

# RADIO CORPORATION OF AMERICA

INDUSTRIAL ELECTRONIC PRODUCTS

CAMDEN 2, NEW JERSEY



September, 1960

Dear Radio Broadcaster:

Enclosed is a group of new catalog folders to supplement the data in your Broadcast Equipment Catalog. These will bring you up-to-date with the latest RCA products and product improvements.

While many of these folders are revisions to explain latest equipment improvements and include most recent performance specs, several of them introduce brand new equipment which deserves particular note.

### New Velocity Microphone

This is a new version of the old favorite 44-BX -- now packaged in a more compact form. Its called the BK-11A Velocity Microphone and combines the latest developments in ribbon microphone design with all the advantages of the previous 44-BX and Junior Velocity mikes. The result is full fidelity performance. The figure eight pattern is easily adjusted for optimum voice or music pickup, making the BK-11A your best choice for a general purpose microphone.

### Monitoring Amplifier

Here's a brand new, completely transistorized monitoring amplifier with self-contained power supply and the capability of delivering a full ten watts of audio output. The BA-34A requires only one-third the power of equivalent tube type units. Mounting space requirements are also reduced. The 104 db gain of this amplifier permits it to be driven directly from microphones, transcription pickups, or other low level devices. The plug-in series of transistor amplifiers also includes the BA-31A Preamplifier and the BA-33A Program Amplifier.

*RCA Pioneered and Developed Compatible Color Television*



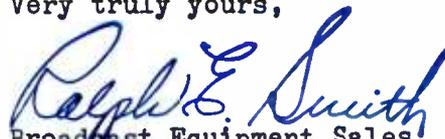
New AM and FM Transmitters

A new concept in AM transmitters is the high-efficiency BTA-5T. This 5 KW unit operates with 90% plate power efficiency which can save the average station 15,000 KW hr/year in power consumption. Silicon rectifiers throughout help reduce power consumption even more.

For low power FM stations there is the new 1 KW BTF-1D transmitter. A single tube power amplifier follows the exciter to produce one of the most simplified units available. For full fidelity FM operation the BTF-1D is a top value.

Very truly yours,

7901 Empire Freeway  
Dallas, Texas

  
Broadcast Equipment Sales

R. E. Smith

LIST OF ENCLOSURES

Audio	BK-10B Ultradirectional Microphone	B. 1002
	BK-11A Velocity Microphone	B. 1024
	BA-31A Preamplifier and Isolation Amplifier	B. 1406
	BA-33A Program Amplifier	B. 1408
	BA-34A Monitoring Amplifier	B. 1410
	BQ-2C Three-Speed Turntable	B. 1617
	Recommended Wiring Practices	B. 1904
Transmitter AM/FM	BTA-5T 5 KW AM Broadcast Transmitter	B. 6508
	BTF-1D 1 KW FM Broadcast Transmitter	B. 6543





# PROGRAM AMPLIFIER

TYPE BA-33A

CATALOG

B.1408



## DESCRIPTION

The BA-33A is a high-fidelity Program Amplifier designed for broadcast service. It incorporates full transistor circuitry providing the advantages of small, compact design, uniform performance, reduced power consumption and long-life expectancy for the amplifier. The high gain and low distortion of the unit make it an ideal choice for use as a program or line amplifier, bridging amplifier or as an isolation amplifier.

The BA-33A is a plug-in type designed for use with the BR-22 Mounting Shelf. This shelf permits quick, easy removal for servicing or interchanging units. Three BA-33A Program Amplifiers as well as one BA-31A Transistor Pre-amplifier can be accommodated on the mounting shelf. All connections are made through plugs at the back of the amplifier. The mating sockets are supplied with the amplifier. Etched wiring boards are used and the circuitry and all components are readily accessible.

The amplifier circuit consists of a loaded input transformer and a two-stage negative feedback preamplifier, followed by a continuously variable gain control that is adjustable from the front panel. The control connects to a negative feedback output amplifier employing five transistors. The output amplifier, in turn, drives an output transformer. Levels as high as +30 dbm (1 watt) can be supplied at the output. The self-contained power supply consists of a full-wave bridge rectifier and a three-section filter to assure low ripple. A strap is provided for either 55 or 70 db of maximum gain. The unit is shipped strapped for 70 db gain. A bridging pad is built into the amplifier.

## FEATURES

- Transistor circuit design and etched wiring provide uniform performance
- Cool operation
- Long-life expectancy—reduced maintenance
- Self-contained power supply
- Excellent frequency response
- Front panel gain control
- Plug-in chassis for shelf mounting

## SPECIFICATIONS

Source Impedance.....	600/150 ohms, balanced or unbalanced
Input Impedance	
Matching.....	Connected when shipped for 600 ohms; may be re-connected for 150 ohms
Bridging.....	20,000 ohms
Load Impedance.....	600 ohms when shipped; may be changed to 150 ohms
Maximum Input Level	
Matching.....	-20 dbm
Bridging.....	+18 dbm
Frequency Response.....	Better than $\pm 1$ db, 30 to 15,000 cps (referred to 1000 cps)
Maximum Output Level.....	+30 dbm
Harmonic Distortion.....	0.5% rms max. +30 dbm output, 30 to 15,000 cps
Matching Gain	
High Gain Connection.....	70 $\pm 1$ db
Low Gain Connection.....	55 $\pm 1$ db
Bridging Gain	
High Gain Connection.....	33 $\pm 2$ db
Low Gain Connection.....	17 $\pm 2$ db
Maximum Ambient Temperature.....	55°C (131°F)
Noise Level at Output	
High Gain.....	-47 dbm max., 30 to 15,000 cps
Low Gain.....	-62 dbm max., 30 to 15,000 cps
Transistor and Diode Complement	
2-2N1010      2-2N526      3-2N553      4-1N2069	
Power Requirement.....	117 volts, a-c, 50/60 cycles, 20 watts (transformer taps at 105, 115 and 125 V)
Fuse.....	3/4 amp 3AG Slow-blow
Overall Dimensions.....	4-21/32" high, 5" wide, 13 1/2" deep (11.8 cm high, 12.7 cm wide, 34.3 cm deep)
Weight.....	10 lbs. (4.5 kg.)
Finish.....	Light umber gray lacquer
Mounting.....	Plug-in mounting on BR-22 Mounting Shelf, requires 3/10 the shelf
Stock Identification (includes transistors).....	MI-11446

## Accessories

BR-22 Mounting Shelf.....	MI-11597
Step Attenuator.....	MI-11751-5
Spare Kit of Transistors and Diodes.....	MI-11781

7KB



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Broadcast & Television Equipment  
Camden, N. J.

TRA(s) ®

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BA 33A Pr

BA 31 - Preamp - 135 ————— 15.49 -  
 BA 33A Preamp 235 ————— 33.62  
 10 watt monitor BA 34 - 252  
 #35.44

~~15.1~~

Tape recorder - 1375 -  
 Monaural use -

1/4  
12

252  
 235 -  
 405

135  
 3  
 405 -

892

James - BA 26 - 120 - 120 -

*(Signature)*  
*(Signature)*

### Completely Transistorized

The RCA RT-21A Professional Audio Tape Recorder has been designed to provide dependable low cost, low maintenance operation. Utmost flexibility is provided in this all new completely transistorized design. The basic recorder is supplied in two sections, a tape transport panel and a control panel, which readily enables either a custom or standard installation to be made. The equipment is normally supplied for rack mounting. Provisions for mounting a duplicate record/playback module for stereo recording have been made. The RT-21A is supplied with dual half-track record/reproduce and erase heads so with little added expense stereo can be had when desired.

### Monaural or Stereo

The control panel of the RT-21A is divided into three sections. The left contains the monaural record/playback module, the center area contains provisions for a duplicate module (used for stereo recording) and the right side of the control panel contains operating controls in a convenient grouping.

The record/playback modules are identical in construction and are directly interchangeable. Front panel controls consist of the following: a record level control, playback level control, headset jack, bias adjustment and meter function selector to monitor, playback, record, bias and erase signals.

### Continuously Variable Speed Control and Interlocked Record Operation

The operating controls consist of the following: variable cue speed and related cue delegate button, record, start, stop, fast forward and fast reverse. The control panel features an interlocked record operation. This means that to place the machine in the record mode, the record button must first be depressed and then the start button to begin operation. A record tally indicator is also provided and illuminates only after the record button is depressed. Rewind may be selected from stop position only. All controls are DC relay operated. The necessary 24 v. dc control voltages are generated within the recorder and are also available for remote control purposes.

### 3¼ and 7½ in./sec. Tape Speed Provided (15 in./sec. available)

The RT-21A Tape Transport Panel accommodates either standard 10½-inch NAB reels or 7-inch EIA reels. Proper tape tension for 10½ or 7-inch reels is provided by means of a toggle switch at the lower right of the panel. Also located in this same area are the main power on-off switch and a switch for selecting either high or low tape speeds. Proper tape equalization is automatically selected by the speed change switch. If desired 7½ and 15-inch tape speeds can be provided.

### Easy Threading . . . Sapphires Used to Lift and Guide Tape

Threading of tape is simple and can be done without removal or movement of the head cover. A micro-switch located on the take-up tension arm turns off the machine in case of tape breakage or end of tape. Sapphire tape guides are used throughout.

### DC Solenoid Operated Tape Lifters

These are employed to lift the tape away from all magnetic heads whenever the machine is in the fast forward or fast reverse mode of operation. When the cue mode is selected, tape is then lifted from all heads except the playback head. This permits the operator to listen to the audio as he jockeys the tape for final cueing via the continuously variable speed control.

### Half-Track Recording With Full or Quarter Track Optional

A total of four magnetic head positions are available. The three heads normally supplied with the equipment provide dual half-track recording and erase as well as dual half-track or full-track playback. Full-track and dual-quarter-track record heads are available on request. An optional fourth head may be used for time delay broadcast and other applications. All azimuth head adjustments are available from the front panel by simply removing the snap-on protective cover.



Monaural Amplifier, MI-41351, and Control Panel, MI-41321, are convenient plug-in modules.

# CHECK THESE ADVANCED NEW FEATURES . . .

Completely transistorized



Continuously variable cue  
speed control



Easy access to all components



Tape lifters (DC solenoid  
operated)



Sapphires used to lift and  
guide tape



Interlocked record operation



Provision for addition  
of stereo channel



DC remote control



3 $\frac{3}{4}$  and 7 $\frac{1}{2}$  in./sec. tape speed  
provided (15 in./sec. available)



Rack or console mounting



Half-track recording with full or  
quarter track optional

## SPECIFICATIONS

Tape Type.....	1/4" wide magnetic
Reels.....	10 1/2" dia. (NAB); 7" or smaller (EIA)
Tape Speed.....	7.5 and 3.75 inches per sec.
Starting Time.....	0.1 sec.
Stopping Time.....	2 inches of tape at 7.5 ips
Playback Timing Accuracy.....	±3.0 secs. in 30 min.
Flutter and Wow.....	0.15 rms at 7.5 ips
Rewind Time.....	Approx. 90 sec. for 2400 feet on NAB reel
Track Width.....	Full track, half track or quarter track. Machine as shipped to be dual half track
Frequency Response:	
7.5 ips.....	±2 db 40-10,000 cps.
	±4 db 30-15,000 cps.
3.75 ips.....	±2 db 50-7500 cps.
Signal to Noise Ratio:	
7.5 ips.....	55 db half track
3.75 ips.....	50 db half track
Record Input:	
Matching.....	150/600 ohms
Bridging.....	20,000 ohms
Record Input Level:	
Matching.....	-70 to -20 dbm
Bridging.....	-30 to +20 dbm
Record Output Load.....	600 ohms
Record Output Level.....	18 dbm max.
Playback Output Load.....	600 ohms
Playback Output Level.....	18 dbm max.
Distortion at Max. Recording Level.....	3%
Meter.....	VU, 3 1/2" illuminated
Power Requirements.....	105-125 v., 60 cps, single phase
Power Supplies (amplifier and control circuit).....	Self contained
Erase and Bias Oscillator Frequency.....	80 kc
Cue Speed.....	Continuously variable in either direction
Remote Control.....	Optional; low voltage for all functions except cue
Dimensions (overall):	
Tape Transport.....	19" wide, 15 3/4" high, 9" deep
Amplifier-Control Panel.....	19" wide, 5 1/4" high, 9" deep
<b>EQUIPMENT SUPPLIED</b>	
Type RT-21 Professional Audio Tape Recorder (Dual Half Track).....	ES-41921-A
Comprising the following:	
1 Tape Transport.....	MI-41121-A
1 Amplifier Module and Control Panel.....	MI-41321
Type RT-21 Professional Tape Recorder (Stereo).....	ES-41921-A5
Comprising the following:	
1 Tape Transport.....	MI-41121-A
1 Amplifier Module and Control Panel.....	MI-41321
1 Record/Playback Amplifier Module.....	MI-41351
<b>OPTIONAL AND ACCESSORY EQUIPMENT</b>	
Record/Playback Amplifier Module.....	MI-41351



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Broadcast & Television Equipment

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# ULTRADIRECTIONAL MICROPHONE

TYPE BK-10B

CATALOG

B.1002

## FEATURES

- Simplifies microphone and camera placement problems—ultra-directional characteristics provide quality pickup under adverse conditions
- Lightweight for TV boom operation
- High quality reproduction over entire audio frequency range
- Maximum sensitivity lies on major mechanical axis
- Rugged construction—improved resistance to gun blasts
- Improved long-life flexible cable

## USE

The RCA Type BK-10B Ultradirectional Microphone is designed to provide quality audio pickup under adverse conditions during television broadcast, radio broadcast, recording and public address. This is accomplished by a highly sensitive second order gradient unidirectional characteristic which may be used to increase the signal to noise ratio of the microphone.

The response pattern and the improved signal to noise ratio of the BK-10B greatly simplifies microphone and camera placements; and allows for greater distance between the microphone and the talent than heretofore possible. It is especially effective for TV studio boom use in high noise areas. Other uses indicated for the new microphone are: situations where feedback from monitor speakers is a problem; and controlling the level of the leading voice in a choral group or solo instruments in an orchestra. The microphone incorporates a filter which effectively reduces the possibility of damage to the instrument from sharp blasts and other violent noises. When mounted on a boom stand the axial directivity makes the microphone very easy to handle so as to keep the sound source "in focus."



## DESCRIPTION

The Type BK-10B Ultradirectional Microphone is a dependable high quality ribbon instrument having a second order gradient unidirectional characteristic with uniform frequency response of 80 to 15,000 cycles. Excellent directivity is accomplished by matching and combining the electrical outputs of two unidirectional ribbon microphone elements.

The unidirectional microphone elements are similar in construction and performance to those used in the BK-5A Microphone. Each element has a thin corrugated metallic ribbon clamped under light tension. The ribbon is placed between the poles of a magnetic circuit. One side of the ribbon is open to the atmosphere, and the other side opens into an acoustical labyrinth which has phase shift openings. The labyrinth of each microphone element houses an impedance matching transformer. Each element has its own blast filter. In addition, the transformers are exceptionally well shielded against stray magnetic fields.

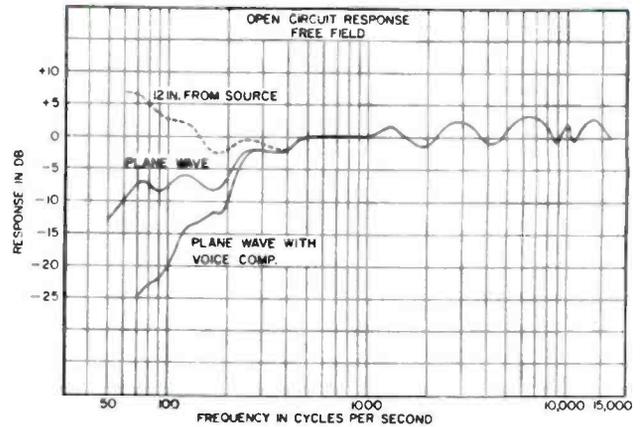
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## DESCRIPTION (Continued)

The BK-10B will perform satisfactorily in high hum fields because of its improved wiring and shielding. The elements are carefully matched so that the performance of each complements the other. In addition, the shock isolation mounting provided incorporates improved compact design features. This mount does not generate any noise and isolates the microphone effectively from its support. There are no rubber band mountings to wear out. The cable supplied with the microphone is braided tinsel cord 18 inches long which has been especially designed to attenuate "stand" noise.

The BK-10B has a low-gloss finish, which with compact mounting arrangement, provide minimum light reflection and minimum shadow. The output impedance of the microphone is 200 ohms for 150- and 250-ohm unloaded input transformers but may be changed at the terminal board to 40 ohms for 30- and 50-ohm input transformers. The output level is maintained at -55 dbm, and hum pick-up is reduced to a level of -128 dbm.

Frequency Response Curves for BK-10B Microphone.



## SPECIFICATIONS

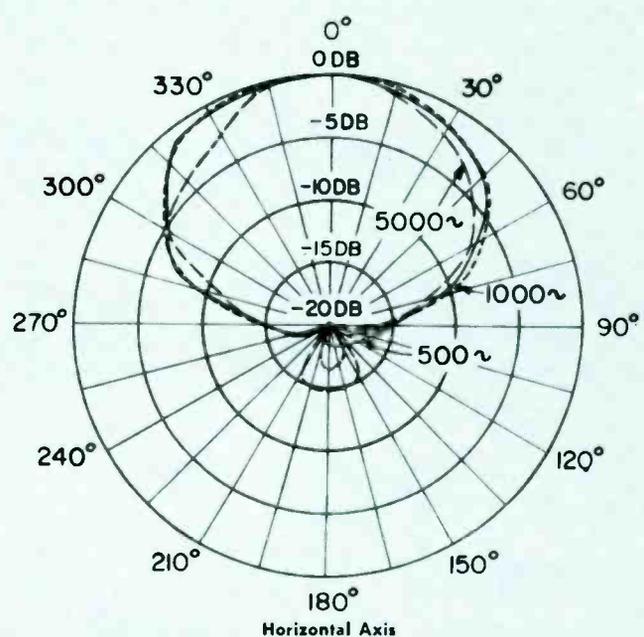
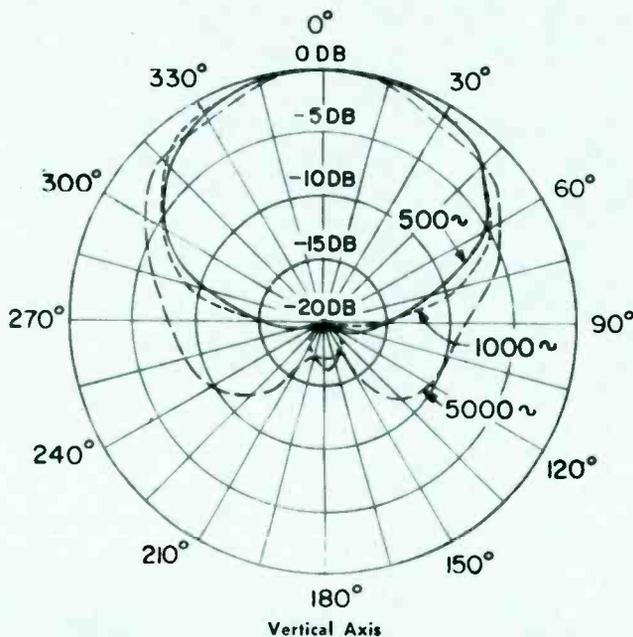
Directional Characteristic.....	Unidirectional 2nd Order Gradient Characteristic
Frequency Response.....	80 to 15,000 cps
Output Impedance.....	200 or 40 ohms
Load Impedance.....	Unloaded input transformer
Effective Output Level at 1000 cps.....	-55 dbm
EIA Rating (Gm).....	-147 db
*Hum Pickup Level.....	-128 dbm
Cable.....	3 conductor, braided tinsel, 18 inches long
Dimensions (overall).....	10 7/8" x 1 3/4" dia.
Weight.....	2 lb., 12 oz. (less cable)
Finish.....	Two Tone, Black and Low gloss gray enamel
Stock Identification.....	MI-11018-B
Boom Mounting.....	Accepts studs up to 1/16" dia.

## Accessories

Microphone Boom and Stand.....	MI-11056
Microphone Boom and Perambulator.....	MI-26574
Microphone Boom and Stand.....	MI-11070

\*Relative to a field of  $1 \times 10^{-3}$  gauss

BK-10B DIRECTIONAL CHARACTERISTICS



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# VELOCITY MICROPHONE

TYPE BK-11A

CATALOG

**B**.1024

## FEATURES

- Famous RCA styling — rugged construction
- Excellent reproduction of the entire audio frequency range
- No loss in quality with off axis pickup
- Artists may be placed on both sides of the microphone
- Pickup of reflected sound reduced
- Response may be adjusted to provide best possible frequency characteristics for either vocal or musical pickup
- Unaffected by temperature, humidity or air pressure
- Exceptionally good shielding permits operation in high hum fields



## APPLICATIONS

The BK-11A is intended primarily for AM, FM and TV studio use where a microphone of highest quality reproduction is desired. It has the following general uses:

### BROADCAST STUDIO

General program and announce.

Plays where the players may be grouped around the microphone.

Conference pickup where the participants are seated on opposite sides of a table.

Programs where studio acoustics are more live than optimum.

Programs where the microphones may be positioned to reduce audience noise.

Programs where the direction pattern permits orientation to eliminate undesirable reflections from walls.

### BROADCAST REMOTE

General program and announce.

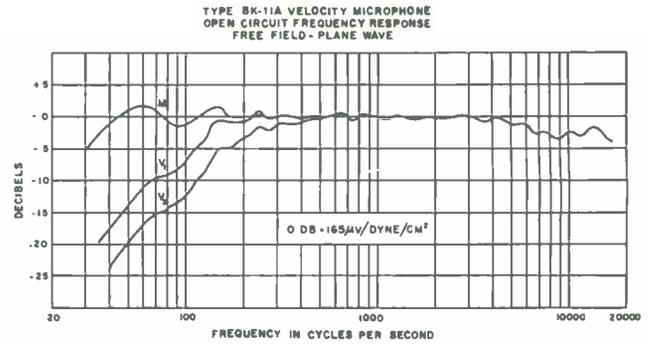
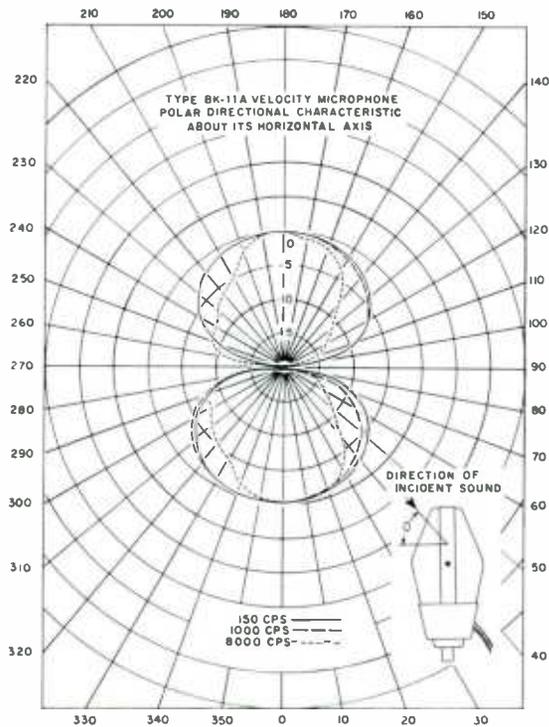
Plays and other stage presentations where the microphone may be suspended overhead and angled to reduce audience noise.

Programs where the directional properties reduce the effect of an overly reverberant location. The BK-11A microphone is not recommended for outdoor use because of the relative sensitivity of the microphone to wind.

3KB

## DESCRIPTION

The BK-11A Velocity Microphone is a dependable bi-directional microphone in which the moving element is a thin, corrugated metallic ribbon supported at the ends and placed between the pole pieces of a magnetic circuit. Because of its light weight, the motion of the ribbon corresponds very closely to the velocity of the air particles and the voltage generated in it is, therefore, a reproduction of the sound waves which traverse it. The microphone is free of the effects of cavity resonance, diaphragm resonance and pressure doubling. The BK-11A is well shielded against stray magnetic fields and can perform satisfactorily in high hum fields. Acoustically designed sturdy stainless steel screens protect the microphone from mechanical injury. Internal isolation is provided between the case and the element so that no external shock mounting is required for the BK-11A. The bottom portion of the microphone contains the impedance matching transformer, frequency compensating reactor and three-point switch for selecting optimum frequency response characteristics for voice or music. The switch shaft is slotted and accessible through a hole in the mounting base. The microphone is supported by a swivel mounting which permits a 45 degree forward or backward tilt. It is designed to mate with the RCA MI-11008 and MI-4092-E desk stands or floor stands with a 1/2-inch standard pipe thread. A 30-foot flexible cable supplied with the microphone makes use of tinned cadmium bronze wire to provide longer life.

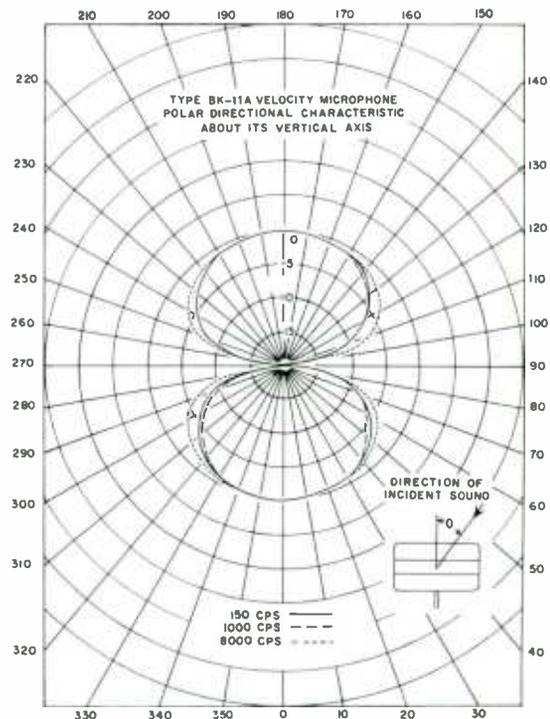


## SPECIFICATIONS

Frequency Response.....	30 cps to 15,000 cps
Directional Characteristics .....	Bi-directional
Output Impedance.....	30, 150 and 250 ohms
Load Impedance.....	Unloaded input transformer
Effective Output Level at 1000 cps.....	-56 dbm (referred to a sound pressure of 10 dynes/cm <sup>2</sup> )
EIA Rating (Gm - 250 ohms connection).....	-147 db
Hum Pickup Level (relative to field of 1 x 10 <sup>-3</sup> gauss).....	-130 dbm (M position)
Response Compensation:	
Switch V <sub>1</sub> .....	Approx. 6 db @ 100 cps
Switch V <sub>2</sub> .....	Approx. 11 db @ 100 cps
Cable.....	3 conductor, shielded, 30 ft. (no plug)
Stand Fitting.....	1/2" pipe thread
Provisions for tilting.....	Swivel providing up to ±45° tilt from vertical
Dimensions (overall).....	8" high, 2 7/8" wide, 2 3/8" deep
Weight .....	2 lbs. less cable
Finish.....	Low gloss deep umber gray and non-reflecting stainless steel
Stock Identification .....	MI-11019

## Accessories

Desk Stand .....	MI-11008
Desk Stand .....	MI-4092-E
Portable Stand .....	MI-4093-C



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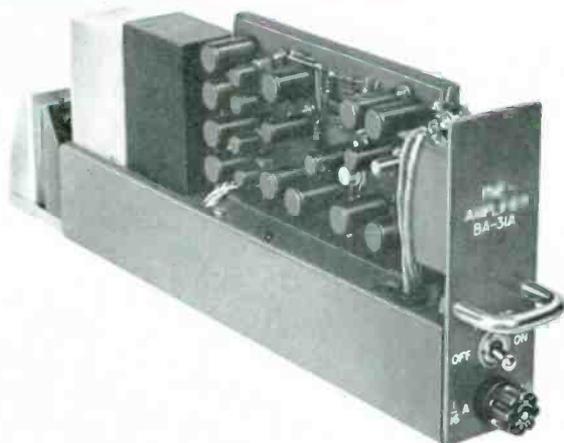


# PREAMPLIFIER AND ISOLATION AMPLIFIER

TYPE BA-31A

CATALOG

B.1406



## FEATURES

- Transistor design
- Long life expectancy—reduced maintenance
- Cool operation
- Self-contained power supply
- Excellent frequency response
- High gain, low noise circuitry
- Plug-in chassis for shelf mounting

## DESCRIPTION

The BA-31A Preamplifier is a small, compact unit featuring complete transistor circuitry design and is intended for use as a microphone preamplifier, turntable preamplifier or booster amplifier. With the addition of the MI-11278-E or F volume control kit, which mounts external to the amplifier, the BA-31A is provided with a 20,000 ohm input and may be used as a bridging or isolation amplifier.

Cool operation, achieved by low power dissipation, makes possible a trouble-free, long-life expectancy for this amplifier. Noise level and distortion have been reduced to a very low value through proper circuit design and the use of stabilized feedback. Transistor selection to produce low noise is not required in the BA-31A. The amplifier is constructed on a plug-in type chassis that is designed for mounting on a BR-22 Shelf.

The BA-31A circuit consists of an unloaded input transformer, a two-stage negative feedback amplifier, and a four-transistor output amplifier. The output amplifier drives a transformer which can be strapped for 150 or 600 ohm loads. The power transformer isolates the amplifier from the power line, and an additional transistor in the power supply reduces ripple.

There are two matching gains available—40 or 46 db—selected by a strap. The unit is shipped with the gain strapped for 40 db. The frequency response is better than  $\pm 1$  db from 30 to 15,000 cps (referred to 1000 cps); and the noise level is  $-82$  dbm or  $-76$  dbm max. at output, depending on gain strapping. As a bridging amplifier, the BA-31A has a 9 db max. gain with the volume control at minimum loss position and bridging a 600-ohm line.

## SPECIFICATIONS

Source Impedance.....	37.5 ohm unbalanced; 150/600 ohm balanced or unbalanced
Input Impedance	
Matching.....	Unloaded transformer, high in comparison with source impedance
Bridging.....	20,000 ohms (using external bridging control)
Load Impedance.....	600 ohms when shipped; may be changed to 150 ohms
Maximum Input Level	
Matching.....	$-22$ dbm low gain strapping, $-28$ dbm high gain strapping
Bridging.....	30 dbm
Gain	
Matching.....	40 $\pm 1$ db low strapping (as shipped) 46 $\pm 1$ db high strapping
Bridging.....	3 db low strapping, 9 db high strapping
Frequency Response.....	Better than $\pm 1$ db from 30 to 15,000 cps (referred to 1000 cps)
Rated Output Level and Distortion.....	Total rms harmonic distortion at $+18$ dbm output less than 0.5% from 30 to 15,000 cps
Hum and Noise Level.....	$-82$ dbm or $-76$ dbm max. at output, depending on gain strapping, measured from 30 to 15,000 cps
Maximum Ambient Temperature.....	55°C (131°F)
Transistor and Diode Complement	
1—2N1010	1—2N404
5—2N270	2—1N2069
Fuse.....	1/16 amp. 3AG Slow-Blow
Power Requirements.....	117 volts, a-c, 50/60 cycles, 3.5 watts (with taps for 105, 115 and 125 volts)
Overall Dimensions.....	4-21/32" high, 1 5/8" wide, 13 1/2" deep (11.8 cm high, 4.1 cm wide, 34.3 cm deep)
Weight.....	3 1/2 lbs. (1 1/6 kg.)
Finish.....	Light amber gray lacquer
Mounting.....	Plug-in mounting on BR-22 Mounting Shelf requires 1/10 of the shelf
Stack Identification (includes transistors).....	MI-11444

## Accessories

Bridging Gain Control Kit	
With Screw-driver Adjustment.....	MI-11278-F
With Knob Adjustment.....	MI-11278-E
BR-22 Mounting Shelf for Rack Mounting	
1 to 10 Preamplifiers.....	MI-11597
Spare Transistor and Diode Kit.....	MI-11780

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# PROGRAM AMPLIFIER

TYPE BA-33A

CATALOG  
**B**.1408



## DESCRIPTION

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## FEATURES

- Transistor circuit design and etched wiring provide uniform performance
- Cool operation
- Long-life expectancy—reduced maintenance
- Self-contained power supply
- Excellent frequency response
- Front panel gain control
- Plug-in chassis for shelf mounting

## SPECIFICATIONS

Source Impedance.....	600/150 ohms, balanced or unbalanced
Input Impedance	
Matching.....	Connected when shipped for 600 ohms; may be re-connected for 150 ohms
Bridging.....	20,000 ohms
Load Impedance.....	600 ohms when shipped; may be changed to 150 ohms
Maximum Input Level	
Matching.....	-20 dbm
Bridging.....	+18 dbm
Frequency Response.....	Better than $\pm 1$ db, 30 to 15,000 cps (referred to 1000 cps)
Maximum Output Level.....	+30 dbm
Harmonic Distortion.....	0.5% rms max. +30 dbm output, 30 to 15,000 cps
Matching Gain	
High Gain Connection.....	70 $\pm$ 1 db
Low Gain Connection.....	55 $\pm$ 1 db
Bridging Gain	
High Gain Connection.....	33 $\pm$ 2 db
Low Gain Connection.....	17 $\pm$ 2 db
Maximum Ambient Temperature.....	55°C (131°F)
Noise Level at Output	
High Gain.....	-47 dbm max., 30 to 15,000 cps
Low Gain.....	-62 dbm max., 30 to 15,000 cps
Transistor and Diode Complement	
2-2N1010      2-2N526      3-2N553      4-1N2069	
Power Requirement.....	117 volts, a-c, 50/60 cycles, 20 watts (transformer taps at 105, 115 and 125 V)
Fuse.....	3/4 amp 3AG Slow-blow
Overall Dimensions.....	4-21/32" high, 5" wide, 13 1/2" deep (11.8 cm high, 12.7 cm wide, 34.3 cm deep)
Weight.....	10 lbs. (4.5 kg.)
Finish.....	Light umber gray lacquer
Mounting.....	Plug-in mounting on BR-22 Mounting Shelf, requires 3/10 the shelf
Stock Identification (includes transistors).....	MI-11446

## Accessories

BR-22 Mounting Shelf.....	MI-11597
Step Attenuator.....	MI-11751-5
Spare Kit of Transistors and Diodes.....	MI-11781

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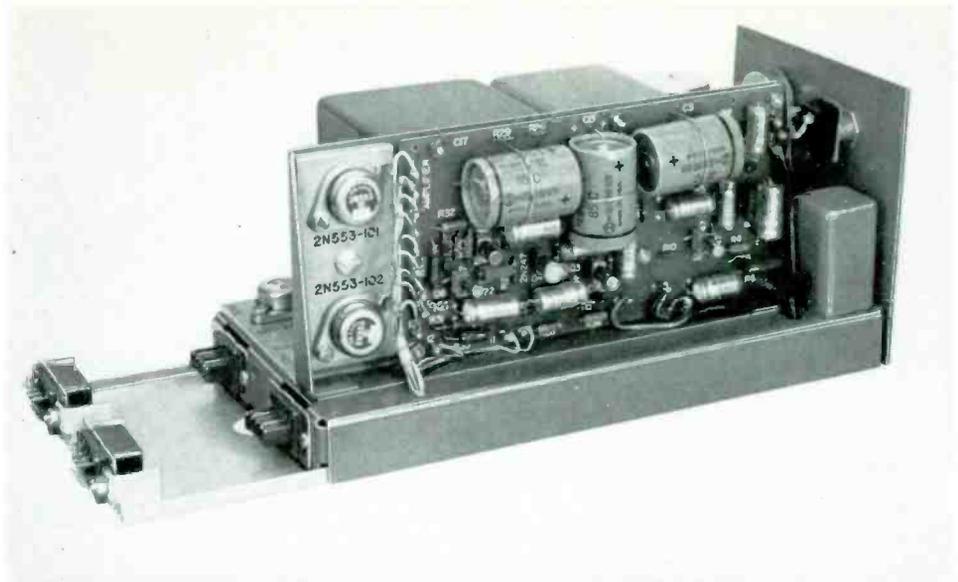
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View of BA-34A Amplifier showing transistors, diodes, self-power supply and quick plug-in chassis connections.



## SPECIFICATIONS

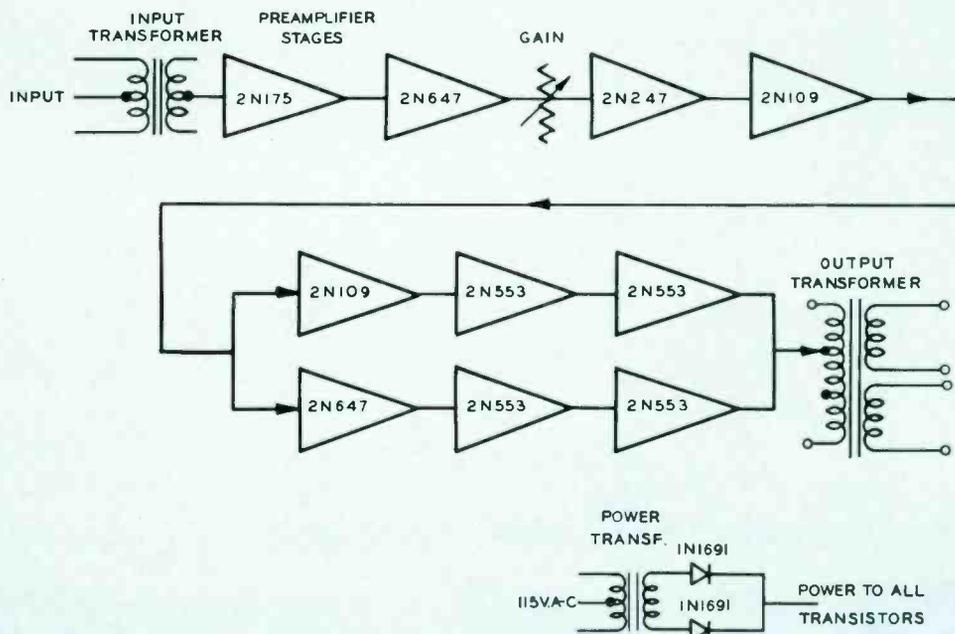
Source Impedance ..... 37.5/150/600 ohms  
 Input Impedance ..... Unloaded transformer, high in comparison with source impedance  
 Output Impedance ..... 600/150/16/8/4 ohms  
 Maximum Input Level ..... -30 dbm  
 Maximum Gain ..... -104 ± 2 db  
 Frequency Response ..... ±1.5 db from 30-15,000 cps  
 Maximum Output Level ..... 10 watts (40 dbm)  
 Harmonic Distortion ..... Less than 1% from 50 to 15,000 cps @ 10 watts output level  
 Noise Level ..... -120 dbm referred to input (less than -16 dbm with amplifier gain of 104 db gain)  
 Maximum Ambient Temperature ..... 120° F.

Transistor Complement ..... 1-2N175, 2-2N647, 1-2N247, 2-2N109, 4-2N553, 2-1N1692 diodes  
 Power Requirement ..... 117 volts, 50/60 cycles, 25 watts (with taps for 105, 117, 125 volts)  
 Overall Dimensions ..... 12 1/2" long, 4-21/32" high, 5" wide  
 Weight ..... 8 lbs.  
 Finish ..... Light umber gray  
 Mounting ..... Plug-in mounting on BR-22A Mounting Shelf, requires 1/3 the shelf  
 Stock Identification (Includes Transistors) ..... MI-11437

### Accessories

BR-22A Mounting Shelf (mounts 3 BA-34A's) ..... MI-11597  
 Bridging Volume Control ..... MI-11278-E/F

Block diagram of BA-34A Monitoring Amplifier.



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# MONITORING AMPLIFIER

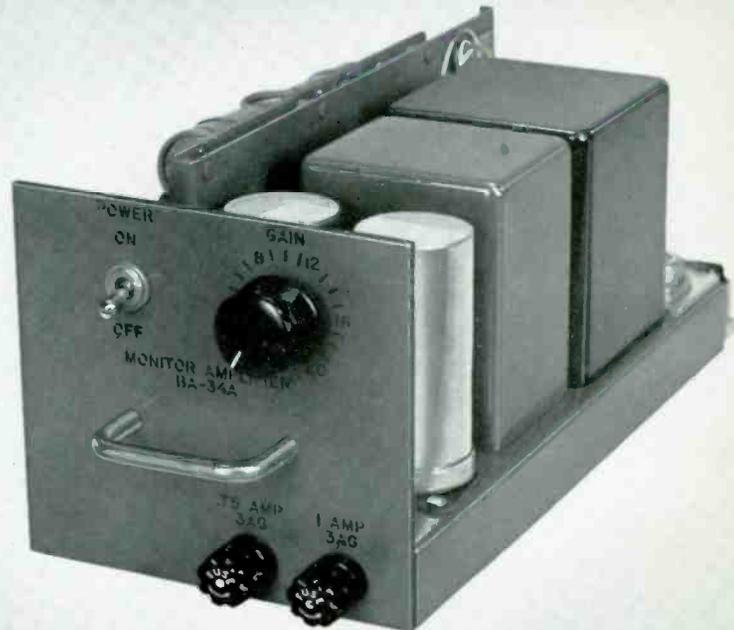
TYPE BA-34A

CATALOG

B.1410

## FEATURES

- Completely transistorized
- Self-contained power supply
- High-gain — will accept microphone input level
- 10 watt output with very low distortion
- Plug-in chassis for shelf mounting
- Ideal for monitoring program lines
- Small, compact, with low heat dissipation



## DESCRIPTION

The BA-34A Monitor Amplifier is a high fidelity amplifier, having 104 db gain and delivering a full 10 watts of audio power output. It is particularly designed for monitoring, audition, recording and "talk-back" applications. It may also be used as a program or a line amplifier for emergency use. It is ideal for playback of transcriptions and will operate an LC-1A speaker directly from the output of an equalized cartridge. The BA-34A is small in size and is designed for convenient plug-in installation with the BR-22A mounting shelf.

The use of transistors throughout the BA-34A provides a number of advantages including: small, compact design, low heat dissipation, greatly reduced power consumption and trouble-free, long-life expectancy for the amplifier. Power requirements have been reduced to 25 watts with corresponding low heat dissipation, and economical performance.

The circuit design of the Monitoring Amplifier is simple and straightforward. All circuit functions are accomplished by ten transistors, and two diodes which are used in the self-contained d-c power supply.

The BA-34A consists of two basic amplifiers, the first a two-stage preamplifier which connects through a gain-control to the input of a multistage power amplifier. The input preamplifier, having an unloaded input transformer

can be connected for 37.5, 150 or 600 ohm sources. A bridging volume control may be used for high level inputs. Negative feedback stabilizes the gain of the two-transistor preamplifier.

Following the preamplifier are two low-level stages, followed by a dual transistor phase splitter, dual transistor driver, and dual class "B" output transistors which are in series with the driver. A thermistor adjusts the idling current of the output stage to compensate for temperature changes. Various taps on the output transformer match 4 to 600 ohm loads. By using three separate feedback paths, the distortion drops to a low level. Silicon diodes in the self-contained power supply result in cool operation and low power consumption. Two fuses serve to protect the transistors and rectifiers from damage by an accidental short-circuit.

All controls are located on the front panel including the interstage gain control knob, a power ON-OFF toggle switch and two fuses—one a  $\frac{3}{4}$  amp. line fuse, the other a 1 amp. output fuse. The entire amplifier is mounted on a plug-in type chassis. Connections to the BA-34A are made through two 8-prong connectors at the back of the amplifier which plugs into a socket supplied with the amplifier. All input connections are made through one plug, the output and a-c power through the other.

3KB



# THREE-SPEED TURNTABLE

TYPE BQ-2C

CATALOG

**B**.1617

## FEATURES

- Simplified speed changing mechanism for ease of operation and reduced maintenance
- Reliable, hysteresis synchronous motor
- Provides a high-quality driving mechanism for 33 $\frac{1}{3}$ , 45 or 78 rpm records
- Rugged and simple construction—less parts to wear
- Very smooth starts—necessary with microgroove
- Rugged drive assembly and resonance-free wooden cabinet built to give many years of satisfactory service
- Superior performance at moderate cost



## USES

The RCA type BQ-2C Transcription Turntable meets broadcasting needs for a high-quality driving mechanism which will accommodate all types of commercial disc recordings up to 16 inches in diameter at speeds of 33 $\frac{1}{3}$ , 45 or 78 rpm. The drive assembly is extremely reliable and quiet, and meets all EIA performance specifications, assuring fidelity in the reproduction of broadcast transcriptions.

The cabinet assembly not only provides a simplified mounting for the drive assembly, turntable and operating

controls, but allows ample room for housing the reproduction equipment. All standard types of broadcast tone arm equipment may easily be mounted on the cabinet and, if desired, two tone arms for various types of pickups can be accommodated. The cabinet has a spacious compartment where equalizer equipment and necessary amplifiers may be installed.

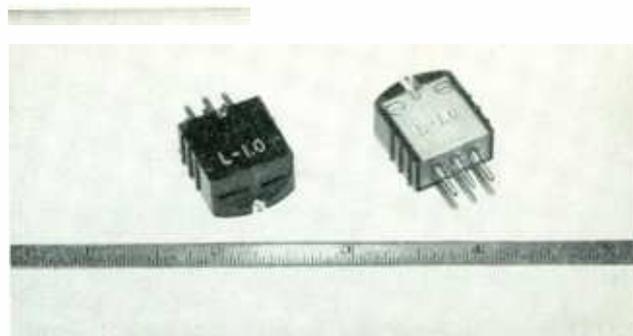
The BQ-2C Drive Mechanism is available as a separate unit for those stations which may wish to mount it in a custom built cabinet, bench, or table.

6KB

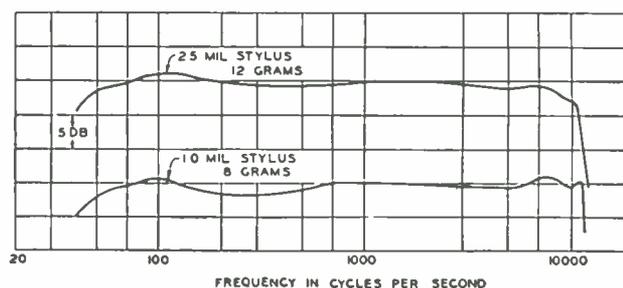
The turntable platter is a sturdy 14-pound aluminum casting. It and the spindle assembly are held in the main support casting in oilite bushings and the thrust is supported by a single ball at the bottom end of the spindle. A belt of foam rubber is affixed to the outside rim of the platter in order to eliminate any resonance effects. The drive motor is mounted on a separate plate and supported by vibration mounts to eliminate rumble. All posts and shafts which provide bearings for cams and arms are assembled to a common plate to insure proper alignment.

A feature of the motor drive assembly is the use of a separate speed control which can be adjusted without motor stopping between any combination of speeds. A separate starting switch is provided to handle cueing and routine operation in the most functional manner. This "On-Off" switch relieves the idlers when set to the "Off" position, thus providing extended idler life.

The BQ-2C Transcription Turntables are supplied less tone arms and filters. These are supplied as accessories and should be selected according to the type and variety of recordings to be played. A template is supplied with the Instruction Book and should be used as a guide in mounting controls, tone arms and filters on the RCA cabinet, or any other suitable cabinet, table or bench.



Plug-in Type Pickup Head, MI-11874-4, used with BQ-2C.



Typical response of Pickup, Tone Arm and Filter.

## SPECIFICATIONS

### Performance Specifications

Turntable Speed.....	33 1/3, 45 and 78.26 ±0.3%
Wow or Flutter:	
At 33 1/3 rpm.....	0.25% half of peak of peak
At 45 rpm.....	0.20% half of peak of peak
At 78 rpm.....	0.20% half of peak of peak
Motor.....	1/100 H.P., 1800 rpm at 60 cycles, or 1/125 H.P., 1500 rpm at 50 cycles, 45° C. temperature rise, 2 or 3 mf 220 working volts capacitor.
Power Supply.....	105-125 volts, 50/60 cycles, single phase
Power Consumption.....	40 watts
Turntable Diameter .....	16"
Hub and Spindle Diameter:	
Hub for 45 rpm Records.....	1.5"
Spindle for 33 1/3 and 78 rpm.....	0.2835"
Overall Dimensions:	
Turntable Drive Unit.....	18" long, 18" wide, 11" high
Cabinet.....	23 1/2" wide, 24 3/4" deep, 28" high (adjustable 3/4")
Weight:	
Turntable Drive Unit.....	31 lbs
Cabinet .....	60 lbs.
Total Weight .....	91 lbs.
Finish.....	Two tone umber gray fabrikoid with aluminum trim

### Equipment Supplied

BQ-2C Turntable and Cabinet including turntable drive assembly, console cabinet, turntable platter assembly and Instruction Book (IB-24780), but less reproducing equipment such as tone arms and amplifiers:

For 60 cycle operation.....	MI-11833-C
For 50 cycle operation.....	MI-11834-C

BQ-2C Turntable Drive Assembly, less console cabinet and reproducing equipment such as tone arms and amplifiers:

For 60 cycle operation.....	MI-11830-C
For 50 cycle operation.....	MI-11831-C

### Accessory Equipment

Lightweight Tone Arm (Less Pickup Head).....	MI-11885-A
1.0 Mil Fine Groove Diamond Stylus Pickup (for Lightweight Tone Arms).....	MI-11874-4
2.5 Mil Standard Groove Diamond Stylus Pickup (for Lightweight Tone Arms).....	MI-11874-5
Pickup Filter for Lightweight Tone Arms.....	MI-11888
BA-24A Monitoring Amplifier.....	MI-11247
BA-26A Equalized Preampfier.....	MI-11436



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# RECOMMENDED WIRING PRACTICES

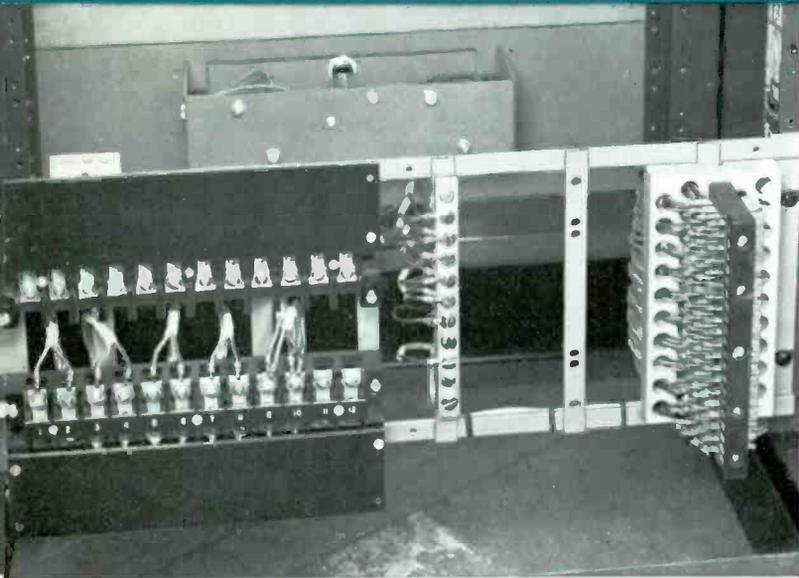


Photo of terminals at bottom of rack. Power terminals are at left, ground bus in center and audio terminals at right.

Almost every studio undergoes minor modifications from time to time, and the subject of proper wiring practice is raised. Modern standards require careful elimination of noise and crosstalk from the program circuits. It is not uncommon to spend many hours wiring in new components, only to find their performance reduced by the wiring itself. A tested and proven standard practice can avoid much wasted time.

There are two basic philosophies employed in practical approaches to the noise problem. In one system every circuit shield is carefully isolated from its neighbors and grounded at one point only. In the other, all the shields of one unit (such as a rack) are put in such close contact that a brute-force ground is provided for any stray currents that might be present. This latter approach is taken in RCA equipment with modifications as follows:

Every rack, cabinet or desk is wired as a unit to terminal boards. The terminal boards are placed as near as possible, consistent with accessibility, to the point where the external circuits enter the unit. See Figs. 1 and 2 for examples.

In a rack, as viewed from the back, all audio cables are run on the right side of the rack; and all signal, a-c and d-c power cables are run on the left side. All audio circuits are twisted pair conductors shielded with a tinned copper braid. Separate cables are formed for:

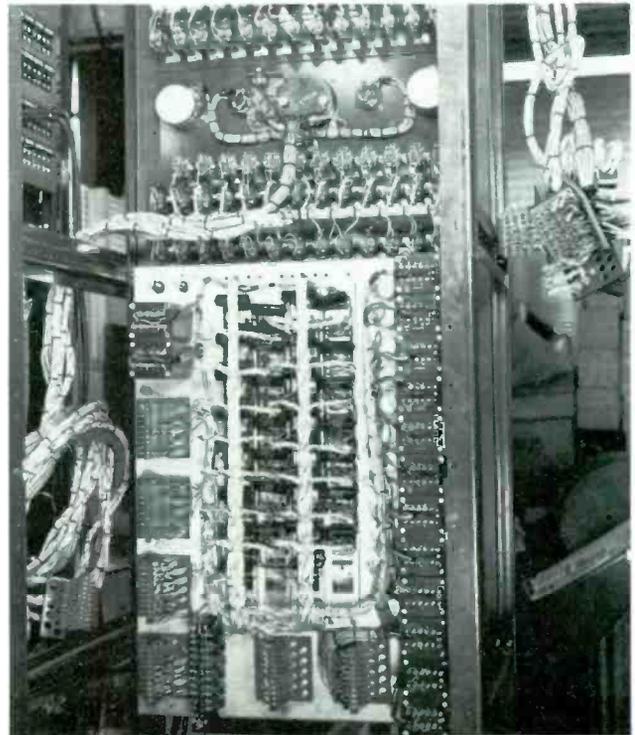
- (a) Microphone outputs, preamplifier outputs and other audio circuits with levels below  $-20$  vu.
- (b) Mixer, line and channel circuits up to  $+30$  vu.

- (c) Loudspeaker and other lines above  $+30$  vu.
- (d) At times further subdivisions are made for convenience in bulk or because levels are widely separated.

Each cable is bound with lacing cord so the shields are in tight contact for their entire length. Where two audio cables cross or join, they should either be definitely insulated or bound together. It is better to have tight contact than to risk an intermittent noise source made by casual contact.

The ends of the individual shields are terminated either with "wedge-on" collars or with plastic tape. The shields are grounded to a main ground bus near the terminal block. A shielded ground lead is run from each amplifier chassis to the ground bus.

The a-c and d-c power circuits are handled similarly. All a-c circuits should be in twisted pair, shielded cable. The a-c current should be balanced in each pair. That is, one pair should not be used for one side of a circuit and a second pair for the other side. If more than one pair is needed for the load, two or more pairs should be used with part of the load on each. Plus and minus plate potentials should be carried in single conductor shielded cable. Shields are tied off and grounded the same as the audio circuits.



View of wiring at rear of a typical audio relay switcher and control panel. Equipment is mounted in standard broadcast rack.

6KB

Signal circuits do not require shielded wire. The frames of jacks should be tied together and grounded with a shielded wire the same as amplifier chassis.

In installing the equipment in a studio or control room the following rules have been found useful:

The pairs run in conduits should be grouped in the same general way as the cables in the racks. The audio conduits should be kept free from grounds to power conduits or power circuits. Low level audio circuits (less than -30 vu) should have the shields insulated from the conduits and from each other.

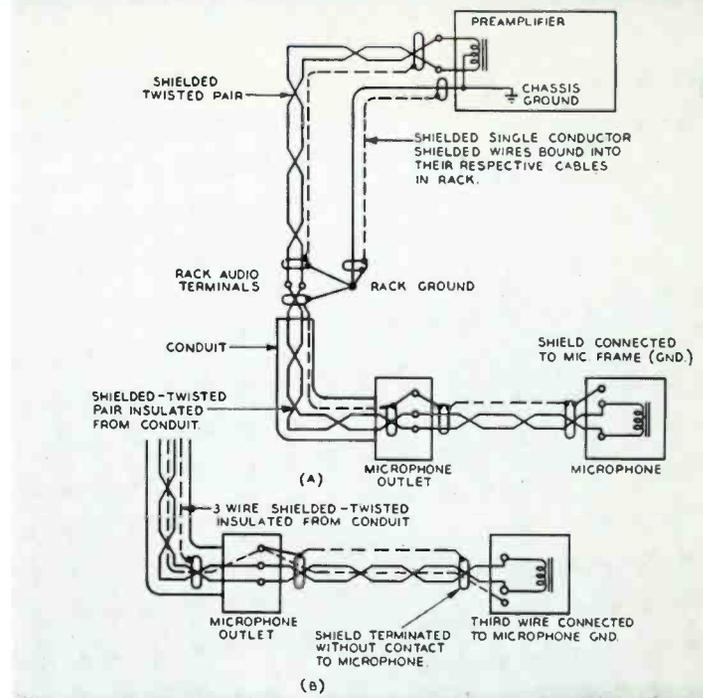
Splices should be avoided. Low level conduits should be well spaced from power conduits.

Signal and telephone circuits should not be run in the same conduit with program or power circuits. Telephone leads should be twisted pair. Power and audio grounds should consist of separate, heavy shielded leads to the main station ground.

TV circuits in general should be considered high level circuits and should therefore be kept away from low level audio circuits. In particular, pulsed lamp circuits should be routed as far away from projector photocell and preamplifier circuits as possible. Shields should be insulated from ground and the audio circuit and shield grounded only at the point of lowest level.

Typical good practice for microphones is shown in Fig No. 3a. In this case two conductor shielded wire, with insulation over the shield, is used for the conduit run and the microphone cord. Fig. No. 3b shows somewhat better practice in which 3-conductor shielded, insulated cable is used for the conduit run and microphone cord. This latter practice removes any ground current from the shield.

Turntable pickup circuits should be handled like microphones with particular care being taken to keep the



motor power circuits and their shields away from the audio circuits.

The input to mixer circuits is usually at comparatively high level, but the output is frequently very close to microphone level and the circuits should be treated in the same way. Fig. No. 4 shows typical good grounding practice in this respect. Unbalanced circuits may be used but are usually more difficult to handle if there is noise present. It will be noted that the only ground to this part of the system is at the point of lowest level and that all the circuits are balanced to ground. The center taps of the mixer attenuators are only tied to ground if special noise difficulty is encountered and tests indicate improvement. This occasionally happens on circuits which connect to remote lines or studio equipment with separate ground systems.

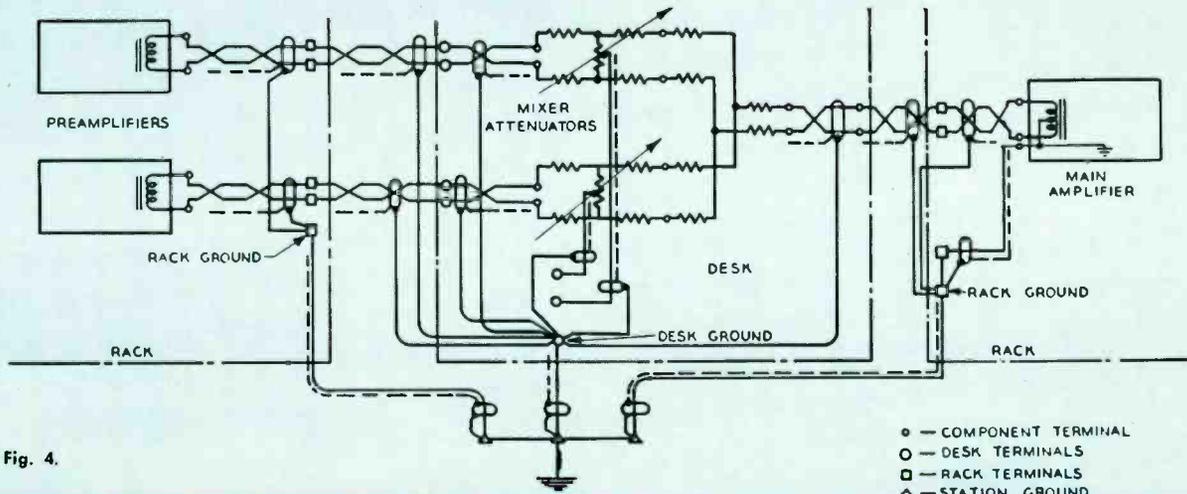


Fig. 4.



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# 5 KW AM BROADCAST TRANSMITTER

Type BTA-5T

CATALOG

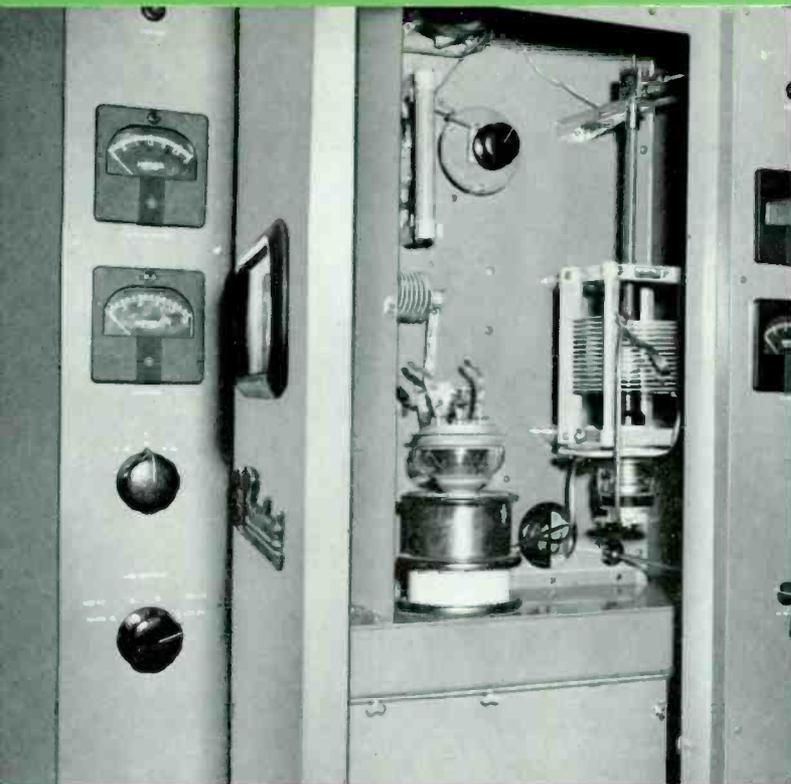
**B**.6508



## FEATURES

- High efficiency PA—only one long life 5762
- Outstanding performance
- Power economy
- Silicon rectifiers used throughout
- Only two tuning controls
- Broadband neutralization
- Compact size
- Functional styling and decor
- Built-in remote control provisions for main, standby or Conelrad switching

7KB



BiA-5T PA stage comprising one 5762 tube used for the high efficiency operation. The coil shown on the right, is the third harmonic coil used in the plate circuit of the PA to increase efficiency by shaping the plate waveform.

### DESCRIPTION

The RCA Type BTA-5T AM Broadcast Transmitter is designed to provide an amplitude modulated signal at any frequency in the standard broadcast band between 535 kc and 1620 kc. The nominal power output rating is 5,000 watts; however, it is capable of producing 5,500 watts to compensate for losses in the antenna tuning equipment. Built-in relays allow remote control of main, standby and Conelrad operations. The transmitter meets requirements of the FCC and EIA pertaining to this class of equipment.

The transmitter operates from a 208/240 volt, 60-cycle, three-phase power source for the main power. In addition, the crystal heaters require an additional 115-volt, 50/60-cycle single phase ac power input. The transmitter can be modified for operation on 50-cycle ac current. Simplified power change to 1 kilowatt or 500 watts can be provided, if desired, by Power Cutback Kit MI-34646.

### New High Efficiency PA

The BTA-5T Transmitter is an air-cooled transmitter featuring a number of RCA's latest developments, including

an important development in Class C amplifier design. The new high efficiency plate modulated power amplifier permits a single long-life 5762 tube to deliver the nominal 5 kw with 5.5 kw power output capability because the plate efficiency exceeds that of a conventional class C amplifier by 15 percent. As a result, considerable power savings can be realized. Referring to the simplified schematic, the circuit arrangement is very similar to a conventional class C amplifier, except for the presence of two resonators  $L_1$ ,  $C_1$  and  $L_2$ ,  $C_2$ . The amplifier is stable and easy to adjust and is the only worthwhile development in class C amplifier design in 20 years. The high-voltage, low-voltage and bias supplies employ silicon type rectifiers throughout. The exciter-driver employs etched circuits, and adjustable broadband circuits for greater operating economies. The equipment also boasts a small-sized, improved plate transformer.

Other new design techniques of the BTA-5T provide simplified tuning, increased safety, longer tube life and improved performance. The transmitter can be tuned from the front panel by only two controls. Provisions for manual or remote control operation are incorporated in the transmitter. All doors and panels are interlocked and grounding switches provide utmost safety for operating personnel. The PA tuning control is located on the front panel. The transmitter is air-cooled, a blower being supplied in the PA cabinet. A delay relay is employed to retain the blower system in operation for one minute after the transmitter has been shut down. This refinement is used to improve tube life and cooling of components.

### Improved Mechanical Design

The entire transmitter, except for the plate transformer, is housed in two attractively styled cabinets made of aluminized steel to provide improved magnetic and electrostatic shielding. Each cabinet consists of end panels with wrap-around front edges formed to provide control panels, mounted on a sturdy, welded steel base. Vertical center chassis are fastened between the end panels to form a basic "H" cross section. Hinged, front doors are located between the control panels. Rear access to each cabinet is provided by two removable, interlocked panels. Control components are conveniently located on the panels on both sides of the front doors. All meters are at eye level to facilitate readings.

The matched cabinets are designed to combine an attractive appearance with the utmost in utility. Doors are offered in burgundy red and dark umber gray, to harmonize with station surroundings. Vertical construction permits easier maintenance and service. It also permits installation of the transmitter against a side wall, or allows other equipment to be placed on either side of the cabinet.

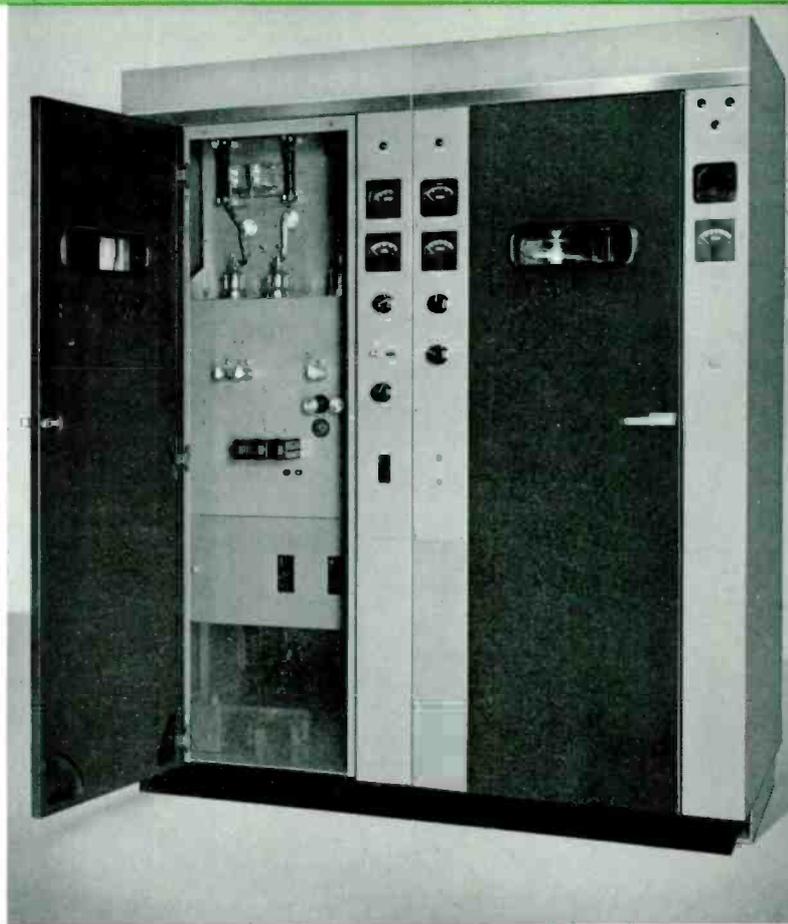
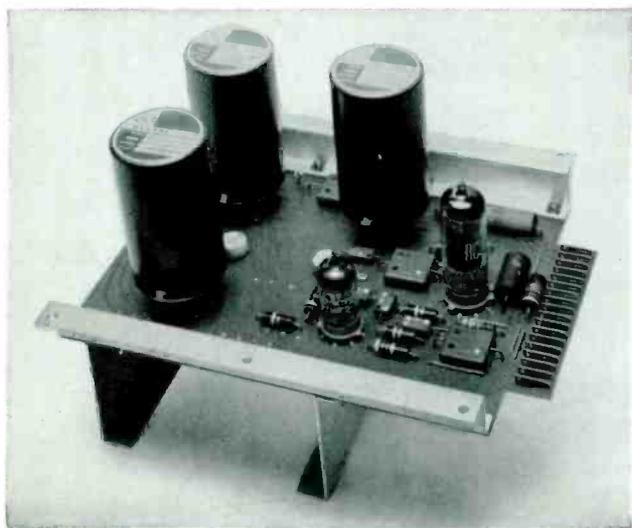
The front doors of the transmitter give immediate access to the front of the vertical panels on which circuit components such as tubes, feedback ladders and overload relays are mounted. Remaining components are mounted on the rear of these chassis, while the larger power components are situated in the base of the cabinet. This type of construction provides excellent accessibility.

The left hand cabinet contains the BTA-5T exciter-driver, while the right hand cabinet houses the amplifier, modulator and high voltage rectifier portions of the transmitter. The cabinets require less than 16 sq. ft. of floor space. A plate transformer occupies only an additional 3 sq. ft.

### Latest Radio and Audio Frequency Circuit Design

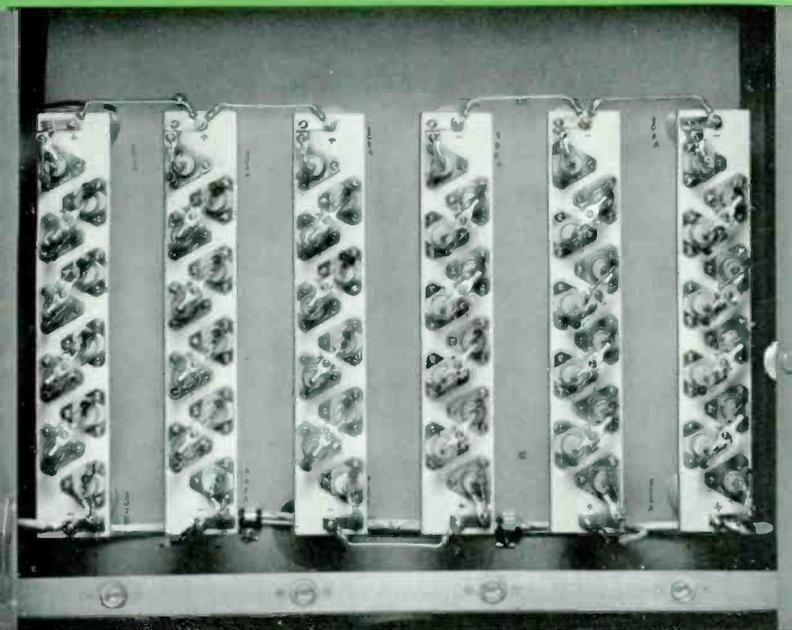
The BTA-5T Transmitter incorporates RCA's new MI-27632 Crystal Oscillator with three, switchable, temperature-

**New Crystal Oscillator, MI-27632, showing three switchable temperature-controlled crystal units for controlling transmitter main, standby and Conelrad operations.**



IPA and modulator driver stages of the BTA-5T can be seen at top of open cabinet. The exciter is at the center of the cabinet, and control equipment is placed just below the exciter.

controlled crystal units. Each crystal will remain constant within plus or minus five cycles. The three crystals control main, standby and Conelrad operations. The desired crystal can be selected by means of a front panel switch or by means of a remote-control switch since relays are built into the exciter. The oscillator employs broadband circuits that require no adjustments. A 6AK5 is used as an oscillator tube with a 5763 as the buffer. This unit is built on an etched circuit panel easily accessible for service by removing the cover. The entire oscillator unit can be removed by disconnecting a cable, plug and retaining screws. Also a part of the basic exciter is the 6146 IPA stage which is operated very conservatively and a pair of 2E26 tubes used as the first a-f stage of the modulator circuit.



Front view of the Silicon Rectifier Chassis of the BTA-5T. The silicon cells offer improved performance since they are particularly resistant to aging, moisture and wide temperature variations.

The output of the 6146 IPA stage is broadband and requires no tuning. It drives a pair of 4-125A tubes where tuning is accomplished by using a slug-tuned coil controlled from the front panel. These tubes, in turn, drive a high-efficiency, long life 5762 output triode. A front panel control of a vacuum variable capacitor tunes the plate circuit.

A new slug-tuned coil was developed for the power output adjustment and it is driven by a reversible motor. The motor is actuated at the front panel or by a remote power output adjustment switch. The second harmonic trap uses a slug-tuned coil, thus eliminating the possibility of contact pitting from high current in the r-f circuit of the transmitter. Neutralization of the 5762 PA stage is achieved by a broadband transformer and a variable vacuum capacitor. The use of a broadband type of transformer holds neutralization over a wide band and prevents spurious oscillation at other frequencies.

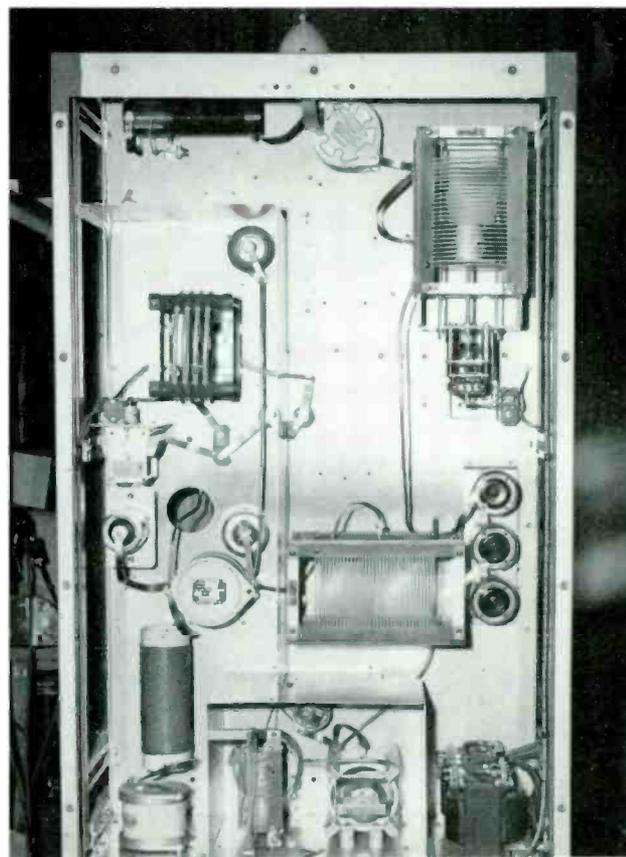
The modulator of the transmitter consists of a pair of 2E26 tubes located in the exciter portion, resistance coupled

to drive a pair of 6155/4-125A second audio frequency amplifiers which, in turn, are resistance coupled to drive a pair of 3X3000F1 modulators. These modulator tubes are low mu triodes, drawing no grid current. They are capable of excellent response and fidelity. Due to the low plate dissipation of the new power amplifier system, the power input of the modulator is also reduced affording appreciable power economies.

### Dependable Semiconductor Power Supply

The BTA-5T incorporates 120 silicon-type rectifiers in the high-voltage circuits. This rectifier is ideal not only in a combined operation, but even more so in a remote-control application.

Rear view of high efficiency PA and modulator stages. Removal of the rear panel provides complete access to all circuit components for ease of maintenance.

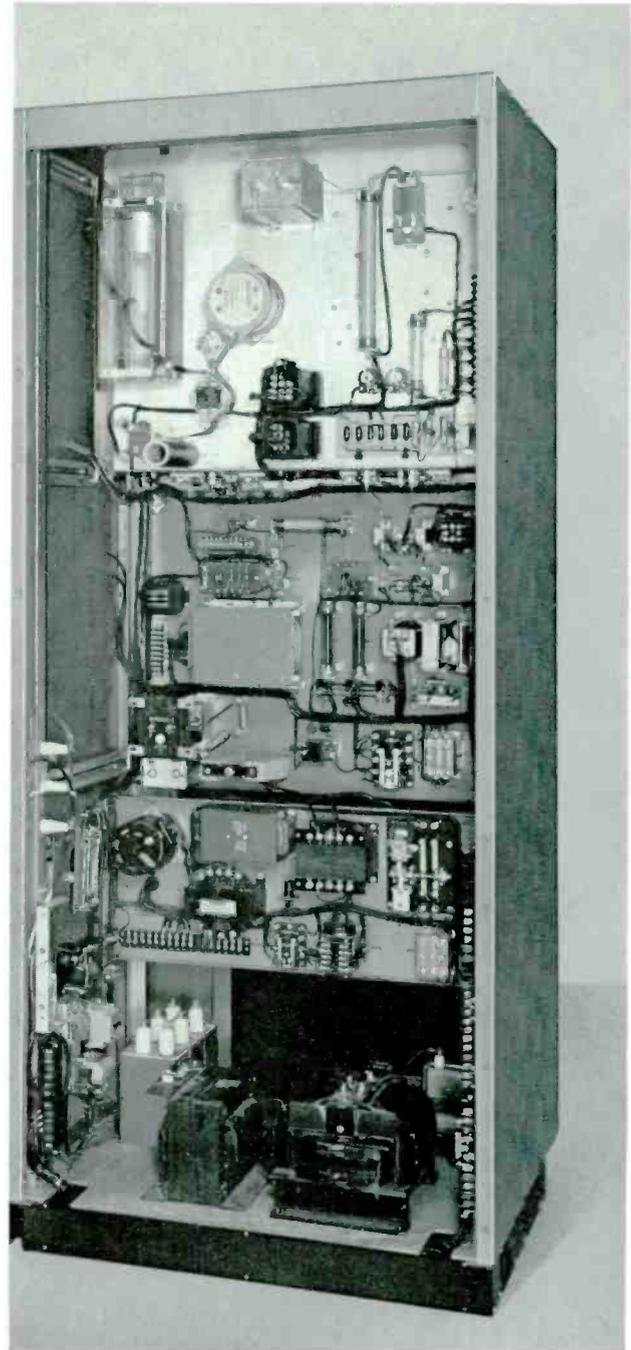
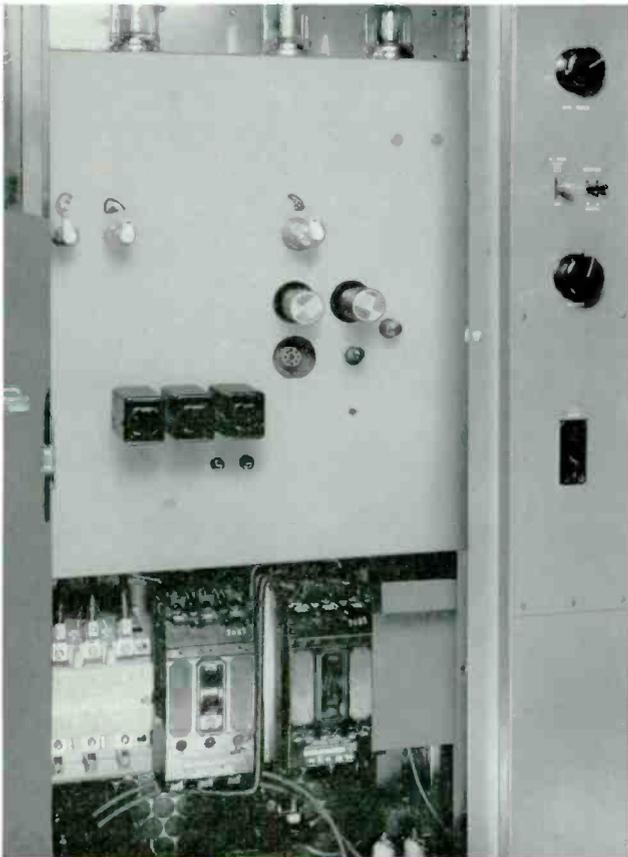


The rectifiers are hermetically sealed so they will not be adversely affected by weather conditions. They can operate at ambient temperatures ranging from  $-20^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$  and at altitudes up to 7500 feet above sea level. There is no significant aging of the forward drop characteristics. Across each one of the silicon cells a resistor has been shunted so that they will all share equally the peak inverse voltage rating. RCA specifications have been set higher than EIA standards by adding an additional 30 percent peak inverse voltage safety factor.

### Cooling System

The transmitter is completely air-cooled. Added refinements such as a delay relay have been built-in to keep the blower system in operation for one minute after the transmitter has been shut down. The continued supply of air extends tube life. The exciter cabinet employs air convection cooling. A louvered lower back panel and top

Close up view of the exciter with two crystal units in place. Just above the crystals is the 6146 r-f driver. To the left may be noted the pair of 2E26 tubes for the a-f input. Panel below exciter is removed to show circuit breakers and fuses.

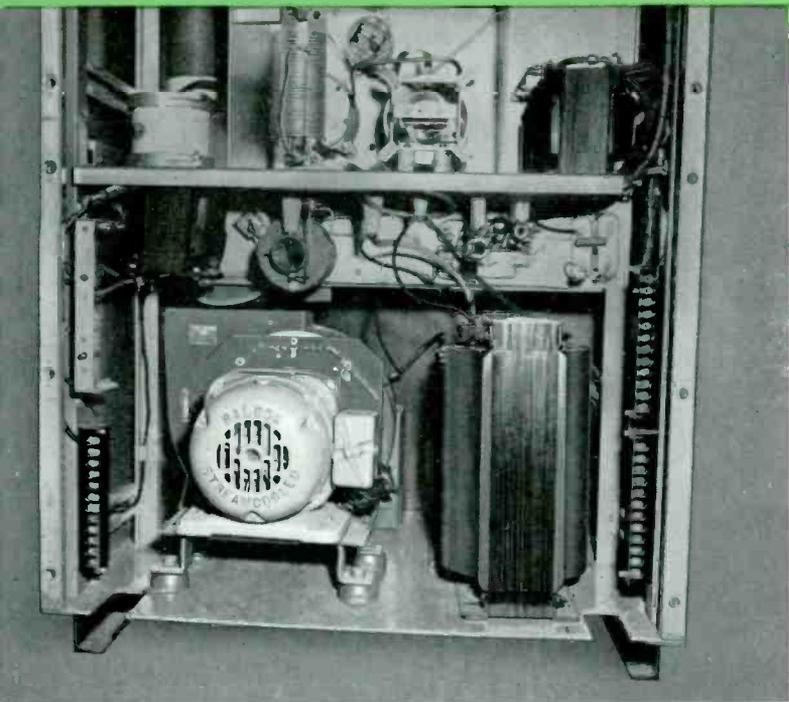


Rear of the BTA-5T exciter-driver cabinet.

grill panel provide good ventilation. In the second cabinet a blower air system distributes air to the modulator and PA tubes.

### Overload Protection

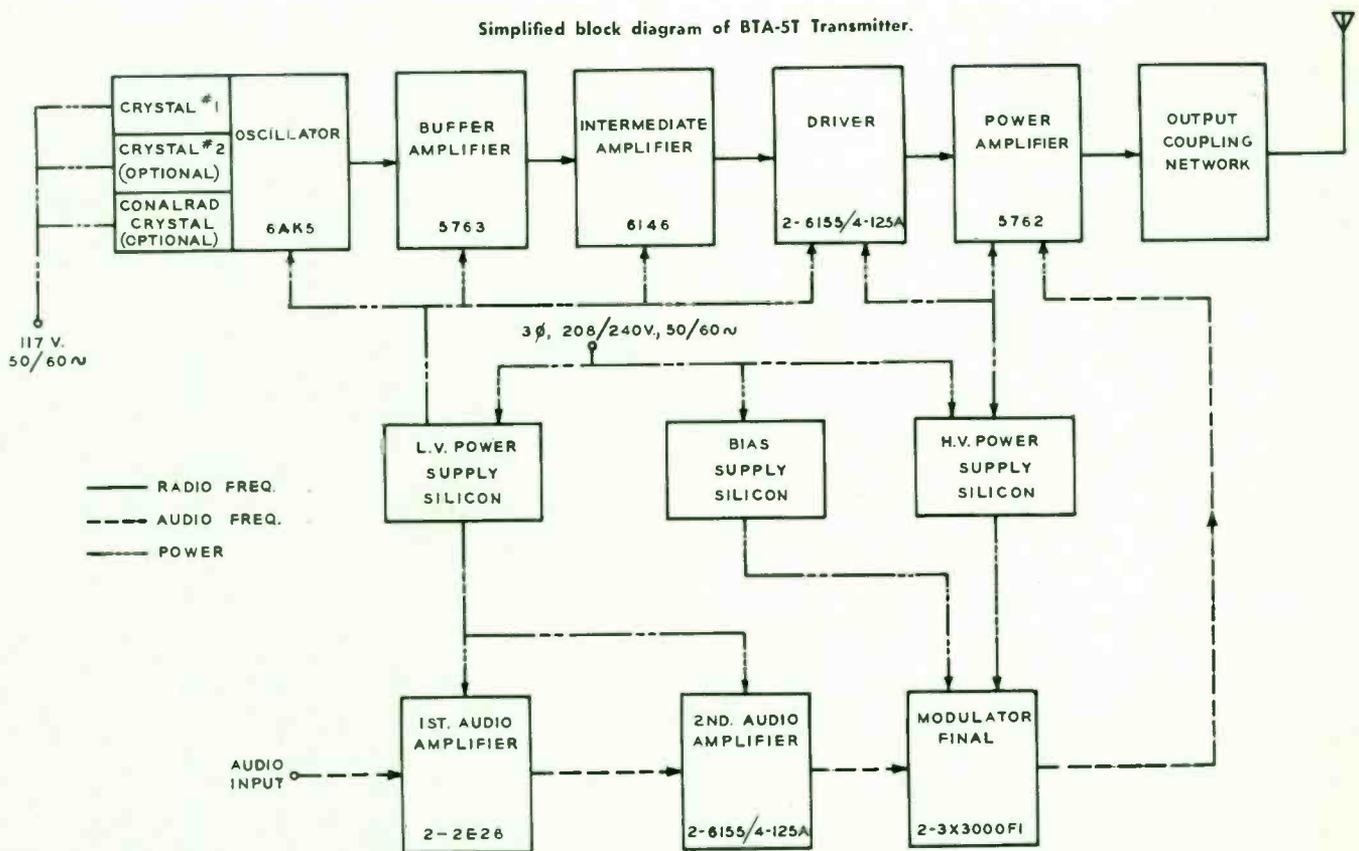
To provide additional reliability, improvements were made in the control and protective circuitry of the BTA-5T Trans-



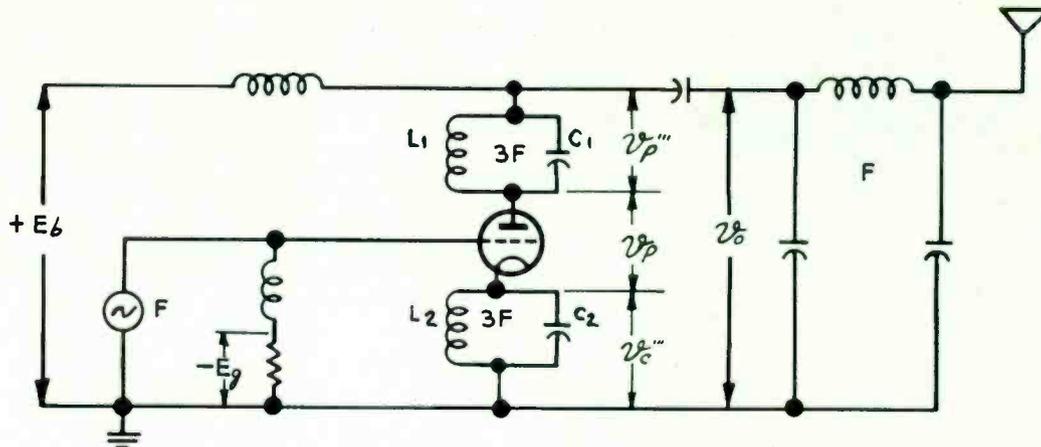
The high efficiency PA permits use of a slow speed blower shown above. The unit is mounted on rubber shock mounts in the base of the PA cubicle. Quiet operation of the blower makes it possible to locate the transmitter in a central control room in smaller stations.

mitter. All primary lines are protected by means of circuit breakers with instantaneous overload trip protection. Line and high-voltage plate circuit breakers have additional built-in thermal protection. The 3-phase blower is protected by a contactor with the thermal cutoff in each phase. Relay switching is sequential so that filaments will not come on unless the blower is operating. Low voltage is delayed to allow proper filament heating. The high voltage is interlocked with the low-voltage and the bias supply so that it will come on only after the low-voltage and bias potential is present. Overload protection is also provided in the low-voltage supply, the second AF stage, the IPA stages, the modulator, the PA stages and the high-voltage rectifier. They are instantaneous in action and each overload relay carries a spare set of contacts wired to terminals that may be connected to an external indicator unit. A two cycle plate overload relay also permits the transmitter to return to the air automatically after one interruption has occurred.

Simplified block diagram of BTA-5T Transmitter.



BLOCK DIAGRAM BTA-5T



Simplified schematic of the new high efficiency PA stage. The adjustment of the circuit differs from a conventional class "C" only in that the coils  $L_1$  and  $L_2$  are resonated for maximum efficiency.

Starting surges in the plate transformer, high voltage rectifier, and the filter capacitor are eliminated by the use of a step-start and damping circuit. This at one time was only available in the higher-power transmitters, but now longer life and added reliability are provided in the BTA-5T with the incorporation of this circuit for the suppression of starting transients. The damping circuit and the primary line reactors afford continuous protection against possible operational transients.

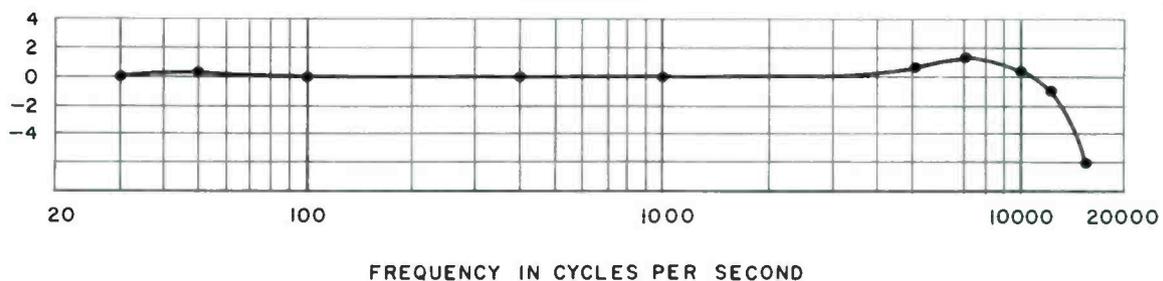
### Smaller Transformers

Continuing research has added still another feature to this RCA transmitter. Grain-oriented steel and epoxy resin are used in the manufacture of plate transformers, this results in realizing half the size that would be normally expected in a transformer of this power. This also reflects in lower floor area requirements while still providing high-quality components.

Audio Frequency Response for BTA-5T Transmitter.

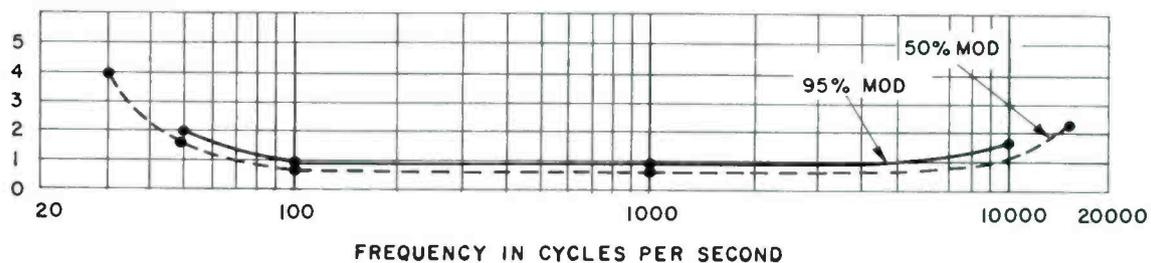
#### TYPICAL FREQ RESPONSE

DECIBELS



#### TYPICAL DISTORTION

PERCENT



# SPECIFICATIONS

## Performance Specifications

AF Input Impedance.....	150/600 ohms
AF Input Level (100% modulation).....	+10 ±2 dbm
AF Response:	
50-7500 Cycles.....	±1 db
30-10,000 Cycles.....	±1.5 db
AF Distortion (95% modulation):	
50-10,000 Cycles.....	2.5%
Noise (below 100% modulation).....	.60 db
Frequency Range.....	535-1620 kc
Frequency Stability.....	±5 cycles
Type of Output.....	Single ended
Carrier Shift (0-100% modulation, 400 cycles).....	3% at constant line voltage 5% at normal line voltage regulation
Output Impedance.....	40-250 ohms

## Electrical Specifications

RF Voltage (for frequency monitoring).....	10 V RMS 75 ohms
RF Voltage (for modulation monitoring).....	10 V RMS 75 ohms
Power Output (nominal).....	5000 watts
Power Output Capability.....	5500 watts
Power Supply.....	208/240 volts ±11 volts
Line Frequency.....	60 cycles (50 cycle kit available)
Phase.....	3
Power Consumption:	
(0% modulation).....	10.0 KW
(100% modulation).....	14.5 KW
(Average program modulation).....	11.0 KW
Power Factor.....	90%
Permissible Combined Line Voltage Variation and Regulation.....	±5%
Crystal Heater Power Supply.....	117 volts 50/60 cycles

## Tube Complement

- 1 6AK5 Crystal Oscillator
- 1 5763 Buffer
- 1 6146 Intermediate Power Amplifier
- 2 6155/4-125A Driver
- 1 5762 Power Amplifiers
- 2 2E26 1st Audio Frequency Amplifier
- 2 6155/4-125A 2nd Frequency Audio Amplifier
- 2 3X3000F1 Modulator

## Mechanical Specifications

Overall Height.....	88" (84" less floor channels)
Cabinet Height.....	84" (80" less floor channels)
Width.....	69"
Depth.....	32" (less door handle)
Overall Depth.....	55" (with door open)
Net Weight:	
Transmitter.....	3800 lbs. (approx.)
Plate Transformer.....	420 lbs. (approx.)
Altitude Range.....	0-7500 ft.
Ambient Operating Temperature:	
BTA-5T.....	-20°C (40°F) min.; +45°C (113°F) max.

## Equipment Supplied

Type BTA-5T 5000-Watt Broadcast Transmitter (complete).....	ES-34229
Including the following:	
1 Transmitter Driver.....	MI-27650-A
1 Amplifier, Modulator and High Voltage Rectifier.....	MI-27635-C
1 Plate Transformer.....	MI-27636
1 Installation Material Kit.....	MI-34610
1 Miscellaneous Hardware Kit.....	MI-7474
1 Blower.....	MI-34616/34616-A
(Order MI-34616-A for altitudes up to 2500 feet. Specify MI-34616 for altitudes 2500 feet to 7500 feet.)	

- 1 Door, Right Hand (Choose decor as follows)
  - Burgundy.....MI-27645-1
  - Light Umber Gray.....MI-27645-2
- 1 Door, Left Hand (Choose decor as follows)
  - Burgundy.....MI-27645-A1
  - Light Umber Gray.....MI-27645-A2
- 1 Nameplate.....MI-28180-1
- 1 Touch-Up Finish Kit.....MI-27660-A
- \* Dome Type Insulator for PA Output.....MI-19406-A
- \* Adaptor or Plate for Coaxial Line Output.....MI-34613-\*

(\* Supply one as specified on sales order. For open type transmission line order MI-19406-A. For coaxial transmission line select from MI-34613-\* Series to suit installation requirements.)

- 1 Set of Frequency Determining Parts.....MI-34648
- 1 Crystal, Type TMV-130B.....MI-27493
- 1 Set of Operating Tubes.....ES-24230
- † Filament Hours, Elapsed Time Indicator.....MI-34614-\*
- † Remote Antenna Current Ammeter.....MI-27644-\*
- † Remote Ammeter Pick-up Unit.....MI-27966

† Specify one elapsed time indicator MI-34614-1 or one Remote Antenna Current Ammeter, MI-27644, (select proper ammeter range from MI-26744 Series) and one Remote Ammeter Pick-up Unit, MI-27966.

## Optional and Accessory Equipment

Type BTR-11B Remote Control System.....	MI-27537/27538
Type BTR-20A Remote Control System.....	MI-27539/27536
Antenna Tuning Equipment.....	ES-27256
Recommended Minimum Set of Spare Tubes.....	ES-34208
Type BW-11A Frequency Monitor.....	MI-30011-A
Type BW-66F Modulation Monitor.....	MI-30066-B
Power Cutback Kit (1000/500 watts).....	MI-34646
Conelrad Kit.....	MI-34312-3
Carrier Off Monitor.....	MI-34650



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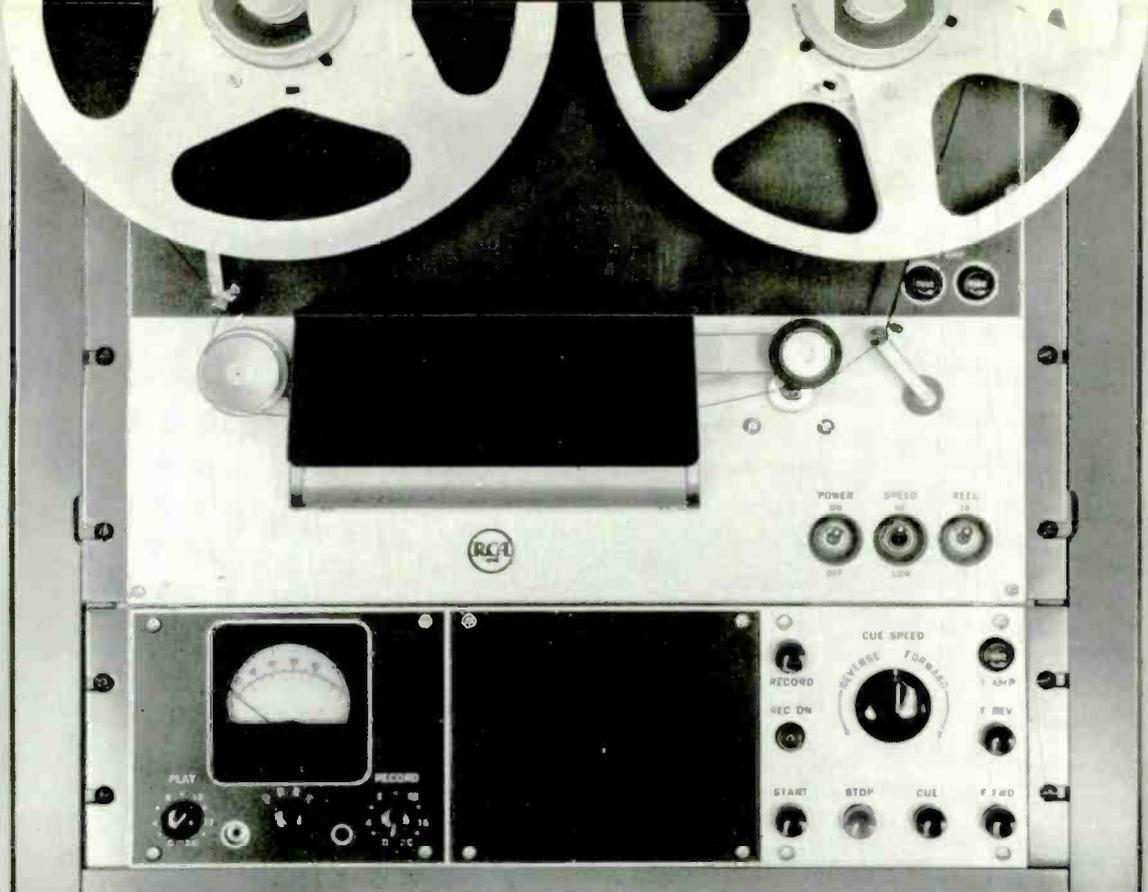
**AUDIO TAPE RECORDER**



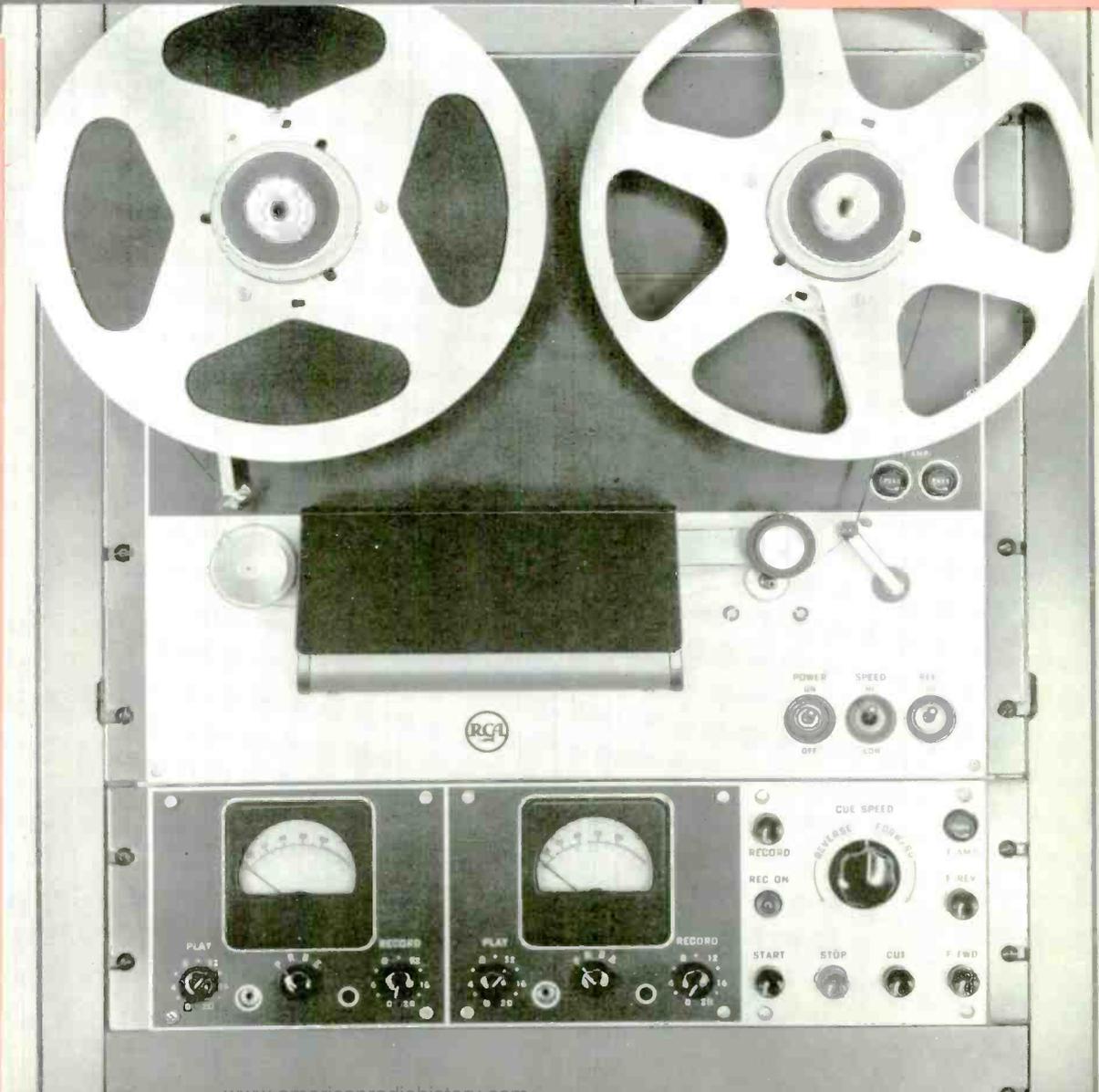
*Handwritten notes in blue ink, including a signature and some illegible scribbles.*

**RCA  
RT-21**

**PRELIMINARY**



◀ **MONAURAL**  
 Equipped with a single record/playback module (lower left) the RT-21A provides dependable monaural operation.



**STEREO ▶**  
 Addition of another identical record/playback module provides the additional flexibility of stereo operation.