TRANSMITTERS AM - FM - TV

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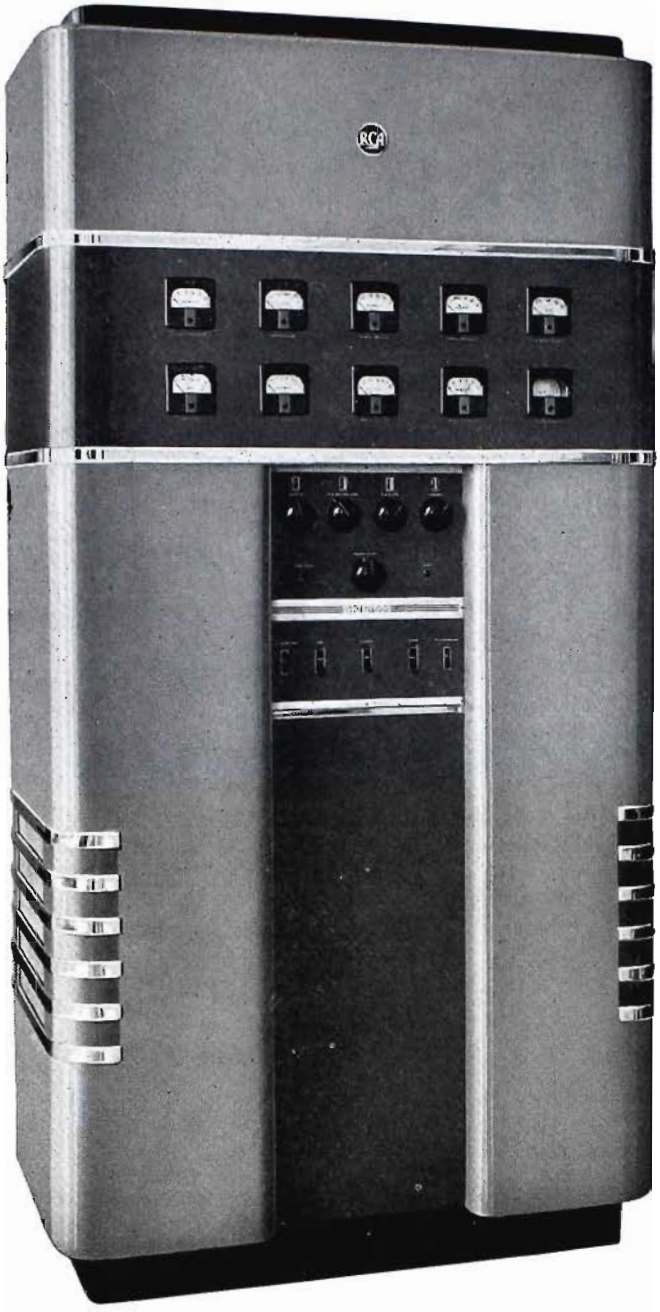
AM Broadcast Transmitter, Type BTA-250L



Features

- Low installation cost.
- Low maintenance cost—only eleven tubes, six types.
- Completely self-contained.
- Simple and efficient in operation.
- Vertical chassis construction for accessibility and ventilation.

Description

The Type BTA-250L Broadcast Transmitter is a complete self-contained unit that will provide reliable, high fidelity operation at any frequency within the range of 540 to 1600 kc. Encompassing the latest developments in broadcast transmitters, the RCA BTA-250L has been designed to fill every need of the 250 watt broadcasting station.

The BTA-250L is housed in a modern, attractive, steel cabinet finished in two tone umber gray and trimmed with strips of satin chrome. There are ten instruments conveniently located at eye level on the front panel. All controls are grouped together on a central control panel which is photo-etched and indirectly illuminated. The tuning controls are provided with indicators so that their positions may be accurately logged. The BTA-250L uses the RCA vertical chassis type of construction, whereby the equipment is mounted in such a manner that each item may be easily removed by one man in the shortest possible time. The variable elements are placed where they are functionally needed and where connection leads to other circuit components may be kept relatively short. This vertical type of construction provides a high degree of mechanical rigidity, adds considerably to the accessibility of the components, and greatly increases the normal circulation of air within the cabinet.

The BTA-250L employs a very simple basic circuit arrangement consisting of a crystal oscillator followed by a buffer amplifier and class "C" power amplifier.

Two RCA low temperature coefficient quartz crystals mounted in RCA Type TMV-129-B temperature controlled holders are provided. The oscillator stage has an extra crystal socket in which the spare crystal may be continuously maintained at the correct operating temperature. These crystals provide excellent frequency stability with no greater deviation than ± 10 cycles from the assigned frequency.

The BTA-250L uses no variable capacitors. Continuously variable inductors are employed as tuning elements throughout, thus eliminating the possibility of flashovers sometimes occurring in variable capacitors.

The modulation system is high-level with a class "B" modulator. High fidelity is materially aided by the use of approximately 20 decibels of audio feedback over the audio system.

In order to insure low maintenance cost, the BTA-250L uses a minimum number of tubes, all inexpensive. There are only eleven tubes, altogether, and only six tube types. A single high voltage power supply provides plate voltage for all tubes. This power supply makes use of two RCA 8008 mercury vapor rectifier tubes, which are known for their long life and unexcelled performance. Bias voltage for the modulators is provided by a separate power supply using a single RCA 5Y3-GT. The power control circuits of the BTA-250L were designed with an eye to simplicity while also providing adequate protection to the equipment and operating personnel. This transmitter features a relay which eliminates any necessity for re-

cycling of the time delay relay when momentary power failures or interruptions occur. Overall protection is provided by the use of magnetic circuit breakers, serving also as switches, and completely eliminating fuses from any power circuits.

A matching network is provided between the output tank circuit and the output terminals of the transmitter, which includes series inductive elements and shunt capacitances resulting in very complete radio frequency harmonic attenuation. Output terminals are provided at the top of the cabinet for connecting to an unbalanced open wire transmission line or an antenna lead-in. A concentric transmission line may be connected through either the base or the top of the transmitter.

Specifications

Carrier Frequency Range	540 to 1600 kcs
Carrier Frequency Stability	±10 cycles
Carrier Power Output	250 watts
Carrier Frequency Harmonics	Below .05%
A-c Power Input (105 to 115 volts, 50/60 cycles, single phase)	
Average Program at 250 Watts Output	1625 watts
Carrier Shift (zero to 100% modulation)	Less than 5%
Carrier Noise and Hum Level (unweighted below 100% modulation)	60 db
Audio Frequency Response (30 to 10,000 cycles)	±1.5 db
Audio Input Level for 100% Modulation	+16 dbm*
Audio Frequency Harmonic Distortion (50 to 7500 cycles, 0 to 95% modulation)	Not to exceed 3% rms
R-f Load Impedance (unbalanced transmission line or antenna)	20 to 250 ohms
Tube Complement	1—807, 2—810, 2—6J7, 3—828, 2—8008, 1—5Y3GT
Dimensions, overall	
Width	40½"
Depth	20¼"
Height	84⅞"
Weight (unpacked)	1360 lbs.
(packed)	1635 lbs.
Stock Identification	MI-7242-C

Equipment Supplied

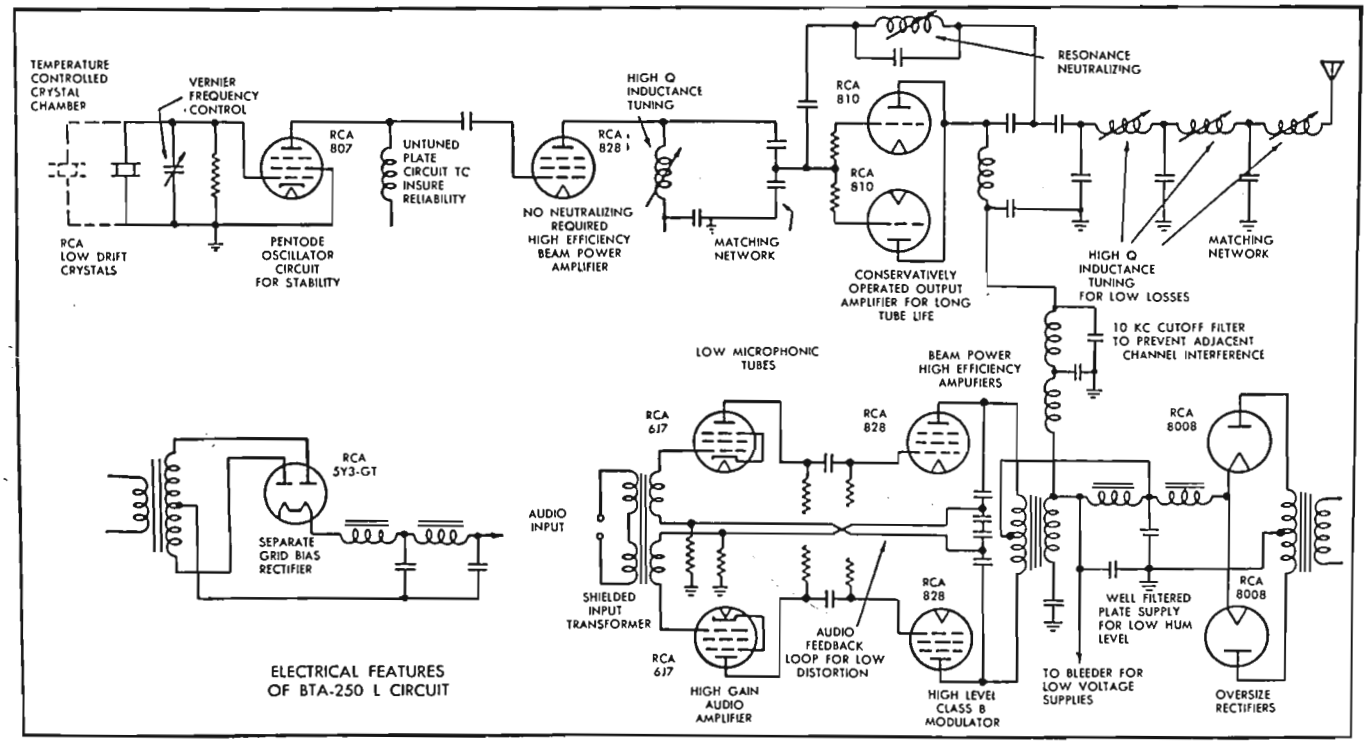
The following is a condensed list of equipment included as a complete BTA-250L transmitter.

Qty.	*Description*	*Reference*
1	Type BTA-250L Broadcast Transmitter Unit	MI-7243-C
1	Type UL-4392 Crystal Oscillator Unit	MI-19458
1	Touch-up Finish Kit	MI-7443
2	Instruction Books	IB-30116-1
2	Type TMV-129B Crystal Units	MI-7467
2	Sets of Tubes	MI-7245-B
1	RF Output Ammeter	MI-7157-B

Available Accessories

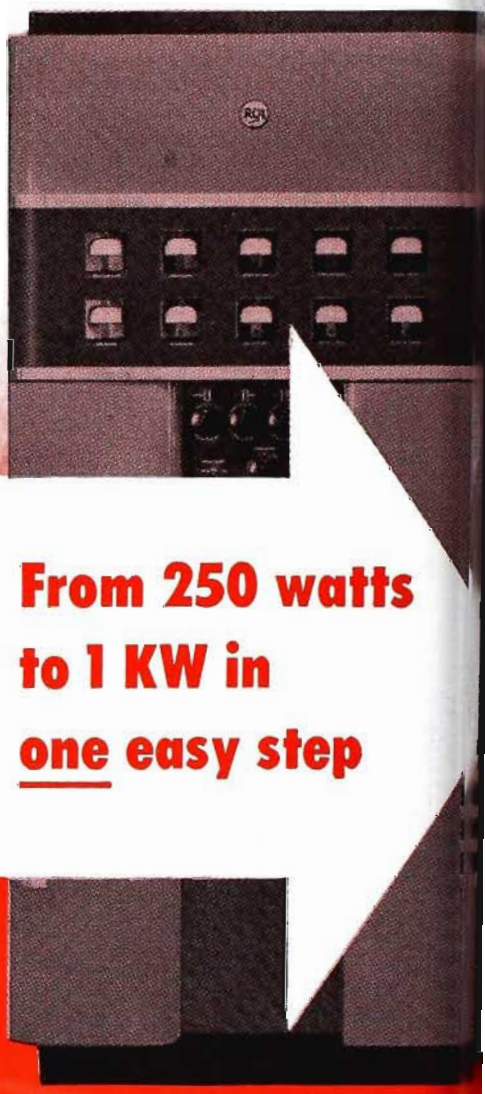
1 KW Amplifier and Conversion Kit	MI-7187-A
Type BPA-1 Antenna Tuner	MI-28901-A
Type BPM-1A Remote Metering Equipment	MI-28027/28037-A
Antenna Towers and RF Transmission Line	On application

* dbm = no. of db above one millowatt when single frequency tone modulation is used.



ELECTRICAL FEATURES OF BTA-250 L CIRCUIT

This 250-watt



From 250 watts to 1 KW in one easy step

Use the BTA-250L as your 250-watt Transmitter now!

READY TO SHIP — America's favorite 250-watt AM transmitter, type BTA-250L

M transmitter can be stepped up to 1 KW

...simply

. . add on this 1-kw Power
mplifier type BTA-1L for
igh power later

WITH this 250-watt AM transmitter you can go to 500 or 1000 watts... simply by adding on an RCA 1-kw r-f power amplifier. Your BTA-250L then becomes your driver. Not a penny of your original transmitter investment is lost . . . because in this conversion there are no power tubes to discard or obsolete equipment left on your hands.

How quick and easy is it to convert? *You can make the change to higher power between "sign-off" and "sign-on"!*

This is one reason why the BTA-250L is a "natural" for stations planning a future power increase . . . or replacement of old equipment.

And there are many other reasons, too. Here is a transmitter that is *hushed* for quiet operation—uses no fans, blowers, or noisy a-c contact controls. It is designed with all controls and switches grouped on one central panel—and within handy reach. It provides an accurate means for logging . . . because it uses precision-type vernier tuning indicators. And all meters are located at eye-level for convenience of the operator.

For complete information about the BTA-250L... and how you can add an RCA 1-kw power amplifier to it *inexpensively* . . . call your RCA Broadcast Sales Engineer. Or write Dept. 19LA, RCA Engineering Products, Camden, New Jersey.

AM Broadcast Transmitter, Type BTA-1L

Features

- Low installation and maintenance costs.
- Completely self-contained.
- Simple and efficient operation.
- Vertical chassis construction for accessibility and ventilation.
- 1000 watt, 500 watt, 500/1000 watt, 250/1000 watt and 250/500 watt operation.
- Adaptable to 500 or 250 watt operation.
- Low tube cost.

Description

The BTA-1L is a one kilowatt AM transmitter designed to meet the most exacting demands of the modern broadcasting station. Essentially, the BTA-1L is composed of an RCA BTA-250L transmitter, serving as an exciter section, with the addition of an amplifier section. The complete transmitter is housed in an attractive cabinet assembly consisting of the BTA-250L cabinet, a matching amplifier cabinet, and a center section which contains the heavy power equipment. The completely accessible RCA open vertical chassis construction, which is used throughout, insures mechanical rigidity and good ventilation. The equipment is mounted in such a manner that every item can be easily removed by one man. Controls for each of the two units are grouped on indirectly illuminated panels conveniently placed on each of the two cabinets. There are no variable capacitors used in this transmitter. The tuning elements are continuously variable inductors which are connected to the control knobs by means of beveled gears and extension shafts. The tuning controls are provided with indicators so that their positions may be accurately logged. The cabinets and center section are finished in two-tone umber gray with trim strips of satin chrome.

The BTA-1L provides reliable, high-fidelity operation at any frequency between 540 and 1600 kc. Efficient high level modulation is employed. Only inexpensive tubes are used throughout and the number of tube types is kept to a minimum.

Two RCA low temperature coefficient quartz crystals mounted in RCA Type TMV-129-B temperature controlled holders are provided. The oscillator stage has an extra crystal socket in which the spare crystal may be continuously maintained at the correct temperature. These crystals provide excellent frequency stability with no greater deviation than ± 10 cycles from the assigned frequency. A control is provided in the oscillator circuit for precise adjustment of the crystal frequency.

The Type BTA-1L will deliver rated power into a 20 to 250 ohm transmission line or into any type of antenna normally used by broadcast stations. A matching network is provided between the output tank circuit and the output terminals of the transmitter which includes series inductors and shunt capacitors, resulting in excellent radio frequency harmonic attenuation. Output terminals are provided at the top of the cabinet for connections to an unbalanced open wire transmission line or antenna lead-in. A concentric transmission line may be connected through either the top or the base of the transmitter. Should the BTA-1L be coupled into either a concentric line or to a single ended line, the RCA Type BPA-1 (MI-28901) Antenna Tuner may be used. In such cases, a remote metering kit BPM-1A is available to replace the r-f ammeter in the transmitter.

Terminals are provided on the BTA-1L for modulation indication by means of a pickup coil coupled to the tank coil of the output stage. Excitation for r-f frequency monitoring is

taken off an r-f voltage divider across a capacitor in the ground side of the buffer stage. A-f monitoring is accomplished by means of a voltage developed across a resistor connected in series with the secondary of the modulation transformer, at which point a level of approximately +10 dbm is available at 100% modulation.

Control circuits are simplified and offer maximum protection to the transmitter and operating personnel. A distinctive feature is a relay which eliminates the necessity of recycling of the time delay when momentary power failures or interruptions occur. Overload protection is provided by using magnetic circuit breakers that also serve as switches.

The BTA-1L is normally supplied for operation at 1000 watts output. Where power change is required, a kit of power change equipment (MI-7188-A) is necessary and is easily installed on the chassis in the center section of the equipment. This equipment will reduce the power output from 1000 to 500 or 250 watts or from 500 to 250 watts as required. A variable transformer adjustable from the control panel provides a means of maintaining the proper voltages as required. A separate 110 volts, 50 to 60 cycle supply is required for the crystal heaters.

The BTA-1L is furnished with two sets of tubes and two crystals.

Specifications

Carrier Frequency Range — 540 to 1600 kcs
Carrier Frequency Stability — ±10 cycles
Carrier Power Output
(a) 1,000 watts (c) 500/1,000 watts*
(b) 500 watts (d) 250/1,000 watts*
(e) 250/500 watts*
Carrier Frequency Harmonics — below .05%
A-c Power Input (220 to 240 volt, 50/60 cycles, single phase (Line voltage regulation and variation not to exceed 5%)

Average Program Level at	1,000 watts	4,500 watts
	500 watts	3,700 watts
	250 watts	3,350 watts
100% Modulation	1,000 watts	5,700 watts
	500 watts	4,900 watts
	250 watts	4,450 watts

A-c Power Input (crystal heaters) — 110 volts, 28 watts
Carrier Shift—from zero to 100% modulation — less than 5%
Carrier Noise and Hum Level (unweighted below 100% modulation) — −60 db
Audio Frequency Response (30 to 10,000 cycles) — ±1.5 db
Audio Input for 100% Modulation — +11 dbm**
Audio Frequency Harmonic Distortion (50 to 7,500 cycles, 0 to 95% modulation) — not to exceed 3% rms
R-f Load Impedance (unbalanced transmission line or antenna) — 20 to 250 ohms
Dimensions, overall
Width — 108¾"
Depth (door swing 18¾") — 20¼"
Height — 84⅞"
Weight (unpacked) — 3,410 lbs.

Tube Complement

For BTA-1L Transmitter Exciter Only — MI-7320

1 RCA-807	1 RCA-810	2 RCA-6J7
3 828	2 RCA-8008	1 RCA-5Y3GT

For Type BTA-1L Amplifier Only — MI-7318

4 RCA-833-A	4 RCA-8008	2 RCA-866/866A

Stock Identification
BTA-1L Transmitter — MI-7186-B
BTA-1L Amplifier (for 250K and BTA-250-L) (complete with conversion accessories) — MI-7187-A

Equipment Supplied

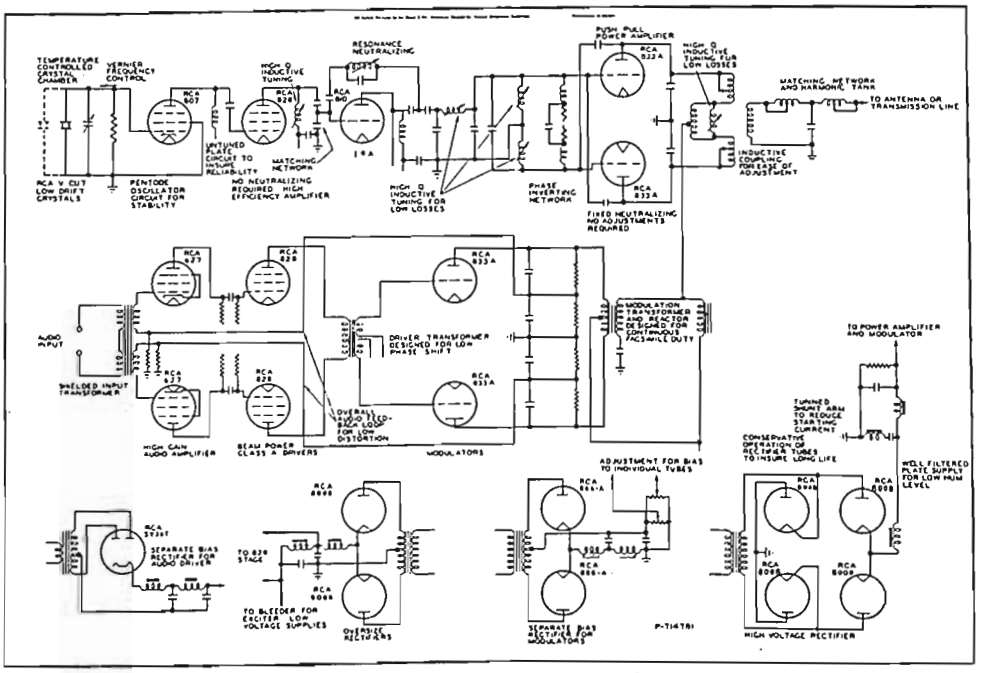
The following is a condensed list of equipment included as a complete BTA-1L transmitter:

1 Type BTA-1L Exciter Unit	MI-7281-B
1 Type BTA-1L Power Amplifier	MI-7185-A
1 Type BTA-1L Power Equipment Section	MI-7284-A
1 Type UL-4392 Crystal Oscillator Unit	MI-19458
1 Touchup Finish Kit	MI-7443
1 Miscellaneous Hardware Kit	MI-7474
2 Instruction Books	IB-30118-1
2 Type TMV-129B Crystal Units	MI-7467
1 RF Output Meter	MI-7157-B
2 Sets of Tubes	MI-7320/7318
1 Set of Station Call Letters	MI-26910

Available Accessories

Type BPA-1 Antenna Tuner	MI-28901-A
Power Change Equipment	MI-7188-A
Type BPM-1A Remote Metering Kit	MI-28027/MI-28037-A
Antenna Phasing Equipment	On application
Antenna Towers and RF Transmission Line	On application

* MI-7188-A Power Change equipment is required.
** dbm = no. of db above one milliwatt when single frequency tone modulation is used.



Simplified Schematic Diagram of BTA-1L

AM Broadcast Transmitter, Type BTA-5F

Features

- Low operating cost—long life tubes—high efficiency circuits.
- Low installation cost—built-in wire channel—efficient layout.
- Vertical chassis construction—utmost accessibility.
- Push button electric tuning—complete circuit metering—panel viewing windows.
- Equipped with control console—centralized control system.
- Entirely air cooled—all cooling air filtered.
- Can be operated at 1 kw by the flick of a switch.
- Quickly and inexpensively converted for 10 kw operation.
- Extension wing cabinets available for housing phasing, monitoring, testing and audio equipments.

Description

The BTA-5F 5 kw Broadcast Transmitter is considered one of the finest, most efficient equipments ever offered to broadcasters. Its excellent design includes refinements in circuits, carefully planned mechanical layout, long life components, and complete protection for personnel and equipment. The design of this transmitter is so conservative that it may be operated on 10 kw with only minor modifications. The front panel view of the new BTA-5F shows the attractive unified panel with two-tone umber gray finish and light trim.

The BTA-5F offers a new concept of accessibility. When the front doors are opened, components and tubes are immediately accessible. This feature provides ready access for servicing, and allows a quick change of tubes when failures occur. In addition it is possible to erect a smaller and less costly structure to house the transmitter.

Vertical chassis construction is employed throughout. This type of construction facilitates the removal or testing of components and insures better ventilation of the cabinet with resultant longer life for individual units.

No trick circuits are used in the BTA-5F. Basic circuits have been time-tested and proved in at least one hundred 5-D, 5-DX, 5-E and 5-F installations throughout the world. The use of straight-forward circuits which are easily adjusted and maintained, prevents loss of time, eliminates the necessity for buying extra test equipment and simplifies tuning and maintenance. Some of the time proven circuit design features are:

Automatic reclosure without recycling on instantaneous power drop-outs.

Class C r-f Stages—easy tuning—no critical adjustments.

Class B Modulators—simple circuit design—high efficiency.

Equalized Feedback—low distortion operation—no adjustments.

Fixed Neutralization—stable performance.

The BTA-5F represents a distinct advance in tube economy. Fewer tubes are employed which reduces the number of spares required. Only 6 tube types are used as compared to 11 tube types in a previous design. Greater use is made of beam power tubes with consequently lower drive requirements and increased efficiencies. All tubes are air-cooled and each high power tube has its own blower, insuring an adequate supply of air and eliminating any possibility of overheating.

The control console for the BTA-5F has been designed to provide a maximum of ease and efficiency in station operation. Each major control function of the transmitter is at the engineer's fingertips, and important meters are placed within easy viewing distance.

For the purpose of housing phasing components and monitoring, test, and audio equipments, extension cabinets may be added to either or both ends of the BTA-5F.

Increasing Power to 10 KW

The BTA-5F may be easily and inexpensively changed over to a standard RCA Type BTA-10F, 10 kw Transmitter by the installation of a 10 kw kit (MI-7267-A). The spare tube position of the BTA-5F provides a socket for the additional required Type 892-R Tube. Sockets, completely wired, are provided for two additional 828 modulator driver tubes. The MI-7267-A conversion kit includes a blower, filament transformers, 10 kw Modulation Transformer and Reactor, and all necessary accessories. Mounting facilities have been provided for new components so that conversion is rapid and easily made.

The BTA-5F is shipped with control console, 2 type TMV-129-B crystal units, 2 complete sets of tubes, 1 installation material kit, 1 touch-up kit and 2 instruction manuals.

Specifications

(All values under "Specifications" are based on RMA Load Impedances)

Type of Emission	A3
Normal Rated Power Output (into RMA normal load)	5 kw
Maximum Power Output	5.5 kw
Frequency Limits—Lower	540 kc
Upper	1600 kc
Frequency Stability	±10 cycles
Power Supply Requirements:	
Line Volts	230 volts
Phase	3
Frequency	50 or 60 cycle
Permissible Voltage Deviation	±5%
A-c Power Input	
Carrier Only	16.5 kw
*25% Modulation, Average Program Level	17.5 kw
100% Modulation (tone)	21.5 kw
Crystal Oscillators	115 volts, 50 or 60 cycle, single phase, 30 watts
Modulation	High level class B
Audio Fequency Input—	
Impedance	600 ohms
(Approx.)—100% Modulation Level	±12.5 dbm
Audio Frequency Response 30-10,000 cy. uniform, within	±1.5 db
Audio Frequency Distortion 50-7,500 cy. not to exceed**	3% rms
Residual Noise, Unweighted Below 100% Modulation	60 db
Maximum Ambient Operating Temperature	45° C.

Tube Complement (MI-7083A)

Crystal Oscillator 2—RCA 807; RF Buffer 1—RCA 828; RF Driver 2—RCA 810; Power Amplifier 1—RCA 892R; 1st AF Amplifier 2—RCA 1620; 2nd AF Amplifier 2—RCA 828; AF Driver 2—RCA 828; Modulator 2—RCA 892R; Bias Rectifier 2—RCA 8008; Low Power Rectifier 2—RCA 8008; Main Rectifier 6—RCA 8008.

Mechanical Specifications

Overall Length	171½"
Overall Height	85½"
Overall Depth (less modulation output unit and plate transformer)	38½"
Plate Transformer (air cooled)	33⅝" x 21" x 24⅝" high
Console	60" x 34½" x 41½" high
Modulator Output Unit (BTA-5F)	
Modulation Transformer	26" x 19½" x 23½" high
(Output Filter—Increases transformer height from 23½" to 27½")	
Building Entrance Requirements	38½" wide, 87" high

Weight in Pounds (unpacked):

Transmitters (Less Modulator Output Unit)	6000
Modulator Output Unit	
Modulation Transformer, Modulation Reactor, Blocking Capacitor	992
Plate Transformer (air cooled)	750
Console	393

Equipment Furnished

The BTA-5F Transmitter (MI-7260-C) consists of:

1	RF Unit	MI-7259-E
1	L.P. Rectifier	MI-7253-C
1	A.F. Unit	MI-7258-E
1	Modulator Output Unit	MI-7087-A
1	Power Control Unit	MI-7257-A
1	Base Assembly	MI-7255-A
1	Enclosure	MI-7256-A
1	Interconnection Jumper Kit	MI-7077
1	Plate Transformer (air cooled)	MI-7088-C
2	UL-4392 Crystal Oscillator Unit	MI-19458
1	Supervisory Control Console	MI-11616
2	TMV-129B Crystal Unit	MI-7467
1	Miscellaneous Hardware Kit	MI-7474
1	Tool Kit	MI-7086-B
1	Touch-up Kit	MI-7499-A
2	Sets of Tubes	MI-7083-A
1	Set of Frequency Determining Parts	MI-19465-A
1	Nameplate	MI-28180-A
1	Installation Wiring Kit	MI-7268-E
2	Instruction Books	IB-30140
2	Installation Prints	IB-300991-1

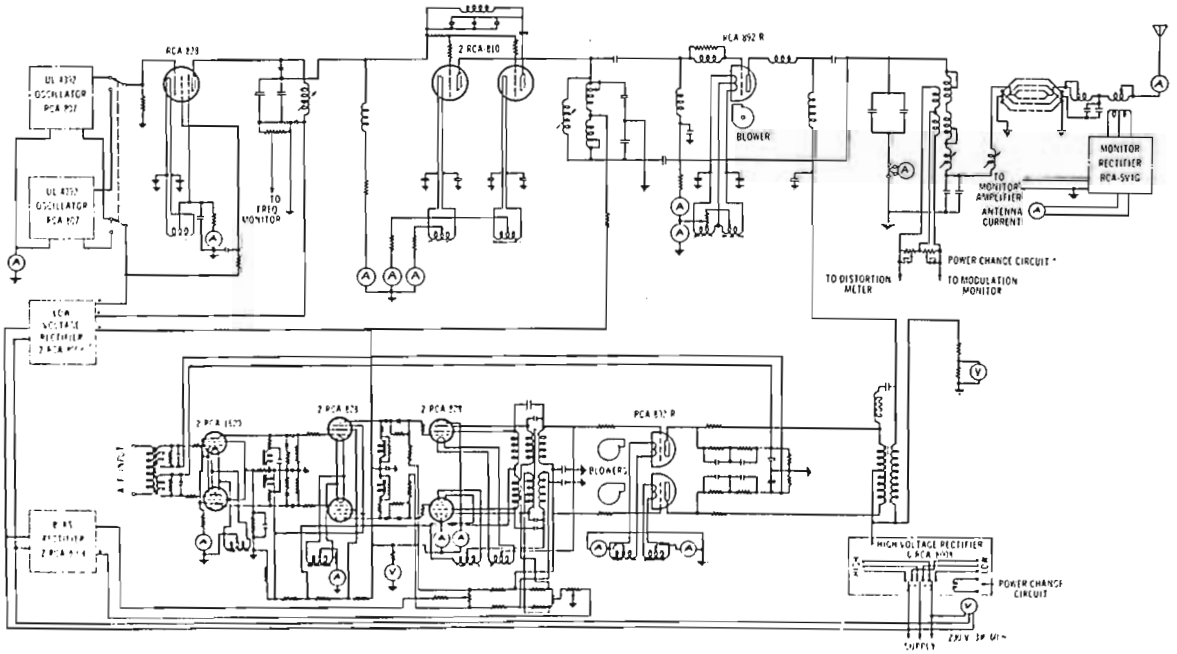
Available Accessories

(Consult nearest RCA office for particulars)

Antennas and RF Transmission Lines	On application
Antenna Tuner, BPA-10 (less or with monitor)	MI-28902A or B
Special Phasing Equipment	On application
Transmitter Amplifier and Monitor Rack	MI-11623
Test and Measuring Equipment	On application
Modification Kit for converting BTA-5F to BTA-10F (with one set of tubes) 60 cycle	MI-7267-A
Set of Tubes for BTA-5F	MI-7083-A
Left Wing Extension Cabinet (Phasing)	MI-7485-F
Right Wing Extension Cabinet (Audio)	MI-7485-E
50 Cycle Conversion Kit	MI-7085-A
Line Voltage Regulator	On application

* For 5 kw output, power factor is 85%.
For 1 kw output, power factor is 78%.

** At 95% Modulation and operating into a load within RMA limits.



* The RCA 10-KW AM transmitter, Type BTA-10F, is identical in size and appearance to the BTA-5F you see here. Over 125 transmitters of this series now in operation.

(Photo courtesy of Radio Station KOOL, Phoenix, Arizona)

with 10-kilowatt insurance

TA-5F. The one 5-KW AM Trans-itter that insures easy increase to 10 KW at any time! Power changeover is imple... inexpensive... quick. *Because was planned that way.*

When you install the BTA-5F Trans-itter for 5-KW operation there is just ne tube in the power amplifier stage left-hand cubicle in view below). But ote the additional tube socket already ounted in place. To increase power to 0 KW, you need only buy the simple odification kit (described in box at ght). With the parts contained in this it...and the few simple circuit changes equired, changeover can be made "over-ight." It's easy...it's inexpensive. You eed lose no air time.

Naturally, you can also buy this trans-itter originally for 10-KW operation specified as Type BTA-10F). Both mod-s—the BTA-5F for 5-KW operation, nd the BTA-10F for 10-KW operation -have the same sleek, well-finished, usiness-like appearance shown by OOL's installation on the opposite age. Both models have the true unified ont . . . an *exclusive feature* of RCA igh-power AM transmitters. This front an integral piece *separate from the com-rtment enclosures.* It greatly facilitates ush-mounting...and improves appear-ance of the installation by several times.

And careful planning like this goes right on through. For instance, this transmitter is equipped with one of the most complete centralized control systems ever designed for *any* transmitter... with all the necessary controls, circuit breakers and relays needed for fully automatic operation or step-by-step manual operation. It has push-button motor-tuning for its high-power stages...and instantaneous power control reduction. It can be furnished with matching cabinet end-extensions for housing antenna phasing, monitoring, test and audio equipment. These extensions have front sections that become an integral part of the overall unified front—another exclusive RCA feature of great importance in station appearance. And note this too: the 5-KW BTA-5F uses only 24 tubes (6 different tube types); the 10-KW BTA-10F uses only 27 tubes (6 different types).

• • •

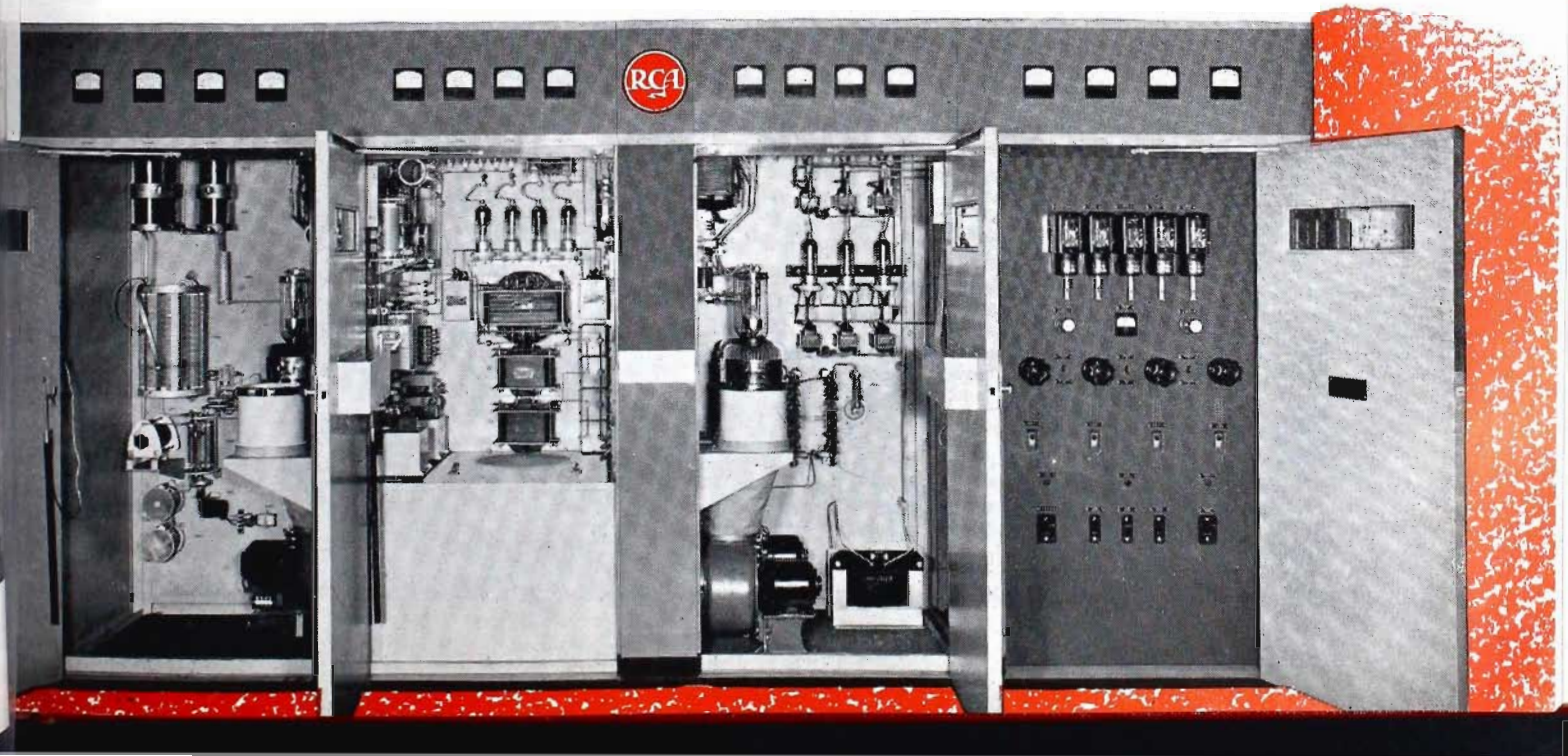
Here, we believe, is the finest streamlined station installation ever engineered for standard-band broadcasting... with all basic circuits proved in more than 125 transmitters of this series now operating throughout the world. Get the details from your RCA Broadcast Sales Engineer, or write Department 19AD

This simple kit (MI-7267-A) takes the BTA-5F to 10 KW... inexpensively and without one change in station layout.

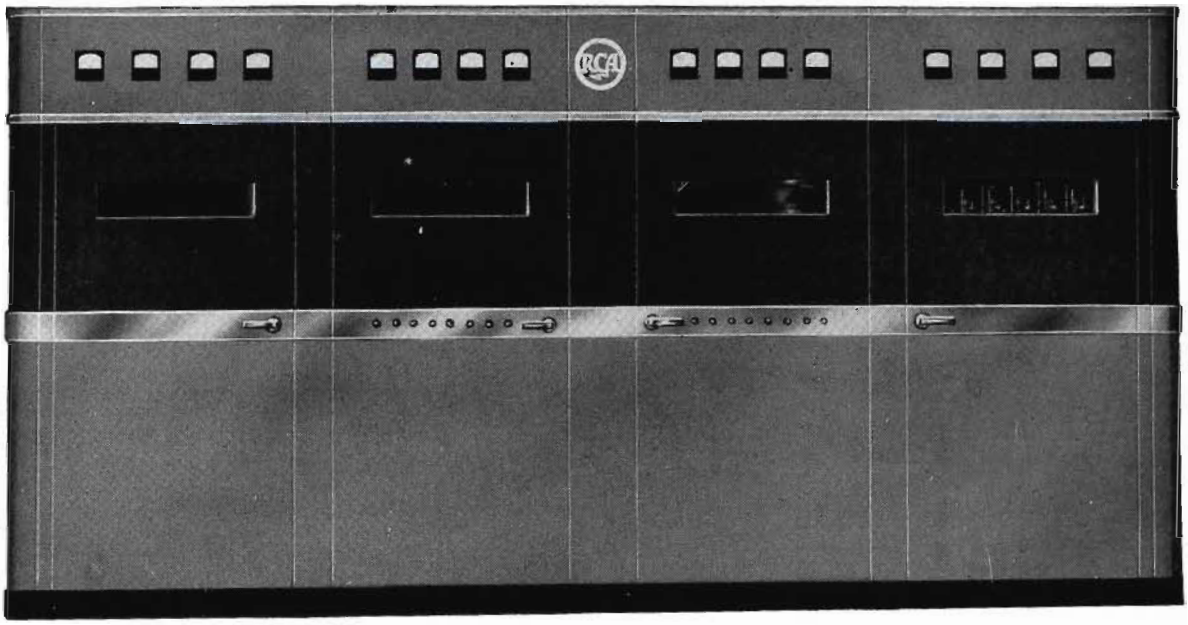
- **One blower**
- **Two filament transformers**
- **One 10-KW modulation transformer**
- **One reactor**
- **All necessary hardware**

The Transmitter Control Console — standard equipment with every BTA-5F and BTA-10F.

THE 5-KW BTA-5F *(open view).* Sweet and simple... with everything up front where you can reach it.



AM Broadcast Transmitter, Type BTA-10F



Features

- Low operating cost—long life tubes—high efficiency circuit.
- Low installation cost—efficient layout—built-in wire channel.
- Vertical chassis construction—utmost accessibility—tubes easily removed.
- Entirely air-cooled. Push button electric tuning.
- Automatic reclosure without recycling on instantaneous power drop-out.
- Equipped with control console—centralized control system.
- Power output may be reduced to 2 kw in emergencies by operation of one switch.
- Extension wing cabinets available for housing phasing, monitoring, testing and audio equipments.
- Tube hour meter.
- Dry transformers.

Description

The Type BTA-10F provides a 10 kw AM transmitter which is outstanding in appearance, performance, and reliability. Fidelity, distortion, and noise level are held to standards meeting the highest requirements. Economy is assured by the use of extremely long life tubes, and the highly efficient high level system of modulation. The cost of operation per hour of this 10 kw equipment has been shown to be considerably less than that of many 5 kw installations.

Basically this 10 kw Transmitter is similar to the Type BTA-5F 5 kw Transmitter. It differs in that it includes an additional 892-R tube with its associated filament transformers and blower motor, a larger modulation transformer, a reactor and two additional 828 modulator driver tubes. The conditions of operation of the tubes are the same, permitting similar performance and the same long tube life which experience has proved to be attained in the BTA-5F Transmitter. The fidelity of transmission and operating efficiency of the Type BTA-10F Transmitter is exceptional. Its high level modulation system is identical to that incorporated in the BTA-5F. The audio feedback circuit is extremely stable and unaffected by adjustments of the radio frequency circuits. Other exclusive circuit design features of the BTA-10F will be found under the description of the type BTA-5F Transmitter.

The BTA-10F Transmitter is equipped with an attractive, unified front panel finished in two-tone umber gray and light trim. Extension cabinets are available for both ends for phasing components and monitoring, test and audio equipment. This compact design not only represents the ideal installation but also permits transmitter houses to be planned for a complete installation with minimum space requirements.

The BTA-10F is shipped with control console, 2 type TMV-129-B Crystal Units, 2 complete sets of tubes (except only seven 892-R tubes are supplied), interconnecting wire kit, 1 touch-up paint kit and 2 instruction manuals.

Specifications

(All values under "Specifications" are based on RMA Load Impedances)

Type of Emission	A3
Normal Rated Power Output (into RMA normal load)	10 kw
Maximum Power Output	10.6 kw
Frequency Limits—Lower	540 kc
Upper	1600 kc
Frequency Stability	±10 cycles
Power Supply Requirements:	
Line Volts	230 volts
Phase	3
Frequency	50 or 60 cycle
Permissible Voltage Deviation	±5%
A-c Power Input	
Carrier Only	24.0 kw
*25% Modulation, Average Program Level	26 kw
100% Modulation (Tone)	33.5 kw
Crystal Oscillators	115 v., 50 or 60 cy., single phase, 30 watts
Modulation	High level class B
Audio Frequency Input—	
Impedance	600 ohms
(Approx.)—100% Modulation Level	±12.5 dbm
Audio Frequency Response 30-10,000 cy. uniform, within	±1.5 db
Audio Frequency Distortion 50-7,500 cy. not to exceed**	3% rms
Residual Noise, Unweighted Below 100% Modulation	60 db
Maximum Ambient Operating Temperature	45° C.

Tube Complement (MI-7084A)

Crystal Oscillator, 2 RCA 807; RF Buffer, 1 RCA 828; RF Driver, 2 RCA 810; Power Amplifier, 2 RCA 892R; 1st AF Amplifier, 2 RCA 1620; 2nd AF Amplifier, 2 RCA 828; AF Driver, 4 RCA 828; Modulator, 2 RCA 892R; Bias Rectifier, 2 RCA 8008; Low Power Rectifier, 2 RCA 8008; Main Rectifier, 6 RCA 8008.

** At 95% Modulation and operating into a load within RMA limits.

Mechanical Specifications

Dimensions in inches (Approx.)	
Overall Length	171½"
Overall Height	85½"
Overall Depth (less modulation output unit and plate transformer)	38½"
Plate Transformer (air cooled)	33⅝" x 21" x 24⅝" high
Console	60" x 34½" x 41½" high
Modulator Output Unit (BTA-10F)	
Modulation Transformer	26" x 20" x 24⅞" high
Modulation Reactor	29½" x 27" x 22" high
Blocking Capacitor and Output Filter	26½" x 6¼" x 20" high
Building Entrance Requirements	38½" wide, 87" high
Weight in Pounds (unpacked):	
Transmitters (Less Modulator Output Unit)	6500
Modulator Output Unit	
Modulation Transformer	1115
Modulation Reactor	1340
Blocking Capacitor	58
Plate Transformer (air cooled)	750
Console	393

Equipment Furnished

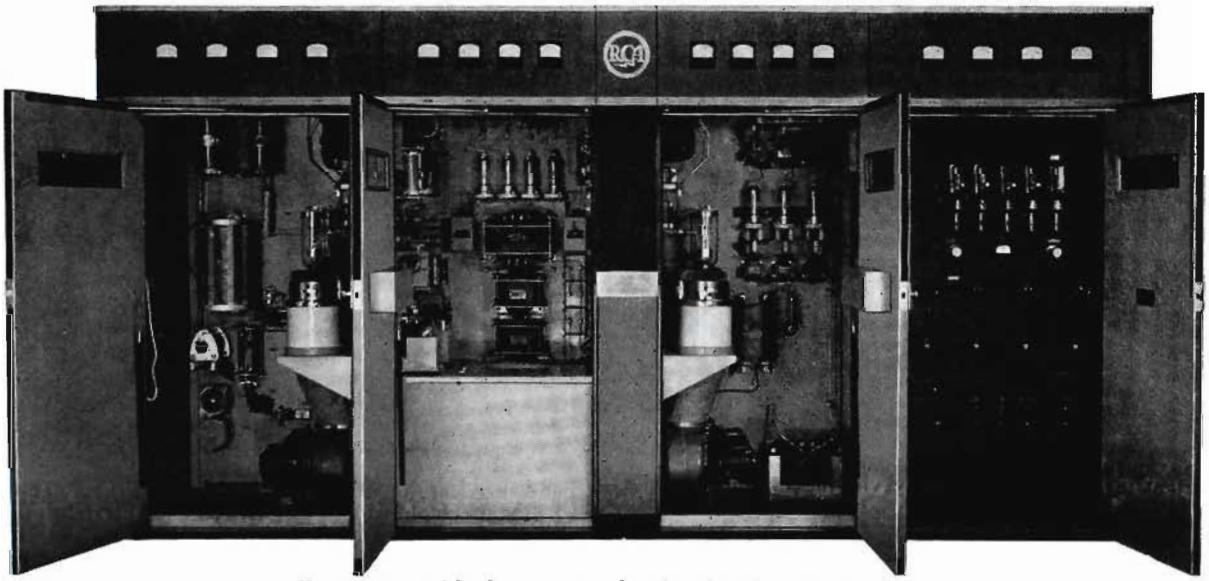
The BTA-10F Transmitter (MI-7266-C) consists of:

1	RF Unit	MI-7259-G
1	L.P. Rectifier	MI-7253-D
1	A.F. Unit	MI-7258-G
1	Modulator Output Unit	MI-7087-B
1	Power Control Unit	MI-7257-C
1	Base Assembly	MI-7255-A
1	Enclosure	MI-7256-B
1	Interconnection Jumper Kit	MI-7077
1	Plate Transformer (air cooled)	MI-7088-C
2	UL-4392 Crystal Oscillator Unit	MI-19458
1	Supervisory Control Console	MI-11616
2	TMV-129B Crystal Unit	MI-7467
1	Miscellaneous Hardware Kit	MI-7474
1	Tool Kit	MI-7086-B
1	Touch-up Kit	MI-7499-A
2	Sets of Tubes	MI-7084-A
1	Set of Frequency Determining Parts	MI-19465-B
1	Nameplate	MI-28180-1
1	Installation Wiring Kit	MI-7268-E
2	Instruction Books	IB-30141
2	Installation Notes	IB-30099-1

Available Accessories

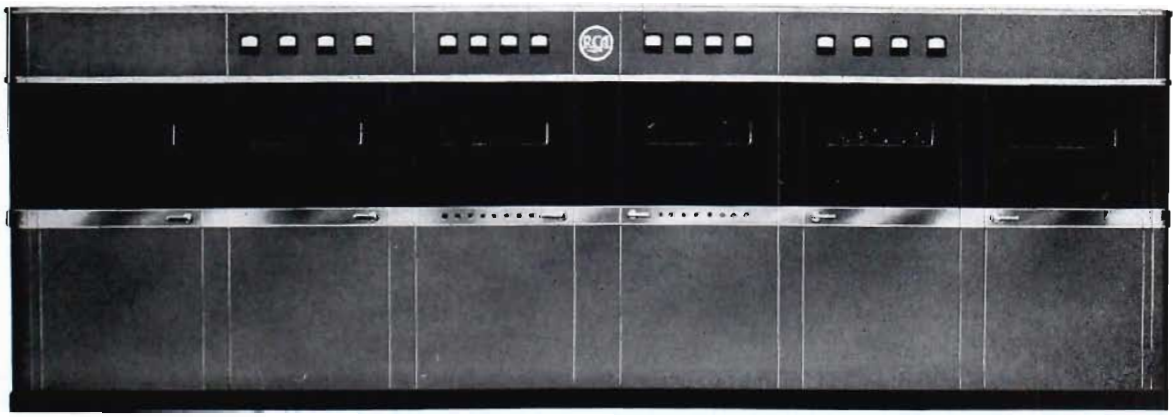
(Consult nearest RCA office for particulars)

Antennas and RF Transmission Lines	On application
Antenna Tuner, BPA-10 (less or with monitor)	MI-28902A or B
Special Phasing Equipment	On application
10 to 5 kw Antenna Cutback Kit	MI-28152
Transmitter Amplifier and Monitor Rack	MI-11623
Test and Measuring Equipment	On application
Modification Kit for converting BTA-5F to BTA-10F (with one set of tubes) 60 cycle	MI-7267-A
Set of Tubes for BTA-10F	MI-7084-A
Left Wing Extension Cabinet (Phasing)	MI-7485-F
Right Wing Extension Cabinet (Audio)	MI-7485-E



Front view with doors open showing interior construction.

BTA-10F Transmitter with left and right wing extension cabinets.



Transmitter Control Console, MI-11616

Features

- Simplifies transmitter installation.
- Major control functions are at engineer's fingertips and important meters are within easy viewing distance.
- Contains all required mixing and switching facilities.
- Standardized vu meter plus extension modulation monitor and antenna current indication.
- All necessary controls for transmitter operations plus visual indicating lamps.

Uses

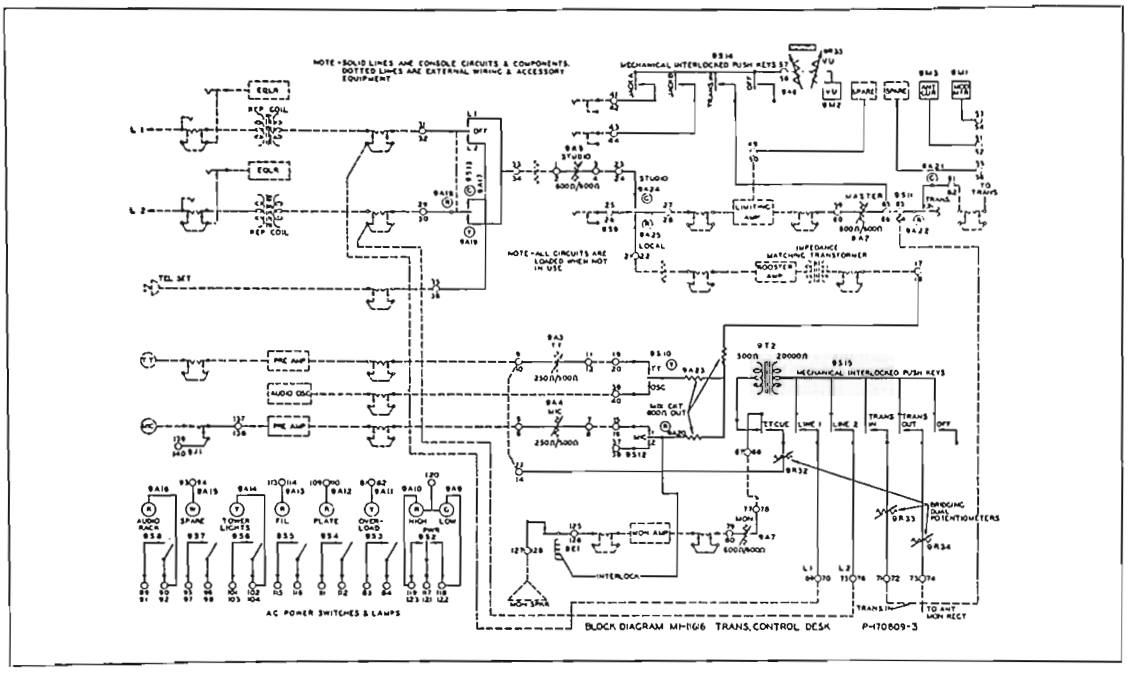
The MI-11616 Transmitter Control Console is an attractive desk type console containing all the mixing and switching facilities required at the transmitter plant. It is equipped with a standardized vu meter, extension modulation monitor meter and antenna current meters. Designed primarily for use with the RCA BTA-5F and BTA-10F Broadcast Transmitter, it may be combined with the MI-11623 Transmitter Monitor and Amplifier Rack to provide a most flexible and complete system of control and monitors.

Description

All controls, switches and meters are mounted on three panels which are assembled in the turret mounted on a metal desk. Each panel is hinged at the bottom so that it may be opened for easy servicing and the entire rear cover of the turret may be removed to facilitate installation or basic changes. Desk and turret are of metal construction throughout. The left hand pedestal contains a typewriter shelf and the right pedestal contains two convenient drawers. A third drawer is located in the center between the pedestals. A cylinder lock on this drawer also locks the drawers in the pedestal. Skirts have been provided below the pedestals to conceal the wiring conduits and all wiring is carried inside the desk. The desk top is covered with black linoleum with rounded corners and metal trim.

Mechanically interlocked push-keys permit instant selection of the circuit to be monitored by the vu meter or by the monitoring amplifier. By means of these keys, the monitoring speaker may be used to check (1) transmitter audio input, (2) transmitter audio output, (3 and 4) two incoming lines and (5) turntable output.

Balanced, high quality, step-by-step mixers are provided for the (1) incoming line, (2) announce microphone and (3) turntable. A master or transmitter input control and a monitor amplifier volume control are also furnished. Key switches in the outputs of the microphone and turntable mixers are equipped with indicating lamps. The microphone key is interlocked with the monitoring speaker through a relay and disconnects the speaker whenever the microphone is on. A line transfer key permits ready selection of two incoming lines and transfers the telephone set to the line not being used for the program. A three position key switch selects the studio line or the local microphone and turntable. Chromium plated guards prevent accidental operation of the important keys. A spare



Block Diagram MI-11616 Transmitter Control Desk

D. P. D. T. lever key is furnished for the convenience of station personnel. The center panel contains a standardized vu meter, with a step-by-step control making it possible to read levels of +4 vu to +40 vu; a modulation meter intended to operate as an extension for a type 66A modulation monitor and an antenna current indicator consisting of a 0-50 ma, d-c movement with a scale of 50 divisions calibrated linearly from 0 to 10 amperes r-f (other scales are available) and intended to be connected into the rectified carrier circuit. Cutouts are provided for two additional meters such as an extension db compression meter for the limiting amplifier; an extension meter from a frequency monitor or additional antenna current indicators where required. The attenuator controls are located below the meters on the center panel.

A 12 volt, 1 ampere, d-c power supply furnishes power to the speaker interlocking relay and to the audio circuit indicating lamps. The power supply utilizes a copper sulphide dry rectifier and capacity filter.

The power control switches are mounted on the left hand panel and are designed for 230 volt operation. Associated lamps are furnished and may be arranged for operation on 115 volt for audio power and 230 volt for transmitter power. Switches and lamps are provided for (1) transmitter filaments, (2) transmitter plate, (3) overload reset, (4) transmitter high-low power transfer, (5) tower lights, (6) audio equipment and (7) spare.

Specifications

Input Impedances
- Lines 1 and 2, Studio, Master and Monitor Controls — 600 ohms
- Telephone Set — 600 ohms
- Microphone and Turntables — 250 ohms
- Monitor—Transmitter in and out (Bridging) — 20,000 ohms
- Monitor—Lines 1 and 2 — 20,000 ohms

Output Impedances
- Lines 1 and 2, Lever Key; Microphone and Turntable Mixer; Studio, Master and Monitor Control — 600 ohms
- Microphone and Turntable Controls — 250 ohms

Frequency Response (30 to 15,000 cycles) — ±0.1 db

Insertion Losses
- (microphone and turntable mixer circuit) — 7 db

Noise Level: Circuits are isolated so that residual noise level will not exceed the aggregate noise level of the associated ampifiers.

A-c Power Input for Lamps and Relays
- (105-125 volts, 50-60 cycles) — 25 watts

Dimensions, overall — Width 60", depth 34½", height 41½"
Note—Turret extends approximately 11" above desk top

Weight (unpacked) — 393 lbs.

Stock Identification — MI-11616

Accessories

Transmitter Monitor and Amplifier Rack — MI-11623

Extension Meter for 86-A1 Amplifier — Stock No. 43504

5/10 KW Conversion Kits For RCA AM Transmitters

Any RCA 5 KW broadcast transmitter from type 5D to type BTA-5F may be easily and inexpensively modified to a standard 10 KW RCA transmitter by installing a 5/10 KW conversion kit. The conversion kit includes a blower, filament transformers, modulation transformer, reactor and all other necessary accessories and instructions.

Conversion can be easily and rapidly accomplished without loss of air time since only minor changes in the existing installation are required. The converted transmitter is efficient and reliable and has quality equal to that of the original.

Moreover, this does not make the installation an orphan, for with this change the former 5 KW transmitter becomes a standard RCA 10 KW unit which is registered with the FCC as such, and for which replacement parts can be readily obtained.

5D to 10D Conversion Kit — MI-7303

5DX to 10DX Conversion Kit — MI-7303-A

5F to BTA-10F — MI-7267-A

or

BTA-5F to BTA-10F
- (60 cycle) — MI-7267-A
- (50 cycle) — MI-7267-B

AM Broadcast Transmitter, Type BTA-50F1

Features

- Low power consumption—reduced operating costs.
- Unified front design — facilitates flush mounting—attractive appearance.
- Fewer tube types—only 9 types of tubes used in entire 50 KW transmitter—fewer spares needed.
- Simplified Power Supply Circuits—only 3 vacuum tube rectifiers used in entire transmitter.
- Small floor space requirements—built-in wiring duct for ease of installation and lower installation costs.
- Spare tube positions in Power Amplifier. Modulator, and Main Rectifier.
- Modern P. A. and modulator design—Type RCA 5671 (thoriated-tungsten filament design) is used in both.
- Walk-in access to every section.
- Simplified control with high-speed air circuit-breaker fault interruption and reclosure.
- Supervisory control console furnished.

Description

Providing up to 53 kilowatts of r-f power, the new RCA BTA-50F1, all air-cooled AM transmitter operates in the range of 540 to 1600 kc. It not only incorporates the latest in modern, deluxe transmitter design—but includes features "proved in" through twenty years of actual service . . . many features as familiar to broadcasters as station call letters. Each RCA 50 kw design has improved on previous designs—new features added.

The BTA-50F1, latest of the "RCA 50" series, is designed to insure *minimum installation cost* plus economy and simplicity of operation. Heavy-duty components are used throughout. All are features that mean *less air time lost* and reduced maintenance costs. Moreover, the BTA-50F1 is outstanding among 50 kw designs in its *unusually low power consumption*—another factor contributing to reduced operating costs.

Electrically, the BTA-50F1 crystal oscillator is followed by three stages of r-f amplification and the final power amplifier. Simplified single-ended circuits are used with push-button motor tuning provided in IPA, R-F driver and Power Amplifier.

The audio section of the BTA-50F1 employs push-pull circuits with fixed audio feedback. This design results in excellent fidelity characteristics with very low distortion and noise level. A minimum number of audio stages and high level, class B modulation provide further economy of equipment and operation. By using high gain tubes in stabilized circuits—a total of only four audio stages are needed (including the modulator) to provide excellent over-all audio performance.

Both modulator and power amplifier employ the same type tube, thus providing greater spare tube economy. Fewer tuned circuits (only 8 simple, single-ended circuits—4 motor-tuned and 4 fixed tuned)—and fewer tube types (only 9 in the entire 50 kw transmitter) are required than in ordinary transmitters of similar power.

Mechanically, the BTA-50F1 is made up of five main units: the exciter, modulator, power amplifier, main rectifier, and control-and-distribution section. All sections are mounted immediately behind a single unified-front panel enclosure, which is thirty-three feet long and eighty-four inches high. Full length doors are provided in each section, front and rear to provide maximum accessibility to tubes and components.

Modulation transformer, reactor and high-voltage plate transformers are oil-filled and require no attention other than occasional inspection of oil. The main filter reactor is air cooled and may be located in the transformer vault or at the rear of the transmitter. A typical transmitter installation requires a space of only 33 x 17 feet for transmitter and associated control and power equipment. A control console finished in umber gray to blend with the transmitter styling is furnished.

Performance Specifications

Operating Frequency — Any specific frequency in the band from 540 kc to 1600 kc

R. F. Power Output — 53 kw at transmitter terminals

*Output Load Impedance — 40 to 250 ohms—zero reactance

Radio Frequency Stability — ±10 cycles

Audio Frequency Response — ±1 db from 30 to 10,000 cycles from a reference level of 1000 cycles at 60% modulation

Audio Input Impedance — 600 ohms

Audio Input Level — Plus 10 dbm at 100% modulation (0 VU, Average Program level)

*Audio Distortion — Less than 3% RMS from 50 to 7500 cycles at 90% modulation

Noise Level—RMS — 60 db below 100% modulation

*Carrier Shift — Less than 5%

R. F. Harmonics — 70 db below carrier fundamental measured at one mile

Power Consumption:	*With 50 KW into Non-Directional Radiator*	*With 52.5 KW into A Directional System*
Without Modulation (@ 87% P. F.)	96.5 kw	99.5 kw
25% Modulation (@ 88% P. F.)	104.5 kw	108.0 kw
100% Modulation (@ 90% P. F.)	138.0 kw	143.0 kw

(A loss of 500 watts, approx., has been allowed between the transmitter terminals and the point of power measurement.)

Power Supply Requirements — 460 volts, 60 cycles, 3 phase, 3 wire, with 5% maximum combined regulation and variation. The equipment can be adapted for 50 cycle operation by minor modification.

* These values are based on RMA minimum standard normal load specifications.

Console—For Specifications on Console see Page 232.

Tube Complement

For RF Exciter Unit: Crystal Oscillators (2) 2 RCA 807, Buffer Amplifier 1 RCA 828, Low Power R-F 2 RCA 810, 5 kw I. P. A. 1 RCA 892-R, Low Power Rectifier 2 RCA 8008.
For Main Modulator: First A-F Input Amplifier 2 RCA 6C6, Second A-F Amplifier 2 RCA 828, Driver 4 RCA 828, Modulator 2 RCA 5671, Bias Rectifier 2 RCA 8008, Stabilizing Rectifier 2 RCA 5R4GY.
For Power Amplifier—2 RCA 5671
For Main Rectifier—6 RCA 857-B
For Antenna Monitor Rectifier—1 RCA 5V4G

Mechanical Specifications

(Dimensions in inches—Weight, uncrated in pounds)

1. MI-7041 Enclosure—Approx. Weight 2800 lbs. Width 396; Height 84
   This enclosure is broken down into 6 sections to facilitate shipping and handling.
2. MI-7042 RF Exciter—Approx. Weight 1800 lbs. Height 88¼; Width 42; Depth 42¾
3. MI-7044 Main Modulator—Approx. Weight 1850 lbs. Overall Height including Insulators 87¼; Width 63¾; Depth 42½
4. MI-7043 50 kw Power Amplifier—Approx. Weight 3600 lbs. Overall Heigbt including insulators 93¾; Width 96¼; Depth 66
5. MI-7378 Main Rectifier—Approx. Weight 1250 lbs. Height 81; Width 29½; Depth 75¼
6. MI-7046 Control and Distribution—Approx. Weight 4300 lbs. Height 90; Width 46; Depth 74
7. MI-7048 Rectifier Plate Transformer Approx. Weight—1400 lbs. Height 53; Width 27; Depth 27
8. MI-28040 A and B Filament Power Units Approx. Weight—300 lbs. Height 38; Width 26; Depth 12½
9. MI-7344-1 Modulation Transformer Approx. Weight—6100 lbs. Height 90¾; Width 56⅜; Depth 48⅛
10. MI-7344-2 Modulation Reactor—Approx. Weight 4000 lbs. Height 90½; Width 39½; Depth 43
11. MI-7383 Main Filter Reactor—Approx. Weight 2000 lbs. Height 56$\frac{15}{16}$; Width 37⅞; Depth 29⅜
12. MI-7047 Switchgear Unit—Approx. Weight 3500 lbs. Height 90; Width 44; Depth 48
13. MI-7049 Blower—Approx. Weight 1200 lbs. Max. Height (each unit) 61$\frac{7}{16}$; Overall Width 39⅛; Depth including motor 86
14. MI-7389 Monitor Rectifier—Approx. Weight 50 lbs. Height 24⅜; Width 15⅜; Depth 6⅛
15. MI-11621 Supervisory Console—Approx. Weight 500 lbs. Height 41¼; Width 60; Depth 34
16. MI-7380-A Tube Jack—Approx. Weight 800 lbs.

Equipment Furnished

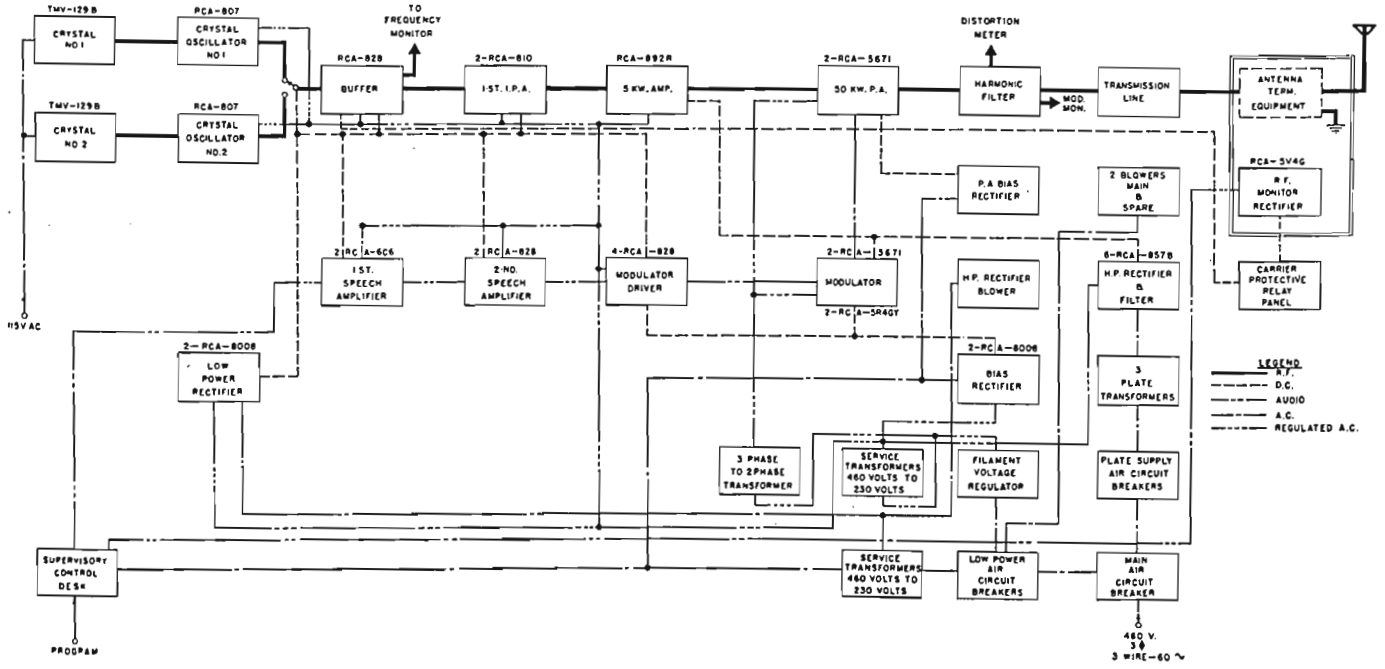
Following is a condensed list of equipment included as a complete BTA-50F1 Transmitter (MI-7050-A):

1	Unified Front Panel	MI-7041
1	RF Exciter Unit	MI-7042
1	50 kw Power Amplifier Unit	MI-7043
1	Main Modulator Unit	MI-7044
1	Main Rectifier and Filter Capacitor	MI-7378
1	Control and Distribution Unit	MI-7046
1	Switchgear Unit	MI-7047
1	Filament Power Unit, Power Amplifier	MI-28040-A
3	Main Rectifier Plate Transformer	MI-7048
1	Blower and Filter Equipment	MI-7049
1	Filament Power Unit, Modulator	MI-28040-B
1	Main Modulation Transformer Reactor and Coupling Capacitor	MI-7344
1	Main Filter Reactor	MI-7383
1	Remote Antenna Meter	MI-7384-C
1	Protective Relay Panel	MI-7387
1	Monitor Rectifier Unit	MI-7389
1	Supervisory Console	MI-11621
1	Complete Set of Tubes	MI-28194-A1/A2
1	Spare Set of Tubes (complete set less one 5671)	MI-28194-A1/A3
2	Crystals in TMV-129B Holders	MI-7467
1	Tube Jack	MI-7380-A
2	Instruction Books	IB-30200
2	Crystal Oscillator Units	MI-19458

Available Accessories

(Consult nearest RCA Office for particulars)

Antenna Tuner (230 ohms)	MI-28903-A
Antenna Tuner (70 ohms)	MI-28903-B
Modification Kit for operation on 50 cycle power supply	MI-7037
Audio and Monitoring Rack, factory wired for use with MI-11621 Transmitter Control Desk	MI-11623
Antenna Phasing Equipment	On application
Antenna Towers and RF Transmission Line	On application
Measuring and Test Equipment	See RCA Catalog
Installation Material and Engineering Service	On application
Water Cooled Dummy Antenna	On application
Spare Parts	On application
Power Reduction Kit, 50/10 KW	MI-28905



50 KW AM Supervisory Console, MI-11621

Features

- Simplifies transmitter operation.
- Provides switching facilities for emergency announce microphone and turntable operation.
- Balanced high-quality mixers and selector keys provided for incoming line, announce and turntable operation.
- Monitor selector switch permits monitoring of transmitter audio input, transmitter output, turntable output and incoming lines.

Description

Supervisory Console, Type MI-11621, is a control console especially designed for use with the 50 kw transmitter. It provides maximum ease and efficiency of station operation and includes all the switching, mixing and control-circuit metering facilities required in the station to insure a complete and flexible system. All controls, indicator lamps, switches and meters are grouped on three panels which are located in the turret mounted on the metal desk. Thus, all major control functions are centralized at the engineer's fingertips—and a constant visual circuit indication is afforded. The console is equipped with a standard VU meter, extension modulation monitor and antenna current meters. Also provided are "time of outage" and "duration of outage" clocks which are controlled by relays located in the transmitter overload circuits. Thus, an accurate station record of outage is made available—in the event carrier is interrupted.

Mechanically interlocked push-keys permit instant selection of the circuit to be monitored. Program operation, special tests, and appropriate transmitter control switches—all are easily and quickly handled by the operator at the console. Important audio control circuit keys such as "transmitter on," and studio and local switches are protected from accidental tripping by chromium plated guards.

The desk and turret are of sturdy metal construction finished in two-tone umber gray to match transmitter styling. The left-hand section of the desk contains a typewriter shelf and the right-section—two convenient drawers. A third drawer is located in the center between the two pedestals. The panels of the turret top of the desk are hinged for ease of maintenance.

Specifications

Input Impedance:

Lines 1 and 2, Studio, Master and Monitor Controls	600 ohms
Telephone Set	600 ohms
Microphone and Turntables	250 ohms
Monitor—Transmitter In and Out (Bridging)	20,000 ohms
Monitor—Lines 1 and 2	20,000 ohms

Output Impedances:

Lines 1 and 2, Lever Key; Microphone and Turntable Mixer; Studio, Master and Monitor Control ——— 600 ohms

Microphone and Turntable Controls ——— 250 ohms

Frequency Response (30 to 15,000 cycles) ——— +-0.1 db

Insertion Losses (microphone and turntable mixer circuit) ——— 7 db

Noise Level—Circuits are isolated so that residual noise level will not exceed the aggregate noise level of the associated amplifier.

A-c Power Input for Audio Lamps and Relays (105-125 volts, 50-60 cycles) ——— 25 watts

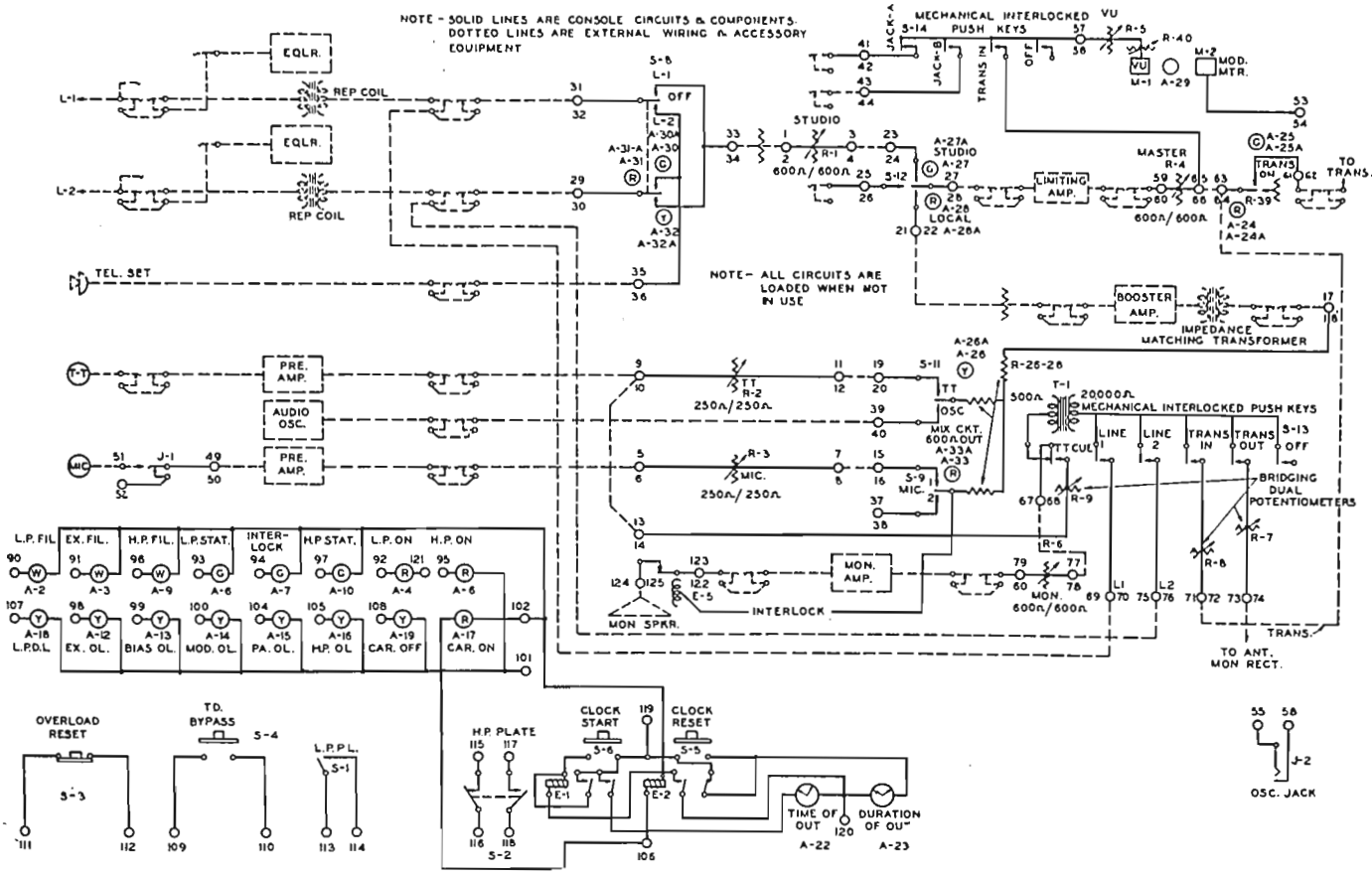
Dimensions, Overall ——— Width 60", depth 34½", height 41½"
Note—Turret extends approximately 11" above desk top.

Weight (unpacked) ——— 500 lbs.

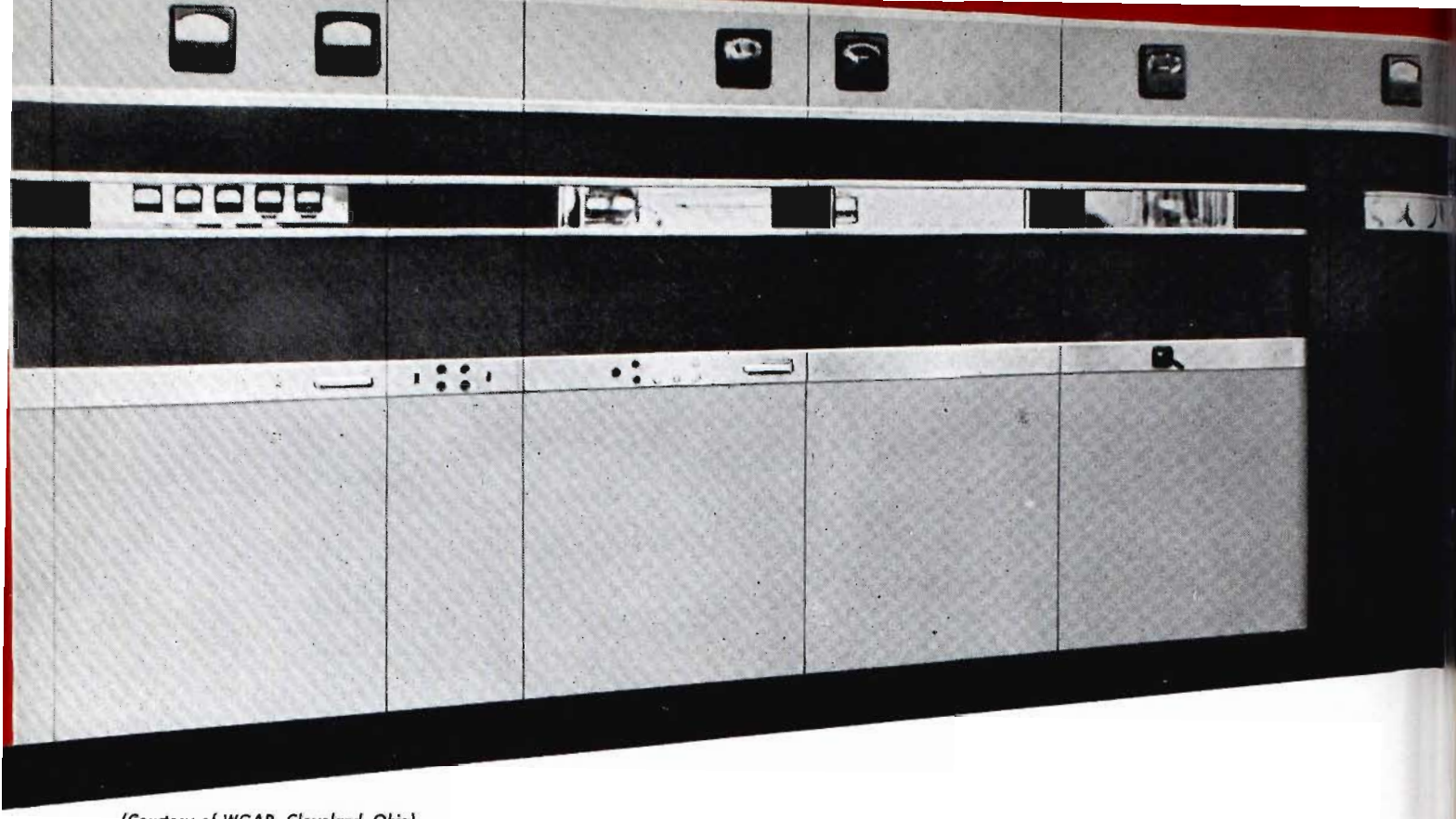
Stock Identification ——— MI-11621

Accessories

Transmitter Monitor and Amplifier Rack ——— MI-11623



Simplified Schematic Diagram of the MI-11621 Console



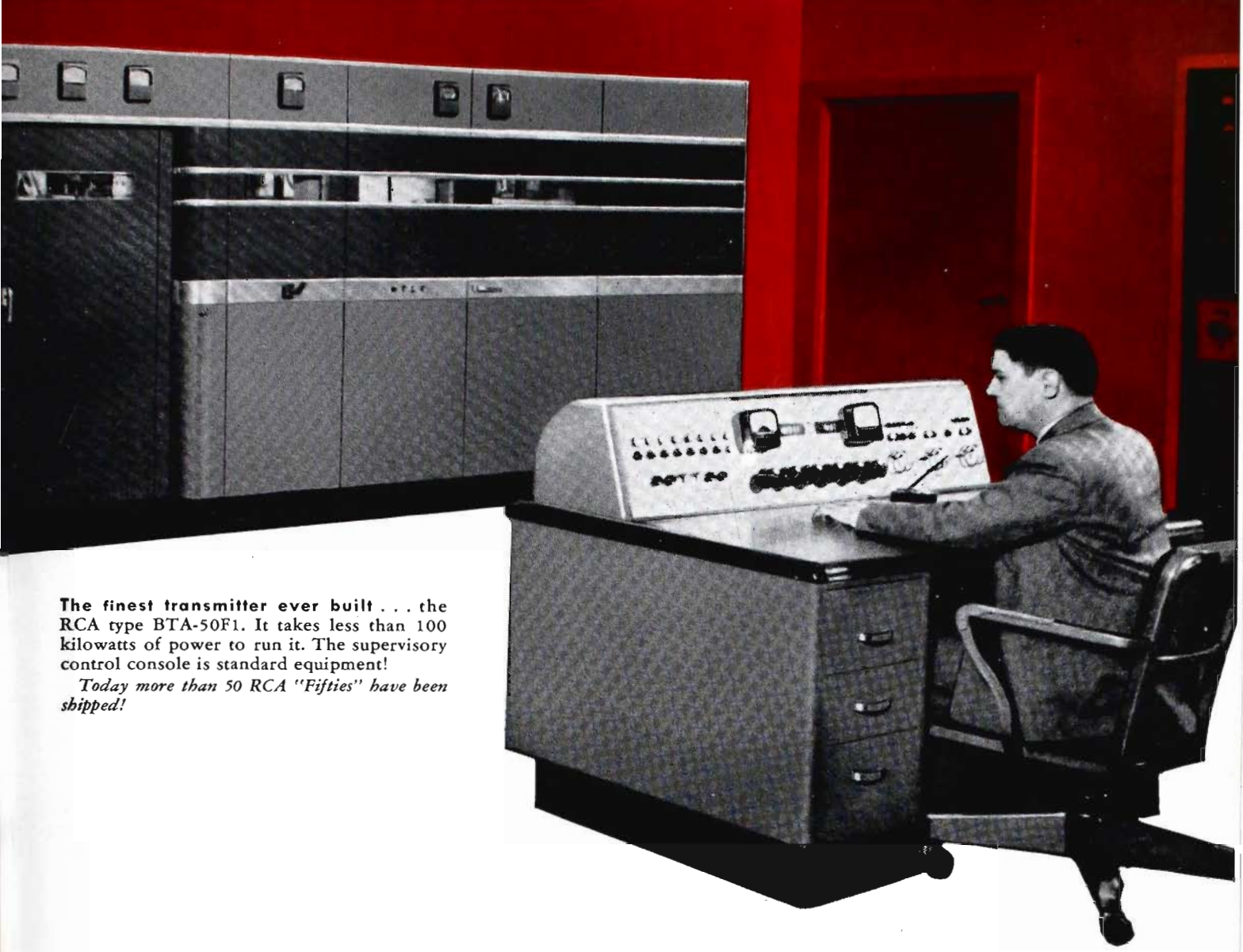
(Courtesy of WGAR, Cleveland, Ohio)

Replace your old AM transmitte

with RCA's new 50 kw.

The revolutionary, new power
RCA-5671. This tube takes abo
third the filament power of conve
triodes used in the older transm
It reduces hum modulation belo
requirements—*even without r-f fe*

The two 5671's in the r-f power
fier and the two in the class B mo
of this 50-kw transmitter save
$1200 yearly in filament power al



The finest transmitter ever built . . . the RCA type BTA-50F1. It takes less than 100 kilowatts of power to run it. The supervisory control console is standard equipment!

Today more than 50 RCA "Fifties" have been shipped!

ınd write off its cost in power savings alone!

ıs a fact — as one high-power broadcaster recently discovered to hi complete satisfaction. Now, he hs replaced his old transmitter wth an RCA "fifty"—*and it's paying its way.*

HRE'S WHY.

Using revolutionary new RCA-5671 pwer triodes that take about one-ıird the filament power of conventional types, this RCA "fifty" saves o to $1.75 an hour in power savings wer former transmitters—*$12,000 year, based on daily operation at 9 hours a day!*

Many other new design features, too, that add to this $12,000 savings.

For example, only 29 tubes and 11 different tube types—less than half the number used in many present 50 kw's. True walk-in accessibility that assures faster maintenance — and lowers maintenance costs. Ultra-conservative operation of tubes and components—with less chance for outages.

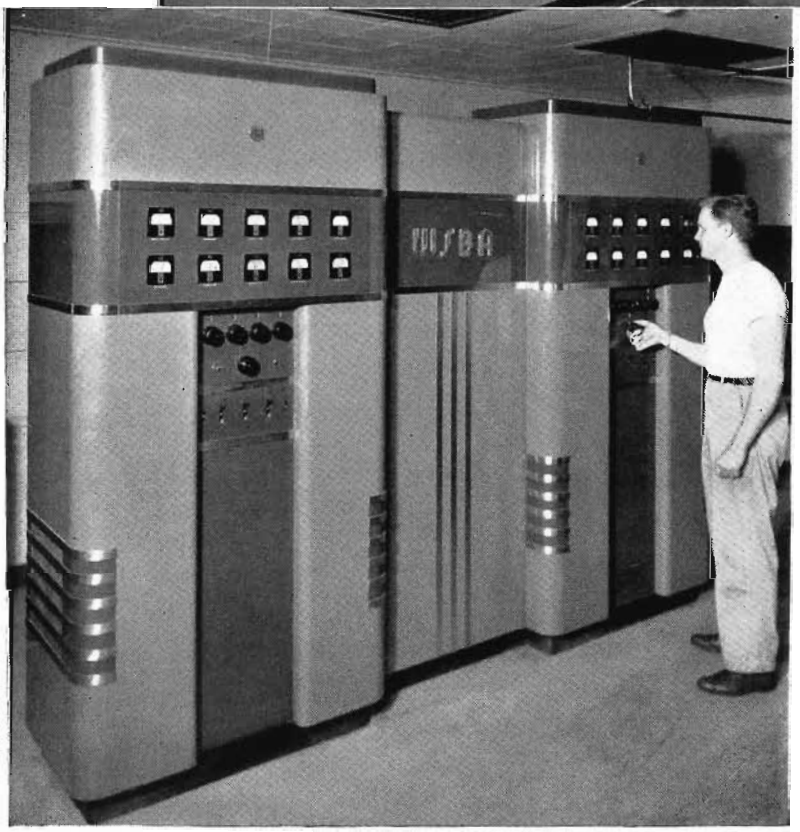
Here is a 50-kw AM transmitter that does away entirely with oil circuit breakers—assures faster circuit protection. Because the BTA-50F1 operates from a 460-volt supply. Control and protection circuits are the most complete of any transmitter designed to date. And its true unified front (an integral part separate from compartment enclosures) facilitates flush-mounting — gives your transmitter room a new, handsome appearance.

Write for the new 28-page brochure about the BTA-50F1. It gives you complete details — including circuits, specifications, floor plans, and full-page pictures showing the remarkable accessibility of this great transmitter.

Dept. 19HC, RCA Engineering Products, Camden, New Jersey.

At the power control section of the five kilowatt transmitter, Type BTA-5F, at KOOL, Phoenix, Ariz.

Fifty kilowatt transmitter, Type BTA-50F, with control console and extension cabinets containing phasing equipment, at KMPC, Hollywood, Cal.



At the controls of the one kilowatt transmitter, Type BTA-1L, at WSBA, York, Pa.

RCA Custom Built Antenna Phasing Equipment

Features

- Individual custom design provides optimum efficiency for feeding each array.
- Circuits chosen to give maximum stability and operating convenience.
- Lower cost—no excess equipment included.
- Coordination of phasing and transmitter design for best performance.
- Shipped wired and assembled.
- Monitoring rectifiers, lighting circuits, automatic switching and electric tuning furnished, if desired.
- Metering facilities may be expanded or minimized as required.
- Various enclosure cabinets and mounting methods available to meet individual requirements.

Description

RCA has adopted the policy of custom-building antenna phasing equipment in accordance with individual design to meet the particular requirements of the user. Experience has shown this policy to be more economical and satisfactory than to attempt to standardize on one elaborate design with sufficient components to meet the requirements of a wide range of powers, various numbers of towers and an almost infinite combination of networks Such designs will inevitably have excess equipment and must, therefore, be a compromise rather than the optimum design. Several types of enclosures and all circuit components are manufactured in quantities and are available from stock, thus making possible a quick delivery of an individual and economical design.

It will be noted from the simplified schematic of a typical directional array installation that, where possible, "T-Networks", having a lagging phase shift, are used in order to take full advantage of their harmonic suppressing qualities, relative ease of adjustment, economy and high efficiency.

The power dividing network usually consists of a parallel-resonant tank circuit having a KVA to KW ratio of approximately two. The inductor is a tapped unit shunted at various points along its length by front-panel controlled rotary coils. These give independent amplitude control for each antenna and allow for a maximum of flexibility in power division. When the network is adjusted to parallel resonance, the input line from the transmitter may be tapped in at the point of proper resistance.

The phasing networks consist of a "T-Network" with a 1:1 impedance transformation. The two inductive legs of the "T" network consist of rotary coils, ganged, with front-of-panel control. For a fixed shunt element, this allows phase variations from approximately 60° to 120° with no appreciable change of impedance transformation. The inductive leg of the series-resonant network consists of a single rotary coil with front panel adjustment.

The line terminating unit consists of a "T-Network" with phase shift impedance-transformation minimum KVA losses, and maximum flexibility.

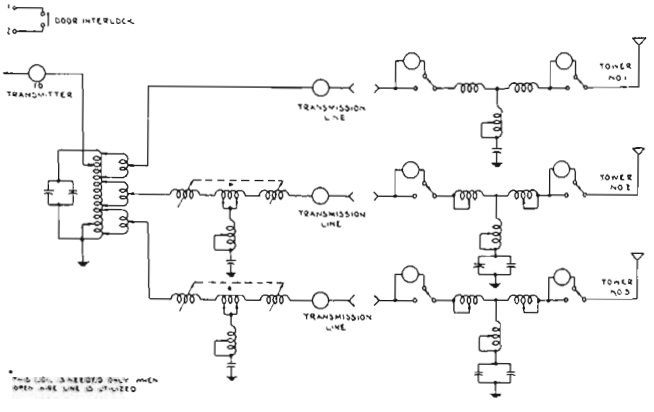
Faradon mica capacitors are generally utilized and are operated at approximately 50% of the nameplate rating. Polystyrene treated capacitors provide lower losses than the wax-treated type and are also more stable under high temperatures sometimes encountered in unventilated antenna tuner houses. Gas-filled or vacuum capacitors, operated well within their nameplate rating, are used where they become an economical choice or when requested by the customer. In general, RCA does not recommend the use of open, air-dielectric capacitors due to their vulnerability to the accumulation of dust and foreign matter, but in those cases where air capacitors are specifically desired, they will be supplied.

RCA phasing equipment embodies high Q coils which are supported on micalex and wound with copper strap or tubing. These coils are available in a large variety of inductance ranges and current handling capacity, and are all supplied with variable taps so that precise adjustments are possible. Special care is taken to insure that conservatively rated coils of sufficient inductance range are utilized to take care of normal variations in antenna array parameters. RCA phasing equipment is designed to insure minimum degradation of transmitter power output, sideband waveform and frequency response.

The r-f meters supplied employ expanded scales and have a full scale range between 1.3 and 2 times the RMS carrier value of the current being metered.

Facilities for remote control switching from directional to non-directional operation, or from night-time to day-time patterns, are supplied if required. Other optional items are: (1) Antenna monitoring rectifiers, (2) Circuit components for isolating the tower lighting system, (3) Phase sampling coils or tower mounted loops, (4) Remote metering, (5) Lightning protective systems.

Schematic of a Typical Directional Arrangement



1 KW Phasing and Branching Equipment

One kilowatt phasing and branching equipment is usually supplied in an MI-7485-G cabinet, a BR-84 cabinet, or mounted on a wall-mounting steel panel. The MI-7485-G cabinet has both front and rear doors with the components mounted on a sub panel behind the front door. The panel controls are made accessible by opening the front door while the interlocked rear door provides access to all components and wiring. The BR-84 rack-type cabinet is suitable for two element non-direction day, and directional day-night arrays. It has front and rear doors and is similar to the MI-7485-G. It is the most economical phasing equipment cabinet in the RCA line. Wall Mounting steel panels are made to order to meet each purchaser's requirements. This type of construction is quite popular because of several inherent advantages—low cost, excellent accessibility—flexible component layout which allows shorter lead lengths and thereby better efficiency.

The line terminating units are supplied in a weatherproof metal housing, or wall-mounting steel panels. The interior view of a tuner housing shows a typical arrangement of components for an installation employing switching facilities for day-night pattern changes, and metering facilities for transmission line and antenna current. Provision can be made for either coaxial line or open wire termination insulators contingent upon the design specifications.

Specifications

MI-7485-G CABINET

Color——Two-tone umber gray enamel except for black base

Dimensions:

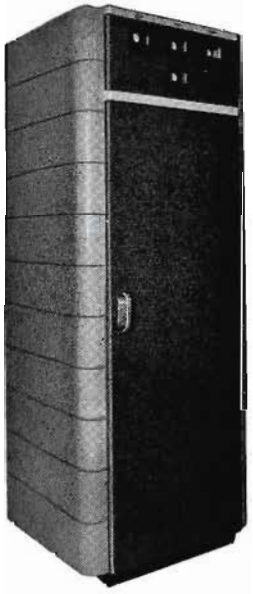
Height	84 1/16"
Width (including end shields)	31"
Depth (including doors and handles)	30 1/8"
Clearance of Door Swing	25 5/8"

BR-84 CABINET

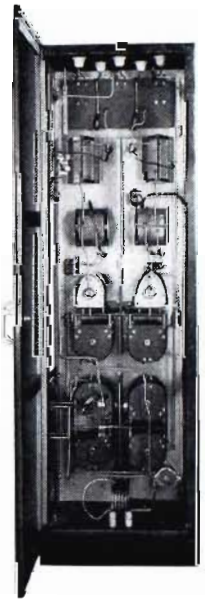
Finish——Two-tone umber gray enamel except for the black base

Dimensions:

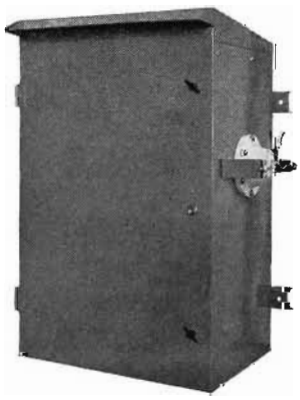
Height	84"
Width	28"
Depth (including door and handles)	24 1/4"
Clearance of Door Swing	23"



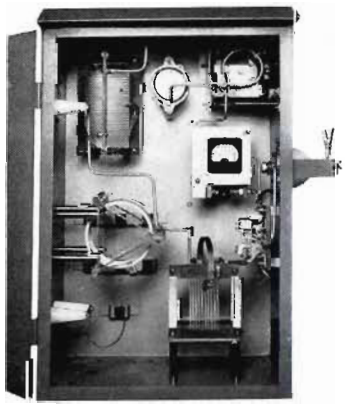
Exterior view of a 1 KW phasing and branching equipment in MI-7485-G cabinet



Interior view of a 1 KW phasing and branching equipment



Exterior view of a 1 KW line terminating unit in weatherproof cabinet

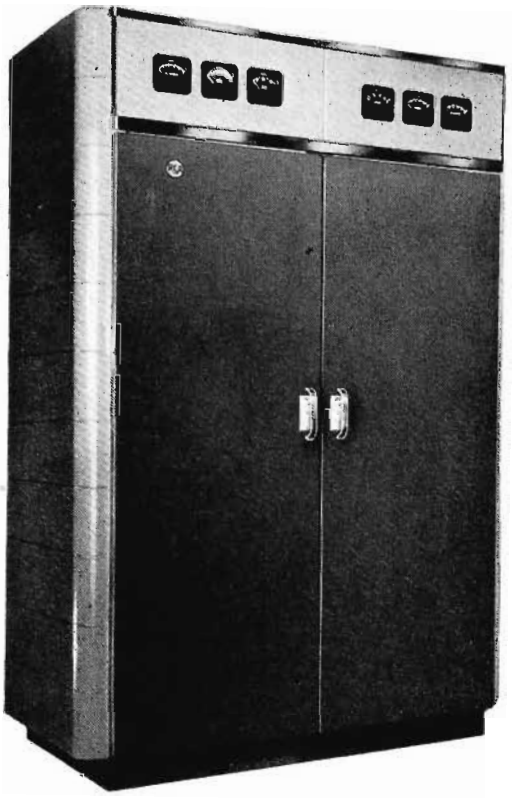


Interior view of 1 KW line terminating unit with phase sampling coil, antenna base metering and pattern switching facilities mounted in BPA-1A Housing

5/10 KW Phasing and Branching Equipment

The 5/10 KW phasing and branching equipment is available in two cabinet styles, as well as the wall-mounting panel construction. When supplied in the MI-7485-F cabinet, the equipment is intended to form a left-wing extension for the RCA BTA-5F or BTA-10F transmitter. This cabinet matches the transmitters both in appearance and quality of material and workmanship. The decorative front panel is finished with a two-tone umber gray, rubbed and waxed, with stainless steel trim and handles. An interlocked door in the left side of the cabinet allows operating personnel to walk inside the cabinet for inspection of phasing components. Meters for measuring transmission line and common point currents are mounted on a sub-panel behind the front door and may be read through the glass panel in the door. Controls for the phase and amplitude of the current in each tower are mounted on the same sub-panel.

The standard double rack type cabinet, MI-28935-B, is designed for those stations where it is desired or necessitated by space requirements that the phasing and branching equipment be set apart from the transmitter. The two typical floor plans illustrated below show, in one case, a typical transmitter room where the phasing equipment is housed in the left wing extension cabinet, and in the other case, an application of the self-contained, standard rack type phasing cabinet. This cabinet is finished in two-tone umber gray lacquer with stainless steel handles and trim. Necessary meters are mounted on the meter panel over the front doors. All controls are brought out through a sub-panel behind the front doors as described for the wing type cabinet. Interlocked, double doors in the rear of the cabinet provide access to all components for inspection. With installations involving unusual complexity, it may be necessary to supply phasing and branching equipment in a three section cabinet of the same design as the one illustrated.



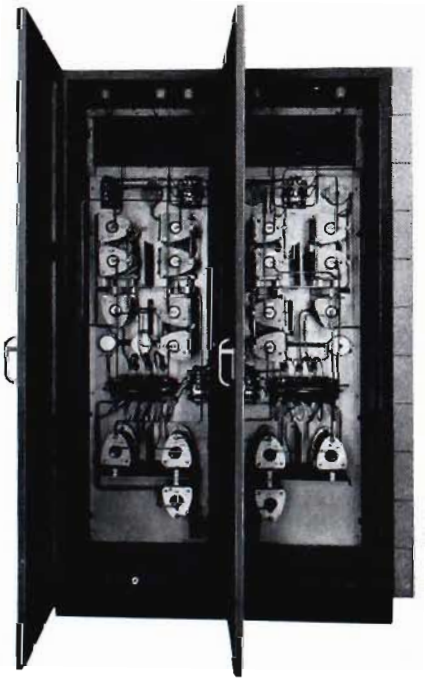
Typical, double section, standard, rack type cabinet, MI-28935-B

Specifications

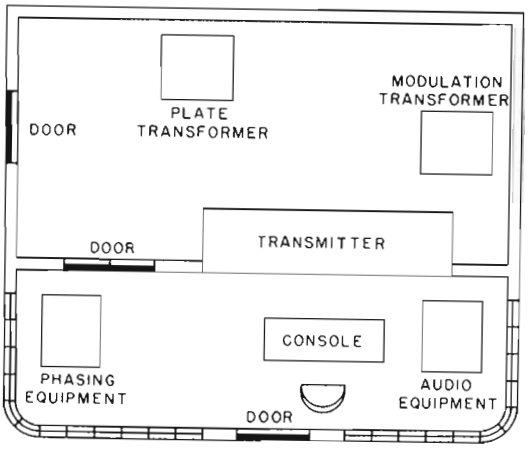
MI-28935-B CABINET

Dimensions:

Height	84″
Width	56 3/32″
Depth	31″
Clearance for Front Door Swing	25⅝″
Clearance for Rear Door Swing	25⅝″

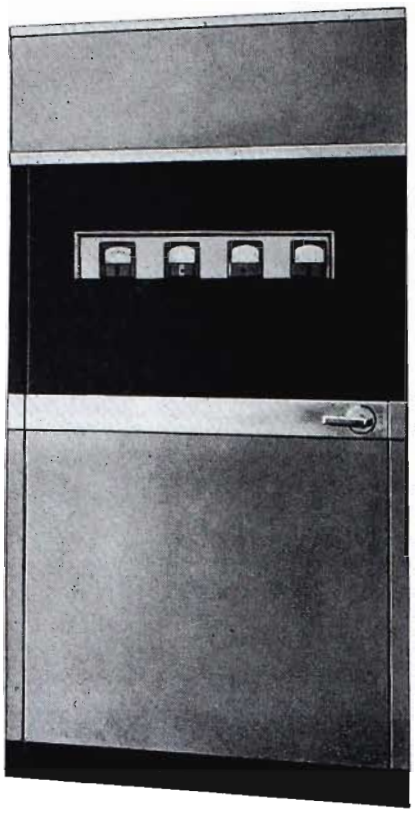


Open-door view of the equipment in an MI-28935-B Cabinet

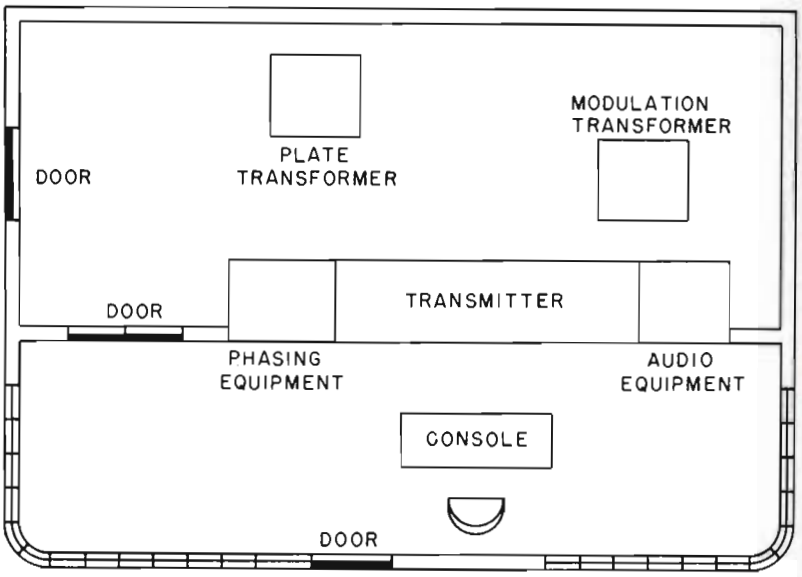


Typical floor plan where audio and phasing equipment is housed in the separate standard rack type cabinets

5/10 KW Phasing and Branching Equipment (Continued)



Exterior front view of a 5 KW phasing and branching equipment housed in MI-7485-F left wing extension cabinet



Typical floor plan using left and right wing extension cabinets

Specifications

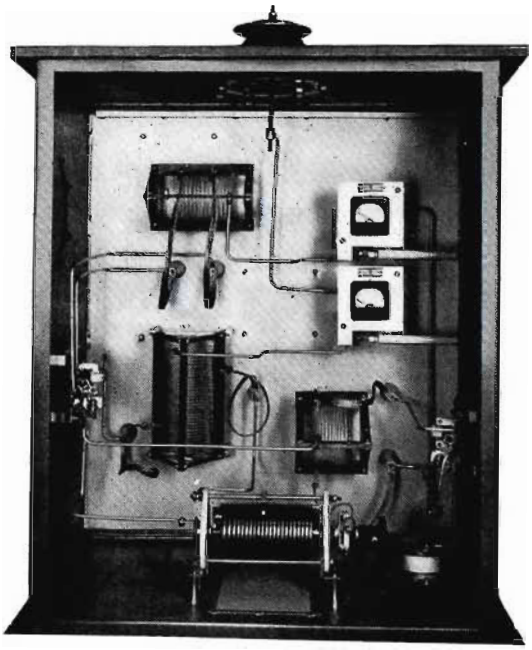
MI-7485-F CABINET

Dimensions:

Height	85½"
Width	42½"
Depth (including enclosure)	38½"
Clearance for Side Door Swing	24¼"
Clearance for Enclosure Door Swing	39¾"

5/10 KW Line Terminating Unit

The 5/10 kilowatt terminating unit can be supplied in a weatherproof metal cabinet or on a wall mounting steel panel. The weatherproof cabinet is dsigned for mounting on a wooden platform or steel angle cradle by means of side flanges at the bottom of the housing. Rear mounting strips are also provided to permit wall mounting. The antenna and transmission line ammeters may be read through a circular window in the door and they are protected from lightning surges by a single pole double throw make-before-break switch, which is operated by means of a knob extending through the side of the tuning house.



Interior view of a 5 KW line terminating unit mounted in a BPA-1A Housing

50 KW Phasing and Branching Equipment

The fifty KW phasing and branching equipment is supplied in an MI-7485-J cabinet which may be used to provide a matching wing extension to give a unified appearance for an RCA BTA-50F1 transmitter.

Specifications

MI-7485-J CABINET

Dimensions:

Height	84 3/32"
Width	102¼"
Depth	78 1/16"
Clearance for Side Door	31"
Finish	Two tone umber gray

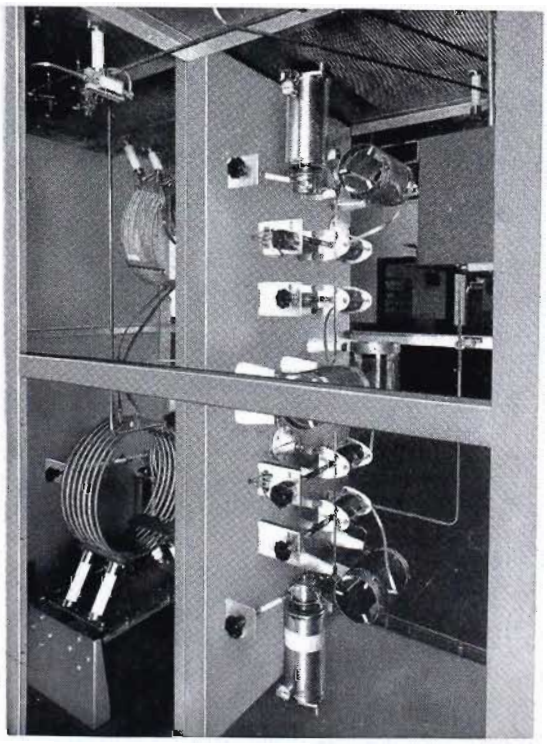
The line terminating unit for 50 KW equipment is designed to be mounted in a tuner house at the base of the tower. RCA does not supply the tuner house but does supply all inductors, capacitors (gas, vacuum, or mica), meters, meter panels, static drain choke, bowl insulators, lightning gap, surge suppressor, wiring material, brackets and hardware. Not included are the protective grill, interlocks, ground strap, and light and telephone auxiliaries. The line terminating unit will require approximately 70 square feet of floor space and an 8 foot ceiling.

How to Order

RCA will be pleased to furnish a proposal on custom built phasing equipment upon receipt of general requirements such as:

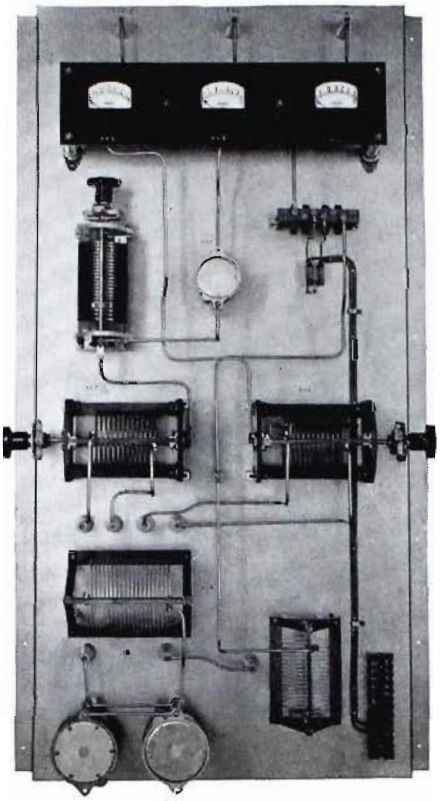
(1) Number, height and type and ground plot of towers.
(2) Phase and relative amplitude of current in each tower.
(3) Type of enclosures in which equipment is to be mounted.
(4) Transmission line specifications together with length of run to each tower.
(5) Any special requirements which should be incorporated in the design of the equipment such as: (a) interlocked pattern switching; (b) type and extent of metering facilities; (c) carrier off protective systems; and (d) monitoring facilities.

To facilitate the transmission of this information, copies of an "Engineering Specification for Broadcast Antenna Phasing Equipment Form" are available at all RCA Broadcast Sales Offices. Those interested in phasing equipment are invited to communicate with their nearest RCA Sales Office for additional information.

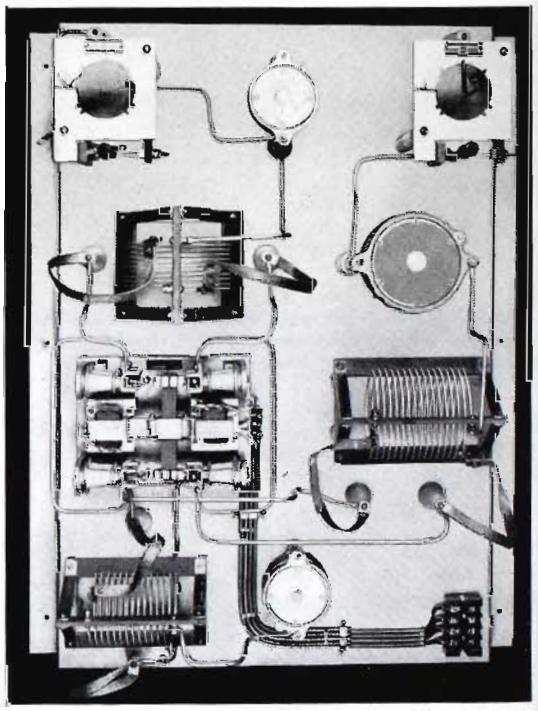


Interior view of a 50 KW phasing and branching equipment

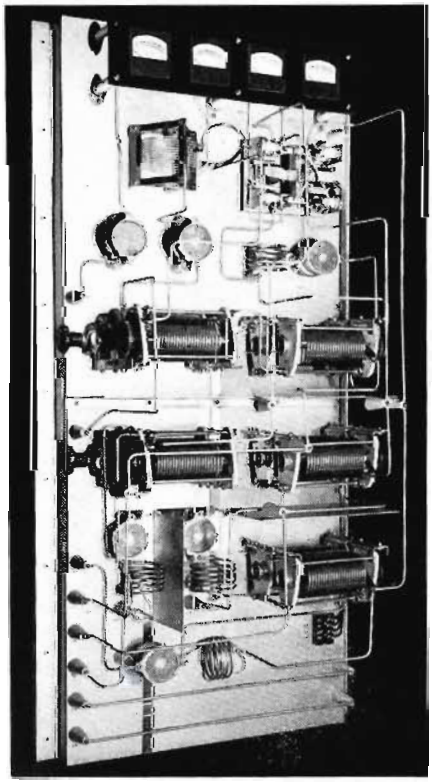
Typical Wall-Mounted Phasing Installations



5 KW, 2 Tower Phasing and Branching Unit



5 KW Line Terminating Unit on Wall Mounted Steel Panel



Typical 5 KW, 5 Tower Phasing Unit on Steel Panel

Antenna Current and Phase Sampling Equipment

Two general methods of obtaining samples of antenna current for phase and amplitude monitoring are commonly used.

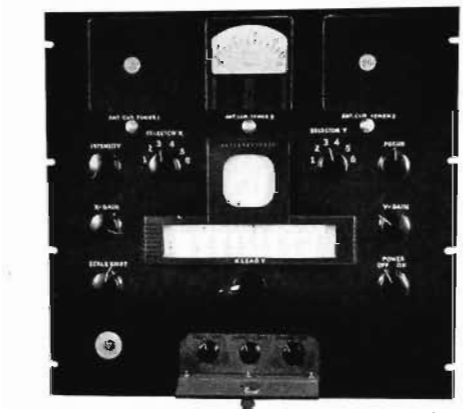
The first method employs an electrostatically shielded, resonant, pickup coil mounted adjacent to the antenna feed line in the line terminating unit or tuner house. The tuned sampling coil can be coupled at virtually any point along the radiator or feed line in many installations and still pick up enough votage to operate the current and phase indicators. Since the tuned circuit is more sensitive than a non-resonant loop, care must be taken to avoid pickup from adjacent towers or voltages induced by other inductors in the installation. Pickup from an extraneous field will cause error in phase indication and may also produce non-linearity in current indicators. Mounting the pickup coil inside a metal shield through which the feed line is run will generally produce satisfactory results. The RCA MI-8217-A remote metering and sampling kit supplies the pickup coil and also the thermo-milliammeter to be mounted on the panel of the WM-30A phase monitor.

The second method of sampling antenna currents employs a non-resonant loop mounted on the tower. This type installation has the advantage that indicators are not usually influenced by base currents if the loop is located up from the base of the tower. In the tower mounting loop type of installation, the sampling line, which may be clamped to the tower, must be brought across the tower base insulators. This may be accomplished by using the RCA MI-7327-4 isolation coil, which is a ⅜" 72 ohm concentric line formed into a high impedance coil at broadcast frequencies. This coil, supplied with the necessary insulators for mounting, is usually located within the tuner house at the base of the tower. In some cases the sampling lines can be spaced from the tower by high voltage insulators, and brought across the base without an isolating network.

The RCA MI-8217-D/MI-7184-A-150 remote metering and sampling loop kit supplies the pickup loop, mounting insulators, and also the necessary thermo-milliammeter to be mounted on the panel of the WM-30-A phase monitor.

Type WM-30A Phase Monitor

The RCA Type WM-30A phase monitor provides a simple means of accurately measuring phase differences between currents in the various towers of an antenna array. It is particularly useful in checking the directional arrays to insure proper phasing and hence proper field pattern. All phase angles up to 360° at any frequency between 225 and 1800 KC can be measured. The Type WM-30A can be used to adjust the phase shifting networks, to measure impedances of arrays, and to facilitate calculation of mutual impedances of antennas.

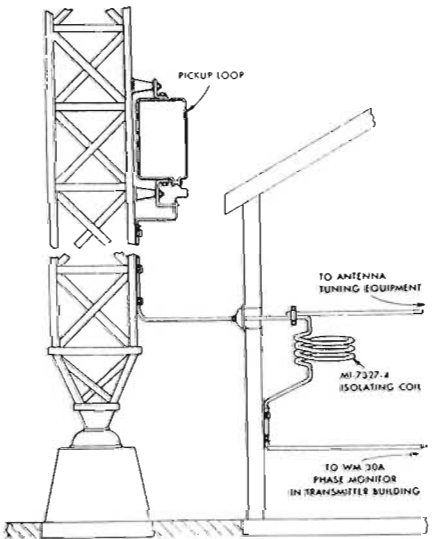


WM-30A Phase Monitor. Blanks in top of panel are to provide for additional meters

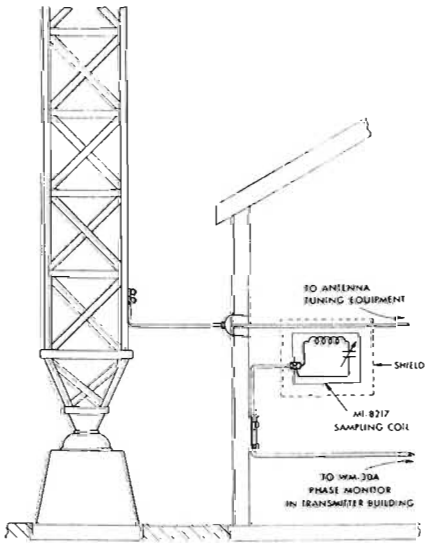
The RCA phase monitor can be used for remote indication of both relative amplitude and phase of antenna currents in arrays employing up to three elements. Used in conjunction with the MI-8216-C remote meter panel, correct relationships can be maintained between phase and magnitude of currents in directional arrays having as many as six elements.

Specifications

MI-8217-A SAMPLING COIL	
Clearance Dimensions	5" x 5" x 5"
Stock Identification	MI-8217-A
MI-8217-D NON-RESONANT LOOP	
Dimensions	2' x 8'
Stock Identification	MI-8217-D
MI-7327-4 ISOLATION COIL	
Dimensions:	
Base Plate	14¼" x 21¾"
Coil	19" I.D.
Winding Length	10½"
Stock Identification	MI-7327-4
MI-7184-A-150 REMOTE METER	
Dimensions	4" rectangular case
Scale	0-150%
Type	Weston 743 expanded scale (150 ma movement)
Stock Identification	MI-7184-A-150
WM-30-A PHASE MONITOR	MI-30030-A



Typical installation of MI-8217-D Pickup Loop and MI-7327-4 Isolating Coil

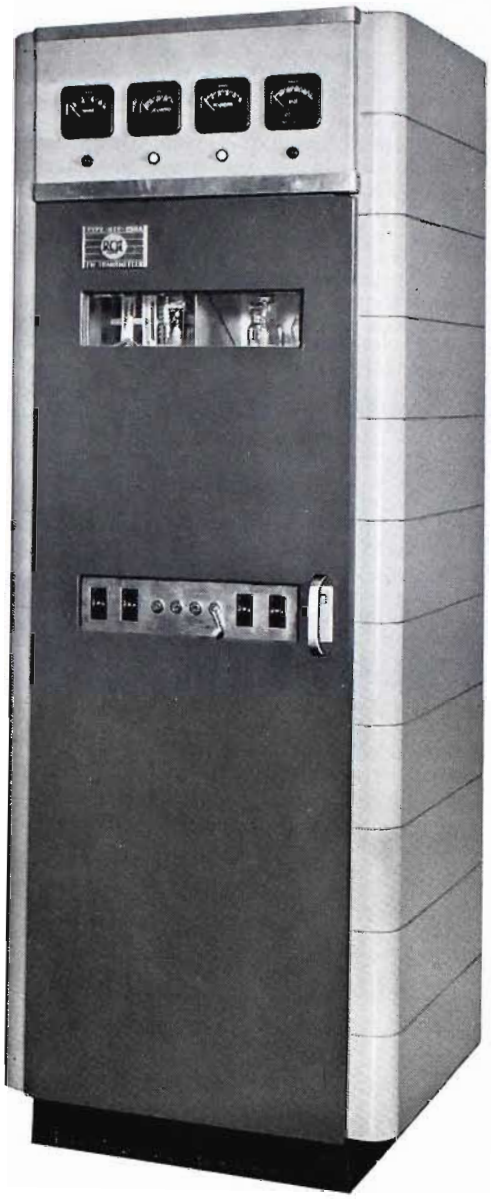


Typical installation of MI-8217-A Sampling Coil

FM Broadcast Transmitter, Type BTF-250A

Features

- Incorporates RCA's Direct FM system which requires fewer and less expensive tubes and parts.
- Automatic frequency control.
- Excellent frequency response ±1 db 30 to 15,000 cps.
- Low distortion—less than 1%, 30 to 15,000 cps.
- Easy to tune, single ended r-f circuits throughout.
- Simplified controls with complete circuit protection.
- Multi-unit construction permits easy addition of higher powered units.
- Vertical chassis construction—front and rear door accessibility.
- Completely self-contained.



Description

The new BTF-250A FM Transmitter incorporates all the latest engineering advances and many desirable basic features. Attractively housed in a single standardized cabinet, this compact unit will provide a maximum of 250 watts output at any specified frequency between 88 and 108 mc. Installation is simple and economical. Future power increases are easily made by adding one or more power amplifiers and power control units housed in matching cabinets. Accessibility is assured by vertical chassis construction plus surface mounting of components and exposed wiring for easy and speedy circuit tracing and servicing.

The exciter unit of the BTF-250A contains RCA's well known Direct FM modulator and frequency control circuits. Fewer tubes and fewer components are used in this exciter than in previous designs. All components are mounted on a single vertical panel and are easily accessible. The exciter power supply is on a separate chassis.

Frequency modulation is accomplished directly by push-pull reactance tubes connected across the frequency-determining circuit of the modulated oscillator. This "direct modulation" process eliminates numerous multiplier and converter stages with a resulting lower noise and distortion level.

Simplified single-ended amplifiers operating Class "C" and comprising a minimum of variable elements form the r-f section of the BTF-250A.

Tube costs have been kept low by using sturdy receiver type tubes in the FM exciter and high efficiency circuits plus inexpensive low power transmitting tubes in the r-f amplifiers. The same tube type is employed in several stages thus reducing spare tube requirements.

All power circuits are protected by magnetically-tripped circuit-breaker type switches. A transmission line monitor which acts as watchman over the antenna and transmission line system is provided. Any unwarranted increase in the standing wave ratio such as might result from an arc in the transmission line, or a fault in the antenna itself, actuates this monitor and shuts down the transmitter. An interlocking control circuit prevents the application of plate power until the rectifier filaments have reached operating temperature. Filament voltage is controlled by tapped transformers and a common filament rheostat. Door interlocks are provided, where required, for the safety of operating personnel. In addition, high voltage compartments are equipped with mechanically operated grounding bars which are automatically released when the doors are opened.

The entire transmitter is housed in a single fabricated steel cabinet which is bolted to a base frame. This cabinet is equipped with both front and rear doors which are provided with observation windows. End shields and a meter panel complete the cabinet-type enclosure which has been styled func-

tionally and presents a pleasing appearance. A filtered air supply for the cabinet is supplied through the air inlet opening, and a removable filter is provided in the base frame. An exhaust fan in the roof expells the warm air.

The BTF-250A is shipped complete with two crystals, two sets of tubes and transmission line monitor.

Specifications

Frequency Range ——— Any specified frequency between 88 and 108 mc.
Power Output (into transmission line) ——— 50 to 250 watts
R-f Output Impedance (SWR 1.75 or less) ——— 51.5 ohms
Carrier Frequency Stability, deviation less than ——— ±1000 cycles
Modulation Capability ——— ±100 kc.
Method of Modulation ——— Reactance-tubes
Audio Input-Impedance ——— 150/600 ohms
100% Modulation Level ——— +10 ±2 dbm
Audio Frequency Response[1]
30 to 15,000 Cycles, 1000 Cycle Reference, within ——— ±1 db
Audio Frequency Distortion[2]
30-15,000 cycles ——— Less than 1% rms
Including all harmonics up to 30 kc/s at 75 kc swing
FM Noise Level, below 75 kc. swing ——— —65 db.
AM Noise Level, below 100% amplitude modulation[2] —50 db.

Power Supply Requirements ——— 208/230 volts, 50 or 60 cycles single phase, capable of supplying approximately 1200 watts at 85% power factor, and 5% maximum regulation and variation. Also approximately 30 watts at 115 volts, 50/60 cycles single phase, is required for the crystal heaters.

Tube Complement ——— 4 RCA 6V6, 4 RCA 1614, 1 RCA 6SH7, 4 RCA 5U4G, 2 RCA OD3/VR150, 1 RCA OC3/VR105, 1 RCA 6AL5, 2 RCA 2E26, 5 RCA 6AC7, 1 RCA 2BP1, 3 RCA 4-125A/4D21, 2 RCA 866A/866, 1 RCA 2D21.

Dimensions in Inches
Overall Width ——— 31"
Overall Height ——— 84"
Overall Depth ——— 31 1/16"
Maximum Crate Size ——— 28" x 30" x 84"
Weight in Pounds (unpacked—assembled) ——— 1025 (approx.)
Maximum Ambient Temperature ——— 45° C.
Finish ——— Two-tone umber gray with brushed chrome trim and fitting
Stock Identification ——— MI-28911

Equipment Supplied

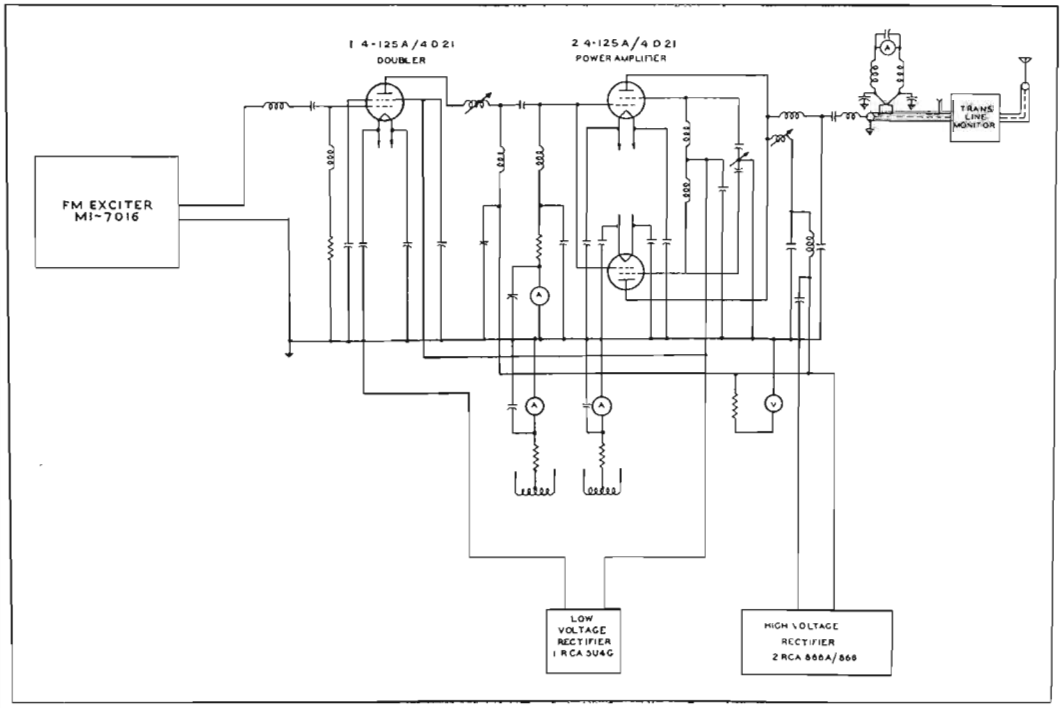
Following is a condensed list of equipment included as a complete BTF-20A Transmitter:

Quantity		*Stock Ident.*
1	Transmitter	MI-28100
1	Pre-emphasis Network	MI-4926-A
1	Transmission Line Monitor	MI-28155-1
2	TMV-129G Crystal Units	MI-19450-A
2	Complete Set of Tubes	MI-28156
1	Installation Material Kit	MI-28166
1	Finish Touch-up Kit	MI-28153
2	Instruction Books	IB-30131
2	Installation Plans	K-8858996

Available Accessories

250 Watt to 1 KW Conversion Kit ——— MI-28919
Set of Tubes for Above Conversion Kit ——— MI-28160
FM Transmitting Antennas ——— See antennas
Towers for Supporting FM Antennas ——— On application
Transmission Line ——— On application
Transmitter Monitoring and Test Equipment ——— See Test and Meas. Equip.
Spare Parts ——— On application

[1] For pre-emphasized response the pre-emphasis filter MI-4926A is provided to be inserted in the 600-ohm audio input line.
[2] Distortion and noise are measured following a standard de-emphasis network.

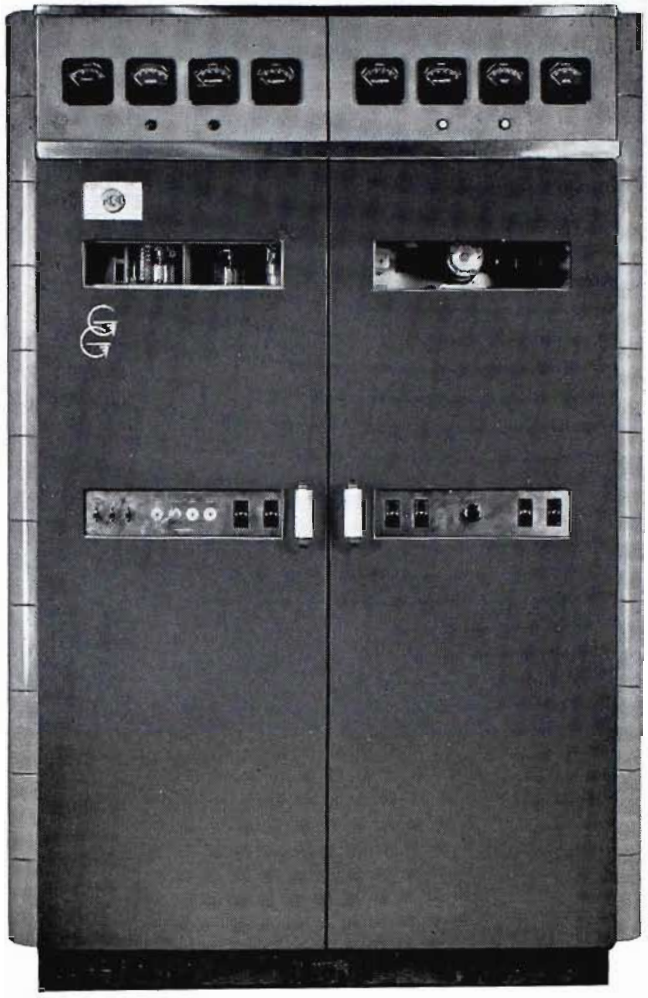


Simplified Schematic of BTF-250A

FM Broadcast Transmitter, Type BTF-1C

Features

- Incorporates RCA's Direct FM system which requires fewer and less expensive tubes and parts.
- Automatic frequency control.
- Excellent frequency response ±1 db 30 to 15,000 cps.
- Grounded grid amplifiers reduce overall transmitter and tube costs, reduce installation and maintenance costs and insure stable operation.
- Single-ended r-f circuits throughout.
- Simplified controls with complete circuit protection.
- Minimum of different tube types.
- Equipment protected against transmission line or antenna failures.
- Multi-unit construction permits easy addition of higher powered units.
- Vertical chassis construction—front and rear door accessbility.
- Completely self-contained—no external units.



Description

Attractively housed in two compact standardized cabinets, the new BTF-1C FM transmitter will provide 1000 watts output at any specified frequency between 88 and 108 mc. Initial installation is simple and economical. Conversion to 3 kw or 10 kw operation is quickly and inexpensively made by the addition of one grounded-grid amplifier unit and a power and control unit housed in matching cabinets.

Circuits of the BTF-1C are similar to those of the BTF-250A with the addition of a grounded-grid amplifier stage to give the increased power. Since all RCA FM broadcast transmitters employ the same basic exciter circuit, all the advantages of the Direct FM circuit used in the BTF-250A also accrue to the user of the BTF-1C, one kilowatt transmitter. Benefits obtained by the use of the Direct FM circuit plus those of the power-saving, grounded-grid amplifier greatly reduce (below that of other transmitters of similar rating) the number of tubes needed to provide required output. This reduction results in a lower, dollar-value, inventory of spares required.

Simplified single ended amplifiers, operating class "C" and comprising a minimum number of variable elements, form the r-f section of the BTF-1C. The same type tube is employed in several stages—an important item when considering spare tube needs. The final stage using a 7C24 tube is operated grounded-grid thus reducing tube, installation and maintenance costs and insuring stable operation. All tubes are air cooled.

Variable output coupling, provided by front panel control, varies the output into the antenna transmission line from 250 to 1000 watts. Power circuits are protected by magnetically-tripped circuit-breaker type switches and overload relays. A transmission line monitor which acts as a watchman over the antenna and transmission line system is provided. Any change in transmission line characteristic which might result from an arc in the transmission line, or a fault in the antenna itself, actuates this monitor and shuts down the transmitter. An interlocking control circuit prevents the application of plate power until the rectifier filaments have reached operating temperature. Filament voltage is controlled by tapped transformers and a common filament rheostat. The 7C24 tube has a separate filament rheostat control. Means are provided for reducing the plate voltage for tuning purposes. Door interlocks are provided, where required, for the safety of operating personnel. High voltage compartments are equipped with mechanically operated grounding bars which are automatically released when a compartment door is opened.

Multi-unit construction is employed in the BTF-1C and the entire transmitter is housed in two fabricated steel frames which are bolted to a base frame. Each compartment is equipped with both a front and rear door. These doors are

provided with windows for observation of the interior of the transmitter while in operation. End shields and meter panels complete the cabinet-type enclosure which has been styled functionally, and presents a pleasing and dignified appearance. A filtered air supply for each compartment is supplied through individual air inlet openings and removable filter sections provided in the base frame. The warm air is exhausted through the roof. For ease in shipment and installation the equipment is partially disassembled. The transmitter is furnished with one FM exciter. A second exciter unit plus a transfer panel mounted in a separate cabinet are available as optional equipment. With dual exciters, instantaneous transfer of operation from one unit to the other is accomplished by the flick of a switch.

The BTF-1C is furnished with two crystals, two sets of tubes, interconnection wire kit, harmonic filter, and transmission line monitor.

Specifications

Frequency Range — Any specified frequency between 88 and 108 mc
Power Output (into transmission line) — 250 to 1000 watts
R-f Output Impedance (SWR 1.75 or less) — 51.5 ohms
Carrier Frequency Stability, deviation less than — ±1000 cycles
Modulation Capability — ±100 kc
Method of Modulation — Reactance-tubes
Audio Input-Impedance — 150/600 ohms
100% Modulation Level — +10 ± 2 dbm (0 dbm = 1 milliwatt)
Audio Frequency Response[1]
30 to 15,000 Cycles, 1,000 Cycle Reference, within ± 1 db
Audio Frequency Distortion[2]
30-15,000 Cycles — Less than 1% rms
(Including all harmonics up to 30 kc/s at ±75 kc swing.)
FM Noise Level, below ±75 kc swing[2] — −65 db
AM Noise Level, below 100% amplitude modulation[2] — −50 db
Power Supply Requirements — 208/230 volts, 50 or 60 cycles single phase, capable of supplying approximately 3700 watts at 89% power factor, and 5% maximum regulation and variation. Also approximately 30 watts at 115 volts, 50 or 60 cycles single phase is required for the crystal heaters.
Tube Complement — 4 RCA 6V6, 4 RCA 1614, 1 RCA 6SH7, 4 RCA 5U4G, 2 RCA OD3/VR150, 1 RCA OC3/VR105, 1 RCA 6AL5, 2 RCA 2E26, 5 RCA 6AC7, 1 RCA 2BP1, 3 RCA 4-125A/4D21, 4 RCA 8008, 1 RCA 7C24, 1 RCA 2D21.

Dimensions in Inches
Overall Width — 56 3/32"
Overall Depth (including door handles) — 31 1/16"
Overall Height — 84"
Maximum Crate Size — 28" x 30" x 84"
Weight in Pounds (unpacked—assembled) — 1900 (approx.)
Maximum Ambient Temperature — 45° C.
Finish — Two-tone umber gray with brushed chrome trim
Stock Identification — MI-28912

Equipment Supplied

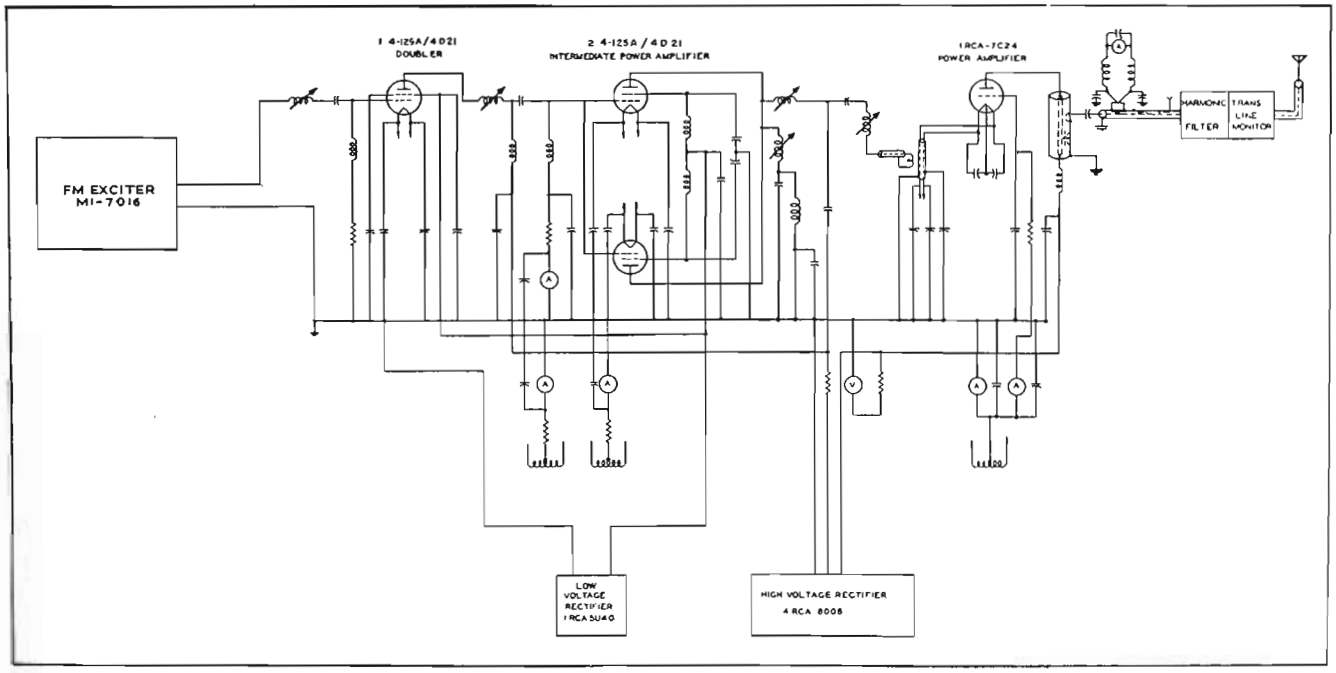
Following is a condensed list of equipment included as a complete BTF-1C Transmitter:

Quantity		*Stock Ident.*
1	Low Power RF and PA Unit	MI-28101
1	Exciter, Power and Control Unit	MI-28102
1	Harmonic Filter	MI-28151
1	Transmission Line Monitor	MI-28155-2
1	Pre-emphasis Network	MI-4926-A
2	TMV-129G Crystal Units	MI-19450-A
2	Complete Sets of Tubes	MI-28157
1	Installation Material Kit	MI-28167
1	Wiring Material Kit	MI-28145
1	Finish Touch-up Kit	MI-28153
2	Instruction Books	IB-30132
2	Installation Plans	K-8883058

Available Accessories

1 KW to 3 KW Conversion Kit — MI-28920
Set of Tubes for Above Kit — MI-28161
1 KW to 10 KW Conversion Kit — MI-28921
Set of Tubes for Above Kit — MI-28162
FM Transmitting Antenna — See antennas
Towers for Supporting FM Antennas — On application
Transmission Line — On application
Transmitter Monitoring and Test Equipment — See Test and Meas. Equip.
Spare Parts — On application

[1] For pre-emphasized response the pre-emphasis filter (MI-4926A) is provided to be inserted in the 600 ohm audio input line.
[2] Distortion and noise is measured following a standard de-emphasis network.



Simplified Schematic of BTF-1C

FM Broadcast Transmitter, Type BTF-3B

Features

- Low installation cost—requires minimum of floor space.
- Low operating cost—low power input.
- Direct FM Exciter with space provided for dual units with instantaneous transfer panel.
- Low distortion—low noise level—frequency response 30 to 15,000 cycles (±1 db).
- Automatic frequency control.
- Motor driven tuning for power stages.
- Fixed-tuned harmonic attenuator.
- All controls conveniently located—utmost accessibility provided both front and rear. Vertical chassis construction throughout.
- All air-cooled.
- Power increase is accomplished by "block-building" with additional power amplifiers.

Description

The BTF-3B FM transmitter will provide a maximum of 3000 watts output at any specified frequency between 88 and 108 mc. Attractively housed in three standardized cabinets, this compact unit is easily and economically installed. Power increases can be made by the addition of a grounded grid r-f amplifier, a power unit and a control unit housed in matching cabinets.

Accessibility is assured by vertical chassis construction plus surface mounting of components and exposed wiring for easy and speedy circuit tracing and servicing.

Electrically, circuits of the BTF-3B are the same as circuits of the BTF-1C plus an additional grounded-grid amplifier stage to furnish the increased power. All RCA FM transmitters use the same basic exciter unit. Therefore, all features of the RCA "Direct FM" circuit common to the other FM transmitters are also realized in the operation of BTF-3B, the 3 kilowatt transmitter. Benefits of RCA "Direct FM" plus the advantages of the power-saving, grounded-grid circuits serve to reduce (below that of other similarly rated transmitters) the number of tubes needed to provide the desired output.

Simplified single-ended amplifiers operating class "C" and comprising a minimum number of variable elements form the r-f section of the BTF-3B. The number of tubes has been reduced to a minimum. The same type tube is used in several stages thus greatly reducing spare tube requirements. High stability grounded grid circuits using RCA type 7C24 tubes are employed in the last two stages.

A variable output coupling provided by front panel control permits adjusting the power output to the antenna transmission line over a range from 1000 to 3000 watts. A fixed-tuned harmonic attenuator (externally mounted) designed to reduce all harmonics 30 db or better is located in the output circuit and is provided as standard equipment. Filament voltage, except for the 7C24 tube, is controlled by tapped transformers and a common filament rheostat. The 7C24 tubes have separate filament rheostat controls.

The entire transmitter is housed in three fabricated steel frames which are bolted to a base frame. Each compartment has both front and rear doors which are provided with observation windows. End shields and meter panels complete the cabinet type enclosure which has been styled functionally to present a pleasing and dignified appearance. Filtered air, supplied through individual air inlet openings and removable filters are provided in the base frame. Warm air is expelled through the roof.

A transmission line monitor externally mounted which acts as watchman over the antenna and transmission line system is provided. Any unwarranted increase in signal-to-noise ratio such as might result from an arc in the transmission line or a fault in the antenna itself, actuates this monitor which shuts down the transmitter. Both manual and automatic overload protection are provided. When in the automatic position, a three shot recycling sequence is provided by the control "brain center" which automatically returns the transmitter to the air up to two times in case of repeated overloads. If such overload condition persists the transmitter is automatically shut down on the third overload.

All high power circuits are doubly protected by high-speed overload relays backed up by magnetic-trip circuit-breaker type switches. Door interlocks are provided, where required, for the safety of the operating personnel. High voltage components are equipped with mechanically operated grounding bars which are automatically released when a door is opened.

The transmitter is furnished with one FM exciter. A second exciter plus a transfer panel are available as optional equipment. Instantaneous transfer of operation from one exciter to the other is accomplished by the flick of a switch.

The BTF-3B is furnished with one exciter, two sets of tubes, two crystals, interconnection wire kit, harmonic filter, and transmission line monitor. An interconnection wiring kit is furnished with each transmitter.

Specifications

Frequency Range ——— Any specified frequency between 88 and 108 mc

Power Output (into transmission line) ——— 1000 to 3000 watts

R-f Output Impedance (SWR 1.75 or less) ——— 51.5 ohms

Carrier Frequency Stability ——— Deviation less than ±1000 cycles

Modulation Capability ——— ±100 kc

Method of Modulation ——— Reactance-tubes

Audio Input-Impedance ——— 150/600 ohms

100% Modulation Level ——— +10 ±2 dbm

Audio Frequency Response[1]

30 to 15,000 Cycles, 1000 Cycle Reference, within ——— ±1 db

Audio Frequency Distortion[2]

30-15,000 Cycles ——— Less than 1% rms (Including all harmonics up to 30 kc/s at 75 kc swing.)

FM Noise Level, below 75 kc swing[2] ——— —65 db

AM Noise Level, below 100% amplitude modulation[2] —50 db

Power Supply Requirements ——— 208/230 volts, 50 or 60 cycles three phase, capable of supplying approximately 7700 watts at 90% power factor, and 5% maximum regulation and variation. Also approximately 30 watts at 115 volts, 50/60 cycles single phase is required for the crystal heaters.

Tube Complement

4 RCA 6V6	2 RCA 2E26
4 RCA 1614	5 RCA 6AC7
1 RCA 6SH7	1 RCA 2BP1
4 RCA 5U4G	3 RCA 4-125A/4D21
2 RCA 0D3/VR150	2 RCA 7C24
1 RCA 0C3/VR105	6 RCA 8008
1 RCA 6AL5	1 RCA 2D21

Dimensions in Inches

Overall Width ——— $81\frac{3}{16}$"

Overall Height ——— 84"

Overall Depth (including door handles) ——— $31\frac{1}{16}$"

Maximum Crate Size ——— 28" x 30" x 84"

Weight in Pounds (unpacked—assembled) ——— 2900 (approx.)

Maximum Ambient Temperature ——— 45° C.

Finish ——— Two-tone umber gray with brushed chrome trim

Stock Identification ——— MI-28913

Equipment Supplied

Following is a condensed list of equipment included as a complete BTF-3B Transmitter.

Quantity		*Stock Identification*
1	Low Power RF, IPA and PA Unit	MI-28103
1	Exciter Unit	MI-28104-1
1	Power and Control Unit	MI-28105
1	Harmonic Filter	MI-28151
1	Transmission Line Monitor	MI-28155-3
1	Pre-emphasis Network	MI-4926-A
2	TMV-129G Crystal Units	MI-19450-A
2	Complete Sets of Tubes	MI-28158
1	Installation Material Kit	MI-28168
1	Wiring Material Kit	MI-28146
1	Finish Touch-up Kit	MI-28153
2	Instruction Books	IB-32133-1
2	Installation Plans	IB-30214

Available Accessories

3 KW to 10 KW Conversion Kit ——— MI-28922

Set of Tubes for Above Kit ——— MI-28163

Spare FM Exciter Kit ——— MI-7015

Set of Tubes for Spare Exciter ——— MI-7020

FM Transmitting Antennas ——— See Antennas

Towers for Supporting FM Antennas ——— On application

Transmission Line ——— On application

Transmitter Monitoring and Test Equipment ——— See Test and Meas. Equip.

Spare Parts ——— On application

Accessories

Set of Tubes for BTF-3B ——— MI-28158

3 to 10 kw Conversion Kit ——— MI-28922

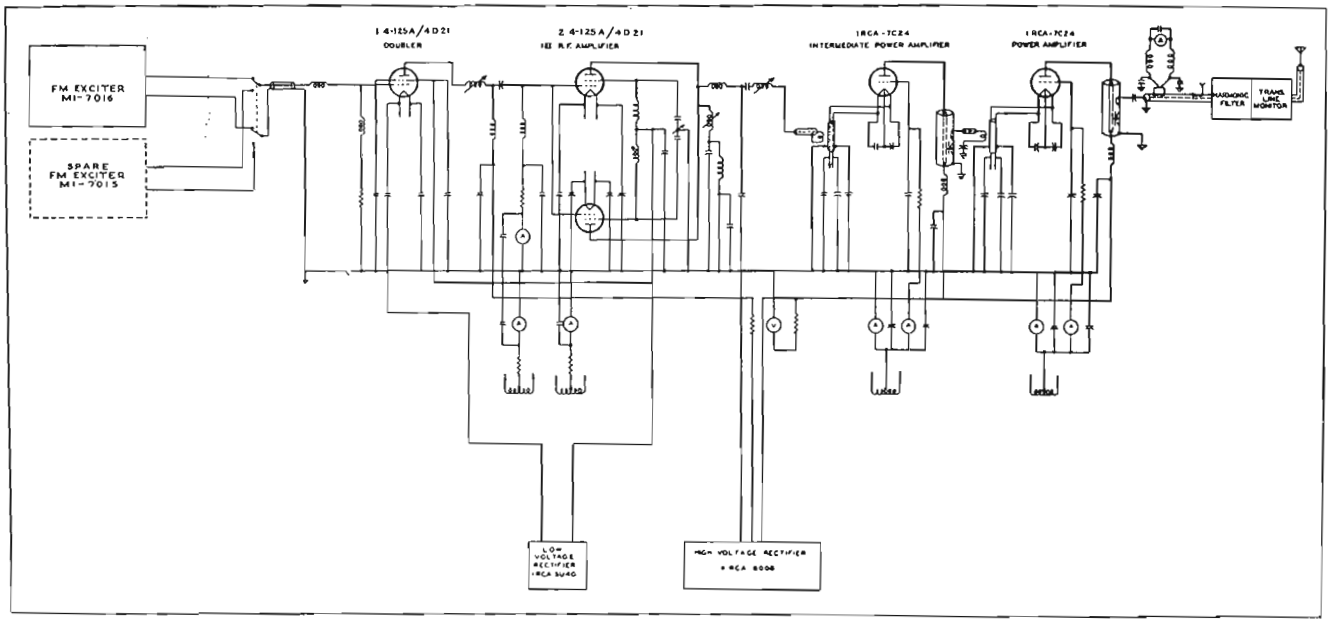
Set of Tubes for Above Kit ——— MI-28163

Spare FM Exciter Kit ——— MI-7015

Set of Tubes for Spare Exciter ——— MI-7020

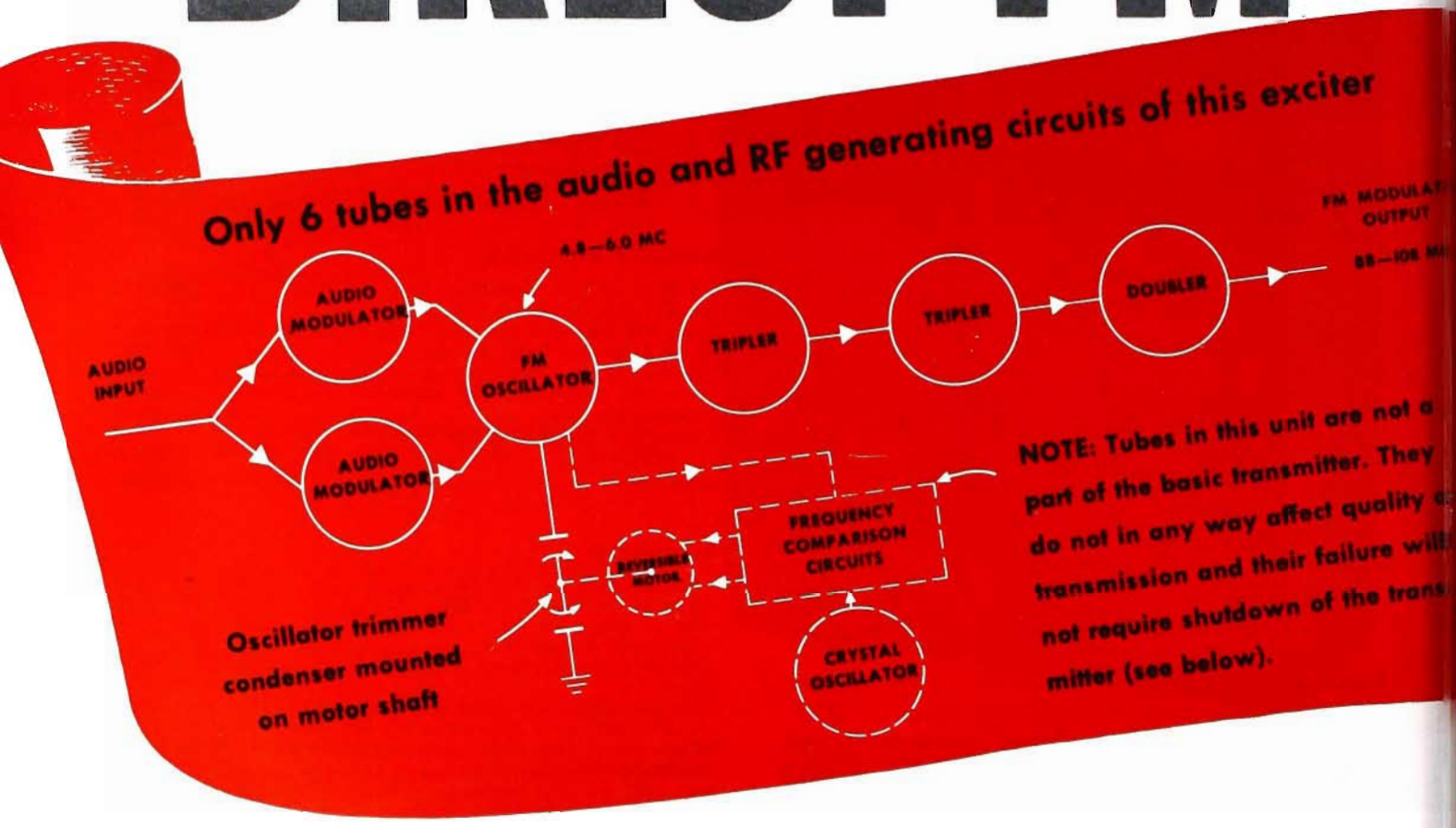
[1] For pre-emphasized response the pre-emphasis filter (MI-4926A) is provided to be inserted in the 600 ohm audio input line.

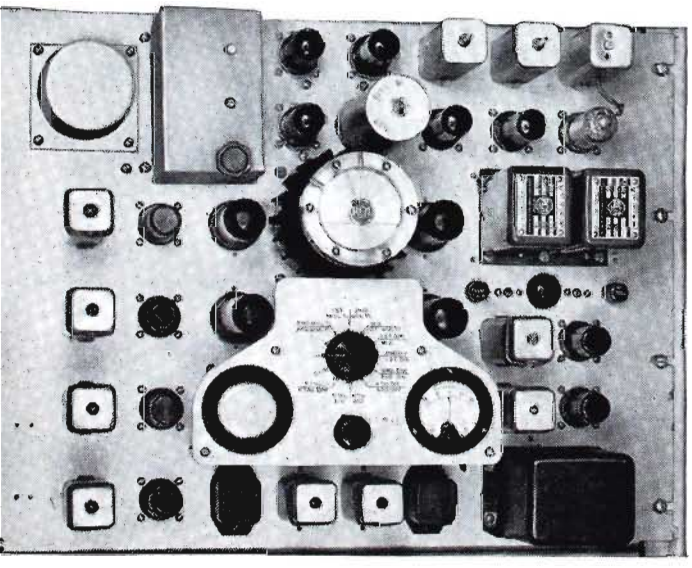
[2] Distortion and noise is measured following a standard de-emphasis network.



Simplified Schematic of BTF-3B

"DIRECT FM"





BASIC CIRCUITS are mounted on this part of the exciter panel. The include two audio modulators, an FM oscillator, and three fre quency multiplying stages (see diagram above).

AUTOMATIC FREQUENCY CONTROL is provided by the circuits in thi part of the exciter panel. Two temperature-controlled, precision ground crystals (one a spare) are provided. Sub-harmonics o the crystal oscillator and FM oscillator are compared. Any differ ence between these frequencies operates a reversible motor with a vernier condenser mounted on the motor shaft. The moto never turns more than 90 degrees either way. No gears, counte circuits, or compensating voltages are involved. Failure in thi section does not take the transmitter off the air, since operation ma be continued by making occasional manual frequency correction

rovides the lowest distortion!

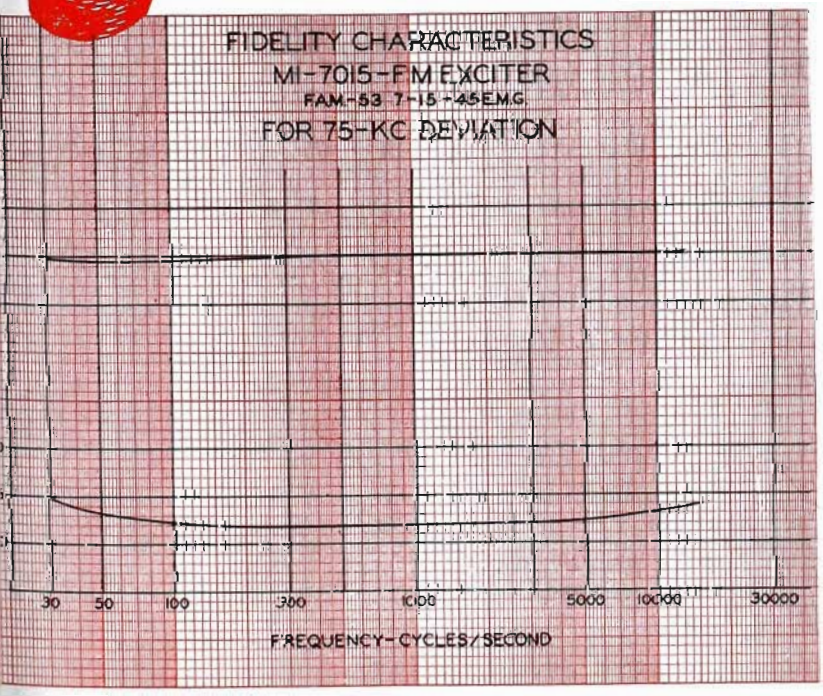
COMPARE these laboratory performance measurements on one of the new RCA "DIRECT FM" EXCITERS

✔ **Distortion:**

Less than ½% from 30 to 15,000 cycles

✔ **Frequency Response:**

Within ±½ db from 30 to 15,000 cycles



THE CURVES at the left show the distortion and response versus frequency as actually measured on one of the first of the new RCA "Direct FM" exciter units. Distortion has been measured at less than one-half of one per cent over the whole "FM range" of 30 to 15,000 cycles, with frequency response varying less than ½ db over the same range.

The fidelity which can be obtained in an FM transmitter is basically limited by the distortion and noise introduced in the FM generating circuits located in the exciter. The simple, straightforward circuits used in the RCA exciter are inherently capable of lower distortion and lower noise level than any other type yet developed. The curves at the left prove this!

The station which proposes to provide true "FM Quality" should start with the best exciter available. We believe that the RCA "Direct FM" exciter is just that!

FM Broadcast Transmitter, BTF-5A

Features

- Low installation cost—requires minimum of floor space.
- Direct FM Exciter—with space provided for dual units with instantaneous transfer panel.
- Automatic frequency control.
- Motor driven tuning for power stages.
- Simplified single-ended r-f circuits throughout.
- High-stability, power-saving, grounded-grid amplifier.
- All air-cooled.
- Power increase easily accomplished with additional power amplifiers.

Description

The RCA BTF-5A FM Transmitter is designed to provide up to 5000 watts of power at any specified frequency in the 88 to 108 mc. band. The entire transmitter is housed in three standard cabinets bolted to a base frame. Each cabinet has front and rear doors for easy access to components.

Electrically, the BTF-5A is similar to the 3 kw transmitter (BTF-3B) except that increased power output is provided through the use of a new type power tube (RCA 5762) designed with higher plate voltage and current ratings.

All features of the RCA "Direct FM" circuit common to other RCA FM transmitters are realized in the operation of BTF-5A, the 5 kilowatt transmitter. Benefits of RCA "Direct FM" plus the advantages of the power-saving, grounded-grid circuits serve to reduce (below that of other similarly rated transmitters) the number of tubes needed to provide the desired output. The reduction in the number of tubes results in a lower dollar value of spare-tube inventory required for station operation.

The standard direct FM exciter is followed by a doubler stage using one Type 4-125A/4D21 and two r-f amplifier stages using, respectively, two Type 4-125/4D21 tubes and one RCA 5762 (the latter operating as a grounded-grid amplifier). This stage acts as the driver for a final output stage which consists of another RCA 5762, in a grounded-grid circuit. The use of the same size tube in both driver and output stages is made practical by the use of grounded-grid circuits in which the driver stage contributes a substantial share of the output power. Thus, it is possible to use a much smaller tube in the output stage than would be required with a conventional grounded-filament circuit. Rectifiers include a low-voltage unit using one RCA 5U4G and a high-voltage unit using six RCA 8008's. The control circuit includes automatic starting and recycling.

All high-power circuits are doubly protected by high-speed overload relays backed up by magnetic-trip circuit-breaker type switches. Similar circuit-breaker type switches are also used to connect blowers, filament and low power circuits to the power line. Interlock switches prevent the application of plate power until rectifier filaments have reached operating temperature, and blowers are supplying sufficient air to cool P. A. tubes.

The power control circuits include both manual and automatic overload protection. When in the automatic position, a 3 shot recycling sequence is provided by the control "brain center" which automatically returns the transmitter to the air up to two times in case of repeated overloads. If such an overload condition still persists the transmitter is automatically shut down on the third overload.

A transmission line monitor acts as a watchman over the antenna and transmission line system. This monitor automatically shuts down the transmitter in case of an unwarranted change in signal intensity such as might result from a transmission line arc or from a change.

Operation of circuits and tubes may be easily and quickly observed by means of a cathode ray tube checking device built in the exciter unit. Selector switches are provided so that frequency control circuits, frequency multipliers and reactance modulators can be rapidly checked.

Performance Specifications

Type of Emission	Frequency modulated
Frequency Range	Any specified frequency between 88 and 108 mc.
Power Output (into transmission line)	1000 to 5000 watts
Output Impedance	51.5 ohms (standing wave ratio 1.75 to 1 or less)
Carrier Frequency Stability	Deviation less than 1000 cycles
Modulation Capability	±100 kc

Method of Modulation	Reactance-tubes
Audio Input-Impedance	600/150 ohms
100% Modulation Level (at input of 600 ohms pre-emphasis network)	+10 ± 2 dbm
Audio Frequency Response (with pre-emphasis filter) 30 to 15,000 cycles (1000 cycle reference)	Within ±1 db
Audio Frequency Distortion* 30 to 15,000 cycles	Not more than 1.0% (including all harmonics up to 30 kc/s at 76 kc swing)
FM Noise Level (reference ±75 kc swing)	Not more than −65 db
AM Noise Level (reference 100% amplitude modulation)	Not more than −50 db
Power Line Requirement—Transmitter	
Line Voltage	208/230 volts
Phase	3
Frequency	50/60 cycles
Instantaneous Regulation (maximum)	5%
Power Consumption (approximate)	11,000 watts
Power Factor (approximate)	Better than 90%
Power Line Requirements—Crystal Heaters	
Line Voltage	100 to 130 volts a-c or d-c
Power Consumption	28 watts
Stock Identification	MI-28960

* Measured with a standard de-emphasis network.

Mechanical Specifications

Size and Weight, approximate	
Overall Length	81 3/16"
Overall Height	84"
Overall Depth (including door handles)	31 1/16"
Overall Weight (unpacked)	3000 lbs.
Overall Weight (packed)	4300 lbs.

Tube Complement

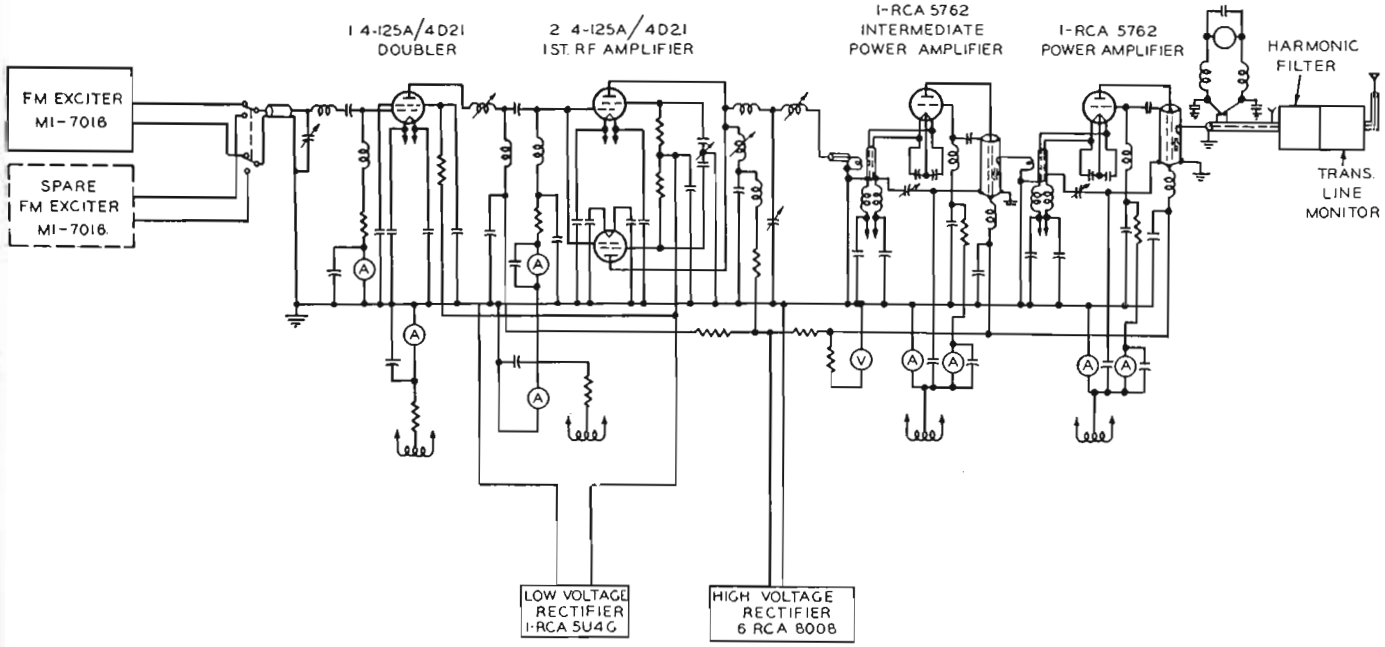
For the FM Exciter:	
Modulators	2 RCA 6V6
Modulated Oscillator	1 RCA 6V6
1st Buffer-Multiplier	1 RCA 6V6
2nd Buffer-Multiplier	1 RCA 2E26
Amplifier	1 RCA 2E26
1st Frequency Divider	1 RCA 6AC7
2nd Frequency Divider	1 RCA 6AC7
3rd Frequency Divider	1 RCA 6AC7
4th Frequency Divider	1 RCA 6AC7
Motor Control Tubes	4 RCA 1614
Crystal Frequency Divider	1 RCA 6AC7
Crystal Oscillator	1 RCA 6SH7
Cathode Ray Indicator	1 RCA 2BP1
For the Exciter Power Supply:	
Low Voltage Rectifiers	2 RCA 5U4G
High Voltage Rectifier	1 RCA 5U4G
Voltage Regulator	1 RCA OC3/VR105
Voltage Regulators	2 RCA OD3/VR150
For the R-F Unit:	
Doubler	1 RCA 4-125A/4D21
First R-F Power Amplifier	2 RCA 4-125A/4D21
Intermediate Power Amplifier	1 RCA 5762
Power Amplifier	1 RCA 5762
For the Low Voltage Rectifier	1 RCA 5U4G
For the High Voltage Rectifier	6 RCA 8008
For the Transmission Line Monitor:	
R-F Rectifier	1 RCA 6AL5
Thyratron	1 RCA 2D21

Equipment Supplied

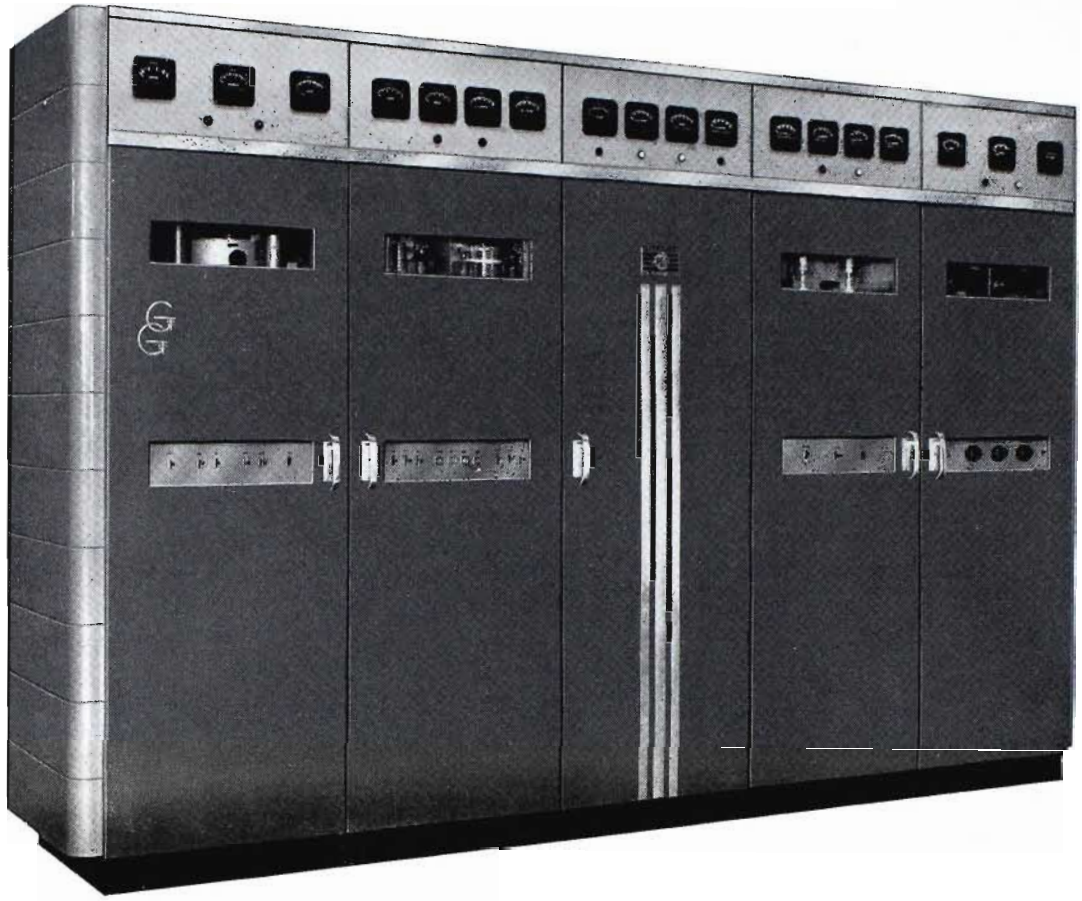
1	Low Power RF, IPA and PA Unit	MI-28107-A
1	Exciter	MI-28104-1
1	Power and Control Unit	MI-28042
1	Harmonic Filter	MI-28151
1	Transmission Line Monitor	MI-28155-3
1	Pre-emphasis Filter	MI-4926-A
1	Wiring Material Kit	MI-28043
1	Installation Material Kit	MI-28044
1	Finish Touch-up Kit	MI-28153
1	Tool Kit	MI-28288
2	TMV-129G Crystal Units	MI-19450-A
2	Complete Sets of Tubes	MI-28158-A
2	Instruction Books	IB-30211
2	Installation Plans	IB-30213

Available Accessories

Spare FM Exciter Kit	MI-7015
Set of Tubes for Above Kit	MI-7020
FM Transmitting Antennas	See Antennas
Towers for Supporting FM Antennas	On application
Transmission Line	On application
Transmitter Monitor and Test Equipment	See Test and Measuring Equipment
Spare Parts	On application



FM Broadcast Transmitter, Type BTF-10B



Features

- Low installation cost—requires minimum of floor space area.
- Low operating cost—low power consumption.
- All tubes in the 1kw, 3 kw and 10 kw final amplifiers are the same types, low-cost 7C24's.
- High-stability, power-saving, grounded-grid amplifiers.
- Direct FM Exciter—with space provided for dual units with instantaneous transfer panel.
- Simplified single-ended r-f circuits throughout with motor driven tuning for high-power stages.
- All controls conveniently located—utmost accessibility provided both front and rear. Vertical chassis construction throughout.

Description

The RCA BTF-10B is a new frequency modulated transmitter designed to supply up to 10,000 watts of power at any specified frequency in the 88 to 108 mc. band. Incorporating the latest developments in FM transmitter design, the BTF-10B is outstanding in performance and reliability. Compact and simplified mechanical construction plus attractive cabinet styling make for an economical installation with dignified appearance. The entire transmitter is housed in five fabricated steel frames which are bolted to a base frame. Each compartment has both front and rear doors with observation windows. Accessibility is assured by vertical chassis construction, surface mounting of components and exposed wiring for speedy circuit tracing.

Electrically, the r-f circuits of the BTF-10B, 10 kilowatt transmitter, are the same as those of the BTF-3B plus an additional grounded-grid amplifier stage to furnish the increased power. Since all RCA FM transmitters use the same basic exciter unit, all the benefits of RCA Direct FM plus the advantages of grounded-grid amplifiers are made available to the user of the BTF-10B.

Simplified single-ended amplifiers operating class "C" and using a minimum number of variable elements form the RF section of the BTF-10B. High stability grounded-grid circuits are employed in the last three stages using RCA type 7C24 tubes. This use of the same type tube in several stages results in greatly reduced spare tube requirements.

A variable output coupling with front panel control permits adjusting the power output into the transmission line over a range from 3,000 to 10,000 watts. Harmonic radiation is held to a minimum by a fixed-tuned harmonic attenuator which is located in the output circuit and is provided as standard equipment.

An externally mounted transmission line monitor acts as a watchman over the antenna and transmission line system. Any unwarranted change in standing wave ratio, such as might result from an arc in the transmission line, or a fault in the antenna itself, actuates this monitor which removes plate voltage from the transmitter to prevent damage. The power control circuits include both manual and automatic overload protection. When in the automatic position, a three-shot recycling sequence is provided by the control "brain center" which automatically returns the transmitter to the air up to two times in the case of repeated overloads, and then, if such overload persists, shuts the transmitter down on the third overload. A reset switch is provided which may be used to restore the transmitter to normal after one, two or three overloads. This switch can be set to lock out the recycling circuit.

All high power circuits are doubly protected by high speed overload relays backed up by magnetic-trip circuit-breaker type switches. Door interlocks are provided, where required, for the safety of operating personnel. High voltage components are equipped with mechanically operated grounding bars which are automatically released when a door is opened.

To minimize lost "air time", an antenna cut-back kit is available as optional equipment. When it is incorporated in the BTF-10B, the antenna can be instantly switched to the 3 kw intermediate power amplifier output. At the same time, the power amplifier plate voltage is removed and the plate circuit grounded. P. A. tube changes or necessary servicing in the power amplifier compartment can then be carried out in complete safety while program continuity is maintained through the driver.

Filtered air is supplied by an external blower for the 1, 3 and 10 kw stages. Individual, internal blowers for these stages are available as optional equipment where the single external blower is not desired. Space is provided in the exciter cabinet for a spare exciter which can be supplied as additional equipment. Instantaneous transfer of operation from one exciter to the other can then be accomplished by the flick of a switch.

The transmitter is furnished with one FM exciter, two sets of tubes, two crystals, interconnecting wire kit, harmonic filter and transmission line monitor.

Specifications

Frequency Range — 88 to 108 mc
Power Output (into transmission line) — 3,000 to 10,000 watts
RF Output Impedance — 51.5 ohms (standing wave ratio 1.75 to 1 or less)
Carrier Frequency Stability — Deviation less than ±1,000 cycles
Modulation Capability — ±100 kc
Method of Modulation — Reactance tubes
Audio Input Impedance — 600/150 ohms
100% Modulation Level* — ±10 ± 2 dbm
Audio Frequency Response** 30 to 15,000 cycles — ±1 db
Audio Frequency Distortion*** 30 to 15,000 cycles (including all harmonics up to 30 kc/s at ±75 kc swing) — Less than 1%
FM Noise Level, below 75 kc swing*** — Not more than —65 db
AM Noise Level, below 100% amplitude modulation*** — Not more than —50 db

Power Line Requirements—Transmitter:
- Line Voltage — 208/230 volts
- Phase — 3
- Frequency — 60 cycles (50 cycles equipment available at slightly higher cost)
- Instantaneous Regulation and Variation — 5%
- Power Consumption (approx.) — 23 kw
- Power Factor (approx.) — 90%

Tube Complement — 4 RCA 6V6, 4 RCA 1614, 1 RCA 6SH7, 4 RCA 5U4G, 2 RCA OD3/VR150, 1 RCA OC3/VR105, 1 RCA 6AL5, 2 RCA 2E26, 5 RCA 6AC7, 1 RCA 2BP1, 3 RCA 4-125A/4D21, 4 RCA 7C24, 6 RCA 673, 1 RCA 2D21

Dimensions:
- Overall Length — 131⅜"
- Overall Height — 84"
- Overall Depth — 31 1/16"

Building Entrance Requirements — 25" x 80"
Weight in Pounds (unpacked—assembled) — 5000 (approx.)
Maximum Ambient Temperature — 45° C.
Finish — Two tone umber gray with brushed chrome trim and fittings

Equipment Supplied

Following is a condensed list of equipment included as a complete BTF-10B Transmitter.

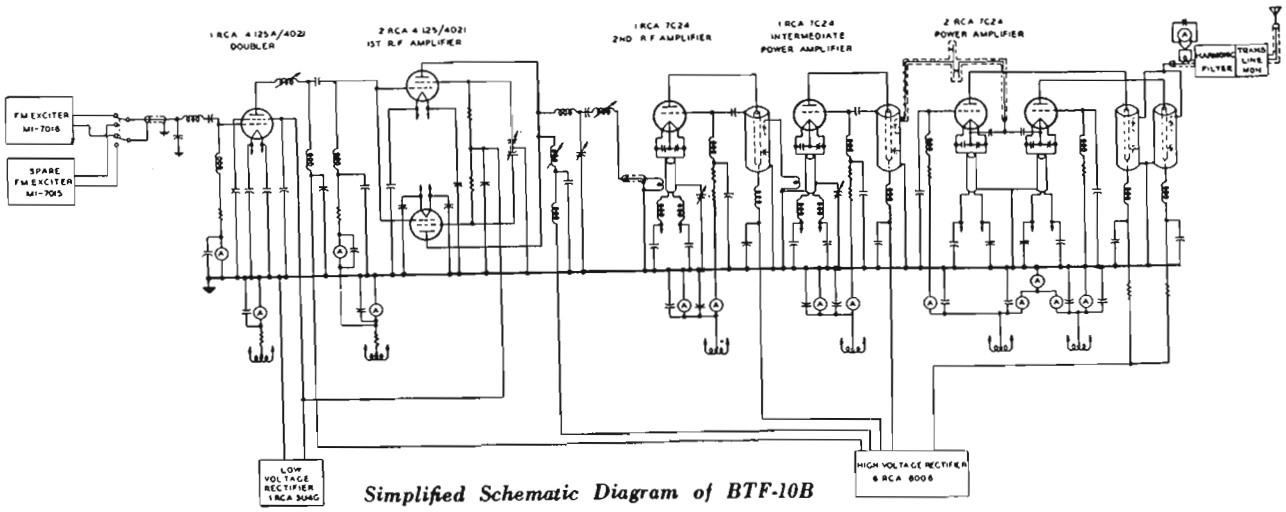
Quantity		*Stock Identification*
1	Power Amplifier	MI-28106-A
1	Low Power RF and IPA Unit	MI-28107
1	Exciter	MI-28104-1
1	Power Supply	MI-28109
1	Control Unit	MI-28110
1	Plate Transformer	MI-28150
1	Harmonic Filter	MI-28151
1	Transmission Line Monitor	MI-28155-3
1	Pre-emphasis Network	MI-4926-A
1	Wiring Material Kit	MI-28147
1	Installation Material Kit	MI-28169
1	Finish Touch-up Kit	MI-28153
1	Tool Kit	MI-28288
2	TMV-129G Crystal Units	MI-19450-A
2	Complete Set of Tubes	MI-28159
2	Instruction Books	IB-30134
2	Installation Plans	IB-30201
1	External or Internal Blower Equipment	Specify when ordering

Available Accessories

Spare FM Exciter Kit — MI-7015
Set of Tubes for Spare Exciter — MI-7020
Power Cut-back Equipment — MI-28154
Modification Kit for 50 Cycle Operation — MI-28178
FM Transmitting Antennas — See Antennas
Tower for Supporting FM Antennas — On application
Transmission Line — On application
Transmitter Monitoring and Test Equipment — See Test and Meas. Equip.
Spare Parts — On application

* Level at input of 600 ohm pre-emphasis network. Insertion loss of this network is approximately 24 db.
** For pre-emphaszed response, the pre-emphasis filter (MI-4926A) is provided to be inserted in the 600 ohm audio input line at the most effective point.
*** Distortion and noise is measured following a standard 75 microsecond de-emphasis network.

Stock Identification — MI-28914



Simplified Schematic Diagram of BTF-10B


Over
200
FM Broadcasters

are going RCA

Here's why . . .

✓ RCA FM transmitters are designed for transmitter engineers who *know* transmitters.
RCA FM transmitters provide a professional performance that comes only through building more broadcast equipment than any other manufacturer.
RCA FM transmitters are backed by a long-standing reputation for making reliable broadcast equipment . . . FM, AM, TV.

●

✓ RCA FM transmitters have Grounded-Grid circuits for true circuit stability at vhf.
RCA FM transmitters use Direct-FM exciters that reduce distortion and noise . . . use fewer tubes.
RCA FM transmitters enable you to go to higher power with only minor equipment modification.

●

✓ RCA FM transmitters are unit-built . . . are easy to move and inexpensive to install.
RCA FM transmitters use RCA-pioneered vertical chassis design and are completely accessible.
RCA FM transmitters can be tuned in minutes . . . even by inexperienced personnel.

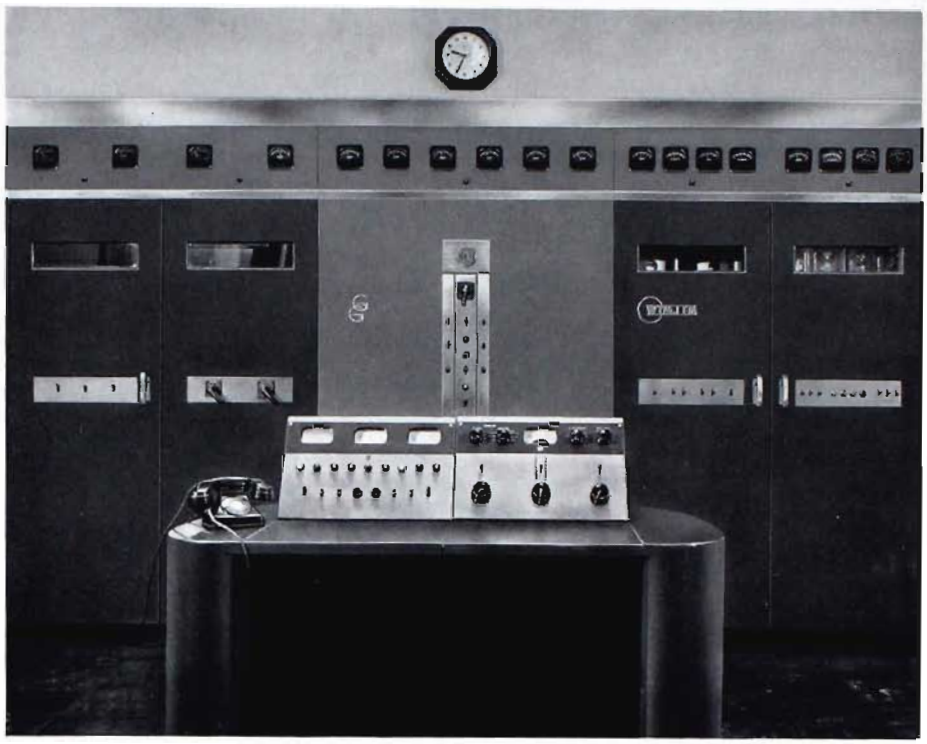
●

For complete information on RCA FM transmitters, write RCA, Broadcast Section, Dept. 19-F, Camden, N. J.

FM Broadcast Transmitter, Type BTF-50A

Features

- Entirely air cooled.
- Low cost installation.
- Small space requirements.
- Simplified power supply—only one high-power rectifier.
- Reduced power feature assures uninterrupted program service.
- Protection against transmission line or antenna failure.
- New BTC-1A control console supplied as standard equipment.



Description

The BTF-50A is an all-new 50 kw FM transmitter incorporating the latest developments in high power FM transmitter design. This RCA transmitter will supply 50,000 watts at any specified frequency in the 88 to 108 mc. band. Installation and operating costs have been held to a minimum through the use of compact mechanical construction and efficient, grounded-grid circuits using a minimum of different tube types. Reliability is assured by conservative operation of all components and dependable forced air cooling.

The general arrangement of the transmitter consists of a series of vertical chassis supported by steel frames which are in line with an attractively styled, sectionalized front. All units employ "dead front" construction with doors in the front panel allowing free access to the low power RF cabinets and to the transmitter area. The entire radio frequency portion of the transmitter can easily be installed in a space only 16½ feet wide by 9 feet deep. External blower and power equipment may be installed either in a basement or on the same floor, depending on individual choice.

A new RCA transmitter control console (BTC-1A) is supplied as standard equipment with the BTF-50A. This control console contains audio mixing and monitor controls, primary power switching for the transmitter and tower lights. "Block type" construction permits the addition of control sections if other transmitters are to be operated in the same building.

The exciter unit of the BTF-50A contains RCA's "Direct FM" system in which frequency modulation is accomplished directly by push-pull reactance tubes connected across the frequency determining circuit of the modulated oscillator.

Simplified single ended amplifiers operating class "C" and using a minimum of variable elements form the RF section of the BTF-50A. High stability grounded-grid amplifiers using the new RCA 7C24 and 5592 tubes are employed in all stages above the 250 watt level. This use of the same type tube in several stages results in greatly reduced spare tube requirements. Inherent advantages of grounded-grid amplifiers at FM frequencies include greater stability, higher efficiency, simpler circuits and elimination of the need for neutralization.

Variable output coupling with a front panel control permits adjusting the power output into the transmission line over a wide range. Harmonic radiation is held to a minimum by a fixed-tuned attenuator, which is located in the output circuit.

Full protection from antenna or transmission line failure is provided by a transmission line monitor which automatically shuts down the transmitter when any unwarranted change in standing wave ratio at the input of the transmission line is detected. An automatic "three shot" reclosing system will return full power up to three times when plate voltage is removed by operation of the transmission line monitor or other overload devices.

The power control system of the BTF-50A is carefully engineered to provide proper starting sequence. All high-powered circuits are doubly protected by high speed overload relays backed up by magnetic-trip circuit breaker type switches, and circuit indicator lamps provide a quick means for analyzing faults such as air failure, tube failure, etc. A single high-power rectifier supplies all anode voltages for the RF stages, and a heated spare tube is provided which may be quickly connected into the circuit, if necessary. Two small rectifiers are used for RF screen and exciter plate voltages. Door interlocks and high voltage grounding bars are provided, where required, for the safety of operating personnel.

To provide for continuous broadcast service with a minimum of interruption, the transmitter is equipped with an antenna cut-back arrangement. Operation of a single control switch transfers the antenna from the final amplifier to an intermediate amplifier which supplies approximately 7.5 kw. At the same time, the driver and power amplifier plate voltage is removed and the plate circuits grounded. Tube changes or necessary servicing in the driver, P.A. or high power blower compartments can then be carried out in complete safety, while program continuity is maintained through the intermediate power amplifier.

Air for all RF stages up to and including the intermediate power amplifier is supplied by a single blower. Air for the driver and final stages is supplied by a separate blower which draws filtered air from outside the transmitter area and may be exhausted into a manifold for outside delivery or for heating purposes, if desired.

Specifications

Frequency Range	Any specified frequency between 88 to 108 mc
Power Output (into transmission line)	10 to 50 kw
RF Output Impedance	51.5 ohms
Carrier Frequency Stability	Deviation less than ±1000 cycles
Modulation Capability	±100 kc

Method of modulation ..... Reactance tubes
Audio Input Impedance ..... 600/150 ohms
Audio Input Level for 100% Modulation* ..... +10 ±2 dbm
Audio Frequency Response** 30 to 15,000 cycles ..... ±1 db
Audio Frequency Distortion*** 30 to 15,000 cycles (including all harmonics up to 30 kc/s at ±75 kc swing) Less than 1.0%
FM Noise Level*** (below 75 kc swing) ..... Not more than —65 db
AM Noise Level (below 100% amplitude modulation) Not more than —50 db

Power Line Requirements:
- Line Voltage (nominal open circuit) 440/480
- Phase 3
- Frequency (can be adapted for 50 cycles) ..... 60 cycles
- Total Variation from Nominal Including Regulation 5%
- Power Consumption (maximum) ..... 120 kw
- Power Factor (approximate) 87%
- Crystal Heaters ..... 115 volts, 50/60 cycles, 28 watts

Tube Complement:

4 RCA 6V6	1 RCA 6AL5	1 RCA 2BP1
4 RCA 1614	2 RCA 2E26	3 RCA 4-125/4D21
1 RCA 6SH7	1 RCA 2D21	4 RCA 7C24
4 RCA 5U4G	1 RCA 6X5	3 RCA 5592
2 RCA OD3/VR150	5 RCA 6AC7	6 RCA 857B
1 RCA OC3/VR105		

Dimensions:
- Transmitter Panel and Equipment Enclosure 198" long x 84½" high (allow depth of 9' to rear wall)
- Plate Transformer ..... Base 25" x 49"; height 50"
- Filter Reactor ..... Base 32" x 40"; height 50"
- Rectifier ..... 50" wide x 70" long x 84" high
- Control and Distribution Unit ..... 48" wide x 82" long x 80" high
- High-power Blower Enclosure ..... 8' x 8' x 6' (approx.)
- Console ..... Base 46" x 36"; height (including turrets) 38½"
- Minimum Entrance Requirements ..... 30" x 84"

Weight, total unpacked ..... Approx. 20,000 lbs.
Finish ..... Two tone umber gray
Stock Identification MI-28926

* Level at input of 600 ohm pre-emphasis network. Insertion loss of this network is approximately 24 db.
** For pre-emphasized response, the pre-emphasis filter (MI-4926A) is provided to be inserted in the 600 ohm audio line.
*** Distortion and noise is measured following a standard 75 microsecond de-emphasis network.

Equipment Furnished

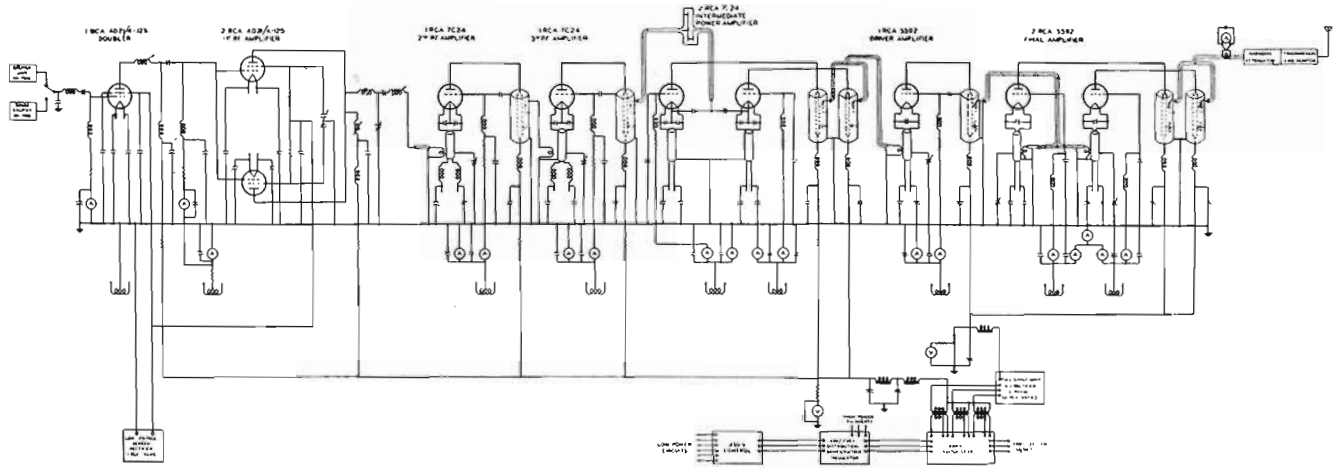
The BTF-50A Broadcast Transmitter equipment is identified as MI-28926 and consists of the condensed list of equipment shown below. Broadcast audio equipment, monitoring and test equipment, antennas and transmission feed line are not furnished as part of this equipment and should be specified and ordered separately if required.

- 1 Power Amplifier Unit MI-28232
- 1 Rectifier MI-28233
- 1 Control and Distribution Unit MI-28234
- 1 Plate Transformer MI-28235
- 1 Filter Reactor MI-28236
- 1 Main Blower and Filter Equipment MI-28237
- 1 Enclosure and Meter Panel MI-28238
- 1 Transmission Line Monitor MI-28155-A
- 1 Harmonic Attenuator MI-28239
- 1 Cut Back Equipment MI-28240
- 1 FM Exciter Unit ..... MI-28104-1 (See Note 1)
- 1 Low Power R.F. Units ..... MI-28106-A, and 7
- 1 Pre-emphasis Filter (600 ohms) MI-4926-A
- 1 Touch-up Enamel Kit MI-28153
- 2 Set of Operating Tubes ..... MI-28225-1, and 2
- 1 Blower and 2nd R.F., 3rd R.F. and I.P.A. Units (and air duct) MI-28165
- 1 Type BTC-1A Supervisory Control Console ..... MI-28950 (See Note 2)
- 2 TMV-129G Crystal Units MI-19450-A
- 2 Instruction Books IB-30175
- 2 Set Installation Instructions 8889029
- 1 Tube Hoist and Accessories MI-28246

Note 1: When dual FM exciters are to be specified, order in addition to item #12 above, the spare FM exciter kit MI-7015 listed under accessories.
Note 2: Specify the carrier frequency when ordering.

Accessories

Spare FM Exciter MI-7015
Set of Tubes for Spare Exciter MI-7020
Modification Kit for 50 Cycle Operation MI-28248

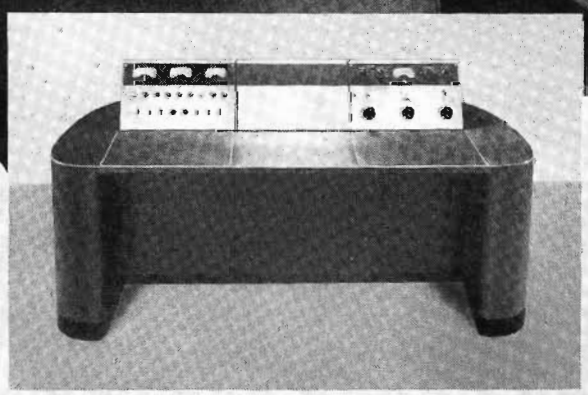


Simplified schematic diagram of BTF-50A

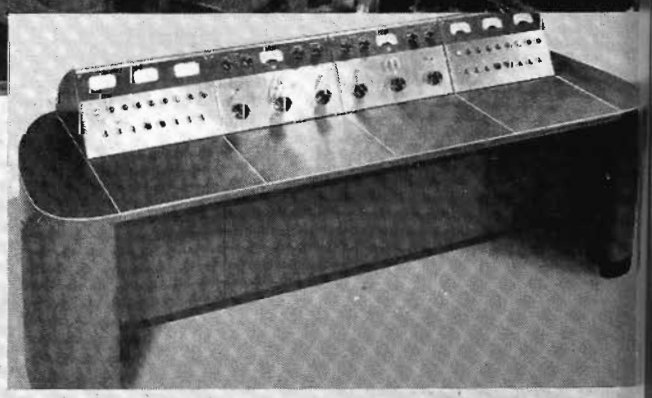
Station man's dream come true... ADD-A-

RCA Transmitter Control Console, type BTC-1A—as versatile and handsome a control console as ever graced a transmitter room. With this BTC-1A you add control turrets and desk sections as your station grows. The left turret is the transmitter control section. The right turret is the audio control section. No equipment obsolescence here when you add on units.

A few of the many combinations



BTC-1A Control Console—with transmitter-control turret, audio control turret, and blank turret for additional facilities such as special meters, jack fields, ringdown, etc. Front panels are bottom-hinged. Rear covers are removable.



Typical console set-up for two transmitters, such as: two AM transmitters, two FM transmitters, or one AM and one FM transmitter. The turrets bolt to the desks. Desk sections bolt to each other. Knockouts for the wiring are provided in all desk and turret sections. All meters are recessed behind turret panels.

INIT Transmitter Control Console

Fits every plant—AM, FM, TV, or any combination

'HIS IS THE MOST FLEXIBLE and versatile control console ever engineered for broadcast service. With ou can handle audio mixing and transmitter switch- operations in stations using RCA 3-, 5-, 10-, or kw FM transmitters—or RCA 5-, 10-, or 50-kw AM nsmitters. And by simply adding units to this basic nsole, you can also handle audio, video and trans- tter switching for any combination of transmitter -ups—starting with a single AM, FM, or TV trans- tter and going to two or more AM and/or FM nsmitters *and a television transmitter.*

The BTC-1A starts with the basic unit shown in the ture at the left. It includes one r-f transmitter control ret and one audio control turret—mounted on a o-section desk having removable end-sections.

The *r-f control turret* contains all power control itches and pilot lights for normal operation of the transmitter; transmitter start; transmitter plate voltage; overload reset; time delay by-pass; manual-automatic control; day-night power switching; tower lights; and a spare switch and pilot lamp. And there is mounting space for three remote indicating meters.

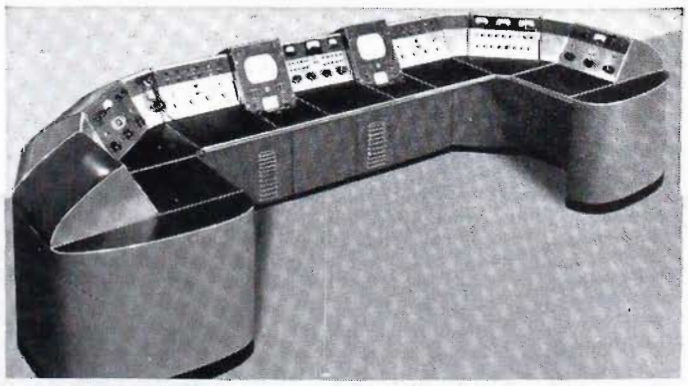
The *audio control turret* includes: a standard VU meter and range switch; an 8-position selector switch that permits monitoring all important circuits, a monitor gain control; and individual bridging pads that enable you to equalize the level of the signal sources. Control of six inputs . . . one microphone, a remote circuit or oscillator, two lines, two turntables . . . is handled by three high quality mixers and associated transfer keys.

• • •

Call your RCA Broadcast Sales Engineer for *all* the details. Or write Dept. 19CD, RCA Engineering Products, Camden, N. J.

ossible with the BTC-1A console

Typical console set-up for an RCA 5-kw television transmitter, and one AM or FM transmitter. From left to right: (1) TV transmitter control; (2) picture monitor; (3) TV audio monitor; (4) blank turret; (5) AM or FM transmitter control; (6) blank turret; and (7) AM or FM transmitter control.



De luxe set-up for combined centralized control . . . AM-FM and TV. Extreme left and right sections are the AM (or FM) transmitter controls. Each includes a transmitter-control, audio-control, and blank wing turret. Center turret controls (for RCA 5-kw TV transmitter) are, left to right: TV power, picture monitor, TV audio, preview monitor, TV program switching.

Universal Transmitter Console, Type BTC-1A

Features

- Handles transmitter switching and audio mixing facilities required for complete supervisory transmitter control—AM or FM.
- Add-a-unit or "block-build" construction allows easy addition of control turrets and desk sections for one or more transmitters of any type—AM, FM and TV.
- Important transmitter power switches and indicating lamps on turret for transmitter-control.
- Provides a VU meter, and facilities for mounting three remote indicating meters.
- Eight position monitor selector switch and monitor gain control.
- Mixing and switching provided for six audio inputs: two lines—two turntables—one microphone—and one utility input for oscillator or remote.

Basic BTC-1A Control Console

Description

The BTC-1A, Universal Transmitter Supervisory Console is one of the most flexible and versatile consoles ever engineered for broadcast transmitter service. It provides complete centralized control of primary switching and audio mixing operations required for AM and FM transmitters . . . and provides for easy addition of video control facilities. The basic console is specially designed for use with RCA 3-, 5-, 10- and 50 kw FM transmitters, as well as RCA 5-, 10- and 50 kw AM transmitters. Moreover, it is suitable for use with any transmitter which is contactor controlled.

Unique "add-a-unit" or "block-type" construction enables the simple addition of turrets and desk sections when expanding facilities to accommodate one or more AM, FM and TV transmitters. As many as nine or more combinations are possible, ranging from the basic BTC-1A for a single AM or FM transmitter . . . up to more elaborate "L," "U" or "in-line" type arrangements which will *accommodate AM, FM and TV transmitters at one location.* Thus, immediate plans may be made for the future installation of any combination of AM, FM and/or television transmitters, without obsolescence of equipment.

The BTC-1A includes one transmitter control turret and one audio control turret—mounted on an attractive two-section desk having removable end sections. Control-turret front panels have a satin chrome finish and the desk proper is two-tone umber gray with a durable black linoleum top. All meters are recessed and each meter panel is hinged for easy adjustment. Rear turret covers may be removed to facilitate installation. End sections contain shelves for storing station logs, records, etc.

The *transmitter-control* turret contains all power control switches and pilot lights for normal operation of the transmitter; transmitter start, transmitter plate voltage, overload reset, time delay by-pass, manual-automatic control, day-night power switching, tower lights, and an extra switch and pilot lamp which may be connected as desired. And there is convenient space provided for mounting a choice of three remote indicating meters. The associated RCA transmitter monitor and amplifier rack, MI-11623, may be added to boost a-f gain from program line to transmitter, and facilitate overall station monitoring and control.

The *audio-control* turret includes: a standard VU meter and range switch, an 8-position selector switch that permits monitoring all important circuits, a master monitor gain control, and individual bridging pads for equalizing the level of the signal sources. With the BTC-1A, control is provided for six different inputs—one microphone-oscillator or remote, two different lines, and two separate turntables—with three high-quality mixers and associated transfer keys. A microphone key cuts off the signal to the monitor amplifier—and prevents feedback when the microphone is in use. A line transfer key removes equalization and connects the telephone to the particular line not in use.

Accessory audio and monitoring equipment is available in a factory-wired assembly (MI-11623). It is supplied in a BR-84 series cabinet rack, finished to match companion equipment. It is suited for co-ordinated operation with the BTC-1A console and facilitates transmitter operation. It also provides extreme flexibility by the termination of all audio units in jack strips. (See FM Transmitter Monitor and Amplifier Cabinet.)

Performance Specifications

Power Required:

Indicator Lights	220 volts a-c, 50-60 cycles
Meter Lights (6.3 volts from transformer)	110 volts a-c, 50-60 cycles

Input Impedances:

Lines 1 and 2	600 ohms, balanced
Microphone and Turntable	600 ohms, balanced
Audio Oscillator or Remote Line	600 ohms, balanced
VU Meter	7500 ohms
Monitor	Bridging

Output Impedances:

Lines 1 and 2, Microphone and Turntable Mixer Circuit	600 ohms, balanced
Microphone and Turntable Controls	600 ohms
Lines 1 and 2 Control	600 ohms

Insertion Losses (lines, microphone, and turntable mixer circuit)	18 db

Volume Controls:

Microphone and Osc./Remote Control—600/600 ohms, 20 steps, 2 db per step, last step infinite, tapered; insertion loss 6 db; balanced.

Lines 1 and 2 Control——600/600 ohms, 30 steps, 1 db per step, last step infinite, tapered; insertion loss 6 db; balanced.
Turntable Control——600/600 ohms, 20 steps, 2 db per step, last step infinite, tapered; insertion loss 6 db; balanced.
Monitor Control——600/600 ohms, 20 steps, 2 db per step, last step infinite, tapered; insertion loss 32 db; balanced.
VU Attenuator Rheostat——800 ohms, 10 steps, 0.1 db per step, linear.
Noise Level: Circuits are isolated so that residual noise will not exceed the aggregate noise level of the associated amplifiers.

Mechanical Specifications

Overall Dimensions:
Width——56½"
Depth——36"
Height, including Turret (turret extends approx. 11" above desk top)——39"
Weight (approx.)——300 lbs.
45° Wing Turrets——10¾" high, 19" deep, $4\frac{9}{16}$" wide (front), 19" wide (rear)
Control Turrets——10¾" high, 19" deep, 19" wide (front and rear)
Straight Desk Sections——$28\frac{3}{16}$" high, 36" deep, 19" wide (front and rear)
90° Desk Sections——$28\frac{3}{16}$" high, 38 11/32" deep, $3\frac{6}{16}$" wide (front), 54⅛" wide (rear)

Equipment Furnished

The RCA Type BTC-1A (MI-28950) Universal Transmitter Control Console is composed of the following:

1 Transmitter Control Turret——MI-28420
1 AM/FM Audio Control Turret——MI-28410
2 Console Desk Sections——MI-27401-1
1 Console End Section (left-hand)——MI-26265-1
1 Console End Section (right-hand)——MI-26265-2

Space is available on the MI-28420 turret for mounting three 4" square-case meters which may be purchased on separate order from the list under "Accessories" below.

Available Accessories

AM/FM Audio Control Turret——MI-28410
Universal Transmitter Control Turret——MI-28420
Basic Desk Section——MI-28401-1
90° Desk Section——MI-28401-2
Complete Turret with Blank Panel——MI-28403-1
Wing Turret with Blank Panel——MI-28404-1
Television Control Console——MI-19122-A

90° desk sections and 45° turret wings being used to "block-build" a "U" shaped arrangement to accommodate two transmitters (AM and/or FM). Sections simply bolt together.

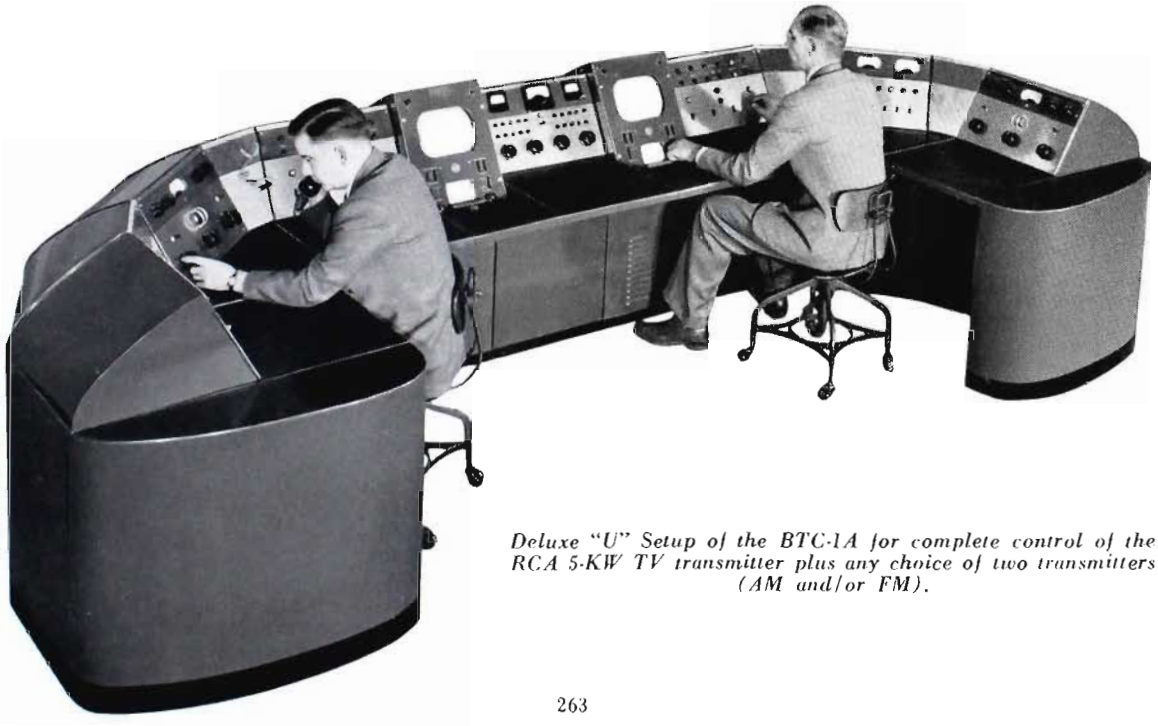
REMOTE METERS FOR AM EQUIPMENT:

1 Remote Limiting Meter, for use with RCA Type 86-A1 Limiting Amplifier——MI-28425
1 Remote Meter, for use with RCA Type WM-43A AM Modulation Monitor——44899

REMOTE METERS FOR FM EQUIPMENT:

1 Remote Meter (carrier deviation), for use with General Radio FM Monitor Type 1170-A——MI-19116-2
1 Remote Meter (percentage modulation), for use with General Radio FM Monitor Type 1170-A——MI-19116-3
1 Remote Meter (percentage modulation), for use with Hewlett-Packard FM Monitor Type 335-B——HP-112-13
1 Remote Meter (percentage output), for use with RCA FM Transmitters Types BTF-250A, BTF-1C, BTF-3B, BTF-5A, BTF-10B, BTF-50A——56412

Space is also available and mounting holes are provided in the MI-28410 turret for one line transformer, MI-11713.
The following related equipment, which is recommended, may be obtained on separate order:



Deluxe "U" Setup of the BTC-1A for complete control of the RCA 5-KW TV transmitter plus any choice of two transmitters (AM and/or FM).

FM Exciter Unit, MI-7016

Power Supply MI-7017

Features

- Crystal-controlled frequency stability.
- Distortion less than 1% through range of 30 to 15,000 cycles.
- Every component and connection is easily accessible.
- Built-in oscilloscope for checking performance.
- No auxiliary equipment necessary for setting up to desired frequency.

Description

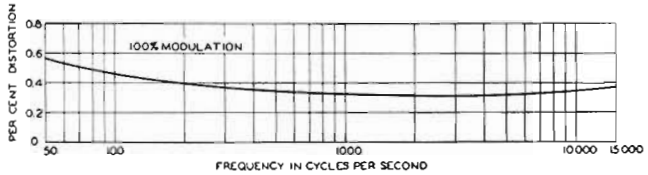
The RCA FM Exciter, MI-7016, and Power Supply, MI-7017, are vertical panel units designed to generate a high quality frequency modulated signal. These are the carrier generating units used in all RCA FM transmitters.

The RCA FM Exciter employs the principle of direct FM which uses fewer tubes and introduces less audio distortion, (especially at low frequencies). In this system, the mean, or "carrier" frequency is produced in a simple and straightforward manner by a master oscillator which is modulated directly by means of a reactance tube modulator. The oscillator is then followed by a relatively small number of multiplier stages. A new-type automatic frequency control system is employed in this exciter. Sub-harmonics of the FM master oscillator are compared with sub-harmonics of a low frequency crystal oscillator (100 to 125 kc). Any difference between these frequencies operates a two-phase, reversible, induction motor attached directly to the shaft of a variable capacitor. The motor never turns more than 45 degrees either way. No gears, counter circuits, or compensating voltages are involved. Its fast action and complete freedom from temperature variations provides a high degree of frequency stability. Failure of the automatic frequency control does not take the transmitter off the air, since operation may be continued by locking the motor shaft and making occasional manual frequency corrections.

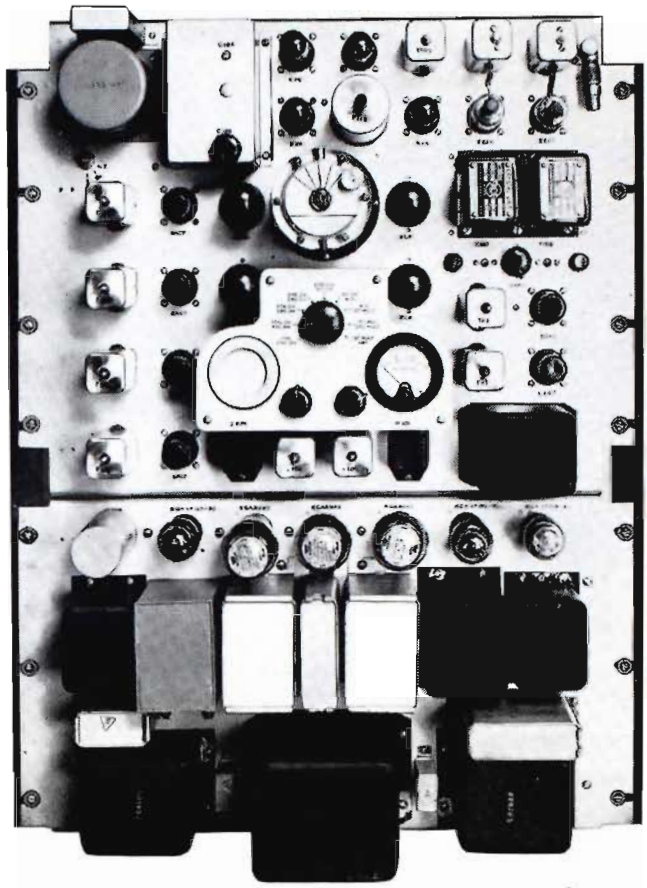
The operation of the circuits may be checked easily and rapidly by means of a built-in cathode ray oscilloscope, milliameter, and associated selector switches. All tubes and large components are mounted on the front of the panel. Wiring on the rear of the panel is "in the clear" with all terminals clearly marked and easily accessible.

Specifications

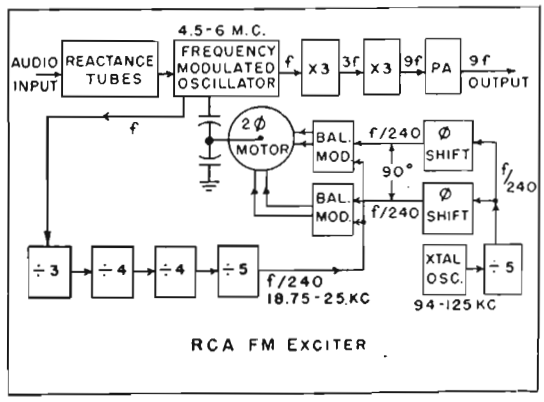
Frequency Range	44 to 54 mc
	Frequency doubled in amp. section to 88-108 mc
Carrier Frequency Stability, at FM output frequency	Deviation less than 1000 cycles
Modulation Capability	±100 kc
Method of Modulation	Push-pull reactance-tubes
Audio Input Impedance	600/150 ohms
Audio Frequency Response	
30 to 15,000 cycles, 1000 cycle reference	±1 db
Audio Frequency Distortion	
30 to 100 cycles	1.0%
100 to 7,500 cycles	0.5%
7,500 to 15,000 cycles	1.0%
(including all harmonics up to 30 kc at 75 kc swing)	
FM Noise Level, below ±75 kc swing	70 db
AM Noise Level, below 100% amplitude modulation	60 db
Power Line Requirements	208/230 volts, 50/60 cycles, 370 watts (approx.)
Power Line Requirements— (Crystal Heaters)	100 to 125 volts a-c or d-c, 28 watts



Percentage distortion at 100% modulation



Overall Height—(RF and Power Supply)	29"
Overall Width	22¼"
Weight (RF Unit)	47 lbs.
Weight (Power Supply)	66½ lbs.
Stock Identification:	
Exciter	MI-7016
Power Supply	MI-7017



Audio frequency response less pre-emphasis

Pre-emphasis Filter, MI-4926-A

Features

- Accurate within 1.5 db from 30 to 15,000 cycles.
- Minimum insertion loss.
- Operation for levels up to +30 db.
- Compact design—completely shielded.

Uses

The MI-4926-A filter is designed for use in such equipment as disc recorders and frequency modulated transmitters to produce the FCC standard 75-microsecond audio pre-emphasis characteristic. The MI-4926-A is supplied as a part of all RCA FM and Television transmitters, as well as the studio-transmitter link equipment. It is also used in conjunction with disc recorders to obtain recordings having the 75 micro-second pre-emphasis characteristic. In FM transmitter installations, if a spare FM exciter is ordered, and it is desired to switch ahead of the filter rather than after, an additional pre-emphasis filter will be required. The MI-4926-A may also be used with composite transmitters.

Description

The MI-4926-A filter is of the constant impedance, balanced, "bridge T" type. The characteristic frequency curve of the filter follows a 75-microsecond curve in accordance with RMA and FCC recommendations.

Mechanically, the filter consists of two reactors, two capacitors and eight resistors sealed inside metal can. Connections are made to the filter by means of solder terminals on top of the can.

The filter may be inserted at any point in the audio system where the signal does not exceed +30 db, and may be mounted in any convenient place so long as the magnetic fields of transformers and similar equipment are avoided.

Specifications

Input:

Source Impedance	600 ohms ±5%
Input Impedance	600 ohms ±5%
Maximum Input Level	+30 dbm*

Output:

Load Impedance	600 ohms ±5%
Output Impedance	600 ohms ±5%

Insertion Loss (from 600 ohm source to 600 ohm load):

Minimum Loss at 15,000 cps	Approx. 5 db.
Maximum Loss Below 500 cps	Approx. 22 db.

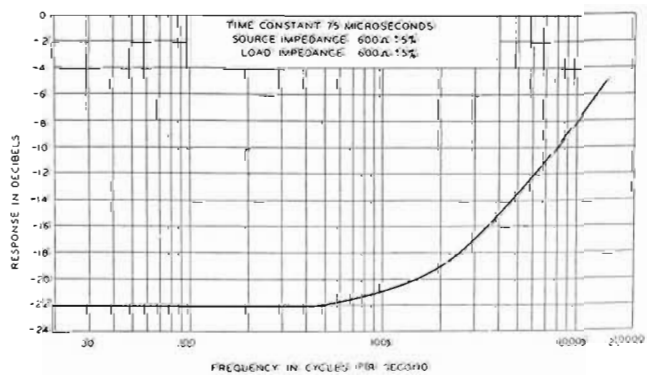
Frequency Response — Corresponds to FCC 75 microsecond pre-emphasis curve within ±1.5 db from 30 to 15,000 cycles

Attenuation Characteristic — Fixed (See curve)

Physical Specifications:

Diameter	3"
Height	4⅜"
Weight (unpacked)	2¼ lbs.
Base Plate	3¼" x 3¼"
Mounting	Four holes with center lines 2¾" x 2¾"

* 0 db = .001 watt.



Frequency response of MI-4926-A

Transmitter Monitor and Amplifier Cabinet Rack, MI-11623

Features

- Simplifies transmitter installations.
- Provides complete monitor and amplifier facilities in one rack.
- Provides extreme flexibility through termination of all audio units in jack strips.
- Wiring and monitoring facilities furnished for addition of optional equipment.
- Attractive styling—matches all RCA transmitters and auxiliary equipment.

Uses

The transmitter monitor and amplifier cabinet facilitates the grouping of all appropriate apparatus necessary to simplify the installation of any broadcast transmitter. This cabinet utilizes the new modernistically styled cabinet of the BR-84 series which blends with all RCA transmitters and equipment.

The cabinet is factory wired to accommodate all the required items for transmitter, speech input equipment, modulation and frequency monitors, and power change switch, etc. The MI-11623 has been designed to operate with the control desks supplied with the BTA-5F/BTA-10F, BTA-50F and BTF-50A Transmitters to provide a complete and flexible system of controls and monitors.

Description

The transmitter control cabinet embraces all the functional equipment, amplifiers, jack panels, etc., required for the operation of an RCA broadcast transmitter in conjunction with the transmitter control console. The MI-11623 consists of one Standard Cabinet Rack complete with a ventilated rear door, one BA-14A* monitoring amplifier, one type 86-A1 limiting amplifier, two type 33-A jack strips complete with mat, and one type 57-C switch and fuse panel. An additional BR-2A panel and shelf is supplied and wired to accommodate three type BA-1A pre-amplifiers, with one type BX-1B power supply for the pre-amplifiers. This arrangement allows microphones and transcription turntables to be used directly from the transmitter in the event of an emergency.

Mountings and all wiring are also provided for the following accessory equipmment:

Two type 56-C Fixed Line Equalizers
Two MI-4925-A 15 KC High Frequency compensators
One MI-4926-A FM pre-emphasis equalizer
One MI-4309-B Power Reduction panel (BTA-5F/10F)
One MI-7264-E Hum Equalizer (BTA-50F)

A blank panel is drilled and tapped for mounting three MI-10253 line transformers.

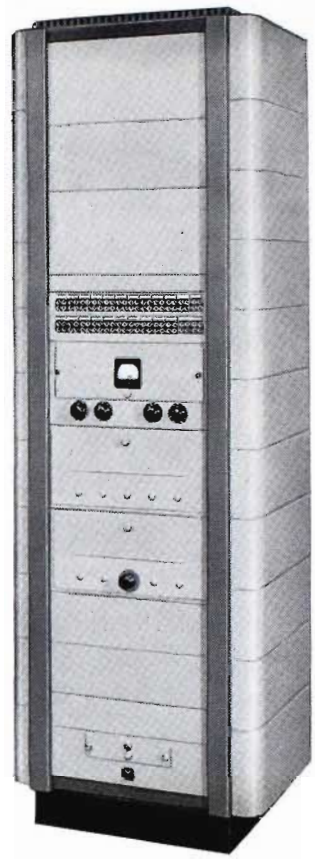
Measuring equipment space and wiring are available at the top of the rack for mounting the AM Frequency Monitor type WF-48A and the Modulation Monitor type WM-43A, or the combination FM Frequency and Modulation Monitor type WF-5A.

The two type 33-A jack panels provide flexibility for all the described audio circuits with spares for utility apparatus according to local requirements.

The photograph illustrates the MI-11623 complete with accessory side panels, MI-30541-G84 and MI-30566-G84 Trim Strips. These are not supplied, but are available for the user's individual requirements. Where fluctuating mains prevail, the Solar voltage regulator is available to regulate the a-c to the 86-A1 limiting amplifier.

Specifications

Frequency Response (line in to transmitter in)	±2 db 30-15,000 cycles
Noise Level (below +10 db output)	—75 db
Power Supply (115 to 125 volts, 50-60 cycles)	450 watts
Dimensions:	
Height	84″
Width (less side panels and 28″ side panels)	22″
Overall Depth (including door handles)	19″
Panel Width	19″



MI-11623 fitted with MI-30541-G84 Side Panels and MI-30566-G84 Trim Strips

Stock Identification (including tubes)	MI-11623
Weight (unpacked)	400 lbs. (approx.)

Equipment Supplied

MI-11623 includes the following equipment:

1 Type BR-84 Cabinet Rack	MI-30951-84D
1 Type BA-14A Monitoring Amplifier	MI-11234
1 Type 86-A1 Limiting Amplifier including tubes plus 36-B Panel and Shelf	MI-11216-C/4682-B
2 Type 33-A Jack Strips with Mat	MI-11501-A
1 Type 57-C Switch and Fuse Panel	
1 Type BR-2A Panel and Shelf. This panel and shelf is wired to accommodate 3 Type BA-1A Pre-Amplifiers and 1 Type BX-1B power supply.	

Accessories

Side Panels (each)	MI-30541-G84
Single Trim Strip (each)	MI-30566-G84
AM Frequency Monitor	Type WF-48A
AM Modulation Monitor	Type BW-66E
FM Frequency and Modulation Monitor (RCA)	Type WF-5A
BA-11A Pre-Amplifier	MI-11231
Tube Kit for BA-11A	MI-11288
BX-1E Power Supply for Pre-Amplifier	MI-11305-D
Tube Kit for BX-1E Power Supply	MI-11262
Power Change Panel for BTA-5F and BTA-10F Transmitter	MI-4309-B
Line Transformer	MI-10253
56-C Fixed Equalizer	MI-4168
15 KC High Frequency Compensator	MI-4925-A
FM Pre-Emphasis Equalizer	MI-4926-A
Solar Voltage Regulator	
60 cycle	MI-11280
50 cycle	MI-11280-A
Audio Terminal Block	MI-4569

* Note: Limiting and monitoring amplifiers supplied with tubes.

RCA Tubes for AM and FM

There's an RCA tube for practically every type of AM or FM broadcast requirement . . . tubes for low, medium, and high power needs . . . rectifier tubes . . . tubes for audio applications . . . special types. RCA pioneers the development of tubes designed specifically for broadcast needs. And you can buy RCA tubes with the assurance that you are getting the world's finest!

Listed below are only a few of the RCA tubes for AM and FM broadcasting.

RCA 833-A

"King of the Kilowatters"—RCA-designed—universally used in the output stages of 1-kw AM broadcast transmitters. Offers exceptional watts-per-dollar value.

RCA 892-R

The standard of the industry for use in 5-kw AM broadcast transmitters. Features rugged, efficient, RCA-designed radiator for simplified, forced-air-cooled operation.

RCA 1620

A universally used triple-grid amplifier which offers unequalled performance in low-level audio applications where low noise level and low microphonics are important.

RCA 7C24

Popular, forced-air-cooled, grounded-grid triode widely used in RCA 1-kw, 3-kw, and 10-kw FM broadcast transmitters. Features famous RCA "metal header" design.

RCA 8008

Standard half-wave mercury-vapor rectifier tube featuring heavy-duty, industrial-type base. Used in most modern broadcast transmitters. RCA's oxide-coated cathode gives copious electron emission at increased efficiency.

RCA 872-A

Similar to RCA 8008, but has standard radio-type base. Used in many broadcast transmitters of all powers.

RCA 5671

RCA-designed power triode featuring a thoriated-tungsten filament which requires 60% less filament power than similar pure-tungsten-filament types. Used in output stages of modern 50-kw air-cooled AM broadcast transmitters.

RCA 828

Beam power amplifier developed by RCA for relatively large power output at low distortion with low driving power requirements. Widely used in audio and radio service in AM broadcast transmitters.

RCA 4-125A/4D21

High-frequency tetrode widely employed in FM and television broadcast transmitters.

RCA 5592

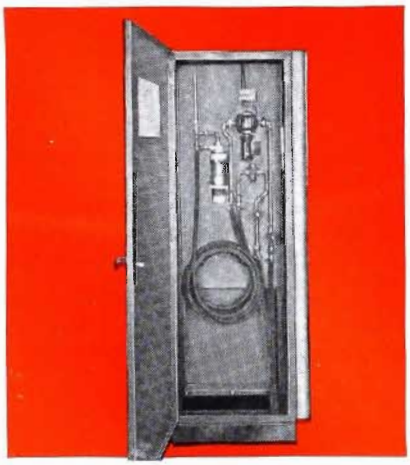
Forced-air-cooled power triode featuring RCA "metal header" design. Used in output stages of grounded-grid, 50-kw FM broadcast transmitters.

For technical data, prices, or delivery on RCA Tubes for AM, FM, or Television—or any RCA Electron Tube—phone your local RCA Tube Distributor, or write RCA Tube Department, Harrison, N. J.

Everything for TV

RCA EQUIPMENT CABINETS for small rack-mounting units, such as monoscope camera, studio line amplifiers for sound and picture, microwave relay receiver, test equipment, power supplies, etc.

RCA DUMMY LOAD. For testing and measuring power output. This unit consists of a coaxial line, the inner conductor of which is a water-cooled resistor.



You see here the transmitter room that is *being delivered to more than thirty television stations* . . . complete, and RCA throughout.

As practical, we believe, as an AM station transmitter room, this layout has the proper equipment you need to put high-quality picture-and-sound signals on the air—reliably, and with surprisingly little supervision. It includes: a combined 5-kw picture and 2.5-kw FM sound transmitter; a complete transmitter control console; a vestigial side-band filter; a dummy load; an antenna coupling network; sound-and-picture input antenna coupling network; sound-and-picture input amplifiers; and frequency and modulation monitors.

Why the overwhelming acceptance for this transmitter room . . . and all other RCA television equipment?

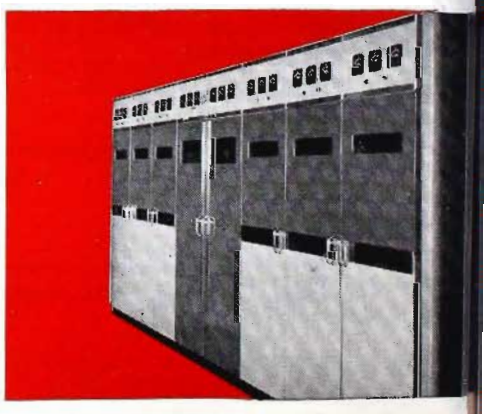
It's the *thoroughness* with which RCA TV equipment is designed. It's the *practical engineering* experience behind it—more of it than any other television equipment manufacturer. It's the *completeness of the line* . . . with one equipment source for everything you need in your station. It's the undivided *responsibility* RCA assumes for all equipment you buy. It's the unbroken *record of past performance and service* to the industry.

Nothing to planning a television station—when you let an RCA Television Specialist help you. Call him in. Or write Dept. 19, RCA Engineering Products Division, Camden, N. J.

L-F ANTENNA DIPLEXER (left) *AND THE VESTIGIAL SIDE-BAND FILTER* (right). Diplexer makes it practical to use one antenna for picture-and-sound signals. Side-band filter partially suppresses one sideband. No adjustments required.

RCA CONTROL CONSOLE for "push-button" control of your transmitter room. Handles both picture and sound transmitters, a turntable, and an announce microphone. Includes power switches, picture and sound monitors, switching circuits, antenna current meters—and an oscilloscope.

THE RCA 5-KW TV TRANSMITTER (plus 2.5 kw for FM sound). Full picture-and-sound power on your channel. High-level modulation. Meter-tuned, narrow-band drivers. Only one class B stage to adjust. No neutralizing of PA. Built for "walk-in." Delivery being made to more than 30 stations.

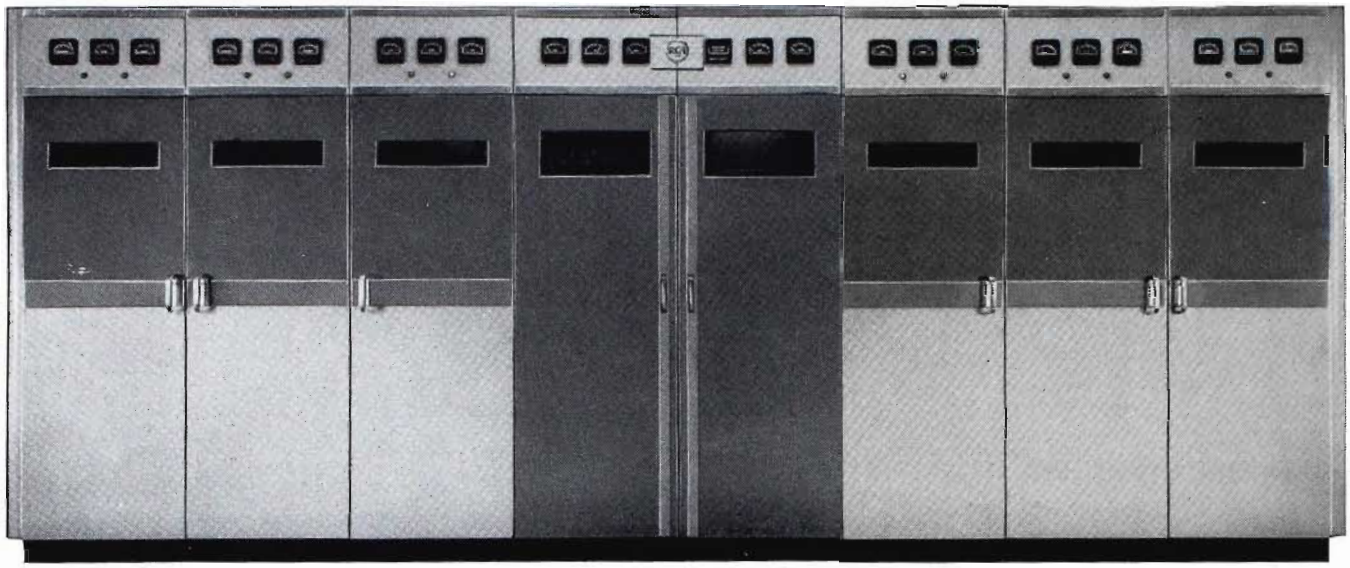


...entire transmitter rooms,

for instance—

COMPLETE TRANSMITTER ROOM — by RCA
More than 30 rooms like this one are going to television stations. The entire layout is designed to be used adjacent to your TV studio control room...or at a remote control location.

Television Transmitter, Type TT-5A



Features

- Low installation costs.
- Low operating cost.
- Straight-forward "meter tuning" of all r-f driver stages.
- Uses highly efficient RCA FM exciter in aural section.
- Packaged for convenience in shipping and installation.
- Power amplifiers require no neutralization.

Description

The TT-5A is a television broadcast transmitter with a nominal power output of five kilowatts peak visual power, and two and one-half kilowatts peak aural power, in conformance with FCC and RMA standards. The TT-5A is designed to operate in any specified channel between Channels 2 to 13.

The entire transmitter is housed in eight steel cabinets which are fastened to a base frame. This frame is divided in such a manner that the eight cabinets may be placed either in a straight line (overall width—208″) or in a "U"-shaped arrangement (smallest possible overall width—150″). Each cabinet has both a front and rear door. The components and wiring are arranged to permit maximum accessibility. The visual section of the transmitter is located on the right side and the aural section is on the left, with the power supplies and control panel for both sections in the center.

The visual section of the transmitter consists of a crystal oscillator followed by r-f amplifiers and a grid-modulated power amplifier. The use of final-amplifier, grid-modulation makes possible the operation of all driver stages as high-efficiency, narrow-band, class "C" amplifiers, which can be tuned quickly and easily from front panel meter observations.

The final power stages of the aural and visual sections each use the RCA 8D21 dual tetrode operated as a push pull amplifier. Dual tetrode construction does away with the need for neutralization of these stages, assuring better picture quality and less likelihood of adjacent channel interference.

The aural section of the transmitter utilizes the highly efficient RCA Direct FM exciter, followed by amplifiers and the power amplifier.

All high power circuits are doubly protected by highspeed overload relays backed up by thermal type circuit breaker switches.

Control Console

Certain controls on the control panel of the TT-5A transmitter such as "start-stop" and aural and visual input gain controls are duplicated on the control console supplied with the transmitter. In addition, the control console contains a picture monitor and oscilloscope, switches for operating tower lights, a VU meter for the aural channel, and meters which operate from the reflectometors in the transmission line. These meters give indications for determining power output as well as standing wave ratio on the transmission line.

In order to provide greater convenience in shipping and installation, the transmitter is partially disassembled when it leaves the factory. The largest unit, uncrated, is 25 x 38 x 80 inches, and no single unit weighs over 1000 pounds. This facilitates handling in confined spaces and elevators. All connections between units are made from conveniently located terminal boards on each unit.

Specifications

	Aural	*Visual*
Type of emision	A3	A5
Frequency range	Chan. 2 to 13	Chan. 2 to 13
Power output (into transmission line)	2 to 4 kw.	2.5 to 5 kw peak
RF output impedance	72 ohms	72 ohms
Carrier frequency stability	±0.002%	±0.002%
Modulation capability	±50 kc.	90%
Method of modulation	Frequency mod.	Amplitude mod.
Input impedance	600 ohms	75 ohms
Input level	+12, ±2 db	1 volt peak to peak
Frequency response**	Uniform within ±1 db from 30 to 15,000 cycles	*0 db at 0.1 mc. 2 db at 0.5 mc. 2 db at 1.25 mc. 2 db at 2 mc. 2 db at 3 mc. 3 db at 4 mc.

Audio frequency distortion:***

50 to 100 cycles	1.5%
100 to 7,500 cycles	1.0%
7,500 to 15,000 cycles	1.5%

Noise level:

FM noise, below ±25 kc swing	60 db
Amplitude noise, rms below carrier	50 db

Power Line Requirement:

Transmitter

Line	208/230 volts, 3 phase, 50/60 cycles
Power consumption (approx.)	24-28 kw
Power factor	85%

Console, crystal heaters, etc.

Line	115 volts, single phase, 50/60 cycles
Power consumption (approx.)	600 watts

Dimensions:

Overall length****	208"
Overall height	84"
Overall depth (inc. door handles)	38"
Building entrance and elevator clearance requirements	25" x 80"

Weight:

Transmitter**** (8 cabinets plus 2 PA cabinets)	8000 lbs. (approx.)
Console	600 lbs. (approx.)
Water circulating system	1300 lbs. (approx.)

Finish	Two-tone umber gray with satin chrome trim and fittings
Stock Identification	MI-19205-A, B

Tube Complement

Visual Crystal Oscillator	1	1614
Visual R-F Chain:		
Doubler	1	8001
Tripler	1	8001
IPA or Tripler	2	4-125A/4D21
†First IPA	2	4-125A/4D21
†Second IPA	2	4X500A
Power Amplifier	1	8D21
Visual Amplifier and Modulator:		
First Visual Amplifier	3	6AG7
Second Visual Amplifier	2	807
Second Visual Amplifier (Synchronizing Pulse Expander)	1	6AG7
Modulator	6	4E27/8001
Synchronizing Separator	1	6J5
Synchronizing Amplifier	1	6AG7
D-c Insertion Diode	1	6H6
Visual Monitor	1	6AG7
Visual Power Supplies:		
Driver Power Supply	3	8008
Modulator Power Supply	6	8008
Power-Amplifier Plate Supply	6	8008
Bias Supply	1	5U4G
PA Bias Supply		
Rectifier	2	816
Electronic Regulator	3	6AS7G
Voltage Regulator	3	VR150
D-c Amplifier	1	6J5
D-c Amplifier	1	6SH7
Amplifier Voltage Regulator		
Electronic Regulator	3	6AS7G
Voltage Regulator	3	OC3/VR105
Voltage Regulator	1	OA3/VR75
Voltage Regulator	2	OD3/VR150
D-c Amplifier	1	6SH7
PA Screen Supply		
Rectifier	2	816
Electronic Regulator	2	6AS7G
Voltage Regulator	3	VR150
D-c Amplifier	1	6SH7
D-c Amplifier	1	6J5
FM Exciter:		
Modulator	2	6V6
Modulated Oscillator	1	6V6
First Multiplier	1	6V6
Second Multiplier	1	2E26
Third Multiplier	1	2E26
First Frequency Divider	1	6AC7
Second Frequency Divider	1	6AC7
Third Frequency Divider	1	6AC7
Fourth Frequency Divider	1	6AC7
Monitor Drivers	4	1614
Crystal Frequency Divider	1	6AC7
Crystal Oscillator	1	6SH7
Cathode-Ray Indicator	1	2BP1
Aural R-F Chain:		
First Amplifier/Doubler	1	4E27/8001
Tripler/Doubler	1	4E27/8001
Amplifier/Tripler	2	4-125A/4D21
†First IPA	2	4-125A/4D21
†Second IPA	2	4X500A
Power Amplifier	1	8D21
Bias Supply	1	5U4G
Aural Power Supplies:		
FM Exciter Power Supply		
Low Voltage Rectifier	2	5U4G
High Voltage Rectifier	1	5U4G
Voltage Regulator	1	OC3/VR105
Voltage Regulator	2	OD3/VR150
Driver Power Supply	3	8008
Power Amplifier Plate Supply	6	8008
Reflectometers:		
Diode	4	6AL5
R-F Over-voltage Cut-out	2	502-A

† Channels 7-13 only.

Equipment Supplied

1	Sound Exciter	MI-19031
1	Sound Driver	MI-19032
1	Sound Rectifier	MI-19033
1	Power Control Unit	MI-19034
1	Picture Modulator Rectifier	MI-19035
1	Picture Rectifier	MI-19036
1	Picture RF Rectifier	MI-19037
1	Picture Modulator	MI-19038
1	Sound Amplifier	MI-19039
1	Picture Amplifier	MI-19040
1	Set of Frequency Determining Coils	MI-19110
1	Set Installation Hardware and Accessories	MI-19108
1	Set Installation and Wiring Kit	MI-19109
3	TMV-129C Crystal Units	MI-19400
2	TMV-129G Crystal Units	MI-19450
1	Touchup Kit	MI-28153
1	Set of Tubes	MI-19030
1	Water Cooler	MI-19045
1	Control Console	MI-19202
1	Vestigial Side Band Filter	MI-19114
1	Inside Transmission Line	MI-19111
1	Monitoring Diode	MI-19051
2	Instruction Books	IB-36012

Available Accessories

Spare Set of Tubes	MI-19030
FCC Spare Tubes	MI-19050
Input and Monitoring Equipment	MI-19203
Antenna Equipment	On application
Dummy Load	MI-19024-A

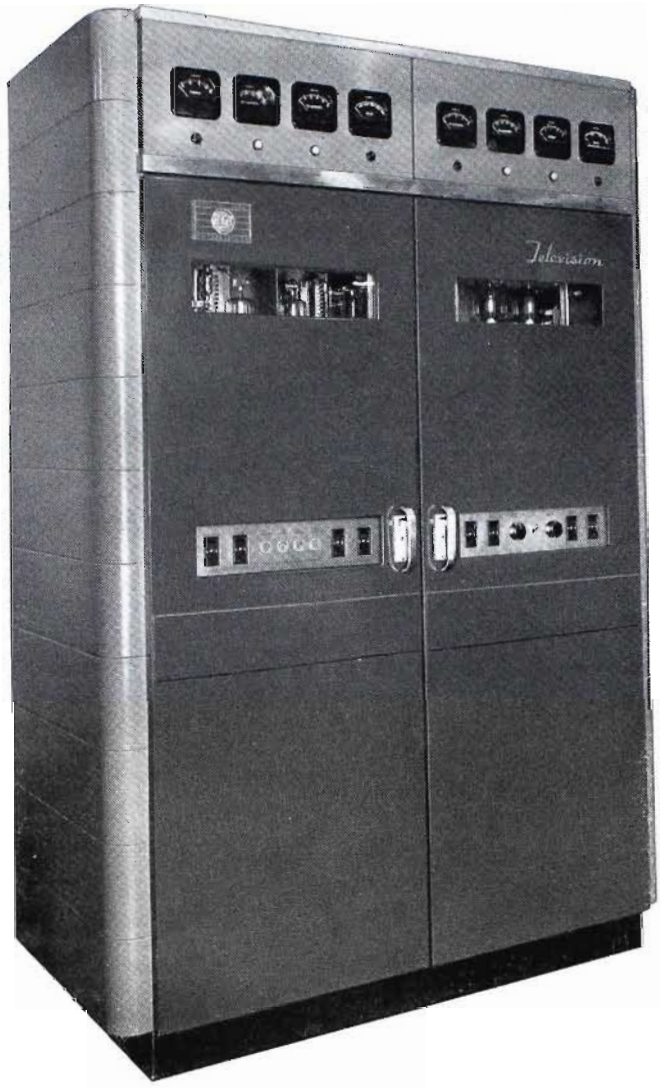
* Maximum attenuation with respect to idealized rectified vestigial sideband response.

** For pre-emphasized response the pre-emphasis filter (MI-4926A) is provided to be inserted in the 600 ohm audio input line at the most effective point.

*** Distortion and noise are measured following a standard de-emphasis network.

**** To facilitate packaging and handling, the equipment breaks down into its component cabinets (8 plus 2 PA cabinets) and is shipped accordingly. The larger power supply components are also removed and packed separately. Thus, the dimensions of the largest unit (unpacked) is 25 x 80 x 38 inches, and the weight approximately 600 lbs.

Television Transmitter, Type TT-500A



Features

- Economical installation—low tube costs.
- Video system with excellent frequency and phase response.
- Easily tuned—straightforward meter-tuned stages.
- Independent control circuits for visual and aural sections of transmitter.
- Air-cooled tubes used throughout.
- Equipment incorporates picture and waveform monitors in console.

Use

The RCA TT-500A is a television transmitter capable of providing a peak power output of 500 watts. It is designed for use in areas where a low-power transmitter will provide adequate signal strength for the desired coverage. The output of the TT-500A multiplied by the power gains of the Super Turnstile and Super-Gain antennas will provide a strong signal in many areas.

Description

The TT-500A Television Transmitter will operate in any one of the low-frequency channels 2-6 (54 mc-88 mc). The transmitter, which employs air-cooled tubes throughout, is housed in two identical cabinets, which can be installed bolted together as one unit 56 inches wide, or arranged on individual cabinets each 31 inches wide. One of these cabinets contains all the components of the visual transmitter, and the other cabinet contains those of the aural transmitter. Controls for both aural and visual sections of the transmitter are accessible through openings in the door of each cabinet.

The visual section of the TT-500A transmitter consists of the carrier generating circuits, video amplifiers, modulator, power supplies, and the necessary control circuits. The video amplifiers, modulator and r-f circuits occupy the upper half of the cabinet. For the r-f channel, an RCA 6V6 Crystal Oscillator drives a 6V6 doubler. This is followed by an RCA 807 tripler, an RCA 4-125/4D21 doubler and two Type 4-250A/5D22's in parallel as the final amplifier. Modulation is applied to the grids of the two 4-250A/5D22 tubes in the power amplifier. Therefore all r-f stages can be simply meter tuned as straightforward class C amplifiers. None of these stages except the power amplifier require neutralization.

The video system is a three-stage amplifier with excellent frequency and phase response. Video signals at RMA standard levels are fed into an RCA 6AG7 first video amplifier which is followed by another RCA 6AG7 video amplifier which drives three RCA 807's in parallel as the modulator.

The aural section of the transmitter is frequency modulated and has a power output of 250 watts in accordance with RMA requirements for television transmitters of this power. It consists of a Direct-FM exciter followed by a single 4-125A/4D21 doubler, which in turn drives a pair of 4-125A/4D21's in parallel as the power amplifier.

TRANSMITTER CONSOLE

The control console for the transmitter is constructed as a monitoring center where the operator has complete fingertip control over operation of the transmitter. In the console are the gain controls for both visual and aural inputs to the transmitter, plus complete monitoring facilities for both visual and aural signals.

Power output of the television transmitter can be measured by means of a dummy load and wattmeter, which can be obtained with the transmitter. A "reflectometer" built into the visual section of the transmitter, and coupled to the transmission line, provides a means for continuous observation of transmitter output during broadcasts.

Specifications

	Aural	*Visual*
Type of Emission	A3	A5
Frequency Range (TT-500A)	Channels 2-6	Channels 2-6
Power Output (into transmission line)	250 watts	500 watts peak
RF Output Impedance	51.5 ohms	51.5 ohms
Carrier Frequency Stability	±.002%	±.002%
Modulation Capability	±40 kc.	90%
Method of Modulation	Reactance tube	Grid amplitude
Input Impedance	600 ohms	75 ohms
Input Voltage	+10 ±2 dbm	1 v. peak to peak
Frequency Response	Uniform ±1 db 30 to 15,000 cycles	*2 db at 0.5 mc. 2 db at 1.25 mc. 2 db at 2. mc. 2 db at 3. mc. 3 db at 4. mc.
Maximum Audio Frequency Distortion	50 to 100 cycles 1.5% 100 to 7500 cycles 1.0% 7500 to 15000 cycles 1.5%	
Noise Level		
F-M Noise Below ±25 kc swing	60 db	
Amplitude Noise, r.m.s. Below Carrier	50 db	
Amplitude Variation Over One Frame of Picture		peak to peak less than 5% of the synchronizing peak level

Tube Complement

VISUAL SECTION

Crystal Oscillator, 1 RCA 6V6-GT; Doubler, 1 RCA 6V6-GT; Tripler, 1 RCA 807; Doubler, 1 RCA 4-125A/4D21; Power Amplifier, 2 4-250A/5D22; 1st Video Stage, 1 RCA 6AG7; 2nd Video Stage, 1 RCA 6AG7; Sync Expander, 1 RCA 6AC7; Sync Separator, 1 RCA 6C4; Pulse Amplifier, 1 RCA 6C4; D-C Insertion Diode, 1 RCA 6AL5; Monitor Amplifier, 1 RCA 6V6-GT; Modulator, 3 RCA 807; Modulator Screen Regulators, 2 RCA VR105; Modulator Power Rectifiers, 2 RCA 866A/866; Video Voltage Regulators, 2 RCA VR105; 500 Volt Rectifier, 2 RCA 866A/866; Low Voltage Supply Regulator, 1 RCA VR105; Low Voltage Rectifier, 1 RCA 6X5-GT; Power Amplifier Rectifier, 2 RCA 8008; Reflectometer Diode, 1 RCA 6AL5.

AURAL SECTION

FM Exciter

Crystal Oscillator, 1 RCA 6SH7; Crystal Frequency Divider, 1 RCA 6AC7; Modulated Oscillator, 1 RCA 6V6; Modulators, 2 RCA 6V6; 1st Buffer-Multiplier, 1 RCA 6V6; 2nd Buffer-Multiplier, 1 RCA 2E26; Amplifier, 1 RCA 2E26; 1st Frequency Divider, 1 RCA 6AC7; 2nd Frequency Divider, 1 RCA 6AC7; 3rd Frequency Divider, 1 RCA 6AC7; 4th Frequency Divider, 1 RCA 6AC7; Motor Drivers, 4 RCA 1614; Cathode Ray Indicator, 1 RCA 2BP1; Low Voltage Rectifier, 2 RCA 5U4G; High Voltage Rectifier, 1 RCA 5U4G; Voltage Regulator, 1 RCA VR105; Voltage Regulator, 2 RCA VR150.

FM Amplifier

Power Doubler, 1 RCA 4-125A/4D21; Power Amplifier, 2 RCA 4-125A/4D21; Low Voltage Rectifier, 1 RCA 5U4G; High Voltage Rectifier, 2 RCA 866A/866.

Power Line Requirements

Transmitter:

Line	208/230 v., 50-60 cycles, single phase
Power Consumption (approx.)	3000 watts
Power Factor (approx.)	0.85

Crystal Heaters:

Line	115 v., 50/60 cycles, single phase
Power Consumption	56 watts

MECHANICAL SPECIFICATIONS

Transmitter:

Dimensions—

Overall Width	56"
Overall Height	84"
Overall Depth (including door handles)	31 1/16"
Weight	5150 lbs. (approx.)
Finish	Two-tone umber gray with brushed chrome trim and fittings
Stock Identification	MI-19206

Equipment Supplied

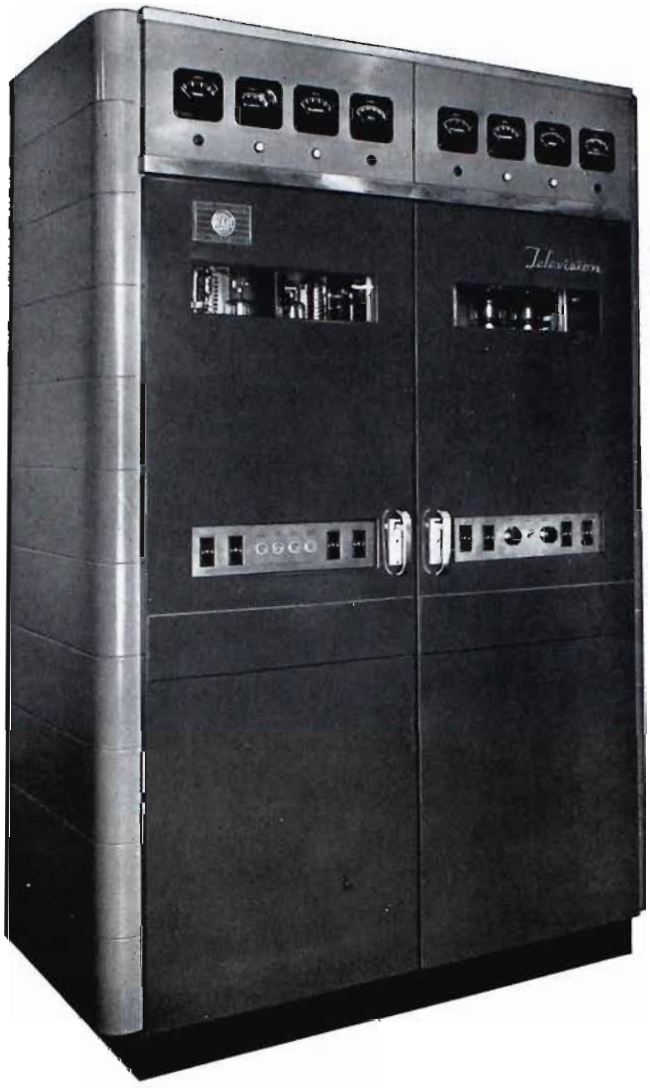
1	Aural Transmitter	MI-19005
1	Visual Transmitter	MI-19006
1	Control Console	MI-19266
1	Set of Inside Transmission Line	MI-19112
1	Set of Installation Accessories	MI-19129
1	Installation Wire Kit	MI-19132
1	Frequency Determining Kit	MI-19004
2	TMV-129C Crystal Units	MI-19400-1
2	TMV-129G Crystal Units	MI-19450-A
1	Monitoring Diode	MI-19051
1	Set of Tubes	MI-19003-A
1	Vestigial Side Band Filter	MI-19114
1	Touchup Kit	MI-28153
2	Instruction Books	IB-36053

Available Accessories

Input and Monitoring Equipment	MI-19203
Antenna Equipment	On application
RF Load and Wattmeter	MI-19024-B

* Maximum variation below idealized rectified vestigial sideband response.

Television Transmitter, Type TT-500B



Features

- Economical installation—low tube costs.
- Video system with excellent frequency and phase response.
- Easily tuned—straightforward meter-tuned stages.
- Independent control circuits for visual and aural sections of transmitter.
- Air-cooled tubes used throughout.
- Equipment incorporates picture and waveform monitors in console.

Use

The RCA TT-500B is a television transmitter capable of providing a peak power output of 500 watts. It is designed for use in areas where a low-power transmitter will provide adequate signal strength for the desired coverage. The output of the TT-500B multipled by the power gains of the Super Turnstile and Super-Gain antennas will provide a strong signal in many areas.

Description

The Type TT-500B television transmitter will operate in any one of the channels 7-13 (174 mc-216 mc). The transmitter, which employs air-cooled tubes throughout, is housed in two identical cabinets, which can be installed bolted together as one unit 56 inches wide, or arranged on individual cabinets each 31 inches wide. One of these cabinets contains all the components of the visual transmitter, and the other cabinet contains those of the aural transmitter. Controls for both aural and visual sections of the transmitter are accessible through openings in the door of each cabinet.

Both the aural and visual sections of the Type TT-500B television transmitter employ four 4X150A tubes in parallel in the final stage. In the case of the visual section, these four tubes are grid-modulated by a pair of 807's. Relatively little power is required for complete modulation of these tubes. The transmitter provides a visual peak power of 500 watts.

In the visual section, a 6V6 crystal oscillator establishes the correct submultiple of the carrier frequency. This oscillator feeds a 6V6 tripler. The frequency is then doubled in the next stage which utilizes a Type 2E26, and tripled again by a 4-65A in the following stage. The 4-65A in turn feeds a 4X150A doubler which drives the four 4X150A's in parallel.

Modulation takes place in the final stage, and so all the preceding stages are narrow-band types providing optimum power amplification and ease of tuning. The frequency multiplying and driver stages are simply meter-tuned as straight class C amplifiers. The transmitter employs a sideband filter which suppresses the undesired sideband. This greatly simplifies the tuning of the transmitter, as compared to transmitters employing low-level modulation and internal sideband cutting. This is easily recognized, because in the latter type, each low-level modulated stage operates as a class B amplifier and each stage must be adjusted for proper band width to do its part of the sideband cutting.

In the FM aural channel, the carrier center frequency is provided by the direct FM exciter. This exciter is identical to that used in RCA FM transmitters. In order to provide the proper carrier frequency, the exciter output, which is in the range of 29-36 mc, is tripled in a 4-65A stage, then doubled in a 4X150A stage. This latter stage drives the four paralleled 4X150A's as the power amplifier.

TRANSMITTER CONSOLE

The control console for the transmitter is constructed as a monitoring center where the operator has complete fingertip control over operation of the transmitter. In the console are the gain controls for both visual and aural inputs to the transmitter, plus complete monitoring facilities for both visual and aural signals.

Power output of the television transmitter can be measured by means of a dummy load and wattmeter, which can be obtained with the transmitter. A "reflectometer" built into the visual section of the transmitter, and coupled to the transmission line, provides a means for continuous observation of transmitter output during broadcasts.

Specifications

	Aural	*Visual*
Type of Emission	A3	A5
Frequency Range (TT-500B)	Channels 7-13	Channels 7-13
Power Output (into transmission line)	250 watts	500 watts peak
RF Output Impedance	51.5 ohms	51.5 ohms
Carrier Frequency Stability	±.002%	±.002%
Modulation Capability	±40 kc.	90%
Method of Modulation	Reactance tube	Grid amplitude
Input Impedance	600 ohms	75 ohms
Input Voltage	+10 ±2 dbm	1 v. peak to peak
Frequency Response	Uniform ±1db 30 to 15,000 cycles	*2 db at 0.5 mc. 2 db at 1.25 mc. 2 db at 2. mc. 2 db at 3. mc. 3 db at 4. mc.
Maximum Audio Frequency Distortion	50 to 100 cycles 1.5% 100 to 7500 cycles 1.0% 7500 to 15000 cycles 1.5%	
Noise Level		
F-M Noise Below ±25 kc swing	60 db	
Amplitude Noise, r.m.s.		
Below Carrier	50 db	
Amplitude Variation Over One Frame of Picture		peak to peak less than 5% of the synchronizing peak level

Power Line Requirements

Transmitter:

Line	208/230 volts, 50/60 cycles, single phase
Power Consumption (approx.)	3000 watts
Power Factor (approx.)	0.85

Crystal Heaters:

Line	115 volts, 50/60 cycles, single phase
Power Consumption	56 watts

MECHANICAL SPECIFICATIONS

Transmitter:

Dimensions—

Overall Width	56"
Overall Height	84"
Overall Depths (including door handles)	31 1/16"
Weight	5150 lbs. (approx.)
Finish	Two-tone umber gray with brushed chrome trim and fittings
Stock Identification	MI-19206-B

Tube Complement

VISUAL SECTION

Crystal Oscillator, 1 RCA 6V6-GT; Tripler, 1 RCA 6V6-GT; Doubler, 1 RCA 2E26; Tripler, 1 4-65A; Doubler, 1 4X150-A; Power Amplifier, 4 4X150-A; 1st Video Stage, 1 RCA 6AG7; 2nd Video Stage, 1 RCA 6AG7; Sync Expander, 1 RCA 6AG7; Sync Seperator, 1 RCA 6C4; Pulse Amplifier, 1 RCA 6CD; D-C Insertion Diode, 1 RCA 6AL5; Monitor Amplifier, 1 RCA 6AG7; Modulators, 2 RCA 807; Power Amplifier Rectifier, 2 RCA 8008; Reflectometer Diode, 1 RCA 6AL5; Low Voltage Rectifier, 2 RCA 5U4G; Voltage Regulator, 2 RCA 6AS7G.

AURAL SECTION

FM Exciter

Voltage Regulator, 1 RCA 6SL7; Voltage Regulator, 1 RCA OA2; Bias Regulator, 2 RCA OA2; Crystal Oscillator, 1 RCA 6SH7; Crystal Frequency Divider, 1 RCA 6AC7; Modulated Oscillator, 1 RCA 6V6; Modulators, 2 RCA 6V6; 1st Buffer-Multiplier, 1 RCA 6V6; 2nd Buffer-Multiplier, 1 RCA 2E26; Amplifier, 1 RCA 2E26; 1st Frequency Dividor, 1 RCA 6AC7; 2nd Frequency Divider, 1 RCA 6AC7; 3rd Frequency Divider, 1 RCA 6AC7; 4th Frequency Divider, 1 RCA 6AC7; Motor Drivers, 4 RCA 1614; Cathode Ray Indicator, 1 RCA 2BP1; Low Voltage Rectifier, 2 RCA 5U4G; High Voltage Rectifier, 1 RCA 5U4G; Voltage Regulator, 1 RCA VR105; Voltage Regulator, 2 RCA VR150.

FM AMPLIFIER

Tripler, 1 4-65A; Doubler, 1 4X150A; Power Amplifier, 4 4X150A; High Voltage Rectifier, 2 RCA 8008.

Equipment Supplied

1	Aural Transmitter	MI-19005-B
1	Visual Transmitter	MI-19006-B
1	Control Console	MI-19266
1	Set of Installation Accessories	MI-19129
1	Installation Kit	MI-19132
2	TMV-129C Crystal Units	MI-19400-1
2	TMV-129G Crystal Units	MI-19450-A
1	Set of Tubes	MI-19003-B
1	Vestigial Side Band Filter	MI-19114
1	Monitoring Diode	MI-19051
1	Touchup Kit	MI-28153
2	Instruction Books	IB-36054

Available Accessories

Input and Monitoring Equipment	MI-19203
Antenna Equipment	On application
Dummy Load	MI-19024-B

* Maximum variation below idealized rectified vestigial sideband response.

Audio/Video Switching Console, Type TTC-3A

Features

- Provides central position for TV program control at transmitter location.
- Provides for remote control of film projectors and automatic slide projectors.
- Accommodates 5 video and 5 audio inputs.
- Video preview and audio monitoring.
- Remote control for one stabilizing amplifier.
- A matching item in RCA's Universal transmitter control console series.

Uses

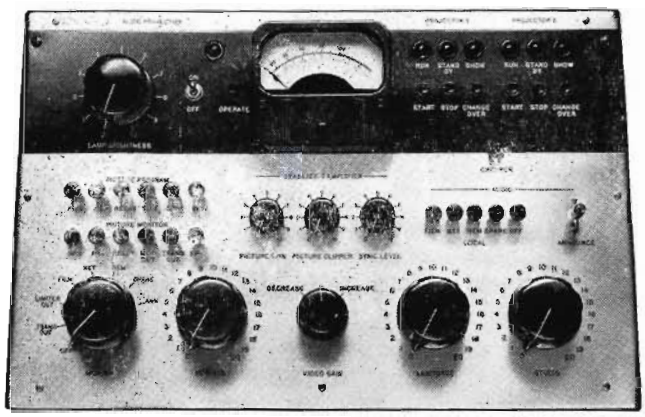
Audio/Video Switching Console, Type TTC-3A consists of a switching turret, desk section and relay/lamp power supply. When used with master monitor and film camera control, the unit provides centralized program-control and transmitter-control positions.

The TTC-3A contains switches and controls which permit the following major functions:

(1) "Start", "stop", "changeover" and "standby" of two 16mm TV film projectors.
(2) Operate an electrical slide-changing device and control the light intensity of a slide projector.
(3) Select and control volume of any one of four sources of sound.
(4) Switch and mix a separate announce circuit with any one of the four sources of sound.
(5) Select and control volume of seven audio monitoring circuits.
(6) Select any one of five video program circuits for feeding the transmitter.
(7) Select any one of six video monitoring circuits.
(8) Operate "chopper" to indicate percentage of picture modulation.
(9) Picture gain control of transmitter input.

Description

The TTC-3A is an all metal unit with flush sides that permit adjacent installation of a Type TM-5B Master Monitor and TK-20A Film Camera Control. The control panel is hinged providing easy access to components mounted on the rear of the panel. Front and rear panels of the desk section are removable providing access to all terminal blocks and the relay power supply.



Picture gain, picture clipper and sync level controls are extension controls for remote operation of the RCA TA-5C Stabilizing Amplifier. The video gain control remotely controls the video gain fader in the transmitter.

The design of the system is based upon use of a standard RMA signal level being delivered to it at all times. The minimum usable signal level at the program switches is the RMA recommended minimum of 1.5 volts.

Specifications

POWER REQUIREMENTS

Relay and Lamp Power Supply—105/125 volts, 50/60 cycle, 34 watts

Slide Projector Lamp Supply—105/125 volts, 50/60 cycle, 100 watts (for TP-9A Multiplexer Unit)

IMPEDANCE

4 Sound Program Input Circuits—600 ohms (+14 dbm)

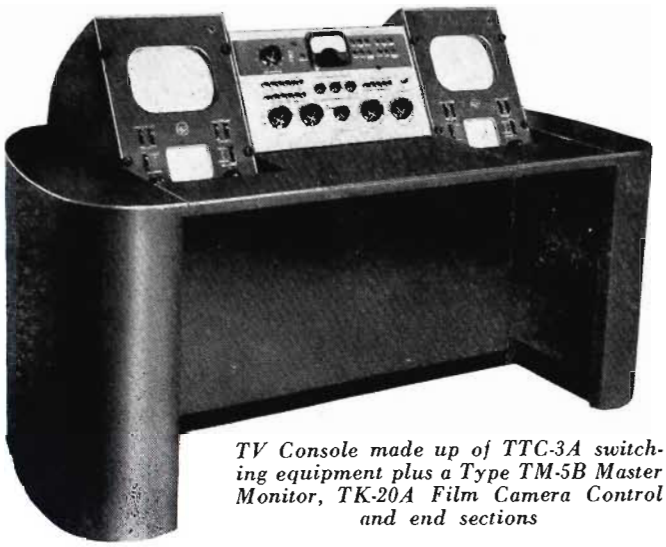
1 Announce Input Circuit—600 ohms (+14 dbm)

Sound Output Circuit—600 ohms (−20 dbm, L.B.) with 86B Amplifier in circuit (−30 dbm, H.B.)

Modulation Monitor Output—600 ohms 0 dbm @ 100% mod. @ 100% mod.

Picture Program Input (5)—75 ohms unbalanced (1.5 to 2.0 volts)

Picture Monitor Input (6)—75 ohms unbalanced. Three provided with level equalizer controls



TV Console made up of TTC-3A switching equipment plus a Type TM-5B Master Monitor, TK-20A Film Camera Control and end sections

VOLUME CONTROLS

Picture Gain——Switch rotary type SPDT momentary contact

Sound Gain——600/600 ohms 20 steps, 2 db per step, 6 db insertion loss balanced ladder

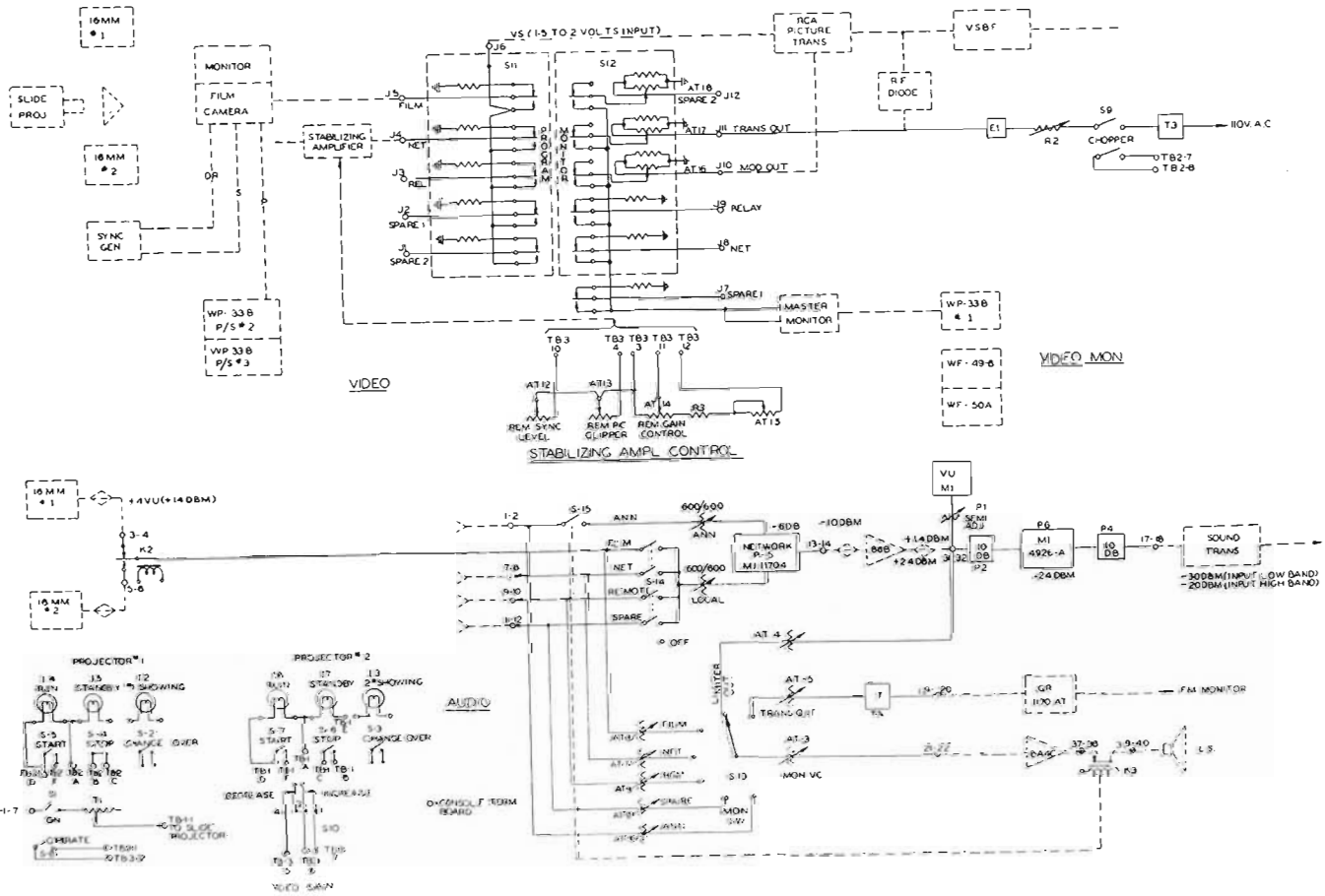
VU Attenuator——Semi-adjustable; +4 to +40 VU

Sound Monitor Gain——10,000/600 ohms continuously variable

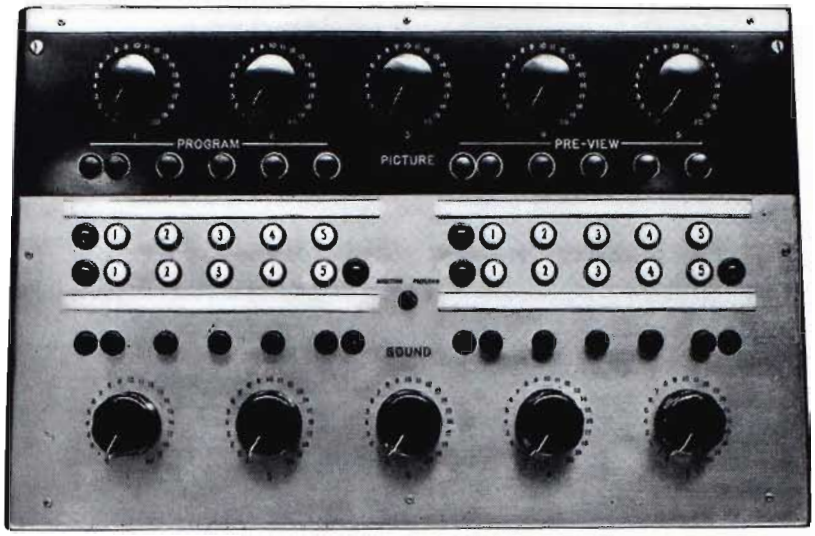
MECHANICAL SPECIFICATIONS

Width Overall	19″
Depth	36″
Height Overall	39″
Weight	290 lbs.
Stock Identification	MI-19316-A

Block Diagram of TTC-3A Switching System (auxiliary equipment in dotted lines)



Audio/Video Switching Turret, Type MI-19063



Features

- Attractively styled turret matches TV transmitter control consoles.
- Provides a program control position at the transmitter location.
- Centralizes program controls at the transmitter control position.
- 5 video and 5 audio inputs with preview and audition provisions.

Uses

Switching Turret, Type MI-19063, is an attractively styled audio and video switching turret designed for use in conjunction with RCA television transmitter consoles. The turret is particularly useful in installations where the transmitter location is remote from the studio. Transmitter input switching required during certain hours can be performed at this position, thus freeing studio control facilities for shut down or rehearsals. The turret is also useful for installations where program sources such as relay, network, and film are available at the transmitter location, and can be more conveniently previewed and switched to the transmitter at this location.

The Switching Turret will permit instantaneous switching of any of five sources of picture signal and five sources of sound signal to the input of the TV transmitter. The level of these signals as well as the ratio of picture and sync components are always under control of the operator. The turret utilizes the sound monitor amplifier and VU meter installed in RCA TV transmitter consoles. Video preview is provided by either the transmitter control monitor, which is also a part of the standard transmitter console, or a separate master monitor mounted in a similar desk section.

Description

The identification MI-19063 consists of the turret only. It is designed for mounting on a desk section (MI-28401-1) and to work into a TA-1A Distribution Amplifier which can be mounted in the desk. Angles for mounting the amplifier are furnished with the turret. The available desk section matches RCA TV transmitter consoles and can be permanently installed adjacent to the transmitter control section.

All switching is accomplished by push-button switches arranged so that the normally associated picture and sound push buttons are one above the other and can be operated simultaneously with one hand. However, the switches are independent, thus sound and picture can be switched separately if desired.

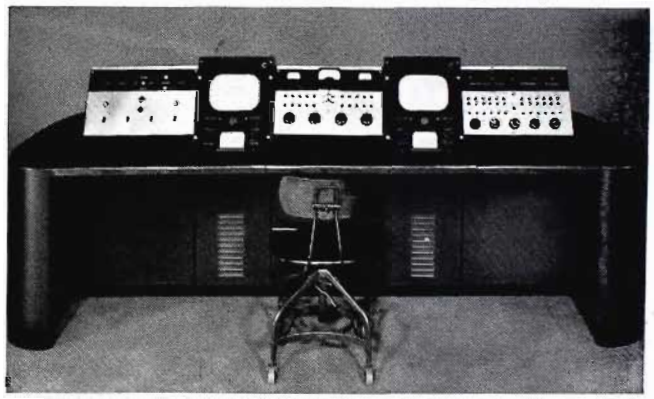
AUDIO CIRCUITS

Five audio push buttons are arranged so that any one of them can be operated to feed its signal to the output. The #5 position, intended for a microphone, can be mixed with the signal from #1, #2, #3 and #4, or used alone as desired. Each audio channel includes a 20-step gain control with 2 db steps tapered to infinity. OFF push buttons remove all signals from the output. Audio circuits are electrically interlocked giving the program circuit priority over audition circuits. Audio monitoring is normally performed through the associated transmitter control console.

VIDEO CIRCUITS

Five video circuits are arranged to receive signals from external preamplifiers (one for each program source), and select signals desired for preview and program uses. Video channels #1, #2 and #3 are designed for use with Stabilizing Amplifiers, Type TA-5B.

These channels are normally used for remotely generated composite signals, but they can be used to mix sync with local signals if necessary. Channels #4 and #5 are designed for use with mixer amplifiers, Type TA-10A, and can be used for local signals where sync and video are available separately. The preview and program video circuits are completely isolated. Two identical outputs are obtained from each preamplifier and connected to the turret through 75-ohm coaxial cable. In the turret, each cable is terminated by a special isolating network. This network permits switching of any of



Transmitter Console, Preview Monitor and Switching Turret (right sections)

the five video inputs to a Distribution Amplifier mounted in the desk, without the loss of high frequency response. One channel of the five-channel Distribution Amplifier supplies the preview monitor, two channels provide signals for the transmitter and transmitter input monitor, and the remaining two channels provide signals for the preview channels #4 and #5. Mixing of video signals is not possible, but locally generated signals can be faded to black. Five controls are mounted on the front panel to remotely control the gain of five external amplifiers. Eight additional controls, accessible by tilting the panel forward, control sync in the five channels as well as the "picture clipper" controls of stabilizing amplifiers used in channels #1, #2 and #3. Three remaining controls, accessible by removing the turret cover, provide for initial gain adjustment for the three stabilizing amplifiers.

Specifications

Number of Audio Channels	5
Audio Input and Output Impedances	600 ohm
Required Audio Input and Output Impedances	600 ohm
Required Audio Input Levels	−20 dbm at input terminals of turret
Number of Video Channels	5
Video Input and Output Impedance	75-ohm
Overall Dimensions:	
Turret	19″ wide, 10¾″ high, 19″ deep (approx.)
Turret Panel	19″ wide, 12½″ high (approx.)
Turret with Accessory Desk Section	19″ wide, 39″ high, 36″ deep (approx.)
Stock Identification	MI-19063

Available Accessories*

Basic Desk Section, Type MI-28401-1

Distribution Amplifier, Type TA-1A

Audio Amplifier, Types BA-13A, BA-1A and BA-2C

Equalizer, MI-26313

Stabilizing Amplifiers, Type TA-5B

Mixer Amplifiers, Type TA-10A

Power Supplies, Types WP-33B, 580-C

Signal Light Relays for External Use, Type MI-11702

Speaker Interlock Relays, Type MI-11703-A

Relay Power Supply (12 v. 1 A.) Type MI-11303

Cables of Specified Length: (allow 4 feet for connections inside turret)

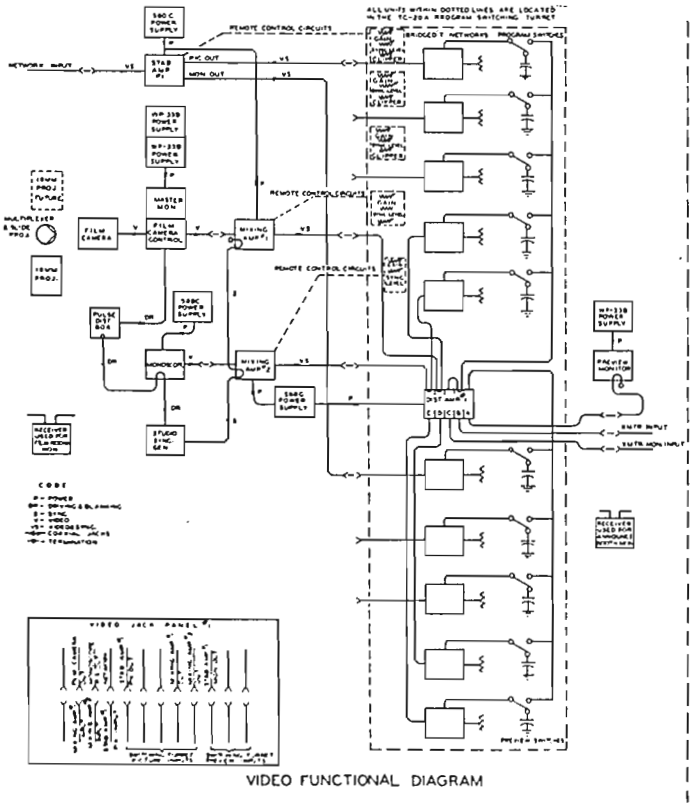
Video and Sync, 75-ohm Coax RG11/U, Type MI-83

Power to Master Monitor, 8 cond. (5 required), Type MI-82

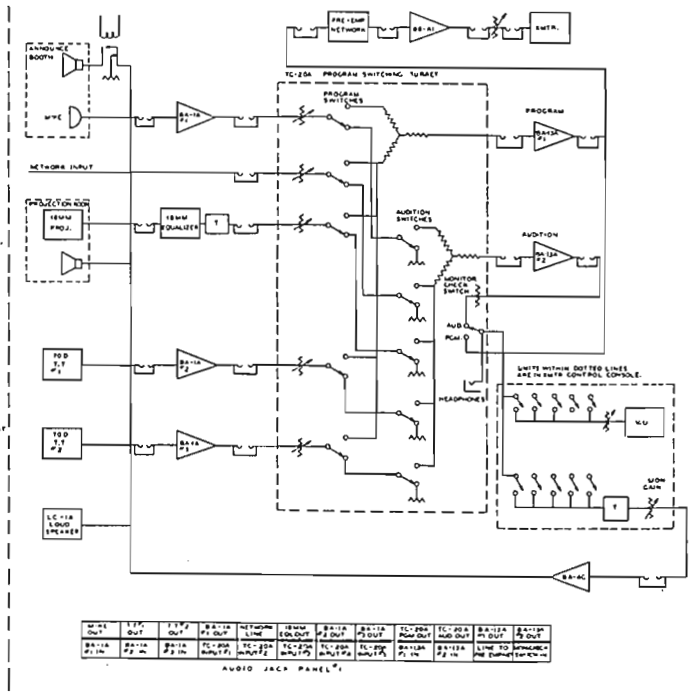
Power to Distribution Amplifier, 4 cond., Type MI-51

Audio and Signal Circuits, #20 or #22 stranded, twisted pair, shielded, Types MI-33, MI-34, MI-49 or MI-63A

* Accessory requirements depend upon circuit arrangement and layout. See block diagram for a typical layout utilizing the five audio and five video channels of the turret.



VIDEO FUNCTIONAL DIAGRAM



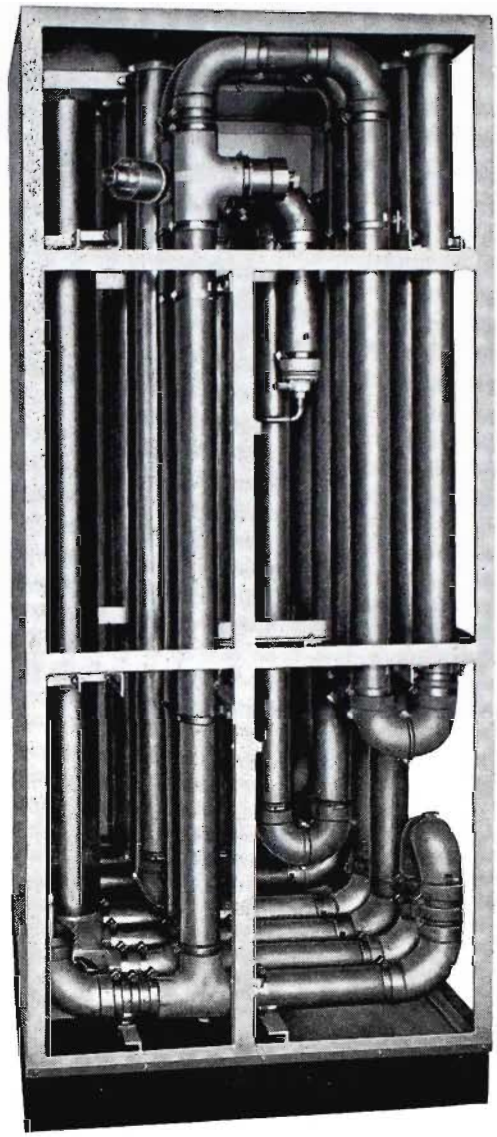
AUDIO FUNCTIONAL DIAGRAM

Block diagram of typical installation using five program sources. Amplifying equipment is shown with power supplies indicated where needed.

Vestigial Side Band Filter, MI-19104

Features

- No adjustments.
- Low insertion loss.
- Constant impedance input over entire double sideband.
- Completely enclosed to prevent tampering and admission of dust.
- Insurance against adjacent channel interference.



Description

The sideband filter is a device which is connected directly to the output of the television visual transmitter to absorb the relatively small amount of lower sideband energy falling outside of the assigned television channel. Use of a sideband filter has several advantages: first, the tedious adjustment of tuned radio frequency amplifiers needed for the rejection of the sideband when low level modulation is employed is eliminated; second, the sideband filter has a constant impedance input so that the process of sideband elimination is accomplished without a detrimental effect on the picture quality; and third, the high level modulation system used in the transmitter gives the visual transmitter a better overall linearity.

Electrically, the sideband filter is a combination of two M-derived filters. Since filter components of the common coil and condenser construction would be difficult to manufacture and uneconomical to use because of the currents, voltages and reactances involved, the sideband filter has been designed, using low loss coaxial transmission line elements. The undesired sidebands are passed through one of the filter units into a properly terminated transmission line that effectively eliminates reflections of the lower sidebands. The desired signals are passed through the other filter unit and a notch filter. The notch filter is incorporated in the design to give positive insurance against interference with the sound channel of the next lower television channel. This notch filter is a system of resonant coaxial transmission line elements that allows the absorption of a single frequency in a second terminated coaxial transmission line while the desired television signals are not effected.

Since the filter is completely assembled at the factory, all tuning adjustments are factory made. It is contained in a completely enclosed metal cabinet finished in umber-gray and styled to match the associated television transmitter. The sideband filter is designed to stand in a vertical position near the visual transmitter, with a connecting transmission line preferably not more than 10 feet in length. The transmission line connecting the filter to the visual transmitter may leave the filter through the top or bottom or on one side. The output line passes through the top of the unit. The only other connections are with the station water-cooling supply and the visual transmitter interlock circuit.

Vestigial sideband filter, MI-19104-A, covers channels 2 to 6 inclusive; and vestigial sideband filter, MI-19104-B covers channels 7 to 13 inclusive. Each unit is tuned for the desired specific channel at the factory.

Specifications

Dimensions

Height*	84"
Width	36"
Depth	42"
Weight	1400 lbs.
Finish	Two-tone umber gray

Water connections (connected to transmitter water cooling system)

"In" union for ½ nominal dia. copper water tubing
"Out" union for ½ nominal dia. copper water tubing

Electrical Connections — Transmitter interlock of circuit

Radio Frequency Connections

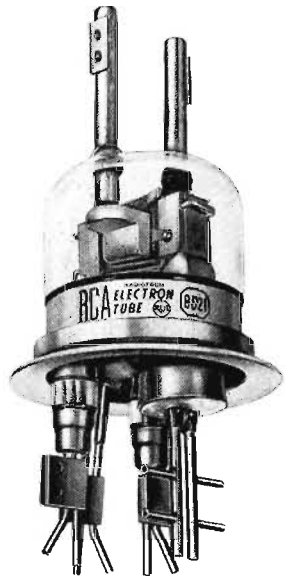
Input Impedance	72 ohms, 3⅛" coaxial line
Output Impedance	72 ohms, 3⅛" coaxial line

* Height of sideband filter with base taken off for shipment is 80".

RCA Tubes for Television

There's an RCA tube for practically every type of television requirement . . . power tubes . . . camera tubes . . . monitor tubes . . . flying-spot scanner . . . tubes for film recording. And you can buy RCA tubes with the assurance that you are getting the world's finest!

Listed below are only a few of the RCA Tubes designed specifically for television broadcasting.



RCA 5820

Image Orthicon. RCA-designed for outside pickup, also suitable for studio use. Has high sensitivity, spectral response close to that of the human eye, stability of performance, 500-line resolution.

RCA 8D21

The RCA push-pull power tetrode used in RCA TT-5A 5-kw television transmitters. Offers important operating benefits by utilizing advanced principles of screening, cooling, and electron optics.

RCA 1850-A

RCA Iconoscope universally used for television film and slide pickup.

RCA 5WP11

Projection-type Kinescope used for photographic transcribing of television broadcasts on motion picture film. Screen incorporates special spectral characteristics required for film recording.

RCA 5WP15

Five inch projection-type Kinescope specially designed for Flying-Spot Scanner television service.

RCA 1816-P4

Kinescope with metal-backed screen used exclusively for television station picture monitoring.

RCA 1699

Custom-Built Monoscope similar to RCA-2F21 except that its test pattern is individually styled to the customer's requirements. Provides TV station identification.

RCA 2F21

Standard "Indian-Head" test pattern Monoscope for routine check of television transmitters and receivers.

RCA 715-C

Pulse amplifier tetrode for use in TV pulsed-light projectors to eliminate the need for mechanical shutters.

For technical data, prices, or delivery on RCA Tubes for Television—or any RCA Electron Tube—phone your local RCA Tube Distributor, or write RCA Tube Department, Harrison, N. J.

Crystal Unit, Type TMV-129B

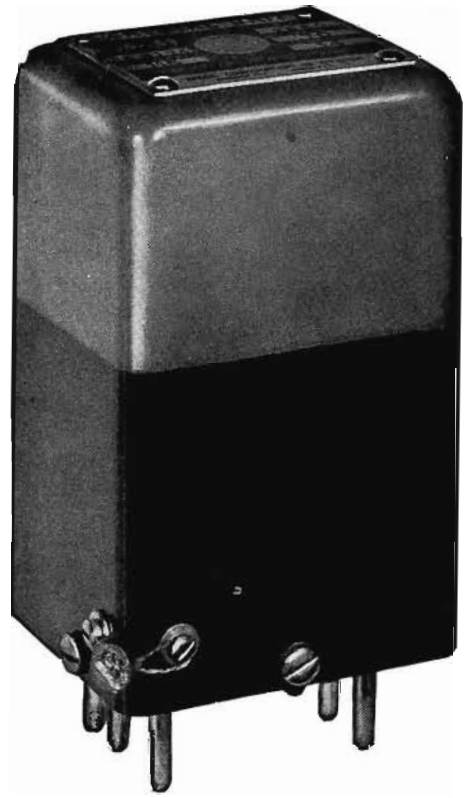
Uses

The RCA type TMV-129B crystal unit was designed especially for stable frequency control of transmitters operating in the AM broadcast band. However, in addition to covering the band from 550 to 1600 kc, these precision units are also available for frequencies as low as 325 kc and as high as 3000 kc. The units may be employed in any type of equipment, within the applicable frequency range, where maximum frequency precision and high crystal activity are essential. The TMV-129B holder has six external contact pins in a polarized arrangement.

Specifications

Frequency Range—325 to 3000 kc
Operating Oven Temperature +60° C. (temperature controlled)
Ambient Temperature Range—−20° C. to +55° C.
Frequency deviation—±10 cycles maximum (normally within ±2 cycles)
Heater Power—14 watts from a 110 volt a-c or d-c source
Stock Identification:
Type TMV-129B—MI-7467
Quartz Plate Size—1.000″ x .938″, predimensioned

Crystal Unit, Type TMV-129C



Uses

The RCA type TMV-129C crystal unit was designed for precise frequency control at frequencies above the AM broadcast band. By use of carefully processed AT cut quartz plates designed to operate at the third harmonic mode, the TMV-129C may be used at frequencies as high as 20 mc. The unit was designed primarily for high frequency transmitters where maximum frequency stability is required. These crystals may also be employed in certain types of receivers for precision fixed frequency reception.

The TMV-129C holder resembles the TMV-129B type. It has six external contact pins in a polarized arrangement.

Specifications

Frequency Range—2,000-20,000 kc
Ambient Temperature Range—−20° C. to +55° C.
Operating Oven Temperature—+60° C. (other temperatures on special order)
Frequency Stability—±.005% or better
Heater Power—14 watts from 110 volt source, a-c or d-c
Stock Identification:
Type TMV-129C—MI-19400

Crystal Unit, Type TMV-129G

Uses

The RCA type TMV-129G crystal unit was designed to provide the optimum of frequency stability in the low frequency range at approximately 100 kc. This unit is widely employed in frequency modulation and television transmitters in which the oscillators normally operate at these low frequencies. Although optimum performance is realized at frequencies between 85 and 125 kc, this unit may be employed with very satisfactory performance as high as 350 kc. The frequency stability approaches that of a primary frequency standard and under normal operating conditions the maximum frequency variation will not exceed one or two cycles.

The TMV-129G holder resembles the TMV-129B type. It has six external contact pins in a polarized arrangement.

Specifications

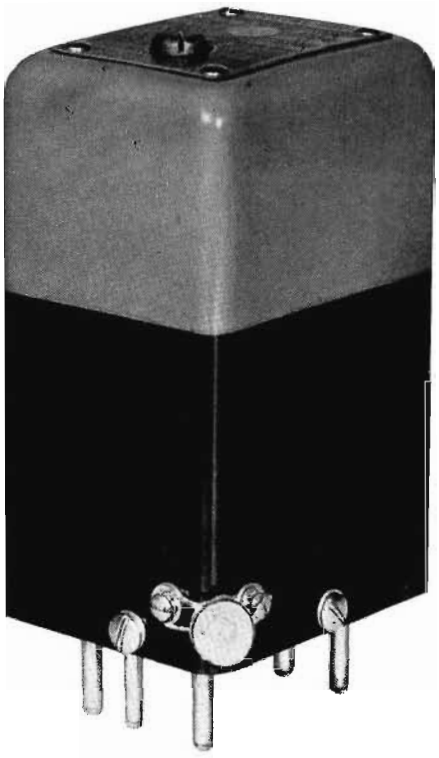
Frequency Range—70 kc to 350 kc using either DT or CT cut quartz plates
Ambient Temperature Range—−10° C. to +65° C.
Operating Temperature—+70° C.
Frequency Stability—±2 cycles
Frequency Calibration—Zero beat in customer's circuit with trimmer capacitor
Heater Power—14 watts from 110 volt source, a-c or d-c
Stock Identification:
Type TMV-129G—MI-19450-A

Crystal Unit, Type TMV-129F

Uses

The RCA TMV-129F crystal unit was designed for use in such applications as international broadcast transmitters or medium frequency communications equipment. It is available at frequencies of 1.8 to 8.5 mc. A feature of the TMV-129F is the provision for slight adjustment of the frequency in the vicinity of the nominal frequency. This is accomplished by rotating a shaft projecting through the unit cover. A micrometer scale on the cover permits exact setting of the adjustment shaft.

The TMV-12F holder has six external contact pins in a polarized arrangement. Two of the pins are provided for contact with the 110 volt source to energize the heater, and the pin located between these two may be used as a pilot lamp indicator of thermostat action. At the other side of the base, two pins are connected to the two crystal electrodes while the third pin should be connected to ground since it is internally connected to the aluminum shields.



Specifications

Frequency Range	1.8 to 8.5 mc
Ambient Temperature Range	−20° C. to +55° C.
Frequency Adjustment	AT cut plates, nominal ±.53% BT cut plates, nominal ±.01%
Stock Identification:	
Type TMV-129F	MI-19400-A
Frequency Stability	±.005% or better
Heater Power	14 watts from 110 volt source, a-c or d-c
Crystal Mounting	Pressure air gap
Weight	12½ oz.

Crystal Unit, Type RC-2A, B, C

Uses

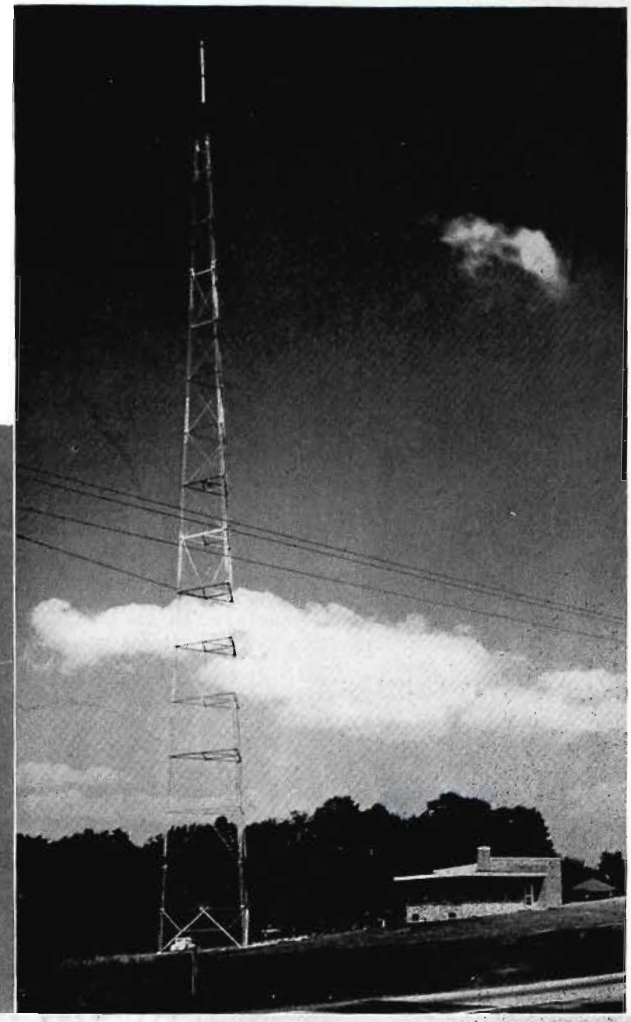
The RCA type RCA-2A, B, and C crystals are small compact units especially designed for use in portable and mobile equipment operating in the frequency range of 1000 to 20,000 kc. Because of the small size and light weight of the RC-2 series crystal units, they have been widely used in both commercial and government transmitting equipment.

Specifications

Dimensions	See diagram
Frequency Range:	
RC-2A	2,600 kc to 15,000 kc
RC-2B	11,000 kc to 20,000 kc
RC-2C	1,000 kc to 3,000 kc
Temperature Range	0° C. to +60° C. minimum
Calibration Accuracy	±.01% or less
Temperature Coefficient	Less than 1.5 cy/mc/deg. C.
Crystal Blank Mounting:	
RC-2A	Pressure airgap
RC-2B	Pressure airgap, button
RC-2C	Fixed airgap
Mounting Position:	
RC-2A	Any
RC-2B	Any
RC-2C	Horizontal preferred

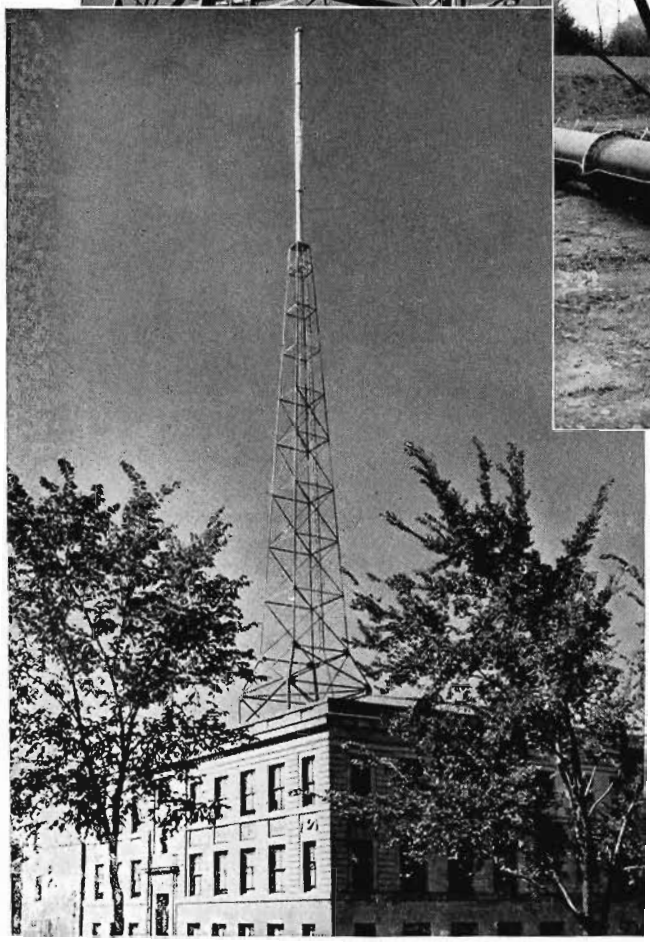
Crystal Type	*Crystal Cut*	*Frequency Range*	*Stock Identification*
RC-2A	AT Fundamental Mode	2,600 to 8,500 kc	MI-19463-3
	BT Fundamental Mode	4,000 to 15,000 kc	MI-19463-3
RC-2B	AT 3rd Harmonic Mode	11,000 to 20,000 kc	MI-19464-4
RC-2C	AT Fundamental Mode	1,000 to 3,000 kc	MI-19464-7

Tower and two-section Pylon at WSBA-FM, York, Pa.



Raising the four-section Pylon in one completely assembled unit at WJPG-FM, Green Bay, Wisc.

Inserting the transmission line harness into the two-section Pylon at WSBA-FM, York, Pa.



Four-section Pylon installation with supporting tower atop building at WSUI, Iowa City, Iowa.