter.
FM-3.5A	909-3500-300	Same as above except for 50 Hz single phase power source.
MVDS	909-0091-002	Optional Microprocessor Video Diagnostic System, factory installed in FM-3.5A transmitter. (Must be ordered with transmitter).
	243-3500	Spare 4CX3500A power tube.

- One-tube transmitter
- Patented folded half-wave output cavity—no plate blocking capacitor or sliding contacts
- Broadband input matching network
- Advanced digital control system
- Optional microprocessor diagnostics
- Synthesized B/E FX-30 exciter
- Solid state broadband IPA
- Automatic Power Control with Proportional VSWR Foldback

ADVANCED ENGINEERING

The one-tube FM-1.5A transmitter incorporates a patented folded half-wave cavity power amplifier, broadband solid state IPA, digitally programmed FX-30 ultra-linear exciter and a digital control system. With these innovative engineering advances Broadcast Electronics has produced a 1500 watt transmitter for optimum reliability and superb FM performance.

The entire transmitter is contained in a single low profile cabinet only 5'10" high (177.8 cm) with easy access to all components. Only five square feet of floor space are required. The air filter is in the full length back door and is replaceable while the transmitter is operating.

SINGLE TUBE DESIGN

The FM-1.5A uses a single Eimac 3CX1500A7/8877 triode to provide 1.5KW power output on any frequency between 87.5 and 108MHz. The triode operates in a high-gain configuration and is cathode-driven by a solid state broadband IPA. The tube is conservatively operated at less than one half of its rated plate dissipation.

Installation and removal of the power tube can easily be accomplished from the front of the transmitter. The entire power amplifier is contained in a slide-out drawer for easy accessibility.

OUTPUT TUBE RELIABILITY

B/E's one tube design provides a transmitter that can remain on the air despite adverse conditions such as lightning, output mismatch or operator error. Unlike solid state devices, an output tube can repeatedly withstand overloads without damage. In the Model FM-1.5A the ruggedness of a single tube output stage is enhanced with a highly reliable PA cavity and automatic protective circuitry.

SIMPLIFIED INPUT CIRCUIT

A new PA input circuit matches the impedance between the IPA and the power tube over the entire FM band. This new broadband matching circuit maximizes bandwidth and stability, while eliminating the input loading control. A single cathode resonating control is adjusted for maximum power output.

INNOVATIVE POWER AMPLIFIER

A unique new cavity employs a patented folded half-wave tank circuit. This new cavity design eliminates the plate blocking capacitor and all sliding contacts. The result is exceptional reliability with lower maintenance costs. A patented second harmonic suppressor is integral in this cavity, minimizing the generation of harmonic energy at the source, without wasting fundamental frequen-



FM-1.5A

cy power. A separate low pass filter with directional couplers is located within the transmitter to insure compliance with FCC and DOC regulations and CCIR recommendations.

All PA adjustments have front panel controls with counters. A grounded bellows tunes the output while a grounded loop couples the antenna. Improved immunity to lightning is accomplished in the FM-1.5A in this manner.

AUTOMATIC POWER CONTROL

An advanced automatic power control system (APC) maintains constant RF output power regardless of fluctuations in primary AC line voltage or changes in the RF drive level. The regulated set point can be changed by remote control and is retained in a non-volatile digital memory.

An external signal can be used to switch the FM-1.5A into a separate "Preset Power" mode for minimal power consumption during an emergency.

A proportional VSWR foldback system protects the PA from overloads by automatically reducing output power to a safe operating level if the antenna system presents a mismatch, such as during icing conditions.

Each time the transmitter is activated a "soft-start" circuit automatically raises the power from a low level to the nominal operating level. At turn-on, this feature allows the transmitter to assume a safe operating level under high VSWR conditions without overloading.



Front view of FM-1.5A Transmitter illustrates modular slide out construction.

SOLID STATE IPA

A high efficiency solid state IPA assembly in the FM-1.5A transmitter is contained in a slide-out drawer for convenience in maintenance.

The broadband amplifier and regulator modules are easily removed—no de-soldering is necessary.

Both RF output transistors are automatically protected against output mismatch. The self-contained IPA unit can be operated directly into an 250 watt transmitter during emergencies. The IPA power supply operates from 97 to 133 VAC, or 194 to 266 VAC.

Operational aids for the IPA include three front panel status indicators and availability of buffered rear panel metering.

DIGITAL CONTROL SYSTEM

All transmitter control and status functions in the FM-1.5A are performed by a modular digital controller. This advanced controller monitors the transmitter operating parameters and determines what control actions are necessary.

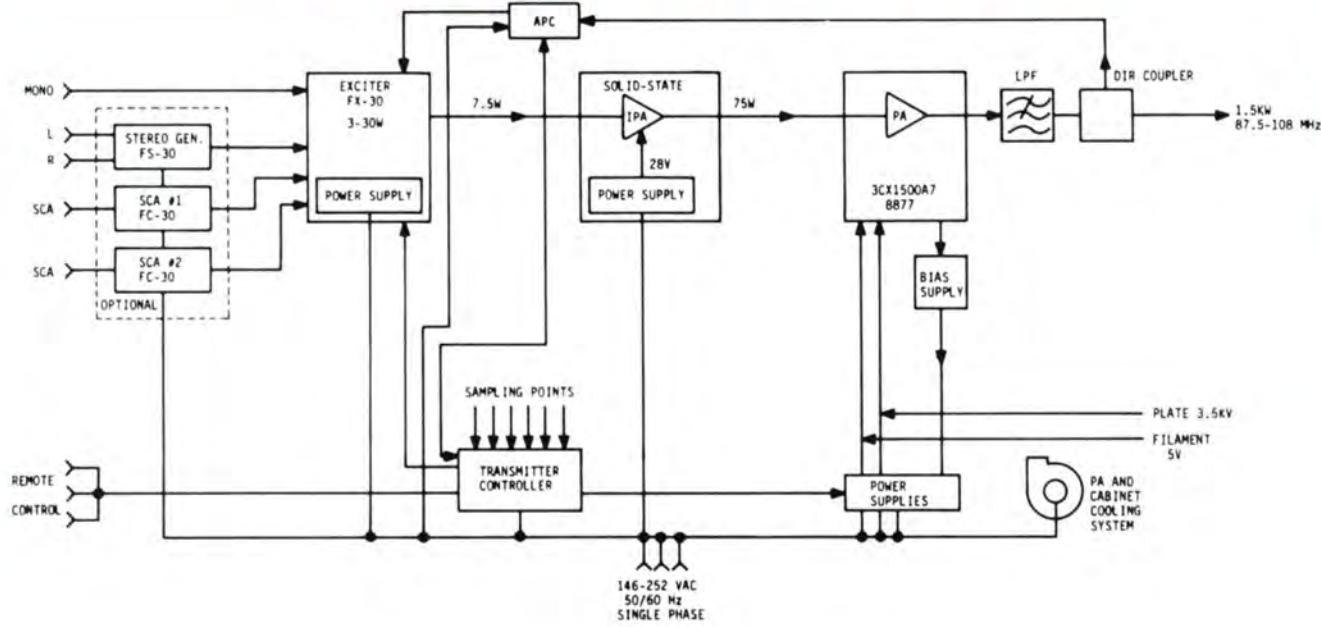
Status indicators (a total of 7) appear on individual LED's. This gives the transmitter operator more information for use in troubleshooting and day-to-day transmitter operation.

MODULAR CONTROL SYSTEM

A modular design approach with ribbon cables and a card edge bus makes board removal quick and easy. CMOS logic is used because of its superior noise immunity. All remote control inputs and outputs are optically isolated for control cut protection.

The modular design will accommodate the optional Microprocessor Video Diagnostic System (MVDS). See page 137 for complete details.

BLOCK DIAGRAM FM-1.5A ONE TUBE 1500 WATT TRANSMITTER





SPECIFICATIONS

GENERAL

Power Output

1.5 kW (from 500 watts to 1650 watts).

Frequency Range

87.5 to 108 MHz, tuned to specified operating frequency. Ex-
citer programmable in 10 kHz increments.

RF Output Impedance

50 ohms (others on special request).

Output Connector

7/8" EIA flange.

VSWR

2:1 maximum (will operate into higher VSWR with automatic
power reduction).

Frequency Stability

±300 Hz, 0° to 50°C, temperature compensated crystal
oscillator.

Type of Modulation

Direct frequency modulation of carrier frequency.

Modulation Capability

Greater than ±200 kHz.

Modulation Indication

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

Exciter

Solid state, 30 watt output, Model FX-30; incorporates digitally
programmed synthesizer (10 kHz increments).

Pre-emphasis

FCC 75uS, CCIR 50uS (where specified), or 25uS (Dolby).

Asynchronous AM S/N Ratio

55dB below reference carrier with 100% AM modulation @
400 Hz, 75 microsecond de-emphasis. (no FM modulation
present).

Synchronous AM S/N Ratio

45dB below reference carrier with 100% AM modulation @
400Hz, 75 microsecond de-emphasis. (FM modulation ±75kHz
@ 400Hz).

Tube Complement

3CX1500A7/8877.

RF Harmonics

Suppression meets all FCC/DOC requirements and CCIR
recommendations.

Power Supply Rectifiers

Silicon.

ELECTRICAL/MECHANICAL

AC Input Power

208V/240V, 50/60Hz, single phase. (Taps for 196 to 252V).
(Other voltages are available upon request).

Primary Power Consumption

3.0kW @ .9pf and 1500 watt output.

Overall Efficiency

Typically 50% (AC line input to RF output).

Size/Weight/Cubage

23.25"W x 70"H x 31.5"D (59 cm x 177.8 cm x 80.0 cm).
Net weight 800 lbs; 315 cu. ft. Packed 925 lbs. 36 cu. ft. (420
kg; 1.1 cu. m).

Altitude

7500 ft. @ 50 Hz. (2286M). 10,000 ft. @ 60 Hz (3048M).

Ambient Temperature Range

-10°C to +50°C.

Finish

BE blue with anodized aluminum trim.

MONAURA 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

0.08% or less, 30 Hz to 15 kHz.

Intermodulation Distortion

0.08% or less, 60 Hz/7 kHz, 4:1 ratio.

Transient IMD

0.1% or less (square wavesine wave).

FM S/N Ratio

72 below ±75 kHz deviation @ 400 Hz (75 dB typical)
measured in a 30 Hz to 15 kHz bandwidth with 75 micro-
second de-emphasis.*WIDEBAND COMPOSITE OPERATION (Thru FM-1.5A using
FX-30)

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 VP-P nominal, for ±75 kHz deviation.

Composite FM S/N Ratio

72 dB below ±75 kHz deviation @ 400 Hz (75 dB typical).
Measured in a 30 Hz to 100 kHz bandwidth with 75 micro-
second de-emphasis.

Composite Harmonic Distortion

0.08% or less (.04% typical).

Composite Intermodulation Distortion

0.08% or less (.04% typical).

Composite Transient IMD

0.1% or less (square wavesine wave).

Composite Amplitude Response

±0.1 dB, 30 Hz to 53 kHz.

Composite Phase Response

±0.5° 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 OPERATION (Thru FM-1.5A using FS-30 Stereo
Generator)

Audio Input Impedance

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

Audio Input Level

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

Audio Input Filter

15 kHz LPF with delay equalization for minimum overshoot.

Frequency Response

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

Total Harmonic Distortion

0.08% or less, 30 - 15,000 Hz.

Intermodulation Distortion

0.08%, 60 Hz/7 kHz; 4:1 ratio.

Transient Intermodulation Distortion

0.1% (Square wavesine wave).

FM Noise

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

Stereo Separation

45 dB or better; 30 - 15,000 Hz (sine wave).

Dynamic Stereo Separation

40 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.

Pilot Stability

±0.5 Hz, 0° to 50°C.

Modes

Stereo, Mono L+R, Mono (L) and Mono (R) remote controlled
(See FS-30 data sheet for full details).*SCA OPERATION (Thru FM-1.5A using FC-30 SCA
Generator)

Modulation

Direct FM.

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 Envelope Decay

Greater than 100 msec. from 90% to 10% subcarrier levels.

Modulation Capability

±20% of subcarrier frequency.

Audio Input Impedance

600 ohm balanced resistive.

Data Input Impedance

75 ohm unbalanced resistive DC coupled.

Input Levels

(Audio) Adjustable, +10 dBm to -10 dBm for ±6 kHz devia-
tion @ 400 Hz (Data) Adjustable, 1.0 to 4.0 V p-p for ±6 kHz
deviation (DC coupled).

Pre-emphasis

(Audio) 150 microseconds standard (75 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.

Intermodulation Distortion

Less than 0.5%, 60 Hz/7 kHz; 1:1 ratio (audio pre-emphasis
and LPF bypassed). Typical 0.1%.

Crosstalk, SCA To Stereo

-60 dB or better below 100% modulation of left or right. 75
usec de-emphasis.

Crosstalk, Stereo To SCA

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

FM Noise

72 dB below ±6 kHz deviation @ 400 Hz (150 usec
de-emphasis).

Auto Muting Level

Adjustable from 10 to 30 dB below program level.

Auto Muting Delay

Adjustable, 0.5 to 10.0 seconds.

(See FC-30 data sheet for full details).

*Through FM-1.5A Transmitter using Model FX-30 Exciter,
FS-30 Stereo Generator and FC-30 SCA Generator as
applicable.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-1.5A	909-1500-200	Model FM-1.5A one tube 1500 watt transmitter for operation on any one specified frequency 87.5 MHz to 108 MHz and for 208V/240V, single phase, 60 Hz, power source.
FM-1.5A	909-1500-300 243-8877	Same as above except for 208V/240V, 50 Hz power source. Spare 3CX1500A7/8877 power tube for FM-1.5A Transmitter.
MVDS	909-0091-004	Microprocessor Video Diagnostic System (Factory installed).

- 100% solid state
- Synthesized exciter, programmable in 10 kHz increments, 87.5 to 108 MHz
- Accepts monaural, stereo composite, and SCA audio or data
- Remote control interface through momentary contact closures
- 194-266 VAC, 50/60 Hz, single phase operation
- Fully metered

The Model FM-300A completely solid state, high performance transmitter delivers 300 watts RF output power on a specific frequency in the 87.5 to 108 MHz range.

The 300 watt FM transmitter combines dual solid state power amplifiers driven by the FX-30 synthesized exciter. A low pass RF filter, housed within the transmitter cabinet enclosure, insures harmonic-free operation.

PA voltage and current, as well as RF forward/reflected power are monitored by easily-read, 3.5-inch front panel meters. Fully buffered DC samples of the meter readings are provided for remote metering purposes. The FM-300A transmitter (including FX30 Exciter), readily interfaces with most modern remote control systems through momentary contact closures to initiate the desired transmitter control functions. Remote control of power output is accomplished through the FX-30 Exciter.

The FM-300A is completely self-contained in a cabinet enclosure with an overall height of 50-9/16 inches. Both the FX-30 exciter and the power amplifier are conveniently accessible for maintenance or servicing because of their pull-out drawer construction. The transmitter control panel assembly is rail-mounted.



FM-300A

SPECIFICATIONS

RF Power Output:
90 to 300 watts.
RF Frequency Range:
87.5 to 108 MHz.
RF Output Impedance:
50 ohms, unbalanced.
Output Connector:
Type "N" receptacle.
Maximum VSWR:
1.2:1 (at full power).
Automatic VSWR Protection:
Greater than 1.8:1.
AC Input Power:
194/266 Vac, 50/60 Hz, single phase.

Modulation Capability:
±200 kHz, direct FM.
Harmonic Distortion:
0.08% or less.
IM Distortion:
0.08% or less, 60 Hz/7kHz, 4:1.
FM S/N Ration:
72 dB below +75 kHz deviation.
Audio Input:
600 ohms, balanced.
Audio Input Level:
+10 dBm nominal for +75 kHz deviation @ 400 Hz.
Audio Response:
+0.5 dB, 30 Hz - 15 kHz. Selectable Flat, 25-, 50- or 75- usecond preemphasis.

MECHANICAL:
Weight:
275 lbs. (124.7 kg).
Height:
50-9/16" (128.4 cm).
Width:
23-5/16" (59.2 cm).
Depth:
30-3/4" (78.1 cm).
Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-300A	909-0300-200	300 watt FM transmitter, including FX-30 exciter, dual 150 watt solid state output amplifiers, control & metering panel, A/C power panel, LPF & rack cabinet, 220V/60Hz single phase.
FM-300A	909-0300-300	Same as 909-0300-200 except for 220V/50Hz power source.



FM-300 M/A

Broadcast Electronics' Model FM-300 M/A transmitter system is composed of two 300 watt solid state FM transmitters designed to a fully redundant main/alternate main configuration for continuous operation on one specified frequency in the 87.5 MHz to 108 MHz FM broadcast band.

A built-in 500 watt test load allows testing of the off-the-air transmitter for maintenance purposes. Two completely independent low pass filters, each rated for 1.7 kW power, are mounted within the transmitter.

The entire dual 300 watt transmitting system is housed in a

TRANSMITTER RACK LAYOUT AND COMPONENT IDENTIFICATION

OVERALL SYSTEM CONTROLLER	Remote control and status indicators rear panel barrier strip.
TRANSMITTER #1 CONTROL	DC samples provided for remote reading PA voltage, current, forward/reflected power.
FM EXCITER #1	B/E standard FX-30, 30 watt FM Exciter in pull-out drawer.
PA-1A	Power amplifiers consist of broadband solid state amplifiers, 150 watts each, isolated and combined by a hybrid combiner to produce 300 watts of power.
PA-1B	IPA is self contained with power supplies and regulators in pull-out drawer.
TRANSMITTER #2 CONTROL	Same as for transmitter #1.
FM EXCITER #2	Same as for transmitter #1.
PA-2A	Power amplifiers are same as for transmitter #1.
PA-2B	
AC CONTROL PANEL	3 breakers, one for each transmitter, one for the automatic switching panel and blowers.

single 72 inch cabinet. Each of the two excitors and all solid state power amplifiers are housed in pull-out drawers for easy servicing.

The transmitter system control panel allows on-off control and automatic transfer switching. It will automatically select the alternate transmitter in the event of a failure of the operating transmitter, transfer the antenna to the operational transmitter and de-energize the faulty unit. The controller is easily adaptable to present day remote control systems. Each transmitter has its own control panel to operate and monitor the transmitter in the manual mode.

SPECIFICATIONS

RF Power Output:
90 to 300 watts.
RF Frequency Range:
87.5 to 108 MHz, as ordered.
RF Output Impedance:
50 ohms unbalanced.
Output Connector:
Type "N" receptacle.
Maximum VSWR:
1.2:1 (at full power).

AC Input Power:
194/266 VAC, 50/60 Hz, single phase.
Modulation Capability:
Greater than ± 200 kHz, direct FM.
Harmonic Distortion:
0.08% or less.
IM Distortion:
0.08% or less, 60 Hz/7 kHz, 4:1.
FM S/N Ratio:
72 dB below +75 kHz deviation.

MECHANICAL:
Weight:
550 lbs. (271.7 kg).
Height:
78.56" (199.5 cm).
Width:
23.38" (59.4 cm).
Depth:
31.37" (78.11 cm).

ORDERING INFORMATION

FM-300M/A	909-2300-200	300 watt FM transmitter, main/alternate main including (2) FM-300A transmitters, with automatic transmitter switcher, RF switch, dummy load and rack cabinet, 220V/60Hz, single phase.
FM-300M/A	909-2300-300	Same as 909-2300-200 except for 220V/50 Hz power source.
	979-0026	Recommended semi-conductor kit for FM-300M/A (includes FX-30 spares).
	979-0024	Recommended spare parts kit for FM-300M/A.

- 100% solid state
- Synthesized exciter, programmable in 10 kHz increments, 87.5 to 108 MHz
- Compact design, yet excellent pull out drawer access for maintenance and servicing of exciter and PA
- Accepts stereo composite and SCA audio or data
- Remote control interface through momentary contact closures
- 194-266 Vac, 50/60 Hz, single phase operation
- 830W maximum power consumption at 250W RF output level
- Fully metered

The Model FM-250 is an ultra-reliable, completely solid state FM transmitter that delivers 250 watts RF output power on a specific frequency in the 87.5 to 108 MHz range.

This high performance 250 watt FM transmitter employs a single solid state power amplifier driven by the FX-30 synthesized exciter which is the industry-acclaimed standard for the ultimate in signal fidelity and frequency stability. A low pass RF filter, housed within the transmitter cabinet enclosure, insures harmonic-free operation.

PA voltage and current, as well as RF forward/reflected power are monitored by easily-read, 3.5-inch front panel meters. DC samples of the meter readings are provided for remote metering purposes. The FM-250 transmitter, (including the Broadcast Electronics FX-30 Exciter), readily interfaces with present day remote control systems through momentary contact closures to initiate the desired transmitter control functions. Remote control of power output is accomplished through the FX-30 Exciter.

The FM-250 transmitter is completely self-contained in a 36.5 inch high cabinet. Both the FX-30 exciter and the power amplifier are conveniently accessible for maintenance or servicing because of their pull-out drawer construction.

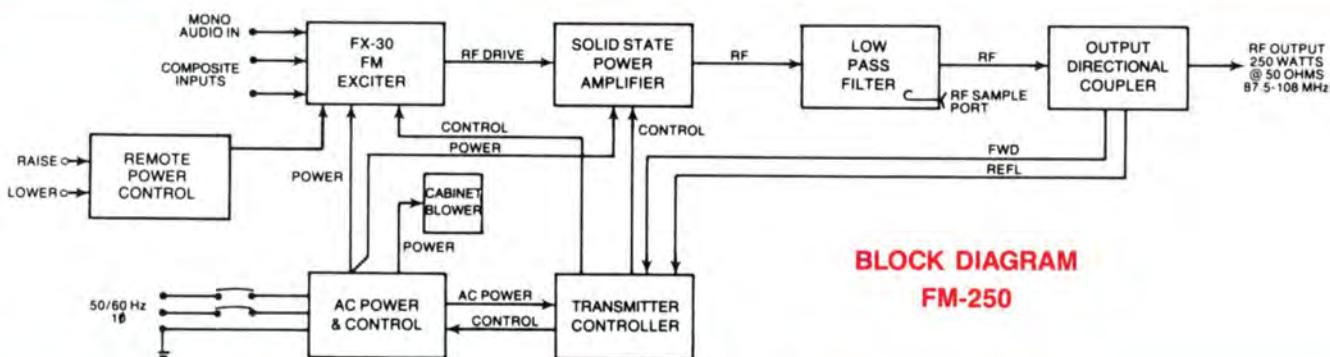


FM-250

SPECIFICATIONS

RF Power Output:	Automatic VSWR protection: Greater than 1.8:1.	IM Distortion:	Depth:
90 to 250 watts.		0.08% or less, 60 Hz/7 kHz, 4:1.	30 1/4" (78.1 cm).
RF Frequency Range:	AC Input Power: 194/266 Vac, 50/60 Hz, single phase.	FM S/N Ratio:	Audio Input:
87.5 to 108 MHz.		72 dB below ±75 kHz deviation.	600 ohms, balanced.
RF Output Impedance:	Power Consumption: 830W maximum at 250W output.	MECHANICAL:	Audio Input Level:
50 ohms, unbalanced.		Weight:	+10 dBm nominal for ±75 kHz deviation @ 400 Hz.
Output Connector:	Modulation Capability: ±200 kHz, direct FM.	Height:	Audio Response:
Type "N" receptacle.		36 5/16" (92.9 cm).	±0.5 dB, 30 Hz - 15 kHz. Selectable Flat, 25-, 50- or 75- u second preemphasis.
Maximum VSWR:	Harmonic Distortion: 0.08% or less.	Width:	Specifications subject to change without notice.
1.2:1 (at full power).		23 5/16" (59.2 cm).	

Specifications subject to change without notice.



BLOCK DIAGRAM
FM-250

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-250	909-0250-200	250 watt FM transmitter including FX-30 exciter, 250 W solid state power amplifier control and metering panel, A/C power panel, LPF and rack cabinet, 220V/60Hz single phase.
FM-250	909-0250-300	Same as 909-0250-200 except for 220V/50Hz power source.



**OVERALL SYSTEM
CONTROLLER**

**TRANSMITTER #1
CONTROL**

**TRANSMITTER #2
CONTROL**

FM EXCITER #1

FM EXCITER #2

**POWER
AMPLIFIER #1**

**POWER
AMPLIFIER #2**

**AC CONTROL
PANEL**



Remote control and status indicators, rear panel barrier strip.

DC samples provided for remote reading PA voltage, current, forward/reflected power.

B/E standard FX-30, 30 watt FM Exciter in pull out drawer.

Broadband solid-state, 250-watt power amplifier. Self-contained with power supply and regulator in pull out drawer.

Three breakers, one for each transmitter, one for the automatic switching panel and blowers.

FM-250M/A

Broadcast Electronics' Model FM-250M/A transmitter system is composed of two 250 watt solid state FM transmitters designed to a fully redundant main/alternate main configuration for continuous operation on one specified frequency in the 87.5 MHz to 108 MHz FM broadcast band.

A built-in 500 watt test load allows testing of the off-the-air transmitter for maintenance purposes. Two completely independent low pass filters, each rated for 1.7 kW power, are mounted within the transmitter.

The entire dual 250 watt transmitting system is housed in a single 70 inch cabinet. Each of the two exciters and all solid state

power amplifiers are constructed in pull out drawers for easy servicing.

The transmitter system control panel allows on-off control and automatic transfer switching. It will automatically select the alternate transmitter in the event of a failure of the operating transmitter, transfer the antenna to the operational transmitter and de-energize the faulty unit. The controller is easily adaptable to present day remote control systems. Remote control of power output is accomplished through the Broadcast Electronics FX-30 Exciter. Each transmitter has its own control panel to operate and monitor that transmitter in the manual mode.

SPECIFICATIONS

RF Power Output:
90 to 250 watts.

RF Frequency Range:
87.5 to 108 MHz, as ordered.

RF Output Impedance:
50 ohms resistive.

Output Connector:
Type "N" receptacle.

Maximum VSWR:
1.2:1.

AC Input Power:
194/266 Vac, 50-60 Hz, single phase.

Power Consumption:
830 watts maximum at 250 watts out. 1660W maximum with both transmitters operating at 250 watts (one into antenna, one into load).

Modulation Capability:
Greater than ± 200 kHz, direct FM.

Harmonic Distortion:
0.08% or less.

IM Distortion:
0.08% or less, 60 Hz/7 kHz, 4:1.

FM S/N Ratio:
72 dB below ± 75 kHz deviation.

MECHANICAL:

Weight:
500 lbs. (226.8 kg).

Height:
69.8" (177.2 cm).

Width:
23.31" (59.4 cm).

Depth:
30.75" (78.11 cm).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-250M/A	909-2250-200	250 watt FM transmitter, main/alternate main including (2) FM-250 transmitters, with automatic transmitter switcher, RF switch, dummy load, and rack cabinet, 220V/60Hz, single phase.
FM-250M/A	909-2250-300	Same as 909-2250-200 except for 220V/50Hz power source.
	979-0026	Recommended semi-conductor kit for FM-250M/A (includes FX-30 spares).
	979-0024	Recommended spare parts kit for FM-250M/A.

- 100% solid state
- Synthesized exciter, programmable in 10 kHz increments, 87.5 to 108 MHz
- Compact design, yet excellent pull out drawer access for maintenance and servicing of exciter and PA
- Accepts stereo composite and SCA audio or data
- Remote control interface through momentary contact closures
- 194-266 VAC, 50/60 Hz, single phase operation
- 524W maximum power consumption at 100W RF output level
- Fully metered

The Broadcast Electronics Model FM-100 high-performance, ultra-reliable, completely solid state FM transmitter delivers 100 watts RF output power on a specific frequency in the 87.5 to 108 MHz range.

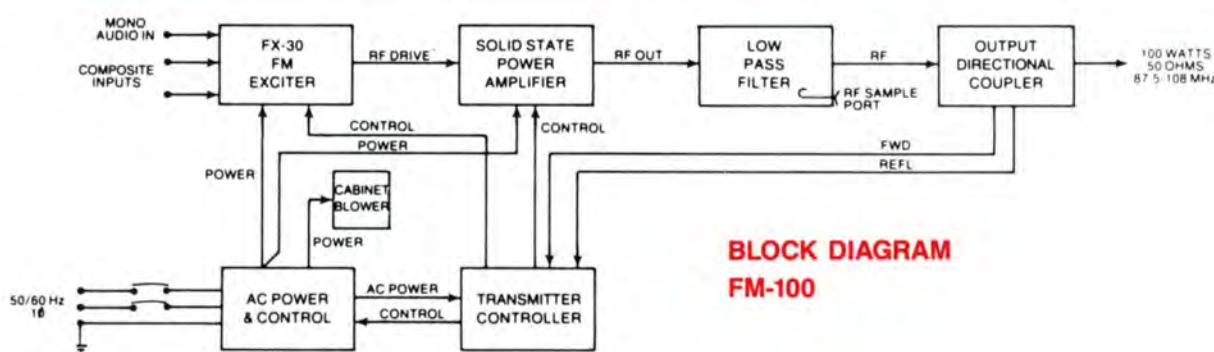
This new 100 watt FM transmitter employs a single solid state power amplifier driven by the FX-30 synthesized exciter which is the industry-acclaimed standard for the ultimate in signal fidelity and frequency stability. A low pass RF filter, housed within the transmitter cabinet enclosure, insures harmonic-free operation.

PA voltage and current, as well as RF forward/reflected power are monitored by easily-read, 3.5-inch front panel meters. DC samples of the meter readings are provided for remote metering purposes. The FM-100 transmitter readily interfaces with present day remote control systems through momentary contact closures to initiate the desired transmitter control functions.

The Model FM-100 is completely self-contained in a cabinet enclosure with an overall height of 36.5 inches. Both the FX-30 exciter and the power amplifier are conveniently accessible for maintenance or servicing because of their pull out drawer construction.



FM-100



**BLOCK DIAGRAM
FM-100**

SPECIFICATIONS

RF Power Output:

100 watts maximum.

RF Frequency Range:

87.5 to 108 MHz.

RF Output Impedance:

50 ohms, unbalanced.

Output Connector:

Type "N" receptacle.

Maximum VSWR:

1.2:1.

Automatic VSWR Protection:

Greater than 1.8:1.

AC Input Power:

194/266 Vac, 50/60 Hz, single phase.

Power Consumption:

524W maximum at 100W output (60 Hz).

Modulation Capability:

±200 kHz, direct FM.

Harmonic Distortion:

0.082% or less, 30 Hz - 15 kHz.

IM Distortion:

0.082% or less, 60 Hz/7 kHz, 4:1.

FM S/N Ratio:

72 dB below ±75 kHz deviation.

Audio Input:

600 ohms, balanced.

Audio Input Level:

+10 dBm nominal for ±75 kHz deviation @ 400 Hz.

Audio Response:

±0.5 dB, 30 Hz - 15 kHz. Selectable Flat, 25-, 50- or 75-usecond preemphasis.

MECHANICAL:

Weight:

225 lbs. (102 kg).

Height:

36-5/16" (92.9 cm).

Width:

23-5/16" (59.2 cm).

Depth:

30-3/4" (78.1 cm).

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-100	909-0100-200	FM-100, 100W Solid State FM Transmitter, Specify frequency. 194-266 Vac.



OVERALL SYSTEM
CONTROLLER

TRANSMITTER #1
CONTROL

TRANSMITTER #2
CONTROL

FM EXCITER #1

FM EXCITER #2

POWER
AMPLIFIER #1

POWER
AMPLIFIER #2

AC CONTROL
PANEL



FM-100 M/A

Broadcast Electronics' Model FM-100 M/A transmitter system is composed of two 100 watt solid state FM transmitters designed to a fully redundant main/alternate main configuration for continuous operation on one specified frequency in the 87.5 MHz to 108 MHz FM broadcast band. The system consists of two Model FM-100 transmitters.

A built-in 150 watt test load allows testing of the off-the-air transmitter for maintenance purposes. Two completely independent low pass filters are mounted within the transmitter.

The entire dual 100 watt transmitting system is housed in a single 70 inch cabinet. Each of the two excitors and all solid state

Remote control and status indicators, rear panel barrier strip.

DC samples provided for remote reading PA voltage, current, forward/reflected power.

B/E standard FX-30, 30 watt FM Exciter in pull out drawer.

Broadband solid-state, 100-watt power amplifier. Self-contained with power supply and regulator in pull out drawer.

3 breakers, one for each transmitter, one for the automatic switching panel and blowers.

power amplifiers are constructed in pull out drawers for easy servicing.

The transmitter system control panel allows on-off control and automatic transfer switching. It will automatically select the alternate transmitter in the event of a failure of the operating transmitter, transfer the antenna to the operational transmitter and de-energize the faulty unit. The controller is easily adaptable to present day remote control systems. Each transmitter has its own control panel to operate and monitor that transmitter in the manual model.

SPECIFICATIONS

RF Power Output:

100 watts.

RF Frequency Range:

87.5 to 108 MHz, as ordered.

RF Output Impedance:

50 ohms resistive.

Output Connector:

Type "N" receptacle.

Maximum VSWR:

1.2:1.

AC Input Power:

194/266 VAC, 50-60 Hz, single phase.

Power Consumption

524 watts maximum at 100 watts out. 1048W maximum with both transmitters operating at 100 watts (one into antenna, one into load).

Modulation Capability:
Greater than ± 200 kHz, direct FM.
Harmonic Distortion:

0.08% or less 30 Hz-15kHz.

IM Distortion:

0.08% or less, 60 Hz/7 kHz, 4:1.

FM S/N Ratio:
72 dB below ± 75 kHz deviation.
MECHANICAL:
Weight:
370 lbs. (166.5 kg).

Height:
69.8" (177.2 cm).

Width:
23.38" (59.2 cm).

Depth:
30.75" (78.11 cm).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-100 M/A	909-2100-200	FM-100, 100-W Main and Alternate Main Transmitters, Specify frequency. 194-266 Vac.



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.

- 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 (MVDS) expands the operation of the Broadcast Electronics Model FM-1.5A, FM-3.5A, FM-5A, FM-10A, FM-20A, FM-30A and FM-35A 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 add-

ed 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 designated 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.

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.

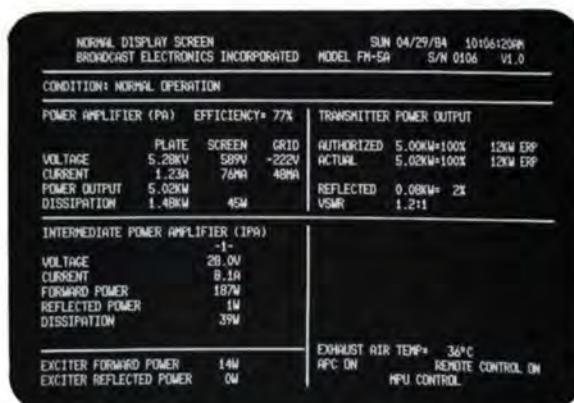


Figure 1 - Normal Display Screen



Figure 2 - Customer Configuration Screen



Figure 3 - Bar-graph Display Screen

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 control WITHOUT ANY INTERRUPTION IN TRANSMISSION. The MVDS option even has its own independent power supply. This prevents any catastrophic MVDS failure from affecting the other transmitter systems—including the primary controller.

ORDERING INFORMATION

MODEL	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 or FM-35A One Tube FM Transmitters only. (Must be ordered with transmitter).



MVDS Remote Control (Available April 1988)

Broadcast Electronics' revolutionary new MVDS Remote Control offers the ultimate convenience of transmitter monitoring and control from home or office using commonly available personal computers.

With MVDS Remote Control and an MS-DOS® compatible personal computer, you can easily monitor primary transmitter status at any time of the day or night. All communication takes place over ordinary telephone lines. MVDS Remote Control will display the Primary and Customer Configuration MVDS screens (see pages 137-138) on your computer with continuous updating of transmitter parameters as they change. Data may be entered into the Customer Configuration screen and the following transmitter functions controlled:

1. Plate Voltage On/Off
2. Filament Voltage On/Off
3. Output Power Raise/Lower
4. APC Pre-set Power On/Off
5. Overload Reset

MVDS Remote Control can even call you automatically. By enabling the call-out feature, MVDS Remote Control can be programmed to call any single designated telephone number at intervals ranging from once every three minutes to once per day. MVDS Remote Control will also call automatically if an overload, overpower or loss of power occurs. If you are not available when MVDS Remote Control calls, it will still connect with your com-

puter (if it is on) and will display the latest Primary screen for you to view as soon as you arrive. Call-out intervals may be changed from your own computer, or the call-out feature can be disabled completely.

Password protection provides excellent security for MVDS Remote Control. Unless the proper password is entered within the required 30 second "window", MVDS will not respond to any commands.

MVDS Remote Control is available for these Broadcast Electronics FM transmitters: FM-1.5A, FM-3.5A, FM-5A, FM-10A, FM-20A, FM-30A, FM-35A, FM-60A, FM-70A.

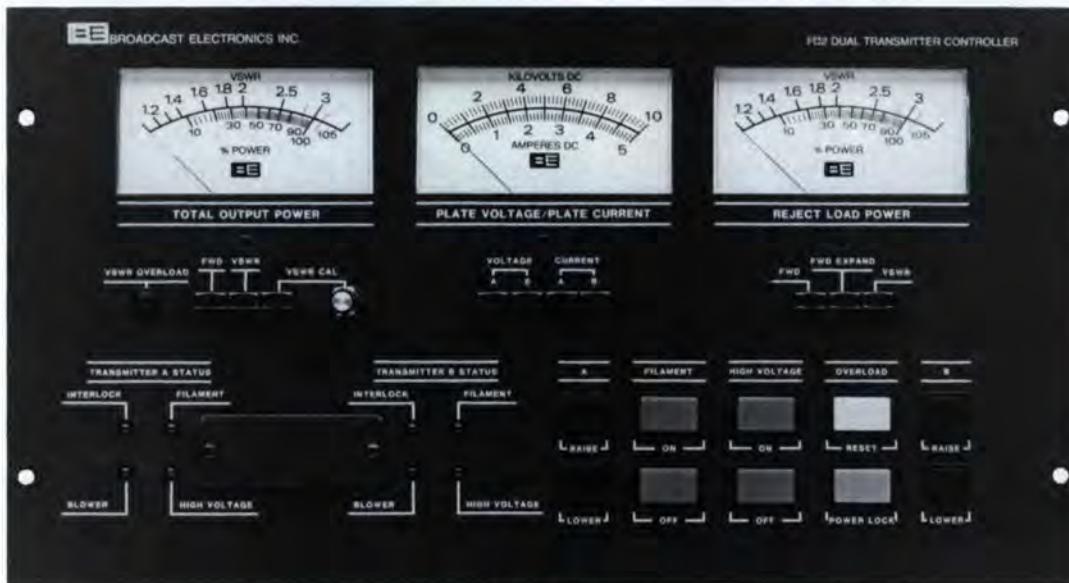
MVDS Remote Control System Requirements:

- 1 MS-DOS® compatible personal computer with at least one 5 1/4" floppy disk drive and a monochrome or color display adaptor.
- 1 MD-DOS® version 2.11 or later.
- 2 Hayes compatible auto-dial/auto-answer telephone modems, 300/1200 baud. Two required: one for remote location, one at transmitter site.
- 1 Printer (optional).

MVDS Remote Control comes complete with software and detailed documentation. You can order MVDS Remote Control factory installed with your new transmitter order, or it can be easily added to MVDS equipped Broadcast Electronics transmitters already in the field. Second transmitter feature is optional.

MS-DOS® is a registered trademark of Microsoft Inc.

Contact Broadcast Electronics or your Broadcast Electronics representative for complete details.



Model FD-2

- Control any two Broadcast Electronics FM transmitters in a combined configuration.
- Monitor and control both transmitters from ONE panel.
- Raise and Lower output power of both transmitters together or separately
- Expanded scale reject load metering
- Output monitoring with combined output VSWR protection for both transmitters.
- Field tested, reliable design
- Modular assembly for easy service
- Remote or extended local control capability
- Optional FO-2 Automatic Output Switcher

The FD-2 Dual Transmitter Controller forms the heart of a combined system utilizing two Broadcast Electronics FM transmitters. The FD-2 allows complete monitoring and control of the entire system from a single center cabinet. In addition, the FD-2 permits extended local and remote control through momentary contact closures.

EASY TO READ METERS

Three large 4.5 inch meters dominate the front panel of the FD-2. For each transmitter they provide measurement of Total Output Power/VSWR, Reject Load Power/VSWR, and Plate Voltage/Plate Current. Locking push buttons under each meter select the parameter to be measured.

DIAGNOSTIC DISPLAY

Eight LED's (two sets of four) comprise the diagnostic status display. These LED arrays indicate the status of critical systems for each transmitter. (Interlock, Blower, Filament, and High Voltage) In addition, a Combined VSWR Overload indicator is located immediately beneath the Total Output Power meter. This indicator will illuminate to signal a Combined VSWR overload condition.

DOUBLE VSWR PROTECTION

The FD-2 incorporates a fast acting VSWR overload protection system. This system monitors the COMBINED VSWR and will shut down BOTH transmitters if a mismatch is detected. The VSWR trip point is factory set but can be re-adjusted through a front panel,

protected access potentiometer. This combined VSWR protection is provided in addition to the proportional VSWR foldback protection built into each Broadcast Electronics transmitter.

ILLUMINATED TRANSMITTER CONTROL SWITCHES

Large, illuminated switches provide separate or combined control of both transmitters. These momentary push button switches operate High Voltage ON/OFF, Filament ON/OFF, and Power Output RAISE/LOWER. The High Voltage ON switch also allows one button activation of both transmitters, energizing the filament contacts followed by the high voltage contactors.

ONE BUTTON OVERLOAD RESET

The Overload Reset switch permits the simultaneous clearing of the overload circuit memories in both transmitters as well as the combined overload circuit memory in the FD-2. The switch illuminates to indicate the presence of an overload condition.

POWER LOCK

The front panel Power Lock switch is one of the handiest features of the FD-2 Dual Transmitter Controller. Depressing this switch will immediately lock together the Power Output RAISE/LOWER switches for both transmitters. This allows an operator to raise or lower the output of both transmitters simultaneously. The total output power of the entire system can be adjusted easily in this manner. The transmitters can be unlocked when balancing for minimum reject load power.

EXTENDED LOCAL CONTROL

The FD-2 provides the capability for extended local monitoring and control of all front panel indicators and switches. Two FD-2's can be easily "daisy chained" for extended control at distances up to one hundred feet. The FD-2 is also capable of Remote Control operation with appropriate systems. All control levels are compatible with Broadcast Electronics "A" series transmitters. A barrier strip is provided on the rear panel.



OPTIONAL FO-2 TRANSMITTER OUTPUT SWITCHER CONTROLLER

The optional FO-2 Transmitter Output Switcher provides an extra measure of operational redundancy in dual transmitter systems. The FO-2 constantly monitors the output of both transmitters and will respond to a loss of power in either unit. If the output from one transmitter falls below a pre-set failure level for a designated period of time, the FO-2 will automatically switch the defective transmitter into a dummy load and place the remaining transmitter directly on-line to the antenna. The FO-2 can also activate the Preset Power mode in the on-air transmitter. (The Preset Power

mode can be set for virtually any emergency output level desired—even full output.) The output failure switching level is user adjustable.

Four operating modes may be selected automatically or manually:

1. Transmitters A+B to Air
2. Transmitters A+B to Load
3. Transmitter A to Air, B to Load
4. Transmitter B to Air, A to Load

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FD-2	909-6001	Dual Transmitter Controller
FO-2	909-0117	Transmitter Output Switcher Controller for use with the FD-2 Dual Transmitter Controller.

FA-2 TRANSMITTER OUTPUT SWITCHER (STAND-ALONE)

- Maximum flexibility for Main/Alternate configurations
- Adjustable switching threshold
- Adjustable switching delay timer
- Automatic or manual switching modes
- Automatic alarm system

The Broadcast Electronics model FA-2 Transmitter Output Switcher is designed to provide the greatest amount of redundancy through AUTOMATIC transmitter switching in Alternate/Main configurations. The FA-2 is similar to the FO-2 shown above, but is a stand-alone unit not requiring the FD-2.

OPERATING MODES

Two primary operating modes may be automatically or manually selected:

1. Transmitter A to the Antenna, transmitter B to Load (A Air)
2. Transmitter B to the Antenna, transmitter A to Load (B Air)

Mode switching is accomplished manually through the operation of the illuminated front panel switches, or automatically upon

- Easy interfacing to motorized coaxial switches*
- Remote control capability
- Direct connection with any B/E transmitter having an output of 1.5 kW or greater

*Coaxial switches not supplied

detection of a failure condition.

AUTOMATIC FA-2 OPERATION WITH ALTERNATE/MAIN TRANSMITTER SYSTEMS

If the output power of the "on-air" transmitter falls below a pre-set threshold for a designated period of time, the FA-2 will automatically connect the "on-air" transmitter to a dummy load. At the same time, the Alternate transmitter will be activated and connected directly to the antenna. (The Alarm System will also be activated.) This eliminates the need for immediate manual intervention on the part of the operator. The FA-2 will monitor the "on-air" transmitter operation at all times and will instantly begin the switch-over procedure if a problem is detected.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FA-2	909-0200	Transmitter Output Switcher Controller with power supply for use in Main/Alternate transmitter systems.



Model FW-30

The exciter occupies a crucial position in the transmission chain. A failure in its complex, delicate circuitry can cause a total transmitter shutdown. It makes perfect sense, therefore, to provide a system for AUTOMATIC switching between primary and back-up exciters in the event of a failure.

The FW-30 Exciter Switcher provides this redundant, automatic switching capability with a state-of-the-art design that is elegant in its simplicity. The FW-30 Exciter Switcher is intended for use with Broadcast Electronics model FX-30 exciters, but it can also be used with many other types of exciters available in the industry today.

OPERATION: By pressing one of the illuminated front panel switches, the operator can designate one exciter as the "on-line" unit. The other exciter will then assume the role of backup. From

- Fast, automatic switching to back-up exciter
- State-of-the-art CMOS design
- Built-in high isolation coax transfer switch
- Built-in dummy load with modulation monitor sample port
- Attractive styling to match B/E equipment

that point onward, the FW-30 Exciter Switcher will constantly monitor the RF output of the operational exciter. Should this exciter fail for any reason, the FW-30 will immediately switch to the "hot" backup with virtually no interruption in transmission. (The backup exciter is maintained on "hot standby" for immediate operation without warm-up.) The operational/backup designation can be changed at any time. In the event of an AC power failure, the FW-30 operating modes are maintained by a battery backup. The FW-30 will return to the chosen mode and exciter as soon as power is restored.

The FW-30 can also be operated manually through the front panel switches. This is especially useful during testing or maintenance. In addition, exciter selection functions can be performed by remote control for added flexibility.

TECHNICAL SPECIFICATIONS

AC Power Requirements:

96 to 136 or 194 to 266 VAC, 50/60 Hz, single phase

Transfer Time:

Less than one second

Switching Capability:

200 watts at 50 ohms

Switch Isolation:

Greater than 80 dB

Exciter Muting:

Logic LOW to mute. Logic HIGH to enable. (HIGH = 15V in Broadcast Electronics transmitters)

Internal Memory:

Retains operational configuration during power failures with a 8.8V, 5 AH battery back-up

Monitor Port:

1.475 VRMS at 50 ohms with 30 watts RF output from exciter

Exciter Test Load:

30 watts continuous, 50 ohms non-inductive

Operating Temperature:

+32 to +122°F. (0 to 50°C.)

Maximum Altitude:

0 to 15,000 feet (4572 m) above sea level

Humidity:

95%, non-condensing

Weight:

18.5 lbs. (8.39 kg) unpacked

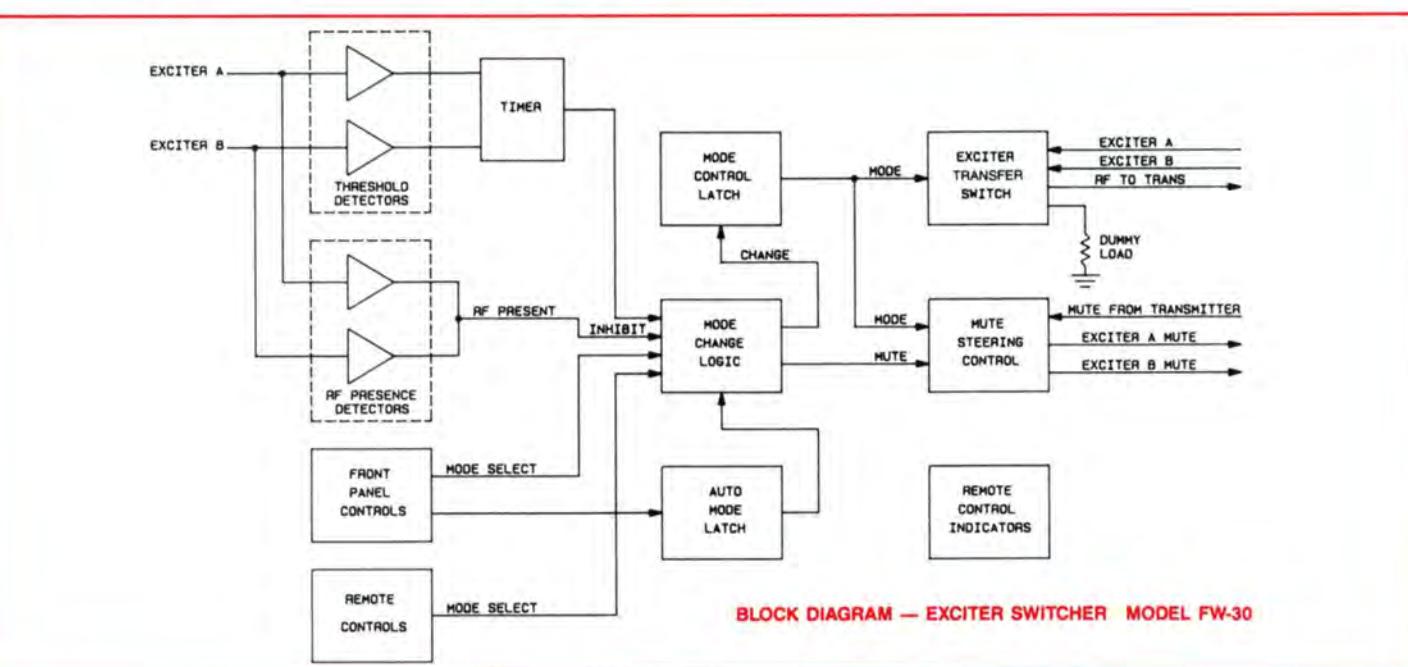
Dimensions:

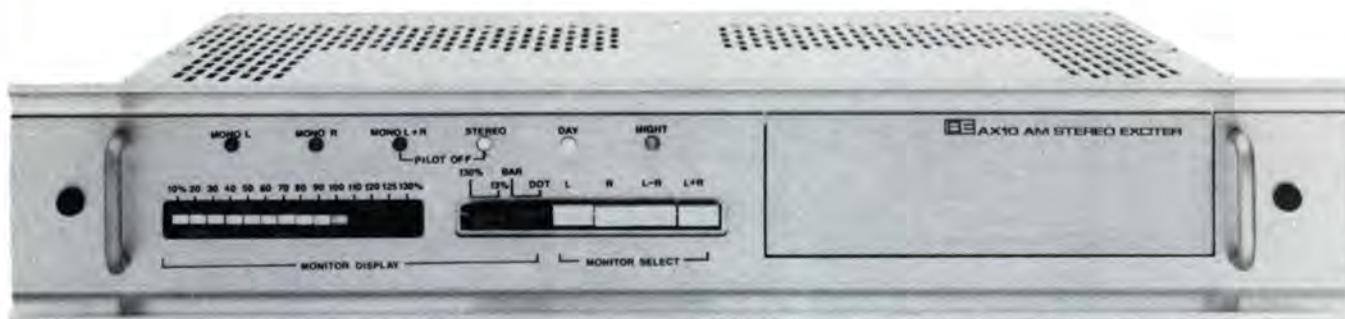
Height 5.25 inches (13.34 cm); Width 19 inches (48.26 cm); Depth 15.25 inches (38.74 cm)

Specifications subject to change without notice.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FW-30	909-0120	Automatic Exciter Switcher





AX-10

- Synthesized operation - 1 kHz increments
- Second generation C-QUAM® digital design
- Advanced independent right and left channel IF modulation technique
- Interfaces with virtually any existing AM transmitter
- Superior stereo performance with full mono receiver compatibility

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. 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 600 ohm 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%.

- Built-in LED peak reading modulation display
- Compact size - occupies only 3.5 inches of vertical rack space
- Independent equalization for two-transmitter or dual antenna pattern operation. Full remote control capability.

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 PM modulator circuitry or the L+R transmitter audio input path.

FLEXIBLE INTERFACING

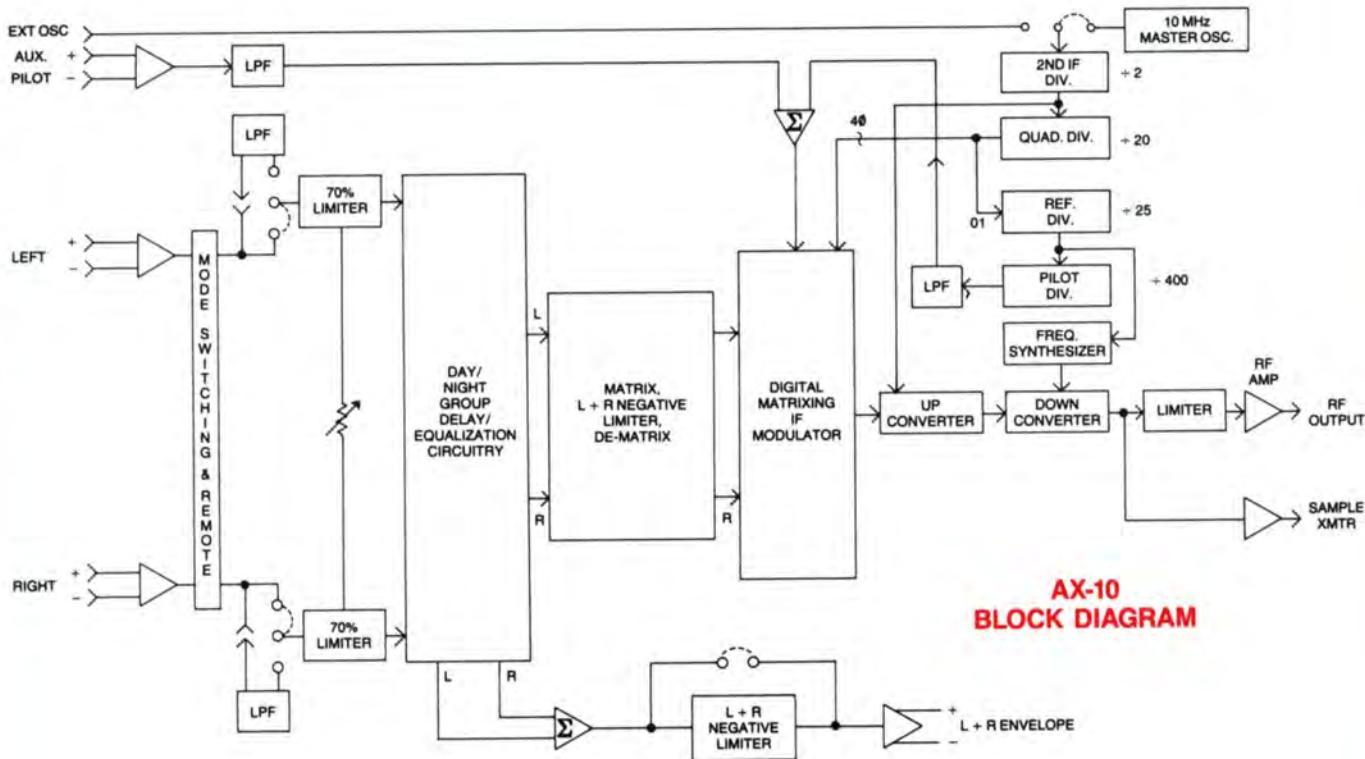
The AX-10 delivers up to 10 watts of RF output and is compatible with virtually any AM broadcast transmitter. An optional TTL-compatible RF adaptor is available for transmitters requiring asymmetrical duty cycle TTL inputs.

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, and 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.

AX-10
BLOCK DIAGRAM

SPECIFICATIONS

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

Stereo Signal to Noise:
L, R -50 dB below 100% mod. at 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. (4,572 m) AMSL

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

RF Output:
.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

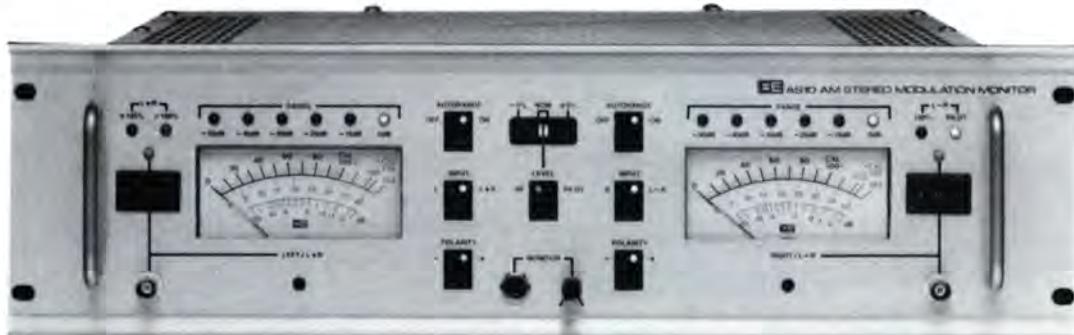
Harmonic Distortion:
(85% modulation) L=R, monaural, 0.25% max.,
50 Hz to 15 kHz.
(50% modulation) L,R, Single Channel, 0.5% max.,
50 Hz to 7.5 kHz.

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

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

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AX-10	907-0010-000	AX-10 AM Stereo Exciter for Q-QUAM system operation on a specified frequency in the 522 to 1620 kHz range. (117 V/60 Hz) (117 V/50 Hz, 220 V/60 Hz available)
	907-0060	12 kHz Low Pass Filter option
AS-10	907-0100-000	AM Stereo Modulation Monitor



AS-10

- Second generation C-QUAM® modulation monitor for stereo or mono
- 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!

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.

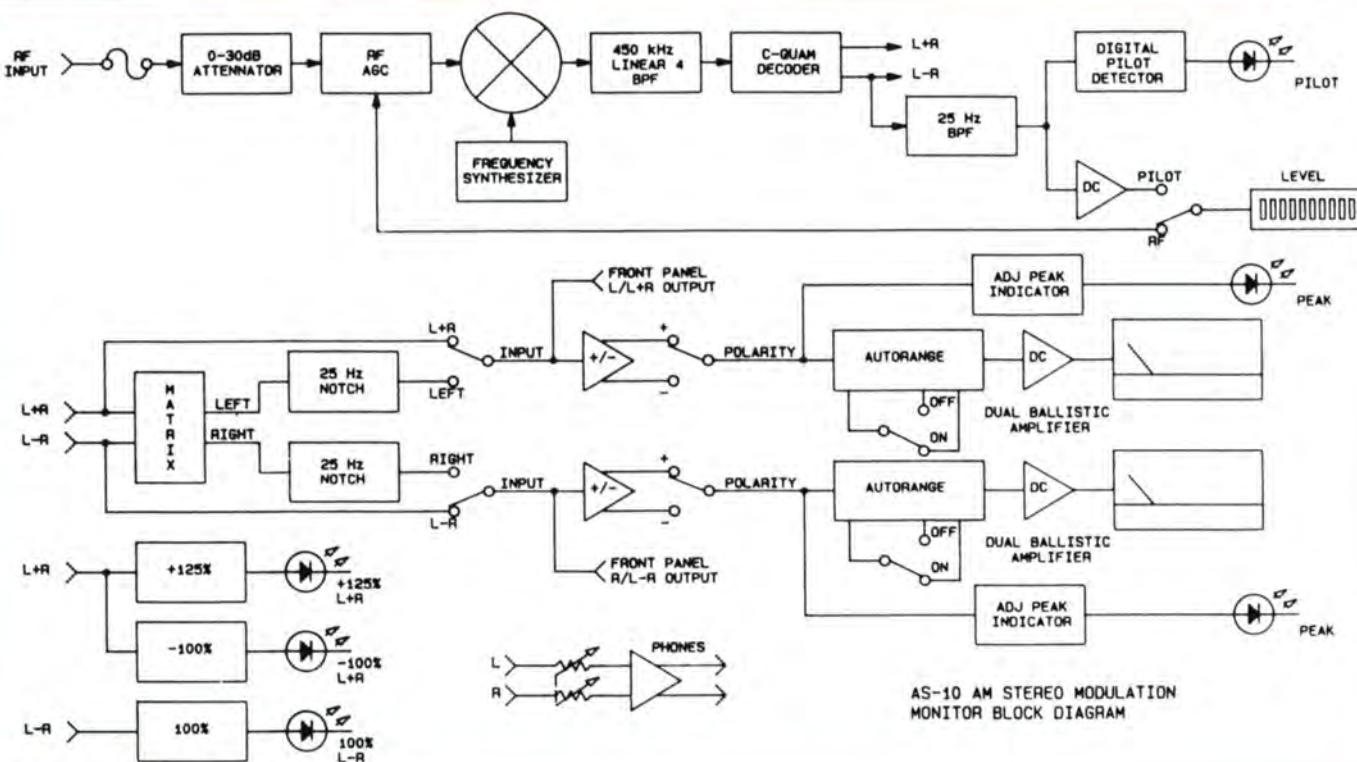
Each meter features semi-peak response on the top ranges, changing to average response on lower ranges. **This allows separation, crosstalk, and signal to noise measurements to be taken directly from the meters.**

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.



AS-10 AM STEREO MODULATION MONITOR BLOCK DIAGRAM

SPECIFICATIONS

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, $\pm 2\%$ 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.

(Pilot) .775V RMS equals 5% pilot injection. BNC connector.

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

Headphone Output:

2 watts minimum into 8 ohms impedance. Adjustable. Specifications may be changed without notice.

* C-QUAM is a registered trademark of the Motorola Corp



AS-10 Internal View

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AS-10	907-0100-000	C-QUAM® AM Stereo Modulation Monitor. 120V, 50/60 Hz
AS-10 Option	907-0100-300	Same as above, except for 220V, 50/60 Hz
	907-0104	9 kHz increment option



Model TZ-30 TV Stereo Generator

- Flat Composite Baseline Mode for Easy System Optimization.
- Baseband Amplitude and Delay Equalization to Compensate for Transmission System Deficiencies.
- Audiophile Quality Precision Encoder for TV Stereo
- Built-in Aural Deviation Calibration for Easy Set-up of Composite Level.
- Independent of Audio Processing.
- Unique *Digital Modulator* and *Digital Pilot Generator* with Crystal Controlled Sync Lock.
- Extended Frequency response (+0, -1 dB) to 15 kHz Utilizing Superior Audio Filtering.
- Utilizes GENUINE dbx® Encoder Card to Assure Correct Encoding of L-R.

Ease of installation and technical design excellence are just two of the ways in which 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 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

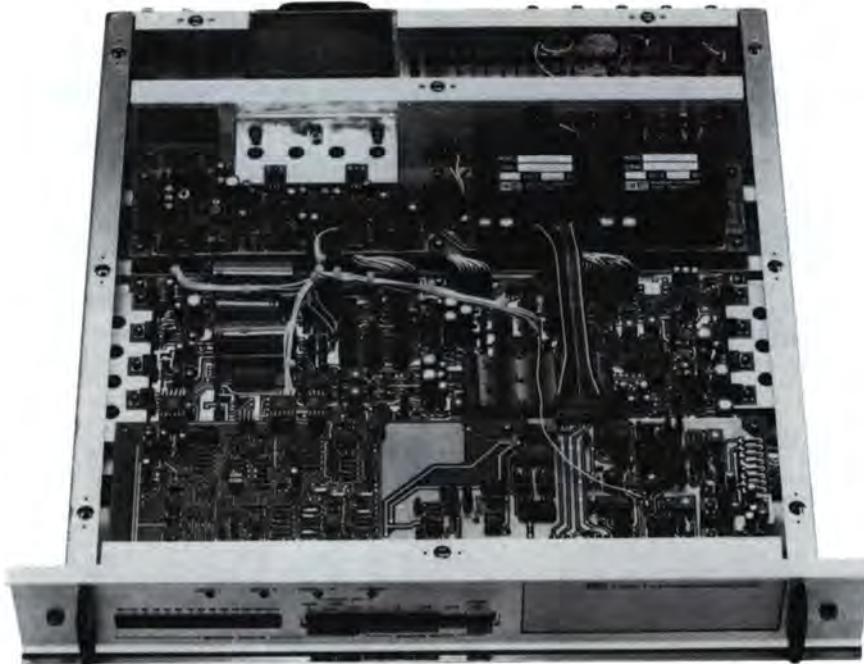
stability and a virtually perfect baseband signal. Both the pilot and the L-R subcarrier sidebands are digitally synthesized simultaneously, eliminating any phase error. Digital synthesis also eliminates the distortion products produced by the linear modulation schemes used in competitive products and 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 by Broadcast Electronics by dbx Incorporated.



TZ-30 Internal View

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 noncompanded 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.

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

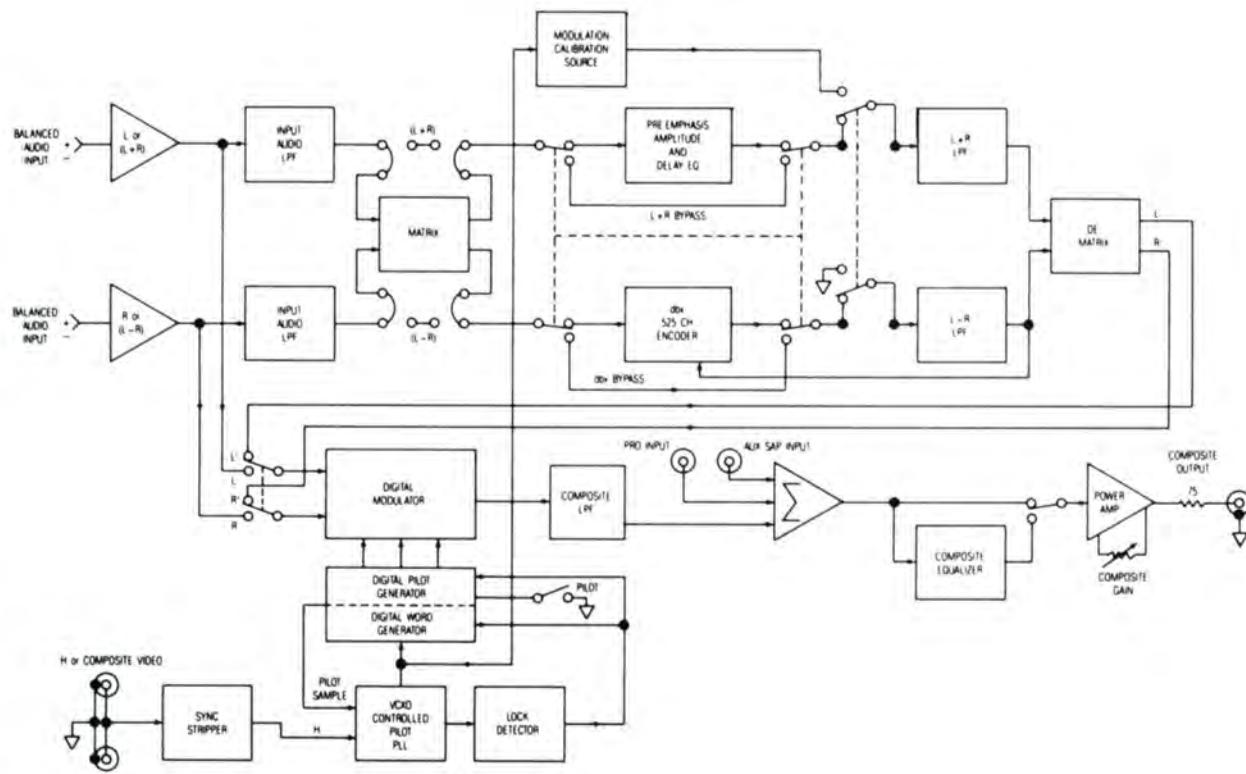
Major networks and group operators indicate that it may not be desirable to locate the audio processing at the transmitter with

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

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 dBm 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:

± 1 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 minimum 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.

dbx® is a registered trademark of dbx corporation

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.

42 dB minimum to 50 to 14,000 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

MODEL	STOCK NO.	DESCRIPTION
TZ-30	906-0030	TV Stereo Generator



TS-30

TS-30 TV SAP GENERATOR

- 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

SPECIFICATIONS

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-EFFECTS:

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 RATIO:

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 FREQUENCY STABILITY:

$\pm 0.5\%$ (± 400 Hz @ 78.67 kHz) unlocked from sync.

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

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TS-30	906-0031-000	TV SAP Second Audio Program Channel



TP-30

TP-30 TV PRO GENERATOR

- 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

SPECIFICATIONS

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 \times 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 \times 19" W \times 9" D (4.5 \times 48.3 \times 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

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TP-30	906-0032-000	TV PRO Professional Audio Program Channel



Aphex "Compellor" Compressor-Leveler-Limiter

For those who desire a completely pre-packaged TV Stereo generator/audio processing system, Broadcast Electronics offers the TZ-30/Aphex system package.

This high performance system is comprised of a TZ-30 TV Stereo Generator, an Aphex "Compellor" Compressor-Leveler-Limiter, and an Aphex "Dominator" tri-band peak processor.

The Aphex Compellor is a revolutionary audio processor. It delivers "invisible" compression, leveling, and peak limiting simultaneously! The Compellor control circuits are actually analog computers that constantly monitor the input, adapting and controlling a single VCA per channel for minimal signal path. Since the Compellor intelligently varies all parameters for you, operating controls are kept to a minimum. You need only set the input level to control the amount of processing, adjust output level, and set the balance between compression and leveling. The Compellor will then provide complete dynamic control with smooth, inaudible gain riding for consistent increased loudness—all automatically. Its unique circuitry actually enhances transient qualities, making even heavy processing undetectable.

Aphex's Dominator is designed to complement the Compellor's average level processing capability. The Dominator is a 3-band peak processor with a proprietary circuit which varies the threshold for limiting—unlike traditional "dumb over-threshold" devices. Tuneable crossover frequencies, plus high and low frequency drive controls allow you to create different effects. Limiting can be pre-shaped to match saturation characteristics for maximum S/N performance, as well as for broadcast pre-emphasis.

Because the Dominator's circuitry is intelligent, only a few basic adjustments are necessary to get the proper results. The user simply sets the calibrated output ceiling control to the level where he wants the peaks to absolutely stop (such as at 100% modulation) and sets the drive control to obtain the desired reduction.

The TZ-30/Aphex system package is shipped completely tested and ready for installation. Contact Broadcast Electronics or your Broadcast Electronics representative for more details.



Aphex "Dominator" 3-band peak processor



AN-2 STEREO SIMULATOR

The versatile sound processor designed to create a wide range of effects including convincing stereo from any mono source.

PERFORMANCE HIGHLIGHTS

- Restores natural timbre of acoustic instruments—adds warmth and reality to synthesized one.
- Simulates the sound of a spaced pair of microphones without loss of mono compatibility.
- Adds "air" and "definition" to mix, reducing the need for equalization.
- Completely mono-compatible—no fade-outs or phase problems.
- Simulates space without reverberation by using random, non-recursive filter techniques.
- Variable width control allows "spread" and "size" of image to match sound.

SPECIFICATIONS — AN-2 STEREO SIMULATOR

Input and Output Levels:
Selectable -10 or +4 dBm, electronically balanced

Frequency Response:
20 Hz to 15 kHz ±2 dB

Distortion:
0.2% THD

Dynamic Range:
90 dB

Signal to Noise Ratio:
70 dB

Power:
115/230V, 50-60 Hz, 10 watts

Dimensions:
19" wide, 1 3/4" high, 7" deep (one standard rack space)

ORDERING INFORMATION

Model	Stock No.	Description
AN-2	806-0003	Studio Technologies, Stereo Simulator for operation on (specify voltage/Hertz) 115/230 VAC, 50/60 Hz.
RCU-1	806-0012	Studio Technologies Stereo Recognition/Control Unit for operation on (specify voltage/Hertz) 115/230 VAC, 50/60 Hz. Recommended companion unit for the AN-2 simulator.

RCU-1 RECOGNITION/CONTROL UNIT

The reliable, real-time unit that precisely determines and displays the mono/stereo status of broadcast audio programming, automatically switching a stereo simulator into the on-air audio chain upon recognition of mono.

PERFORMANCE HIGHLIGHTS

- Recognizes if input signal is stereo or monaural. Circuitry compensates for phase errors and level differences.
- High performance cross-fade circuit automatically switches stereo simulator in-circuit on detection of mono. Compatible with Studio Technologies AN-2 Stereo Simulator or other manufacturers' products.
- Manual override functions using front panel controls or logic level signals from remote control equipment.
- Two auxiliary relay contacts provide contact closures on recognition of mono and simulator in-circuit conditions.

SPECIFICATIONS — RCU-1 RECOGNITION/CONTROL UNIT

Input and Output Levels:

+8 dBm

Input Impedance:

20K ohms, electronically balanced

Output Impedance:

100 ohms, electronically balanced

Output to Simulator:

Sum of left and right (L+R) line input signals

Mono Input Signals:

Mono input signal must be present on both left and right line inputs for correct recognition

Frequency Response:

10 Hz to 20 kHz, ±1 dB

Distortion:

.04% THD at max output (+22 dBm)

Signal to Noise Ratio:

80 dB

Output Signal Switching:

VCA based cross-fade circuit

Recognition Section:

Will recognize phase error of ±45 degrees @ 500 Hz, and channel level difference of 10 dB

Remote Control Inputs:

Current limited logic level

Auxiliary Relay Contacts:

Isolated, sealed, bifurcated type

Connections:

26-position screw terminal strip

Power:

115/230V, 50-60 Hz, 10 watts

Dimensions:

19" wide, 1 3/4" high, 7" deep (one standard rack space)

Specifications subject to change without notice.



TVM-210

TVM-220



Belar TVM-200 TV Stereo Modulation Monitor System

BELAR TVM-200

To provide complete monitoring of BTSC stereo transmission systems, the Belar TVM-200 TV Stereo Modulation Monitor System consists of two separate units; the TVM-210 BTSC Reference Monitor and the TVM-220 BTSC Program Monitor.

The TVM-210 is designed to operate in conjunction with the Belar TVM-100 TV Aural Monitor or other precision wide band demodulators, such as the Tektronics 1450-1. The TVM-210 may

be used separately from the TVM-220 for the set-up, test and measurement of BTSC TV Stereo transmission systems, as well as for providing accurately decoded left and right channel audio outputs.

The TVM-220, as used with the TVM-210, provides full time monitoring of L+R and composite signal modulation levels.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TVM-200	809-7026	Belar TV Stereo Modulation Monitor System (Specify channel and offset) for operation on 117/234 VAC, 60/50 Hz.

TFT MODEL 850 (photo on p. 162)

The TFT Model 850 BTSC TV Stereo Aural Modulation Monitor is fully capable of monitoring and measuring the performance characteristics of the BTSC composite signal as stated in the EIA BTSC System Multichannel Television Sound Recommended Practices. Over 20 different performance parameters can be called up for monitoring and measurement on an optional plug-in Distortion Analyzer/AC Voltmeter (TFT model 860), while modulation levels are read on two analog meters with quasi-peak ballistics. Also, digitally settable peak flashers respond to program peaks. The 850's monitoring capabilities include Total modulation, Stereo Channel modulation, Left and Right channel modulation and Peak modulation of the Total, Stereo and Main Channels.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
850	809-7022	TFT BTSC Aural Modulation Monitor (specify channel and offset) for operation on 117/234 VAC, 50/60 Hz (Specify voltage/freq.)

- Option 1 (7100-4010): AA501 Distortion Analyzer
- Option 2 (7100-4020): Remote Meter & Flasher Panel
- Option 3 (7100-4050): Spare Parts Kit

TELEMET (not shown)

The Telemet model 3713 is a comprehensive precision testing instrument for performance testing television transmissions with BTSC Multichannel Sound. It also has a built-in tester for checking its own video response. The Model 3713 is usable over a wide range of input levels from 5 millivolts to 1 volt RMS. The 3713 is supplied for any one selected channel 2 to 13 in the VHF band or 14 to 83 in the UHF band. Sound traps preceding the main IF circuit can be switched in or out.

Also available: The Telemet 4501 VHF/UHF BTSC Broadcast demodulator.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
3713-A1	806-0006	Telemet Precision Demodulator for VHF BTSC
3713-A2	806-0007	Telemet Precision Demodulator for UHF BTSC
4501-B1	806-0010	Telemet Broadcast Demodulator for VHF BTSC
4501-B2	806-0011	Telemet Broadcast Demodulator for UHF BTSC

Other BTSC monitors/demodulators available.

See current price list or contact Broadcast Electronics.



FM-601

- Independent Compression/
Expansion Control
- Advanced Audio Gating
- Single 5 1/4" Rack Package
- Mono and Stereo Models
- Modular, Front Access Plug-In Electronics
- Dolby-B Compatible

OVERMODULATION PROTECTION, PLUS FULL PROCESSING CONTROL

The Broadcast Electronics FM-600 monaural, and FM-601 stereo AGC/Limiter amplifiers allow the FM broadcaster to modulate his transmitter at the highest permissible level and to precisely control the amounts of signal compression and expansion in order to maintain a desired station "sound." These amplifiers, unlike many audio processors, do not produce an uncontrollable "sound" of their own. Instead, they permit the broadcaster to smoothly establish the sound he wishes to produce...whether it be "the loudest sound in town" or the gentle "tailoring" of classical music with wide dynamic range. And this is accomplished with no "thumps", extraneous noise or distortion.

AUDIO GATING—SMOOTH COMPRESSION AND EXPANSION CONTROL

Innovative audio-gating techniques which sample incoming program material, automatically apply signal processing only when needed.

This gated operation mode allows 50 dB of automatic level control. Individual controls establish compression over a 0 to 30 dB range and expansion, if desired, from 0 to 20 dB. These control adjustments have no effect on maximum peak output levels nor on limiter attack time. In their full-on positions output is at nearly-constant amplitude. Thus a combination of control settings,

precisely suited to individual station program material, is easily established.

SIMPLE SET-UP AND OPERATING MODE SELECTION

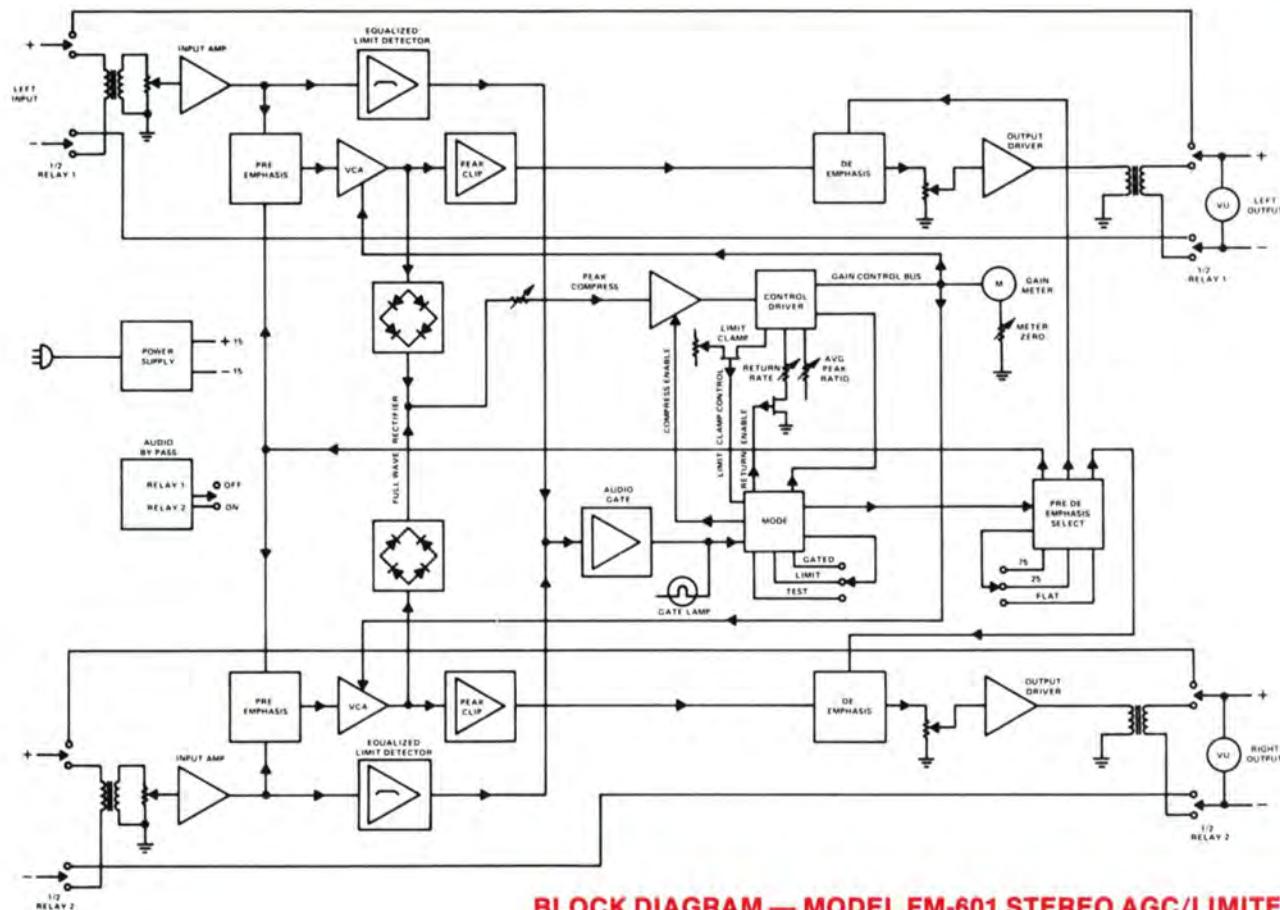
Set-up controls and operating mode switches are mounted on plug-in modules accessible behind the hinged front panel. Mode switch functions include selection of: (a) 75-microsecond pre-emphasis; (b) 25-microsecond pre-emphasis (for Dolby-B compatibility); (c) flat-frequency response; (d) test (unit operates as conventional line amplifier. Convenient for proof-of-performance measurements); (e) full gated expansion/compression; and (f) limiting only. All mode switching may be controlled remotely by switch closures to ground.

AUTOMATIC STEREO BALANCE

Precise stereo balance is insured by matched, ultra-linear, temperature-compensated voltage-controlled amplifiers.

COMPACT, SINGLE 5 1/4" RACK-MOUNTED PACKAGING

The amplifiers replace, in a single 5 1/4" rack-mount package, separate interconnected AGC and limiting amplifiers. This is done without crowding and with front access to all electronics, which are on six labelled plug-in cards. Output levels plus compression and expansion are fully metered.



BLOCK DIAGRAM — MODEL FM-601 STEREO AGC/LIMITER

SPECIFICATIONS

Input Impedance:

600 ohm, transformer balanced.

Input Level:

-20 dBm to +26 dBm for +20 dBm output (-20 dBm input yields +20 dBm output with zero compression or expansion).

Frequency Response:

±0.5 dB, 30 Hz-20 kHz (1 kHz reference).

Distortion:

0.75% or less, 30 Hz-20 kHz at +20 dBm output.

Signal-to-Noise:

60 dB or greater below +20 dBm output with -20 dBm input.

Output Impedance:

600 ohm, transformer balanced.

Output Level:

Adjustable, +20 dBm maximum.

Overall Gain:

60 dB with full expansion.

Compression Range:

0 to 30 dB.

Expansion Range:

0 to 20 dB.

Expansion Recovery Rate:

Adjustable, 5 to 40 seconds for 20 dB expansion.

Average/Peak Ratio:

Adjustable, 35 dB minimum, 1 dB maximum.

Limiter Attack Time:

5 microseconds or less for 10 dB of limiting.

Equalization:

Normal Mode: 75 microseconds, 25 microseconds, or flat response (50/25 usec or flat optional).

Test or Limit Only Modes: Flat response.

Operating Temperature Range:

0° to 55° C.

Power Requirements:

105 to 125 or 210 to 230 Vac (switchable), 50/60 Hz, 30 watts.

Dimensions:

19" Wide, 5.25" High, 10" Deep (48.3 x 13.3 x 25.4 cm)

EIA Std. Rack Mounting.

Weight (packed):

16 lbs. (7.2 kg).

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FM-600	937-0600	Mono FM AGC/Limiter w/mating 24-pin female conn.
FM-601	937-0601	Stereo FM AGC/Limiter w/mating 24-pin female conn.



CRL FM-4 Audio Processing System

CRL FM STEREO PROCESSING — MODEL FM-2 AND FM-4

Circuit Research Laboratories uses the modular, or "building block" approach to audio processing. The "two" (as in FM-2) refers to two bands; the "four" (as in FM-4) refers to four bands. The FM-2 system consists of the SPP-800, which is a dual band AGC unit and the SMP-800, which is a dual band limiter. Adding the

SEP-800 four band compressor makes it an FM-4 system. The output of both systems is pre-emphasized and filtered for pilot protection. The FM-2 system may be upgraded to an FM-4 at any time. The FM-4 is recommended for competitive situations or where more flexibility and maximum loudness are important.



CRL AM-4 AM Stereo Audio Processing System

CRL AM STEREO PROCESSING — MODEL AM-2 OR AM-4

There two versions of the Circuit Research Laboratories AM Stereo system. The two band (AM-2) system consists of the SPP-800 and the SMP-900 Stereo matrix processor. It produces a very open, pleasing sound quality at a modest price. This system

can be upgraded to the four band AM-4 system by adding the SEP-800 four band compressor between the other two units. This provides additional control and creates a very dense signal which will increase overall signal coverage.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AM-4	803-1003	AM-4 Audio Processing System, Stereo
AM-2	807-1004	AM-2 Audio Processing System, Stereo
FM-4	807-1003	FM-4 Audio Processing System, Stereo
FM-2	803-1004	FM-2 Audio Processing System, Stereo

OPTIMOD-FM MODEL 8100A

The Orban OPTIMOD-FM model 8100A is ideal for any format and is the best-sounding FM processor that Orban knows how to make. OPTIMOD-FM is a multiband compressor/limiter/stereo generator. It features selectable multiband or wideband operation plus versatile setup controls that permit precise "tuning" for different formats. The OPTIMOD-FM offers complete freedom from processing artifacts and distortion while providing optimum voice/music balance.



Model 8100A/1



Model 9100B

OPTIMOD-TV MODEL 8182A

OPTIMOD-TV has set the standard for TV audio processing, with its natural sound and its ability to handle typical television audio feeds—from master tape to live voice to 16mm optical film—smoothly and gracefully, without introducing processing artifacts. OPTIMOD-TV rides gain over a range of up to 25 dB (user adjustable), provides consistent subjective loudness from source to source, and precisely controls peak modulation levels for mono or stereo.

OPTIMOD-AM MODEL 9100B

The new OPTIMOD-AM model 9100B is already establishing itself as the processor of choice for those AM stations demanding high-quality, natural sound free from the pumpiness, grittiness and "honky" midrange colorations. The 9100B is an integrated audio processing system for AM stereo or mono, including compressor, program equalizer, multiband limiter, clipper and transmitter equalizer. The 9100B complies with the latest NRSC standards with 75 us pre-emphasis and a 10 kHz LPF.



Model 8182A

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
8100A/1	829-0056	Optimod Model 8100A Stereo Generator/Processor
8100A/ST	809-7013	Optimod studio chassis assembly to house compressor stages of Optimod FM
8100A/XT	809-7014	Optimod 6 band limiter chassis. Extends performance of the 8100A/1 system
9100B/1	809-7017	Optimod AM (mono) audio processing system
9100B/2C	809-7018	Optimod AM (stereo) audio processing system (C-QUAM)
8182A	809-7016	Optimod TV audio processing with CBS loudness controller and Hilbert clipper
8182A/ST	809-7015	8182A Accessory chassis assembly. Houses compressor and loudness control stages of Optimod TV at studio.



Model FMM-2

Model FMM-2 FM Modulation Monitor

The Belar model FMM-2 FM Modulation Monitor is a precision wideband FM monitor designed to measure the total modulation characteristics of mono as well as multi-plexed FM Transmitters. The FMM-2 is also used as a low distortion and low noise FM demodulator to drive the companion FMS-2 Stereo Monitor and SCM-1 SCA Monitor, as well as providing audio outputs for aural

monitoring and proof of performance measurements. Features include a digitally selectable peak modulation indicator, adjustable in 1% increments, built-in modulation calibrator, carrier alarms, true peak and semi-peak metering and a built-in voltmeter for AM & FM noise measurement.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FMM-2	829-0050	Belar FMM-2 FM Modulation Monitor



Model FMS-2

Model FMS-2 Stereo Modulation Monitor

The Belar model FMS-2 Stereo Modulation Monitor is designed to operate in conjunction with the Belar FMM-2 "baseband" modulation monitor. The FMS-2, besides measuring left and right modulation levels, is also used as a test instrument to ensure the proper performance of FM Stereo Transmitters. The test and measurement capability is enhanced by the integration of two independent auto-ranging voltmeters allowing automatic measure-

ment of channel separation and crosstalk, along with sub-carrier suppression and noise. Features include two independent semi-peak modulation meters for simultaneous monitoring of left and right channels, pilot alarm, switchable de-emphasis for noise measurements and a stereo separation measurement capability of over 70 db at 15 kHz.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
FMS-2	829-0049	Belar FMS-2 Stereo Modulation Monitor

Model TVM-200 TV Stereo Modulation Monitoring System

The Belar TVM-200 TV Stereo Modulation Monitoring System consists of two separate units: the TVM-210 BTSC Reference Monitor and the TVM-220 BTSC Program Monitor. (see photos and additional information on p. 155)

The TVM-210 is designed to operate in conjunction with the Belar TVM-100 TV Aural Monitor, or other precision wide band demodulators, such as the Tektronics 1450-1. The TVM-210 is used

for the set-up, test and measurement of BTSC Stereo Transmission Systems, as well as providing accurately decoded left and right channel audio outputs.

The TVM-220, as used with the TVM-210, provides full time metering and peak indication of L+R and composite signal modulation levels.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
TVM-200	809-7026	TV Stereo Modulation Monitor System (TVM-210 & TVM-220)
RFA-3	809-7029	TV RF Amplifier



SCM-1

Belar Model SCM-1 SCA Frequency and Modulation Monitor

The Belar SCM-1 SCA Frequency and Modulation Monitor, when added to the FMM-2 Modulation Monitor, provides complete monitoring and test functions for SCA storecasting, data transmission and remote telemetering applications. Up to four crystal switch positions allow four channels to be operated and tested.

Features include three deviation ranges for optimum operation on a particular subcarrier. Narrow deviation (2 kHz deviation) is for remote telemetering applications and selective call systems. Normal operation (6 kHz deviation) is for storecasting and other background programming applications; 4 kHz deviation is for simultaneous stereo operation. The discriminator is wideband for

minimum distortion. Maximum versatility is thus provided for future applications as well as present needs.

The SCM-1 features unlimited SCA frequency selection by incorporating interchangeable crystals into its unique design. Select the one to four frequencies best suited to your application and plug in the appropriate crystals. Monitor four channels by means of pushbutton selection. To test other frequencies or to change frequencies, merely plug in new crystals. The separate SCA peak flasher is independent of SCA modulation polarity. The front panel push button modulation calibrator allows the calibration accuracy to be checked at any time.

SPECIFICATIONS

MODULATION METER RANGE:

133% to -70 dB

SCA MODULATION SENSITIVITIES:

100% = 6 kHz, 4 kHz, 2 kHz deviation, switched

MAXIMUM MODULATION FREQUENCY:

5 kHz at 6 kHz deviation

SCA MODULATION CALIBRATOR:

±2 kHz

SCA SUBCARRIER:

24 kHz to 100 kHz, 4 switched crystal positions. SCA subcarrier and deviation maintained in the FCC allowable total frequency deviation

SCA INJECTION LEVEL:

133% to 5%

SCA PEAK INDICATOR:

100% = 6 kHz, 4 kHz, 2 kHz deviation, switched, independent of modulation polarity

SCA FREQUENCY METER ACCURACY:

±2 kHz

INTERNAL CROSSTALK:
SUB TO MAIN:

-66 dB

MAIN TO SUB:

Better than 50 dB

STEREO TO SUB:

Better than 50 dB

REMOTE METERING:

Both frequency meter and modulation meter may be remotely metered, 5000 ohms external loop resistance

WEIGHT:

14 lbs.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
SCM-1		SCA Frequency and Modulation Monitor
SCM-2		SCA Modulation Monitor
RFA-1	829-0034	FM RF Amplifier
MJ-10	829-0038	Yagi antenna, for use with RFA-1

TFT Model 844 FM/Stereo Modulation Monitor

Model 844

TFT Model 845 SCA Modulation Monitor

Model 845

The built-in preselector in the Model 844 FM/Stereo Modulation Monitor allows you to digitally select any two FM stations, then precisely monitor, off-air, the modulation and carrier frequency error of either one. This gives you a quick, easy way to check on how your modulation measures up to that of the other stations in your market. The Model 844 makes complete stereo measurements or right channel modulation, left channel modulation, channel separation, cross talk between main and sub-channels, L+R, L-R, 38 kHz carrier suppression and 19 kHz injection level. Measurements are selected by front-panel pushbuttons, and are read on the Modulation/Test Meter. A front panel BNC connector provides an output of the signal displayed on the Modulation/Test Meter.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
844	809-7019	TFT Model 844 FM/Stereo Modulation Monitor (Specify frequency for high level monitoring) 75 usec de-emphasis supplied standard Absence of modulation/carrier failure alarm Spare parts kit Remote meter and peak flasher panel
Option 01		
Option 02		
804		

Up to three customer-specified frequencies are selectable from the front panel of the Model 845 SCA Modulation Monitor. The Model 845 makes complete, accurate measurements of injection level, modulation, S/N ratio, crosstalk and THD (using an external analyzer). Measurement modes are selected by front panel pushbuttons. In addition, for true proof-of-performance measurements (at the transmitter), a wideband input is provided. It gives you an unrestricted bandwidth for making distortion and frequency response measurements. The high measurement accuracy of the 845 is ensured by upconverting the baseband signal to an IF frequency and extracting the SCA sub-channel through precision filters. Pushbutton selection of either ± 4 kHz or ± 6 kHz as the frequency deviation to represent 100% modulation is standard.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
845	809-7021	TFT Model 845 SCA Monitor 67 kHz supplied standard RF Module - Preselector (specify freq.)
Option 01		SCA Channel (41 kHz)
Option 02		SCA Channel (92 kHz)
Option 03		Spare parts kits
Option 04		Remote meter and peak flasher panel.

TFT Model 850 BTSC TV Stereo Aural Modulation Monitor**Model 850 features include:**

- Split-Sound and Intercarrier Modes
- dbx® Decoder or 75 usec Modes
- Four Inputs for Versatility
- Microprocessor Controlled Switching with Keyboard Command Entry
- Frequency Synthesized Modulation Calibrator with Front Panel Controls

The TFT Model 850 BTSC TV Stereo Aural Modulation Monitor is capable of monitoring and measuring the performance characteristics of the BTSC stereo composite signal as stated in the EIA BTSC System Multichannel Television Sound Recommended Practices. Over 20 different performance parameters can be called up for monitoring and measurement on an optional plug-in Distortion Analyzer/AC Voltmeter (TFT Model 860), while modulation levels are read on two analog meters with quasi-peak ballistics. Also, digitally settable peak flashers respond to program peaks.



Model 850

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
850	809-7022	TFT, BTSC Aural Modulation Monitor, Rack mount, specify channel and offset AA501 Distortion Analyzer
Option 01		Remote Meter & Flasher Panel for Model 850
Option 02		Spare Parts Kit for Basic Model 850
Option 03		Alarm and MUX board
Option 04		

Also Available: The TFT Model 851 BTSC Monitor

For those installations using a precision TV demodulator, the TFT 851 is available as a lower cost version of the model 850.

In the 851 the RF/IF connections are omitted. Connection to the demodulator is made via the model 851's composite input.

ORDERING INFORMATION - MODEL 851

MODEL	STOCK NO.	DESCRIPTION
851	809-7042	BTSC Aural modulation, monitor, Rack mount Baseband input only. Specify de-emphasis.
Option 01		Distortion Analyzer
Option 02		Remote meter and flasher panel
Option 03		Spare parts kit
Option 04		Modulation alarm with 2 MUX filters

TFT Model 855 BTSC TV SAP/PRO Monitor



Model 855

855 features include:

- Independent SAP and PRO Channel sections
- Separate meters for Modulation and Injection
- Off-Frequency LED Indicators
- Selectable Operating Modes
 - Switchable bandpass filter for operation with subcarriers individually (when performing a Proof) or with the entire composite signal
 - Switchable dbx® decoder or 75 usec de-emphasis, or flat response (15 kHz bandwidth) in SAP channel

The TFT model 855 BTSC SAP and PRO Channel Modulation Monitor was designed for those broadcasters who utilize the Second Audio Program (SAP) and/or the Professional Channel (PRO) as part of their BTSC broadcast signal. It is designed to monitor and measure SAP and PRO Channel performance characteristics. It can also be used to check the performance of SAP and PRO

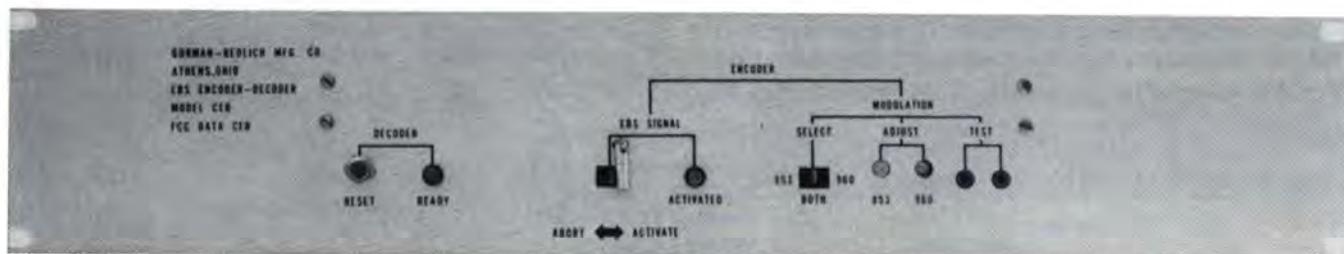
- Switchable de-emphasis (150 usec de-emphasis or flat, 6 kHz bandwidth) in Pro Channel for data or voice applications
- Peak Modulation flashers with thumbwheel switch presets
- Built-in frequency-synthesized modulation calibrator
- Demodulated signals available via front panel BNC

generators. The model 855 can accept signals from any source of BTSC composite signal consisting of SAP/PRO - such as the feed from TFT models 850 or 851 BTSC stereo monitors or other wideband audio demodulator - or can accept signals from SAP and PRO generators directly.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
855	809-7047	SAP/PRO Modulation Monitor, Rack Mount
Option 01		Remote meter and flasher panel
Option 02		Spare parts kit

dbx® is a registered trademark of dbx corporation



Gorman-Redlich Model CEB EBS Encoder/Decoder

The Gorman-Redlich Model CEB Encoder-Decoder is a complete two frequency EBS system which meets all necessary FCC requirements. The Model CEB is fully compatible with most AM or FM monitor receivers and can also be used with Gorman-Redlich monitor receivers.

The "Encoder" portion of the Model CEB counts down the 3.9 MHz crystal oscillator frequency to generate the 960 Hz and 853 Hz tones which make up the new attention signal. These are used to modulate the transmitter. The crystal is a fundamental AT-cut quartz crystal. Also available is the model CE Encoder with stereo

options.

The "Decoder" portion of the Model CEB detects the presence of the EBS attention signal at the output of the monitor receiver. (Connecting the monitor receiver to the CEB is easy.) If, and only if, the attention signal is present at the monitor receiver output, the decoder responds by closing a relay which demutes the monitor receiver and/or actuates an auxiliary alarm. The receiver can be demuted at any time by pressing a reset button. The reliability of the Decoder portion of the Model CEB is enhanced by the use of 1% tolerance capacitors and resistors.

ORDERING INFORMATION

MODEL	DESCRIPTION
CEB	EBS Encoder-Decoder
CE	EBS Encoder only
CE	EBS Encoder with stereo option
CD	EBS Decoder (required for LPTV)



Gorman-Redlich Model CRW Weather Receiver

The Gorman-Redlich Model CRW Weather Receiver is a highly sensitive and selective receiver for National Weather Service (NWS) transmissions. It's equipped with a tone decoder that processes the 1050 Hz and 1650 Hz signal tones for automatic audible and visual alarm signals in the event of emergency situations. This receiver also makes it possible to automate the recordings of weather forecasts and emergency alert messages. The Model CRW has rear terminals for remoting and a coaxial connector for external antennas.

The NWS transmits 1050 Hz for 10 seconds immediately prior to an emergency alert message such as severe storm or flood warnings and Civil Defense alerts. A 1650 Hz tone can be transmitted by NWS to signal transmission of updated forecasts.

Both the 1050 Hz and 1650 Hz tones will close a relay in the Model CRW receiver. The 1050 Hz tone will also demute the receiver, activate a flashing LED and cause the NWS audio to be gated to a pair of rear terminals which can be used for remote alarm. Continuous audio is available with another pair of rear terminals and may be used for tape recording.

The FCC has authorized AM, FM and TV stations to rebroadcast weather transmissions originated by the NWS provided that commercials in connection with the weather broadcasts do not convey an endorsement by the government.

ORDERING INFORMATION

MODEL	DESCRIPTION
CRW	Weather Radio Receiver

See current Broadcast Electronics price list or contact Broadcast Electronics for more information.



Potomac AT-51 Audio Test System



Potomac FIM-71 Field Strength Meter

POTOMAC INSTRUMENTS AT-51 AUDIO TEST SYSTEM

Consists of the AG-51 Audio Generator and the AA-51 Audio Analyzer. Measures harmonic distortion, intermodulation distortion, voltage, dB, signal + noise/noise ratio, wow and flutter, stereo phasing, and differential gain in stereo channels. Features transformerless stereo outputs (balanced or unbalanced), source resistance of 150 or 600 ohms, automatic signal leveling, precision step attenuators, RFI shielding, automatic "set level" and "balance" circuits, scope display of distortion products and output level monitor. Weight: 24 lbs. Power source: 117 V (230 V optional), 50 or 60 Hz as specified.

POTOMAC INSTRUMENTS FIM-71 FIELD STRENGTH METER

The FIM-71 Field Strength Meter is a truly portable test instrument of laboratory quality which is designed to withstand the rigors of extended field use. Combining a calibrated half-wave dipole antenna and a highly accurate tuned voltmeter with a range of 140 dB, this instrument is suitable for practically all types of RF emission measurements in the 45 MHz to 225 MHz frequency spectrum. Depending upon the characteristic of the signal to be measured, the operator can switch select wide or narrow bandwidth, peak or average value of TV or pulse modulated signals, AM or FM demodulation, and meter dynamic range of either 20 dB or 60 dB. A DC analog voltage, proportional to the meter indication, is provided for the purpose of driving a chart recorder or similar device. A leveled output from the calibrating oscillator (which is automatically tracked to the tuned frequency) is available for a variety of test purposes. The 4½ inch, taut band, mirrored scale meter is calibrated in Volts and dB for precise measurements in field or laboratory environments.

NOTE: The Model FIM-72 is also available for 460-470 MHz.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
AT-51	829-0051	Audio Test System, consists of AG-51 audio generator and AA-51 Audio Analyzer
AA-51	829-0087	Audio Analyzer Only
AG-51	829-0086	Audio Generator Only
DX-51	829-0094	Detector Attenuator for AT-51 Test Set
IX-51	829-0093	Input Transformer for AT-51 Test Set
FIM-71	809-6004	Field Strength Meter, 45-225 MHz, utilizes 10 "D" batteries (not included)
FIM-72	809-6005	Field Strength Meter, 470-460 MHz, utilizes 10 "D" batteries (not included)

(Refer to Potomac Instruments, Inc. for other options and accessories)

**BALD MOUNTAIN LABS MODEL 1760FM/AM
AUDIO STEP GENERATOR**

Nine precise crystal-controlled frequencies are instantly available for use in proof of performance measurements. Frequencies may be stepped manually or automatically, making possible one-man line checks. Features very low distortion, precision output attenuator and front panel output jack. The Model 1760FM/AM provides frequencies extending to 15 kHz for FM checks, and may be limited to 7.5 kHz for AM checks. Weight: 10 lbs. Power source: 117 V, 60 Hz (220 V, 50 Hz optional).

MODEL 781F DECIBEL METER

With the 781F Decibel Meter it is now possible to resolve either level differences, or absolute levels in 600 ohm audio circuits to one tenth of a decibel. Used as a companion unit to the Model 1760FM/AM Audio Step Generator, this instrument is useful in making audio equipment and line checks in broadcast facilities.



Model 1760FM/AM Audio Step Generator and Model 781F companion Decibel Meter.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
1760FM/AM	829-1761	Audio Step Generator, FM/AM
781F	829-0052	Decibel meter with frequency readout



Advanced Micro-Dynamics TC-8 Remote Control

Advanced Micro-Dynamics model TC-8 Remote Control System

- 8 metering channels
- 8 raise, 8 lower inputs
- One-person calibration
- Large dot-matrix display
- Radio or wire link

- 8 status inputs
- Delayed failsafe output
- Non-volatile memory
- Optional computer interface
- Space saving 1 3/4" rack units



IP-8 Interface Panel

The Advanced Micro-Dynamics TC-8 is designed to provide highly reliable remote transmitter control at a modest cost. Eight metering channels are displayed on a large, easy to read dot-matrix array. The status display provides continuous tally for eight on/off inputs.

All controls are easy for non-technical operators to learn and push button setup and calibration makes the TC-8 a pleasure to install and operate. Non-volatile memory stores all setup and calibration data for ten years without power, allowing convenient maintenance and providing orderly recovery from power outages. All inputs are filtered for excellent RF immunity. Hefty open collector outputs are protected from over-current by individual crowbar circuits.

The optional IP-8 interface panel can be conveniently located away from the unit to provide relay outputs and barrier strip connections for all outputs and status and metering inputs. With this option, the transmitter unit can be easily removed from the rack for maintenance without disturbing the individual connections.

An optional computer interface allows interconnection with several popular personal computers. This expands the capability of the TC-8 to include full screen display, automatic control functions, limits monitoring, and logging.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics.

TFT 8610/8611 Series Digital Remote Control System

- Start with 10 channels each of Raise, Lower, Telemetry and Status
- Expandable to 70 channels of Raise, Lower, Telemetry
- Expandable to 42 channels of Status and Alarm
- Built-in relays for control and telemetry interface
- Interfaces with STL, SCA, TSL and phone lines
- Complete line of accessories for transmitter and monitoring interface

The TFT 8610/8611 Series Digital Remote Control System provides an economical and versatile means of installing a remote control system of capacity suitable to your needs. Built-in relays interface with the transmitter's control and telemetry circuit for excellent ground isolation and transient protection.

Models 8610, Control Terminal, and 8611, Remote Terminal, form the heart of the system, providing 10 channels each of Raise, Lower, Telemetry and Status monitoring to provide a total of 40 functions. The model 8610 can be expanded to provide additional Raise/Lower and Telemetry channels with the addition of up to as many as three model 8631 expander units. Each model 8631 provides 20 additional channels of Raise/Lower and Telemetry for a system total of 70 Raise/Lower and Telemetry channels.



TFT 8610/8611 Series Remote Control System

Also, the model 8632/8633 Control Status Expander and Remote Status Expander add 32 channels of Status/Alarm for a total of 42 channels of Status Alarm.

ORDERING GUIDE

MODEL 8610/8611: 10 Channel RAISE/LOWER Plus 10 Channel TELEMETRY and STATUS digital remote control system. Expandable by adding Models 8631, 8632/33, to a 112 channel system. To provide digital remote control systems for AM, FM & medium size TV stations. Minimum system comprises one (1) 8610 and one (1) 8611.

MODEL 8610
(5116-8610)

Control portion only of 8610/8611 system

MODEL 8611
(5116-8611)

Remote portion only of 8610/8611 system

Option 01
(7100-2610)

Sub-carrier (SCA) Detector. Frequencies from 26 kHz to 185 kHz available. Mounts within 8610 or 8611.

Option 02
(7100-2620)

Sub-carrier (SCA) Generator. Frequencies from 26 kHz to 185 kHz available. Mounts within 8610 or 8611.

Option 03
(7100-2600)

SCA Generator/Detector in one module.

Option 07
(7100-4136)

Spare Parts Kit

MODEL 8631
(5116-8631)

Expands the RAISE/LOWER and TELEMETRY channels of the Model 8610/8611 by 20 additional channels. (to be installed at the Remote Terminal only) Up to 3 Model 8631's can be added (for 70 channels, total).

Option 01
(7100-4137)

Spare Parts Kit

MODEL 8632/8633 32 Channel Status/Alarm Expander. Provides an additional 32 channels of STATUS/ALARM to 8610/8611 system, for a total of 42 channels.

MODEL 8632
(5116-8632)

Control portion only of 8632/8633 system
(One 8633 is also required for full operation)

MODEL 8633
(5116-8633)

Remote portion only of 8632/8633 system
(One 8632 is also required for full operation)

Option 01
(7100-4138)

Spare Parts Kit



Marti STL-10/950 Transmitter and R-10/950 Receiver

MARTI STL-10/950, AM OR FM STEREO STL SYSTEM

The Marti STL-10 Studio-Transmitter Link/Intercity Relay is a line-of-sight communications system providing a high quality broadcast audio channel with two optional sub-channels. A dual link for stereo provides two identical broadcast quality channels. The STL-10 system comes complete with two STL-10/950 transmitters, two R-10/950 receivers, an HRC-10 transmitter combiner and an MTS-1 receiver combiner. The system is furnished complete with crystals and tested on final frequency.

SYSTEM SPECIFICATIONS

Freq. Range (MHz)	Transmitter	Maximum Power	Maximum Deviation	Receiver	Freq. Stab.	System Specifications			Equipment Package No.
						Frequency Response	Distortion	Noise	
800-960	STL-10/950	10 Watts	±50 kHz	R-10/950	.00025%	±0.25 dB 20-15000 Hz	0.25% or less	-75 dB or better	50, 51

APPLICATION SPECIFICATIONS

Freq. Range (MHz.)	Application	FCC Part	B.W. Each Channel	Frequency Response	System Specifications	Distortion	Noise	Channel Separation
800-960	FM Stereo STL	74	200 kHz	±0.25 dB, 20-15000 Hz	0.25% or less	-75 dB or better	75 dB	
800-960	FM Stereo STL	74	150 kHz	±0.3 dB, 20-15000 Hz	0.3% or less	-73 dB or better	73 dB	
800-960	AM Stereo STL	74	100 kHz	±0.3 dB, 20-15000 Hz	0.5% or less	-70 dB or better	70 dB	
928-960	Data or Background Music	94	100 kHz	±0.3 dB, 20-15000 Hz	0.5% or less	-70 dB or better	70 dB	
928-960	4-Channel Sat. Pgm. Feed	94	100 kHz	±0.3 dB, 20-15000 Hz	0.5% or less	-70 dB or better	70 dB	

STL Transmitters and Receivers - No Antennas
PACKAGE 50
 1 STL-10/950 transmitter
 1 R-10/950 receiver for STL

PACKAGE 51
 2 STL-10/950 transmitters
 2 R-10/950 receivers for STL
 1 HRC-10 transmitter combiner
 1 MTS-10 receiver combiner

STL Monaural Systems with Antennas
PACKAGE 50M
 1 STL-10/950 transmitter
 1 R-10/950 receiver for STL
 2 P-9A48GN-1 4' dish
 2 PG-1.5B cables
 2 L44N female connectors
 2 L44W male connectors
 2 K-1 grounding kits
*transmission line required

STL Stereo Systems with Antennas
PACKAGE 51S
 2 STL-10/950 transmitters
 2 R-10/950 receivers for STL
 1 HRC-10 transmitter combiner
 1 MTS-1 receiver combiner
 2 P-9A48GN-1 4' dish
 2 PG-1.5B cables
 2 L44N female connectors
 2 L44W male connectors
 2 K-1 grounding kits
*transmission line required

MARTI TSL SYSTEMS

Marti TSL Telemetry Links provide reliable telemetry circuits for AM, FM and television stations. Expensive and unreliable Telco lines can now be replaced with cost effective Marti TSL Systems. These links are simple to install, easy to operate and maintain. Broadcast Electronics has assembled complete Marti TSL equipment packages consisting of the Transmitter, Receiver, Station Identifier and rack shelf. The 2.5 watt transmitter (TSL-2 system) is available for solar power and other limited power source applications. The 15 watt transmitter (TSL-15 system) is recommended for use on medium to long paths having high signal attenuation.

SYSTEM SPECIFICATIONS

Frequency:
 (Group P) 450.01, 450.02, 450.98, 450.99, 455.01,
 455.02, 455.98, 455.99 MHz. FCC 74.402 (a) (7)

Modulation:
 10F3 (±1.5 kHz Deviation)

Frequency Response:
 50 Hz - 3000 Hz ±2.0 dB

Distortion:
 2% THD

Signal to Noise Ratio:
 44 dB

STATION IDENTIFIER
 A model 1300 station identifier is required by FCC rules for all domestic TSL systems to identify the TSL transmitter. Call signs for the identifier are assigned by the FCC when TSL frequencies are approved.

TSL-15 PACKAGE (15 WATTS)
 1 RPT-15/450 Transmitter
 1 CR-10/450 Receiver
 1 Model 1300 Station Identifier
 1 RMH-3B Rack Shelf

TSL-2 PACKAGE (2.5 WATTS)
 1 RPT-2/450 Transmitter
 1 CR-10/450 Receiver
 1 Model 1300 Station Identifier
 1 RMH-3 Rack Shelf

TSL ANTENNA PACKAGE
 2 DB-438 Antennas
 1 PG-2A Jumper Cable
 1 PG-2B Jumper Cable
 2 K-1 Weatherproofing Kit
 2 L44N Female Connectors
 2 L44W Male Connectors

MODEL CR-10 BASE RECEIVER

Model CR-10 is a rack-mounted VHF or UHF base station receiver designed for broadcast remote pickup service. This receiver has dual frequency capability built in. Marti technology has provided the highest frequency response with the lowest noise and distortion possible for the assigned channel band width. Special attention has been given to solving today's high interference problems. The CR-10 features a built-in test meter, squelch relay, optional DC operation, built-in sub-audible tone decoder, special noise reduction circuit, and 90 dB spurious rejection.



Model CR-10 Receiver

CR-10 SPECIFICATIONS

Frequency Range:
400-480, 280-340, 200-260 & 140-180 MHz

Dual Frequency:
Provision for Dual Frequency. Separation 2% Max.

Sensitivity:
0.5 microvolts for 20 dB S/N

Input Impedance:
50 ohms

Frequency Stability:
+.00025% -10°C to +50°C

Selectivity:

Filter	3 dB	60 kHz
F 75	75 kHz	145 kHz
F 50	50 kHz	100 kHz

F 36 35 kHz 60 kHz
F 25 25 kHz 42 kHz

Spurious Response:
-90 dB

Audio Output:
Balanced 600 ohms, +10 dBm, Barrier strip.

Subaudible Tone Decoder:
800-229 Decode Board provides relay closure upon receipt of 27 Hz tone

Front Panel Controls:
Frequency select switch, program level adjust, meter switch, squelch adjust.

Power Requirements:
120/220* VAC, 50/60 Hz, 10 Watts, 13.5V, DC 300 MA

AC Power Supply:
Precision, electronically regulated with current limiting

Metering:
RF signal level, audio output level, sub. level, +13 V, DC supply, L.O. level, mixer level, LED indicators for power and open squelch.

Dimensions:
3½" High x 19" Wide x 12" Deep.

Weight:
Net 10 lbs. Domestic packed 17 lbs.

RF Connector:
UG-58 (UHF)

*Available on 220 Vac, 50 Hz, upon request.

MARTI MODEL RPT-30 REMOTE PICKUP TRANSMITTER

- 20% more output power, 52% small, 40% lighter
- Subaudible encoder
- FM compressor-limiter

The MODEL RPT-30 is a light, compact, but powerful transmitter designed for remote pickup broadcast service. It will operate in **continuous duty** while providing **broadcast quality** audio when used with the MARTI CR-10 or AR-10 receivers. Operating from internal regulated power supply or external 11 to 13.5V. DC (negative ground) power, the RPT-30 delivers high performance in mobile, portable or fixed station applications. The RPT-30 is designed to operate with other Marti equipment to function in

- Illuminated VU meter
- Dual-frequency capability
- Four balanced microphone mixing inputs, one switchable to balanced line level

mobile repeaters, fixed automatic repeaters, base stations and transmitter to studio links (TSL). Four balanced inputs with mixing are provided. Input number four may be switched to balanced line level if desired. Other advanced features include a high performance FM compressor/limiter, subaudible encoder, dual frequency operation, illuminated meter, warning lights for antenna VSWR and temperature.

RPT-30 SPECIFICATIONS

Frequency Range and Maximum Power Output:
140-180 MHz - 45 Watts 280-340 MHz - 35 Watts
200-260 MHz - 40 Watts 400-480 MHz - 30 Watts

RF Connector:
SO-239

Operating Temp. Range:
-10°C to +45°C

Modulation (Specify):
10F3 (±1.5 kHz Deviation)
25F3 (±4 kHz Deviation)
50F3 (±8 kHz Deviation)

Channels (Frequencies):
Two frequencies selected by switch. Freq. separation 1.1% max.

Frequency Stability:
Mobile .0005% Base .00025% (above 400 MHz)

Spurious Emission:
Meets FCC Requirements

Audio Inputs:
Four Balanced microphone (150 ohm) inputs (XLR3) with mixing controls. One input switchable to balanced line level at mic. No 4 input and "D" connector on rear.

Modulation Control:
Broadcast quality Compressor/Limiter built in.

Encoding:
Subaudible tone (27 Hz) encoder built in.

Metering/Indicators:
Illuminated meter indicates audio compression, relative RF output, relative supply voltage. Flashing LED's indicate "Antenna" (VSWR) and high "Temp."

Controls:

(4) Input level, meter sw., encode sw., power sw., frequency sw., monitor jack.

Power Requirements:

110-125 V. 50-60 Hz. (220 V. 50 Hz. available on special order) DC operation on 11-13.5V negative ground.

Accessory Connector:
9 pin "D" connector for DC power, remote control, encode, line level input.

Weight:

12.4 lbs. net, 16 lbs. shipping wt.

Dimensions:

11.5 in. wide x 3.5 in. high x 13.3 in. deep

FCC ID: BEN9EZRPT30-150

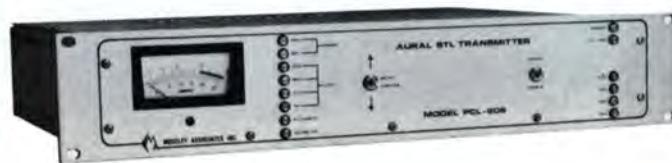
BEN9EZRPT30-450

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics for more information.



Moseley PCL-606 and PCL-606/C STL Systems



Moseley PCL-606/PCL-606/C STL System

The PCL-606 and PCL-606/C Studio-Transmitter Links provide the broadcast user with the highest quality program conveyance service currently available in equipment of this type. By the use of the latest technology available in today's market, significantly improved specifications and performance are achieved, even in areas overly congested in STL service or in areas presenting high density RF environments. The PCL-606 STL system, designed for

highest quality monaural audio service, may be used in a dual configuration for stereo service where composite stereo is not desired. The PCL-606/C STL system (the composite stereo version) conveys the composite stereo waveform with virtually no degradation, neither adding to nor taking away from the stereo waveform.

SPECIFICATIONS

FREQUENCY RANGE:

300-330 MHz, 450-470 MHz, 890-960 MHz,
1.5-1.71 GHz.

FREQUENCY RESPONSE:

Composite, ± 0.1 dB or better, 30 to 53,000 Hz.
 ± 0.3 dB or better, 53 to 73,000 Hz.

THD & IMD DISTORTION:

0.2% or less 30 to 15,000 Hz, (typically better than
0.07% at 1 kHz.)

STEREO SEPARATION:

48 dB or better, 50 to 15,000 Hz (typically 50 dB or
better)

NON-LINEAR CROSSTALK:

Subchannel to Main Channel, Narrow (Wide) IF Filter,
50 dB (54 dB) or better

NON-LINEAR CROSSTALK:

Main Channel to Subchannel, Narrow (Wide) IF Filter,
50 dB (54 dB) or better

SIGNAL-TO-NOISE RATIO:

72 dB or better (typically 75 dB) below 100%
modulation, de-modulated, de-emphasized left or
right

ORDERING INFORMATION

See current Broadcast Electronics price list
or contact Broadcast Electronics.

Moseley PCL-505 and PCL-505/C STL Systems



Moseley PCL-505/PCL-505/C STL System

The PCL-505 and PCL-505/C Studio-Transmitter Links have set performance standards for clean sound, durability and economical price. The monaural PCL-505 and the composite stereo PCL-505/C use true, direct frequency modulation for uniformly flat frequency

response over a wider range, with less distortion. Enclosed module construction reduces RFI and allows easy service access to circuit boards.

SPECIFICATIONS

FREQUENCY RANGE:

148-174 MHz, 215-240 MHz, 300-330 MHz, 450-470
MHz, 890-960 MHz.

FREQUENCY RESPONSE:

Composite, ± 0.3 dB or better 30 to 60,000 Hz
 ± 0.5 dB or better 30 to 75,000 Hz

THD AND IMD DISTORTION:

0.4% or less, 30 to 60,000 Hz

STEREO SEPARATION:

38 dB or better, 50 to 15,000 Hz

NON-LINEAR CROSSTALK:

43 dB or better, Subchannel to Main channel or
Main channel to Subchannel

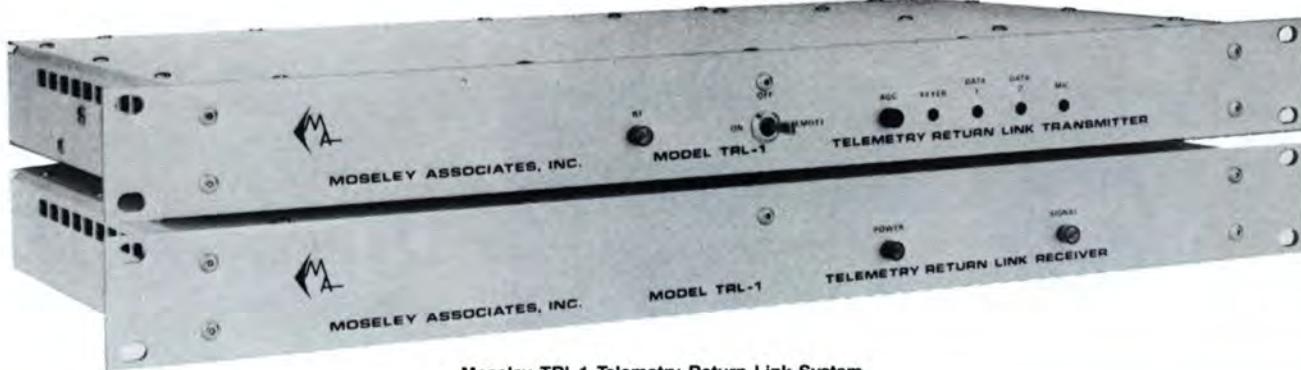
SIGNAL-TO-NOISE RATIO:

68 dB or better below 100% modulation,
demodulated, de-emphasized left or right

ORDERING INFORMATION

See current Broadcast Electronics price list
or contact Broadcast Electronics

Moseley TRL-1 Telemetry Return Link



Moseley TRL-1 Telemetry Return Link System

The Moseley TRL-1 Telemetry Return Link system gives the broadcaster an alternative to subcarriers and telephone lines for conveying control and telemetry data between the studio and transmitter locations. TRL-1 systems provide the broadcaster with independent control and telemetry circuits, while freeing the STL and program subcarrier channels for other uses. TRL-1 data transmission is extremely reliable, even over a path length of 50 miles (line of sight).

The TRL-1 system consists of a one watt transmitter and companion receiver in the 450-470 MHz range, and is type-accepted

for use on the Group P channels authorized by the FCC. Two data inputs are provided on the transmitter rear panel, with a microphone input for voice communication on the front panel. The TRL-1 receiver is supplied with two audio outputs.

An optional MCW Identifier for transmitter identification and optional transmitter battery for operation during a power failure of up to 20 minutes are available. When both options are used, the ID module identifies the transmitter continuously, providing power failure indication.

SPECIFICATIONS

FREQUENCY RANGE:

450-470 MHz
FCC Type accepted per part 74.402(a) (7),
450-456 MHz
Exact Group P frequencies: 450.01, 450.02, 455.01,
455.02, 450.98, 450.99, 455.98, 455.99 MHz

AUDIO (DATA) RESPONSE:
20 Hz to 3000 Hz, ± 3 dBDISTORTION:
3% nominal THDSIGNAL-TO-NOISE RATIO:
45 dB nominal

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics



TFT model 8600 STL System

TFT has developed the economical, yet high quality Model 8600 950 MHz STL System for single channel or dual monaural applications.

The 8600 STL transmitter incorporates a true VCO frequency modulation scheme. The output VCO (which eliminates the need for multipliers) is phase locked to an IF frequency which is modulated by the program audio. This reduces distortion and improves the signal to noise ratio. A PLL within the crystal-controlled IF oscillator ensures frequency stability. The nominal 6 watt output of the model 8600 is generated by direct amplification, instead of using antiquated varactor diode techniques. This yields greater efficiency and introduces fewer harmonics at the output.

The 8601 receiver has been designed for 100 kHz channel spacing for mono stations; it's ideal for the real world conditions of congested STL bands. Comprehensive front panel metering is included.

HOT-STANDBY SYSTEM

Consists of two Transmitters, one Transmitter Automatic Changeover Unit, and one Receiver Changeover Unit. The Transmitter Automatic Changeover Unit has a built-in coaxial changeover relay making outboard combiners unnecessary when interfacing two transmitters (one on hot-standby) to one antenna. The Receiver Changeover Unit has a built-in power combiner for interfacing with two receivers (one on hot-standby).

ORDERING INFORMATION

MODEL NO.	DESCRIPTION
8600	All solid state monaural transmitter including 39 kHz SCA generator, self contained power supply and tested to customer specified operating frequency.
8601	All solid state monaural receiver including 39 kHz SCA detector, self contained power supply and tested to customer specified frequency.
8300	All solid state composite transmitter including self contained power supply and tested to customer specified frequency.
8301	All solid state composite receiver including self contained power supply and tested to customer specified frequency.
7770	Transmitter Automatic Changeover Unit, for hot-standby use. Use with two STL transmitters. Contains coaxial changeover relay; power combiner not required. Self contained power supply.

TFT model 8600 950 MHz STL System

- Optimized for mono applications
- Efficient Spectrum Use
- True VCO frequency modulation scheme
- Direct output power amplification
- Built-in SCA generator/demodulator (39 kHz)
- Provision for phase matching between two systems for stereo
- Compatible with TFT Hot-Standby Auto Changeover Equipment

DUAL MONAURAL SYSTEMS

The 8600 series STL is ideal for dual monaural applications. (discrete stereo) Separation between operating frequencies should be at least 125 kHz. For a dual transmit/dual receive system using one antenna each at the studio and broadcast transmitter site, an STL transmitter combiner and receiver splitter are necessary and must be ordered separately.

MULTI-HOP SYSTEMS

Any of the systems shown in here can be used for conventional multi-hop STL links.

IF REPEATER

Model 8300 Transmitter and 8301 (or 8301B) Receiver can be used as a unique IF Repeater combination. Order option 22 for each 8301 Receiver and 8300 Transmitter combination used at all intermediate sites.

OTHER SYSTEMS

Broadcast Electronics can assist you with almost any conceivable variation of STL equipment, options and accessories. Please contact Broadcast Electronics for more information.

MODEL NO.	DESCRIPTION
7773	Receiver Automatic Changeover Unit for hot-standby use with two STL receivers; built-in power splitter. Unit derives DC power from STL receivers.
Option 01	Spare parts kit for 8300 Series
Option 05	Spare parts kit for 8600 Series
Option 06	Non-standard frequency for STL and TSL (Specify exact frequency required)
Option 15	Stereo decoder module for composite receivers
Option 16	Extended Baseband Response, permits composite STL to convey 92 kHz SCA channel
Option 22	IF Repeater (63 MHz) circuits installed in model 8300 STL. One (1) required for each intermediate site. Specify operating frequency for each path segment (hop).
Option 23	12 volt option for 8600 Series

Mark Antenna - Grid Parabolics

Grid Parabolic antenna

Mark Antenna offers a variety of sizes of Heli-Arc welded aluminum Multi-Element Grid Parabolas for STL, TSL and other broadcast applications in the 890 to 960 MHz frequency range. The patented grid construction is lightweight, yet extremely strong. One of the outstanding advantages of the grid antenna is its low wind loading—only 25 to 40% of comparable size solid parabolas.

Heated grid parabolas come with completely installed de-icing equipment. The lead jacketed heater cable is securely mounted to the back side of each grid element and terminated in a weather-proof cast aluminum enclosure. The thermostat is preset to activate when the temperature drops to the ice forming range. De-icing power is applied only between 25 and 35 degrees F.

Standard termination of all grid parabolas in the 890 and 960 MHz range is $\frac{1}{8}$ inch EIA swivel flange or "N" female. VSWR is 1.3:1 or better for all grid parabolas. Midband gain varies from 19.0 to 30.7 dBi depending on antenna type.

Scala Antennas

Scala FM-960, PR-450U, CA5-150 (clockwise, from upper left corner)

Scala antennas are ideal for a broad spectrum of broadcast applications, including STL and Intercity Relay Systems as well as Remote Pickup Systems. Careful attention to design and strict quality control have earned Scala a reputation for unmatched performance and reliability under conditions ranging from tropical marine to arctic environments. Internal baluns are sealed in foam to prevent moisture accumulation. Insulating materials are carefully selected for favorable high-frequency characteristics and stability under extreme temperature changes.

Scala antennas available from Broadcast Electronics include:
Model MF-960 Miniflector cylindrical grid parabolic antenna for 940 and 960 MHz with an average gain of 14 dBi. **Broadcast Electronics stock #829-0061.**

Model PR-450U Paraflector cylindrical grid parabolic antenna for 300 to 960 MHz with midband gain of approximately 17 dBi. **Broadcast Electronics stock #829-0060.**

Model CA5-150 Communications Yagi for 40 to 225 MHz with an average gain of 9 dBi. **Broadcast Electronics stock #829-0062.**

Other Scala antennas available. Contact Broadcast Electronics for details.

ORDERING INFORMATION — MARK ANTENNA

MODEL	STOCK NO.	DESCRIPTION
P-9A48G-1	809-1063	Mark parabolic 4' multi-element grid, 19.1 dBi gain, $\frac{1}{8}$ " EIA flange
P-9A72G-1	809-3015	Mark parabolic 6' multi-element grid, 22.6 dBi gain, $\frac{1}{8}$ " EIA flange
P-9A96G-1	809-3014	Mark parabolic 8' multi-element grid, 25.1 dBi gain, $\frac{1}{8}$ " EIA flange
P-9A120G-1	809-3013	Mark parabolic 10' multi-element grid, 27.0 dBi gain, $\frac{1}{8}$ " EIA flange



High-Power Rigid Line Series

Model No.	Freq. Range MHz	Power Range kW	Flg/Unflg	No. of Sockets	Scale Divisions	Element Table	Overall Length	Weight
1½" LINE 50 ohms nominal								
4712	2-1000	1/4-25	EIA Flg	Single	5/10/25	1½A	6¾" (171mm)	3 lbs (1¼kg)
4715-200	2-1000	1/4-25	EIA Flg	Double	5/10/25	1½A	6¾" (171mm)	3¼ lbs (1.4kg)
4720	2-1000	1/4-25	Unflg	Single	5/10/25	1½A	6¾" (162mm)	1¼ lbs (0.6kg)
4723-200	2-1000	1/4-25	Unflg	Double	5/10/25	1½A	6¾" (162mm)	1½ lbs (0.7kg)
4712-037	50-250	0.3-6	EIA Flg	Single	15/30/60	1½B	6¾" (171mm)	3 lbs (1¼kg)
4715-300	50-250	0.3-6	EIA Flg	Double	15/30/60	1½B	6¾" (171mm)	3¼ lbs (1.4kg)
3½" LINE 50 ohms nominal								
460	2-1000	1-100	EIA Flg	Single	5/10/25	3½A	7½" (197mm)	7 lbs (3kg)
4610-200	2-1000	1-100	EIA Flg	Double	5/10/25	3½A	7½" (179mm)	7¼ lbs (3.1kg)
4805	2-1000	1-100	Unflg	Single	5/10/25	3½A	6½" (165mm)	4 lbs (2kg)
4802-200	2-1000	1-100	Unflg	Double	5/10/25	3½A	6½" (165mm)	4¼ lbs (2.1kg)
4600-037	50-250	1½-30	EIA Flg	Single	15/30/60	3½B	7½" (179mm)	7 lbs (3kg)
4610-300	50-250	1½-30	EIA Flg	Double	15/30/60	3½B	7½" (179mm)	7¼ lbs (3.1kg)
4805-037	50-250	1½-30	Unflg	Single	15/30/60	3½B	6½" (165mm)	4 lbs (2kg)
4802-300	50-250	1½-30	Unflg	Double	15/30/60	3½B	6½" (165mm)	4¼ lbs (2.1kg)
6½" LINE 50 ohms nominal								
4902	2-1000	2½-250	EIA Flg	Single	5/10/25	6½A	107½" (260mm)	16¾ lbs (7½kg)
4905-200	2-1000	2½-250	EIA Flg	Double	5/10/25	6½A	107½" (260mm)	17 lbs (7¾kg)
4907	2-1000	2½-250	Unflg	Single	5/10/25	6½A	9½" (245mm)	12½ lbs (5½kg)
4909-200	2-1000	2½-250	Unflg	Double	5/10/25	6½A	9½" (245mm)	12¾ lbs (5¾kg)
4902-037	50-750	3-60	EIA Flg	Single	15/30/60	6½B	107½" (260mm)	16¾ lbs (7½kg)
4905-300	50-750	3-60	EIA Flg	Double	15/30/60	6½B	107½" (260mm)	17 lbs (7¾kg)
4902-080	50-750	8, 80	EIA Flg	Single	8/80	6½C	107½" (260mm)	16¾ lbs (7½kg)
4907-080	50-750	8, 80	Unflg	Single	8/80	6½C	9½" (245mm)	12½ lbs (5½kg)

See next page for plug-in element tables.

SPECIFICATIONS

SERIES 4700, 4600 & 4800, 4900

ACCURACY:

±5% of full scale

INSERTION VSWR:

1.05 max.

FINISH:

Line Section—Silverplated, Meter Housing—Light Navy grey baked enamel (MIL-E-15090)

NOMINAL SIZE:

Meter Housing 5½" × 6½" × 3¾"
(141 × 165 × 85mm)

WEIGHT:

Meter 5 lbs. (2.3kg)

ORDERING INFORMATION

See current Broadcast Electronics price list

or contact Broadcast Electronics

Plug-In Element Tables

(Elements must be calibrated with the Wattmeter to insure stated accuracy.)

Table 1½ A Standard Elements

Power Range	2-30	25-60	Frequency Bands (MHz)		200-500	400-1000
			50-125	100-250		
250 watts		250A1	250B1	250C1	250D1	250E1
500 watts		500A1	500B1	500C1	500D1	500E1
1000 watts	1000H1	1000A1	1000B1	1000C1	1000D1	1000E1
2500 watts	2500H1	2500A1	2500B1	2500C1	2500D1	2500E1
5000 watts	5000H1	5000A1	5000B1	5000C1	5000D1	5000E1
10kW	10KH1	10KA1	10KB1			
25kW	25KH1					

Table 3½ A Standard Elements

Power Range	2-30	25-60	Frequency Bands (MHz)		200-500	400-1000
			50-125	100-250		
1000 watts		1000A3	1000B3	1000C3	1000D3	1000E3
2500 watts		2500A3	2500B3	2500C3	2500D3	2500E3
5000 watts	5000H3	5000A3	5000B3	5000C3	5000D3	5000E3
10kW	10KH3	10KA3	10KB3	10KC3	10KD3	10KE3
25kW	25KH3	25KA3	25KB3	25KC3	25KD3	25KE3
50kW	50KH3	(50KA4	50KB4	50KC4)**		
100kW	100KH3					

** The special 50kW Elements inside the parentheses must be used with special line sections 4616-000, 4617-000, 4808-000, 4808-010 or 4808-020. The 50KC4 Element should not be used above rated 3½" line power of 35kW.

Table 6½ A Standard Elements

Power Range	2-30	25-60	Frequency Bands (MHz)		200-500	400-1000
			50-125	100-250		
2500 watts		2500A6	2500B6	2500C6	2500D6	2500E6
5000 watts		5000A6	5000B6	5000C6	5000D6	5000E6
10kW		10KA6	10KB6	10KC6	10KD6	10KE6
25kW	25KH6	25KA6	25KB6	25KC6	25KD6	25KE6
50kW	50KH6	50KA6	50KB6	50KC6	50KD6	50KE6
100kW	100KH6					
250kW	250KH6					

WATTCHER® RF Power Monitor/Alarm

model 3127 for rigid lines

model 3128 for cable



Installations which do not require the fast response time and the forward-power drop-off alarm of model 3171 are protected from high VSWR by WATTCHER MODELS 3127/3128.

Abnormal load conditions quickly cause transmitter shut-down, a buzzer alarm, and a change of illumination color of the reset button from green to red. Audible and visual alarms indicating system malfunction may be remote. Fail-Safe or Non-Fail-Safe Modes are switch-selectable and the Reflected Power meter-relay has a front-adjustable trip-level.

MODEL	DC cables for 3170, 3171:
3127 for rigid line	3170-058-1 14'
3128 for cables	3170-058-2 15'
3170 HighSpeed. For cables	3170-058-4 40'
3171 HighSpeed. For rigid lines	3170-058-5 50'

Note: 25 ft. DC cables supplied with all models.

Table 1½ B

Power Range	50-125MHz	100-250
300 watts	300B1	300C1
600 watts	600B1	600C1
1500 watts	1500B1	1500C1
3000 watts	3000B1	3000C1
6000 watts	6000B1	6000C1

Table 3½ B

Power Range	50-125MHz	100-250
1500 watts	1500B3	1500C3
3000 watts	3000B3	3000C3
6000 watts	6000B3	6000C3
15kW	15KB3	15KC3
30kW	30KB3	30KC3

Table 1½ B

Power Range	Frequency Bands (MHz)	470-750
	50-125	100-250
3000 watts	3000B6	3000C6
6000 watts	6000B6	6000C6
15kW	15KB6	15KC6
30kW	30KB6	30KC6
60kW	60KB6	60KC6

Table 6½ C

Power Range	Frequency Bands (MHz)	470-750
	50-125	100-250
8kW	8KB6	8KC6
80kW	80KB6	80KC6

HighSpeed Wattcher® RF Monitoring System

model 3171

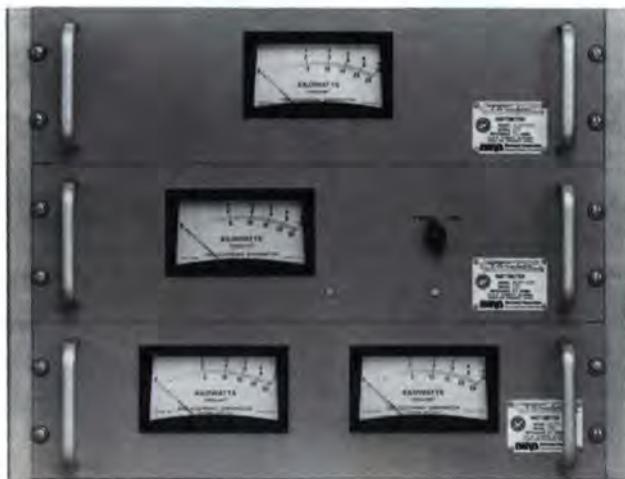


Model 3171 is a new high-speed monitoring system for remote and on-location supervision of transmitter ancillary services. The two most important features of the new design are a shortening of response time down to 200 microseconds—much faster than equipment protection requires—and remote reset capability. The series 3171 WATTCHER RF Monitoring Systems warn a remote operator 1) Of low power due to detuning, component aging, AC line difficulties (to conform with FCC part 21.107 requirements) and 2) Of high VSWR due to antenna icing, transmission or lightning. Alarm trip levels for both functions can be set from the front.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

Bird Rack-Mounted Wattmeters



SPECIFICATIONS

ASSEMBLED RACK-MOUNTED WATTMETERS

FINISH:

Line Sections—Silverplated; Panel—Light Navy grey baked enamel
(MIL-E-15090)

NOMINAL SIZE AND WEIGHT:

Panels 19" x 5 $\frac{7}{32}$ " x 4 $\frac{3}{8}$ " (483 x 133 x 111mm) 3 RU; 3 lbs. (1.4kg)

Selection guides

(For Element Tables, see previous page)

	5/10/25 scale-division meters	15/30/60 scale-division meters
for 1$\frac{5}{8}$" systems	<p>Meter: No. 3127-035</p> <p>Line Section: 4712-000 single socket 1$\frac{5}{8}$" EIA Flg or 4720-000 single socket 1$\frac{5}{8}$" Unflanged</p> <p>Element: Choose one from Table 1$\frac{5}{8}$A or</p> <p>Meter: No. 3127-055 with switch or No. 3127-040 double meters</p> <p>Line Section: 4715-000 double socket 1$\frac{5}{8}$" EIA Flg or 4723-000 double socket 1$\frac{5}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 1$\frac{5}{8}$A</p>	<p>Meter: No. 3127-070</p> <p>Line Section: 4712-000 single socket 1$\frac{5}{8}$" EIA Flg or 4720-000 single socket 1$\frac{5}{8}$" Unflanged</p> <p>Element: Choose one from Table 1$\frac{5}{8}$B or</p> <p>Meter: No. 3127-080 with switch or No. 3127-075 double meters</p> <p>Line Section: 4715-000 double socket 1$\frac{5}{8}$" EIA Flg or 4723-000 double socket 1$\frac{5}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 1$\frac{5}{8}$B</p>
for 3$\frac{1}{8}$" systems	<p>Meter: No. 3127-035</p> <p>Line Section: 4600-000 single socket 3$\frac{1}{8}$" EIA Flg or 4805-000 single socket 3$\frac{1}{8}$" Unflanged</p> <p>Element: Choose one from Table 3$\frac{1}{8}$A or</p> <p>Meter: No. 3127-055 with switch or No. 3127-040 double meters</p> <p>Line Section: 4610-000 double socket 3$\frac{1}{8}$" EIA Flg or 4802-000 double socket 3$\frac{1}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 3$\frac{1}{8}$A</p>	<p>Meter: No. 3127-070</p> <p>Line Section: 4600-000 single socket 3$\frac{1}{8}$" EIA Flg or 4805-000 single socket 3$\frac{1}{8}$" Unflanged</p> <p>Element: Choose one from Table 3$\frac{1}{8}$B or</p> <p>Meter: No. 3127-080 with switch or No. 3127-075 double meters</p> <p>Line Section: 4610-000 double socket 3$\frac{1}{8}$" EIA Flg or 4802-000 double socket 3$\frac{1}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 3$\frac{1}{8}$B</p>
for 6$\frac{1}{8}$" systems	<p>Meter: No. 3127-035</p> <p>Line Section: 4902-000 single socket 6$\frac{1}{8}$" EIA Flg or 4907-000 single socket 6$\frac{1}{8}$" Unflanged</p> <p>Element: Choose one from Table 6$\frac{1}{8}$A or</p> <p>Meter: No. 3127-055 with switch or No. 3127-040 double meters</p> <p>Line Section: 4905-000 double socket 6$\frac{1}{8}$" EIA Flg or 4909-000 double socket 6$\frac{1}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 6$\frac{1}{8}$A</p>	<p>Meter: No. 3127-070</p> <p>Line Section: 4902-000 single socket 6$\frac{1}{8}$" EIA Flg or 4907-000 single socket 6$\frac{1}{8}$" Unflanged</p> <p>Element: Choose one from Table 6$\frac{1}{8}$B or</p> <p>Meter: No. 3127-080 with switch or No. 3127-075 double meters</p> <p>Line Section: 4905-000 double socket 6$\frac{1}{8}$" EIA Flg or 4909-000 double socket 6$\frac{1}{8}$" Unflanged</p> <p>Elements: Select two in 10:1 power ratio from Table 6$\frac{1}{8}$B</p>

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

Bird Moduload® Systems 25kW — series 8645-115, -230

Moduload 8646-115 on optional Dolly 6771-011 with optional Wattmeter 4805.



SPECIFICATIONS

25kW — series 8645-115, -230

POWER RATING:
25kW continuous

FREQUENCY RANGE & VSWR:
1.1 max. 1kHz to 900MHz (dc for continuity checks)

AMBIENT TEMPERATURE RANGE:

Coolant 100% Water +5°C to +30°C. To +45°C below 20kW; Coolant 35% Ethylene Glycol -20°C to +25°C. To +35°C below 20kW

CONNECTOR:
8645 3 1/8" EIA Fl, 8646 3 1/8" Unfl

LOAD COOLANT:
9 qts. (8.5 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced air cooling

FINISH:

Light Navy grey baked enamel (MIL-E-15090)

NOMINAL SIZE:

excl. conn. 25 15/16" x 19 5/32" x 19 1/16" (659 x 487 x 497mm)

WEIGHT:

115 lbs. (70 kg)

AC POWER:

11 amps @ 115V 60Hz—Models with -115 suffix

5 1/2 amps @ 230V 50Hz—Models with -230 suffix

OPTIONAL DOLLY:
P/N 6771-011

10kW — series 8631-115, -230 (not shown)

SPECIFICATIONS

10kW — series 8631-115, -230

POWER RATING:
10kW continuous

FREQUENCY RANGE & VSWR:

1.1 max. 1kHz to 1000MHz (dc for continuity checks)

AMBIENT TEMPERATURE RANGE:

Coolant 100% Water +5°C to +45°C or 35% Ethylene Glycol -20°C to +35°C

CONNECTOR:

8635 1 1/8" EIA Fl, 8631 3 1/8" EIA Fl, 8638 3 1/8" Unfl

LOAD COOLANT:

10 pts. (4.75 liters) 100% water or 65% water/35% industrial Ethylene Glycol. With forced air cooling

FINISH:

Light Navy grey baked enamel (MIL-E-15090)

NOMINAL SIZE:

excl. conn. 22 1/8" x 15 15/16" x 15 13/16" (562 x 405 x 402mm)

WEIGHT:

110 lbs. (50 kg)

AC POWER:

9 1/2 amps @ 115V 60Hz—Models with -115 suffix

4 3/4 amps @ 230V 50Hz—Models with -230 suffix

OPTIONAL DOLLY:
P/N 6771-011

Direct Water-Cooled Loads 50kW — models 8775, 8776

SPECIFICATIONS

25kW — Econoload® models 8775/6

POWER RATING:
50 kW continuous

FREQUENCY RANGE & VSWR:

1.1 max. 1kHz to 900MHz (dc for continuity checks)

WATER TEMPERATURE RANGE:

+5°C to +60°C

WATER FLOW RATE:

9 to 11 gals./min.
(34.1 to 41.7 liters/min.)

CONNECTOR:

8775 3 1/8" EIA Fl, 8776 3 1/8" Unfl Waterlines 1/2" FPT or 3/4" hose

LOAD COOLANT:

Potable water

OPERATING POSITION:

Any

FINISH:

Semi-Gloss black enamel

NOMINAL SIZE:

19 1/2" x 3 1/2" dia. (495 x 90mm). Input Fig. 5 13/16" dia. (132mm)

WEIGHT:

8775 13 lbs. (5.9kg), 8776 12 1/2 lbs. (5.7kg)



40kW — models 8765, 8766



SPECIFICATIONS

40kW — Econoload® models 8765/6

POWER RATING:
40 kW continuous

FREQUENCY RANGE & VSWR:

1.1 max. 1kHz to 900MHz
(dc for continuity checks)

Shown with optional caloriometer

WATER TEMPERATURE RANGE:

+5°C to +60°C

WATER FLOW RATE:

8 to 10 gals./min. (30.3 to 37.9 liters/min.)

CONNECTOR:

8765 3 1/8" EIA Fl, 8766 3 1/8" Unfl Waterlines 1/2" FPT or 3/4" hose

LOAD COOLANT:

Potable water

OPERATING POSITION:

Any

FINISH:

Semi-Gloss black enamel

NOMINAL SIZE:

19 1/2" x 3 1/2" dia. (495 x 90mm). Input Fig. 5 13/16" dia. (132mm)

WEIGHT:

8755 13 lbs. (5.9kg), 8756 12 1/2 lbs. (5.7kg)

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

Electro Impulse Dry, Forced Air Cooled Loads

DPTC-25KFM
Formerly DPTC-20KFM



25KW

Electro Impulse model DPTC-25KFM

DRY, FORCED AIR COOLED

FREQUENCY:
DC - 110 MHz

VSWR:

1.15:1
Useable to 200 MHz — consult factory

POWER:
25,000 watts continuous

AMBIENT:
-40 to +45°C

INPUT:
3½" EIA

WEIGHT:
100 pounds

OP. POSITION:
Upright

FINISH:
White Enamel

AIR FLOW:
1000 CFM
Interlocked for line power, air flow, and over temperature

AC REQUIRED:
115VAC 8A 60Hz (50 Hz available optional)
Reject load option available.

DPTC-50KFM



55KW

Electro Impulse model DPTC-50KFM

DRY, FORCED AIR COOLED

FREQUENCY:
DC - 110 MHz

VSWR:

1.15:1
Useable to 200 MHz — consult factory

POWER:
55 kW continuous

AMBIENT:
-40 to +45°C

INPUT:
3½"

WEIGHT:
120 pounds

OP. POSITION:
Upright

FINISH:
White Enamel

AIR FLOW:
3600 CFM
Interlocked for line power, air flow, and overtemperature

AC POWER:
220VAC 7A 60Hz (50 Hz available optional)
Reject load option available.

ORDERING INFORMATION

See current price list or contact Broadcast Electronics. Other Electro Impulse loads available.

Altronic Research Dry, Forced Air Cooled Loads

Series 6725



Altronic Research series 6725

POWER RATING:
25 kW continuous duty

USEFUL FREQUENCY RANGE:
DC to 250 MHz

INPUT CONNECTOR:
3½" EIA Flange or 3½" Unflanged

IMPEDANCE:
50 ohm nominal

DIMENSIONS:
19" x 19" x 76"H (483 x 483 x 1930 cm)

WEIGHT:
136 lbs. (61.20 kg)

FINISH:
Beige Epoxy Splatter

AC POWER REQUIRED:
115VAC/60 Hz 7.5A
230VAC/50-60 Hz 5A

Also available: Series 5825 (25 kW) and Series 5850 (50 kW) self-contained heat exchanger RF loads.

ORDERING INFORMATION

See current price list or contact Broadcast Electronics. Other Altronic loads available.

Phasemaster® T-Series Rotary Phase Converter



The Phasemaster T-Series Rotary Phase Converter from Kay Industries is specifically designed for use with all types of broadcast transmitters. It converts single-phase power to 3-phase in locations that are not economically served by 3-phase lines.

Phasemaster is ideal for situations where the cost of installing utility supplied 3-phase power is prohibitive. A Phasemaster Rotary Phase Converter can be put in place for a fraction of the cost of obtaining 3-phase utility lines.

The utilities frequently use open delta lines to reduce distribution costs. However, the lack of a third transformer allows the line voltage to fluctuate excessively across the open leg, a condition that is unacceptable for broadcast use. With the Phasemaster in operation, the open delta is closed, eliminating the undesirable fluctuations and providing regulation of all three lines.

The Phasemaster is low in initial cost, high in performance and has a proven record of over 15 years of commercial broadcast

- Voltage produced through Phasemaster is regulated within a range of 2-5% of the single phase primary electrical supply.
- Output wave forms and phasing are nearly identical to utility supplied 3-phase.
- The converter has the ability to buffer line transients and voltage spikes.
- Integral lightning protection adds to operating reliability.
- Systems are available to accommodate dual power output ratings. Automatic high/low power switching also available.
- Phasemaster is designed to operate indefinitely on a continuous, 24 hour a day basis, with or without a load, without injury to the converter.
- Remote control capability
- Operating cost savings by taking advantage of lower kilowatt-hour rate structures.

service. Phasemaster has been sized and tested for compatibility with virtually any commercial transmitter.

To assure proper sizing by the factory, the following information is required:

Transmitter Type (AM, FM, radio, TV) and Manufacturer
Model Number

kW Rating

Operating voltage and elevation

Input power consumption at full rated output (FM)

Input power consumption at actual operating power (FM)

Input power consumption at average and 100% modulation (AM)

REFER ALL OPEN-DELTA SIZING APPLICATIONS TO FACTORY

See current Broadcast Electronics price list or contact Broadcast Electronics for full details.

Model		T-1300	T-2000	T-2500	T-4000	T-5000	T-7500	T-8000	T-10000	T-12000	T-14000
Max. Current	Amps	14.0	18	25	40	48	65	75	95	115	135
Length	Inches	14.81	15.17	16.67	19.68	20.56	22.06	22.32	23.32	24.68	26.18
Width	Inches	15.09	16.72	16.72	19.00	22.06	22.06	23.66	23.66	25.81	29.96
Height	Inches	17.00	20.06	22.06	25.88	27.88	27.88	29.69	29.69	33.50	33.50
Shipping Weight	Pounds	145	190	227	365	430	497	640	788	905	950
Shipping Dim. (inches)	Height	28	28	28	37.5	37.5	37.5	40.5	40.5	40.5	40.5
Dim. (inches)	L × W	18×22	18×22	18×22	24.5×24.5	24.5×24.5	24.5×24.5	26.5×26.5	26.5×26.5	26.5×26.5	26.5×26.5

Comark Coaxial Switches

Comark motorized coaxial switches are designed with replaceable watchband spring contact assemblies for all electrical connections. Three separate watchband springs are used for each inner conductor assuring trouble-free operation. To simplify maintenance and inspection, the follower flange can be removed. This provides easy access to the inner conductor without total disassembly.

Low VSWR and low insertion loss combined with maximum isolation have made Comark coaxial switches the ideal instrument for routing RF, especially in remote applications. A switch control panel is available for remote control of up to 3 switches. It is compact (fits in a standard 19" rack) and easy to operate. Switching may be set in pre-determined patterns to control RF drive into the system with a multiplex button operation.

ORDERING INFORMATION

MODEL	DESCRIPTION — MOTORIZED COAXIAL SWITCHES
CSW-158	1 $\frac{1}{8}$ ", 4 port, EIA flange
CSW-158U	1 $\frac{1}{8}$ ", 4 port, unflanged
CSW-318	3 $\frac{1}{8}$ ", 4 port, EIA flange
CSW-318U	3 $\frac{1}{8}$ ", 4 port, unflanged
CSW-416	4 $\frac{1}{16}$ ", 4 port, EIA flange
CSW-416U	4 $\frac{1}{16}$ ", 4 port, unflanged
CSW-618	6 $\frac{1}{8}$ ", 4 port, EIA flange
CSW-618U	6 $\frac{1}{8}$ ", 4 port, unflanged

SWITCH CONTROL PANELS

SCP-1	One switch
SCP-3	Three switches

Other Comark switches available. Contact Broadcast Electronics for more information.



Comark Motorized Coaxial Switches



Dielectric A-50000 Series Motorized Coaxial Switches

Dielectric RF Coaxial Switches

A-50000 SERIES MOTORIZED SWITCHES - 1 $\frac{1}{8}$ ", 3 $\frac{1}{8}$ ", 4 $\frac{1}{16}$ "

The A-50000 Series are motorized blade type (with silver plated contacts) coaxial SPDT or 4 port transfer switches. Reliable design and construction allow as many as 100,000 cycles without damage.

Switch position is indicated by a mechanical pointer and through auxiliary switches. The auxiliary switches are for readout and interlocking circuits. In the closing mode, the interlock switches do not activate until the RF contacts are ready to accept full power. In the opening mode, the interlock switches open prior to the RF contacts to prevent the breaking of the RF contacts while under power.

Manual operation is provided by a knob. Terminations are standard EIA fixed flanges with non-removable male inner conductor connectors. Adaptors are available for mating with other types of terminations. Optional control panels are also available.

ORDERING INFORMATION

MODEL	DESCRIPTION — MOTORIZED COAXIAL SWITCHES
A 50000-200	1 $\frac{1}{8}$ ", 4 port, EIA flange
A 50000-300	3 $\frac{1}{8}$ ", 4 port, EIA flange
A 50000-400	4 $\frac{1}{16}$ ", 4 port, EIA flange

Other Dielectric switches available. Contact Broadcast Electronics for more information.



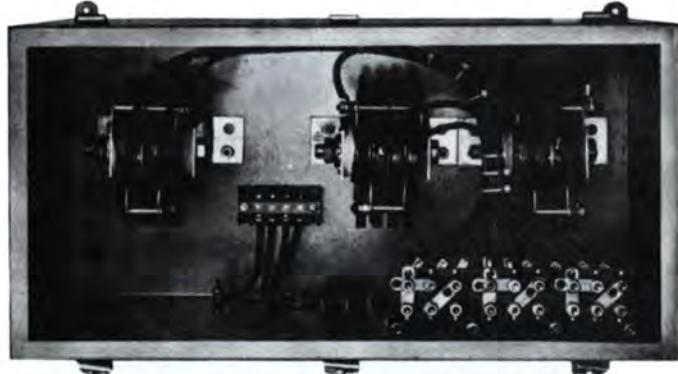
LEA Dynatech Heavy Duty Surge Eliminator

LEA Dynatech Surge Eliminators

With an LEA Surge Eliminator properly installed, your equipment will enjoy absolute surge protection. The SE will intercept and dissipate at least 99% of all potential lightning-induced surges without damage to either itself or your equipment, and without interrupting service. Should you experience a rare surge that exceeds the SE's design limit, the surge fuse will open to prevent damage to the SE or your equipment.

The Surge Eliminator's response is nearly instantaneous, reacting to surges within 5 nanoseconds or less. This is quick enough to intercept all the unwanted energy that exceeds the threshold level. During and after the surge, normal power flows uninterrupted, and remains within the accepted voltage range. It is not necessary to reset any breaker or switch. In the rare instance of a surge fuse opening, the fuse itself can be quickly replaced.

Contact Broadcast Electronics for more information on the complete line of LEA Dynatech Surge Eliminators.



Eagle Hill Surge Suppressor

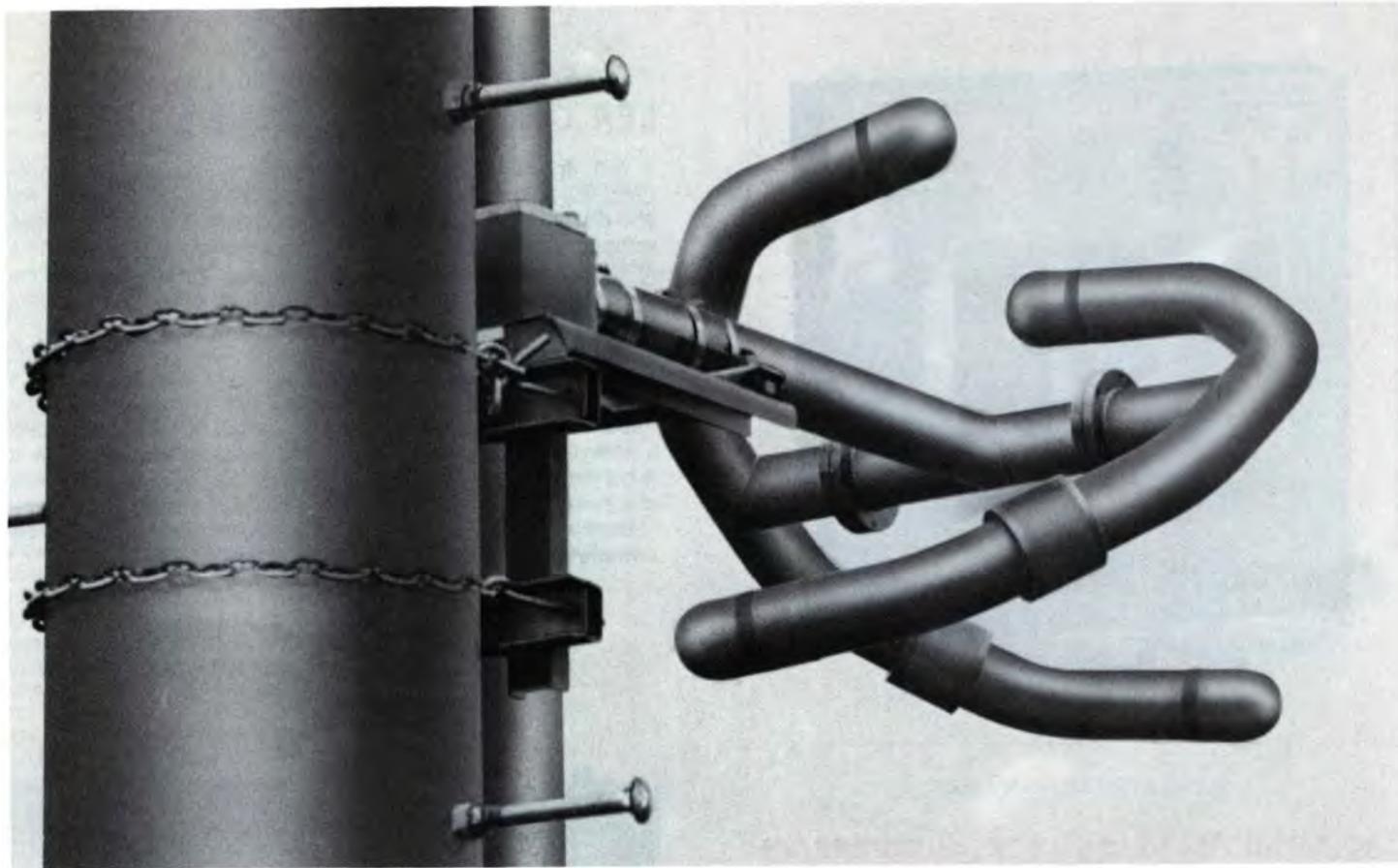
SPECIFICATIONS

MODEL	M220	M240	M460
VOLTAGE	208/240	208/240	380/340
SURGE DISSIPATION	180,000 W/sec	270,000 W/sec	270,000 W/sec
POWER CONSUMPTION	40 W/phase	40 W/phase	40 W/phase
TYPE SERVICE	Single phase	Single or 3 phase	Single or 3 phase
SIZE	10" x 10" x 24"	12" x 12" x 24"	12" x 12" x 24"
WEIGHT	45 lbs.	45 lbs.	55 lbs.
ENCLOSURE	NEMA	JIC Std.	JIC Std.

ORDERING INFORMATION

MODEL	STOCK NO.	DESCRIPTION
M220	809-5000	AC Line Surge Suppressor for single phase 208-240 VAC balanced three wire main power
M240	809-5001	AC Line Surge Suppressor for 3 phase 208-240 VAC any type of service
M460	809-5002	AC Line Surge Suppressor for 3 phase power mains 380-480 VAC.

Other models available. Contact Broadcast Electronics for more information.



Model BESP

Broadcast Electronics model BESP - Super-Power, Circularly Polarized FM Antenna

- High input power rating for maximum design flexibility
- Supports multi-station operation
- Superior bandwidth characteristics for minimal VSWR related signal loss
- Internal feed point design reduces weather related VSWR problems
- Durable, corrosion resistant construction (Brass elements, stainless steel supports)
- A variety of models available to meet virtually any requirement

You can count on years of rugged performance with the Broadcast Electronics model BESP circularly polarized FM antennas.

RADIATING ELEMENT

All BESP antennas feature a brass radiating element with an outside diameter of 3 $\frac{1}{8}$ inches. The feed point is internal, well shielded from the effects of weather. Each model BESP element is rated at 40 kW, with the exception of the "A" series end fed 1 and 2 bay antennas and the center fed 2 bay antennas which are rated at 32 and 39 kW respectively. The actual element ratings are limited only by the power handling capability of the 3 $\frac{1}{8}$ " rigid coaxial line.

BANDWIDTH

BESP antennas offer a low VSWR of 1.07:1 or less, ± 200 kHz on any FM channel with field trimming. Without field trimming, the VSWR at the input is typically 1.2:1 or less when the antenna

is pole mounted on the top of a tower, rising slightly to 1.5:1 or less when side mounted.

The BESP's are ideal for common antenna, multi-station operation due to their superior bandwidth characteristics. Broadcast Electronics can supply all of the necessary filtering components for these types of diplex or multiplex systems. Stations having a frequency separation of at least 4 MHz can be diplexed on a common BESP antenna. (If both transmitters are operating at the 40 kW level, a minimum frequency separation of 1.2 MHz is best to avoid over-heating the filter components.) Multi-station operation may require a multiple slug tuning system.

CIRCULARITY

When a BESP antenna is pole mounted at the top of a tower, the horizontally polarized radiation pattern is omni-directional. Circularity is usually ± 2 db when the antenna is mounted on a 14" diameter steel pole. If the antenna is side mounted, the supporting structure will have a slight effect on the radiation pattern.

DE-ICING

The BESP antennas have been designed to function without the need for de-icers or radomes in environments where the antennas do not accumulate more than a half inch of ice at any given time. Assuming that the normal VSWR is 1.1:1 or less, a half inch of ice should not increase the VSWR beyond 1.5:1. However, if the antennas will be used in heavy icing environments, we recommend the use of optional BESP radomes or electrical element de-icers.

AVAILABLE MODELS

There are three versions of the BESP available. The "A" version uses a 3½" element feed system and 3½" interbay line. It is available in 3½" end fed, 3½" center fed, and 6½" center fed models. Arrays of up to 16 bays can be assembled.

The BESP "B" version uses a 4½" element feed stem and a 4½" rigid interbay line. It is available in either 6½" end fed or 6½" center fed models in arrays of up to 12 bays.

The BESP "C" version utilizes a 4½" element feed stem and a 6½" rigid interbay line with 6½" end feed. "C" version antennas are available in arrays of up to 6 bays.

Each BESP antenna is supplied with a six foot input transformer. The input is 50 ohm EIA with either a 3½" or a 6½" flange depending on the model type. All antennas are assembled at the factory and pre-tuned to the desired frequency. A thorough pressure test is also performed to ensure that the antenna is free of leaks.

"A" Model, 3½" Interbay Line, 3½" Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² CAPABILITY	CALCU-LATED WT. [LBS]	CALCU-LATED WIND-LOAD [LBS]
	POWER	dB				
BESP-1AE	0.4611	-3.3623	3½"	32 kW	114	137
BESP-2AE	0.9971	-0.0128	3½"	32 kW	225	304
BESP-2AC	0.9971	-0.0128	3½"	39 kW	250	319
BESP-2AC6	0.9971	-0.0128	6½"	64 kW	301	421
BESP-3AE	1.5588	1.9278	3½"	32 kW	336	470
BESP-4AE	2.1332	3.2903	3½"	32 kW	447	637
BESP-4AC	2.1332	3.2903	3½"	39 kW	472	652
BESP-4AC6	2.1332	3.2903	6½"	64 kW	523	758
BESP-5AE	2.7154	4.3384	3½"	32 kW	558	804
BESP-6AE	3.3028	5.1888	3½"	32 kW	669	971
BESP-6AC	3.3028	5.1888	3½"	39 kW	694	986
BESP-6AC6	3.3028	5.1888	6½"	64 kW	745	1096
BESP-7AE	3.8935	5.9034	3½"	32 kW	780	1138
BESP-8AE	4.4872	6.5197	3½"	32 kW	891	1305
BESP-8AC	4.4872	6.5197	3½"	39 kW	916	1320
BESP-8AC6	4.4872	6.5197	6½"	64 kW	967	1433
BESP-10AC	5.6800	7.5435	3½"	39 kW	1138	1653
BESP-10AC6	5.6800	7.5435	6½"	64 kW	1189	1770
BESP-12AC	6.8781	8.3747	3½"	39 kW	1360	1987
BESP-12AC6	6.8781	8.3747	6½"	64 kW	1411	2108

MOUNTING

Stainless steel mounting brackets and associated hardware are supplied with each antenna for mounting on standard poles or towers. Brackets for mounting on tapered towers are also available.

DIMENSIONS

BESP antenna elements are approximately 47½ inches long and 30 inches high. Weight is approximately 57 pounds per element including the line block.

OPTIONAL EQUIPMENT

- DC shorting stub for additional lightning protection
- Mounting brackets for special tower configurations
- Radomes and electrical de-icers

"B" Model, 4½" Interbay Line, 4½" Element Stem

TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² CAPABILITY	CALCU-LATED WT. [LBS]	CALCU-LATED WIND-LOAD [LBS]
	POWER	dB				
BESP-1BE	0.4611	-3.3623	6½"	40 kW	159	201
BESP-2BE	0.9971	-0.0128	6½"	56 kW	297	407
BESP-2BC	0.9971	-0.0128	6½"	80 kW	336	468
BESP-3BE	1.5888	1.9278	6½"	56 kW	435	613
BESP-4BE	2.1332	3.2903	6½"	56 kW	573	818
BESP-4BC	2.1332	3.2903	6½"	112 kW	612	879
BESP-5BE	2.7154	4.3384	6½"	56 kW	711	1024
BESP-6BE	3.3028	5.1888	6½"	56 kW	849	1229
BESP-6BC	3.3028	5.1888	6½"	112 kW	888	1290
BESP-7BE	3.8935	5.9034	6½"	56 kW	987	1435
BESP-8BE	4.4872	6.5197	6½"	56 kW	1125	1641
BESP-8BC	4.4872	6.5197	6½"	112 kW	1164	1702
BESP-10BC	5.6800	7.5435	6½"	112 kW	1440	2113
BESP-12BC	6.8781	8.3747	6½"	112 kW	1716	2524

"C" Model, 6½" Interbay Line, 4½" Element Stem

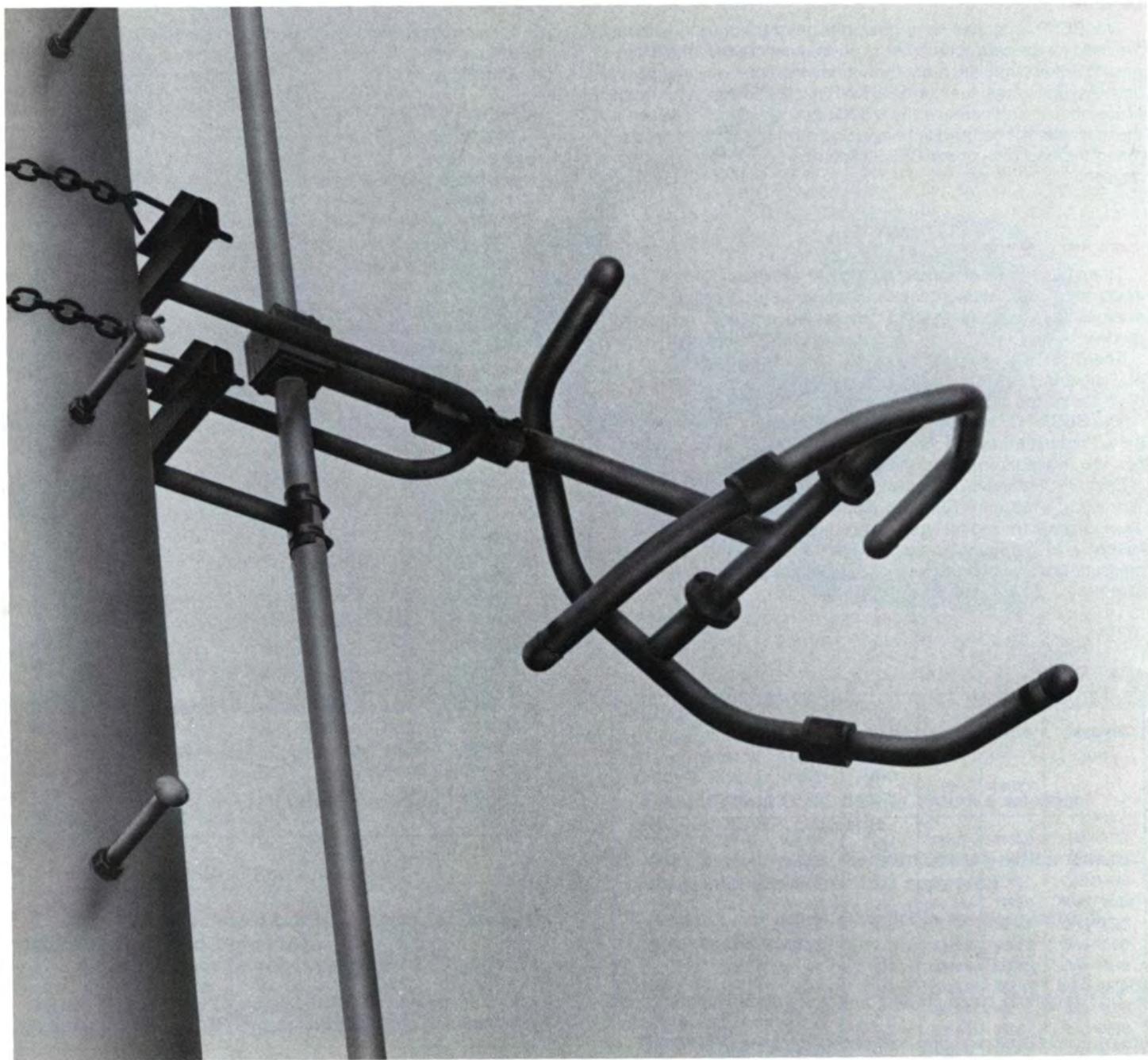
TYPE NO.	POWER GAIN ¹		FEMALE 50 OHM INPUT	POWER ² CAPABILITY	CALCU-LATED WT. [LBS]	CALCU-LATED WIND-LOAD [LBS]
	POWER	dB				
BESP-1CE	0.4611	-3.3623	6½"	40 kW	205	260
BESP-2CE	0.9971	-0.0128	6½"	80 kW	410	520
BESP-3CE	1.5888	1.9278	6½"	120 kW	615	780
BESP-4CE	2.1332	3.2903	6½"	120 kW	820	1040
BESP-5CE	2.7154	4.3384	6½"	120 kW	1025	1300
BESP-6CE	3.3028	5.1888	6½"	120 kW	1230	1560

FOOTNOTES - (Apply to all models)

1. Horizontal and vertical power gain are the same. 2. Power input capability to 2,000 ft. above mean sea level. Derating required above 2,000 ft. 3. Windload based on 50/33 PSF, 112 m.p.h. actual wind velocity. NOTE: Brackets included in weight and windload calculations.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics.



Model BEMP

Broadcast Electronics Model BEMP - Medium Power Circularly Polarized FM Antenna

- Superior design flexibility with a high input power rating
- Durable construction
- Broad bandwidth to minimize VSWR related signal problems
- Special pattern optimization available

Broadcast Electronics' model BEMP antennas offer the same quality construction and design as the BESP antennas. These medium power antennas are designed for years of reliable, trouble-free service.

RADIATING ELEMENT

All BEMP radiating elements are constructed of tubular brass with an outside diameter of 1 $\frac{3}{4}$ inches. The feedpoint is internally mounted and pressurized to prevent corrosion.

AVAILABLE MODELS

The BEMP is available in two versions. The "E" version is an end fed model that is mounted on $1\frac{5}{8}$ ", 50 ohm rigid line. The "C" version is center fed using $3\frac{1}{8}$ ", 50 ohm rigid line. The end fed models feature a conservatively rated power input capability of 9 kW. The center fed models have a power input capability of 12 kW with the $3\frac{1}{8}$ " inch input feed. Each BEMP antenna comes with a 6 foot input transformer. The antenna feed point is 6 feet below the bottom bay for end fed models and approximately 6 feet below the center for center fed models. The input is a standard $1\frac{5}{8}$ " EIA female flange for end fed models and a $3\frac{1}{8}$ " EIA female flange for center fed models.

RADIATION PATTERN

Antenna pattern measurement and optimization is available upon request at additional cost.

BANDWIDTH

BEMP antennas feature a typical VSWR of 1.1:1 or less, ± 200 kHz with field trimming. VSWR at the input (without trimming) is 1.2:1 when the antenna is pole mounted on the top of a tower. In side mounting applications, the VSWR is typically 1.5:1 without field trimming.

CIRCULARITY

When a BEMP antenna is mounted on a 14" diameter steel pole, the horizontally polarized radiation pattern is omnidirectional and circularity is typically ± 2 dB. When the antenna is side

mounted, the resulting pattern will be affected by the surrounding structures.

DE-ICING

In applications where accumulation of radial ice does not exceed $1\frac{1}{2}$ " thickness, antennas de-icers and radomes are usually not required. Under these conditions the VSWR is typically does not rise above 1.5:1, assuming a normal VSWR of 1.1:1. In heavier icing environments, optional BEMP radomes and electrical de-icers are recommended.

CONSTRUCTION

All BEMP antennas employ brass tubular construction in the radiating element and support stem. As a result, they can tolerate a variety of weather extremes including wind velocities of up to 150 miles per hour.

Each antenna is completely assembled and pre-tuned to the desired frequency prior to shipment. A pressure test is also performed to check for leakage.

Stainless steel mounting brackets are supplied for uniform cross section towers having face dimensions of 4 feet or less. Optional brackets are also available for mounting the antenna on tapered towers.

BEMP Options:

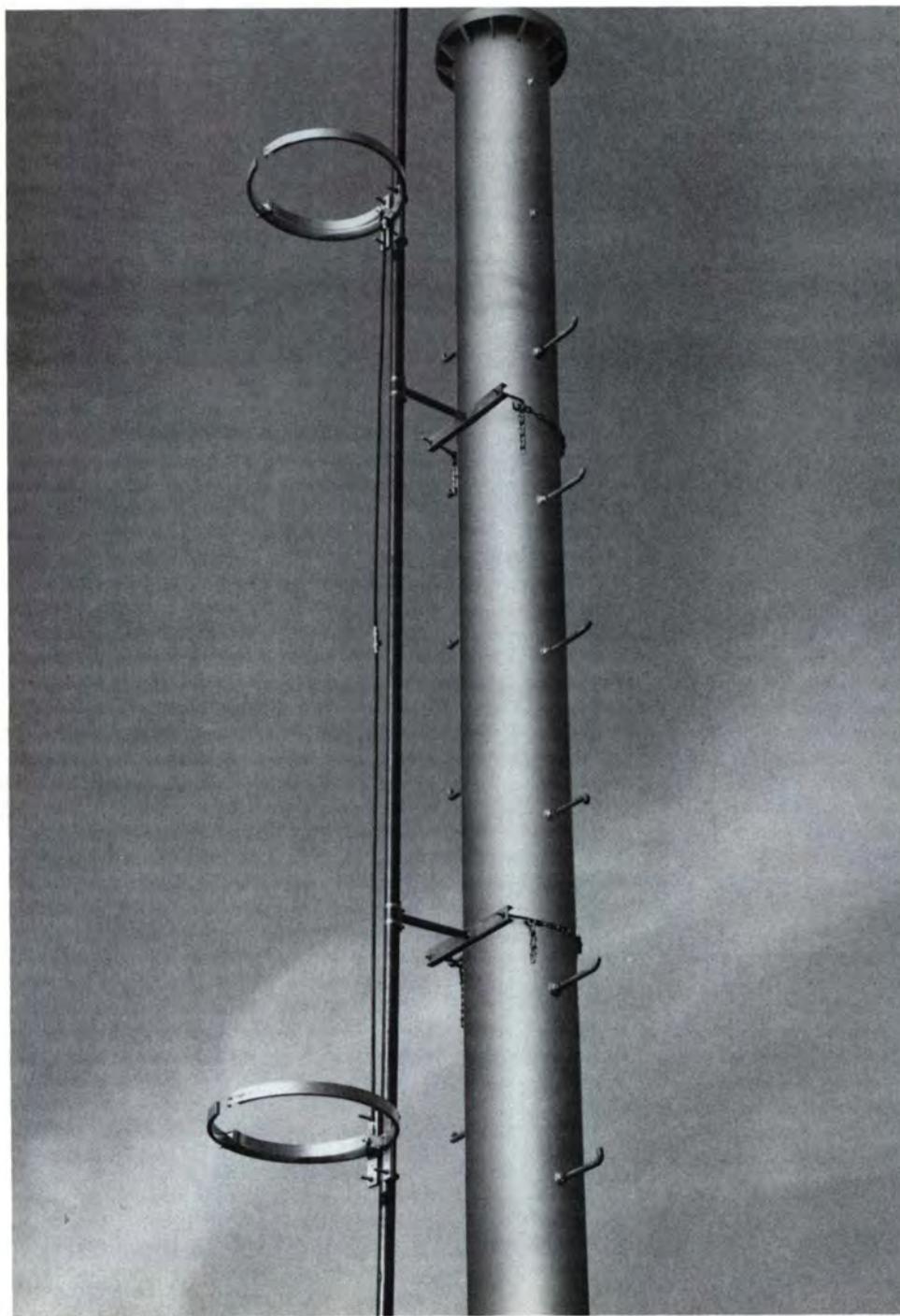
- DC shorting stub for enhanced lightning protection
- Radomes or electrical de-icers
- Special mounting brackets
- Pattern measurement and optimization

TYPE NO.	POWER GAIN ¹		TYPE FEED	FEMALE 50 OHM INPUT	POWER ² INPUT CAPABILITY	CALCU-LATED WEIGHT [LBS.]	CALCU-LATED WIND LOAD [LBS.]
	POWER	dB					
BEMP-1E	0.4611	-3.3623	END	$1\frac{5}{8}$ "	9 kW	57	102
BEMP-2E	0.9971	-0.0128	END	$1\frac{5}{8}$ "	9 kW	114	212
BEMP-3E	1.5588	1.9278	END	$1\frac{5}{8}$ "	9 kW	170	323
BEMP-4E	2.1322	3.2903	END	$1\frac{5}{8}$ "	9 kW	227	433
BEMP-4C	2.1322	3.2903	CENTER	$3\frac{1}{8}$ "	12 kW	260	509
BEMP-5E	2.7154	4.3384	END	$1\frac{5}{8}$ "	9 kW	283	543
BEMP-5C	2.7154	4.3384	OFF CENTER	$3\frac{1}{8}$ "	12 kW	317	620
BEMP-6E	3.3028	5.1888	END	$1\frac{5}{8}$ "	9 kW	340	654
BEMP-6C	3.3028	5.1888	CENTER	$3\frac{1}{8}$ "	12 kW	373	730
BEMP-7E	3.8935	5.9034	END	$1\frac{5}{8}$ "	9 kW	396	764
BEMP-7C	3.8935	5.9034	OFF CENTER	$3\frac{1}{8}$ "	12 kW	430	840
BEMP-8E	4.4872	6.5197	END	$1\frac{5}{8}$ "	9 kW	453	874
BEMP-8C	4.4872	6.5197	CENTER	$3\frac{1}{8}$ "	12 kW	486	950
BEMP-9C	5.0826	7.0608	OFF CENTER	$3\frac{1}{8}$ "	12 kW	543	1060
BEMP-10C	5.6800	7.5435	CENTER	$3\frac{1}{8}$ "	12 kW	599	1171
BEMP-11C	6.2783	7.9785	OFF CENTER	$3\frac{1}{8}$ "	12 kW	656	1281
BEMP-12C	6.8781	8.3747	CENTER	$3\frac{1}{8}$ "	12 kW	712	1391
BEMP-13C	7.4785	8.7381	OFF CENTER	$3\frac{1}{8}$ "	12 kW	769	1501
BEMP-14C	8.0800	9.0741	CENTER	$3\frac{1}{8}$ "	12 kW	825	1612

FOOTNOTES: 1. Horizontal and vertical power gain and dB gain are the same. 2. Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft. 3. Wind load based on 112 mph wind velocity (50/30 psf) and the wind blowing normal to the side of the antenna. Weight and wind load calculations include brackets, interbay line and the transformer section. Calculations based on the frequency of 95 MHz.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics



Model BELP

MODEL	POWER GAIN			POWER RATING (WATTS)	WEIGHT (LBS)	WIND LOAD (LBS)
	POWER	dB	FIELD			
BELP-11	0.80	-0.969	0.894	500	7.5	52.5
BELP-22	1.80	2.55	1.342	800	16.5	117.0
BELP-33	2.75	4.39	1.658	800	27.5	196.0
BELP-44	3.72	5.70	1.929	800	36.0	257.0

BROADCAST ELECTRONICS MODEL BELP LOW POWER EDUCATIONAL FM ANTENNAS

BELP antennas are specifically designed for optimum performance in low power applications. Each BELP utilizes horizontally polarized ring radiators to assure an omnidirectional pattern in the horizontal plane. The BELP-11 features a single ring element, the BELP-22 uses two rings, the BELP-33 employs three rings, and the BELP-44 features four rings. In multi-ring antennas the vertical spacing between the rings is one wavelength.

The BELP antennas are designed for mounting on a pipe or pole with an outside diameter of 2 to 2½ inches. (Two "U" bolts are provided with each antenna element.) Mounting poles and transmission line available at additional cost.

SPECIFICATIONS

Frequency Range:
Factory tuned to a specific frequency in the 88-108 FM band

Polarization:
Horizontal

Pattern:
Horizontal plane pattern circularity of ±3 dB when mounted on a steel pole

VSWR:
Typically 1.5:1, or less, ±1.2 MHz

Input Connector:
UHF female mating to UHF male

Windloading Calculation:
Based on 50 lbs./sq. ft. for flat surfaces, 33 lbs./sq. ft. for cylindrical surfaces (velocity = 112 MPH)

Dimensions:
Single bay height approximately 9". Length approximately 23". Two bay antenna 11 ft. high; 3 bay is 22 ft.; 4 bay is 33 ft.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics



ERI Series 1100

**ELECTRONICS RESEARCH SERIES 1100 HIGH POWER,
CIRCULARLY POLARIZED FM ANTENNA**

The Series 1100 from ERI is a rugged, heavy-duty antenna capable of handling from 5 kW (single bay) to 40 kW (eight or more bays). The antenna may be purchased in arrays of up to 16 bays. End fed configurations are used in combinations from one to eight bays.

The radiating elements are fed using a $3\frac{1}{8}$ " coax stem which is supported by a stainless steel bracket. The interbay 50 ohm coax is $3\frac{1}{8}$ " rigid line. On standard Series 1100 antennas, the coaxial input is $3\frac{1}{8}$ " 50 ohm EIA female and the input power rating is 32 kW or less, depending on the number of bays in the array.

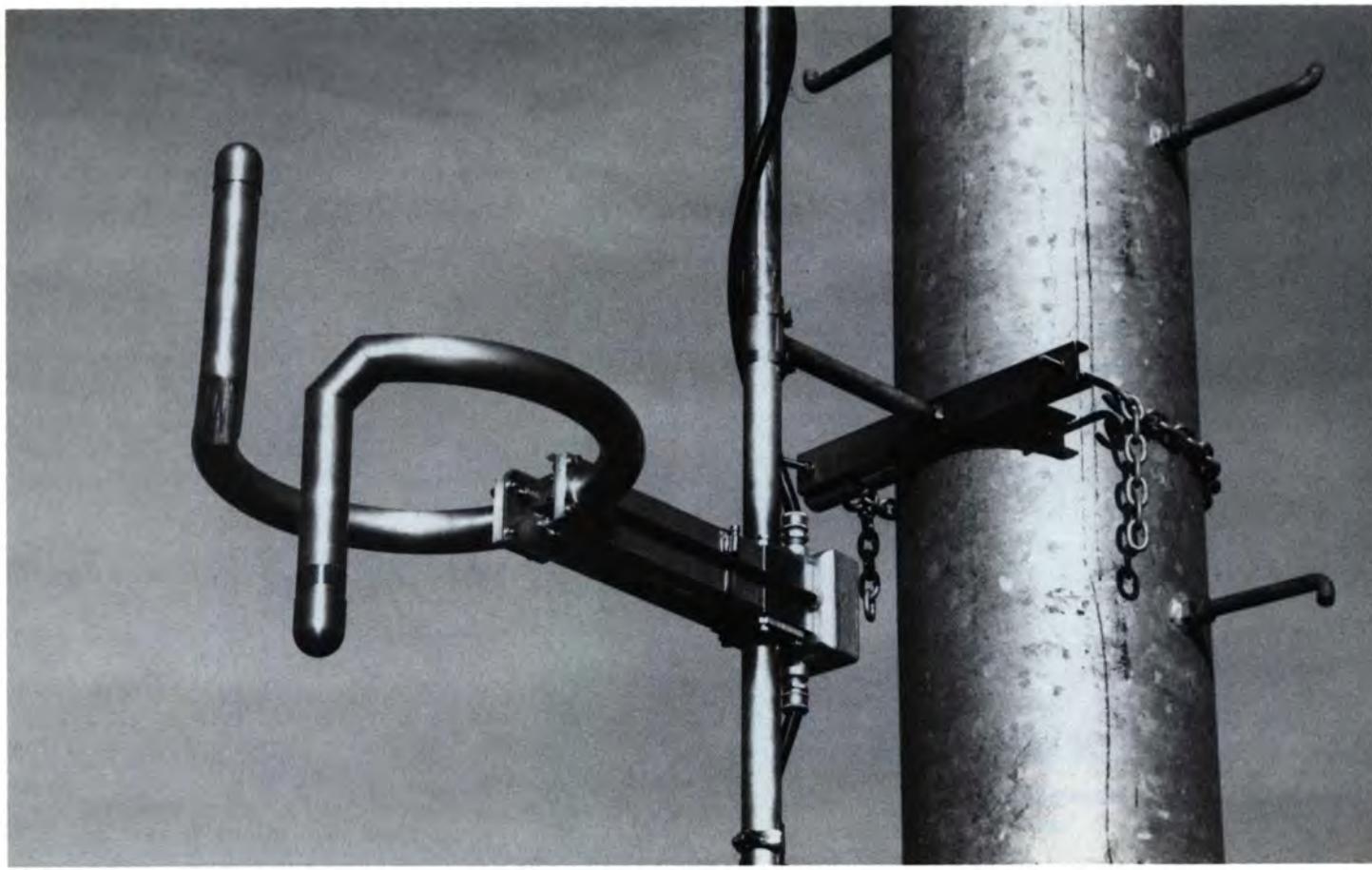
Factory installed de-icers are available in powers of 300 and 500 watts per bay. (Specify 115 or 220 volt operation when ordering.) Shielded interbay heater cable and junction boxes are supplied as a part of the heater system.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

Type	Power Gain		dB Gain		Field Gain		Input Power Rating kW	Weight Including Brackets lb	Wind Load in lbs Based on 50/33 lb/sq ft	Weight in lbs With Radomes Incl. Brackets	Wind Load in lbs With Radomes Based on 50/33 lb/sq ft
	Horiz	Vert	Horiz	Vert	Horiz	Vert					
1100-1AE	0.4611	0.4611	-3.3623	-3.3623	0.6790	0.6790	5	84	144	104	265
1100-2AE	0.9971	0.9971	-0.0128	-0.0128	0.9985	0.9985	10	184	318	224	560
1100-2AC	0.9971	0.9971	-0.0128	-0.0128	0.9985	0.9985	10	209	333	249	575
1100-3AE	1.5588	1.5588	1.9278	1.9278	1.2485	1.2485	15	274	492	334	855
1100-4AE	2.1332	2.1332	3.2903	3.2903	1.4605	1.4605	20	364	666	444	1150
1100-4AC	2.1332	2.1332	3.2903	3.2903	1.4605	1.4605	20	389	681	469	1175
1100-5AE	2.7154	2.7154	4.3384	4.3384	1.6478	1.6478	25	454	840	554	1445
1100-6AE	3.3028	3.3028	5.1888	5.1888	1.8174	1.8174	30	544	1014	664	1740
1100-6AC	3.3028	3.3028	5.1888	5.1888	1.8174	1.8174	30	569	1029	689	1755
1100-7AE	3.8935	3.8935	5.9034	5.9034	1.9732	1.9732	35	634	1187	774	2034
1100-8AE	4.4872	4.4872	6.5197	6.5197	2.1183	2.1183	40	724	1361	884	2329
1100-8AC	4.4872	4.4872	6.5197	6.5197	2.1183	2.1183	40	749	1376	909	2344
1100-9AC	5.0826	5.0826	7.0608	7.0608	2.2545	2.2545	40	835	1608	1015	2697
1100-10AC	5.6800	5.6800	7.5435	7.5435	2.3833	2.3833	40	925	1782	1125	2992
1100-11AC	6.2783	6.2783	7.9785	7.9785	2.5057	2.5057	40	1015	1956	1235	3287
1100-12AC	6.8781	6.8781	8.3747	8.3747	2.6226	2.6226	40	1105	2130	1345	3582
1100-13AC	7.4785	7.4785	8.7381	8.7381	2.7347	2.7347	40	1195	2303	1455	3876
1100-14AC	8.0800	8.0800	9.0741	9.0741	2.8425	2.8425	40	1285	2477	1565	4171
1100-15AC	8.6818	8.6818	9.3861	9.3861	2.9465	2.9465	40	1375	2651	1675	4466
1100-16AC	9.2846	9.2846	9.6776	9.6776	3.0471	3.0471	40	1465	2825	1785	4761

All antenna brackets are stainless steel. All weights given include brackets, interbay line, and transformer section. Factory-installed deicers are available using either 300 watts or 500 watts per bay. Specify 120 or 230 volts. Heater elements are replaceable in the field. Shielded interbay heater cable and junction boxes are supplied. Heater weight, including junction boxes and interbay cable, is 6 lb (2.7 kg) additional per bay.



ERI 1105 Series

ELECTRONICS RESEARCH 1105 SERIES CIRCULARLY POLARIZED FM ANTENNAS

ERI's 1105 series of circularly polarized FM antennas meets the requirements of virtually all Class "A" licensed stations. This is an end-fed antenna having a maximum input power rating of 7.5 kW and power gains ranging from 0.46 for one bay up to 4.48 for the 8 bay model.

The use of only brass, copper and stainless steel in the construction of the 1105 antenna assures long term service and

freedom from the maintenance problems suffered by other antennas. De-icers and radomes are available for use where heavy icing is present.

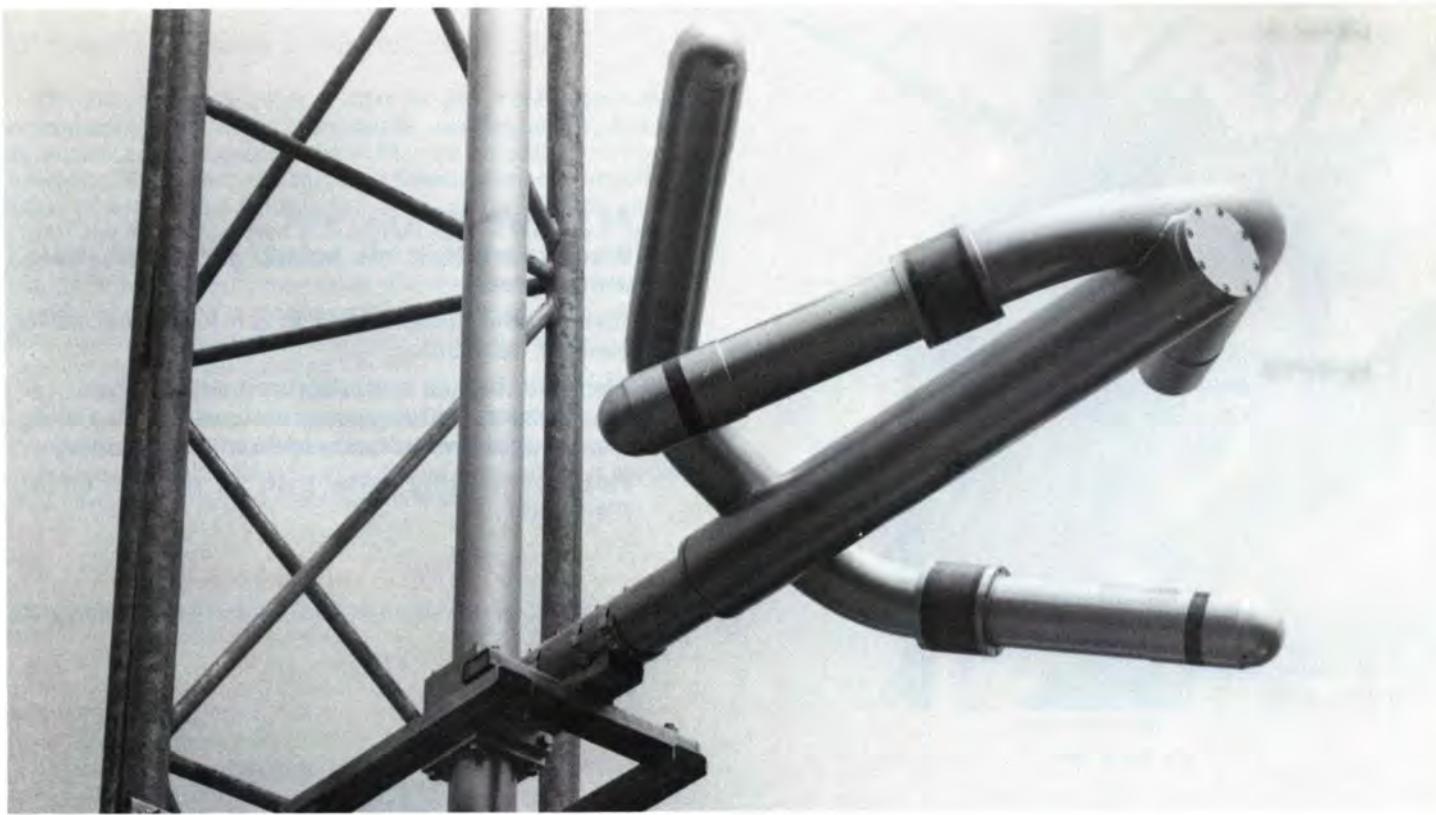
Circularity is ± 2 dB in free space, both horizontal and vertical. Ellipticity is rated at ± 3 dB in free space. This ensures a smooth radiation pattern for maximum signal penetration.

ORDERING INFORMATION

See current Broadcast Electronics price list or contact Broadcast Electronics

Type	Power Gain				dB Gain		Field Gain		Input Power Rating kW	Approx. Length (m) ft	Weight (Including Brackets) (kg) lb.	Wind Load Based on 244/161 kg/sq.m (50/33 lb/sq ft)		Weight (With Radomes) (kg) lb.	Wind Load With Radomes Based on 244/161 kg/sq.m (50/33 lb/sq ft)	
	Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert				(16) 36	(34) 74	(24) 54	(73) 161	
1105-1	0.4611	0.4611	-3.3623	-3.3623	0.6790	0.6790	3	—				(47) 104	(52) 115	(153) 338		
1105-2	0.9971	0.9971	-0.0128	-0.0128	0.9985	0.9985	6	(3) 10				(115) 254	(78) 172	(234) 515		
1105-3	1.5588	1.5588	1.9278	1.9278	1.2485	1.2485	7.5	(6) 20				(156) 344	(105) 231	(314) 693		
1105-4	2.1332	2.1332	3.2903	3.2903	1.4605	1.4605	7.5	(10) 30				(197) 434	(132) 290	(385) 870		
1105-5	2.7154	2.7154	4.3384	4.3384	1.6478	1.6478	7.5	(12) 40				(238) 524	(158) 349	(475) 1047		
1105-6	3.3028	3.3028	5.1888	5.1888	1.8174	1.8174	7.5	(15) 50				(279) 614	(185) 408	(555) 1224		
1105-7	3.8935	3.8935	5.9034	5.9034	1.9732	1.9732	7.5	(18) 60				(319) 704	(212) 467	(636) 1402		
1105-8	4.4872	4.4872	6.5197	6.5197	2.1183	2.1183	7.5	(21) 70								

All antenna brackets are stainless steel. All weights given include brackets, interbay line, and transformer section. Factory-installed deicers are available using either 300 watts or 500 watts per bay. Specify 120 or 230 volts. Heater elements are replaceable in the field. Shielded interbay heater cable and junction boxes are supplied. Heater weight, including junction boxes and interbay cable, is 6 lb (2.7 kg) additional per bay.



ERI Series 200

ELECTRONICS RESEARCH SERIES 200 SIDEMOUNT FM ANTENNAS

The ERI Series 200 antenna is ideal for medium to high power applications. Circularity is excellent with horizontal plane patterns circular to better than ± 2 dB. The free space axial ratio is better than ± 3 dB. Power input capability ranges from 10 to 39 kW.

The radiating element is constructed of solid brass and has an outside diameter of $3\frac{1}{8}$ ". The feed system is completely internal

within a pressurized environment. Each element has an internal DC short so a quarter wave stub is not necessary.

De-icers are available as accessories for the Series 200. They are installed at the factory and must be specified at the time the order is placed. Anti-rotation brackets are recommended for leg mounted systems on towers with less than 3" o.d. legs.

SPECIFICATIONS FOR SERIES 200 ANTENNAS

Antenna Type	Power Gain	dB Gain	Type Feed	Power Input Capability (kW)	Calculated Weight (lbs)	Calculated Windload* (lbs)
200-1AE	.4611	-3.3623	End	10	108	176.4
200-2AE	.9971	-0.0128	End	20	225	382.5
200-2AC	.9971	-0.0128	Center	20	243	405.7
200-3AE	1.5588	1.9278	End	20	342	588.6
200-4AE	2.1332	3.2903	End	30	459	794.7
200-4AC	2.1332	3.2903	Center	30	477	817.9
200-5AE	2.7154	4.3384	End	32	576	1000.8
200-6AE	3.3028	5.1888	End	32	693	1206.9
200-6AC	3.3028	5.1888	Center	39	711	1230.1
200-7AE	3.8935	5.9034	End	32	810	1413.0
200-8AE	4.4872	6.5197	End	32	927	1619.1
200-8AC	4.4872	6.5197	Center	39	945	1642.3
200-10AC	5.6800	7.5435	Center	39	1179	2054.5
200-12AC	6.8781	8.3747	Center	39	1413	2466.7
200-14AC	8.0798	9.0740	Center	39	1647	2878.9

*Windload calculated based on 50/33 psf, 112 mph actual wind velocity. No ice.

Power input capability up to 2,000 ft. above mean sea level. Derating required above 2,000 ft.

Note: All antenna systems have 50 ohm female inputs.

Weight and windload calculations include brackets.



ERI Series 1000

The Series 1000 FM Cogwheel Antennas are antenna arrays designed to be top mounted on towers, buildings, or mountain tops. Unlike conventional FM antenna arrays that are side mounted on large tower structures, Series 1000 Cogwheel antennas have broadband radiating elements on each face of their four sided custom made tower spine. Due to the design of the cogwheel spine, no reflector screens are required. Because of this tower spine design feature, cogwheel antennas produce a pattern circularity of better than ± 1 dB over the entire FM band.

Series 1000 Cogwheel antenna arrays are manufactured with a coaxial feed harness to distribute antenna input power throughout the array. Unlike side mounted FM antennas with rigid coax harnesses, the Series 1000 antenna power distribution harness is not frequency sensitive. Since all the elements in a Series 1000 Cogwheel are fed with proper phase, multiple station use of a common antenna is practical.

Standard side mounted FM antennas experience severe pattern degradation when installed on towers having a face dimension of 30 inches or more. For single station operation, the ERI

- All stainless steel hardware
- Brackets are built into hot-dip galvanized steel tower spine
- Tower spine custom built in ten foot sections for ease of installation
- Elements baluns manufactured with rugged brass channel fiberglass construction. Radiating elements are manufactured from brass tubing
- Pattern circularity better than ± 1 dB over entire FM band

Series 1000 Cogwheel FM antenna provides a means of obtaining excellent pattern circularity in the horizontal plane.

The ERI Series 1000 Cogwheel FM antenna is excellent for multiple station use. The radiating elements exhibit good bandwidth characteristics, and the antenna provides excellent horizontal plane pattern circularity for all stations using the system.

Cogwheel antennas can be provided for use in areas that experience severe environmental conditions, and can be designed for operation without the use of radomes or thermal deicers. Radomes designed to cover the actual radiating dipoles in the Series 1000 cogwheel antennas are available, but will increase the wind loading considerably. Thermal deicers are also optional. Their use requires a large amount of electrical power.

The radiating elements of the Series 1000 panel antennas are of a thick wall brass tubing with the element feed stems enclosed in heavy brass channels separated by fiberglass radome covers.

Electronics Research, Inc. can design a cogwheel FM antenna and associated filters to meet your needs, and can offer the finest back-up support available, whether it be parts or field service.

SPECIFICATIONS

Tower Spine:

Hot dip galvanized custom made 24" square solid rod tower with flanged legs for connection. Tower includes beacon mount and mounting holes for lightning rods on top as well as element mounting bracket for four versions of cogwheel (circular polarized, slant linear polarized, horizontal polarized or vertical polarized.) Spine design has been analyzed and certified by registered structural engineer.

Horizontal Plane Pattern CircularitY:

Horizontal Polarization $< \pm 1$ dB
Vertical Polarization $< \pm 1/2$ dB

Coaxial Input:

Antenna available with either one or two inputs. 50 ohm input coax is available in EIA sizes up to and including 6 $\frac{1}{2}$ "

Input Power Rating:¹

COG1054-1	40 kW ²	COG1054-7	240 kW
COG1054-2	80 kW	COG1054-8	240 kW
COG1054-3	120 kW	COG1054-9	240 kW
COG1054-4	160 kW	COG1054-10	240 kW
COG1054-5	200 kW	COG1054-11	240 kW
COG1054-6	240 kW	COG1054-12	240 kW

Notes:

1. In multiplex systems, input power can be voltage limited. Electronics Research analyzes peak voltage for cogwheels with more than one user and sets input power rating based on the results of analysis. Power ratings are given based on two 6 $\frac{1}{2}$ " coaxial inputs. 2. With custom feed, 80 kW per bay is possible.

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Electronics Research Series 900 FM Filters

ERI offers a complete line of filters for use in commercial FM broadcast stations. These filters can be used as building blocks in various configurations. The basic filter line consists of two band reject (notch) filters and two bandpass filters. All four of these filters share several unique advantages. They can be adjusted under power and this adjustment is designed so that the notch filters cannot be accidentally adjusted into their pass band even with the notch 800 kHz from the carrier. The resonant inner conductor grounding clamp is a solid copper compression ring with no hose clamps required. Also, there are no teflon components inside the high voltage cavity of the filter.

ERI has notch filters in a fifteen inch cavity with $3\frac{1}{8}$ ", 50 ohm input/output ports and in a twenty inch cavity with $6\frac{1}{8}$ ", 50 ohm input/output ports. The band pass filters are offered in a fifteen inch cavity with $3\frac{1}{8}$ ", 50 ohm input/output ports and in a twenty inch cavity with $3\frac{1}{8}$ ", 50 ohm input/output ports.

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Series 900 Filter



FM Isolation Transformer

ERI FM Isolation Transformers

The FM isolation transformer is designed to couple the FM power across the base insulator of a transmitting tower used jointly as an AM and FM radiator without introducing objectionable mismatch into the FM antenna feed line. An isolation transformer is especially desirable for feeding high impedance AM radiators, or AM radiators which are part of an AM directional antenna system, which might be adversely affected by a "bazooka" type isolation system. Isolation transformers are available in 10 kW and 25 kW models (25 kW model not pictured).

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SPECIFICATIONS**Frequency:**

88 to 108 MHz. Tuned to the station's FM carrier frequency at the factory.

VSWR:

(10 kW unit) Less than 1.05 to 1 at the FM station frequency, ± 1.0 MHz when terminated in a matched 50 ohm load. (25 kW unit) Less than 1.05 to 1 at the FM station frequency, ± 0.5 MHz when terminated in a matched 50 ohm load.

Insertion Loss:

(10 kW unit) Less than 0.05 dB. (25 kW unit) 0.10 dB or less.

Input:

(10 kW unit) $1\frac{1}{8}$ " EIA 50 ohm captive male swivel flange. (25 kW unit) $3\frac{1}{8}$ " EIA 50 ohm male flange.

Output:

(10 kW unit) $1\frac{1}{8}$ " EIA 50 ohm female swivel flange. (25 kW unit) $3\frac{1}{8}$ " EIA 50 ohm male flange (will mate with a $3\frac{1}{8}$ " EIA 50 ohm female flange).

Weight:

(10 kW unit) Approx. 105 lbs. (25 kW unit) 255 lbs.

Flange to Flange Length:

(10 kW unit) 67 to 73 inches, depending on the FM frequency. (25 kW unit) 44 inches.

Mounting:

(10 kW unit) in a cradle supplied. The cradle is fitted with a 2-inch pipe flange on the bottom. Two stainless steel straps secure the tank to the cradle. The 2-inch mounting pipe is not supplied with the transformer. (25 kW unit) Separate 3-inch pipe flange on the bottom. Two stainless steel straps secure tank to cradle.

Pressurization:

Designed for use in a pressurized system with gas passing through the unit.



	Foam 1¼"		Foam 1½"	
	Andrew	Andrew	Andrew	Andrew
Standard Cable, Standard Jacket	LDF6-50		LDF7-50A	
Standard Cable, Fire-Retardant Jacket	41690-46		41690-23	
1½" EIA Flange, no gas barrier at interface ¹		L46R ²		L47R
7/8" EIA Flange, no gas barrier at interface ¹		L46S ²		L47S
"F" Flange (male) ³		L46F		L47F
"F" Flange (female) ⁴		Not available		201942
N Plug (male), mates with UG-23		L46W ²		Not available
N Jack (female), mates with UG-21		L46N ²		L47N
LC Plug (male), mates with UG-352		L46M ²		L47M
LC Jack (female), mates with UG-154		L46L ²		L47L
7/16" DIN male		L46DM ²		L47DM
7/16" DIN female		L46DF ²		L47DF
Splice		L46Z		L47Z
1½" End Terminal ⁵		2061		2061
1½" Gas Barrier ⁶		1261B		1261B
Hanger Kit		42396A-1		42396A-2
Hoisting Grip		24312A		24312A
Grounding Kit		204989-3		204989-4
Reattachment Kit		34767A-43		34767A-35

Notes: (1) Includes inner connector; (2) Includes pressure port for pressurization of antenna feed; (3) For attachment to "F" series antennas; (4) For connection to jumper cable; (5) For strap connection to center conductor, includes inner connector; (6) For connection to pressurized line, includes inner connector.

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	Andrew	Cablewave	Myat	Dielectric
20-Ft. Line Section, flanged both ends	561	920214	201-001	DC-275-002
20-Ft. Line Section, flanged one end	561-11	920218	201-006	Not Available
20-Ft. Line Section, unflanged	561-21	920222	201-004	DC265-002
Elbow, 90-degree	1061A	920226	201-020	DC275-017
Elbow, 45-degree	Not Available	920230	201-030	DC275-020
Flange, fixed	18631	920288	201-008	DC270-006
Flange, swivel	18041	920284	201-009	Not Available
Flange, field (Soft sold.)	1561A	Not Available	201-013	DC275-014
Flange, unpressurized	Not Available	920304	Not Available	DC260-015
Inner Connector	34660	612874	201-010	DC275-011
Inner Connector for unflanged line only	Not Available	920300	201-014	DC265-007
Gas Barrier	1261B	920238	201-050	DC275-005
End Terminal	2061	920253	201-080	Not Available
Hardware Set	669225-2	920273	201-012	DC270-012
"O" Ring Gasket	10683-406	520681-011	201-011	DC270-010
Fixed Hanger	13924	920308	201-142-1	DC270-034
Spring Hanger	14379	920311	201-042-3	DC270-036
Horizontal Hanger	3911	920319	201-042-12	DC270-030
Round Member Adaptor	13550	514542-003	Not Available	Use Cablewave
Angle Adaptor	13555A	920167-004	Not Available	Use Cablewave
Wall Feed Thru	Not Available	920322	201-042-5	DC270-028
Reducer, 1 $\frac{5}{8}$ " to 7 $\frac{1}{2}$ "	1860A	920249	201-064	DC275-060
Reducer, 3 $\frac{1}{8}$ " to 1 $\frac{5}{8}$ "	1861	920250	301-064	DC375-060
Lateral Brace	3921	920316	201-042-8	Not Available

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	Andrew	Cablewave	Myat	Dielectric
20-Ft. Line Section, flanged both ends	562A	920215	301-001	DC375-002
20-Ft. Line Section, flanged one end	562A-11	920219	301-006	Not Available
20-Ft. Line Section, unflanged	562A-21	920223	301-004	DC365-002
Elbow, 90-degree, flanged	1062A	920227	301-020	DC375-017
Elbow, 45-degree	1162	920231	301-030	DC375-020
Flange, fixed	15840	920289	301-008	DC375-006
Flange, swivel	18200	920285	301-009	DC360-013
Flange, field (soft solder)	1562A	Not Available	301-013	DC370-014
Flange, unpressurized	Not Available	920305	301-014	DC360-015
Inner Connector	15093A	622720	301-010ML	DC375-011
Inner Connector for unflanged line only	Not Available	920301	301-010ML	DC365-007
Gas Barrier	1262B	920239	301-050	DC375-005
End Terminal	2062	920254	301-080	Not Available
Hardware Set	69226-2	920274	301-012	DC370-012
"O" Ring Gasket	10683-405	Not Available	301-011	DC370-010
Fixed Hanger	13927	920309	301-042-1	DC370-034
Spring Hanger	13925	920312	301-042-3	DC370-036
Horizontal Hanger	3912	920320	301-042-12	
Round Member Adaptor	31670-3	514542-003	Use Cablewave	Use Cablewave
Angle Adaptor	31768A	920167-004	Use Cablewave	Use Cablewave
Wall Feed Thru	3902	920323	301-042-5	DC370-028
Reducer, 6 $\frac{1}{8}$ " to 3 $\frac{1}{8}$ "	1872	920251	601-064	DC665-061
Reducer, 3 $\frac{1}{8}$ " to 1 $\frac{5}{8}$ "	1861	920250	301-064	DC365-060
Lateral Brace	3922	920317	301-042-8	DC370-038

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	Andrew	Cablewave	Myat	Dielectric
20-Ft. Line Section, flanged both ends	ACX-450-1	Not Available	401-001	DC475-002
20-Ft. Line Section, flanged one end only	ACX-450-4	N/A	Not Available	Not Available
20-Ft. Line Section, unflanged	ACX-450-5	N/A	401-004	DC465-002
Elbow, 90-degree	ACX-450-10	N/A	401-020	DC475-017
Elbow, 45-degree	Not Available	N/A	Not Available	DC475-020
Flange, fixed	ACX-450-28	N/A	401-008	DC475-006
Flange, swivel	ACX-450-27	N/A	401-009	DC460-013
Flange, field (soft solder)	Not Available	N/A	401-013	DC470-014
Flange, unpressurized	Not Available	N/A	401-014	DC460-015
Inner Connector	ACX-450-20	N/A	401-010	DC475-011
Inner Connector for unflanged line only	Not Available	N/A	use 401-010	DC465-007
Gas Barrier	ACX-450-16	N/A	401-050	DC475-005
End Terminal	Not Available	N/A	Not Available	Not Available
Hardware Set	ACX-450-21	N/A	401-012	DC470-012
"O" Ring Gasket	Not Available	N/A	401-011	DC470-010
Fixed Hanger	ACX-450-13	N/A	401-042-1	DC470-034
Spring Hanger	ACX-450-11	N/A	401-042-3	DC470-036
Horizontal Hanger	Not Available	N/A	Not Available	Not Available
Round Member Adaptor	Cablewave 514542-004	N/A	Cablewave 514542-004	Not Available
Angle Adaptor	Cablewave 920167-004	920167-004	Cablewave 920167-004	Not Available
Wall Feed Thru	ACX-450-15	N/A	401-042-5	DC470-028
Reducer, 6 $\frac{1}{8}$ " to 4 $\frac{1}{16}$ "	Not Available	N/A	601-067	DC665-060
Lateral Brace	ACX450-14	N/A	401-042-8	DC470-038
Coupling, unpressurized	Myat 401-017	N/A	401-017	Myat 401-017

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	Air Dielectric: $\frac{7}{8}$ "		Air Dielectric: $1\frac{5}{8}$ "	
	Andrew	Cablewave	Andrew	Cablewave
Line Type Number	HJ5-50	FCC78-50J	HJ7-50A	HCC-158-50J
Flange, gas pass EIA	75AR	738259	87R	738314
Flange, gas barrier EIA	75AG	738256	87G	738303
Flange, LC plug	75AM	738254	87L (female)	738302 (female)
Flange, N-plug	75AN	738251	87N	738301 (female)
End Terminal	75AT	738258	87T	738306
Gas Barrier	1260A	920237	1261B	920238
Splice	75AZ	738257	87Z	738305
Hanger Kit, non-insul., maximum spacing—3'	42396A-5	920396	42396A-2	920159-003
Hardware Kit	31769-1	Not Available	31769-1	Not Available
Angle Adaptor	31768A	920167-001	31768A	920167-004
Round Member Adaptor, 1-2" leg diameter	31670-1	514542-002	31670-1	514542-002
Round Member Adaptor, 2-3" leg diameter	31670-2	514542-003	31670-2	514542-003
Insulated Hanger, maximum spacing 3'	11662-2	920150-002	33948-3	920161-003
Hoisting Grip	19256B	910307	24312A	910311
Wall Feed Thru	40656-3	920433	40656-2	920434
Grounding Kit	204989-2	713737-004	204989-4	713737-005
Nylon Cable Ties (50 pieces)	40417	Not Available	40417	Not Available
90-Degree Elbow	1060A	920225	1061A	920226

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Air Dielectric: 3"**Air Dielectric: 3½"**

	Andrew	Cablewave	Andrew	Cablewave
Line Type Number	HJ8-50B	HCC-300-50J	Not Available	HCC-312-50J
Flange, gas pass	78ARF	738355	N/A	734579
Flange, gas barrier	78AGF	738350	N/A	734578
End Terminal	2062	920254	N/A	920254
Gas Barrier	Not Available	920239	N/A	920239
Splice	78BZ	738352	N/A	734574
Hanger Kit, maximum spacing 5', 10-pieces	31766-11	920159-004	N/A	920159-005
Hardware Kit	31769-1	Not Available	N/A	Not Available
Angle Adaptor	31768A	920167-004	N/A	920167-004
Round Member Adaptor, 1-2" leg diameter	31670-1	514542-002	N/A	514542-002
Round Member Adpator, 2-3" leg diameter	31670-2	514542-003	N/A	514542-003
Round Member Adaptor, 3-4" leg diameter	31670-3	514542-004	N/A	514542-004
Insulated Hanger	33948-2	920161-002	N/A	920161-007
Hoisting Grip	26985A	913563	N/A	913563
Wall Feed Thru	40394-2	920435	N/A	920572
Grounding Kit	204989-5	713737-006	N/A	713737-007
Nylon Cable Ties (50 pieces per kit)	40417	Use Andrew	N/A	Use Andrew
90-Degree Elbow	1062A	920227	N/A	920227
45-Degree Elbow	1162	920231	N/A	920231
Inner Connector	15093A	622720	N/A	622720

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Air Dielectric: 4"

Air Dielectric: 5"

	Andrew	Cablewave	Andrew	Cablewave
Line Type Number	HJ11-50	Not Available	HJ-9-50	HF4½"CU2Y
Flange, gas pass	81RF	N/A	79R	734646(6½")
Flange, gas barrier	81GF	N/A	79AG	734645(6½")
End Terminal	2062	N/A	Not Available	920255
Gas Barrier	1262B(3½")	N/A	Not Available	920240
Splice	78Z	N/A	79AZ	Not Available
Hanger Kit, maximum spacing 5', 10-pieces	31766-10	N/A	33598-5	920159-006
Hardware Kit	31769-1	N/A	31769-1	Not Available
Angle Adaptor	31768A	N/A	33981A-1	920160
Round Member Adaptor, 1-2" leg diameter	31670-1	N/A	Not Available	514542-002
Round Member Adaptor, 2-3" leg diameter	31670-2	N/A	Use Cablewave	514542-003
Round Member Adaptor, 3-4" leg diameter	31670-3	N/A	Use Cablewave	514542-004
Insulated Hanger	33948-4	N/A	33948-1	920161-008
Hoisting Grip	34759	N/A	31031-1	Not Available
Wall Feed Thru	40394-1	N/A	33938-5	920555
Grounding Kit	204989-6	N/A	204989-7	713737-008
Nylon Cable Ties (50 pieces per kit)	40417	N/A	40417	Use Andrew
90-Degree Elbow	1062(3½")	N/A	Use Cablewave	920228(6½")
Reducer 6½" to 3½"	Use Cablewave	N/A	Use Cablewave	920251
45-Degree Elbow	1162(3½")	N/A	Use Cablewave	920232(6½")

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Internal view of mobile studio with FM-3.5A transmitter visible in background.

TRANSPORTABLE BROADCAST STATIONS FOR SPECIAL APPLICATIONS

Broadcast Electronics has extensive experience in the design and assembly of transportable stations for special applications requiring temporary, mobile broadcast capability. Each system is custom designed to meet the particular needs of the user.

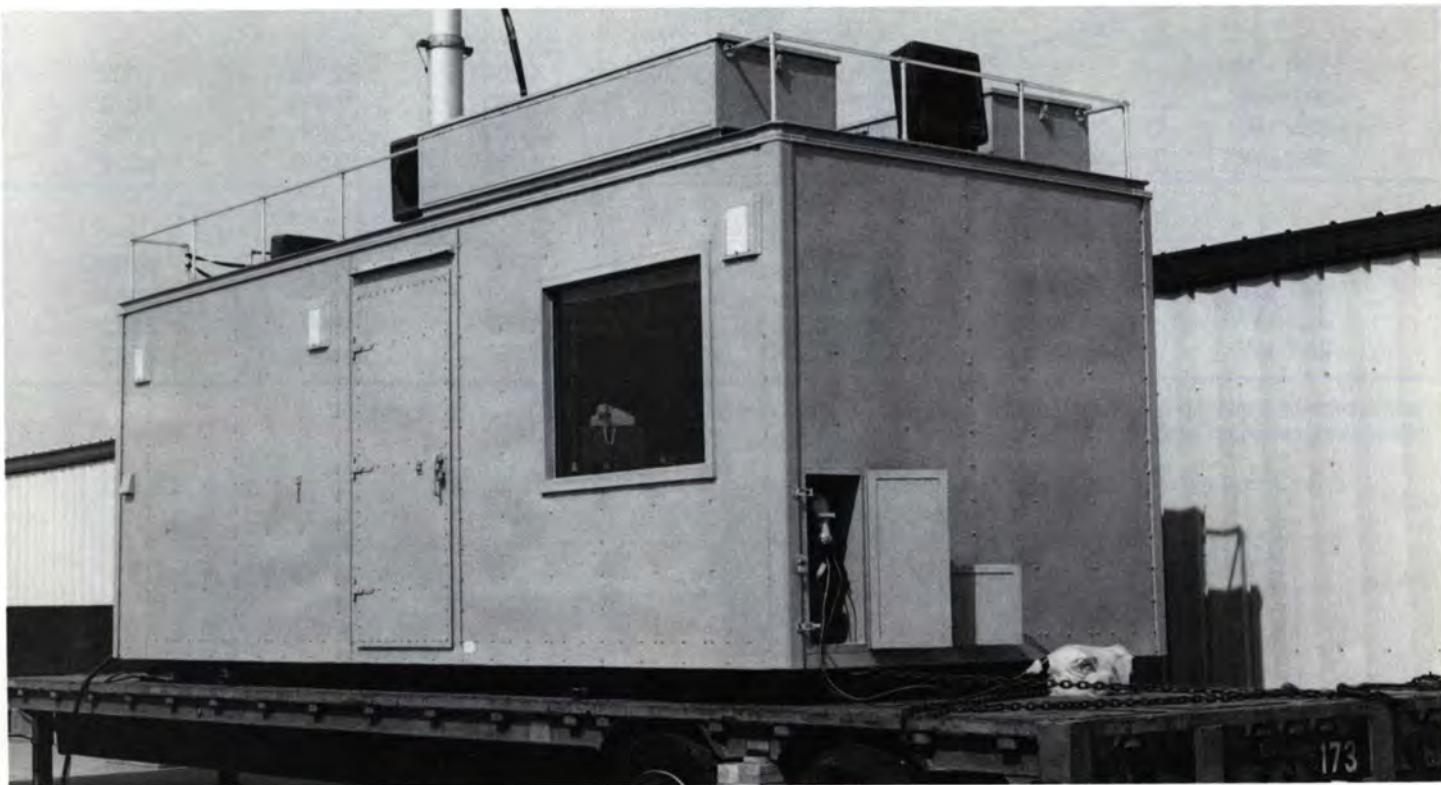
A typical example is the transportable FM broadcast system that was built in 1987 for use in Thailand. (See photographs)

The full featured broadcast system as illustrated was designed to originate and transmit stereo programming. It was built around a 3,500 watt Broadcast Electronics FM-3.5A FM transmitter. The facility was constructed in an air conditioned shelter housing a complete on-air studio and control room featuring an eight channel console, turntables, tape cartridge machines, reel to reel recorders and other professional studio equipment.

Besides the FM-3.5A transmitter, the shelter also contained an HF SSB long range communication system as well as VHF point-to-point communications. A four bay FM broadcast antenna and a VHF communication antenna were mounted on a 50 foot telescoping mast assembly integral to the shelter itself.

The transportable FM station was fully self-contained and included support equipment for the operating personnel. Amenities such as a portable cook stove, fold-down bed and toilet facilities were built into the shelter. On-board voltage regulation systems provided the capability to power the entire system from available AC mains or portable generators.

Once again, the system pictured on this page is only a typical example of the types of custom assembled transportable broadcast stations available from Broadcast Electronics. Depending on the type and number of individual units required, the total assembly and testing period can be very rapid. Contact Broadcast Electronics or your Broadcast Electronics representative for more details.



External View: close-up

Classes of FM Stations, FCC 80-90 Docket

The following table is offered as a general guide to the classes of FM radio broadcast stations brought about by the FCC 80-90 docket. For specific interpretation and equipment requirements, see your Broadcast Electronics representative.

Required Transmitter Power Out**	Antenna Bays	Effective Radiated Power**	Coax Line Size	Coax Line Length	Coax Line Efficiency	Tower Height**
Class A FM - 328 Feet						
7.6 kW	1	3 kW	1 $\frac{5}{8}$ "	328'	86.1%	328'
3.5 kW*	2	3 kW	1 $\frac{5}{8}$ "	342'	85.6%	333'
2.3 kW*	3	3 kW	1 $\frac{5}{8}$ "	347'	85.4%	337'
Class B1 FM - 328 Feet						
12.9 kW	4	25 kW	3"	332'	90.6%	343'
10.1 kW*	5	25 kW	3"	327'	91.2%	348'
8.3 kW*	6	25 kW	3"	322'	90.9%	353'
7.0 kW	7	25 kW	3"	317'	91.5%	358'
6.1 kW*	8	25 kW	3"	313'	91.1%	363'
Class B or C2 FM - 492 Feet						
21.3 kW	5	50 kW	3"	491'	86.5%	512'
17.5 kW*	6	50 kW	3"	486'	86.6%	517'
14.8 kW	7	50 kW	3"	481'	86.7%	522'
12.8 kW*	8	50 kW	3"	477'	86.8%	527'
11.4 kW	9	50 kW	3"	511'	86.0%	532'
10.2 kW*	10	50 kW	3"	511'	86.0%	537'
Class C1 FM - 984 Feet						
36.9 kW*	6	100 kW	4 $\frac{1}{8}$ "	1,003'	82.1%	1,009'
30.2 kW*	8	100 kW	3"	1,003'	73.6%	1,019'
23.9 kW*	10	100 kW	3"	1,003'	73.6%	1,029'
19.8 kW	12	100 kW	3"	1,003'	73.6%	1,039'
Class C FM - 1,968 Feet						
44.5 kW	6	100 kW	4 $\frac{1}{8}$ "	1,987'	68.1%	1,993'
36.7 kW*	8	100 kW	3 $\frac{1}{2}$ "	1,987'	60.8%	2,003'
32.3 kW*	10	100 kW	3"	1,987'	54.4%	2,013'
26.7 kW*	12	100 kW	3"	1,987'	54.4%	2,023'

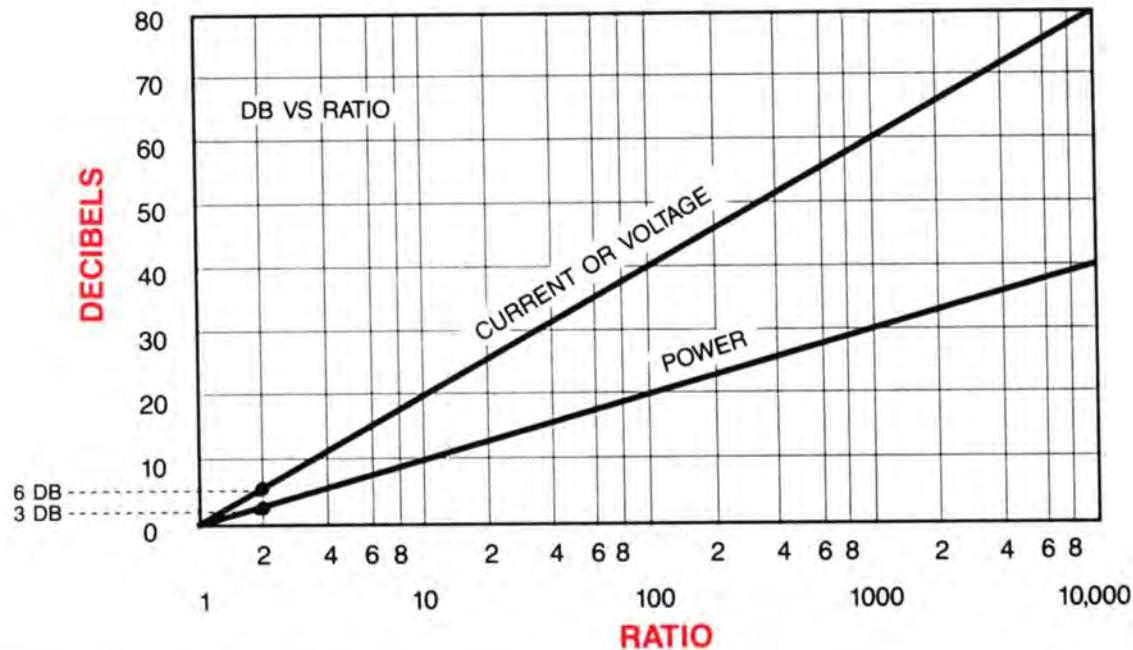
*Most commonly requested antenna transmitter combinations. (Even number of bays required for beam tilt and null fill)

**Shown with maximum effective radiated power (e.r.p.) and maximum height allowed, at 98.1 MHz.

Frequency Designation of FM Broadcast Channels

Freq. (MHz)	Channel No.	Freq. (MHz)	Channel No.	90.9	.....	215	100.9	.....	265	94.5	.....	233	104.5	.....	283
88.1	201	98.1	251	91.1	.....	216	101.1	.....	266	94.7	.....	234	104.7	.....	284
88.3	202	98.3	252	91.3	.....	217	101.3	.....	267	94.9	.....	235	104.9	.....	285
88.5	203	98.5	253	91.5	.....	218	101.5	.....	268	95.1	.....	236	105.1	.....	286
88.7	204	98.7	254	92.1	.....	221	102.1	.....	271	95.3	.....	237	105.3	.....	287
88.9	205	98.9	255	92.3	.....	222	102.3	.....	272	95.5	.....	238	105.5	.....	288
89.1	206	99.1	256	92.5	.....	223	102.5	.....	273	95.7	.....	239	105.7	.....	289
89.3	207	99.3	257	92.7	.....	224	102.7	.....	274	95.9	.....	240	105.9	.....	290
89.5	208	99.5	258	92.9	.....	225	102.9	.....	275	96.1	.....	241	106.1	.....	291
89.7	209	99.7	259	93.1	.....	226	103.1	.....	276	96.3	.....	242	106.3	.....	292
89.9	210	99.9	260	93.3	.....	227	103.3	.....	277	96.5	.....	243	106.5	.....	293
90.1	211	100.1	261	93.5	.....	228	103.5	.....	278	96.7	.....	244	106.7	.....	294
90.3	212	100.3	262	93.7	.....	229	103.7	.....	279	96.9	.....	245	106.9	.....	295
90.5	213	100.5	263	93.9	.....	230	103.9	.....	280	97.1	.....	246	107.1	.....	296
90.7	214	100.7	264	94.1	.....	231	104.1	.....	281	97.3	.....	247	107.3	.....	297
				94.3	.....	232	104.3	.....	282	97.5	.....	248	107.5	.....	298
										97.7	.....	249	107.7	.....	299
										97.9	.....	250	107.9	.....	300

Decibels Vs Ratio



Volume Level to Power and Voltage Conversion

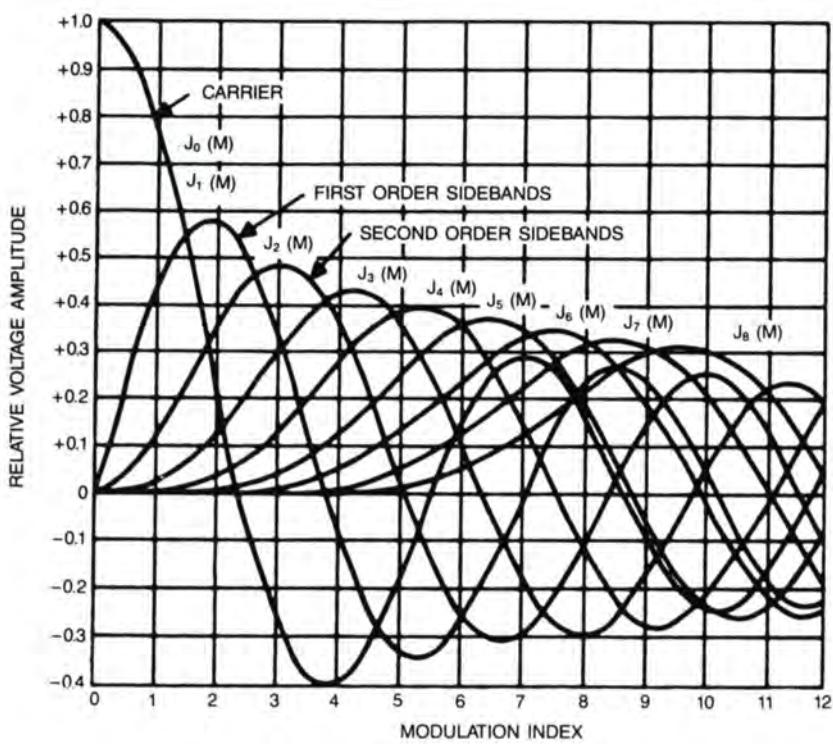
REFERENCE LEVEL: 0 DBM = 1 MW, 600 OHMS

MILLIWATTS	VOLTS	DBM	WATTS	VOLTS	DBM
0.000001	0.0007746	-60	0.001000	0.7746	0
0.000010	0.002449	-50	0.002512	1.228	+4
0.000100	0.007746	-40	0.006310	1.946	+8
0.001	0.02449	-30	0.01000	2.449	+10
0.010	0.07746	-20	0.1000	7.746	+20
0.100	0.2449	-10	1.000	24.49	+30
1.000	0.7746	0	10.00	77.46	+40

Bessel Nulls for Frequency Modulation Systems

A listing of useful carrier and first order sideband nulls as a function of the modulation index (m) and the modulating frequency (F_m) is given below:

Null	$m = (\text{Dev.} / F_m)$		(FM)		(TV-MTS)		(SCA / PRO)	
	Modulation Index (m)	(F_m) for 75 kHz Deviation	Carrier	1st Sidebands	Carrier	1st Sidebands	Carrier	1st Sidebands
1st	$m = 2.405$	$m = 3.832$	31,185.0 Hz	19,572.0 Hz	10,395.0 Hz	6,524.0 Hz	2,079.0 Hz	1,304.8 Hz
2nd	$m = 5.520$	$m = 7.016$	13,587.0 Hz	10,689.9 Hz	4,529.0 Hz	3,563.3 Hz	905.8 Hz	712.7 Hz
3rd	$m = 8.654$	$m = 10.173$	8,666.5 Hz	7,372.5 Hz	2,888.8 Hz	2,457.5 Hz	577.8 Hz	491.5 Hz
4th	$m = 11.792$	$m = 13.323$	6,360.2 Hz	5,629.4 Hz	2,120.1 Hz	1,876.5 Hz	424.0 Hz	375.3 Hz
5th	$m = 14.931$	$m = 16.470$	5,023.1 Hz	4,553.7 Hz	1,674.4 Hz	1,517.9 Hz	334.9 Hz	303.6 Hz
6th	$m = 18.071$	$m = 19.616$	4,150.3 Hz	3,823.4 Hz	1,383.4 Hz	1,274.5 Hz	276.7 Hz	254.9 Hz
7th	$m = 21.212$	$m = 22.760$	3,535.7 Hz	3,295.3 Hz	1,178.6 Hz	1,098.4 Hz	235.7 Hz	219.7 Hz



Relationship of carrier and sideband amplitudes to modulation index

FREQUENCY IN HERTZ	DECIBELS
400 Hz	0.15 db
1,000	0.87
2,000	2.76
3,000	4.77
4,000	6.58
5,000	8.16
6,000	9.54
7,000	10.75
8,000	11.82
9,000	12.79
10,000	13.66
11,000	14.45
12,000	15.18
13,000	15.86
14,000	16.49
15,000	17.07

75 Microsecond pre-emphasis response

VOLTAGE STANDING WAVE RATIO RELATIONSHIPS

VSWR	REFLECTION COEFFICIENT	RETURN LOSS	POWER RATIO	PERCENT REFLECTED
1.01 : 1	.0050	46.1 dB	.00002	.002%
1.02 : 1	.0099	40.1 dB	.00010	.010%
1.04 : 1	.0196	34.2 dB	.00038	.038%
1.06 : 1	.0291	30.7 dB	.00085	.085%
1.08 : 1	.0385	28.3 dB	.00148	.148%
1.10 : 1	.0476	26.4 dB	.00227	.227%
1.20 : 1	.0909	20.8 dB	.00826	.826%
1.30 : 1	.1304	17.7 dB	.01701	1.7%
1.40 : 1	.1667	15.6 dB	.02778	2.8%
1.50 : 1	.2000	14.0 dB	.04000	4.0%
1.60 : 1	.2308	12.7 dB	.05325	5.3%
1.70 : 1	.2593	11.7 dB	.06722	6.7%
1.80 : 1	.2857	10.9 dB	.08163	8.2%
1.90 : 1	.3103	10.2 dB	.09631	9.6%
2.00 : 1	.3333	9.5 dB	.11111	11.1%
2.20 : 1	.3750	8.5 dB	.14063	14.1%
2.40 : 1	.4118	7.7 dB	.16955	17.0%
2.60 : 1	.4444	7.0 dB	.19753	19.8%
2.80 : 1	.4737	6.5 dB	.22438	22.4%
3.00 : 1	.5000	6.0 dB	.25000	25.0%
3.50 : 1	.5556	5.1 dB	.30864	30.9%
4.00 : 1	.6000	4.4 dB	.36000	36.0%
4.50 : 1	.6364	3.9 dB	.40496	40.5%
5.00 : 1	.6667	3.5 dB	.44444	44.4%
6.00 : 1	.7143	2.9 dB	.51020	51.0%
7.00 : 1	.7500	2.5 dB	.56250	56.3%
8.00 : 1	.7778	2.2 dB	.60494	60.5%
9.00 : 1	.8000	1.9 dB	.64000	64.0%
10.00 : 1	.8182	1.7 dB	.66942	66.9%
15.00 : 1	.8750	1.2 dB	.76563	76.6%
20.00 : 1	.9048	.9 dB	.81859	81.9%
30.00 : 1	.9355	.6 dB	.87513	87.5%
40.00 : 1	.9512	.4 dB	.90482	90.5%
50.00 : 1	.9608	.3 dB	.92311	92.3%

$$\text{VSWR} = \frac{1 + |p|}{1 - |p|} = \frac{1 + \sqrt{(\text{Prfl}/\text{Pfwd})}}{1 - \sqrt{(\text{Prfl}/\text{Pfwd})}}$$

$$\text{POWER RATIO} = (\text{Prfl}/\text{Pfwd})$$

$$p = \frac{\text{VSWR} - 1}{\text{VSWR} + 1} = \text{REFLECTION COEFFICIENT}$$

$$\text{RETURN LOSS} = -20 \log |p|$$

SYNCHRONOUS AM WAVEFORMS AND CALCULATIONS

DIRECT MEASUREMENT OF SYNCHRONOUS AM NOISE USING A HALF-WAVE PRECISION ENVELOPE DETECTOR AND OSCILLOSCOPE.

$$\text{RATIO} = \frac{\text{ACp-p VOLTS (AC MODULATION)}}{2 \times \text{DC VOLTS (RECTIFIED CARRIER)}}$$

SCOPE DISPLAY OF HALFWAVE ENVELOPE DETECTOR OUTPUT

$$\text{dB} = 20 \log_{10} (\text{RATIO}) \\ (\text{BELOW } 100\% \text{ EQUIV AM})$$

$$\% \text{AM} = 100 \times (\text{RATIO})$$

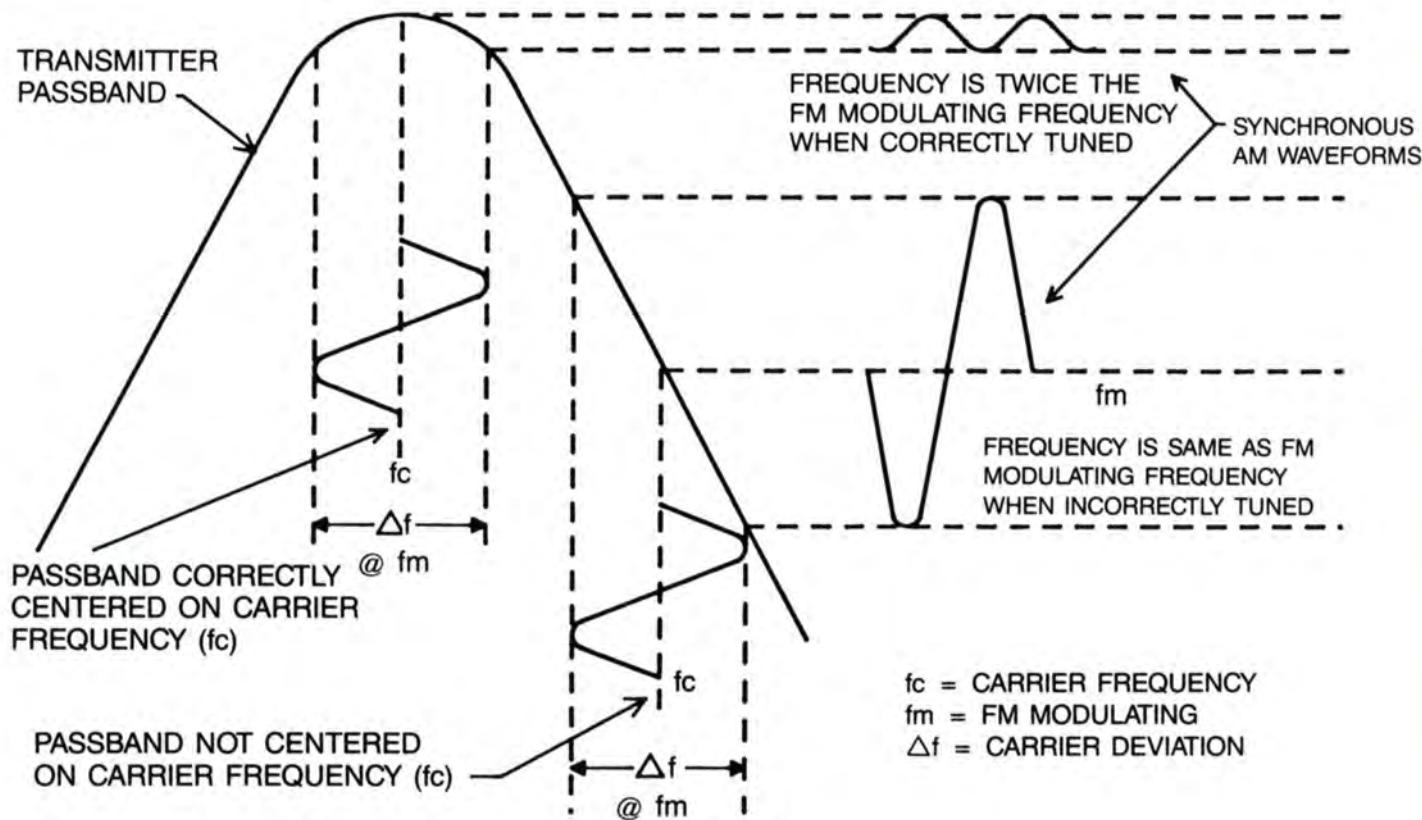
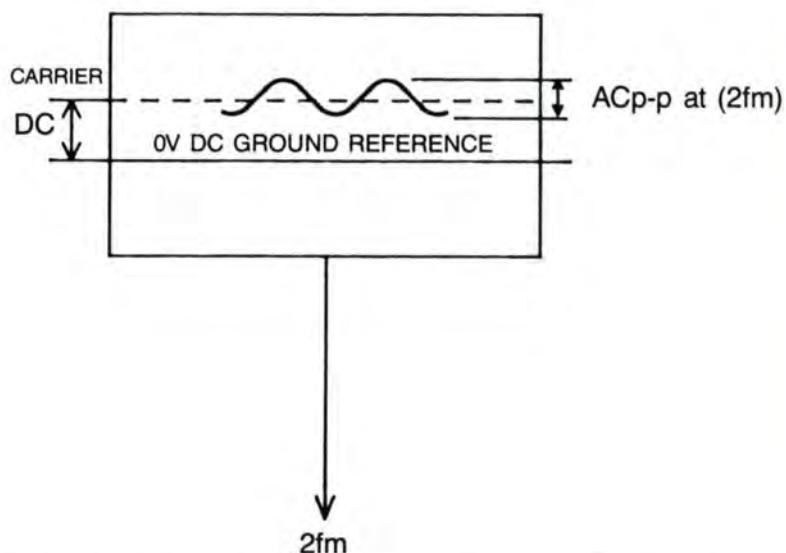
EXAMPLE:

$$\begin{array}{ll} \text{RECTIFIED CARRIER} & \text{DC} = 940 \text{MV} \\ \text{AC MODULATION} & \text{AC} = 4.6 \text{MV p-p} \end{array}$$

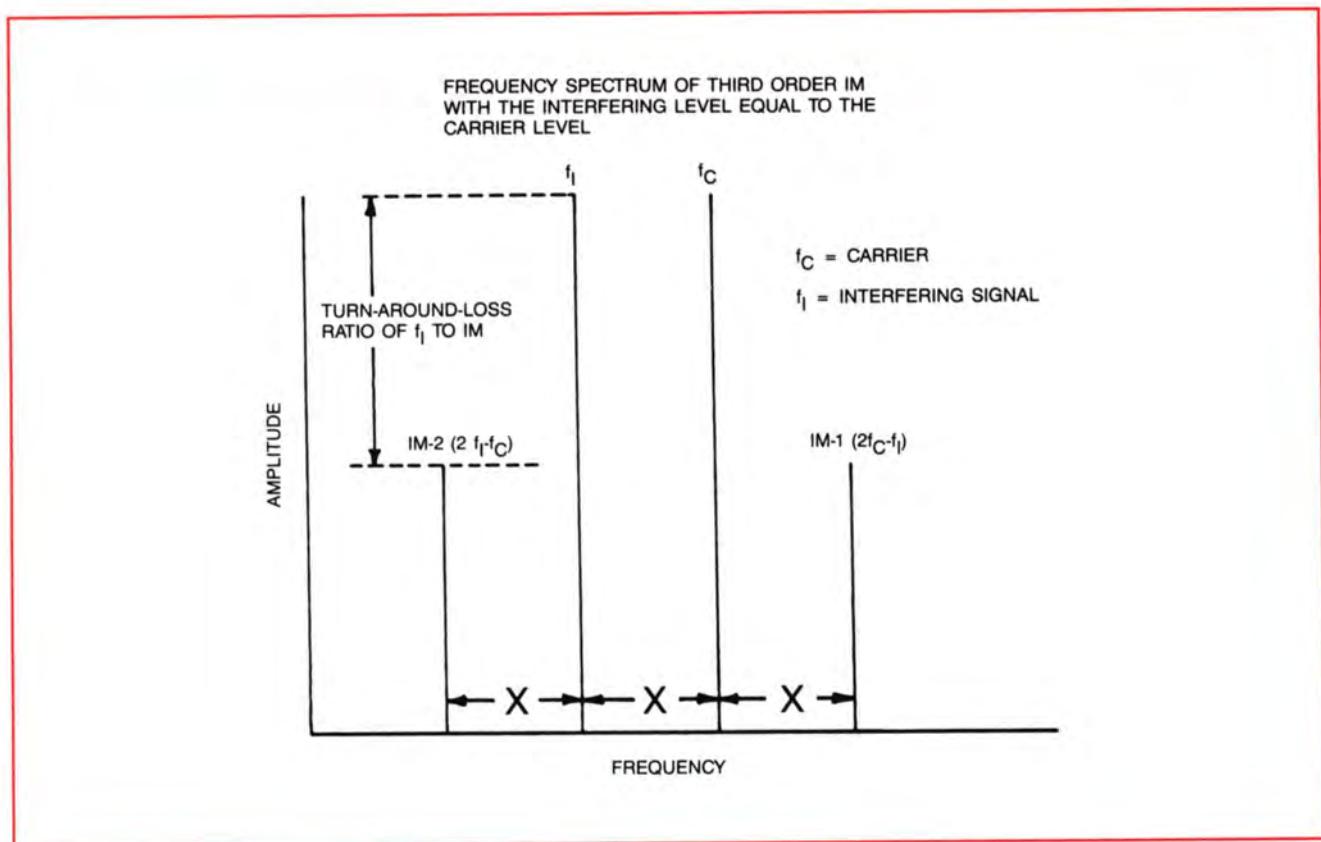
$$\text{RATIO} = \frac{4.6 \times 10^{-3}}{2 \times 940 \times 10^{-3}} = \frac{4.6 \times 10^{-3}}{1880 \times 10^{-3}} = .002447$$

$$\text{dB} = 20 \log_{10} (.002447) = -52.23 \text{dB}$$

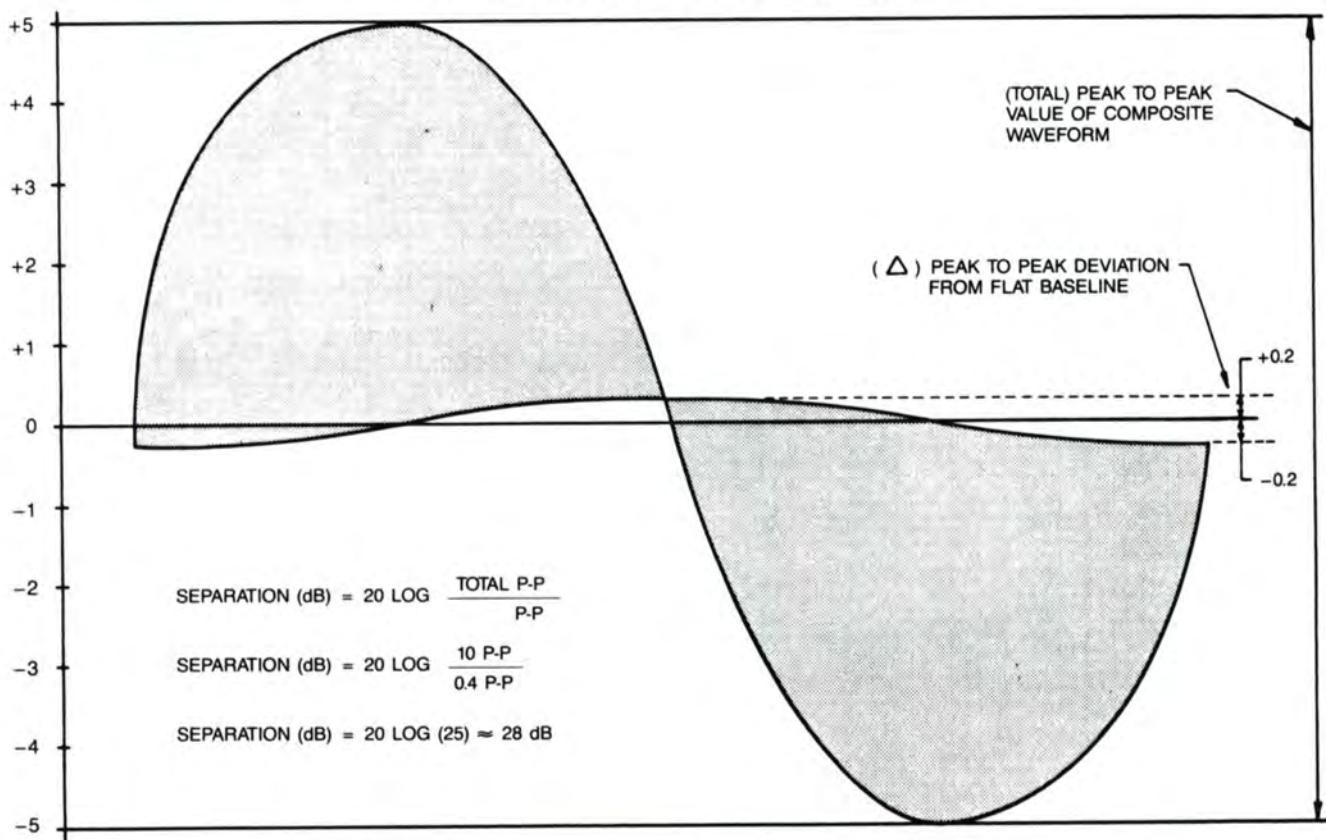
$$\% \text{AM} = 100 \times (.002447) = 0.25\%$$



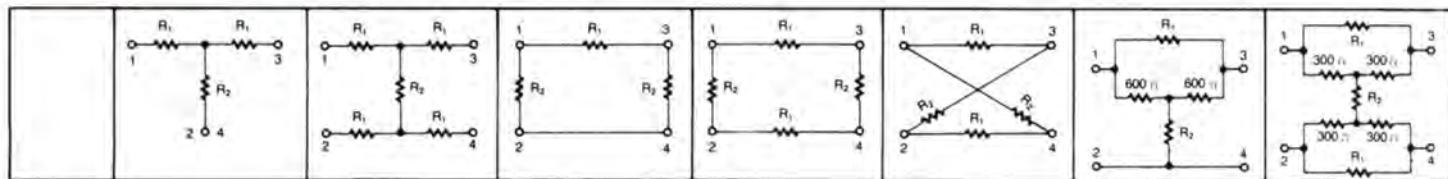
f_c = CARRIER FREQUENCY
 f_m = FM MODULATING FREQUENCY
 Δf = CARRIER DEVIATION



DIRECT MEASUREMENT OF STEREO CHANNEL SEPARATION FROM COMPOSITE WAVEFORM
(L+R AND L-R IN EQUAL RATIO WITHOUT PILOT)



Attenuator Networks



Impedance	600 Ohms		600 Ohms		600 Ohms		600 Ohms		600 Ohms		600 Ohms		600 Ohms	
Loss, dB	R ₁ Ohms	R ₂ Ohms	R_{1} Ohms	R_{2} Ohms	R_{1} Ohms	R_{2} Ohms	R_{1} Ohms	R_{2} Ohms	R_{1} Ohms	R_{2} Ohms	R_{1} Ohms	R_{2} Ohms	R_{1} Ohms	R_{2} Ohms
0	0	∞	0	∞	0	∞	0	∞	0	∞	0	∞	0	∞
0.1	3.58	50204	1.79	50204	7.20	100500	3.60	100500	3.58	100500	7.2	50000	3.6	50000
0.2	6.82	26280	3.41	26280	13.70	57380	6.85	57380	6.82	57380	13.8	26086	6.9	26086
0.3	10.32	17460	5.16	17460	20.55	34900	10.28	34900	10.32	34900	21.0	17143	10.5	17143
0.4	13.79	13068	6.90	13068	27.50	26100	13.80	26100	13.79	26100	28.2	12766	14.1	12766
0.5	17.20	10464	8.60	10464	34.40	20920	17.20	20920	17.20	20920	35.4	10169	17.7	10169
0.6	20.9	8640	10.45	8640	41.7	17230	20.85	17230	20.9	17230	43.2	8333	21.6	8333
0.7	24.2	7428	12.1	7428	48.5	14880	24.25	14880	24.2	14880	50.4	7143	25.2	7143
0.8	27.5	6540	13.75	6540	55.05	13100	27.53	13100	27.5	13100	57.6	6250	28.8	6250
0.9	31.02	5787	15.51	5787	62.3	11600	31.2	11600	31.02	11600	65.4	5504	32.7	5504
1.0	34.5	5208	17.25	5208	68.6	10440	34.3	10440	34.5	10440	73.2	4918	36.6	4918
1.5	51.8	3452	25.9	3452	104.3	6950	52.1	6950	51.8	6950	113.4	3174	56.7	3174
2.0	68.8	2582	34.4	2582	139.4	5232	68.7	5232	68.8	5232	155.4	2310	77.7	2316
2.5	85.9	2053	42.9	2053	175.4	4195	87.7	4195	85.9	4195	200.4	1796	100.2	1796
3.0	102.7	1703	51.3	1703	212.5	3505	106.2	3505	102.7	3505	247.8	1452	123.0	1452
3.5	119.2	1448	59.6	1448	258.0	3021	120.0	3021	119.2	3021	297.6	1209	148.8	1209
4.0	135.8	1249	67.9	1249	287.5	2651	143.8	2051	135.8	2651	351.0	1025	175.5	1025
4.5	152.2	1109	76.1	1109	324.6	2365	162.3	2365	152.2	2365	407.8	883.7	203.7	883.7
5.0	168.1	987.6	84.1	987.6	364.5	2141	182.3	2141	168.1	2141	466.8	771.2	233.4	771.2
5.5	184.0	886.8	92.0	886.8	405.9	1956	203.0	1956	184.0	1956	530.4	678.7	265.2	678.7
6.0	199.3	803.4	99.7	803.4	447.5	1807	223.8	1807	199.3	1807	597.0	693.0	298.6	603.0
6.5	214.6	730.8	107.3	730.8	492.6	1679	246.3	1679	214.6	1679	667.8	539.8	333.0	539.8
7.0	229.7	685.2	114.8	685.2	537.0	1569	268.5	1569	229.7	1569	743.4	484.3	371.7	484.3
7.5	244.2	615.6	122.1	615.6	584.7	1475	292.4	1475	244.2	1475	822.0	437.0	411.3	437.6
8.0	258.4	567.6	129.2	567.6	634.2	1393	317.1	1393	258.4	1393	907.2	396.8	453.6	396.8
8.5	272.3	525.0	136.1	525.0	685.5	1322	342.8	1322	272.3	1322	996.6	361.2	498.3	361.2
9.0	285.8	487.2	142.9	487.2	738.9	1260	369.4	1260	285.8	1260	1091	329.9	545.5	329.9
9.5	298.9	453.0	149.5	453.0	794.4	1204	397.2	1204	298.9	1204	1191	302.2	595.5	302.2
10.0	312.0	421.6	156.0	421.6	854.1	1154	427.0	1154	312.0	1154	1297	277.5	618.5	277.5
11.0	336.1	367.4	168.1	367.4	979.8	1071	489.9	1071	336.1	1071	1529	235.5	704.5	235.5
12.0	359.1	321.7	179.5	321.7	1119	1002	550.5	1002	359.1	1002	1788	201.3	804	201.3
13.0	380.5	282.8	190.3	282.8	1273	946.1	636.3	946.1	380.5	946.1	2080	173.1	1040	173.1
14.0	400.4	249.4	200.2	249.4	1443	899.1	721.5	899.1	400.4	899.1	2407	149.6	1204	149.6
15.0	418.8	220.4	208.4	220.4	1632	859.6	816.0	859.6	418.8	859.6	2773	129.8	1387	129.8
16.0	435.8	195.1	217.9	195.1	1847	826.0	923.2	826.0	435.8	826.0	3186	113.0	1598	113.0
17.0	451.5	172.9	225.7	172.9	2083	797.3	1042	797.3	451.5	797.3	3648	98.68	1824	98.68
18.0	465.8	152.5	232.9	152.5	2344	772.8	1172	772.8	465.8	772.8	4166	86.4	2083	86.4
19.0	479.0	136.4	239.5	136.4	2670	751.7	1335	751.7	479.0	751.7	4748	75.8	2374	75.8
20.0	490.4	121.2	245.2	121.2	2970	733.3	1485	733.3	490.4	733.3	5400	66.66	2700	66.66
22.0	511.7	95.9	255.9	95.9	3753	703.6	1877	703.6	511.7	703.6	6954	51.72	3477	51.72
24.0	528.8	76.0	264.4	76.0	4737	680.8	2369	680.8	528.8	680.8	8910	40.4	4455	40.4
26.0	542.7	60.3	271.4	60.3	5985	663.4	2992	663.4	542.7	663.4	11370	34.66	5685	31.66
28.0	554.1	47.8	277.0	47.8	7550	649.7	3775	649.7	554.1	649.7	14472	24.87	7236	24.87
30.0	563.0	37.99	281.0	37.99	9500	639.2	4750	639.2	563.2	639.2	18372	19.58	9186	19.58
32.0	570.6	30.16	285.3	30.16	11930	630.9	5967	630.9	570.6	630.9	23286	15.46	11643	15.46
34.0	576.5	23.95	288.3	23.95	15000	624.4	7500	624.4	576.5	624.4	29472	12.21	14736	12.21
36.0	581.1	18.98	290.6	18.98	18960	619.3	9480	619.3	581.1	619.3	37200	9.66	18630	9.66
38.0	585.1	15.11	292.5	15.11	23820	615.3	11910	615.3	585.1	615.3	47058	7.65	23529	7.05
40.0	588.1	12.00	294.1	12.00	30000	612.1	15000	612.1	588.1	612.1	59400	6.06	29700	6.06

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Please send me complete information on the following products:

Audio Equipment

- Digitalalk Solid State Voice Recorder Model DV-2
- Phase Trak 90 Stereo Cartridge Machine
- Cartridge Tape Machines (Single Deck)
- Three Deck Cartridge Tape Machines Five Deck
- Audio Control Consoles Mono Stereo
 - Rotary Attenuators Vertical Attenuators
- Number of Mixers: 4 5 8 10
 - 12 or more
- Tape Cartridge Winder Eraser
- Audio Distribution Amplifiers
- Turntables Tone Arms Turntable Preamplifiers
- Patch Panels Compressor/Limiters
- Program Automation Equipment

Transmitting Equipment

- FM Exciter Model FX-30
- FM Stereo Generator Model FS-30
- SCA Generator Model FC-30
- 100 Watt Solid State FM Transmitter
- 250 Watt Solid State FM Transmitter
- 300 Watt Solid State FM Transmitter
- 1.5KW FM Transmitter Model FM-1.5A
- 3.5KW FM Transmitter Model FM-3.5A
- 5KW FM Transmitter Model FM-5A
- 10KW FM Transmitter Model FM-10A
- 20KW FM Transmitter Model FM-20A
- 30KW FM Transmitter Model FM-30A
- 35KW FM Transmitter Model FM-35A
- 60KW FM Transmitter Model FM-60A
- 70KW FM Transmitter Model FM-70A
- Dual Combined or Main/Alternate Main FM Transmitter System
- Microprocessor Video Diagnostic System (MVDS) for FM Transmitters
- AX-10 AM Stereo Exciter, C-QUAM
- AS-10 AM Stereo/Modulation Monitor
- TZ-30 TV Stereo Generator
- FM Antenna Number Bays
- Other Equipment (Specify) _____

NAME _____ TITLE _____

STATION/ORGANIZATION _____

STREET ADDRESS _____

CITY _____ STATE/PROVINCE _____

ZIP/POSTAL CODE _____ COUNTRY _____

TELEPHONE _____ TELEX _____

MAIL THIS CARD FOR LITERATURE, PRICE AND DELIVERY INFORMATION ON FM TRANSMITTERS

Please send me technical information on the:

- 100 Watt FM Transmitter Model FM-100
- 250 Watt FM Transmitter Model FM-250
- 300 Watt FM Transmitter Model FM-300
- 1.5KW FM Transmitter Model FM-1.5A
- 3.5KW FM Transmitter Model FM-3.5A
- 5KW FM Transmitter Model FM-5A
- 10KW FM Transmitter Model FM-10A
- 20KW FM Transmitter Model FM-20A
- 30KW FM Transmitter Model FM-30A
- 35KW FM Transmitter Model FM-35A
- 60KW FM Transmitter Model FM-60A
- FX-30 FM Exciter
- FS-30 Stereo Generator
- FC-30 SCA Generator
- Microprocessor Video Diagnostic Option (MVDS)
- FM Antennas Number Bays _____
- FW-30 Exciter Switcher

- FD-2 Dual Transmitter Controller
 - FA-2 Transmitter Output Switcher
 - FO-2 Optional Transmitter Output Switcher
- NOTE: If requesting price quotation on any one of above switchers or controllers, please indicate make and model number of existing equipment:

Transmitter is: _____

Exciter is: _____

I'm interested in Price and Delivery. Please send me a quotation on the following:

- FM Transmitter (Specify power) _____ kW. FM Antenna (Specify number of bays) _____
- FX-30 FM Exciter FS-30 Stereo Generator FC-30 SCA Generator
- FW-30 Exciter Switcher FD-2 Dual Transmitter Controller FA-2 Transmitter Output Switcher FO-2 Optional Switcher

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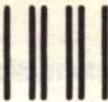
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