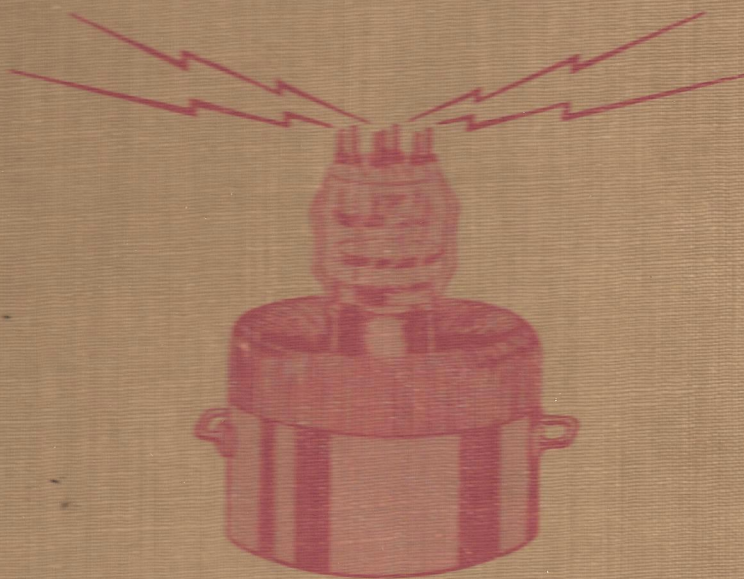


**GATES**



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**GENERAL CATALOG**





## *A Word of Introduction*

*The equipment listed in this catalog is among the most comprehensive ever offered to the broadcast, communications and associated industries. Gates has prepared this catalog both as an informative book and a buying guide. Though provided to list all major items of manufacture by Gates, this catalog also lists parts and complete equipments manufactured by other reputable companies that have entered into distributing arrangements with Gates. Almost without exception, every item listed is carried in stock at either the main Gates factory and warehouses at Quincy, Illinois, or our various factory warehouse branches.*

*Our field sales, service and engineering are international in scope. Field sales engineers travel all areas of the United States. In addition to our main sales and engineering offices in Quincy, Illinois, branch offices are in Washington, D. C., Atlanta and Houston. The Atlanta and Houston branches carry a generous inventory of capital equipment as well as service parts. Sales in Canada are handled exclusively by the Canadian Marconi Company with its branches in every major city in Canada. International sales are handled by the international department of the Gates Radio Company, located at 13 E. 40th Street in New York City.*

*Established in 1922 and nearing forty years of service, Gates is the senior member in the broadcasting fraternity of many fine manufacturing concerns. — Gates has consistently led in new and progressive designs. — Recognizing quality as of first importance, progressive engineering is backed by a strict manufacturing quality control in one of the world's most modern electronics factories.*

*Gates is a member of the Harris-Intertype Corporation family, world leader in the Graphic Arts field. In addition to the two large Gates factories in Quincy, Illinois, this family includes manufacturing plants in Brooklyn, Cleveland, Dayton, Los Angeles, Westerly, R. I., Slough, England and West Berlin, Germany.*

*If your need is in radio broadcasting, television broadcasting, communications or industrial electronics, we wholeheartedly invite your patronage. Everyone in the Gates organization will do his very best to justify the confidence placed in us.*

**GATES RADIO COMPANY**  
SUBSIDIARY OF HARRIS-INTERTYPE CORPORATION



# GATES OFFICES and FACTORIES



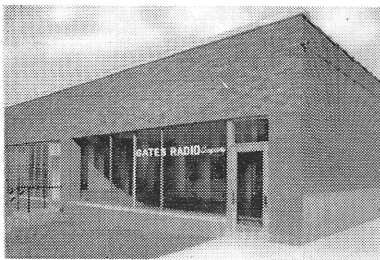
Gates Hampshire Street plant in Quincy, Illinois with 50,000 sq. ft. of manufacturing and administrative office space.



Quincy warehouse of Gates contains 30,000 sq. ft. and is the most strategically located building in Quincy in relation to air, rail and truck shipping.



Modern Broadway plant built by Gates in 1953 is located on a 7-acre tract and considered one of country's finest electronic manufacturing facilities.



Atlanta, Georgia stock carrying branch is located at 1133 Spring Street, N. W., telephone Trinity 6-0369.



Houston, Texas stock carrying branch is located at 2700 Polk Avenue, telephone Capitol 8-8536.

## WASHINGTON OFFICE

Complete sales engineering, across from FCC offices, Warner Building, 13th & E Streets, N. W., telephone Metropolitan 8-0522.

## THROUGHOUT CANADA

The Canadian Marconi Company, with main office in Montreal and branches in all principal Canadian cities. Telephone Atlantic 9441 in Montreal.

## INTERNATIONAL

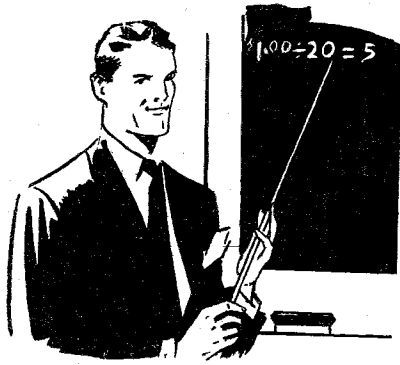
World-wide sales are conducted by the Gates International Division, 13 East 40th Street, New York City. Cable address ARLAB.

# GATES RADIO COMPANY, Quincy, Ill., U. S. A.

Telephone Baldwin 2-8202

A SUBSIDIARY OF HARRIS-INTERTYPE CORPORATION, CLEVELAND, OHIO





# Sales Policy and Terms

(in brief)

**GUARANTEE:** The Gates guarantee is one of the most liberal in the entire manufacturing industry, a copy of which will be gladly mailed on request. Products listed herein but not manufactured by Gates are subject to the maker's guarantee.

**PRICES:** Gates sells through its own world-wide sales organization. A one-price policy is maintained. This is the lowest price and any discounts, normally provided, have already been deducted. Every effort is made to purchase at lowest prices and pass these savings on to our customers. Federal Excise Taxes, except in isolated instances, do not apply to broadcasting and communications equipment. In some states and cities, so-called Use Taxes are imposed. Where any tax is imposed, this is additive to the price and is explained as a separate invoice item.

**CREDIT:** We solicit open account transactions at our regular net 30-day terms. In some instances of urgency and where credit has not been established, shipment will be made C. O. D. Gates also has an excellent time payment plan. Full information is obtainable on request. Credit is only extended within the United States (see export).

**SHIPPING:** Terms are F. O. B. Quincy, Illinois, except as otherwise noted in the price list. In some instances, to provide faster service, shipment may be made direct from a vendor's factory and in this case terms are F. O. B. vendor's factory.

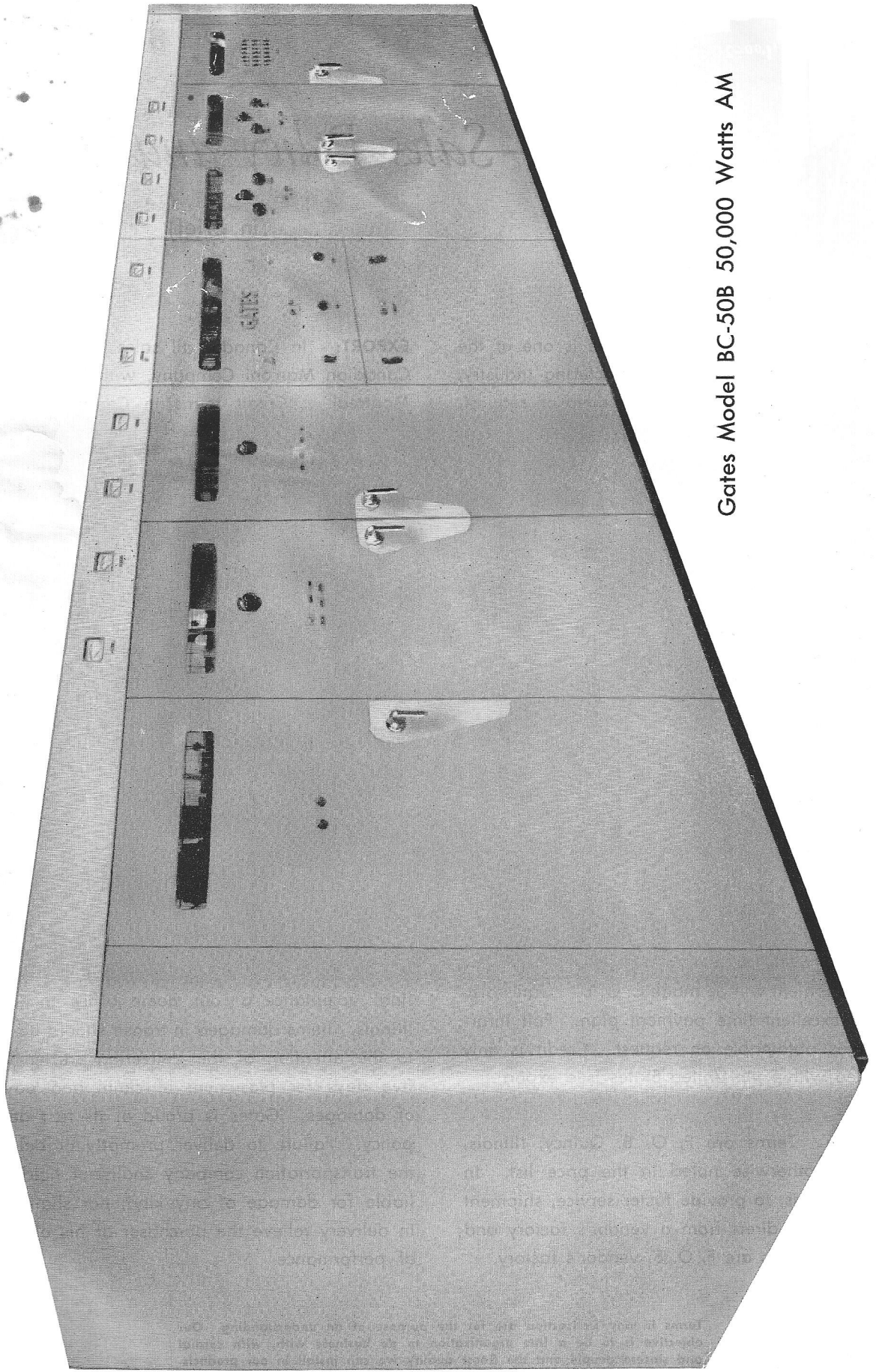
**EXPORT:** In Canada, all sales are through the Canadian Marconi Company, with head office in Montreal. Credit terms in Canada are those established by the Canadian Marconi Company. Overseas export sales are usually handled by the International Division, 13 East 40th Street, New York City, or Quincy, Illinois. Payment is either by irrevocable letter of credit or any approved and acceptable method to Gates. Terms are F. O. B. Quincy, Illinois. A small added charge is made for export packaging.

**MODIFICATION:** Gates reserves the right to modify any item in this catalog without notice where the modification improves the product. If alteration necessitates a price increase, Gates will notify the purchaser prior to shipment. Gates also reserves the right to withdraw any item, listed herein, from sale and without notice.

**OTHER CONDITIONS:** All orders are subject to final acceptance at our home office in Quincy, Illinois. Items damaged in transit should be called to the attention of the delivering carrier within five days for placement of claim and payment of damages. Gates is proud of its fast delivery policy. Failure to deliver promptly or delays of the transportation company shall not hold Gates liable for damage of any kind, nor shall delays in delivery relieve the purchaser of his obligation of performance.

Terms in any transaction are for the purpose of an understanding. Our objective is to be a fine organization to do business with, with cordial and sincere people and the finest quality we can install in our products.



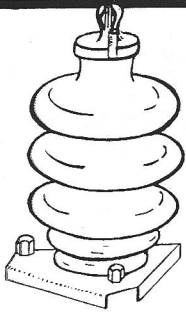


Gates Model BC-50B 50,000 Watts AM



**GATES**

**MASSIVE POWER**



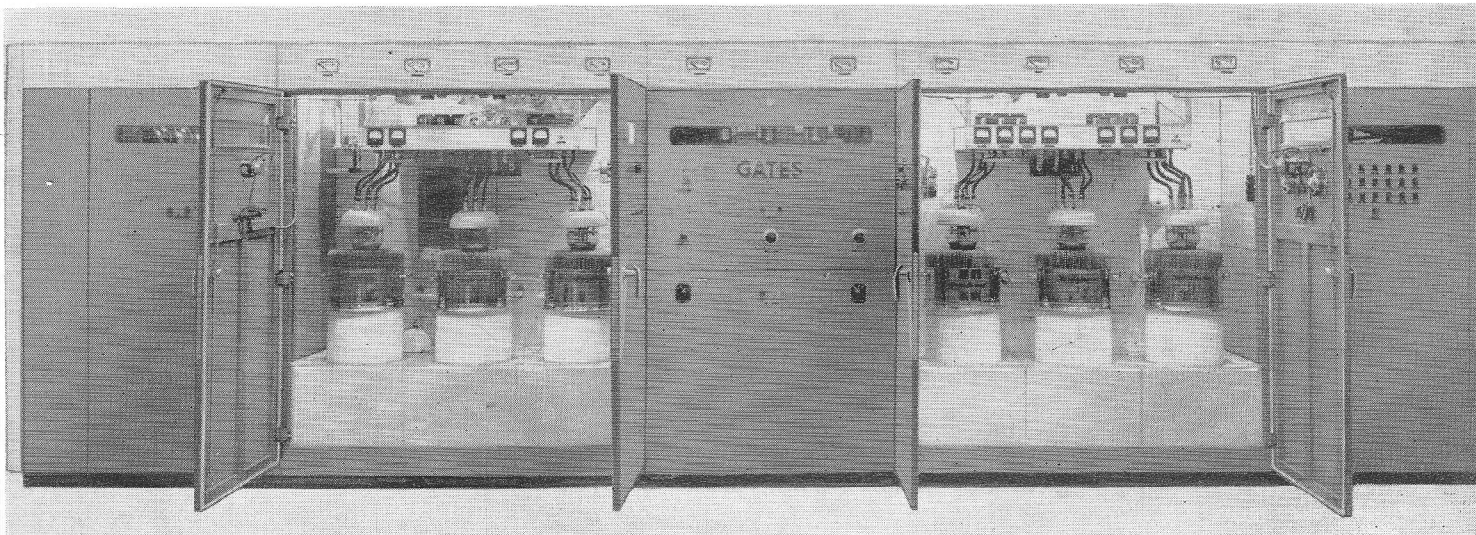
## **MODEL BC-50B 50,000 WATTS**

Because of the conservative approach in design, "massive power" accurately describes this newest of 50 kilowatt AM broadcast transmitters. No effort has been made to make BC-50B the smallest of its kind. Conversely, the generous size, roomy construction permits "massive power". Here is ample room for husky components and the feature every transmitter engineer cherishes, **walk in to service**.

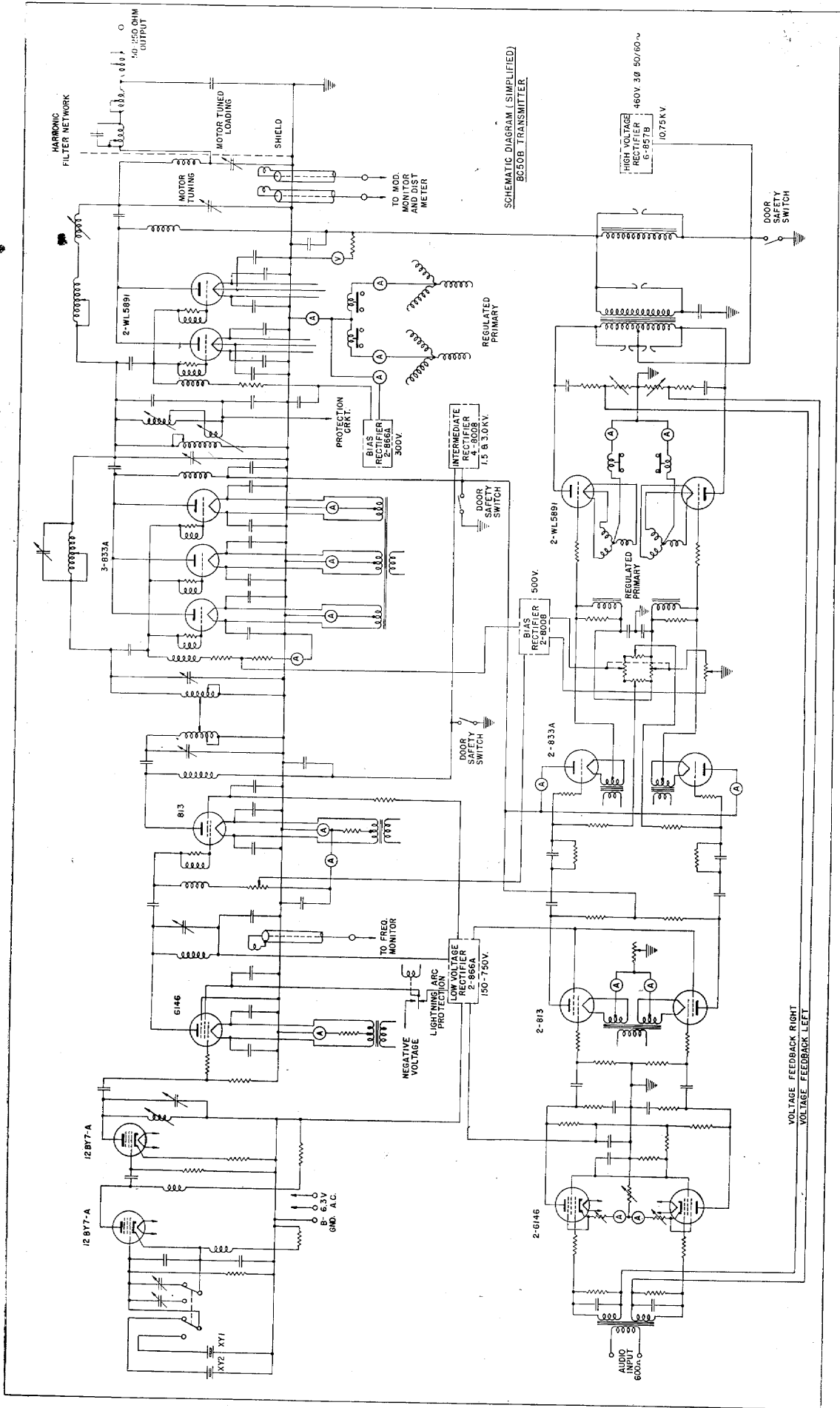
Outstanding is the 100,000 watt capabilities of both the power amplifier and modulator tube complement. This **loaf along** tube complement costs no more and means so much. — Longer tube life is indeed a cost savings that management will more than appreciate. Engineering will enjoy the promise of **on specifications performance** way beyond the normal tube life cycle of older designs.

In the Gates BC-50B "massive power" is a combine of 36 years of engineering and manufacturing experience, — a transmitter that exemplifies quality throughout.

(continued)







SCHEMATIC DIAGRAM (SIMPLIFIED)  
BC-50B TRANSMITTER

SCHEMATIC DIAGRAM OF BC-50B TRANSMITTER. EXTREME DETAIL HAS BEEN OMITTED FOR EASY CIRCUIT IDENTIFICATION.

**GATES**

## GENERAL INFORMATION

(Model BC-50B 50,000 Watts)

Five cubicles or enclosures comprise the main transmitter unit which is 22½' wide, 78" high and 64" deep. Front and back doors are provided for each cubicle. Walk-in-to-service even to mats on the floor and service lights, assures ease of maintenance. Transmitter is beautifully styled in two tones of medium gloss gray with hardware in chrome.

Air circulation is by simple under transmitter ducting. One large, slow speed squirrel cage blower supplies all cooling to each of the cubicles as well as the power tubes. Two small secondary blowers provide an air stream to the base of each rectifier tube.

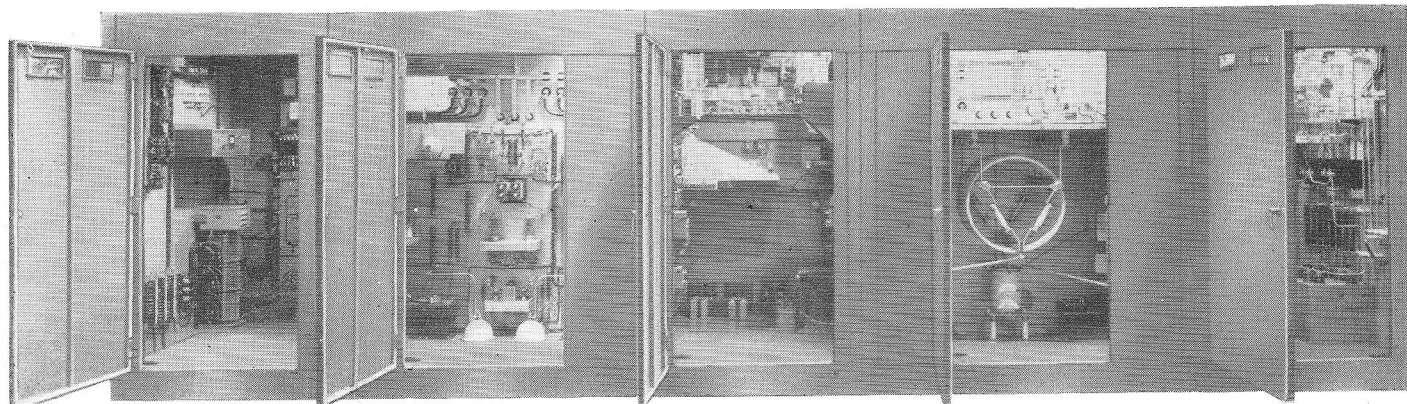
There are 5 radio frequency stages and 4 audio frequency stages. Power and modulator tubes are interchangeable. Vacuum type crystals are employed. Main primary voltage is 460 volts, 3-phase, which has been determined most readily available world-wide. Other primary voltages may be had where desired. There are 22 meters that measure every needed circuit including a filament hour meter. A separate primary contactor cabinet is supplied for secondary location such as near the utilities entrance or blower.

Six externally mounted, oil-filled transformer units include three plate transformers, filter reactor, modulation reactor and modulation transformer. These may be mounted either indoors or outdoors. — A spare tube socket for both PA and modulator allows almost instantaneous change by reason of inbuilt switch-over.

Electrically the Gates BC-50B has incorporated circuits very familiar to broadcasters, with today's modern engineering approach. RF harmonic reduction, lower distortion through both improved circuit and transformer design, construction for low air noise, use of vacuum type crystals and an ultra complete relay control system that permits unattended control — are just a few points where Gates engineers gave months of design attention.

In a field where illustrious names often appear, it becomes obvious that Gates must supply a "Fifty" that, wherever possible, must be ahead of all others. — We confidently feel that no finer 50,000 watt transmitter is available today and the sincerity of purpose by going the extra mile throughout the design could make Gates BC-50B **the best "Fifty"** available anywhere. Fully FCC approved, of course.

**MASSIVE POWER**





**MASSIVE POWER**



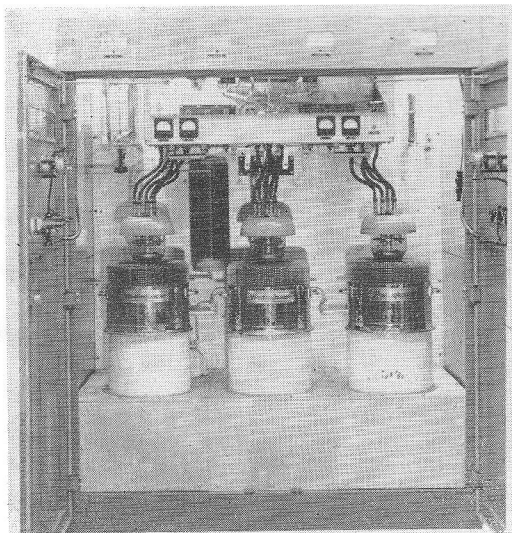
## BC-50B RADIO FREQUENCY SECTION

Six RF stages are headed with dual vacuum type crystals requiring no temperature oven or thermometer. Intermediate amplifiers are self-neutralized up to the trio of 833A driver amplifiers. The reliability and proven long life of 833A tubes is well known to all. — The final power amplifier is two 5891 tubes operating single ended. Actual FCC rating of a single 5891 tube is 50KW. The use of two tubes is to permit lower plate voltage and current to each tube to develop both long tube life and even more important, trouble-free operation throughout ultra-conservative design. The third tube, illustrated below, is the spare which may be inserted in the circuit in 10 seconds.

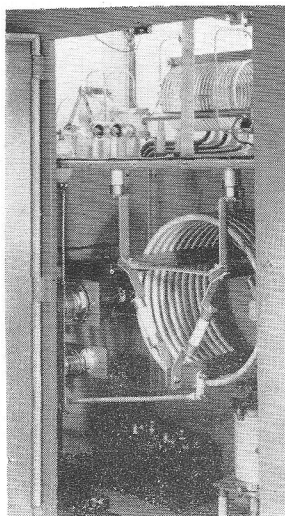
Complete attention has been paid to low harmonic radiation. An extensive Tee and harmonic network is part of the output system. The generous use of edgewise micalex insulated coils, even in lower power stages, signifies studiness and reliability. Illustrated below is the large silver plated tank inductor, a very necessary part in high output efficiency. In power stages, vacuum type capacitors predominate.

Metering is complete to every measurable circuit. Reaching every part in seconds has been a major design goal. **“Walk in to service”** is carried to the point of automatic service lights when the doors are opened and floor mats provided. — Some may say that Gates engineers have gone too far in massive design. The rebuttal is unquestioned superiority of quality.

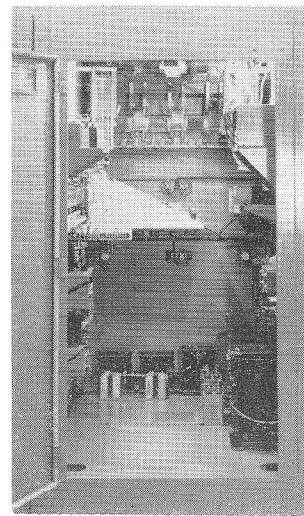
“Massive Power” output tube complement is reached from the front. The third tube is a spare, ready to insert in 10 seconds.



Tank and output coupling system are partially viewed in this rear illustration of the radio frequency section.



This fine view illustrates all power RF stages including the trio of 833A drivers. Note the roomy design. Easy to service?



**GATES**

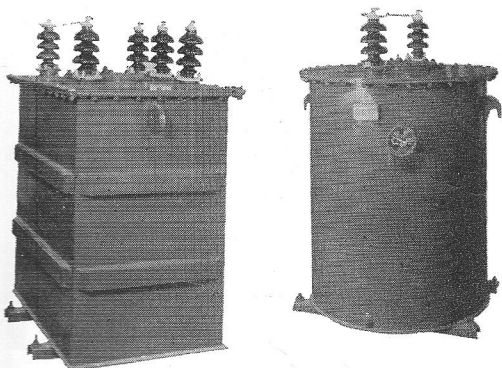
## BC-50B MODULATOR SECTION

What is quite as desirable as an abundance of modulator power? Ease of modulation automatically results in low carrier shift, better regulation and not strangely — a smoother sounding audio quality. Here again the 100KW capabilities of the modulator tubes provide the big **performance plus**. Here is high level Class B modulation in the finest form where transformer design, cathode follower audio drive and a stable feedback system develop that smoothness in quality that is the result of low distortion and wide response.

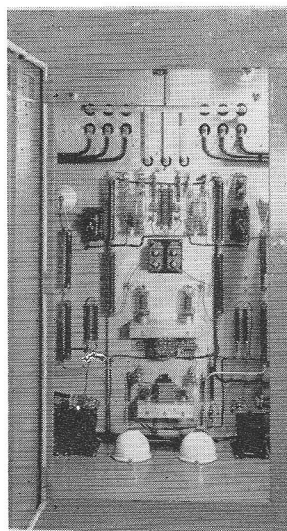
There are 4 push-pull audio stages. All audio tube types are identical to those found in the radio frequency section. This interchangeability adds to utility and savings. — Metering leaves no important circuit untouched. Fifteen decibels of feedback is employed to improve the already excellent performance without feedback. Twin 833A audio drivers cathode couple to the modulator grids. Elimination of the driver transformer and coupling capacitors, because of cathode follower, reduces distortion and adds to reliability.

Modulation transformer and reactor have been specially designed. Phase shift at higher frequencies has been reduced to the point that high frequency distortion is low distortion too. Made for Gates by the manufacturer that supplied the transformers for Boulder Dam, nothing has been left undone to give broadcasters the quality that defines "**massive power**".

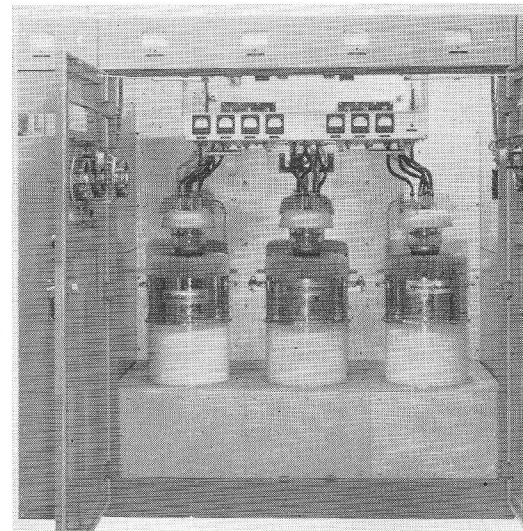
Modulation and reactor transformers are oil-filled and double impregnated, then mounted into gasket sealed steel tanks for indoor or outdoor service.



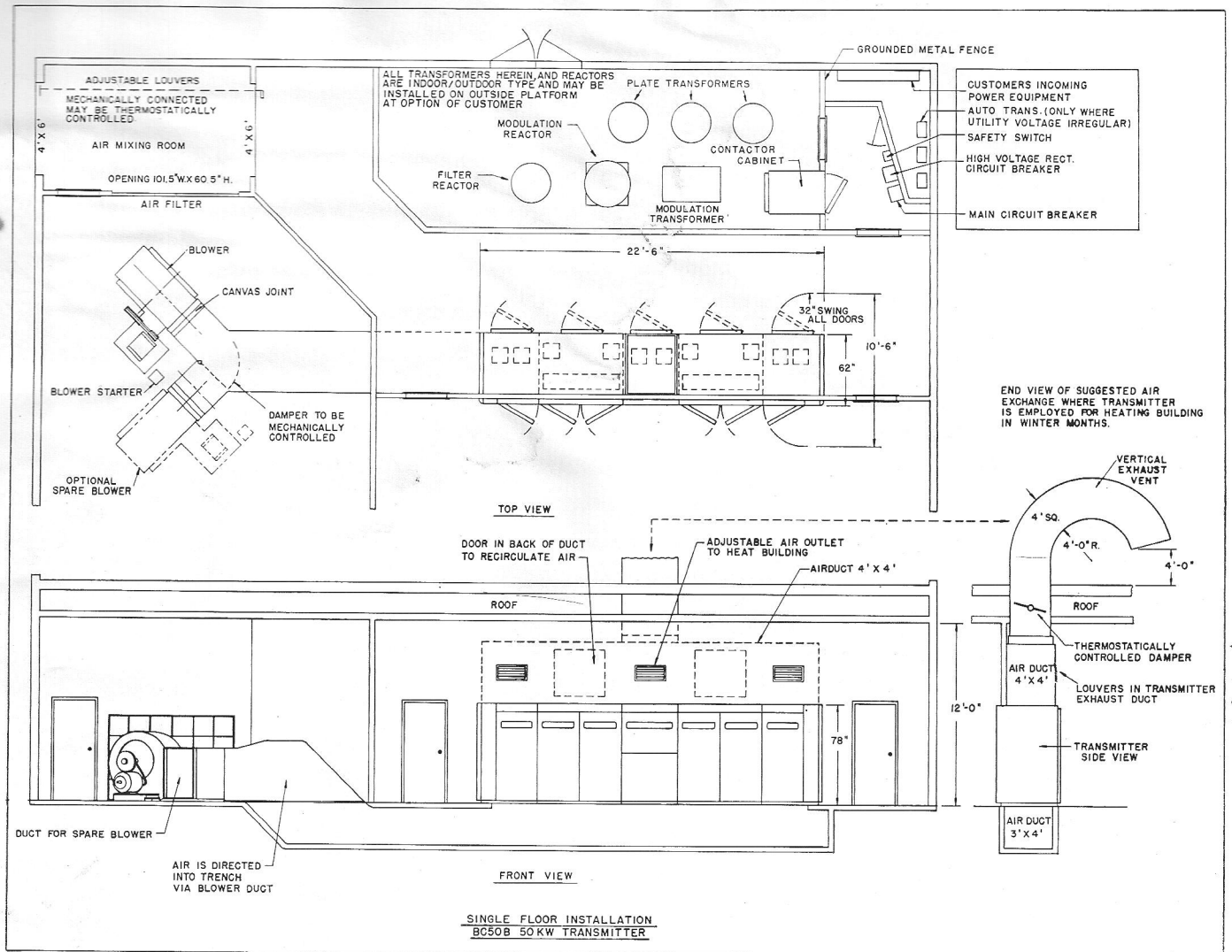
Rear view audio section showing 833A drivers, intermediate power supply and feedback system.



Front of modulator section. Third modulator is optional. Note wide, unobstructed access doors and the 11 meters in section alone.



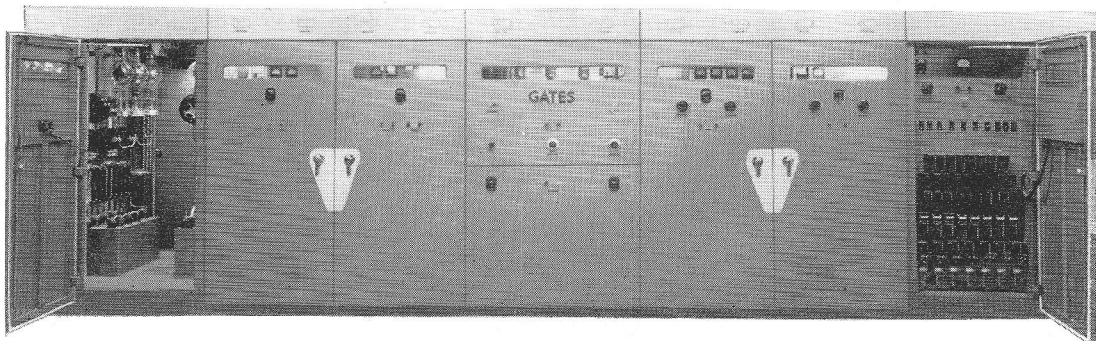




## Model BC-50B

Installation of the 50,000 watt equipment may be made in several excellent and by no means complicated procedures. Drawings on this and the opposite page are suggestions and many alternates are very acceptable.

A one-floor plan sketch is shown above. The transformers and reactors are shown indoors but this space may be conserved by placing them outdoors as these units are of the outdoor type as well. A typical outdoor arrangement is shown at the top of next page. In this arrangement, the main cooling blower



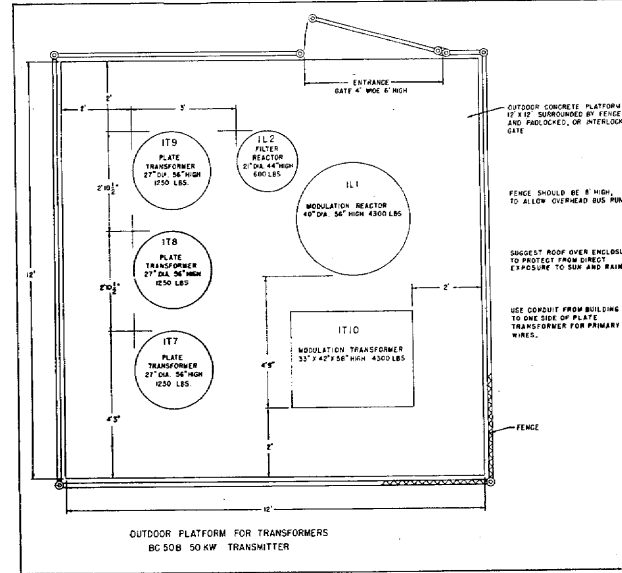
# GATES

Model BC-50

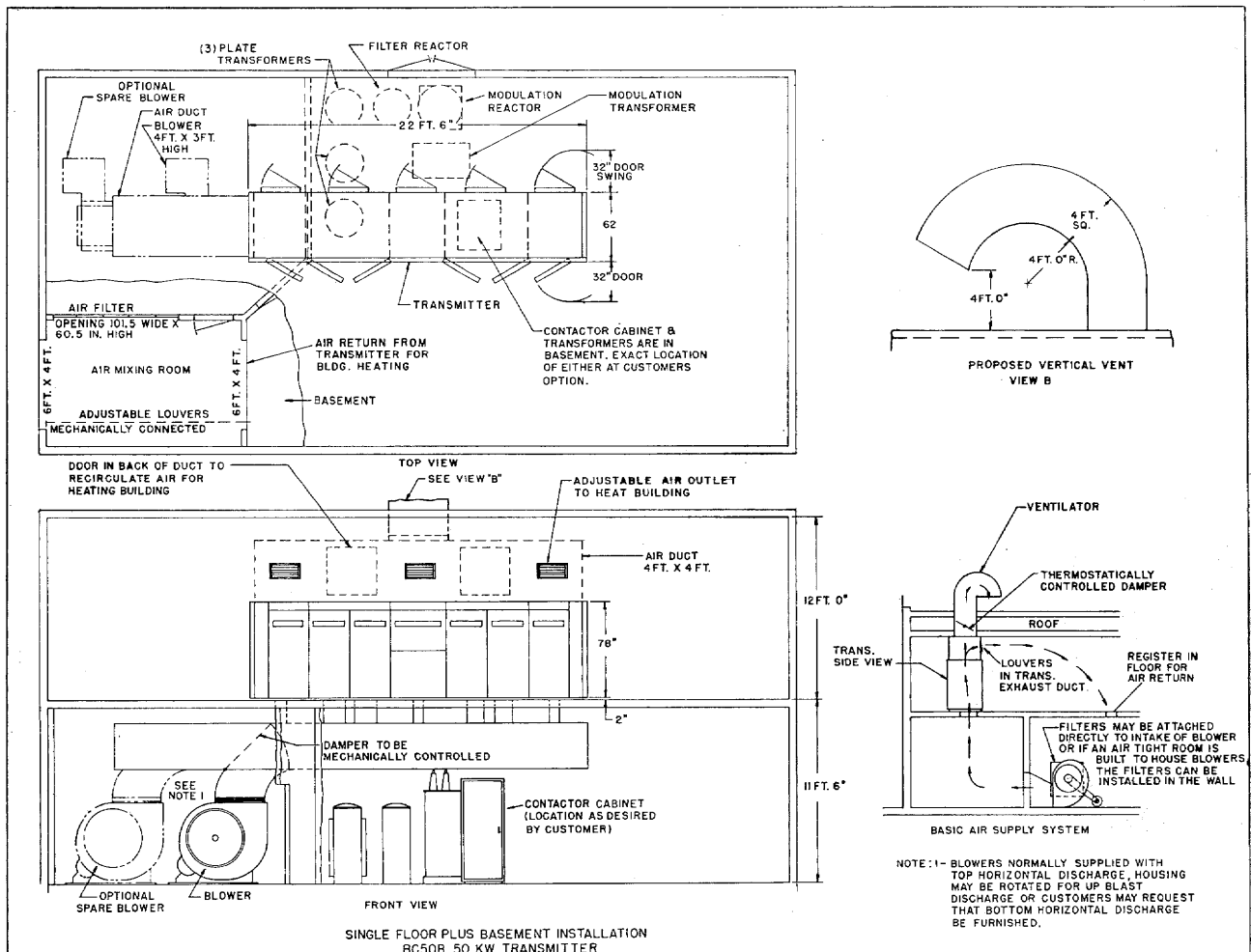
is often placed in a separate room, though by no means mandatory. — Adjustable air outlets have been shown. In winter months the heat normally exhausted during summer months may be employed for building warmth. Approximately 175,000 BTU is available for this purpose.

As BC-50B is 100% air cooled, installation is straightforward and can be speedily accomplished.

In the sketch below, BC-50B is installed in a one-floor-plus basement arrangement. Here the blower and power transformer units are mounted below the transmitter. Obviously this arrangement permits a smaller building area and yet full convenience is enjoyed. — Here again, the heat dissipated through the air cooling system is used for building heat in cold months. Many alternatives to this suggested layout can be easily visualized.



Where main power components are outdoor installed, the above suggested layout calls for a simple concrete platform with cyclone fence, or similar, on all sides.





**MASSIVE POWER**



**MODEL BC-50B 50,000 WATT TRANSMITTER**

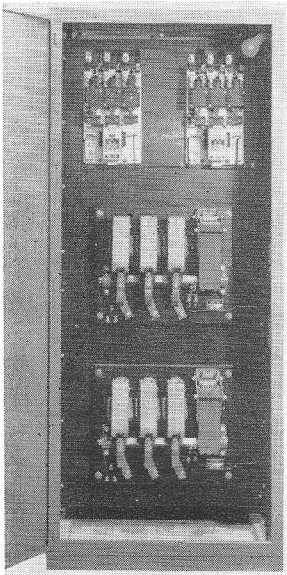
**HIGH VOLTAGE RECTIFIER.** Six 857B rectifier tubes operate in a 3-phase, full wave system, producing approximately 10.7 KV to the PA and modulator tubes. This long life rectifier tube complement has been proven over a period of years as the lowest cost, trouble-free rectifier system available. The output of the filter reactor has 16½ mfd. of filter for both extremely low noise and marvelous regulation. — The rectifier cubicle is of **walk-in design** from both front and rear. Condenser discharge switches and double safety door interlocks, connected to a most elaborate relay/circuit breaker system, insure personnel safety.

Three oil-filled main plate transformers (one for each phase leg) are provided for reliability. These are usually outdoor mounted but indoor mounting is also very practical. There are two additional lower voltage power supplies plus two bias supplies, all of the reliable time proven tube type.

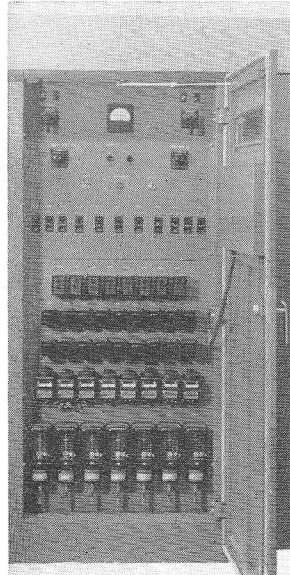
**PROTECTION.** At any power, few transmitters are as well protected. The main primary contractor cabinet (illustrated below) contains the plate, start and run contactors interlocked by auxiliary relays in the same cabinet, to the ultra complete protective system, which is the right cubicle of the transmitter enclosure and illustrated below. This cubicle has a non-interlocked front door to reach any protective relay or breaker. 21 status lights, located on the front door, indicate immediately the relay circuit activated.

There are 7 major overload relays, 18 intermediate overload relays, 8 time delay relays, 8 auxiliary relays that pilot larger contactors and 11 primary circuit breaker type switches. — This very complete complement can be quickly summarized by stating, "every circuit and every facility, large or small, is 100% protected."

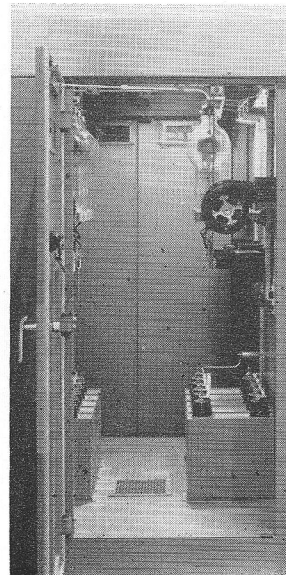
Contactor cabinet is usually installed near the primary entrance and interlocks to the complete BC-50B protective system.



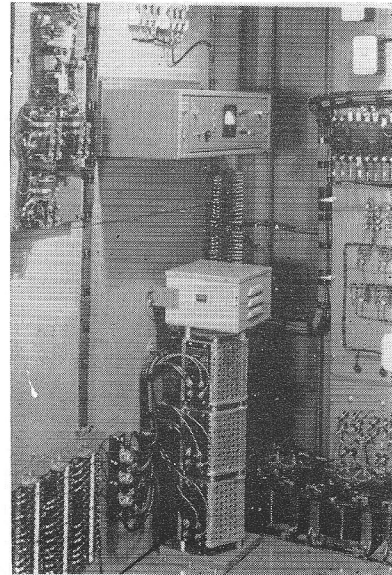
Lifeguard of "massive power" is this most complete protective system which interlocks to every function of the transmitter.



Rear view of HV rectifier cubicle. Long life, trouble-free vacuum tubes are in "walk in to service" surroundings.



Here is a close-up of the electronic filament voltage regulator. Wave form is held perfect by use of an automatic motor driven variable auto transformer.



**GATES**

## MODEL BC-50B 50,000 WATT TRANSMITTER

**REGULATION.** Under the subject of "High Voltage Rectifier" it was pointed out that  $16\frac{1}{2}$  mfd. paralleled the filter output. This provides the great asset of output voltage stability. — Added to this is 100% automatic regulated filament voltage to every tube in the entire transmitter. — A standard Gates 3-phase voltage regulator consists of an electronically controlled motor driven auto transformer, keeping filament voltage within  $\frac{1}{2}$  % (approximately .05 volts variation on an 11 volt PA filament) at all times.

Though any transmitter regardless of power will require adequate primary supply from the utility company, the Gates BC-50B **massive power** design adds to rather than subtracts from regulation. Heavier filter reactors, larger plate transformer design, plus **big design** throughout, assures regulation as an outstanding BC-50B feature.

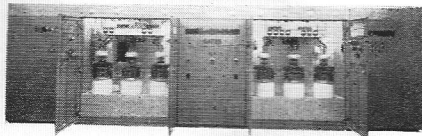
**BLOWER.** As BC-50B is 100% air cooled and movement of air is important, not only as to the amount but so are important considerations as mechanical and electrical noise, air rush noise and distribution of forced air to the entire transmitter as well as power tubes, the selection of the blower is important.

By use of one large, low speed blower, located remote (separate room or basement), air rush noise is negligible. Likewise, mechanical noise cannot be converted to low frequency audio noise. Equal distribution of air to every section of the transmitter virtually bathes each part with clean fresh flowing air. Exhaust is then vented out of the building, or in winter a portion is converted to building heat. Engineers in daily attendance to the Gates BC-50B will appreciate and revel in the great amounts of air being moved almost silently.

This rugged backfield of heavy power and modulation components spells reliability and meticulous performance. The blower (inset) supplies up to 14,000 cu. ft. of air per minute. Slow speed assures negligible air rush and quiet performance.







# BC-50B COMPLETE SPECIFICATIONS

## PERFORMANCE SPECIFICATIONS

- POWER OUTPUT:** 53,000 watts.
- OUTPUT IMPEDANCE:** 40-250 ohms, zero reactance\*.
- FREQUENCY RANGE:** 540-1600 Kc (as ordered).
- RF STABILITY:** ±10 cycles.
- CRYSTAL:** Sealed vacuum type, no heater or oven required.
- AUDIO DISTORTION:** At 95% modulation, less than 3%, 50-75,000 cycles.
- FREQUENCY RESPONSE:** ±1 db 30-10,000 cycles.
- MODULATION:** High Level, Class B.
- MODULATION CAPABILITY:** 100%.
- AUDIO INPUT:** 600/150 ohms at +10 dbm ±2 db for 100% modulation.
- CARRIER SHIFT:** Less than 5% at 100% modulation.
- CARRIER HUM AND NOISE:** 60 db or better below 100% modulation.
- RF HARMONIC POWER:** 70 db or more below fundamental.
- POWER LINE REQUIREMENTS:** 460 volts ±5%, 3 phase, 60 cycles\*\*.
- POWER INPUT:** **Unmodulated:** 90.8 KW.  
**Average modulation:** 98 KW.  
**100% modulation:** 133 KW.  
**Power factor (at 100% modulation):** 90%.
- RECYCLING:** Transmitter may be set for either 1 or 3 automatic resets of carrier before final disconnect.  
\* For standard transmission line as ordered.  
\*\* 50 cycles also available.

## METERING

### Individual Meters:

- 1 ..... Supply bus volts
- 2 ..... Regulated bus volts
- 3 ..... Left modulator plate
- 4 ..... Right modulator plate
- 5 ..... RF line current
- 6 ..... PA plate current total
- 7 ..... Left PA cathode
- 8 ..... Right PA cathode
- 9 ..... PA filament voltage (3 legs)
- 10 ..... Modulator filament voltage (3 legs)
- 11 ..... First audio cathode (left)
- 12 ..... First audio cathode (right)
- 13 ..... Second audio cathode (left)
- 14 ..... Second audio cathode (right)
- 15 ..... Third audio cathode (left)
- 16 ..... Third audio cathode (right)

**Multimeter No. 1:** By switch selector, oscillator plate, first IPA cathode, second IPA cathode, third IPA cathode No. 1, third IPA cathode No. 2, and third IPA cathode No. 3.

## TUBE COMPLEMENT

- RADIO FREQUENCY SECTION:** 12BY7A oscillator.  
12BY7A buffer.  
6146 first IPA.  
813 second IPA.  
(3) 833A third IPA.  
(2) 5891 power amplifiers.
- AUDIO FREQUENCY SECTION:** (2) 6146 first audio.  
(2) 813 second audio.  
(2) 833A third audio.  
(2) 5891 modulators.
- RECTIFIER SECTION:** (6) 857B high voltage rectifiers.  
(4) 8008 intermediate rectifiers.  
(2) 866A low voltage rectifiers.  
(2) 866A bias rectifiers (for power amplifier).  
(2) 8008 audio bias rectifiers.

## MECHANICAL SPECIFICATIONS

- MAIN TRANSMITTER SECTION:**  
Total width, 22'6". Total depth, 5'4". Total height, 6'6".
- SUB UNITS:**
  - Plate transformers (3):** 27" dia., 56" high. Wt. each 1250 lbs.
  - Filter reactor:** 21" dia., 44" high. Wt. 600 lbs.
  - Modulation transformer:** 33" wide, 42" deep, 58" high. Wt. 4300 lbs.
  - Modulation reactor:** 40" dia., 56" high. Wt. 4300 lbs.
  - Contact cabinet:** 34 1/2" wide, 47 1/2" deep, 78" high. Wt. 600 lbs.

- SUPERVISORY CONSOLE AND DESK:** 50" wide, 30" deep, 36 1/2" high.
- BLOWER:** 65" high, 55 1/2" wide, 56 3/8" long.
- BLOWER CAPACITY:** Adjustable 10,000 to 14,000 cu. ft. minute.

**WEIGHTS (unpacked):**

|   |                    |
|---|--------------------|
| Transmitter including contactor cabinet | 10,580 lbs.        |
| External transformers                   | 12,950 lbs.        |
| Blower                                  | 1,005 lbs.         |
| Control desk (optional)                 | 390 lbs.           |
| Miscellaneous equipment                 | 535 lbs.           |
| <b>Total estimate net weight</b>        | <b>25,460 lbs.</b> |

**WEIGHTS AND CUBAGE (packed):**

|   | Domestic      | Export        | Cubage        |
|---|---------------|---------------|---------------|
| Transmitter including contactor cabinet | 14,000        | 16,500        | 1116.3        |
| External transformers                   | 13,220        | 14,200        | 220.1         |
| Blower                                  | 1,600         | 1,400         | 176.4         |
| Supervisory control console             | 495           | 595           | 40.2          |
| Miscellaneous equipment                 | 720           | 1,000         | 71.5          |
| <b>Total</b>                            | <b>30,035</b> | <b>33,695</b> | <b>1624.5</b> |

NOTE: Weights and cubage are estimates and will vary in accord

# BC-50B COMPLETE SPECIFICATIONS

## ORDERING DATA

(equipment supplied)

- 1 Transmitter section including: (a) left end cubicle, (b) left intermediate cubicle, (c) center cubicle, (d) right intermediate cubicle, (e) right end cubicle.
- 1 Contactor primary distribution cabinet.
- 1 Blower and filter equipment.
- 1 Modulation transformer (oil-filled).
- 1 Modulation reactor (oil-filled).
- 3 Plate transformers (oil-filled).
- 1 Filter reactor (oil-filled).
- 1 Complete 100% set of tubes.
- 2 Vacuum crystals.
- 3 Auto transformers for reduction from 460 to 230, for 3-phase intermediate supplies.
- 2 Instruction Books.

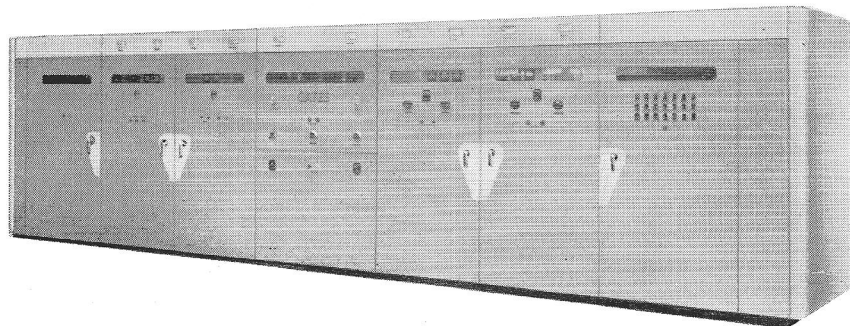
**BC-50B Complete 50KW Transmitter as listed above ..... Cat. M-4946**

**NOTE:** BC-50B is supplied as a complete transmitter and no effort has been made to break down the transmitter herein as to individual components which would only be confusing.

## OPTIONAL ACCESSORIES

(ordered where required)

|   |        |
|---|--------|
| Supervisory control console (next page) .....   | M-5120 |
| 100% spare tube set .....   | TK-263 |
| FCC required tube set .....   | TK-264 |
| Spare blower unit .....   | M-5519 |
| Modification kit for 50 cycle operation .....   | M-5520 |
| Single tower antenna coupler to specifications of customer as to frequency, tower height and line impedance ..... | Custom |
| Phasing equipment, any directional design .....   | Custom |
| Proof of performance equipment .....  | SA-131 |
| Water cooled dummy antenna .....  | M-5497 |
| Spare parts kit to customer needs .....   | Custom |



**GATES**

# SUPERVISORY CONTROL CONSOLE



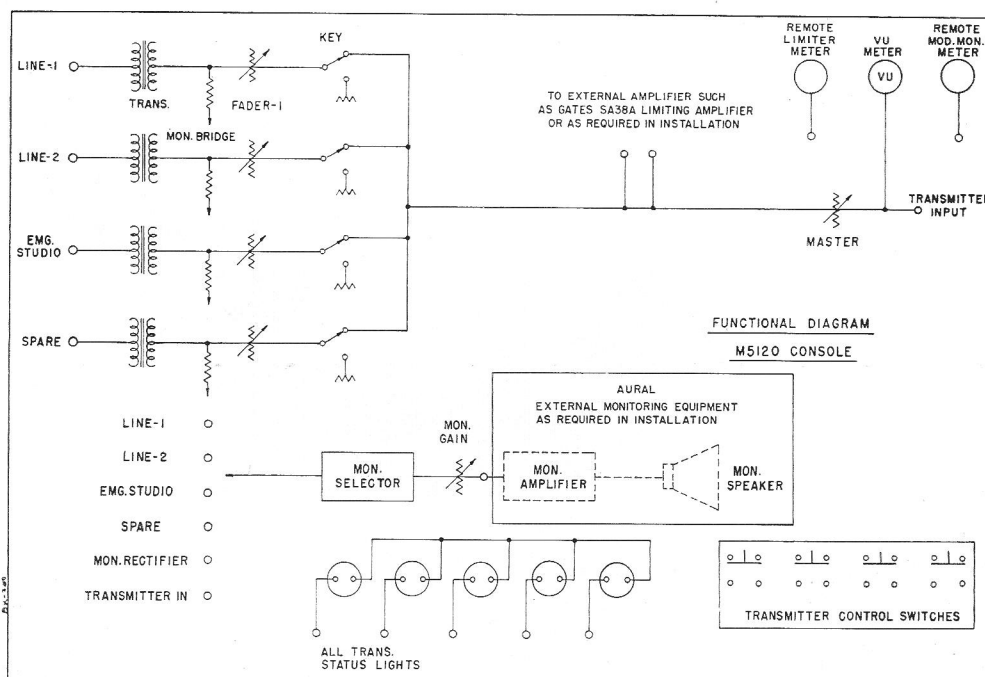
Though designed basically for the BC-50B and BC-100B, 50KW and 100KW transmitters, this very complete console and desk is adaptable to any make or power of transmitter. Four mixing channels adjust level to 4 incoming circuits. These may be lines, microphone, turntable, network or as desired. Master and monitor gains are at finger tips. Meters include VU, extension modulation percentage\* and extension limiter\*\*. Status lights, 21 in all, duplicate those on the transmitter. Duplicate push-buttons for all transmitter functions are also incorporated.

Serviceability is complete to tilt back of console to reach every part and connection. Desk is a deluxe steel office desk with typewriter well and triple drawer space. Fre-

quency response within 1/2 db 30-15,000 cycles and noise is 70 db below +10 dbm output or better. — Though not mandatory for transmitter performance, the M-5120 Supervisory Control Console will add appreciated utility and convenience. Size and weight are listed on the preceding page.

\* for Gates MO-2639 modulation monitor.  
\*\* for Gates SA-39B limiting amplifier.

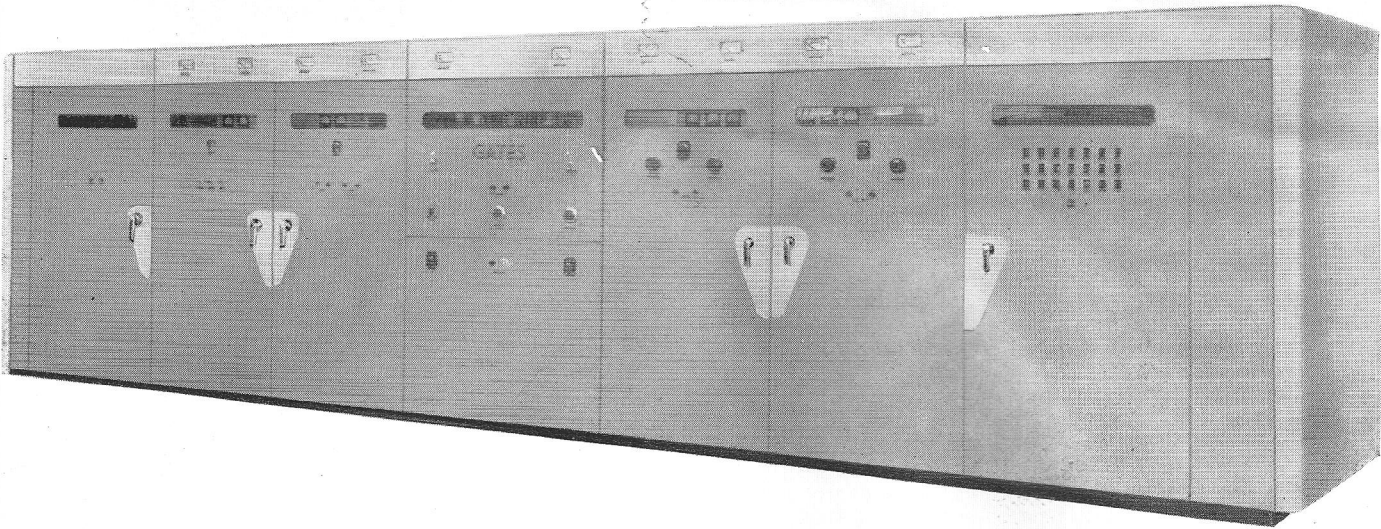
Complete Supervisory Console with Desk ..... Cat. M-5120





**GATES**

## **BC-100B 100,000 WATT BROADCAST TRANSMITTER**



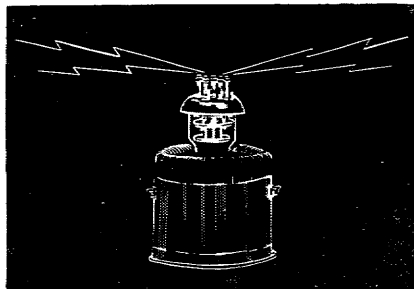
As the BC-50B, 50KW model, described on the several preceding pages, has so many 100KW features, it is only natural that this companion 100,000 watt model offers many outstanding and exclusive features. — High level modulation, 100% air cooling, a total of only eight tube types with the commanding feature of "massive power" defining big husky design, highlights this newest transmitting plant.

On the following pages, the reader is asked to refer to the BC-50B transmitter on the preceding pages. Major variance is in the high power stages, larger power supply and modulator components and slightly larger physical size. General appearance and construction has been standardized in the two models to effect manufacturing economy and less cost to our customers. — Complete specifications, simplified wiring diagram and floor plans for the 100,000 watt model are on the succeeding pages.

**MASSIVE POWER**



**GATES**



## MODEL BC-100B TRANSMITTER

(100,000 watts AM)

Realizing this transmitter may be used in all parts of the world and under often severe climatic conditions, generous safety factors are inbuilt. Critical component values have also been avoided to assure easy maintenance anywhere. BC-100B is 100% forced air cooled. Costly water cooling systems have been entirely eliminated. There are only 8 tube types and a total of 39 tubes, of which 22 are 2-element rectifiers. — An interesting feature is the 5891 tubes employed as power amplifiers and modulators cannot be harmed by simultaneous removal of both plate and filament voltage. This important feature is emphasized as many large power tubes in this category require continued forced air, after removal of voltages, to protect the end seals.

The BC-100B transmitter is completely automatic with proper sequencing of starting operations and full electrical and personnel protection. An electronic motor-driven auto transformer voltage regulator provides proper voltage to all filament and low power stages under wide variations of line voltage.

BC-100B is a totally wired and finished transmitter. The purchaser is not asked to construct the transmitter on arrival and need only busy himself with inter-connections of the normal conduit type. Mechanical construction is solid and rugged. Enclosures are built around welded channel frameworks. Aluminum divider panels supply excellent electrical shielding.

Power transformer section, consisting of modulation transformer, reactor, two filter reactors and six plate transformers are all oil-filled and in well built, leakproof steel tanks. They may be indoor or outdoor mounted, as the customer prefers or requires.

Mechanically, BC-100B is constructed in seven cubicles having a total width of 29' 10", depth of 5' 4" and height of 78" exclusive of door swing. Two independent cubicles house the contactors for the individual high voltage supplies. These seven cubicles or sections are as follows:

### Cubicles 1 and 2: High Voltage Supplies

Separate six tube, 3-phase, full wave, high voltage supplies are provided for the radio frequency power amplifiers and the modulators. Each power supply is in its own cubicle and utilizes 857B rectifier tubes. The RF power supply delivers 12.5 kilovolts and the modulator supply 15 kilovolts. The circuit is designed for quadrature operation providing a high safety factor. Two small blowers supply spot air cooling to the base of each 857B rectifier tube.

### Cubicle 3: Modulator

All of the audio system is in this section. First three stages are vertically mounted in the shielded back section. Modulator tubes are accessible by opening the front doors. A third spare tube socket is provided to keep the spare in readiness for nearly instantaneous cut in.

**MODEL BC-100B TRANSMITTER  
(100,000 Watts)**

**Cubicle 4: RF Exciter**

In this cubicle are located the Crystal Oscillator Unit, Buffer, Amplifier, Intermediate Amplifier and PA Driver. The RF bias rectifier, using 866A tubes, is mounted in this unit along with the 3KV plate supply, the modulator bias supply and the low rectifier. A duplicate crystal is mounted with the switching controlled from the front of the panel. Tuning facilities for the RF stages are on the front of this panel.

**Cubicle 5: RF Power Amplifier**

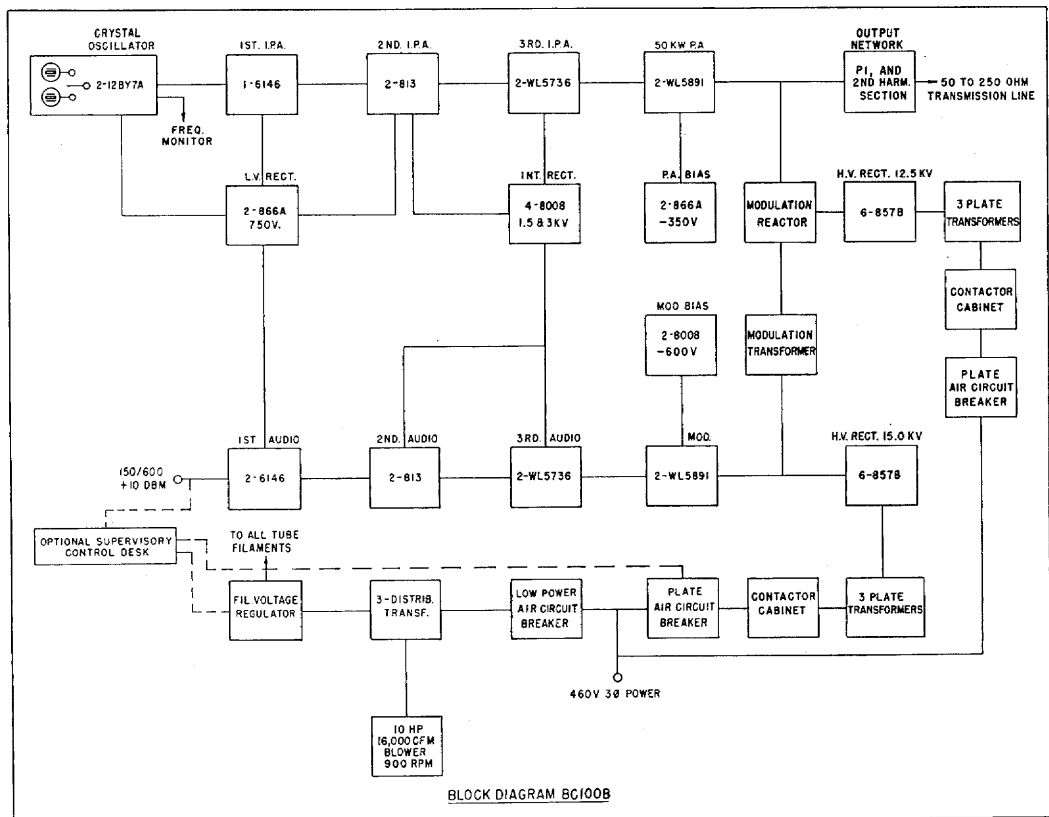
Here are the 5891 power tubes, each producing 50KW power to make up the 100KW output. A third spare socket is provided so the spare 5891 is quickly accessible. Control switches, filament selector and other metering switches are provided on the front doors.

**Cubicle 6: Power Amplifier Tank/Output**

Contained herein is the PA tank circuit consisting of a pi network using a Gates special built, silver plated coil and capacitor. The pi network is tuned by motor-driven variable vacuum capacitors. The pi network works into a T network, the two being shielded from each other to minimize harmonic transfer. In addition, a second harmonic section is made a part of the T to give added rejection to this specific frequency. This cubicle is pressurized by the main blower, as are the others making up the transmitter proper, to assure cool operation with a minimum of dust collections.

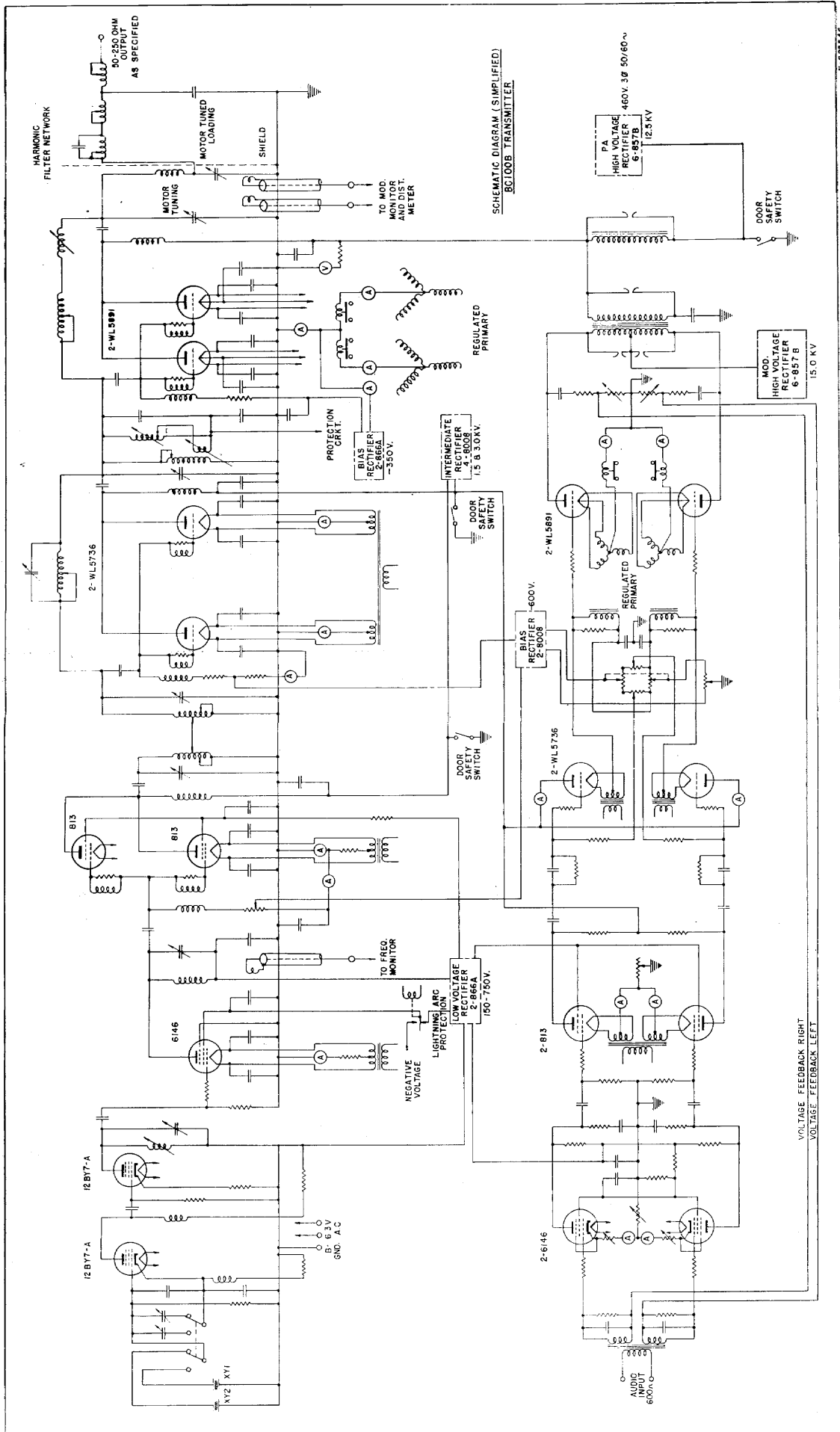
**Cubicle 7: Protection**

Every part of the transmitter is guarded with this elaborate and ingenious protective system. Circuit breakers, relays and status lights watch and indicate every circuit and automatically remove voltage for any abnormal reason. Recycling plus electronic filament/low voltage regulation are in this cubicle.



BLOCK DIAGRAM BC100B





E-C23346

SIMPLIFIED WIRING DIAGRAM OF "MASSIVE POWER" MODEL BC-100B 100,000 WATT TRANSMITTER. FOR EASY READING, THE DETAIL IS OMITTED.

## ELECTRICAL DESCRIPTION

(BC-100B 100,000 Watts)

Basic circuits of the transmitter are shown in the simplified wiring diagram. The purpose of this drawing is to demonstrate the features of the Gates BC-100B transmitter; various power circuits and controls are shown only to the extent as to make clear the operation.

### RF Channel

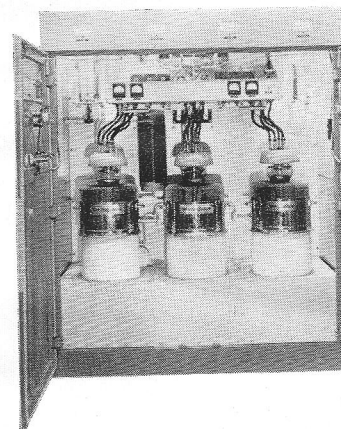
The Gates BC-100B transmitter uses a crystal controlled oscillator unit housed in a separate shielded compartment and a pair of 12BY7A tubes are in a stable, electron coupled oscillator and buffer circuit. Two individual vacuum crystals are provided, with either selective from the front panel. Frequency trimmers for individual adjustment of crystal frequency are on the front panel. Output of the oscillator unit is tuned and capacity coupled to the first IPA.

In the first intermediate power amplifier is found a 6146 tube operating at conservative plate and screen voltages. Where applicable to the station's particular antenna system, a special lightning arc protection circuit is incorporated in the screen circuit of this stage. This feature gives a momentary interruption of carrier output during lightning discharges rather than noticeable interruption by overload relays. At the same time audio input is attenuated so the modulator is not overloaded.

For the second IPA, two 813 tubes with 1500 volts plate supply are employed. Tuning is accomplished by a suitable combination of fixed and variable capacitances. The output is inductively coupled to the Power Amplifier Driver.

The PA driver consists of two type 5736 tubes operating in parallel. These tubes are excellent for this service and are the same tube type as used for modulator drivers. Characteristics of the 5736 tubes are so uniform that no unbalanced conditions will be encountered. This stage is coil neutralized with the same stable circuit as used in the Power Amplifier.

Two 5891 tubes are parallel operated in the radio frequency power amplifier. These are identical to those employed as modulators. The spare socket is conspicuous as a service plus for quick tube change if ever necessary. The tank, Tee and harmonic networks have been earlier discussed.



### Audio Channel

Audio input is 600 ohms and the required input level is approximately +10 dbm for 100 kilowatts output modulated 100%. An input pad is incorporated in the transmitter, normally with 6 db attenuation, and is automatically placed in use when the transmitter is operated on low power with half voltage on the power amplifier.

The input stage consists of a pair of 6146 tubes in push pull. This stage is resistance coupled to a pair of 813 tubes operating as voltage amplifiers. The third stage, that of the cathode coupled driver, uses a pair of 5736 tubes operating with a supply voltage of 3000 volts. The cathode impedance provides direct coupling to the modulator grids. A bias supply furnishes the required bias to the modulators, and as the cathode follower filaments are operated at this bias voltage, additional voltage from the bias supply provides the required bias for driver tubes.

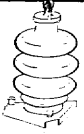
Again the twin 5891 tubes supplies an abundance of audio to power, to easily modulate the 100KW carrier at low distortion and wide response. A superbly designed modulation transformer/reactor combination along with 12 db of feedback, produces that rich and smooth quality that is characteristic of finely made transmitting equipment.

### Control Circuits

The design of the control system is in keeping with the highest present day standards. Protection of valuable equipment, reliability and safety of personnel were constantly kept in mind in the design. All cubicle doors are interlocked, and in addition are provided with automatic mechanical grounding switches for safety.

Desirable features such as three notch lockout, fail safe control system and simple power reduction are all included. A generous number of status lights mounted on the control unit door provides instant indication of failure and serve as a guide to their location.

**MASSIVE POWER**



A reliable air pressure switch protects the large tubes in the unlikely event of blower failure or air duct blockage. No harm will be done if

due to power failure, air is simultaneously removed along with plate and filament voltages. On normal shutdown a blower timer keeps normal air volume flowing for five minutes after filaments are turned off.

Switches to operate contactors are located near the Power Amplifier, Modulator and Rectifier tubes for quickly turning off a filament to permit easy tube switching.

Either automatic recycling or one shot overload may be selected from the front panel of the control unit. The automatic recycling circuit is returned to the control circuit in such a way that opening a door disables the recycling.

### Cooling System

In air cooling, the blower becomes a very important equipment item. The finest blower money can buy is provided, delivering 16,000 cu. ft. of air at 2½ inches static pressure. The 950 RPM slow speed insures low air rush noise. Blower is operated by a 10 HP motor V belt driven with adjustable sheave to compensate for varied altitudes.

### Supervisory Control Console

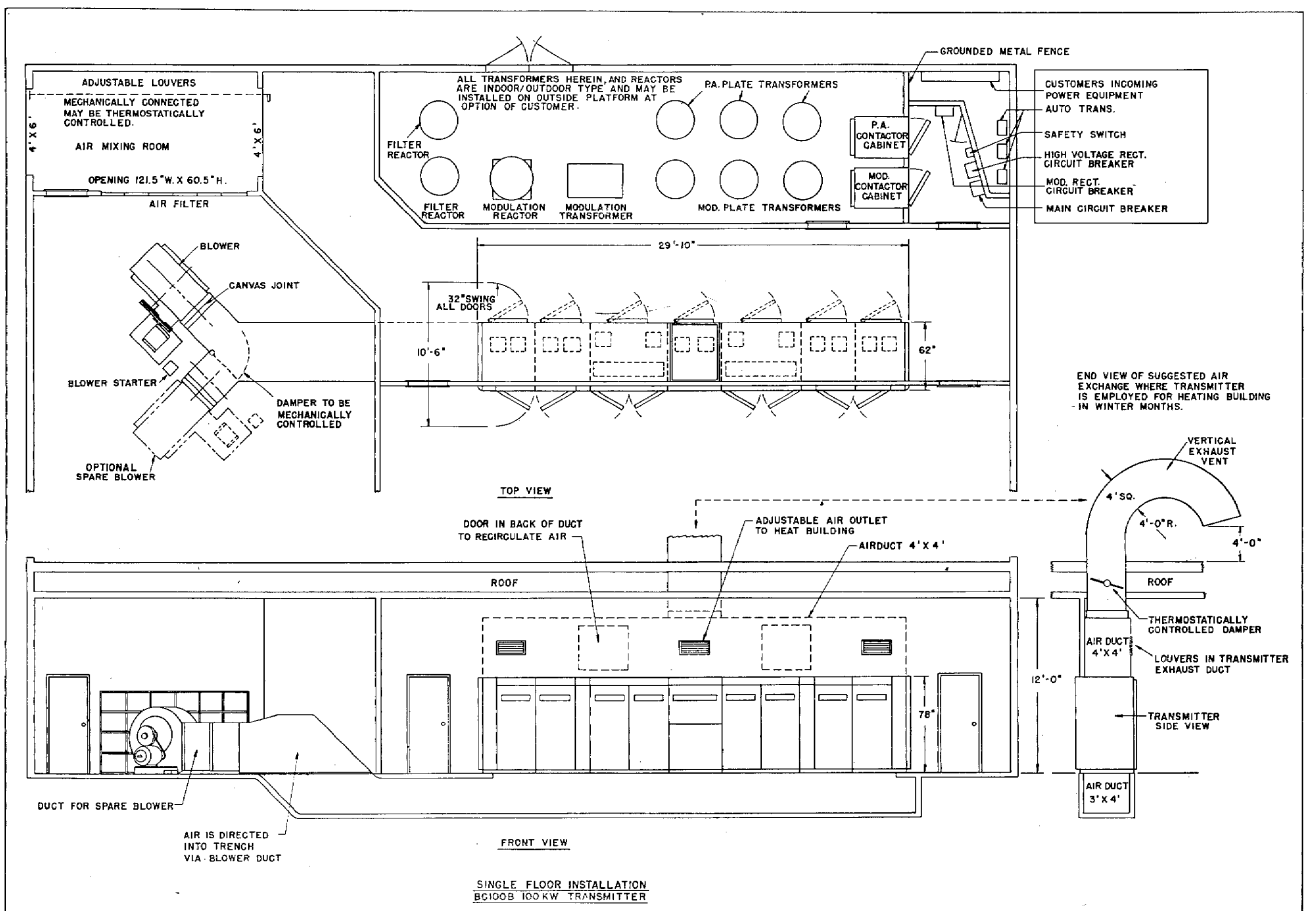
The M-5120 console and desk is fully described on Page 16 and is an ideal optional accessory for the BC-100B transmitter.

### Floor Plans

Several suggested floor plans are shown on these pages, giving the installer the choice of a one-floor or a floor/basement arrangement. These plans are typical and may be altered to suit individual needs. Another layout is the outdoor platform for the "massive power" oil-filled components. In most cases, the use of outdoor mounting will be found desirable as a space saver and in taking advantage of the "massive power" showmanship by visibility of these impressive components.

### Gates Cooperation

In many instances, the purchaser of the BC-100B transmitter will concurrently construct a building. Gates will gladly cooperate in suggested building design or in approving building modifications in line with proper air flow, building heating, ventilation and electrical wiring. — This service is automatic where requested and, of course, without added charge.

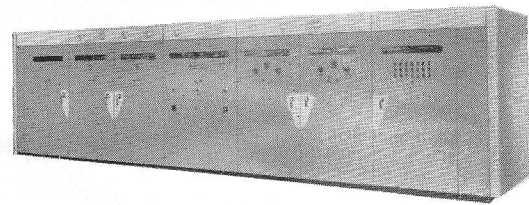






# ELECTRICAL SPECIFICATIONS

(BC-100B 100,000 Watts)



- TYPE OF EMISSION: A-3.
- POWER OUTPUT: 103 KW.
- FREQUENCY: 540 to 1600 Kc.
- FREQUENCY STABILITY:  $\pm 10$  cycles.
- TYPE OF MODULATION: High Level, Class B.
- RF OUTPUT IMPEDANCE: Unbalanced, 50-250 ohms.
- AUDIO INPUT IMPEDANCE: 600 ohms, balanced.
- AUDIO FREQUENCY INPUT LEVEL (100% Modulation):  $+12$  dbm,  $\pm 2$  db.
- AUDIO FREQUENCY RESPONSE:  $\pm 2$  db, 30-10,000 cycles at 90% Modulation.  $\pm 1.5$  db, 50-7500 cycles at 90% Modulation.
- AUDIO FREQUENCY DISTORTION: 4% RMS or less, 50-7500 cycles at 90% Modulation.
- NOISE LEVEL (RMS): 60 db below 100% Modulation.
- TUBE COOLING SYSTEM: Forced Air Cooling.
- CARRIER SHIFT: 5% or less at 100% Modulation.
- POWER FACTOR: 90%.
- POWER LINE REQUIREMENTS: 460 Volts, 3 phase, 60 cycle. 50 cycle or other frequencies or voltages on special order.
- POWER LINE REGULATION:  $\pm 2\%$ .
- POWER LINE REGULATION, No Load to Full Load:  $\pm 5\%$ .
- POWER CONSUMPTION:
  - Carrier (No Modulation): 158 KW at 90% PF.
  - Average Program (30% Modulation): 176 KW at 90% PF.
  - 100% Modulation: 262 KW at 90% PF.

# MECHANICAL SPECIFICATIONS

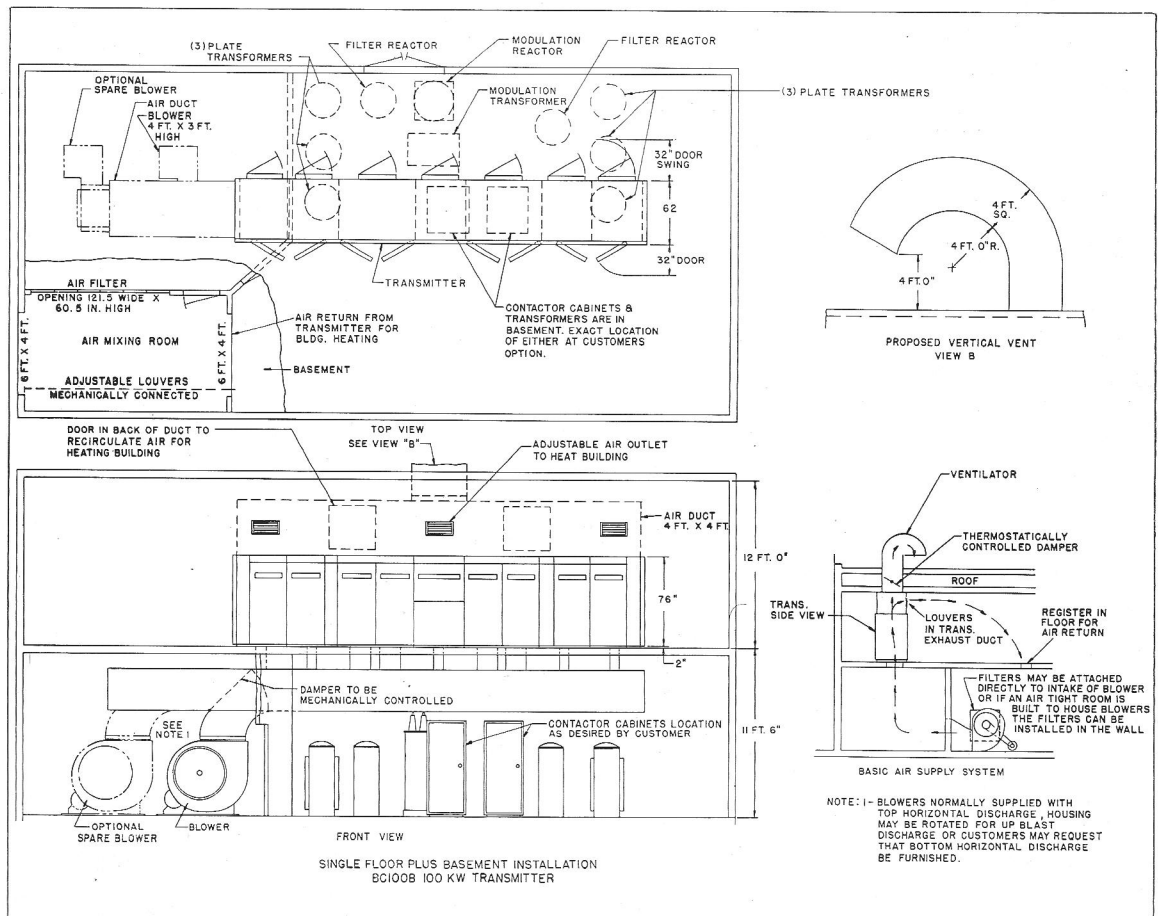
- DIMENSION OF TRANSMITTER: 29' 10" wide, 5' 4" deep, 6' 6" high.
- LARGEST CABINET SIZE FOR BUILDING ENTRANCE REQUIREMENTS: 66" wide, 64" deep, 78" high.
- SPACE REQUIRED FOR MODULATION TRANSFORMER, REACTORS AND POWER TRANSFORMERS: 192 square feet.
- BLOWER: 65 1/4" wide, 55 1/2" deep, 64 1/8" high.
- NET WEIGHT, Approximate: 36,000 pounds.
- GROSS WEIGHT: (Approximate) 38,000 pounds.
- CUBAGE: (Approximate) 2,300 Cubic Feet.

# TUBE COMPLEMENT

## RF Channel

|                                    |   |   |        |
|------------------------------------|---|---|--------|
| Oscillator Unit .....              | 2 | — | 12BY7A |
| Buffer Amplifier .....             | 1 | — | 6146   |
| Intermediate Amplifier .....       | 2 | — | 813    |
| RF Driver .....                    | 2 | — | 5736   |
| 3 KV Rectifier .....               | 4 | — | 8008   |
| Bias Rectifier .....               | 2 | — | 866A   |
| Low Voltage Rectifier .....        | 2 | — | 866A   |
| Power Amplifier .....              | 2 | — | WL5891 |
| Power Amplifier HV Rectifier ..... | 6 | — | 857B   |

(continued next page)





### TUBE COMPLEMENT (continued)

#### Audio Channel

|                              |   |   |      |
|------------------------------|---|---|------|
| Input Amplifier .....        | 2 | — | 6146 |
| Intermediate Amplifier ..... | 2 | — | 813  |
| Driver .....                 | 2 | — | 5736 |

|                              |   |   |        |
|------------------------------|---|---|--------|
| Modulator .....              | 2 | — | WL5891 |
| Bias Rectifier .....         | 2 | — | 8008   |
| Modulator HV Rectifier ..... | 6 | — | 857B   |

### ORDERING INFORMATION

(Equipment Supplied)

- 1 — Complete transmitter section.\*
- 2 — Contactor/primary distribution cabinets.
- 1 — Blower and filter equipment.
- 1 — Modulation transformer (oil-filled).
- 1 — Modulation reactor (oil-filled).
- 6 — Plate transformers (oil-filled).
- 2 — Filter reactors (oil-filled).
- 1 — Complete 100% set of tubes.
- 2 — Crystals to your frequency.
- 3 — Auto transformers for operating intermediate supplies at 230 volts.
- 2 — Instruction manuals.

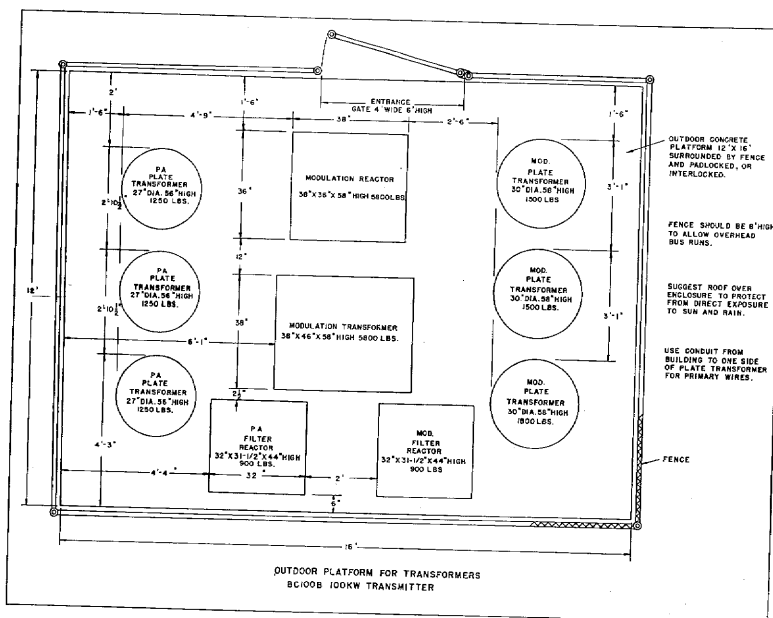
\* State frequency and output impedance when ordering.

### OPTIONAL ACCESSORIES

|  |             |
|--|-------------|
| Supervisory control console and desk ..... | Cat. M-5120 |
| 100% spare tube set .....                  | Cat. TK-297 |
| FCC required spare tube set .....          | Cat. TK-298 |
| Spare blower with motor, complete .....    | Cat. M-5590 |
| Spare blower motor only .....              | Cat. M-5591 |
| Modification kit for 60 cycles .....       | Cat. M-5592 |
| Single tower antenna coupler * .....       | Custom      |
| Directional phasing equipment .....        | Custom      |
| Proof of performance equipment .....       | Cat. SA-131 |
| Spare parts kit to customer needs .....    | Negotiation |

\* State frequency, tower height and all available antenna data, when ordering.

Model BC-100B 100,000 watt transmitter ..... Cat. M-5556



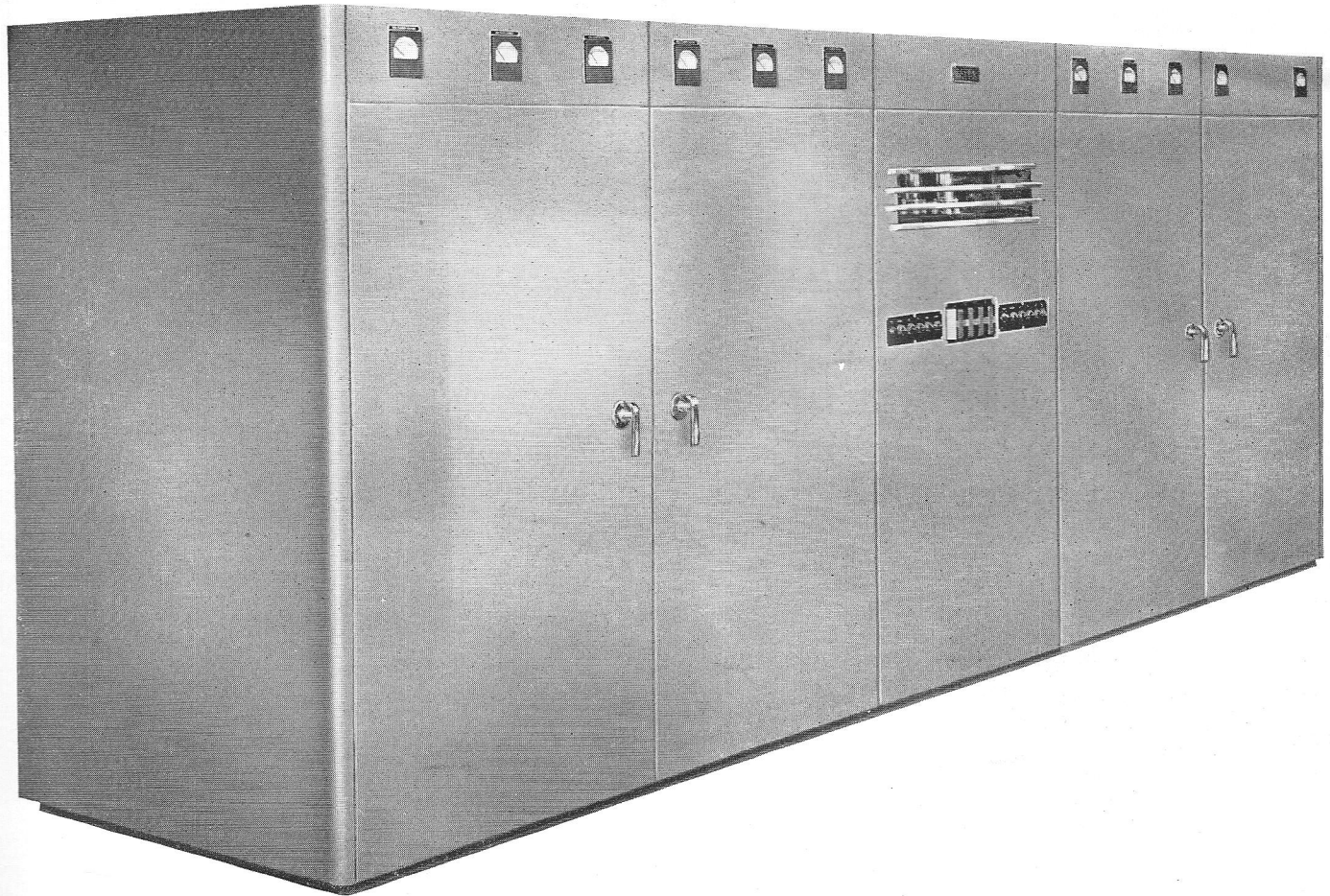
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**GATES**

# MODEL BC-20B BROADCAST TRANSMITTER

(20,000 Watts)



This 20 KW AM broadcast transmitter is in world-wide service and provides wide range broadcast performance in the standard broadcast band of 540-1600 Kc. The Gates BC-20B transmitter has been particularly popular overseas and fills the definite area where 10 KW is not quite big enough and 50 KW is too much.

Heavy commercial construction is combined with **walk in to service** and modern up to date circuitry. Dual full wave, 3 phase, high voltage power supplies. One for the RF power amplifiers and the second for the modulators exemplifies the conservative approach to BC-20B design. — Tube complement utilizes thoriated single phase filament design in all power stages and tube cost is lower by a generous margin than any other transmitter in this power area.

The several following pages supply a detailed description of this time proven Gates quality transmitting plant.



## BC-20B 20,000 WATT BROADCAST TRANSMITTER

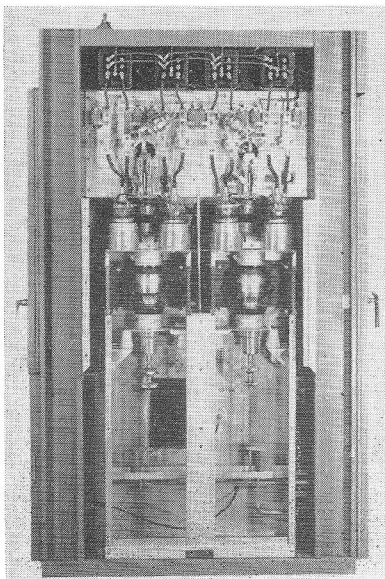
**CONSTRUCTION:** Five cubicles join together to house the 20KW radio frequency, audio frequency, protective and power supply units. The only external components are the two main power transformers, modulation transformer and reactor. These units are oil-filled and may be installed either in the building or on a protected platform outside the building. The transmitter is dead front, and all front doors may be opened without disrupting the carrier. No inter-cubicle cabling is required when installing. Each of the five cubicles is completely assembled and wired. These cubicles bolt together speedily. At the base of each cubicle are barrier terminal boards; and wiring of all cubicles together for an operating transmitter is accomplished by means of short jumpers between these terminal boards. Floor space, exclusive of external units mentioned above, is 210" wide, 78" high and 49" deep. Door swing of 40" should be allowed for both front and back doors. Finish is in hand rubbed medium gray with trimmings in chrome, brushed aluminum and anodized black.

**RADIO FREQUENCY SECTION:** Including oscillator, there are five radio frequency stages. All but the final ampli-

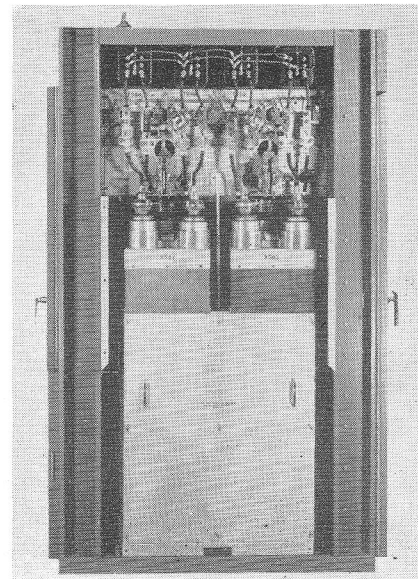
fiers are self-neutralized. Dual crystals with closely held temperature controlled ovens excite a 6V6 oscillator with very low voltage applied for stability. IPA stages are 807, 6146 and dual 4-250A drivers. Four 3X2500F3 triodes comprise the pushpull power amplifier. Output coupling provides an impedance match from 40-270ohms as ordered.

**MODULATOR SECTION:** Gates engineers have built a truly fine audio system into BC-20B. Four audio stages are all pushpull. A special design transformer coupling system between the audio drivers and four 3X3000F1 modulators results in remarkably low distortion and wide response. Overall feedback is an adjunct to the excellent capabilities of the audio system without feedback. — Modulation transformer and reactor are heavy duty, oil-filled units for either indoor or outdoor service.

**METERING:** No multi-metering is employed, and a full meter complement is supplied to measure all necessary circuits both for tune-up and general operation. Individual plate current meters are provided for each of the power amplifier and modulator tubes.



Open and closed views of the husky power amplifier tube complement. The engineer will note the large variable vacuum tank capacitors are located in the main air chamber, cooling the four 3X2500F3 tubes. Though unnecessary, this feature adds to potential reliability.



**GATES**

## MODEL BC-20B

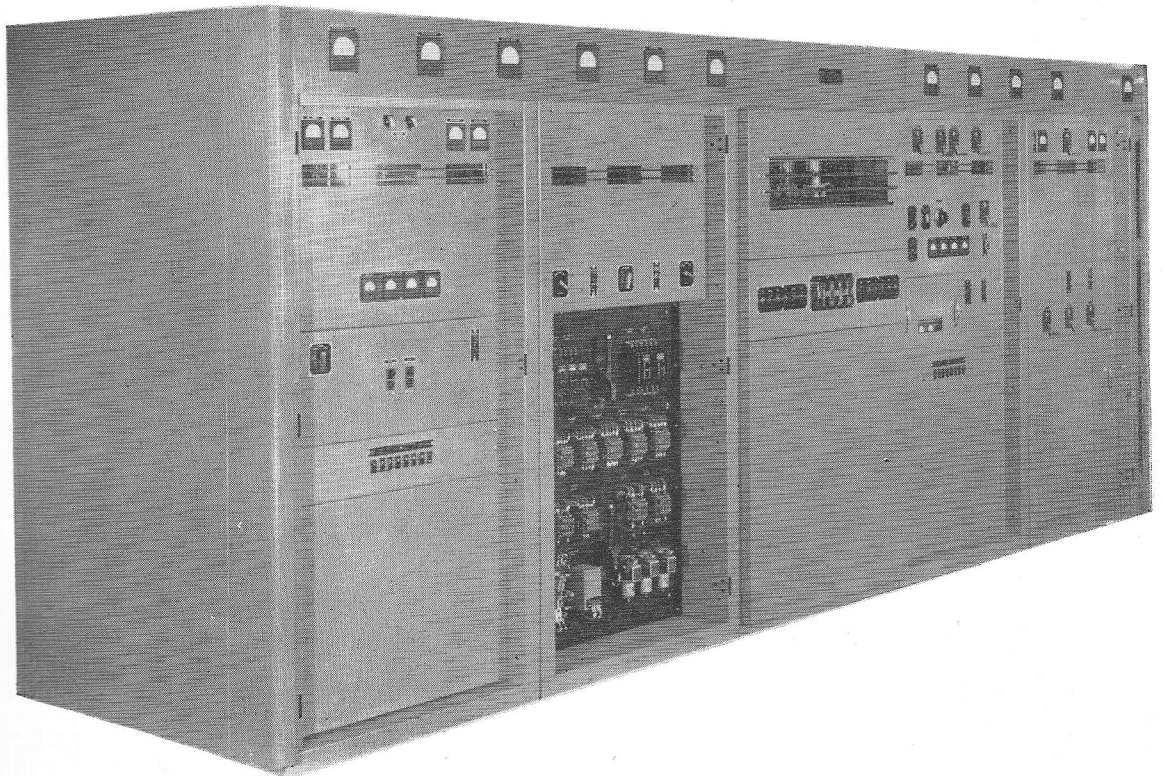
**RELAYS AND PROTECTION:** Gates engineers have provided protection to the point that no power consuming circuit of importance has been overlooked. Primary thermal breakers are inserted in all main primary lines. Individual supervisory overload relays are incorporated for, not only the transmitter main overload, but also for separate protection; exciter failure, air failure, RF driver, power amplifier, audio driver and modulators. Included are secondary relays for door interlock and air cooling interlock. Automatic condenser discharge relay switch immediately discharges the main filter capacitors when the door interlocks are disengaged.

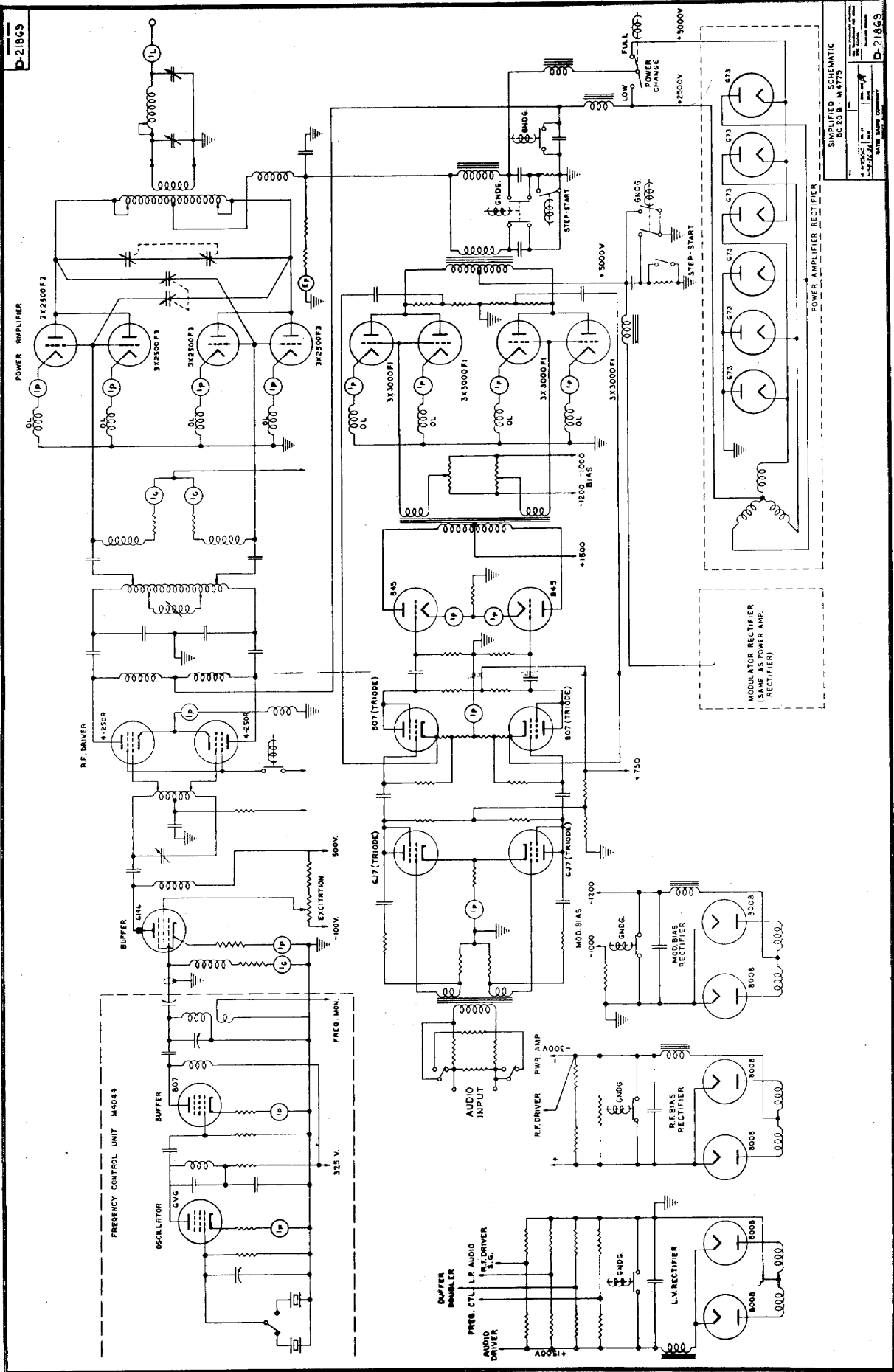
**RECYCLING:** Automatic recycling relay controls automatically where the carrier is disrupted, and attempts to reset the carrier four times before remaining off. Many times carrier interruption is caused by static discharges across the transmission line or tower base and this recycling feature is indispensable.

**POWER SUPPLIES:** Five major power supplies deliver plate and bias voltage to the BC-20 transmitter. Featured

are the two complete high voltage supplies. One is used for the radio frequency power amplifier and the other for the modulators. The resulting almost perfect regulation is quickly recognized by the engineer. Likewise, in case of failure of one power supply, the remaining one can be used in, operating the transmitter on reduced power until repairs are made. Each of these power supplies is a full wave, three phase, six tube supplies. Other individual supplies provide modulator bias voltage, power amplifier bias voltage and intermediate voltage for driver stages. All power supplies are generously protected by circuit breakers, overload relays, etc.

**PERFORMANCE:** Recognizing this transmitter will be used in every climate of the world, every engineering attention was given to reliability under unusual conditions. Extra blower capacity in case of extreme heat is an example. BC-20B will produce a carrier with punch and on the carrier will be a rich transmission quality, the result of low distortion, wide response, low noise and excellent stability.







**GATES**

## BC-20B SPECIFICATIONS

### ELECTRICAL

**FREQUENCY RANGE:** 540-1600 Kc as ordered.

**RF OUTPUT IMPEDANCE:** 40-270 ohms as ordered.

**RATED POWER OUTPUT:** 20,000 watts.

**CAPABLE POWER OUTPUT:** 21,250 watts.

**POWER REDUCTION:** Low power tune-up switch standard equipment.

**POWER INPUT:** 230 volt, 3 phase, 50 or 60 cycles (specify power line frequency when ordering). Other input voltages available on special order.

**INPUT WATTS:** No modulation, 37 KW.  
Average modulation, 43 KW.  
100% modulation (sine wave), 55 KW.

**AUDIO RESPONSE:**  $\pm 1\frac{1}{2}$  db, 50-10,000 cycles.

**RATED DISTORTION:** 4% or less, 50-7500 cycles.

**CAPABLE DISTORTION:** 3% or less, 50-7500 cycles.

**NOISE:** 55 db or better below 100% modulation.

**RF STABILITY:** 0.005% or better.

**MONITORS:** Provision for RF take-off for both frequency and modulation monitors.

**CRYSTAL:** Supplied in temperature controlled oven.

**TUBES:** (Radio Frequency) 6V6 osc., 807 IPA, 6146 IPA  
(2) 4-250A IPA, (4) 3X2500F3 power amplifier

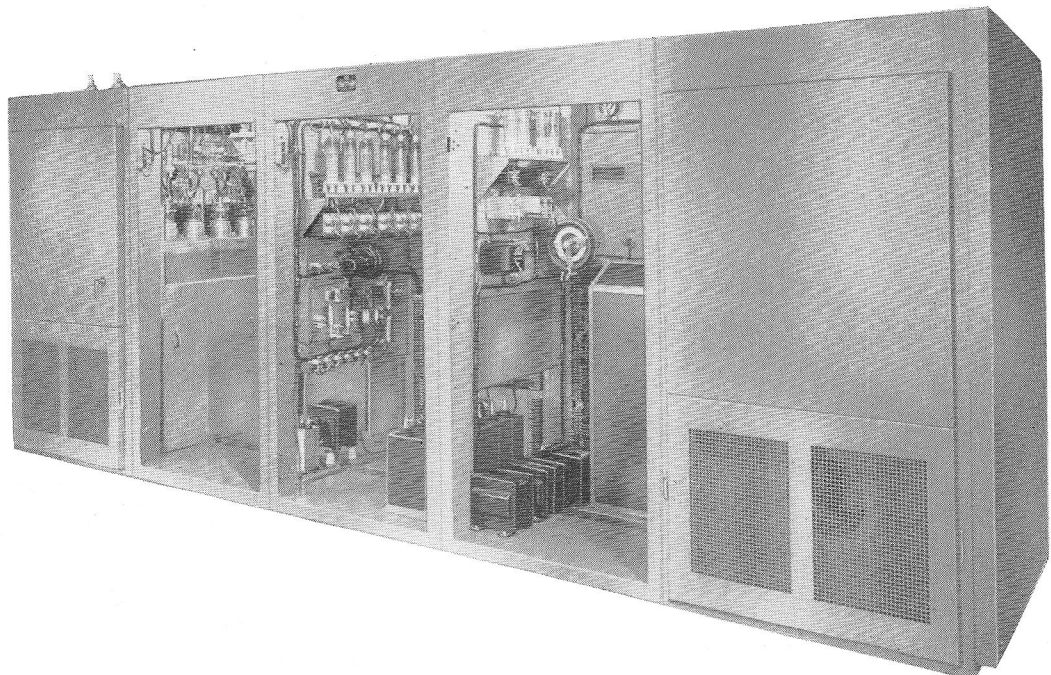
(Audio Section) (2) 6J7 1st audio, (2) 807 2nd audio, (2) 845 3rd audio, (4) 3X3000F1 modulators.

(Power Supplies) (12) 673, (6) 8008.

Total tubes: 37

Number of tube types: 10

**METERING:** Line current RF  
Plate volts RF  
Filament volts  
Primary volts  
Modulator plates (4 meters)  
Power amplifier plates (4 meters)  
Oscillator plate  
807 1st IPA plate  
6146 2nd IPA plate  
6146 2nd IPA grid  
4-250A 3rd IPA plate  
3-2500X3 grids (2 meters)  
6J7 plates (audio)  
807 plates (2nd audio)  
845 plates (2 meters) 3rd audio





## BC-20B SPECIFICATIONS

### MECHANICAL

**SIZE:** (less external transformers illustrated) — 210" wide, 49" deep, 78" high. Door swing, front and rear, 40". Floor space external transformers, 10'x2½'.

**WEIGHT:** Packed, 23,000 lbs. Net, 19,500 lbs.

**CUBAGE:** 720.

**FLOOR PLAN:** Please refer to index "Model HF-20B" high frequency model for floor plan, which is identical.

### EQUIPMENT SUPPLIED AS STANDARD

- 1 — Complete transmitter section (5 cubicles) ready to install, completely wired and assembled. Blowers are self-contained.
- 1 — Oil-filled modulation transformer\*.
- 1 — Oil-filled modulator reactor\*.
- 2 — Oil-filled power transformers\*.
- 2 — Oil-filled filter reactors\*.
- 1 — Complete 100% set of tubes.
- 1 — Crystal and oven.
- 2 — Instruction Books.

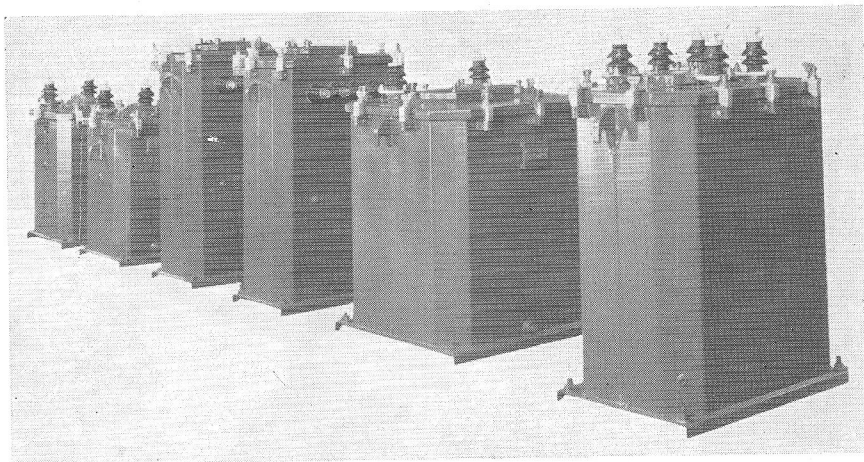
**NOTE:** BC-20B is a complete transmitter as listed above, ready to operate at the carrier frequency and RF output impedance you specify.

\* For indoor or outdoor service.

### ORDERING INFORMATION

|  |           |
|--|-----------|
| Transmitter complete as listed above ..... | BC-20B    |
| Extra crystal and oven .....               | JK-57M    |
| Spare 100% tube complement .....           | TK-139    |
| Single tower antenna coupler .....         | see index |
| Directional phasing equipment .....        | see index |
| Supervisory console (see Page 16) .....    | M-5120    |

These six heavy external units are part of BC-20B and may be indoor or outdoor mounted. From left to right: filter reactor RF high voltage, filter reactor modulator HV, power transformer RF, power transformer modulator, modulation reactor, modulation transformer.



**GATES**

# 5000 WATT AM BROADCAST TRANSMITTER

Model BC-5P



**New**, modern and accepted world-wide, the Gates BC-5P is endorsed by an illustrious list of satisfied users. Each of the 3 cubicles is independent from the other and each is individually cooled. The result is the coolest operating "Five" ever built. — Here is a transmitter that will meet the future rigid demands of low spurious radiation. — Quality is evident everywhere and Gates specialization in broadcast equipment manufacturing permits tooling and manufacturing processes that price-wise, are advantageous to Gates customers.



**GATES**

## BC-5P 5000 WATTS AM

Providing the industry with the very latest in modern transmitter design is a Gates enjoyable habit. — Here is a new and different broadcast transmitter . . . smaller in floor area, yet big as ever in cubical content. A 100% air cooled RF power plant strides many steps forward by cooling all of the important radio frequency components instead of only the power tubes.

Performance standards reach a new high! Lower spurious radiation looks to the obvious tighter demands as the electronic age expands. Every day reliability is the result of conservative component specifications and a 3-cabinet cooling system replacing the single blower.

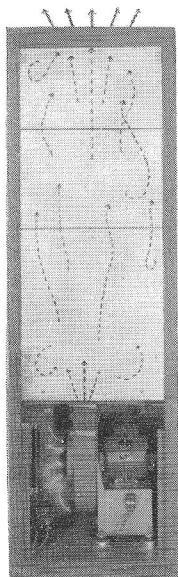
Lower tube cost is twofold in both the lowest dollar cost for a 100% tube complement and longer tube life through the advanced cooling system and high efficiency.

Fidelity, or what the listener often refers to as rich tonal quality, is far more than wide and uniform frequency

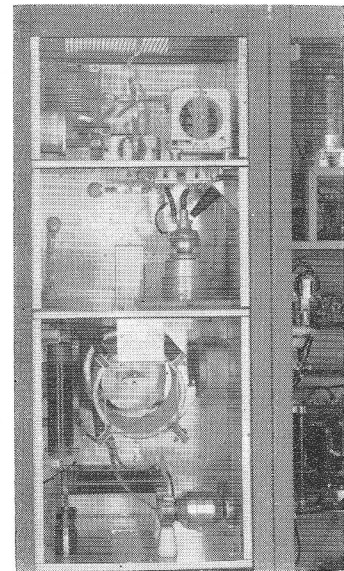
response. In the Gates BC-5P transmitter, careful attention has been given to intermodulation, assured day to day low noise without resorting to selected tubes or tedious circuit balancing and other vital elements such as stability, low carrier shift and attention to audio transformer design in line with extremely low leakage reactance and phase shift to move low distortion into a normal expectancy without unusual transmitter adjustments or maintenance.

Mechanically, BC-5P is modern in styling and yet conservative in appearance. Front access doors slip in place. Rear doors are full length of the latch-on type. There are no external components of any kind—BC-5P is 100% self-contained.

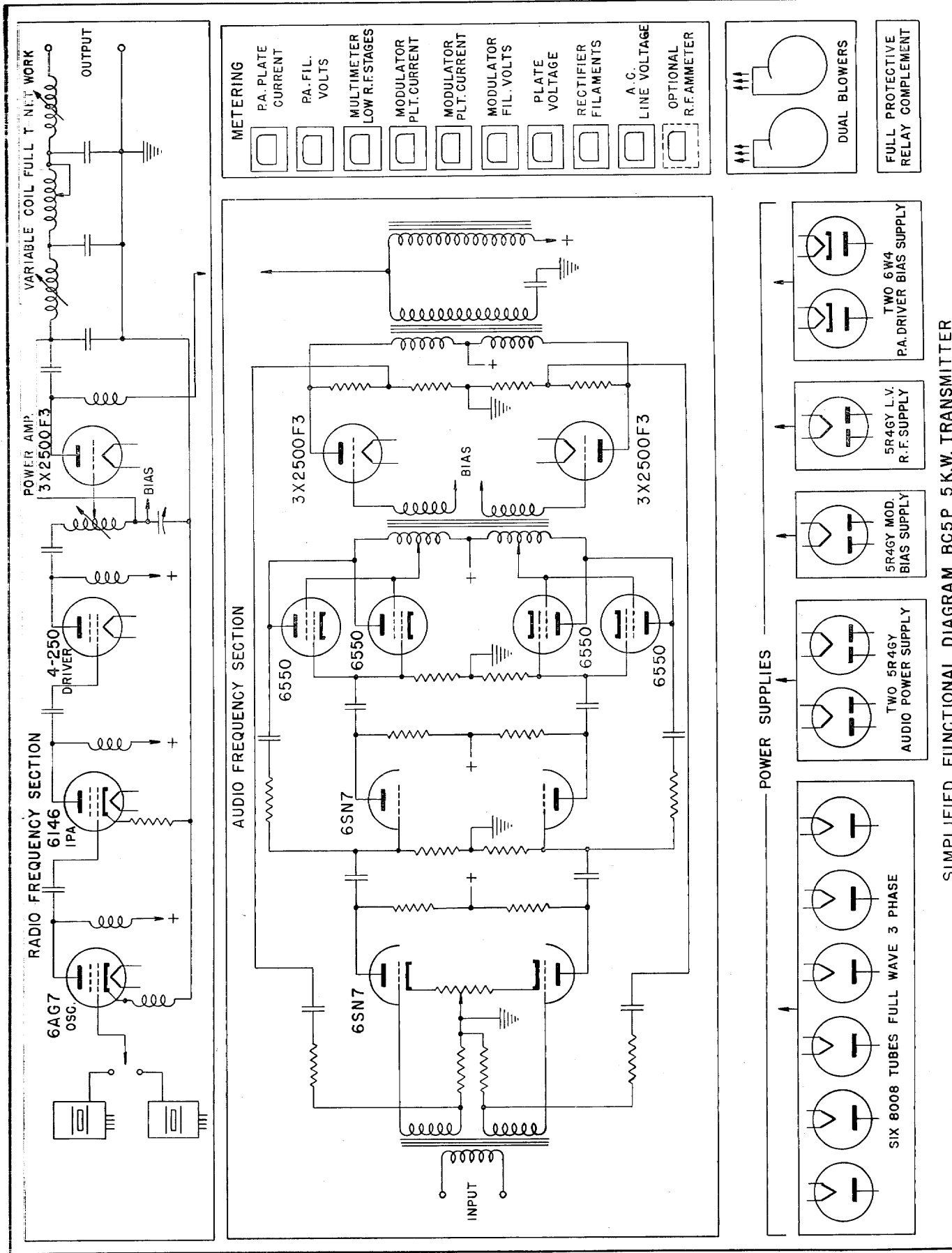
BC-5P is an engineer's transmitter. Nothing has been left wanting while much has been incorporated to become a pleasant surprise. Only Gates could build so fine a product at so modest a price because with Gates, broadcasting equipment is a major endeavor and **not a side line.**



Open (right) and closed (left) views of the BC-5P radio frequency section. Dotted lines in left illustration indicate flow of filtered air around all components in the right open illustration. This total shielding for spurious radiation becomes a cool air chamber for many parts that will now be trouble-free.

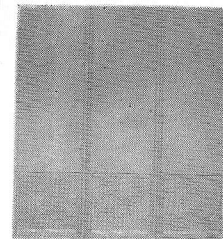
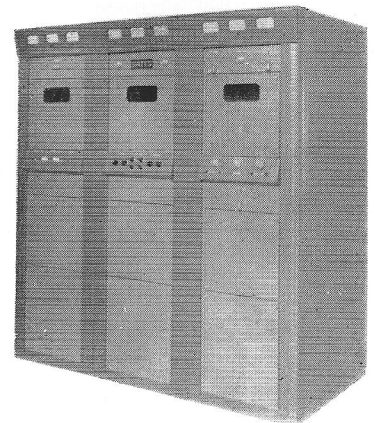






SIMPLIFIED FUNCTIONAL DIAGRAM BC5P 5K.W. TRANSMITTER

**GATES**



## MODEL BC-5P 5KW

(continued)

**RADIO FREQUENCY SECTION:** In the above rear view, the RF section is the left cubicle. As each cubicle is mechanically independent of the other, the RF cubicle could also be to the right or completely separate. In this way, the RF section may be placed exactly convenient to the desired phasor location or transmission line exit from the building. — Headed by dual vacuum type crystals requiring neither oven, thermometer nor thermostat, the four RF stages are self-neutralized except the triode 3X2500F3 power amplifier. — The final tank plus the complete 2-coil Tee output coupling network is variable coil tuned, eliminating chance for arc over. The squirrel cage blower at the bottom cools this cubicle only and places every major component under forced air.

**AUDIO SECTION:** This cubicle can be moved from left to right too. A second independent cubicle is forced air cooled by another blower identical to that in the RF cubicle. Four stages, all push-pull, feature an ultra linear driver amplifier, known world-wide as the ultimate in

low distortion audio. Modulators are Class B 3X2500F3 tubes and are interchangeable with the RF power amplifier. Overall feedback from the modulator plates to the input stage grids, adds to the excellent performance possible even without feedback.

**POWER SUPPLIES:** Five power supplies include (a) the six tube, full wave, 5000 volt, high voltage supply, (b) audio driver supply, (c) RF driver supply, (d) modulator bias supply, and (e) RF bias supply. All are well regulated and excellently filtered power supplies of the highest order.

**PROTECTIVE:** A complete relay complement for overload start-stop, interlock and condenser discharge. Air pressure switches replace the older damper type interlock to supply 100% protection in case of failure.

**REMOTE CONTROL:** The use of relays in the protective system is a natural adjunct for easy attachment of remote

(continued next page)

**GATES**

## MODEL BC-5P 5000 WATTS

(continued)

### REMOTE CONTROL (continued)

control. As circuit breakers are not used in major control circuits, alterations, either mechanical or electrical, are negligible.

**RECYCLING:** In case of overload the transmitter automatically places itself back on the air until overload has been determined permanent, an indispensable feature for both attended and unattended operation.

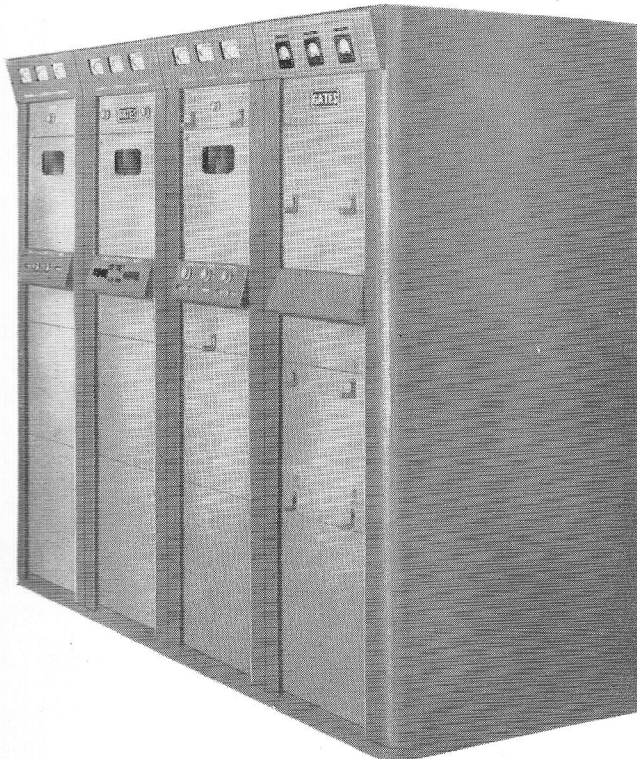
**COOLING:** RF cubicle and modulator cubicles have individual shock mounted impeller type blowers developing 270 CFM at 1.4" pressure. Power supply cubicle has exhaust fan in top. All motors are single phase for easy maintenance.

**STYLING AND CONSTRUCTION:** Attractively finished in two-tone. Base color medium dark gloss gray, hand

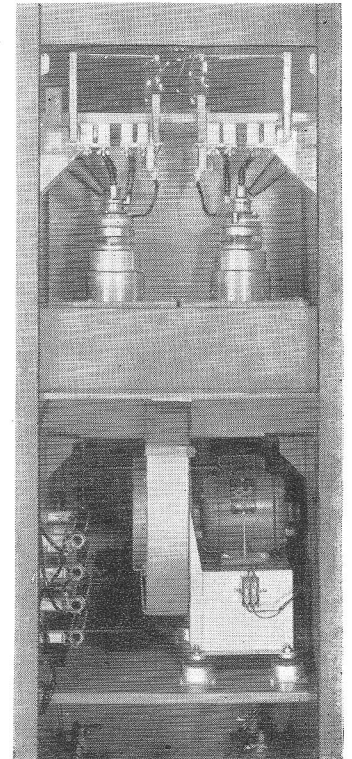
rubbed with second tone in medium light gray. Control knobs in anodized aluminum and knurled for firm gripping. — Other colors available on special order. — Top meter panels tilt forward and down for ease in viewing. Center control panels tilt forward and up for ease in handling. — Parts provided for viewing tubes. Front panels of semi-hinged type are instantly removable for servicing. Three back doors of latch-on type conserve space. Three cleanable air intake filters are removable without turning off transmitter.

**SIZE AND WEIGHT:** Several floor plan layouts are provided on subsequent pages. Features conservative floor space. 78" high, 39½" front to back, 73½" wide. With no swinging doors either front or back, only minimum aisle clearance required. Net weight 2186 lbs., packed weight 2970 lbs. Cubage, 198.

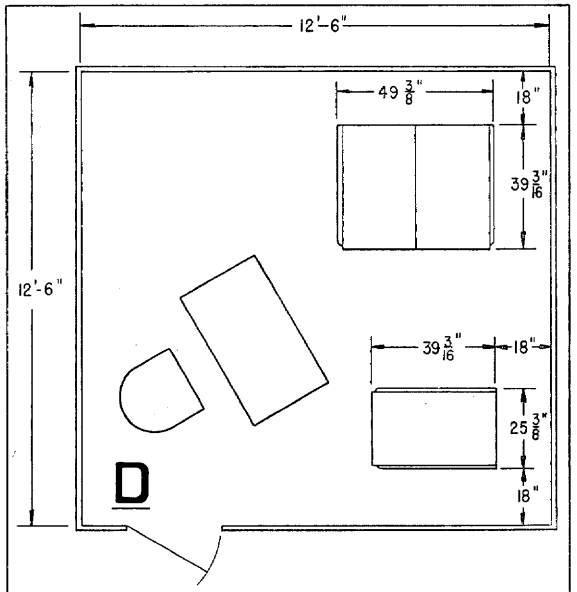
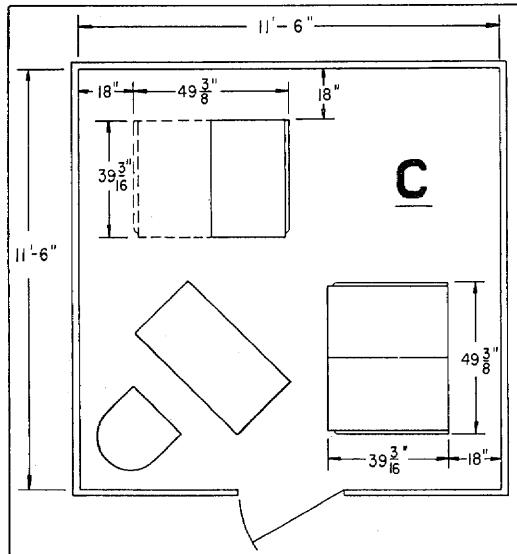
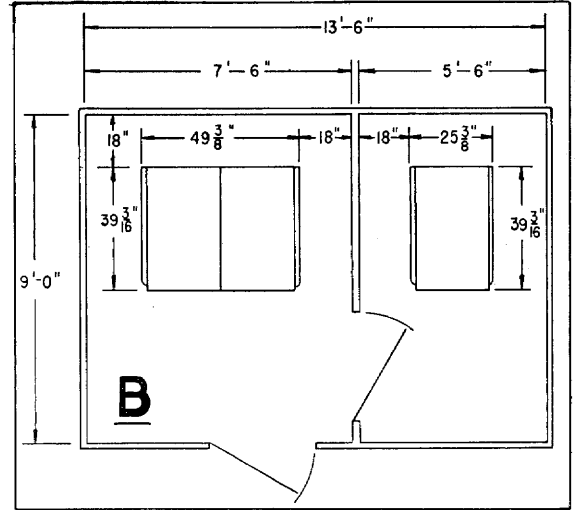
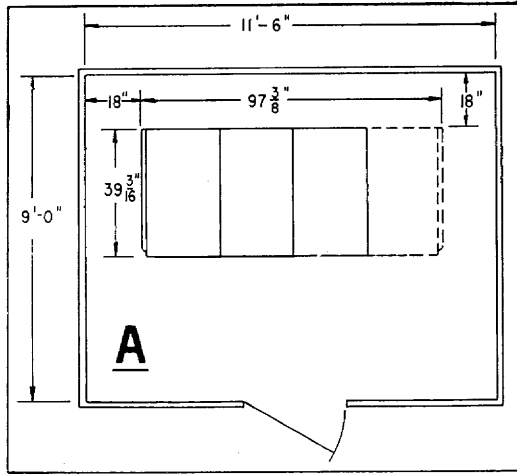
Below: BC-5P 5000 watt transmitter with single cubicle phasor added. As each transmitter cubicle is mechanically independent of the other, phasor and RF cubicle may be to left or right. Floor space is 8' 1½" x 3' 3½" deep.



Below: Partial rear view of modulator cubicle, illustrating dual 3X2500F3 modulators and 270 CFM impeller type blower. Note entire blower assembly is shock mounted.



**BC-5P AND BC-10P VERSATILE FLOOR PLANS**



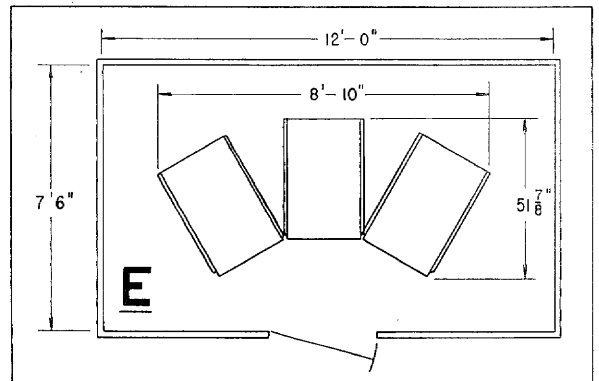
Shown above are four typical floor arrangements for Models BC-5P and BC-10P, which are identical in width and depth.

**FIG A:** Three cubicles comprise the transmitter. The fourth (dotted line) may be either a phasor or extra RF cubicle for Conelrad or standby. The RF cubicle and phasor may be to the left or right side, as preferred. Note very small floor area even with extra cubicle added.

**FIG B:** Often when increasing power to 5KW the transmitter building is too small. As each cubicle in BC-5P or BC-10P is independent, they may be moved around as desired. Here, one of the BC-5P cubicles has been placed in the tool or bunk room. This may also be a simple lean-to added to the present building.

**FIG C:** In this arrangement a square building accommodates 2 cubicles on one side of the room and 2 cubicles at 90° angle. In this way, a complete transmitter plus phasor will install in the most cramped quarters, leaving ample room for a rack or audio, monitor and remote control equipment. As both front and back doors are of latch-on type, provision for door swing is unnecessary.

**FIG D:** Another method of BC-5P and BC-10P installation. Floor space, in this arrangement, is kept to an absolute minimum. Actually most 250 watt buildings will accommodate this arrangement.



**FIG E:** Here is something different in 5 and 10KW floor arrangements. Only Gates design permits a semi-horseshoe floor plan. Only Gates has independent cubical design where cooling and electrical construction is complete in each cabinet or cubicle and wire jumpers between cubicles is the only necessity for complete operation.





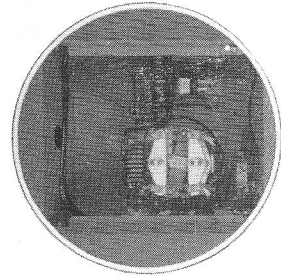
# BC-5P SPECIFICATIONS

- RATED POWER OUTPUT:** 5000 watts.
- CAPABLE POWER OUTPUT:** 5600 watts.
- POWER INPUT:** 230 volts, 3 phase, 50/60 cycles.
- POWER DEMAND:** Carrier, 11KW. Average modulation, 12½KW.  
100% modulation, 17KW.
- POWER REDUCTION:** Carrier reduction to 1KW.
- POWER FACTOR:** 90%.
- CARRIER SHIFT:** 3% or less at 100% modulation.
- IMPEDANCES:** Audio input, 600/150 ohms at -5 dbm.  
RF output, 40-270 ohms, as ordered.
- FREQUENCY RANGE:** 535-2000 kc, as ordered.
- FREQUENCY STABILITY:** ±5 cycles.
- AUDIO RESPONSE:** Average programming ±1½ db, 30-12,000 cycles.  
Where ordered, transmitter will be supplied to maximum high frequency response of 7500 cycles to meet proposed new FCC regulations for lower sideband radiation.
- AUDIO DISTORTION:** 3% or less, 50-7500 cycles at 95% modulation.
- INTER-MODULATION DISTORTION:** At 90% modulation typical inter-modulation of 3% at 60 and 7000 cycles is measured.
- NOISE:** 60 db or better below 100% modulation at 5KW power.
- YOUR BONUS:** As BC-5P transmitter is made for both 50 and 60 cycles, all transformers are made larger to cope with 50 cycle needs. This is a bonus safety factor for 60 cycle users and assures prompt delivery to our many 50 cycle customers.
- FCC REQUIREMENTS:** 99% of usable sideband power has been confined to a bandwidth corresponding to the proposed new FCC regulations. Complete shielding of power amplifier/loading components including power tube assures much lower spurious radiation with the eye to meeting new regulations. It is believed the Gates BC-5P transmitter will meet possible revised FCC regulations now under consideration.
- CONELRAD:** As each radio frequency cubicle is independent to the overall transmitter, a second RF cubicle for Conelrad may be purchased at less cost than a separate Conelrad transmitter. Simple instantaneous relay switching to Conelrad.
- WEIGHTS AND CUBAGE:**  
Net weight: 2610 lbs.  
Gross weight: domestic packed, 3040 lbs.  
export packed, 3390 lbs.  
Cubage: 321.



The 3X2500F3 tube is used in both RF and modulator service. — Tube complement for the BC-5P is lowest cost of any "Five" manufactured today.

Below: A single solenoid relay in the Conelrad RF cubicle is push button operated to change from the main RF section to Conelrad.



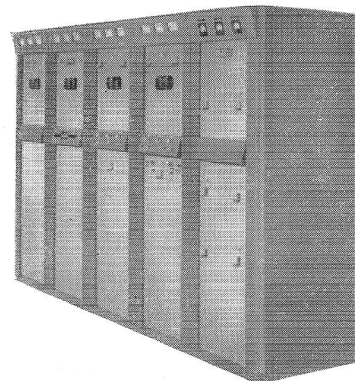
## ORDERING INFORMATION

|   |         |
|---|---------|
| Model BC-5P transmitter complete with one set of tubes, crystal and to carrier frequency and RF output impedance as ordered ..... | M-5565  |
| Extra RF cubicle for Conelrad or standby. Includes inbuilt automatic changeover solenoid relay, less tubes and crystal** .....    | M-5190A |
| 100% spare tube kit .....   | TK-248  |
| FCC spare tube kit .....  | TK-259  |
| Spare crystal with vacuum holder .....  | M-5602  |
| Phasing equipment .....   | Custom  |
| Right-hand end bell and style trim* .....   | M-5600  |
| Left-hand end bell and style trim* .....  | M-5601  |

\* Only needed where cubicles are separated for installation.

\*\* State frequency and output impedance when ordering. Order M-5602 crystal to frequency. Tubes for Conelrad are usually spare tubes where 100% spare tube kit TK-248 is on hand.

Five-cubicle transmitter may consist of basic transmitter plus Conelrad RF cubicle and phasor. Same arrangement could be transmitter plus two-cabinet phasing equipment.



**GATES**

# 10,000 WATTS BROADCAST—NEW MODEL BC-10P



For the **satellite age** a new 10,000 watt broadcast transmitter! Modern design all the way with the emphasis on wide frequency response to satisfy the discriminating music lover, less floor space to permit a power jump in the same building facilities and low operating cost via reliability for lesser maintenance and lowest tube replacement cost.

BC-10P is another Gates product pleasing to the budget maker. The cost is modest by reason of the extensive planning for production. Known as **manufacturing engineering**, production talent and engineering skills join together for a better product to be constructed under advanced manufacturing methods in one of the industry's most modern electronics factories.



## BC-10P 10,000 WATT BROADCAST TRANSMITTER

Good broadcast transmitters must meet basic Federal Communications Commission requirements. The BC-10P transmitter generously exceeds these requirements. The specifications on Page 40 and the block diagram on Page 41 will provide the excellent circuit design and performance expectations for this transmitter. Let's then look at the above expectancy portion of BC-10P.

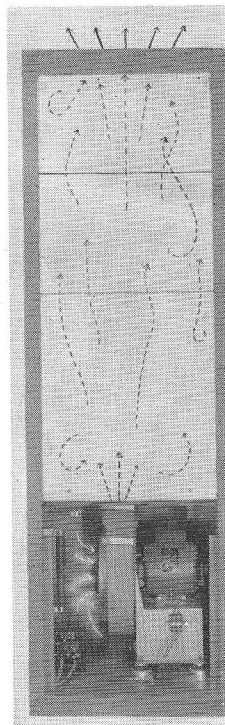
**HARMONIC RADIATION** is realistically reduced by constructing the entire radio frequency section within a heavy aluminum enclosure. This is known as elimination of cabinet radiation, otherwise serious in higher powered transmitters. — The tank circuit includes a full Tee network, coil tuned and void of variable capacitors. It is believed no 10 KW transmitter will equal the low potential harmonic radiation of the BC-10P transmitting plant.

**FIDELITY** of the BC-10P transmitter extends to 15,000 cycles. Where adjacent channel conditions will not permit 15,000 cycle response, this may be reduced to meet FCC requirements. Low distortion is even more important to high fidelity than wide frequency response. The use of cathode follower audio drive, overall audio feedback and over-powered RF grid drive assures day to day low distortion without exhaustive alignment and balancing. Not to be overlooked is the use of low impedance modulator tubes where transformer ratio between modulator plates and Class C amplifier impedance is near unity and conducive to best audio transfer at high efficiency and lower distortion.

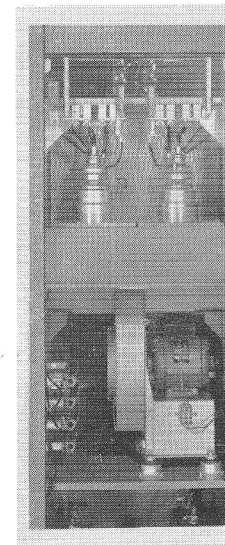
**COOLING:** Many factors are associated with reliability. Cooling is the most important. The BC-10P transmitter incorporates individual cooling for each of the three cubicles comprising the entire equipment. Instead of one master blower, as in older models, where hot air could be spilled into another part of the transmitter, BC-10P has three sealed separate air chambers, each cooled separately. In this way, all air from the filtered intake at the base of each cubicle is sent thru to the top exhaust point quite like the up draft of a fireplace. Components in the RF section are cooled with the tubes, remembering the RF section is in an aluminum chamber. — There is no cooler operating 10 kilowatt than the Gates BC-10P.

**TUBES AND LIFE:** Though the BC-10P has the lowest cost tube complement of any 10 KW broadcast transmitter, of much greater value is the long tube life and tube interchangeability. — Major recognition must be given to interchangeability of RF power amplifier and modulator tubes in both maintaining highest performance standards and ability to obtain the last ounce of tube life through interchangeability. But again, the masterful cooling system plays a major part in tube life. The torrent of BC-10P air develops the longer tube life from the lowest cost tube complement.

**REMOTE CONTROL:** Whether attended or unattended, the engineer should note the 100% relay complement and absence of circuit breakers in control circuits. To adapt to remote control is as simple as making the connections. No major mechanical alterations or addition of control relays is necessary if remote control is in your operating picture. Remote control systems are listed on Pages 89-93.



Rear closed view of the stream through the aluminum enclosed RF section. blower brings in cool filtered air. On its way to cool the power tubes, this passes by capacitors, ducts and other components to add to reliability.



A partial rear view of modulator cubicle. Here other blower nearly smother the tubes in air. There is way for warm air to pass into an adjoining cubicle.



**GATES**

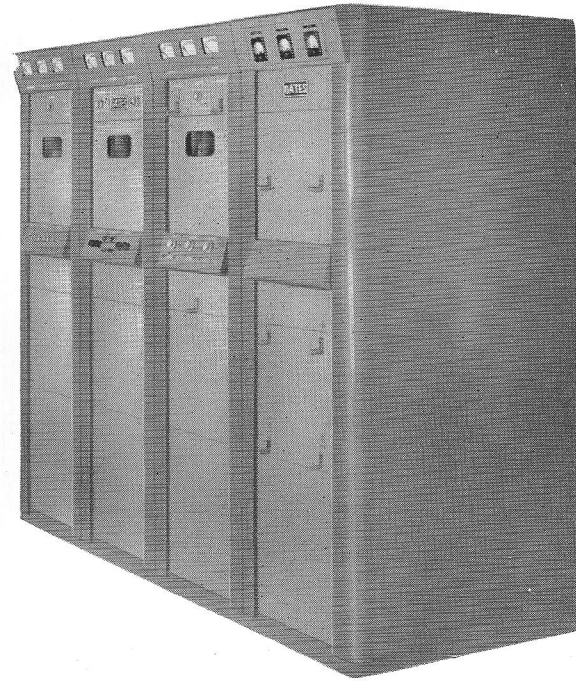
## BC-10P 10,000 WATTS

**SELF-CONTAINED:** BC-10P is 100% self-contained and requires no external transformers or cabinets other than illustrated.

**REPLACEMENT AREA:** Those increasing power or replacing existing equipment will note the floor space area is 73½" wide and 39½" deep. Back doors are of the latch-on type and no door swing allowance is necessary. Even older model 1KW transmitters often nearly consumed this area. Installation of BC-10P may be made in nearly all buildings housing lower powered equipment at the present time.

**OSCILLATOR:** New vacuum mount ovenless crystals are used with pin-point accuracy. There is provision for two.

**INSTALLATION VERSATILITY:** In BC-10P design, each cubicle is independent and only connected together electrically. The cubicles may be installed as desired. If the RF cubicle installs better as the left instead of right cubicle, install it that way. Cubicles may even be installed at right angles or opposite to save floor space or add to convenience.



Gates BC-10P transmitter with 2-tower directional phasing equipment as right cabinet. Phasors with any number of elements can be supplied in matching cabinet or cabinets.

### SPECIFICATIONS

**STYLING AND CONSTRUCTION:** Beautifully finished in two-tone. Base color: dark industrial gray, with second color in semi-gloss rose gray. Control knobs in anodized aluminum and curled for firm gripping. — Other colors available on special order. — Top meter panels tilt forward and down for ease in vision. Center control panels tilt forward and up for ease in handling. — Parts provided for viewing tubes. Front panels of semi-hinged type are instantly removable for servicing. Three back doors of latch-on type conserve space. Three cleanable air intake filters are removable without turning off transmitter.

**SIZE AND WEIGHT:** Features conservative floor space. 78" high, 39½" front to back, 73½" wide. With no swinging doors either front or back, only minimum aisle clearance required. Net weight 2650 lbs., packed weight 3400 lbs. Cubage 198.

**RF POWER PLANT:** Single ended dual 3X2500F3 air cooled power stage feeds full-fledged Tee network. Tank and load tuning by variable coils. Optional RF ammeter in direct electrical circuit visible through port. Dual vacuum mount crystals excite untuned Colpitts oscillator. 6146 IPA and 4-250A tetrode drives 3X2500F3 power amplifiers. Maximum output power of 10,600 watts accommodates most complicated multi-tower phasor. Complete RF section is in right cubicle.

**AUDIO:** Four push-pull stages with overall feedback. Dual 3X2500F3 modulators interchangeable with RF power amplifier. Audio driver is cathode follower design. Modulator/audio section in left cubicle.

**POWER SUPPLIES:** Four in all, 3 low voltage supplies plus 3 phase full wave (six 673 tubes) main power supply.

**RECYCLING:** In case of overload, transmitter automatically recycles and places itself back on air. A rapid succession of overloads removes the high voltage. For remote control, this feature indispensable.

**PROTECTIVE DEVICES:** Full overload, start, stop and interlock protection of relay type. No electrical or mechanical alterations necessary for adapting to remote control.

**CONSTRUCTION:** Built in 3 separate independent cubicles that may be either joined together or, where space is at a premium, one of the cubicles may be at right angle or even in a separate room. Each cubicle independently cooled to prevent warm air from one cubicle spilling over to adjoining cubicle.

**COOLING:** Two squirrel cage shock mounted blower cool RF and modulator cubicles including tubes. Exhaust fan installed in ceiling of rectifier cubicle. Single phase motors are used for easy servicing and maintenance.





# BC-10P 10,000 WATTS

**TUBES:** (2) 12BY7A osc./isolation buffer, 6146 IPA, 4-250A RF driver, (2) 3X2500F3 RF power amplifiers, (5) 5R4GYA LV power supply rectifiers, (6) 673 HV power supply rectifiers, (2) 6W4 hold bias rectifiers, 6SN7 first audio, (2) 6BG6 second audio, (4) 6528 cathode follower driver amplifiers, (2) 3X2500F3 modulators.

**CONELRAD:** As each radio frequency cubicle is independent to the overall transmitter, a second RF cubicle for Conelrad may be purchased at less cost than a separate Conelrad transmitter. Simple instantaneous relay switching to Conelrad.

**RATED POWER OUTPUT:** 10,000 watts.

**CAPABLE POWER OUTPUT:** 10,600 watts.

**POWER INPUT:** 230 volts, 3 phase, 50/60 cycles.

**POWER DEMAND:** Carrier, 18KW. Average modulation, 21KW. 100% modulation, 26KW.

**POWER REDUCTION:** Carrier reduction to low power (2500 watts) for tune-up. Other power reductions on special order.

**POWER FACTOR:** 90%.

**CARRIER SHIFT:** 3% or less at 100% modulation.

**IMPEDANCES:** Audio input, 600/150 ohms at 0 dbm. RF output, 40-270 ohms, as ordered.

**FREQUENCY RANGE:** 535 Kc to 2000 Kc as ordered.

**FREQUENCY STABILITY:**  $\pm 10$  cycles (typical  $\pm 2$  cycles)

**AUDIO RESPONSE:**  $\pm 1\frac{1}{2}$  db, 30-10,000 cycles at 95% modulation.  $\pm 1\frac{1}{2}$  db, 30-15,000 cycles under typical programming conditions.

**AUDIO DISTORTION:** 3% or less 50-7500 cycles at 95% modulation including all harmonics to 45,000 cycles

**NOISE:** 60 db or better below 100% modulation.

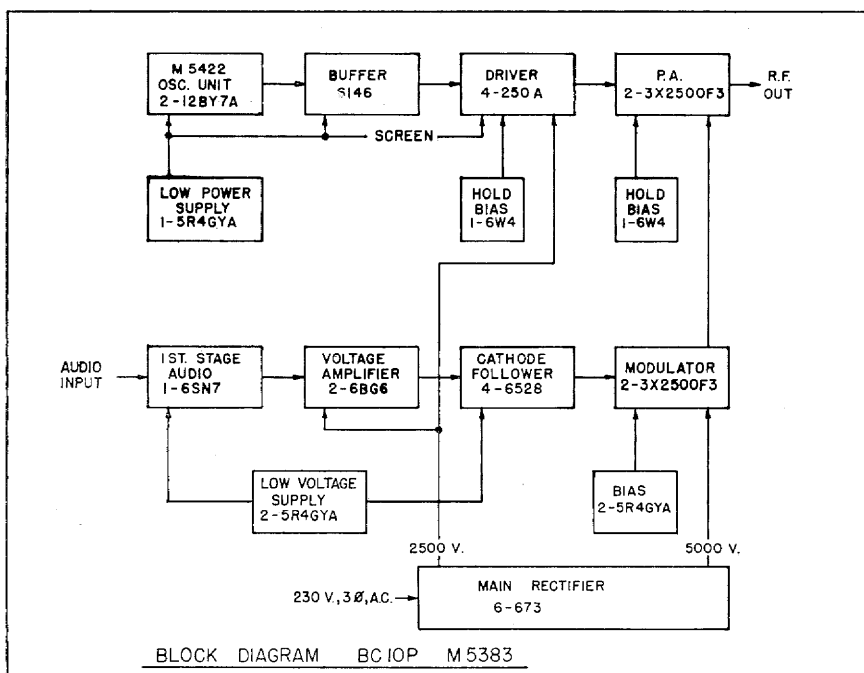
**SIZE:** 73 $\frac{1}{2}$ " wide, 39 $\frac{1}{2}$ " deep, 78" high. Largest cubicle (for door entrance) 27 $\frac{3}{4}$ " x 39 $\frac{1}{2}$ " x 78" high.

**YOUR BONUS:** As BC-10P transmitter is made for both 50 and 60 cycles, all transformers are made larger to cover with 50 cycle needs. This is a bonus safety factor for 60 cycle users and assures prompt delivery to our many 50 cycle customers.

## ORDERING INFORMATION

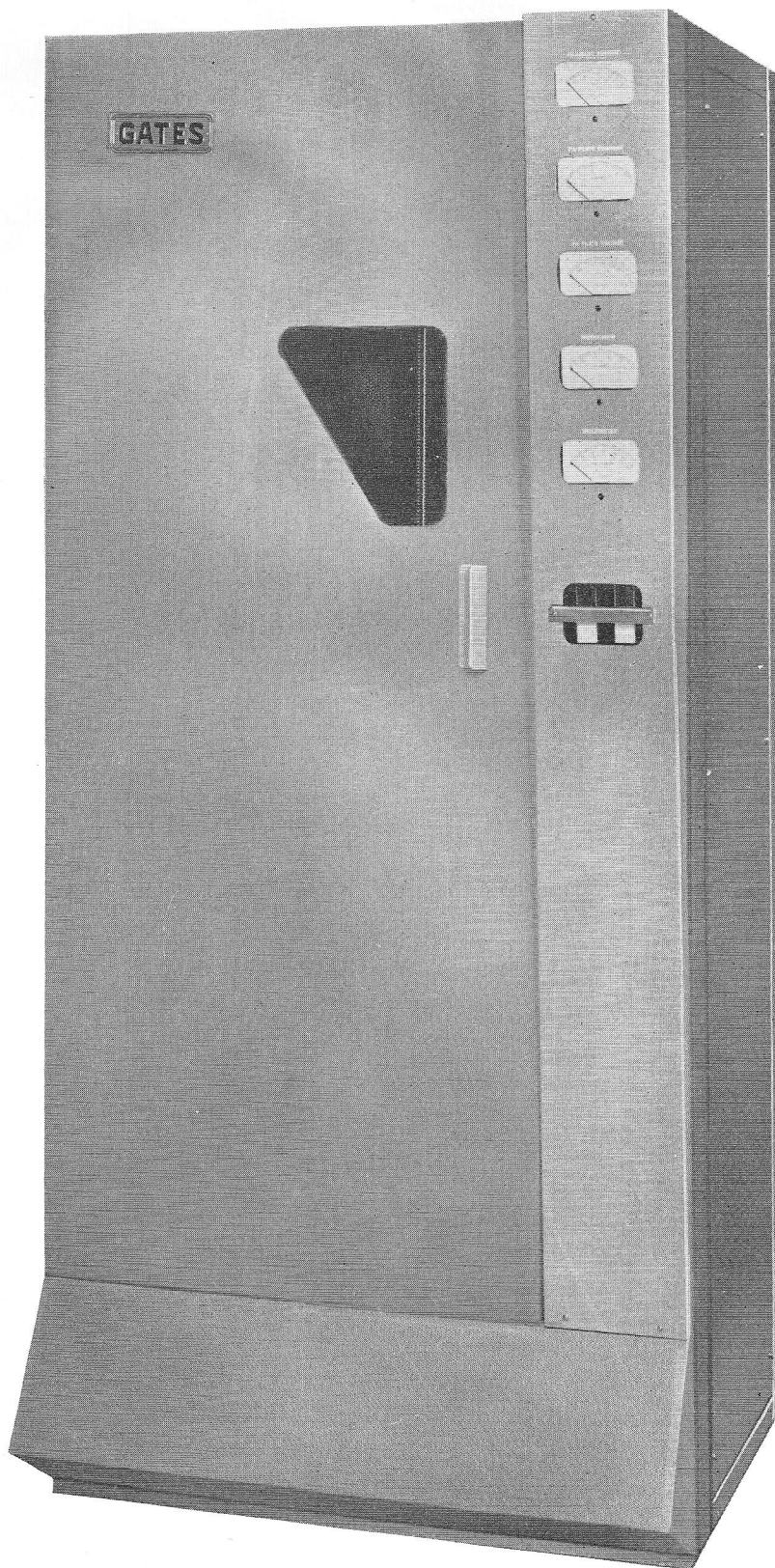
|  |               |
|--|---------------|
| Transmitter complete with one set of tubes and one crystal ..... | <b>BC-10P</b> |
| Spare crystal and vacuum mounting .....                          | <b>A30866</b> |
| 100% spare tube kit .....  | <b>TK314</b>  |
| FCC required spare tube kit .....                                | <b>TK315</b>  |

NOTE: Kindly state carrier frequency and RF output impedance, when ordering.



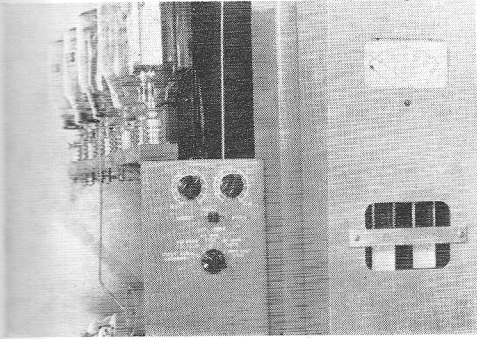
**GATES**

**MODEL BC-1T 1000 WATT BROADCAST TRANSMITTER**





## MODEL BC-1T — THE ENGINEER'S TRANSMITTER



Again Gates engineers have provided the one kilowatt broadcasting industry **the transmitter of tomorrow!** — Entirely new in electrical design, all new in functional design and styling, a new high in performance standards with the **big plus** of the extra features only found in Gates. These features largely came from your suggestions and the result is **the engineer's transmitter.**

**THE INBUILT DUMMY ANTENNA** was suggested by many broadcast men. "We want a way to do off-the-air testing that is positive, reliable, accurate and quick," they said. Now, for the first time, comes a transmitter, the Gates BC-1T, which offers this important exclusive.

**THAT BOTHERSOME BACK DOOR** consumes wasted floor space. "Let us have a transmitter 100% serviceable from the front," was a repeated suggestion. First again, comes a transmitter fully accessible from the front.

**"FREQUENCY STABILITY** must certainly be possible," broadcasters said, "without the crystal oven, thermostats and thermometers." BC-1T has dual vacuum type crystal units with pin-point stability and without ovens, thermostats and thermometers.

**FIRST AGAIN** is a broadcast transmitter with the uniformity and positive results of printed wiring. Here results are always the same. This tremendous plus tells the maintenance engineer his work is easier and management the initial cost is lower through technological progress.

**HIGH FIDELITY** is often correctly thought of as wide frequency response. In BC-1T is added **lower distortion** and lower noise. BC-1T distortion is more frequent in the one percent range and noise in the lower sixties. The result is **all the way** high fidelity or what the listener calls — "Right nice!"

**AND RELIABILITY** comes only through the big design. A glance at the inner cabinet tells the story. Big, husky Gates-built edgewise tank and Tee network coils, scientific design for cooling, replaces the hodge-podge of indiscriminate assemblage of components and big transformers that invite 24-hour schedules.

**ISN'T IT TRUE** that a well built transmitter inside becomes a handsome product outside? Modern styling of BC-1T was a natural as the inside electrical styling is so symmetrical. Indeed, the Gates BC-1T radiates modernism in today's modern broadcasting station.

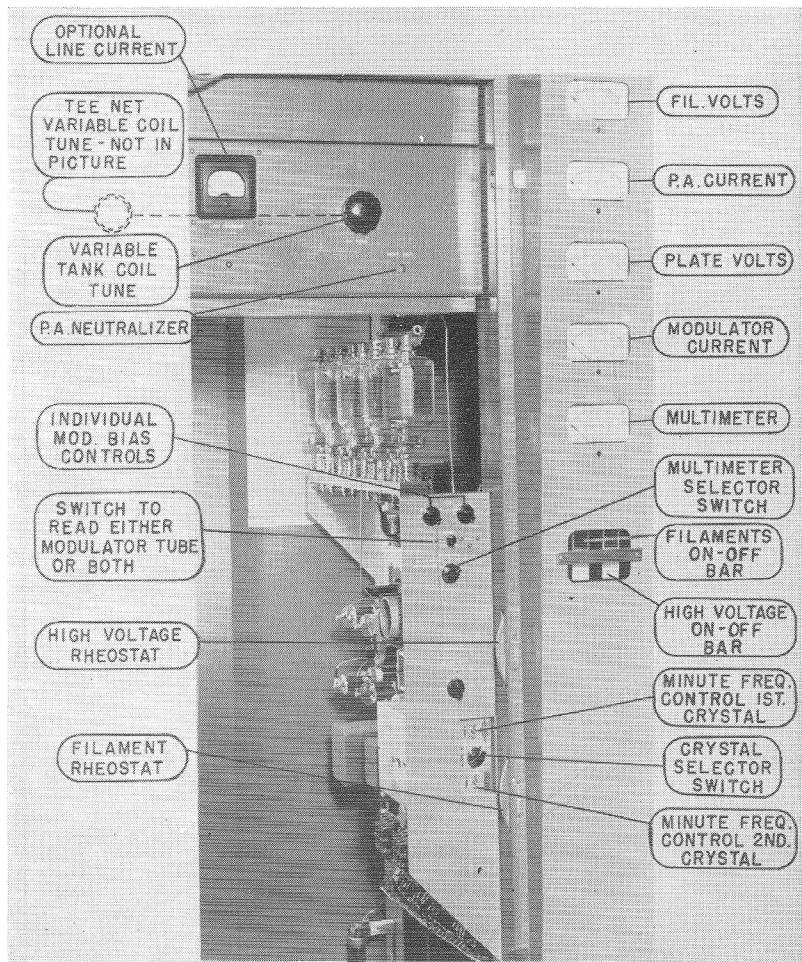
**LITTLE THINGS** are important too. The tilted vertical meter panel, illuminated bar type Off-On controls, magnetic front door catches and concealed tuning controls — to mention a few. But the **big performance** is BC-1T's claim to fame. Like the many one kilowatt predecessors of the Gates line, BC-1T is certainly the engineer's transmitter. "Dependable performer" — "Well done" will be its historical note.

**GATES**

## GENERAL DESCRIPTION MODEL BC-1T (1000 Watt Broadcast Transmitter)

**CONSTRUCTION** is in a heavy 16 gg. steel cabinet, rigidly reinforced and attractively styled. Meter panel slopes forward for ease in observation and gives the added touch for today's modern radio age. A full length front door is held closed by magnetic door catches. Behind the front door is a full length perforated screen, interlocked for personnel protection but affording full view of components from top to bottom, with the transmitter in operation. This perforated screen may be removed in seconds by means of snap locks. — All operating controls are instantly accessible by opening the door. — At the bottom front is a full width filtered air intake grill. Exhausted air is brought out of the top by dual exhaust fans. Though the back of the transmitter is quickly removable, there is no need to do so as all servicing is accomplished from the front. With this design exclusive, the transmitter may be located near or against the wall with great savings in floor space and the convenience of more usable room in the transmitter building. The cabinet side is also removable. Though the need is unlikely, every part may be reached, down to the smallest resistor, in seconds. — BC-1T is the **engineer's transmitter.**

**OPTIONAL LINE CURRENT:** The word optional refers to the range of the meter.





## GENERAL DESCRIPTION MODEL BC-1T

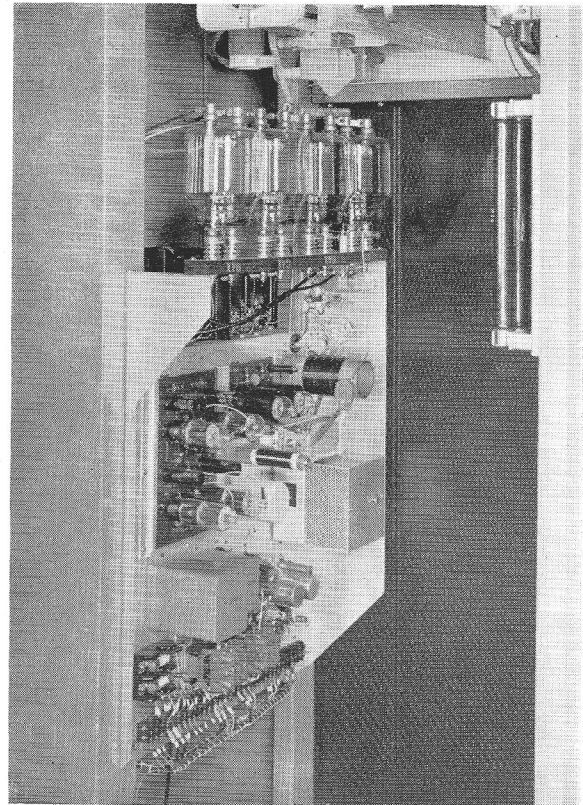
**FOR OFF AIR TESTING**, Gates offers for the first time, the inbuilt dummy antenna that will handle the full 1000 watts power 100% modulated. For the new station yet to go on the air, complete tests may be made even before the tower is up, often saving hours of time. — The station already on the air will find this feature indispensable. Regular maintenance becomes a pleasure. Testing may be done any time instead of awaiting the wee hours of after midnight. A light indicates when the dummy antenna is in use to omit possibility of leaving dummy antenna in the circuit for regular broadcasting.

**LISTENABILITY** is defined as that unusual rich quality that holds listeners to BC-1T dial spots. The combination of cathode follower, a modulation system that modulates both the Class C and driver amplifiers and overall feedback, results in a new distortion low. — Prototype BC-1T transmitter actually produced 50 cycle distortion as low as one-half of one percent. As a result, production models may be easily held in the one percent range. This is **listenability**. The frequency response has been gently tilted up at 50 and 10,000 cycles to balance often found response losses in other parts of the overall broadcasting system. The total **at the receiver** result is a sales producing transmission.

**PRINTED WIRING** is uniformity. Wiring is always errorless. More important is reliability. No wires to chafe or deteriorate in the more critical circuits of the transmitter. Do not confuse printed wiring with printed circuit. In BC-1T there are no printed components — only printed wiring. The oscillator — IPA unit, RF driver section, audio amplifier section and feedback ladder are all printed wiring. — In maintenance and point to point

checking, the engineer will not overlook the tremendous advantage of printed wiring with no wires or parts stacked on top of each other and the realization "the wiring is errorless" today and in years to come.

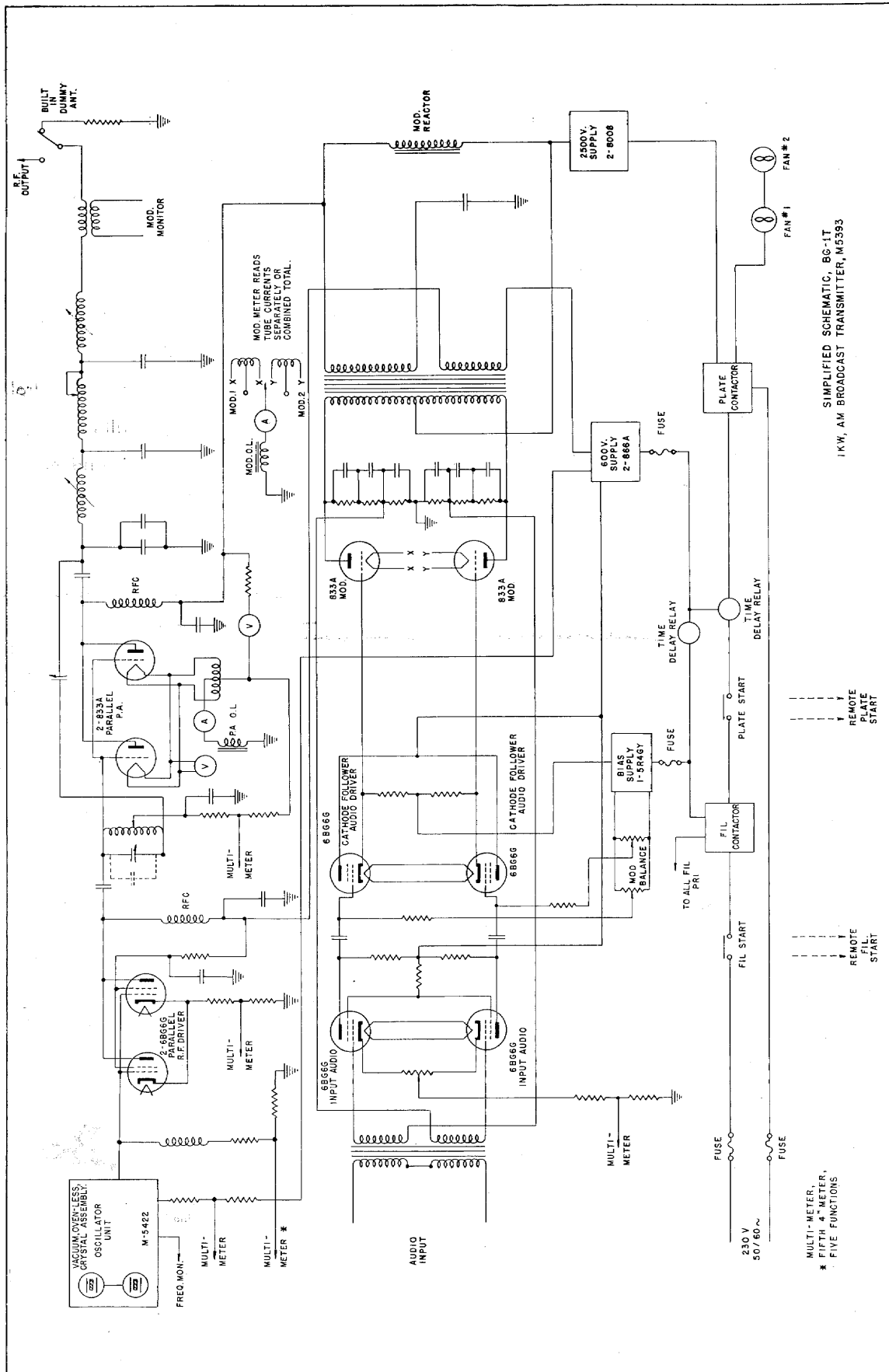
**LOCAL REMOTE CONTROL** is handled entirely by relays. No hard to adapt circuit breakers are employed. Terminals are incorporated for attachment of filament on-off and high voltage on-off for remote control. Overload relays and time delay relays are all of the type and circuit which assures positive protection and easy adaptation to remote control.



The clean electrical lines of the Gates BC-1T transmitter assures ease of servicing never before attained. Parts stacking is entirely absent.

**COOLING:** Across the bottom front is a full width grille behind which is a replaceable air filter. In the top of the cabinet are two quiet operating suction fans. One of these

(continued on Page 4)



D-22120

Functional diagram of the Gates BC-1T, 1000 watt transmitter, has been simplified for easy reading.

## GENERAL DESCRIPTION MODEL BC-1T

### COOLING (continued)

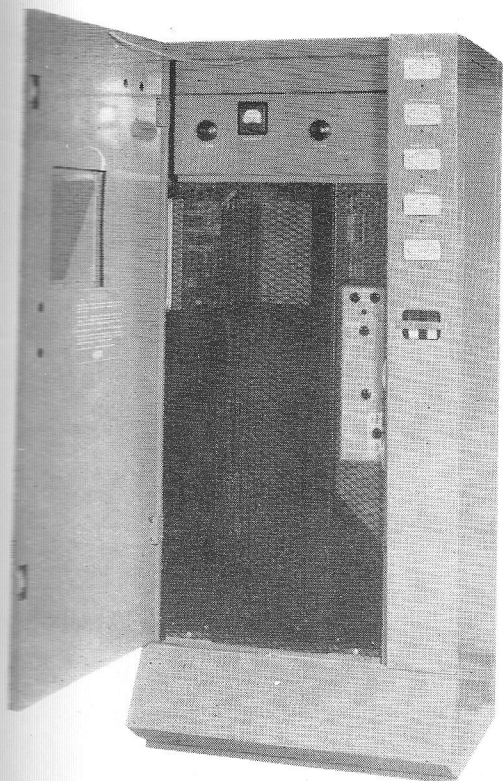
is directly over the power tube section. The other removes all other air. By observing the inner BC-1T construction, the engineer will note all components, large and small, are in the exact circulating air stream. BC-1T cooling has been as much of the engineering consideration as the outstanding electrical design.

**METERING:** The five wide-face 4" meters read every necessary measurable circuit. Individual meters continuously read plate volts, PA plate current, filament volts and modulator current. The fifth meter, a multi-meter, is switch selectable to grid and cathode circuits over the entire transmitter. Individual modulator plates may be observed by a key that switches the modulator current

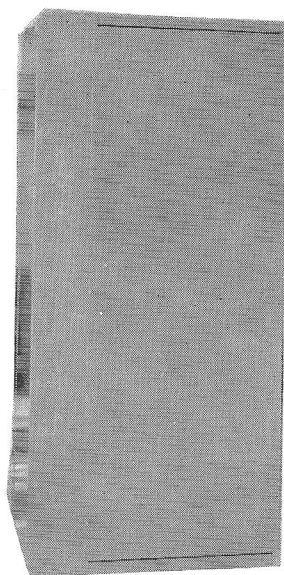
meter to either tube. When this key is in the center, both tubes are metered. — A 0-8 RF line meter is mounted at the top center. — The question may be asked as to reaching meters for servicing. The front shield does not hold the meters. This shield is speedily removable and all meters are 100% accessible.

**RF SECTION:** Dual vacuum type crystal units require no temperature oven for pin-point stability. Frequency adjustment and crystal changeover is from the front. There are four RF stages, with all stages self-neutralized except the last. Dual long-life 833A tubes feed 1000 watts into a complete Tee network for exact loading and harmonic attenuation. The final amplifier and Tee network are tuned by variable coils of the large edgewise type, manu-

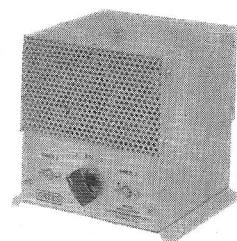
(continued next page)



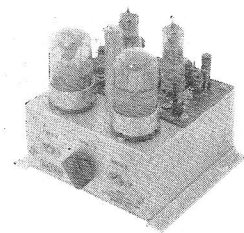
Open the front door and every tuning control is at finger tip, plus an interlocked perforated grill to observe every transmitter component from top to bottom.



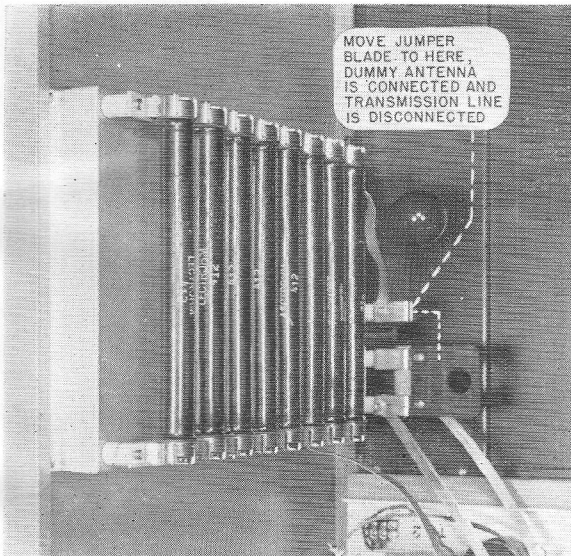
The back, though removable, is only necessary as an enclosure. Complete access is from the front.



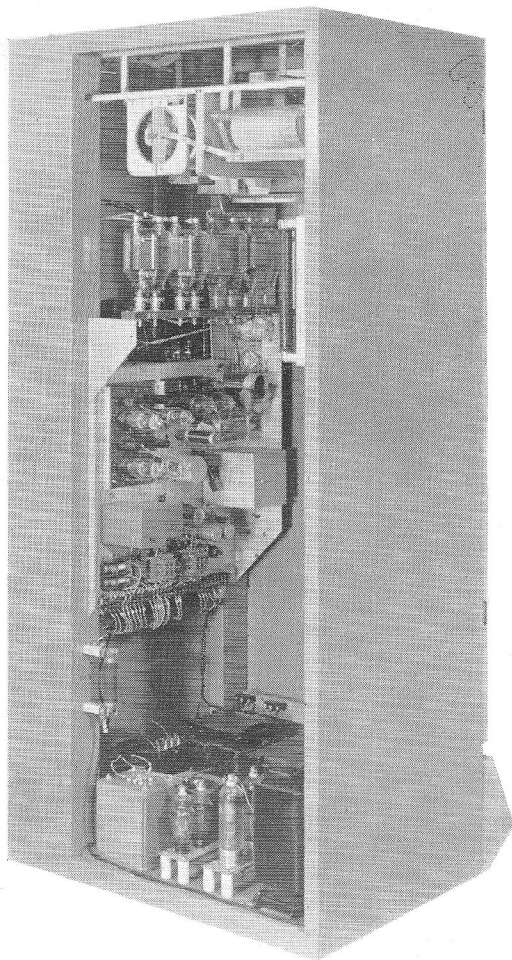
Open and closed views of the new ovenless, low drift crystal oscillator — first IPA unit.



## GENERAL DESCRIPTION MODEL BC-1T



Inbuilt dummy antenna is standard equipment and becomes the engineer's third arm.



Full length rear view of the BC-1T transmitter. The design radiates confidence.

### RF SECTION (continued)

factured by Gates. A portion of the audio is applied to the first RF driver plate to provide linear RF drive under modulation for improved performance and ease of modulating. The oscillator-1 unit and RF driver section incorporate printed wiring throughout.

**AUDIO SECTION** has three stages, all push-pull. The cathode follower driver stage has dual 6BG6G tubes, a heavier tube similar to the 807. The modulation transformer has been designed for extremely low leakage for superb high frequency performance. Typical production BC-1T transmitters continually indicate distortion under 2% at the critical 7000 cycle audio frequency. The modulation transformer has two secondary windings, one for high level modulating the Class C amplifier, the other for modulating the cathode follower, feedback, all push-pull and new transformer design produces true high fidelity through wide response combined with lower than ever distortion for real **listenability**.

**POWER SUPPLIES** in proper design and distribution can contribute greatly to **listenability**. In the BC-1T, noise can be below 60 dB. One husky, low voltage supply with dual 866A rectifiers delivers well filtered direct current to all stages except the RF power amplifier and modulators. The power tubes are devoted exclusively to the high voltage supply with full wave 800B rectifiers. A thermal bias supply for the Class B modulators with individual bias rheostats completes a dependable, loafing type of power section.

**MONITORS:** The BC-1T transmitter will operate with all current makes of frequency and modulation monitors. A scramble word pickup coil inductively couples the modulation monitor. The frequency monitor connects to the 1st IPA in the crystal oscillator section. A modern transmitter accessory cabinet including monitors and limiting amplifiers will be found listed elsewhere in this catalog, or the GY-1000B package will be found immediately following these pages.





## BC-1T SPECIFICATIONS

**POWER OUTPUT:** Rated 1000 watts. Capability 1100 watts.

**AUDIO INPUT:** +12 db  $\pm$ 2 db for 100% modulation at impedance choice of 150, 250 or 600 ohms.

**AUDIO RESPONSE:**  $\pm$ 1 1/2 db 30-12,000 cycles.  
(Typical:  $\pm$ 1 1/2 db 30-16,000 cycles under practical programming conditions.)

**AUDIO DISTORTION:** 3% or less 50-10,000 cycles (at 95% modulation.)  
(Typical: 2% or less 50-16,000 cycles under practical programming conditions.)

**NOISE (unweighted):** Below 100% modulation, rated 60 db, capable 65 db.

**RF RANGE:** 540 kc to 2000 kc, as ordered.

**RF OUTPUT IMPEDANCE:** 50/70 ohms\*

**FREQUENCY STABILITY:**  $\pm$ 10 cycles.  
(Typical:  $\pm$ 2 cycles.)

**MONITOR IMPEDANCES:** Will match all current makes of frequency and modulation monitors.

**MODULATION:** High level Class B.

**POWER INPUT:** 230 volts, 2 wire, 50/60 cycles from 2740 watts at zero modulation to 3940 watts at 100% modulation.

**CARRIER SHIFT:** 3% or less at 100% modulation.

**DUMMY ANTENNA:** 51 1/2 ohms at 1000 watts 100% modulation.

**TUBES:** 12BY7A oscillator  
12BY7A 1st IPA  
(2) 6BG6G 2nd IPA  
(2) 833A power amplifiers  
(2) 6BG6G 1st audio  
(2) 6BG6G 2nd audio  
(2) 833A modulators  
5R4GY rectifier  
(2) 866A LV rectifiers  
(2) 8008 HV rectifiers

Total number of tubes: 17

Total tube types: 6

**SIZE:** 78" high, 36" wide, 32" deep. Front door swing 28". Floor space 8 sq. ft.

**WEIGHT:** 800 lbs. net. 1090 lbs. packed. Cubage, 61. Export, 1500 lbs. estimated packed. Cubage, 110.0.

\*For other impedances, refer to antenna couplers (see Index).

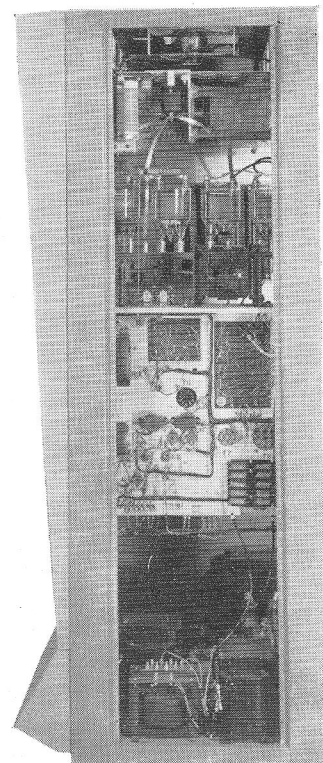
### HI-FI-QUALITY

This transmitter is "Hi-Fi-Quality", an advancement over high fidelity. "Hi-Fi-Quality" is the combination of three components: (1) extremely wide frequency response, (2) very low distortion over a wide range under practical programming conditions, and (3) lower capable noise. The total of the three is "Hi-Fi-Quality" — the new **quality sound** in radio broadcasting.

### ORDERING INFORMATION

|  |        |
|--|--------|
| 1000 watt transmitter complete with tubes, one crystal, dummy antenna and ready to operate ..... | BC-1T  |
| Extra crystal and vacuum holder .....  | M-5602 |
| 100% spare tube complement for BC-1T .....   | TK-287 |
| FCC required spare tube complement for BC-1T .....   | TK-288 |

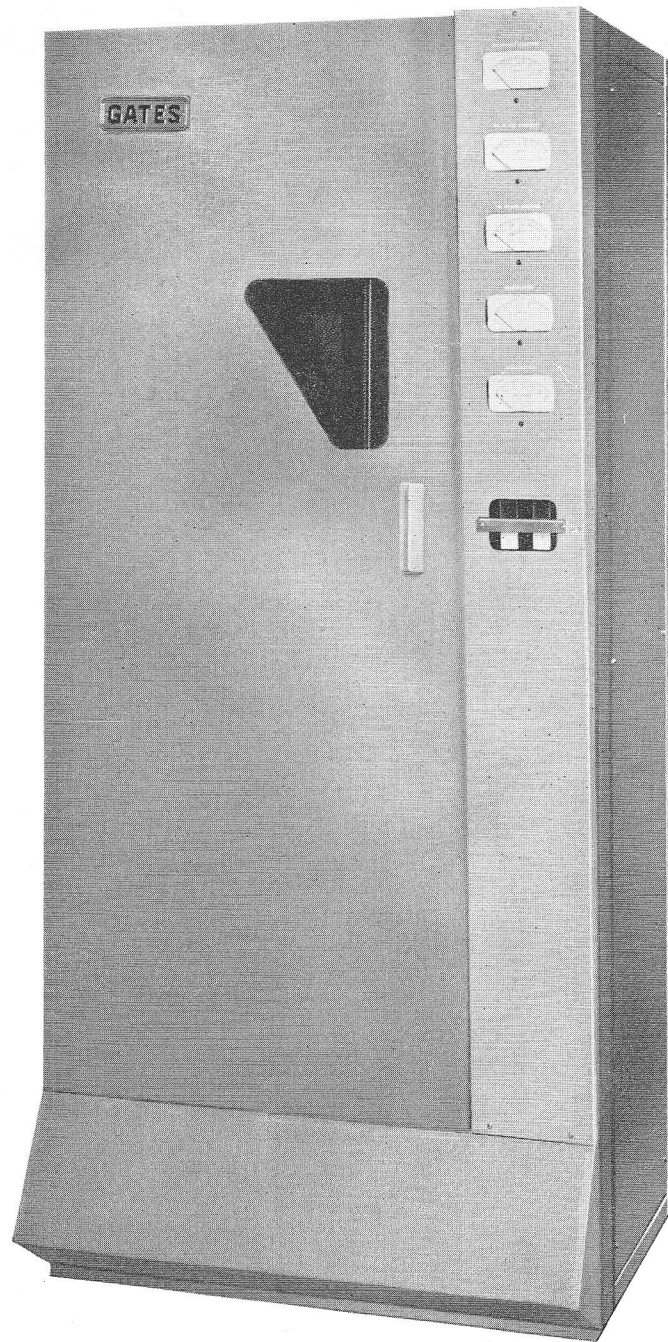
**NOTE:** Be sure and specify carrier frequency when ordering.  
Other line voltages available on special order without delay.



Side of BC-1T removes to expose the few components not accessible from the front. Reaching every part is an engineering must in Gates transmitters.

**GATES**

## **MODEL 500T 500 WATT BROADCAST TRANSMITTER**



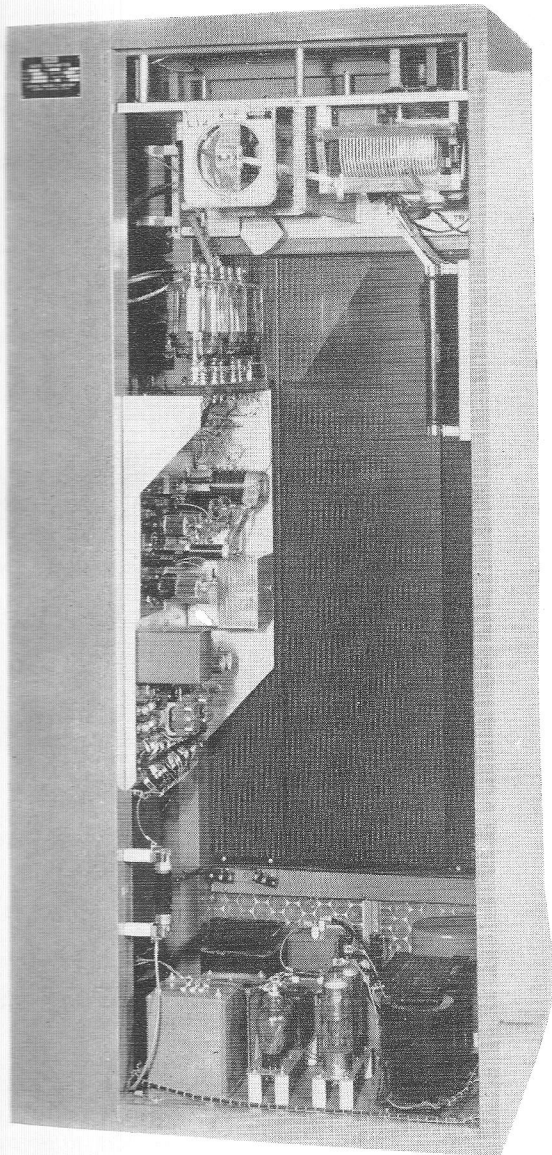
This modern 500 watt model is in all respects, except where modified for 500 watt service, the same transmitter as the BC-1T, 1000 watt model on the preceding pages. — Step up to 1000 watts, at any later date, may be done quickly and effectively. BC-500T is another entirely new transmitter in the continuing parade of progressive Gates equipment.

As the basic description of the BC-500T transmitter is the same as Model BC-1T, the following pages cover information pertinent to the BC-500T and for all other descriptive data the reader is asked to refer to Model BC-1T.

## GENERAL DESCRIPTION (Model BC-500T)

In standardization of manufacturing processes, the BC-500T transmitter is produced on the same line and with most of the same components as the BC-1T, 1000 watt model. Modification of the BC-1T to become the BC-500T consists of only the necessary basic changes to meet FCC requirements along with proper power, modulation and reactor transformer sizes.

For metering, local-remote control, cooling, general construction, audio section and other data common with BC-500T to the BC-1T, reference to the BC-1T on preceding pages will not only provide the desired information but emphasize the 1000 watt basic design of this modern 500 watt model.



This is BC-500T from the rear. Modern design and husky construction spells confidence for the heaviest broadcasting schedule.

**RADIO FREQUENCY SECTION:** Identical in all respects to Model BC-1T other than a single 833A power amplifier tube is employed.

**AUDIO FREQUENCY SECTION:** Identical in every way to that in the BC-1T other than the modulation transformer and reactor are of 500 watt size.

**POWER SUPPLY SECTION:** The power transformer and filter reactors are of 500 watt size in the high voltage supply. The balance is BC-1T 1000 watt design.

**METERING** for BC-500T is changed to accommodate a 0-RF ammeter and a lower range PA plate current meter to meet FCC requirements.

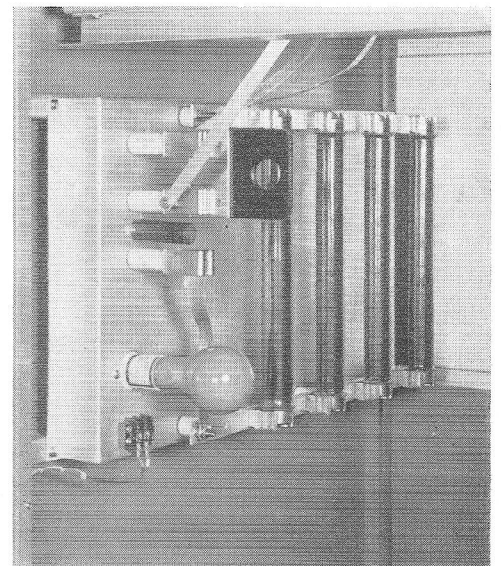
**OFF AIR TESTING** provides the inbuilt dummy antenna for 500 watts 100% modulated. Move the switch back to "Dummy" and you may test any time. New stations may finish tests prior to even erection of the antenna tower. — For regular maintenance, this feature will save hours of time and add greatly to performance through convenience of routine maintenance. **Construction** identical to the BC-1T transmitter.

**PRINTED WIRING** as in BC-1T is the same.

**LOCAL-REMOTE CONTROL** system in BC-500T is the same relay system as in the BC-1T. No circuit breakers are employed.

**COOLING** includes full width filtered air intake at the bottom and dual exhaust fans at the top. Same as Model BC-1T.

**PERFORMANCE:** The owner of BC-500T has without question an ultra-conservative transmitter when basic 1KW design is followed. Tube life, especially that of the larger tubes, should be extra gratifying.



Standard equipment in BC-500T is the inbuilt dummy antenna. Routine maintenance now becomes a pleasure.





## BC-500T SPECIFICATIONS

- POWER OUTPUT:** Rated 500 watts.  
Capability 600 watts.
- AUDIO INPUT:** +9 db  $\pm$ 2 db for 100% modulation at impedance choice of 150, 250 or 600 ohms.
- AUDIO RESPONSE:**  $\pm$ 1½ db 30-12,000 cycles.  
(Typical:  $\pm$ 1½ db 30-16,000 cycles under practical programming conditions.)
- AUDIO DISTORTION:** 3% or less 50-10,000 cycles (95% modulation).  
(Typical: 2% or less 50-16,000 cycles under practical programming conditions.)
- NOISE (unweighted):** Below 100% modulation, rated 60 db, capable 65 db.
- RF RANGE:** 540 kc to 2000 kc, as ordered.
- RF OUTPUT IMPEDANCE:** 50/70 ohms.\*
- FREQUENCY STABILITY:**  $\pm$ 10 cycles.  
(Typical:  $\pm$ 2 cycles.)
- MONITOR IMPEDANCES:** Will match all current makes of frequency and modulation monitors.
- MODULATION:** High level Class B.
- POWER INPUT:** 230 volts, 2 wire, 50/60 cycles from 1960 watts at zero modulation to 2660 watts at 100% modulation.
- CARRIER SHIFT:** 3% or less at 100% modulation.
- DUMMY ANTENNA:** 51½ ohms at 500 watts 100% modulation.

- TUBES:** 12BY7A oscillator.  
12BY7A 1st IPA.  
(2) 6BG6G 2nd IPA.  
(1) 833A power amplifier.  
(2) 6BG6G 1st audio.  
(2) 6BG6G 2nd audio.  
(2) 833A modulators.  
5R4GY rectifier.  
(2) 866A LV rectifiers.  
(2) 8008 HV rectifiers.

Total number of tubes: 16.

Total tube types: 6.

**SIZE:** 78" high, 36" wide, 32" deep. Front door swing 28". Floor space 8 sq. ft.

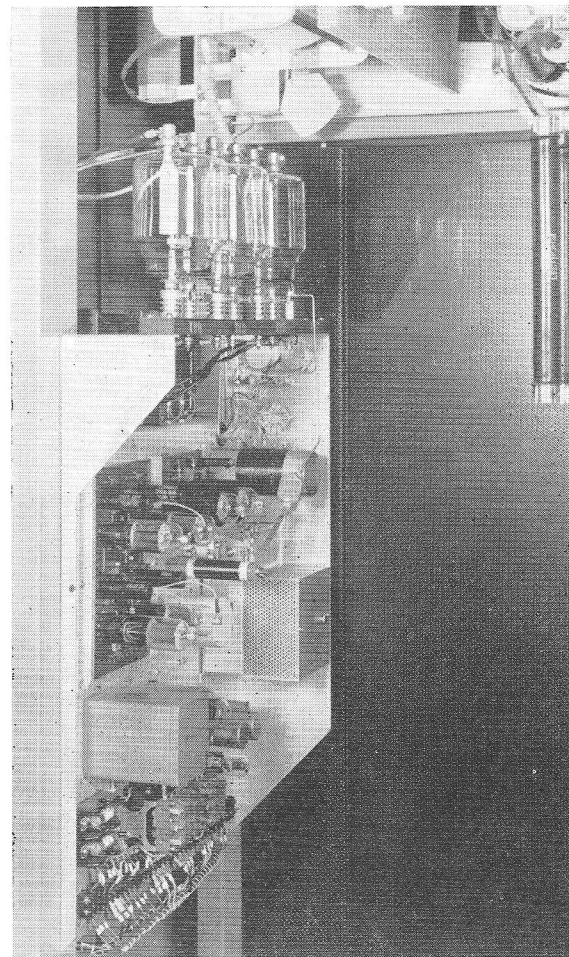
**WEIGHT:** 700 lbs. net. 990 lbs. packed. Cubage, 6 Export, 1400 lbs. estimated packed. Export cubage, 110.0.

\* For other impedances, refer to antenna couplers (see Index).

### ORDERING INFORMATION

|   |        |
|---|--------|
| 500 watt transmitter complete with one set of tubes, dummy antenna and crystal .....  | B-500T |
| Extra crystal with vacuum type holder .....   | M-5602 |
| 100% spare tube kit for BC-500T .....   | TK-300 |
| FCC required spare tubes for BC-500T .....  | TK-307 |
| Conversion kit to change BC-500T transmitter to BC-1T 1000 watt transmitter, includes all necessary components, with purchaser retaining 500 watts components removed ..... | M-5614 |

NOTE: State carrier frequency when ordering. Other primary voltages available on special order and without delay.

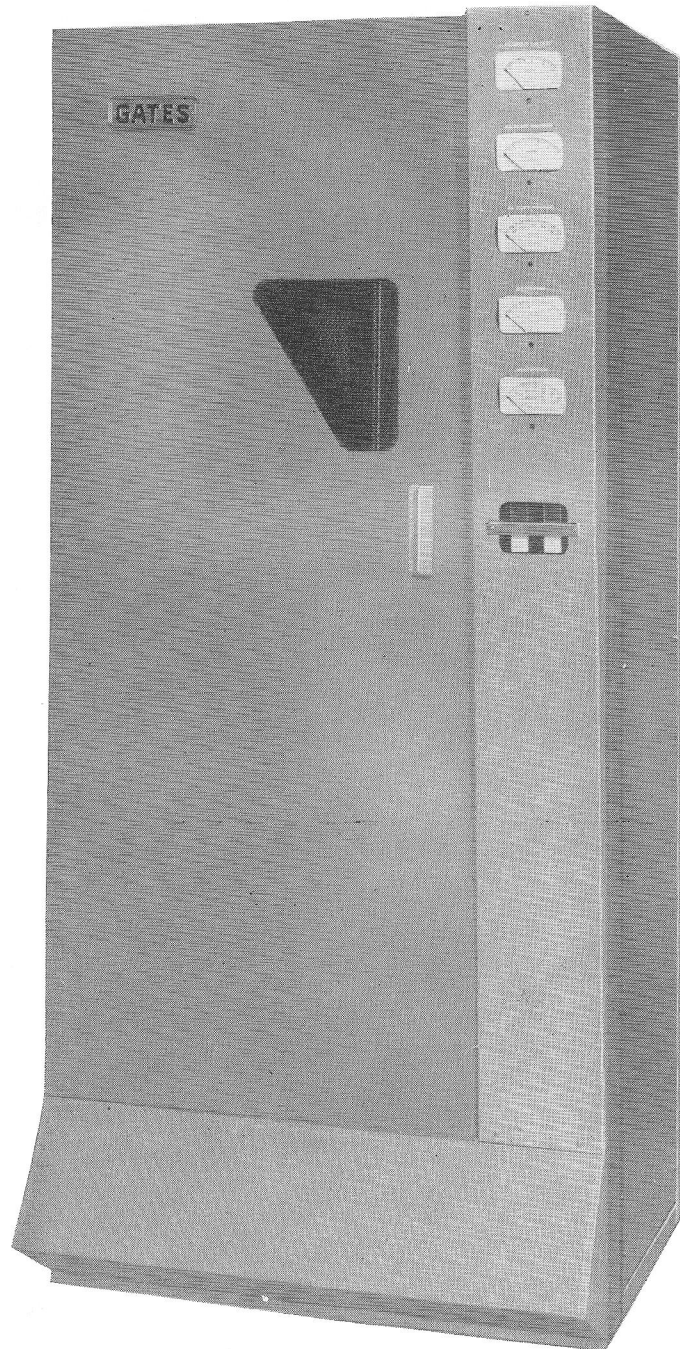


To the trained engineering eye, the sharp electrical lines illustrate the months of planning in BC-500T design.

**GATES**

# **MODEL BC-250T 250 WATT BROADCAST TRANSMITTER**

(with power step up design)



Model BC-250T is a basic 1000 watt design modified and fully FCC approved for 250 watt operation. Broadcasters now operating on 250 watts with an eye to future higher power, may immediately own an ultra conservative 250 watt equipment and step up later to 500 or 1000 watts by purchasing a "power increase kit". — Change to higher power can be made in 2 hours' time, resulting in a fully FCC approved higher powered model.

# Model BC-250T

This model is offered the broadcast industry to fill future expansions as well as the most conservative 250 watt equipment ever offered. — Actually the BC-250T transmitter is a model BC-1T, 1000 watt design, fully described on Pages 42-49, with certain minor changes to meet 250 watt FCC and engineering requirements. So similar are the designs, the reader may obtain basic data by reading BC-1T descriptive matter.

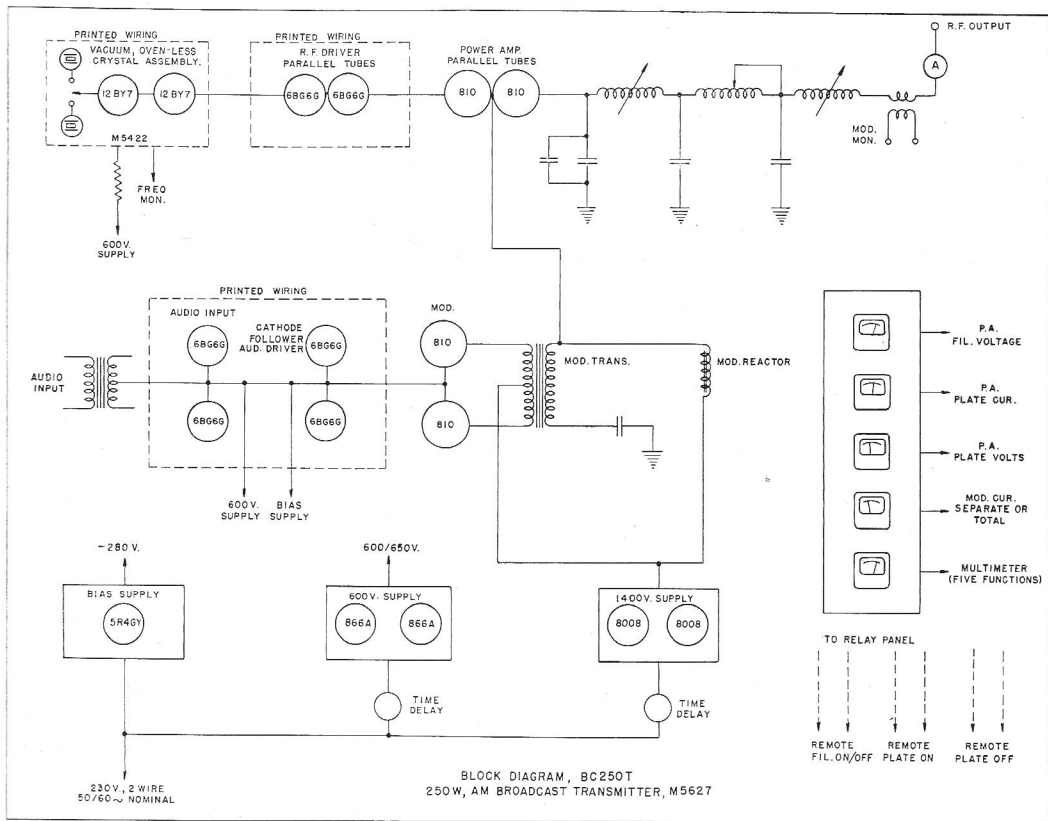


Four 810 tubes in the 250 watt model replace the 833A tubes in higher powered models. Even here the tube socket chassis are interchangeable and wiring to either the 810 or 833A tubes is the same. Power, modulation, filter and reactor transformers, filter capacitors and mica tank capacitors are specifically for the 250 watt model. All other components are the same in the 250 watt BC-250T, 500 watt BC-500T or 1000 watt BC-1T. — Such items as tank coils, Tee-network coils, intermediate power supplies, metering, protective relays, insulation,

cabinet design, oscillator and intermediate power amplifier are identical in the BC-250T transmitter to that of higher powered models.

If you increase power later, order the "power increase kit" for 500 or 1000 watts as listed on Page 56 and you may start the following day's broadcasting at high power. — If, on the other hand, you never increase power your broadcasting station will own the most conservative and reliable 250 watt equipment ever built.

Simplified schematic diagram of the Gates BC-250T transmitter. Basic 1000 watt design is employed throughout.







## MODEL BC-250T SPECIFICATIONS

**POWER OUTPUT:** Rated 250 watts. Capable 300 watts.

**MODULATION:** High level Class B.

**RF FREQUENCY RANGE:** 540-2000 Kc.

**RF OUTPUT:** Full Tee-network variable coil tuning to match 50-75 ohms.  
Please refer to antenna couplers, Pages 81 and 82.

**RF STABILITY:** Rated  $\pm 10$  cycles. (Typical:  $\pm 2$  cycles). Vacuum mounted, ovenless crystals (provision for 2) used throughout.

**CARRIER SHIFT:** 3% or less 0-100% modulation.

**AUDIO INPUT:** 150/250 or 500/600 ohms at +8 dbm for 100% modulation.

**AUDIO RESPONSE:**  $\pm 1\frac{1}{2}$  db, 30-12,000 cycles.  
(Typical:  $\pm 1\frac{1}{2}$  db 30-16,000 cycles under practical programming conditions.)

**NOISE:** 60 db or better below 100% modulation.

**DISTORTION:** 3% or less, 50-10,000 cycles. (At 95% modulation).  
(Typical: 2% or less 50-16,000 cycles under practical programming conditions).

**TUBES:** 12BY7A oscillator, 12BY7A first IPA, (2) 6BG6G second IPA, (2) 810 power amplifier, (2) 6BG6G first audio, (2) 6BG6G cathode follower drivers, (2) 810 modulators, (2) 866A intermediate power rectifiers, (2) 8008 main power rectifiers, (1) 5R4GY bias rectifier.

Total tubes, 17.

Total tube types, 6.

**VENTILATION:** Convex through wide bottom front grill.

**SIZE:** 78" high, 36" wide, 32" deep. Front door swing 28".\*  
Floor space, 8 sq. ft.

**WEIGHT:** Net 750 lbs. Packed 1070 lbs. Cubage 71.

**FINISH:** Medium hand rubbed gloss gray in two tones.

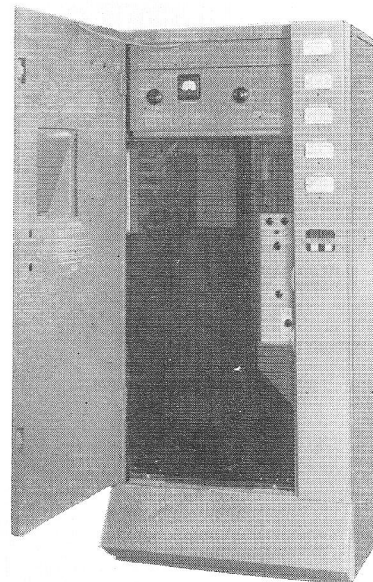
\* Back and side removable. As design is for 100% service from the front, transmitter may be located near or against back wall.

### ORDERING INFORMATION

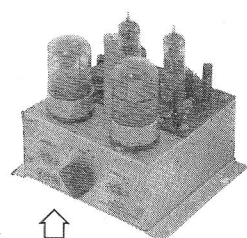
|   |         |
|---|---------|
| Complete 250 watt transmitter with one set of tubes, one crystal and 0-3 line meter** ..... | BC-250T |
| 100% spare tube kit for above .....   | TK-306  |
| FCC spare tube kit for above .....  | TK-307  |
| Spare crystal and vacuum holder for above .....   | A-30866 |
| Power increase kit to increase from 250 to 500 watts*** .....                               | M-5637  |
| Power increase kit to increase from 250 to 1000 watts*** .....                              | M-5638  |

\*\* Please state frequency and line impedance when ordering.

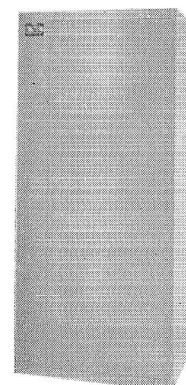
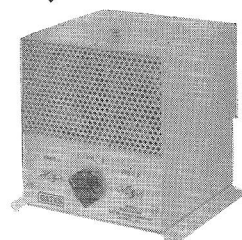
\*\*\* Includes all necessary components and tubes excluding crystal. Price is based on customer returning lower power components removed, except tubes.



Open BC-250T front door to reach all tuning controls. Slip off the snap on interlock perforated grill to reach all parts from the front. BC-250T is the only transmitter manufactured today with complete parts visibility during operation.



Dual vacuum mounted crystals are designed into a new oscillator with the emphasis on stability and dependability.

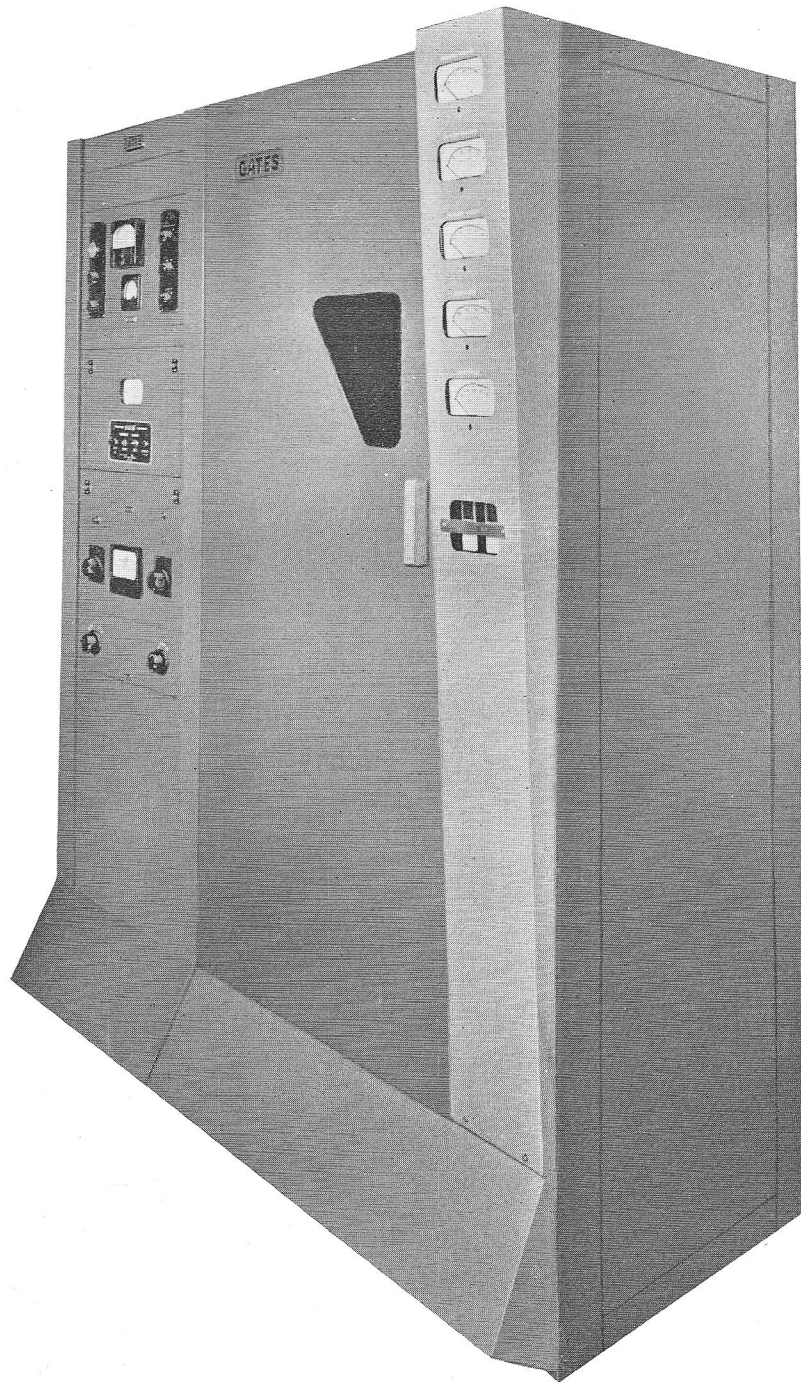


The back is removable but you will never need to with BC-250T as all servicing is from the front.



**GATES**

## **PACKAGED RADIO BROADCASTING EQUIPMENT**



These three models of complete radio stations are ready to attach to studio and transmission lines. The 250 watt BC-250T, the 500 watt BC-500T or the 1000 watt BC-1T transmitters are joined with all necessary FCC approved monitors, audio equipment and with optional remote control apparatus. This equipment is mounted, wired and tested. Along with assured system performance is offered a most attractive and eye-catching broadcasting equipment installation.



# PACKAGED RADIO BROADCASTING EQUIPMENT

(for 1000 and 500 watts ready to install)

For many years, the Gates complete packaged radio station has been very popular. Provided is everything necessary to attach studio equipment and transmission line to the antenna. Transmitter, monitors, audio equipment and remote control equipment, where used, is all packaged and ready to install. — The result is speedier installation through the purchase of a complete system. As wiring is complete, the installation engineer need not concern himself with the details ordinarily associated with piece by piece procurement.

The Gates modulation monitor has high level output for the monitoring speaker which may be any good quality speaker. Four input lines are switch selectable. A switch is also incorporated to bypass the limiting amplifier. In this manner an emergency tube change in the limiter does not necessitate leaving the air.

All equipment components of the accessory cabinet are fully described on a near adjacent page (see Index "Accessory Cabinet"). Remote control equipment referred to herein is also covered in detail elsewhere in this catalog.

## SPECIFICATIONS

- TRANSMITTER:** For 1000 watts, Model BC-1T.  
For 500 watts, Model BC-500T.  
For 250 watts, Model BC-250T.
- MODULATION MONITOR:** Gates MO-2639 (FCC approved).
- FREQUENCY MONITOR:** Gates M-4990 (FCC approved).
- LIMITING AMPLIFIER:** Gates SA-39B.
- SWITCHING PANEL:** 4 switch selectable 600 ohm inputs to limiter. One input selector switch to limiter or transmitter direct.

**SIZE OVERALL (including transmitter):** 78" high, 59 1/2" wide, 32" deep.

**REMOTE CONTROL (optional):** Gates Model RDC-10 with transmitter unit mounted and wired in cabinet and studio unit ready to install in studios, includes plate current, plate voltage and tower light extension kit also motor tuned power adjusting rheostat. Also includes modulation monitor and frequency monitor extension meters for studio installation, (see Index "Remote Control" for full detail).

## ORDERING INFORMATION

|   |            |
|---|------------|
| Complete 1000 watt radio station with one set of tubes, crystal, less remote control .....    | GY-1000B   |
| Complete 1000 watt radio station with one set of tubes, crystal and with remote control ..... | GY-1000BRD |
| Complete 500 watt radio station with one set of tubes, crystal, less remote control .....     | GY-500B    |
| Complete 500 watt radio station with one set of tubes, crystal and with remote control .....  | GY-500BRD  |
| Complete 250 watt radio station with one set of tubes, crystal, less remote control .....     | GY-250B    |
| Complete 250 watt radio station with one set of tubes, crystal and with remote control .....  | GY-250BRD  |

## EQUIPMENT REFERENCES:

- BC-1T transmitter . . . Page 42
- BC-500T transmitter . . . Page 50
- BC-250T transmitter . . . Page 54
- M-4990 frequency monitor . . . Page 84
- MO-2639 modulation monitor . . . Page 87
- SA-39B limiting amplifier . . . Page 123

**GATES**

## **BC-250GY 250 WATT BROADCAST TRANSMITTER**

The Gates BC-250GY has a world-wide reputation for long trouble-free service, and is the most used 250 watt broadcast transmitter in America. Walk in to service, big component design and extra generous facilities. — The Gates BC-250GY transmitter is rightfully called, "The work horse of the broadcast industry." If the frequency allocation will never permit increase in power, this model BC-250GY is the proper selection.

**CONSTRUCTION:** In the BC-250GY transmitting plant is an assemblage of large heavy parts strategically placed for instantaneous accessibility. This, added to walk-in-to-service design, not only brings the admiration of the technical staff but spells cool, reliable operation. Generous spacing of components with the entire center of the cabinet free air, just naturally brings this result. Built in a cabinet 78" high, 40" wide and 33" deep and finished in hand rubbed gloss gray. Oscillator deck slips out in seconds if need be. Audio deck hinges out to reach under components. Full length hinged interlocked rear door is provided.

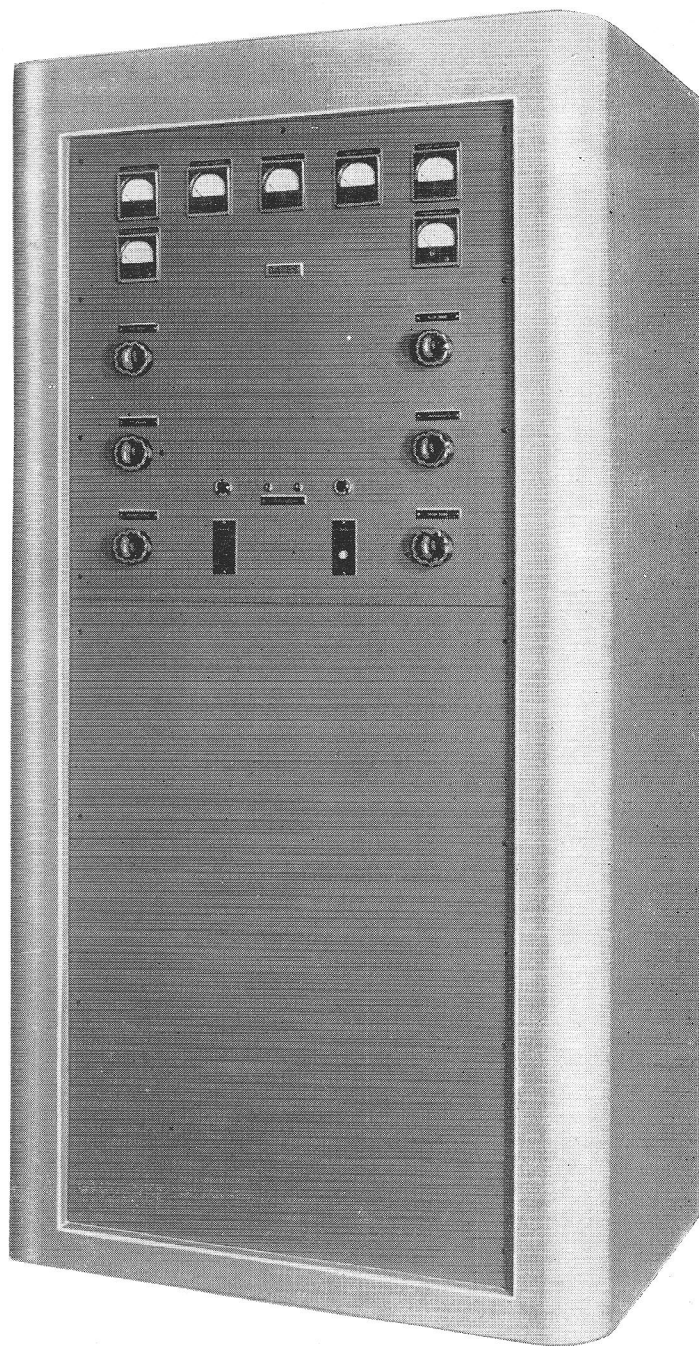
**RADIO FREQUENCY:** Three stages, provision for 2 crystals in temperature controlled ovens, 813 RF driver provides abundance of drive and long tube life, 2 type 810 single ended power amplifiers feed an output coupling network that will match specified impedances from 30 to 300 ohms.

**AUDIO FREQUENCY:** Two audio stages consist of push-pull 6L6's driving two 810 tubes operating as Class B high level modulators. Conservatively rated 810's in the modulator insure reliable operation and added tube life.

**METERING:** Eight meters, more than in any other 250 watt broadcast transmitter. Includes: oscillator plate, RF driver plate, PA grid, PA plate, plate volts, filament volts, modulator plate and RF output. There is no multi-metering in the BC-250GY transmitter.

**POWER SUPPLIES:** Two power supplies develop the high voltage, intermediate and bias voltages for the entire transmitter.

**PROTECTIVE RELAYS:** Like all Gates transmitters, relays largely replace circuit breakers. Adaption to remote con-



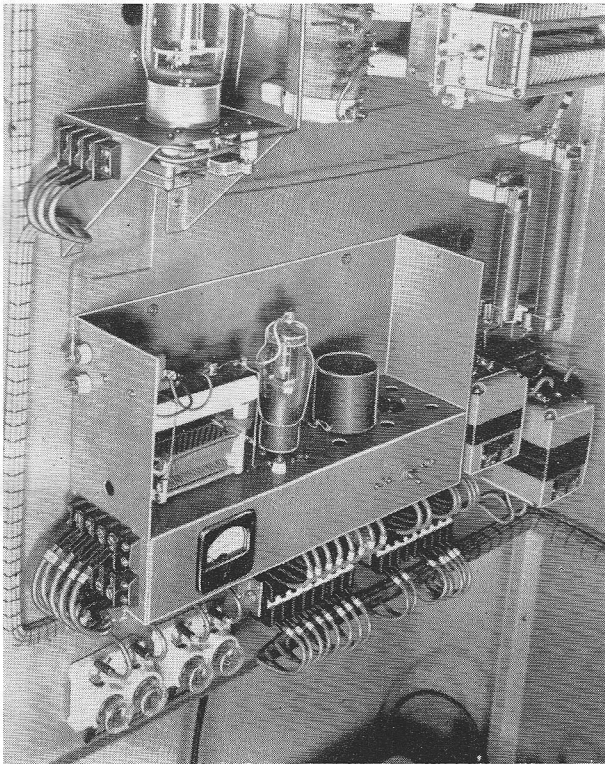
rol, as well as full protection is complete in this type design. Two overload relays for power amplifier and modulator are incorporated plus plate contactor relay and vacuum time delay relay. Ease of attaching remote control is self-evident.

**POWER RESISTORS:** All heavy sized power resistors are of the ferrule or plug-in type. This not only assures easy replacement but is indispensable for cleaning and assurance of no breakage during shipment.

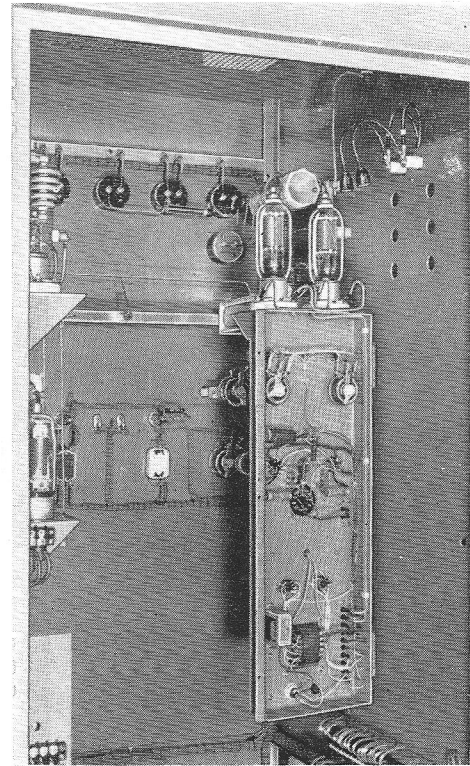


**GATES**

## BC-250GY 250-WATT BROADCAST TRANSMITTER



Oscillator unit (dust cover removed) accommodates two crystals and ovens, has its own tuning meter and may be removed in seconds.

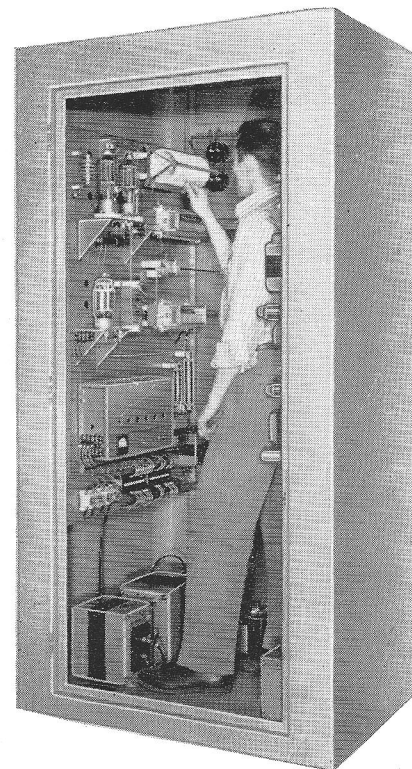


100% serviceability is always foremost in Gates designs. Here the audio deck hinges out to reach the under-chassis parts.

**COOLING:** As the large roomy design allows convex cooling, the absence of blowers or fans assures quiet operation. In properly treated room design operation may be near a microphone, though it is always recommended that the transmitter be isolated from operating procedures by a glass partition or similar.

**TRANSFORMERS:** As all Gates transmitters are designed for 50 and 60 cycle operation, the transformers must be built with larger core and coil sections. This offers extra conservatism to 60 cycle users and no waiting for 50 cycle users. Generally there are no multi-transformers or the load is divided through several filament transformers and filter reactors instead of combining.

**PERFORMANCE:** Low distortion and noise, wide frequency response and excellent stability, both RF and in regulation of the power supply, forms smooth sounding equipment that will delight musical audiences, and develop the rich full quality required in all programming.

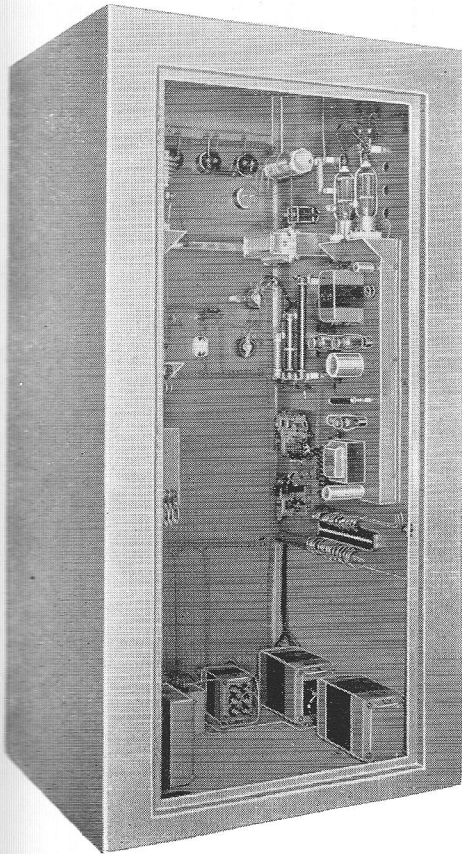


Rear illustration shows roomy big transmitter design with walk-in-to-service feature.





# BC-250-GY SPECIFICATIONS — ORDERING DATA



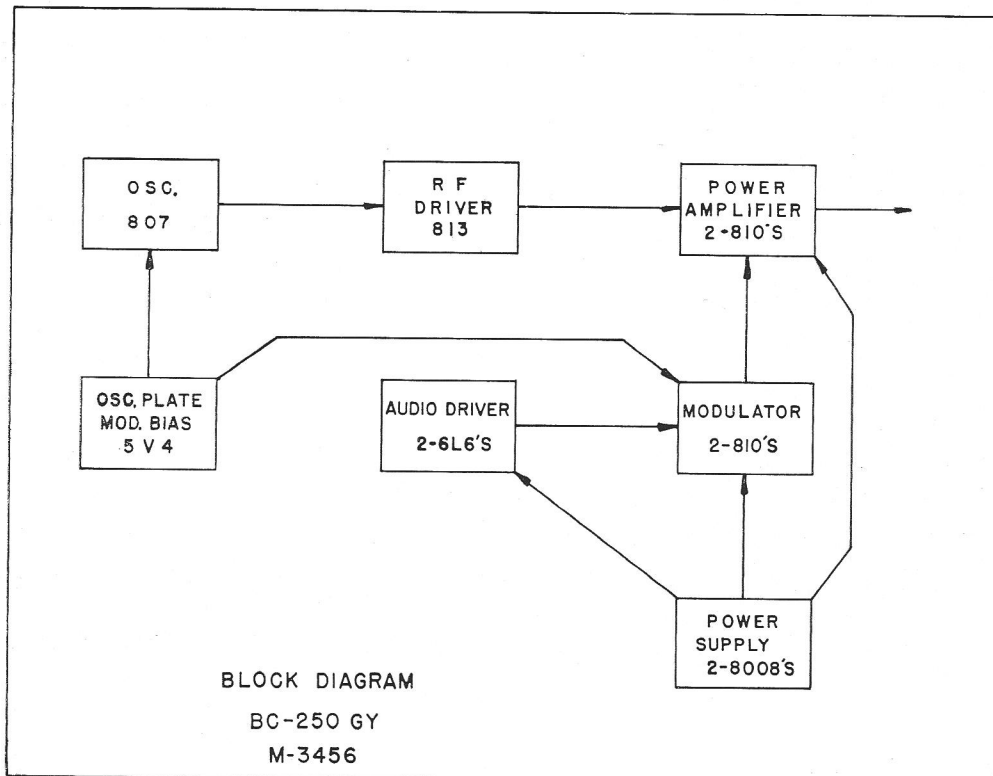
## SPECIFICATIONS

- RATED POWER OUTPUT:** 250 watts.
- CAPABLE POWER OUTPUT:** 280 watts.
- STABILITY:**  $\pm 5$  cycles.
- FREQUENCY RESPONSE:** At 90% modulation, 1  $\pm 1\frac{1}{2}$  db 30-10,000 cps.  
 $\pm 2$  db 30-12,000 cps.
- DISTORTION:** 50-7500 cps 3% or less at 90% modulation.
- NOISE:** 60 db or better below 100% mod.
- RF OUTPUT IMPEDANCE:** 30-300 ohms (as ordered).
- RF RANGE:** 540-1600 Kc (as ordered).
- AUDIO INPUT:** 600 ohms balanced at  $\pm 2$  dbm  $\pm 2$  db.
- POWER INPUT:** 230 volt, 2 wire, single phase.
- POWER CONSUMPTION:** 1.6 KW at 95% modulation.
- TUBES:** 807 oscillator, 813 IPA, (2) 810 power amplifiers, (2) 6L6 (1622) audio drivers, (2) 810 Class B modulators, (2) 800B rectifiers and 5Y4G rectifier.
- WEIGHT AND CUBAGE:** 900 lbs. packed. Cubage, 112.
- SIZE:** 78" high, 40" wide, 33" deep. Rear door swing 32".

## ORDERING INFORMATION

- Complete 250 watt broadcast transmitter with one set of tubes, crystal and oven ..... **BC-250GY**
- 100% spare tube complement for BC-250GY transmitter ..... **M-3074**
- FCC spare tube complement for BC-250GY transmitter ..... **TK-201**
- Extra crystal and oven for BC-250GY transmitter ..... **JK57M**

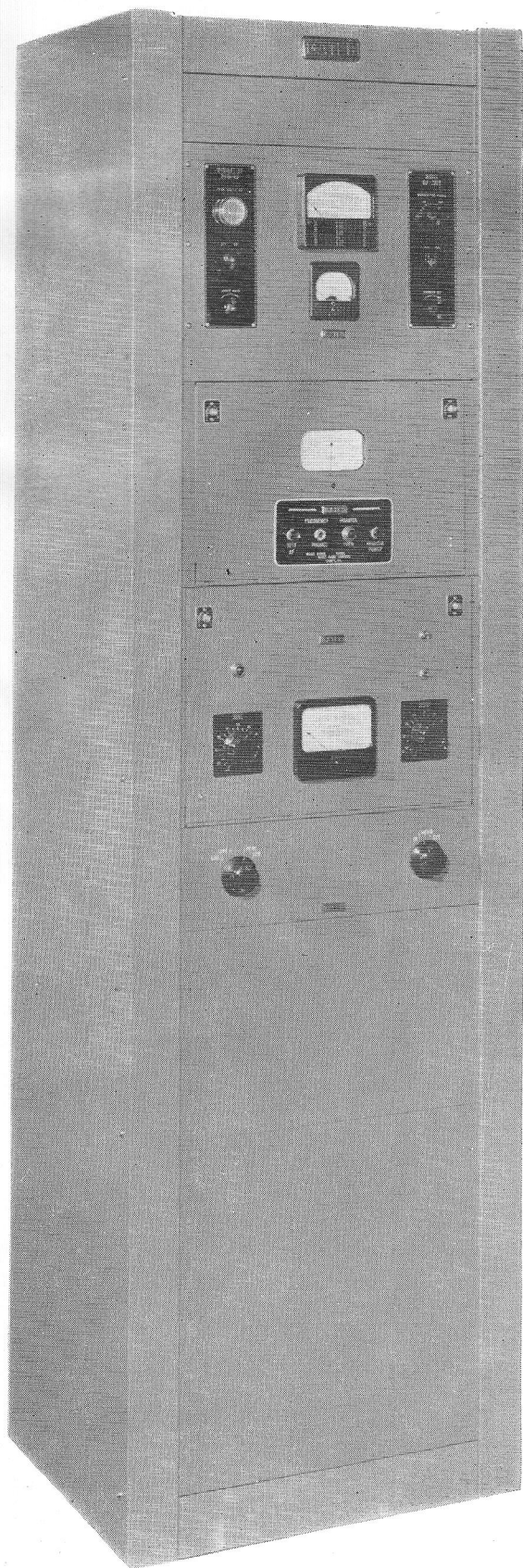
**NOTE:** Be sure to state carrier frequency and RF output impedance when ordering. For monitors, antenna couplers and other accessories, please refer to Index in back of catalog.



**GATES**

## **ACCESSORY CABINET FOR RADIO BROADCAST TRANSMITTERS**

(Model GY-60B)



All the necessary accessories to meet FCC requirements and good operating practice will be found in this cabinet. — At the top is the Gates FCC approved MO-2639 modulation monitor and under this is the FCC approved M-4990 frequency monitor. Next in line is the SA-39B limiting amplifier, directly under which is the input switching panel. The switching panel accommodates two telephone lines, a local and auxiliary input (four in all) at 600 ohms. A second switch allows bypassing the limiting amplifier for emergency tube change in the limiter, etc.

More than ample blank panel space is provided in the lower section of the cabinet for incorporation of remote control equipment for unattended operation or any other desired accessory. The GY-60B accessory cabinet is completely wired, including coaxial cables to terminate the frequency and modulation monitors.

Cabinet size, design and finish are compatible to all Gates broadcast transmitters. A full length rear door assures easy access. Use of this equipment offers the definite advantages of time saving during installation, proven performance of these accessories as a package and the attractive commercial appearance so necessary in today's modern era where visitor and worker admire equally a job well done.



# SPECIFICATIONS GY-60B

**MODULATION MONITOR:** Gates Model MO-2639, fully FCC approved.\*

**POWER INPUT:** 115 volts, 50/60 cycles, approximately 390 watts.

**LOUDSPEAKER OUTPUT:** 8 ohms from modulation monitor for direct off the air monitoring.

**FINISH:** Two-tone gloss gray with escutcheons in anodized black.

**FREQUENCY MONITOR:** Gates Model M-4990, fully FCC approved.\*

**SIZE:** 78" high, 23½" wide, 19½" deep. Rear door swing 20".

**LIMITING AMPLIFIER:** Gates Model SA-39B. Input and output impedances, 500/600 ohms.

**WEIGHT:** Net 290 lbs. Packed 405 lbs.

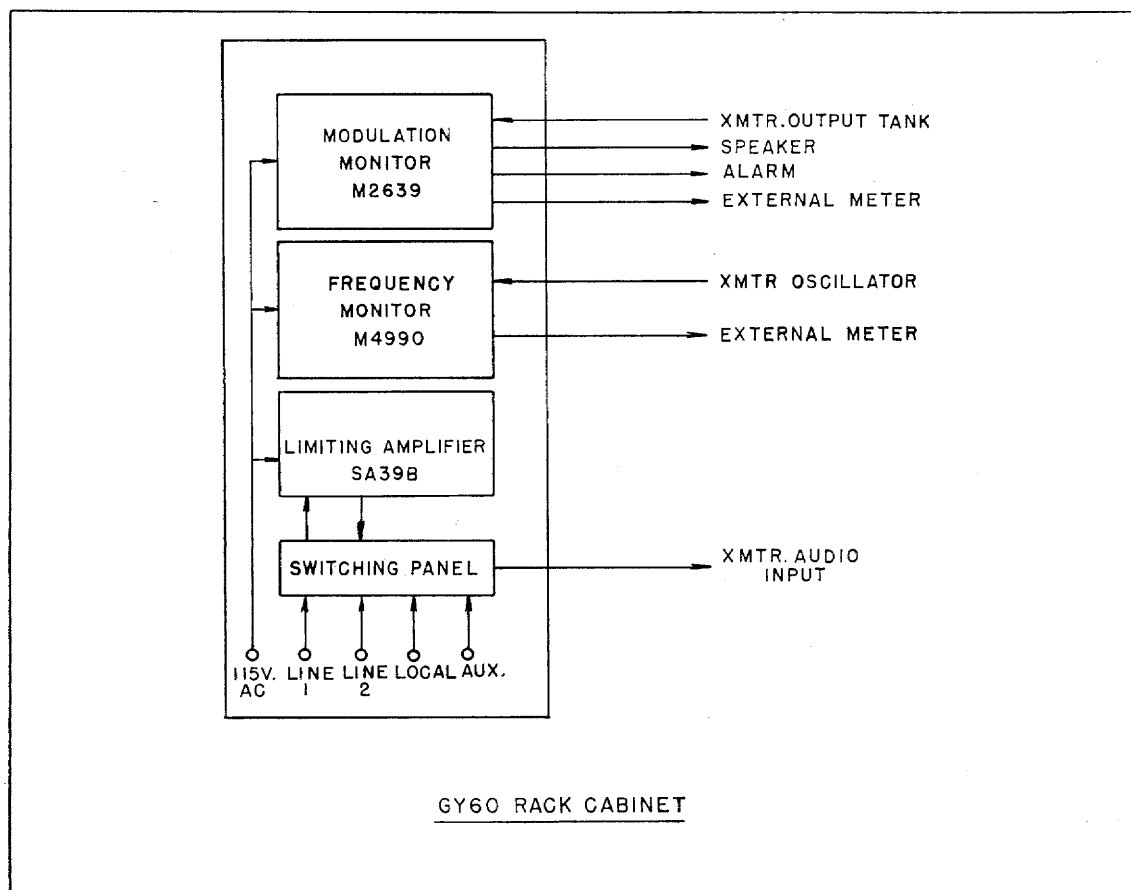
**SWITCHING PANEL:** Four switch selected 500/600 ohm inputs, two for line input, one for local input such as microphone preamplifier, and one for auxiliary input such as turntable. Second switch is for bypassing limiting amplifier for on-air maintenance.

**CUBAGE:** 31.

\* Fully described elsewhere in this catalog. Please refer to Index.

## ORDERING INFORMATION

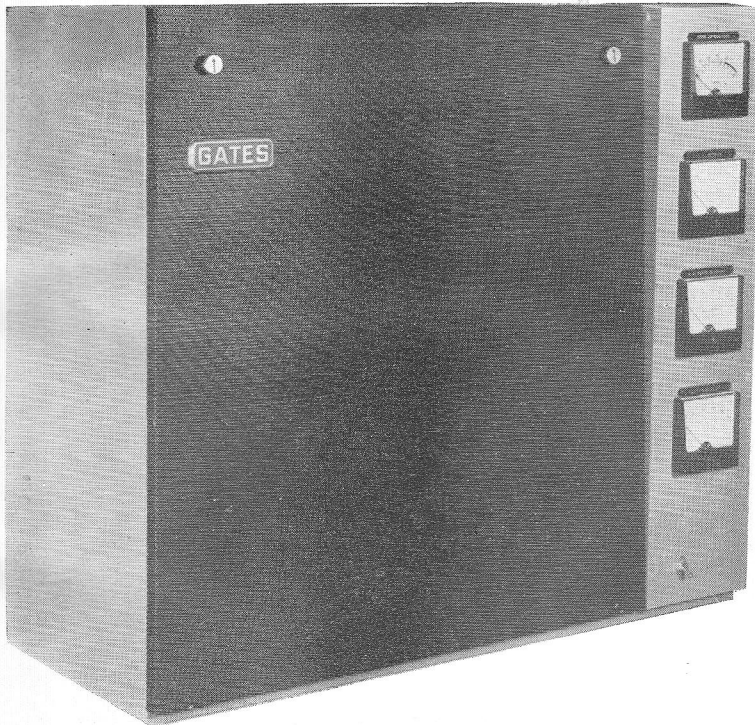
|  |        |
|--|--------|
| Complete accessory cabinet with one set of tubes ..... | GY-60B |
| 100% spare tube kit for GY-60B .....                   | TK-302 |



**GATES**

# 10 WATT AND 50 WATT FM RADIO TRANSMITTERS FOR BROADCASTING

(with multiplex optional)



Front of Models BF-E-10B and BF-E-50B transmitters.  
Removable perforated cover screen allows full visibility with component protection.

- Approved for educational FM broadcasting 88-108 Mc.
- FM link service\*.
- 40-220 Mc model (Page 205).
- 100% self-contained.
- Entirely new.

\* In most countries but not U. S. A.

Two smart all new transmitters for low power FM broadcasting provide higher performance standards than ever before in a mode of broadcasting synonymous with quality transmission.

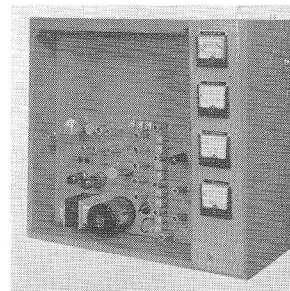
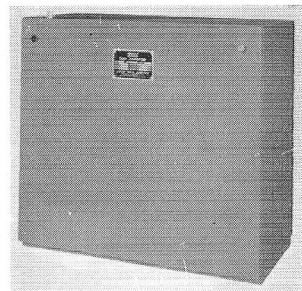
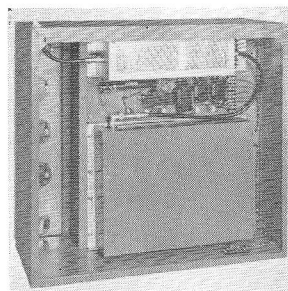
Basic in all Gates FM transmitters up to 5000 watts is the M-5534 ten-watt exciter unit. This exciter is detailed in the block diagram on Page 65 and is 100% new in circuit and component design with multiplex as an optional plug-in accessory (see Page 70). A new low in distortion has been obtained after long research in both circuitry and associated components. Inexpensive type tubes are employed and when replaced, no retuning is necessary for maximum performance.

**MODEL BF-E-10B:** Primarily for educational broadcasting but with many other interesting applications. Ten watts output and meets all FCC requirements including RF output indicator and audio level meter adjustable to 100% modulation. Operates 88-108 Mc.

**MODEL BF-E-50B:** Quite similar to the BF-E-10B but with a 50-watt power amplifier added, along with additional power supply. Has RF output indicator and audio level meter. Operates 88-108 Mc.

**MODEL BF-R-50C:** For many relay, communications and link service in the 40-220 Mc range, this model is very similar to the BF-E-50B and is listed on Page 205.

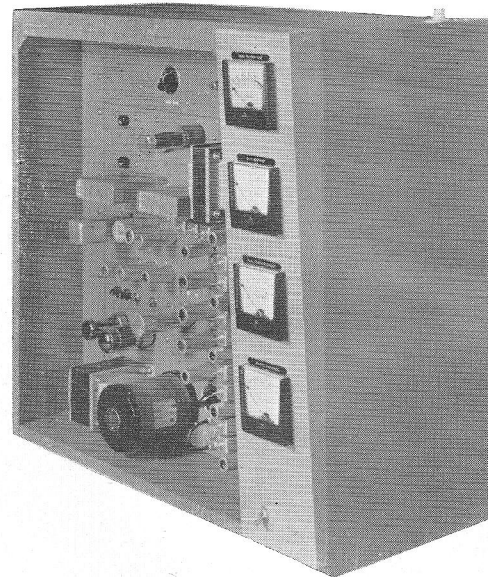
From left to right: (1) Rear view of BF-E-50B and BF-R-50C transmitters, (2) rear closed view of all three models, (3) front view (cover removed) of BF-E-10B ten-watt model.





**SPECIFICATIONS**

- POWER OUTPUT:** BF-E-10B, ten watts. BF-E-50B, fifty watts
- FREQUENCY RANGE:** 88-108 Mc, as ordered.
- RF OUTPUT:** 51 ohms (Type N connector).
- OSCILLATOR:** Direct crystal controlled, 0.001% stability.
- MODULATION:** Phase shift, employing pulse techniques.
- FREQUENCY SWING:**  $\pm 100$  Kc. ( $\pm 75$  Kc=100% modulation in FM broadcasting).
- INPUT:** +10 dbm  $\pm 2$  db at 600 ohms impedance.
- RESPONSE:** Within 1 db of standard 75 microsecond pre-emphasis curve or flat  $\pm 1$  db, 50-15,000 cycles, as desired. (If preference, state when ordering.)
- DISTORTION:** 1% or less 50-100 cycles.  
 $\frac{1}{2}$  % or less 100-10,000 cycles.  
 1% or less 10,000-15,000 cycles.
- NOISE:** 65 db below 100% modulation (FM).  
 60 db below equivalent 100% AM modulation.
- METERING:** RF output, audio level, plate current, plate voltage.
- POWER:** 115 volts, 50/60 cycles. BF-E-10B, 120 watts. BF-E-50B, 230 watts.
- RF HARMONICS:** Suppression meets or exceeds all FCC requirements.
- TUBES:** BF-E-10B — (7) 6AU6, (4) 12AX7, (3) 6J6, (2) 6A2, and one each 6AQ5, GZ34/5AR4, 6080, 6360.  
 BF-E-50B — Same as above, with (2) 6146 and (1) 5R4GYA tubes added.
- SIZE:** 26½" high, 28" wide, 14" deep.
- WEIGHT:** BF-E-10B — Packed 115 lbs. Cubage 8.5.  
 BF-E-50B — Packed 165 lbs. Cubage 8.5.



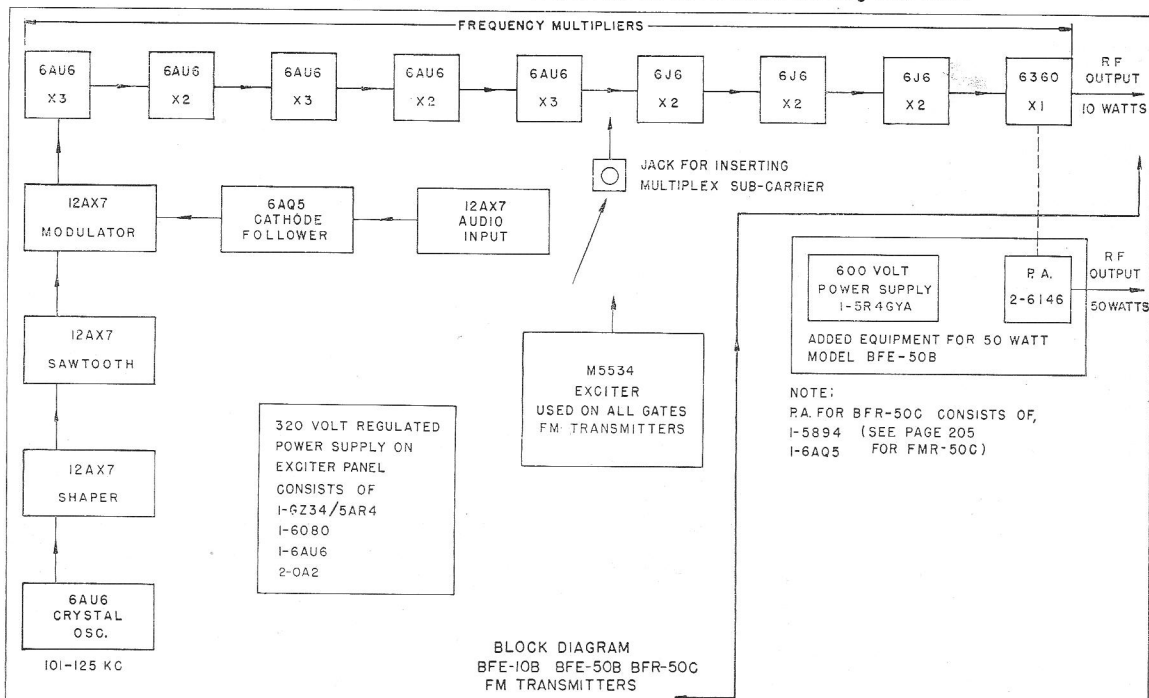
Inner front view (cover removed) of BF-R-50C and BF-E-50C fifty-watt FM transmitters.

**ORDERING INFORMATION**

- Ten watt FM transmitter with tubes and crystal ..... BF-E-10B
- Fifty watt FM transmitter with tubes and crystal ..... BF-E-50B
- 100% spare tube kit for BF-E-10B ..... TK-308
- 100% spare tube kit for BF-E-50B ..... TK-309
- Multiplex single sub-channel .... M-5633
- Multiplex dual sub-channel ..... M-5634

When ordering, state carrier frequency. If multiplex ordered, state sub-carrier frequency or frequencies as related to receivers to be used.

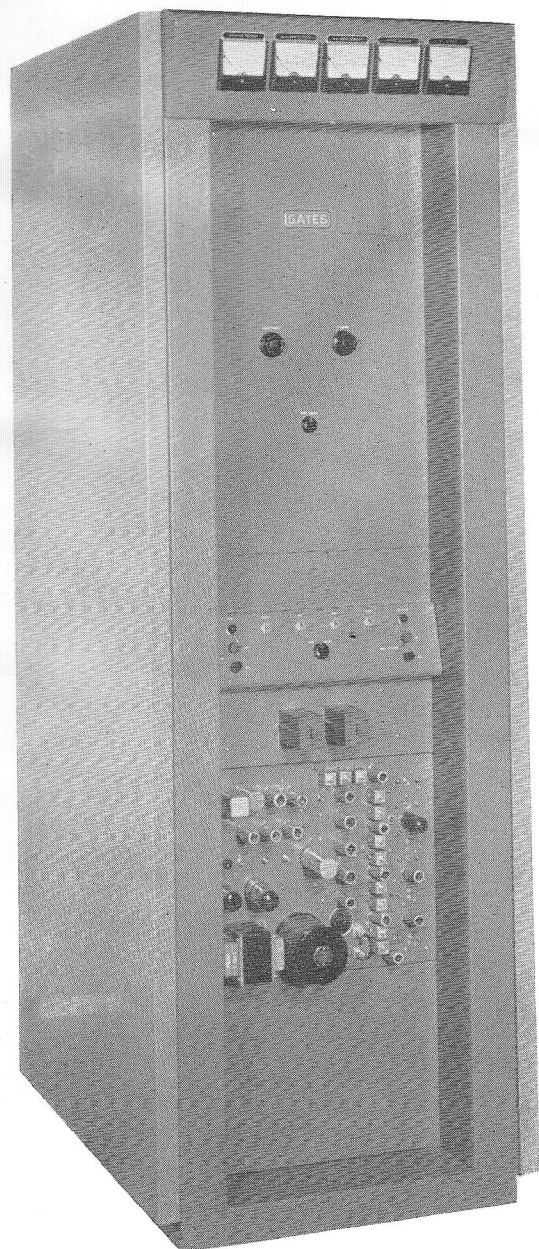
Block schematic of BF-E-10B, BF-E-50B and BF-R-50C transmitters. The M-5534 exciter (part of these transmitters) is basic for all FM models including 5000 watts.



**GATES**

## 250 WATT FM TRANSMITTER

(Model FM-250B)



- 100% new FM design.
- For 88-108 Mc broadcasting and other models between 40 and 220 Mc.
- Multiplexing optional.
- Built for easy adapting to remote control.
- New wide response and low distortion.
- New exciter uses standard receiving type tubes.

Scores of earlier Gates 250 watt FM transmitters have set the stage for this entirely new FM equipment. Constructed in one sturdy cabinet and entirely self-contained, the FM-250B eliminates the complexities formerly associated with FM and in the doing, adds greatly to performance standards and reliability.

The M-5534 exciter unit (block diagram on Page 65) with plug-in multiplex sub-channels as optional accessories is all new with basic design built around the additional quality demands in multiplexing which results in a superior exciter whether or not multiplexing is used. — If multiplex is added later, the cost is much less as the basic design is with multiplex in mind. See Page 70 for multiplexing

The power output stage is single ended, using one 4X250B tube. As the exciter develops 10 watts output, the total 250 watt transmitter consists of the exciter and the single tube power amplifier stage.

Metering is complete including a direct reading power output and VSWR meter. Protective and operating relays are built with remote control in mind. No circuit breakers are employed. Ease of servicing is emphasized in the mechanical design. Air intake is filtered and air pressure to the power amplifier tube is diaphragm pressure switch protected. — The FM-250B is available for use at other frequencies and at other carrier swing limits between 40-88 and 108-220 Mc.



# FM-250B SPECIFICATIONS

**POWER OUTPUT:** Rated 250 watts.

**FREQUENCY RANGE:** FM-250B (Broadcast), 88-108 Mc.  
FM-250C (Communications), 40-88 Mc and 108-220 Mc, as ordered.

**FREQUENCY SWING:** FM-250B,  $\pm 100$  Kc (75 Kc considered 100% modulation).  
FM-250C, available as ordered.

**FREQUENCY STABILITY:** 0.001% via temperature controlled crystal.

**OSCILLATOR:** Direct crystal controlled.

**RF OUTPUT:** 51 1/2 ohms to coaxial line to Type N connector.

**AUDIO INPUT:** 600 ohms at +10 dbm,  $\pm 2$  db (for 100% modulation).

**FREQUENCY RESPONSE:** Within 1.0 db of standard 75 microsecond pre-emphasis curve or flat  $\pm 1.0$  db, 50-15,000 cycles, as desired. Specify if preference.

**DISTORTION:** (at 100% modulation)  
1% or less 50-100 cycles.  
0.5% or less 100-10,000 cycles.  
1% or less 10,000-15,000 cycles.

**NOISE:** 65 db below 100% modulation (FM).  
60 db below equivalent 100% AM modulation.

**RF HARMONICS:** Suppression meets or exceeds all FCC requirements.

**POWER INPUT:** 115 volts, 50/60 cycles, single phase  
2 KVA demand.

**TUBES:** (7) 6AU6, (4) 12AX7, (3) 6J6, (2) OA2, (2) 866A and one each 6360, 6AQ5, 6080, GZ34/5AR4X250B.

**METERING:** Filament volts, PA grid current, PA plate current, plate volts, power output/VSW.  
Pin jacks measure each circuit in exciter using standard volt-ohm-meter and probe.

**RELAY PROTECTION:** Grid underload, plate overload, overpressure, door interlock, filament current or end plate voltage on.

**SIZE:** 78" high, 27" wide, 36 1/3" deep. If end be removed, width reduces to 24".

**WEIGHT:** Net 510 lbs. Packed 820 lbs. Cubage 44.

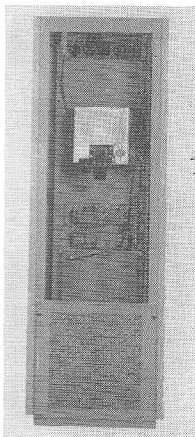
**FINISH:** Medium gloss gray with escutcheons in black and trim in chrome.

## ORDERING INFORMATION

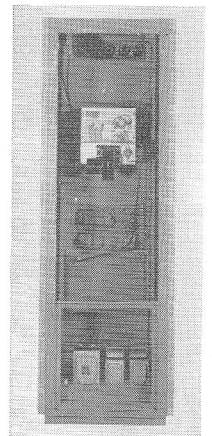
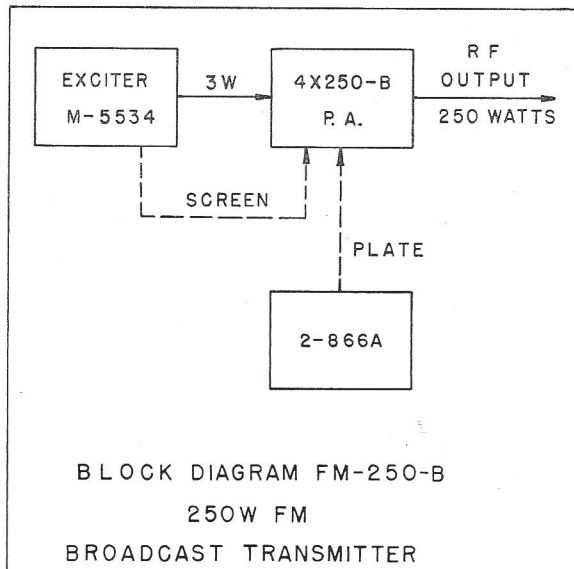
|  |         |
|--|---------|
| FM 250 watt broadcast transmitter with tubes, crystal and oven*                    | FM-250B |
| FM 250 watt transmitter for 40-88 Mc or 108-220 Mc, with tubes, crystal and oven** | FM-250C |
| Spare 100% tube complement for FM-250B   | TK-311  |
| Multiplex single sub-channel   | M-5633A |
| Multiplex dual sub-channel   | M-5633  |

\* State carrier frequency when ordering.

\*\* State carrier frequency and frequency swing when ordering.



Rear of FM-250B and FM-250C transmitters showing air filter intake and internal units with dust covers in place.



Open view of FM-250B and FM-250C exposing interior of power amplifier and power supply components.

**GATES**

# 1000 WATT FM BROADCAST TRANSMITTER

(88-108 Mc)

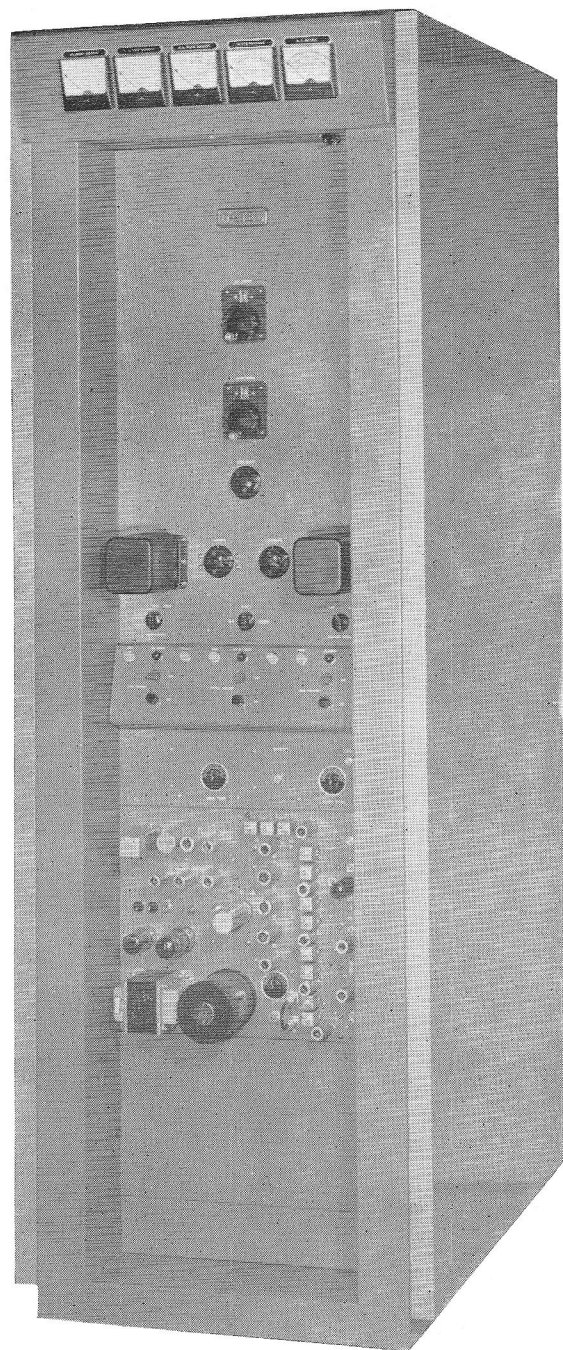
Another 100% new FM broadcast transmitter fitting the exacting needs of the Hi-Fidelity era. New circuits and greatly simplified design up-grades FM to a new quality stature. Inbuilt reliability, a new exciter using standard receiving tubes and elimination of clumsy mechanical arrangements, often associated with earlier FM equipments, assures complete technical contentment through minimum service and maintenance needs.

As in all Gates FM transmitters, multiplex is an optional accessory. Where basic design is with multiplex in mind, the main channel exciter must be way above normal needs in standard FM. This makes for better FM broadcasting and much lower cost multiplexing equipment. — The M-5534 exciter "block diagram" is found on Page 65. Multiplexing is discussed on Page 70.

Radio frequency line-up consists of the M-5534 exciter feeding a 30 watt IPA stage which in turn drives the push-pull 4-400A power amplifiers to produce an easy 1000 watts output. Coupling between exciter and IPA, and IPA and the power amplifier is at the low 51 ohm impedance. This greatly adds to stability and ease of tune-up.

The relay complement is complete including: (a) filament start contactor, (b) plate start contactor, (c) grid underload protection, (d) plate overload, (f) door interlock, and (g) diaphragm type air flow guard to the power tubes.

Exciter, IPA and power amplifier are each in separate shielded compartments to eliminate interaction and assure meeting FCC harmonic standards. The output meter reads directly "power in watts" and VSWR. Two power supplies, a 600 volt and 3500 volt, operate intermediate and power stages respectively. Air intake is filtered and blower cooling is applied to the entire power amplifier chamber.



Attractively styled, the FM-1B, 1000 watt FM transmitter has all controls to the front including exciter tubes and pin jacks for testing. If multiplex is added, the blank panel at the bottom is removed and multiplex quickly installed.





# FM-1B SPECIFICATIONS

**POWER OUTPUT:** Rated 1000 watts. Capable 1100 watts.

**FREQUENCY RANGE:** 88-108 Mc. (On special order, available for other frequencies between 40 and 88 Mc.)

**RF OUTPUT:** 51½ ohms into a 7/8" coaxial flange connector.

**OSCILLATOR:** Direct crystal controlled.

**FREQUENCY STABILITY:** 0.001%.

**HARMONICS:** Suppression meets or exceeds FCC requirements.

**MODULATION:** ±100 Kc, (±75 Kc required for 100% modulation).

**AUDIO INPUT:** 600 ohms at ±10 dbm ±2 db.

**RESPONSE:** Within 1 db of standard 75 microsecond pre-emphasis curve or flat ±1.0 db from 50 to 15,000 cycles. If preference, please specify.

**DISTORTION:** (at 100% modulation)  
1% or less 50-100 cycles.  
0.5% or less 100-10,000 cycles.  
1% or less 10,000-15,000 cycles.

**NOISE:** 65 db below 100% modulation (FM).  
60 db below equivalent 100% AM modulation.

**POWER INPUT:** 230 volts, 50/60 cycles, single phase  
3-wire, 5 KVA demand.

**TUBES:** (7) 6AU6, (4) 12AX7, (3) 6J6, (2) OA2, (2) 6146  
(2) 4-400A, (2) 8008 and one each, 6360, 6AQ5,  
6080, GZ34/5AR4 and 5R4GYA.

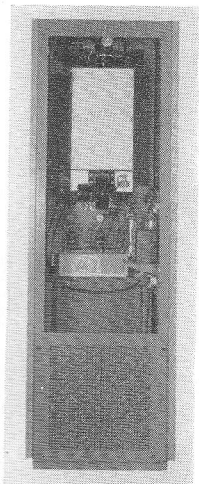
**METERING:** Filament volts, PA grid current, PA plate current, plate volts and power output/VSW.  
(Pin jacks permit detailed checking of exciter with volt-ohm-meter and standard products.)

**SIZE:** 27" wide, 78" high, 36½" deep. Width may be reduced to 24" by removing end bells.

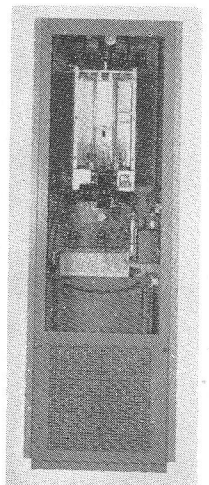
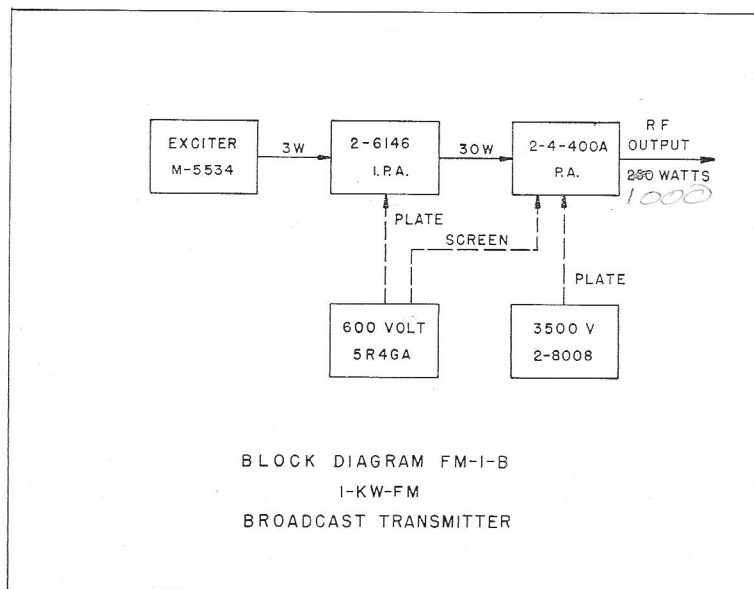
**WEIGHT:** Net 880 lbs. Packed 1140 lbs. Cubage 44.

## ORDERING INFORMATION

|  |         |
|--|---------|
| 1000 watt FM transmitter with tubes, crystal and oven<br>(state frequency when ordering) ..... | FM-1B   |
| 100% spare tube kit for above .....  | TK-312  |
| Multiplex single sub-channel .....   | M-5633A |
| Multiplex dual sub-channel .....   | M-5633  |



Rear view FM-1B transmitter showing air intake filter and clean, straightforward construction.



The cover plate is removed to expose the push-pull power amplifier. Blower attaches directly to power tube chamber for maximum effect.



## MULTIPLEX FOR ALL GATES FM TRANSMITTERS

All Gates FM transmitters from the 10 watt and 50 watt models for educational institutions to the large 5000 watt models, are designed for the addition of multiplex now or at any future date.

The new Gates M-5633 and M-5633A multiplex sub-channel generators, for one or two sub-channels, are plugged into the main exciter unit with standard coaxial plugs provided. The addition of multiplex is simplified to bolting down the 10½" x 19" panel that accommodates the power supply, inserter and one or two sub-channels, plugging it into the main exciter, connecting to the power line voltage and with only touch-up tuning, it is ready to use.

The main exciter is of entirely new design to offer superb main channel service and equally important, to accommodate the broader technical demands of multiplexing, not possible with older FM exciters.

Multiplex receivers are available from several prominent companies. A sub-carrier frequency of 41 Kc for the first sub-channel and 67 Kc for the second sub-channel has been adopted by one well known receiver and functions excellently. Unless otherwise stated, these sub-frequencies will be supplied with Gates multiplex systems.

In all Gates FM transmitters except the BF-E-50B, multiplex can be installed in place of a blank panel on the front of the transmitter. In the BF-E-50B transmitter the multiplex chassis fits inside the cabinet.

Most multiplex installations are with one sub-channel. This permits regular broadcasts on the main channel and storecasting, music service to restaurants, etc., or any other approved service on the sub-channel. Many will recognize the stereophonic possibilities. In the communications models, the sub channel may be used as a talking channel or a second program channel, subject to restrictions of government bodies and technical feasibility.

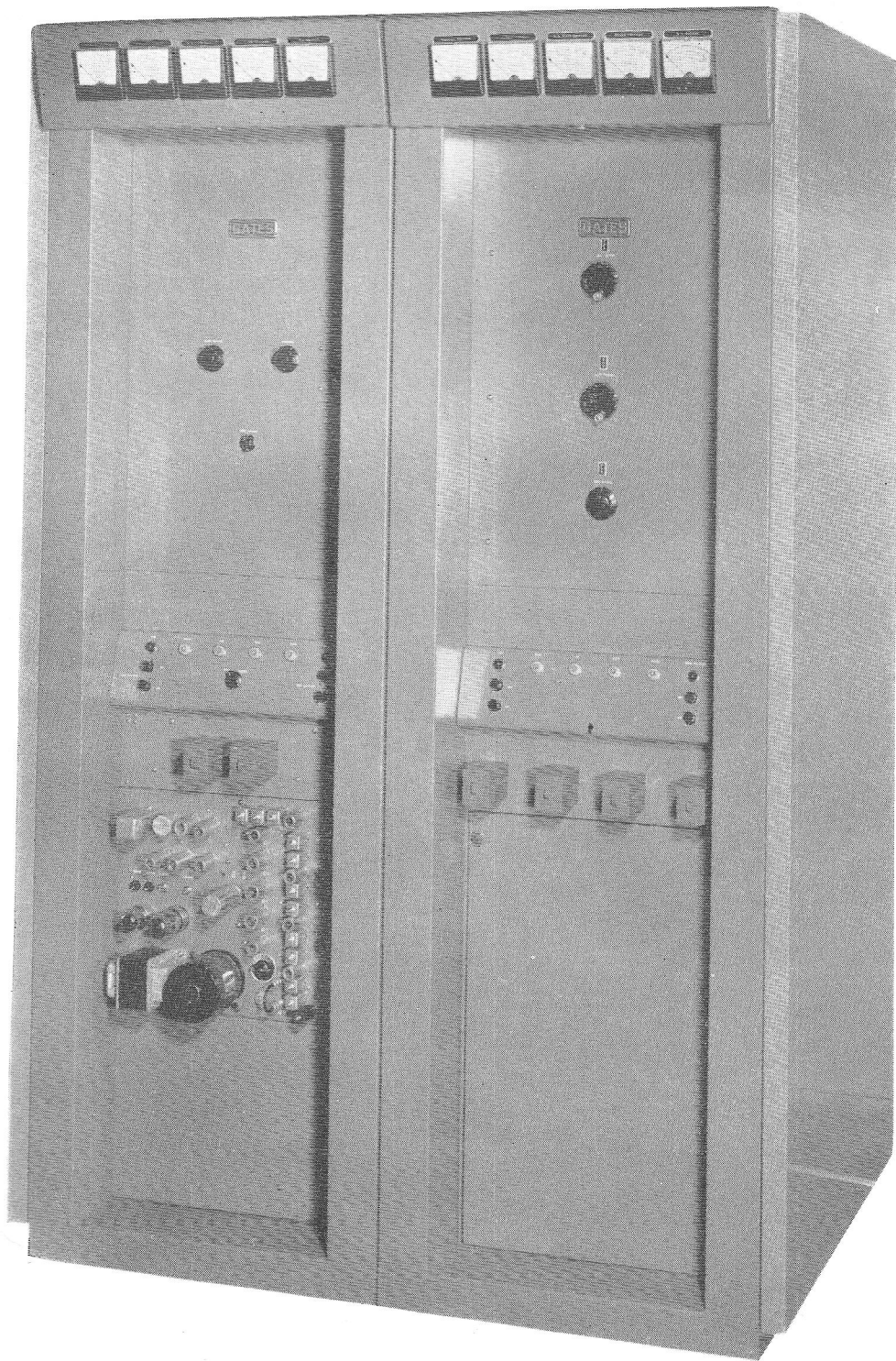
**M-5633A SUB-CHANNEL** is a single sub-channel unit with inserter and power supply, ready to plug in the main exciter.

**M-5633 DUAL SUB-CHANNEL** is the same as the M-5633A but has the second sub-channel added.

**GATES RADIO COMPANY**  
Quincy, Illinois, U. S. A.

**GATES**

# 5000 WATT FM BROADCAST TRANSMITTER



A new quality 5 KW FM power plant with multiplex optional, to fit the most exacting technical requirements of an industry on the march. NEW, low cost, long life tube complement. NEW performance standards and NEW ease of servicing to keep a fine transmitter fine!

## FM-5B 5000 WATT FM TRANSMITTER

Rated at one-half percent distortion between 100 and 10,000 cycles and 1% at 50 cycles and 15,000 cycles, the new FM-5B power in FM will produce true Hi-Fi-Quality. An entirely new exciter (schematic Page 65) employing pulse techniques in phase modulation was created. The greater quality demands of multiplexing demanded research in circuit constants with the result, a simpler, better performing and highly reliable basic exciter void of special tubes and where standard tubes, when replaced, necessitates no readjustments for best performance.

The left cabinet of the FM-5B FM transmitter (Page 71) will be recognized as the FM-250B, 250 watt transmitter listed on Page 66. The 51 ohm output of this 250 watt model becomes the driver for the 5 KW amplifier. This adds stability and ease in servicing and with the 5000 watt section entirely independent as to power supplies, control circuits and function the possibility of interaction, the cause of instability, is eliminated. For full detail on the FM-250B transmitter, the driver for this 5KW model, the reader need only refer to Page 67.

For 5 KW, two 6076 tetrodes are operated in push-pull

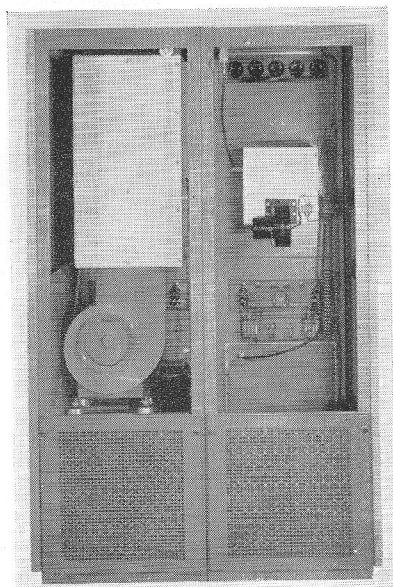
and receive their plate voltage from a self-contained, 3-phase, full wave power supply delivering 5000 volts to the plate. An intermediate screen supply consists of dual 8008 tubes as a full wave supply.

As the carrier frequency appears at the output of the RF exciter, both the IPA driver, the IPA itself and the power amplifier operate at the assigned carrier frequency. This again adds to stability as well as assured ease in modulation.

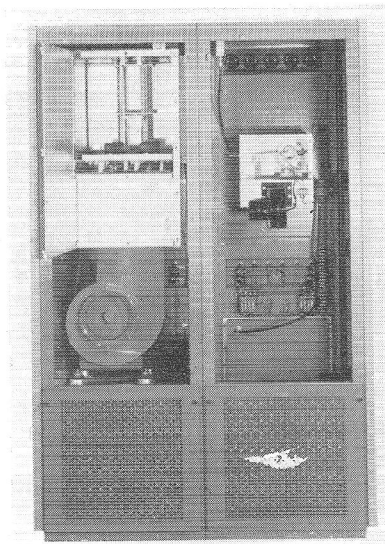
Protective circuits are all relay controlled for both instant protection and easy adaptation to remote control. RF output metering reads directly in watts and standing wave ratio. Multiplex may be added at any time or ordered with the equipment. Please refer to Page 70 for multiplexing.

In the Gates FM-5B, 5000 watt FM transmitter, the buyer has indeed the very latest and most modern FM broadcasting equipment available today. Nothing has been spared to make it so. Here indeed is the excellence of Gates research demonstrated at its fullest fruition.

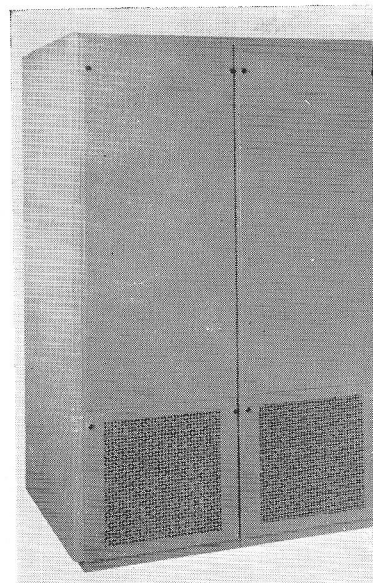
Rear of FM-5B, 5000 watt FM transmitter. The right cabinet is the FM-250B transmitter described on Page 66.



Open view of the 5 KW power chamber. The chamber door hinges open for quick accessibility. The large squirrel cage blower supplies an over abundance of air for long tube life.



Full length rear doors are fully removable permitting location of the transmitter closer to the rear wall. The air intake filters are shown at the bottom.







# FM-5B SPECIFICATIONS

**POWER OUTPUT:** Rated 5000 watts. Capable 5500 watts.

**FREQUENCY RANGE:** 88-108 Mc. (Other frequencies to 170 Mc available on special order.)

**RADIO FREQUENCY OUTPUT:** 51 1/2 ohms into 1 5/8" coaxial flange connector.

**OUTPUT METER:** Reads directly in watts power plus standing wave ratio.

**OSCILLATOR:** Direct crystal control.

**FREQUENCY STABILITY:** 0.001%.

**MODULATION:** Phase shift with pulse techniques.

**MODULATION CAPABILITY:** ±100 Kc, (±75 Kc=100% modulation).

**AUDIO INPUT:** 600 ohms at +10 dbm ±2 dbm.

**FREQUENCY RESPONSE:** Within 1 db of standard 75 microsecond pre-emphasis curve or flat ±1 db from 50-15,000 cycles. If preference, please specify.

**DISTORTION:** (at 100% modulation)  
1% or less 50-100 cycles.  
1/2% or less 100-10,000 cycles.  
1% or less 10,000-15,000 cycles.

**NOISE:** 65 db below 100% modulation (FM).  
60 db below 100% equivalent AM modulation.

**TUBES:** (7) 6AU6, (6) 575A, (4) 12AX7, (3) 6J6, (2) OA2, (2) 6076, (2) 8008 and one each, 6360, 6AQ5, 6080, GZ34/5AR4, 4X250B.

Total tubes: 31.  
Total tube types: 12.

**POWER:** 230 volts, 50/60 cycles, 3 phase, 20 KVA demand. 115 volts, 50/60 cycles, single phase, 500 watts.

**METERING:** (driver cabinet) (1) filament volts, (2) IPA grid\*, (3) PA plate current\*, (4) plate volts, (5) output meter in watts and VSWR.

(power amplifier cabinet) (1) filament volts, (2) PA grid, (3) PA plate current, (4) plate volts, (5) output meter in watts and VSWR.

NOTE 1: Pin jacks measure exciter tubes at every monitor point by using standard volt-ohm-meter and test prods.

NOTE 2: Use of power output/VSWR meter at output of driver amplifier or input of power amplifier, provides superb method of correct coupling and easy tune-up between driver (IPA) and final (PA).

\* IPA in driver is actually PA of the 250 watt unit but of course becomes IPA in 5 KW model.

**MULTIPLEX:** (optional accessory) Attaches to lower front of left cabinet, (see Page 71 for illustration).

**SIZE:** (overall) width 51", height 78", depth 36 1/2".  
(each cubicle) width 24"\*\*, height 78", depth 36 1/2".

**FINISH:** Medium gloss gray with escutcheons in black and hardware chrome.

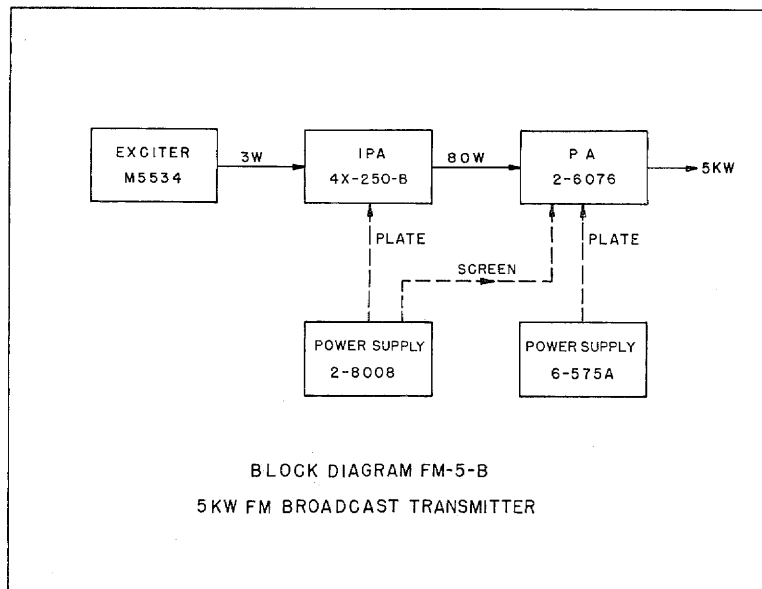
**WEIGHT:** Net 1800 lbs. Packed 2375 lbs. Cubage 78.

\*\* Less removable end bells which add 1 1/2" width to each end and included in overall width.

## ORDERING INFORMATION

|   |                |
|---|----------------|
| 5000 watt FM transmitter with tubes, crystal and oven ..... | <b>FM-5B</b>   |
| 100% spare tube kit for above .....                         | <b>TK-313</b>  |
| Multiplex single sub-channel .....                          | <b>M-5633A</b> |
| Multiplex dual sub-channel .....                            | <b>M-5633</b>  |

NOTE A: See Page 70 for multiplex detail.  
NOTE B: Please state frequency when ordering.

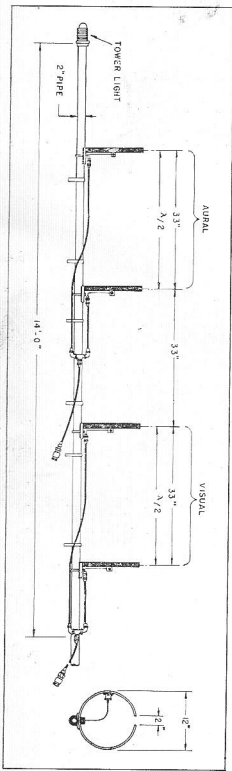


AC-30875



# ANTENNAS FOR TV AND FM

## MODEL TV-100/TV-500



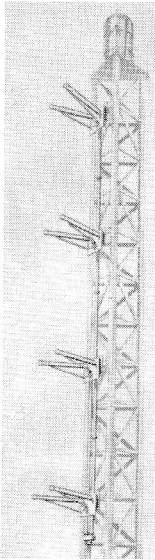
This antenna is designed specifically for low power TV. Consists of two sections of two rings each. One section is for visual and the other for aural. With this method, the diplexer is not required. As each ring has a power gain of 0.7, the two rings when stacked provide a power gain of 1.3. Thus, when used with normal transmission line lengths, unity power output is had, or a 100 watt transmitter will have an ERP of approximately 100 watts, or a 500 watt transmitter an ERP of approximately 500 watts.

Pattern is essentially omni-directional. Includes mounting mast with top plate for an obstruction light. Rings are provided with connecting coaxial cable and matching studs. Each antenna is tested prior to shipment. Impedance 51 ohms. Size of rings and spacing varies as to channel.

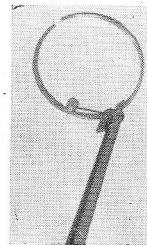
- For 100 watts, channels 2-6 ..... TV-100-L
- For 100 watts, channels 7-13 ..... TV-100-H
- For 500 watts, channels 2-6 ..... TV-500-L
- For 500 watts, channels 7-13 ..... TV-500-H

## MULTI-V ANTENNAS

Omni-directional, this popular Andrew antenna for FM in the 88-108 Mc band is available in a 2-bay, 4-bay, or 8-bay version. Power gain of 2 bay is 1.6, 3.7 for the 4 bay, and 7.3 for the 8 bay. Mounts on side of tower and light weight allows use on nearly any type of tower. Power rating up to 10 kw. Standard design is for use with 1 5/8" coaxial cable. However, smaller cables may be used by purchasing a simple reducer. The Multi-V line has been field proven by many years of dependable service at hundreds of radio stations in the country.



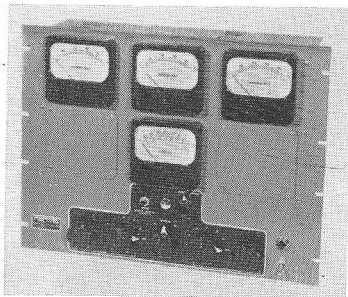
- 2-bay, power gain 1.6 ..... Type 1302
- 4-bay, power gain 3.7 ..... Type 1304
- 8-bay, power gain 7.3 ..... Type 1308
- Reducer to RG17U coax .. Model 4874



## BROAD BAND FM ANTENNA

An omni-directional antenna for the 88-108 mc FM band, having a power gain of 0.8. Primarily designed for FM educational band but may be used at powers up to 1 kw. Design is broad band, greatly reducing standing wave problems due to changing climatic conditions. State frequency when ordering.

- Two ring antenna, power gain of 1.3 ..... Type FM-22
- Broad band antenna ..... Type FM-11



108E Three-Tower Monitor

Recognized as the finest phase meter built today. Available in standard models up to 4 towers. Special designs above 4 towers readily available. The Clarke 108 phase meter comes with remote antenna current meters and is unaffected by modulation. Operation has been simplified. Two selector switches are set to elements to be compared and the outputs of the amplifiers are adjusted to a red line on the meters. By a flip of a switch, the phase difference is indicated.

## PHASE MONITOR

### SPECIFICATIONS

- FREQUENCY RANGE:** 100 Kc to 2000 Kc (as ordered).
- PHASE ANGLE RANGE:** 0-360 degrees.
- MONITORING ACCURACY:** 1 degree.
- RESOLUTION:** 1/2 degree.
- RF INPUT IMPEDANCE:** 50 or 70 ohms (as ordered).
- RF VOLTAGE RANGE:** 1-7 volts.
- SIZE:** 14" high, 19" wide, 7" deep.
- POWER:** 115 volts, 50/60 cycles, 80 watts.
- TUBES:** (2) 6AU6, (2) OB3, (3) 6AL5, (1) 5Y3.

### ORDERING DATA

- Two Towers ..... Model 108
  - Three Towers ..... Model 108
  - Four Towers ..... Model 108
  - Model 108 (more than four towers) ..... on request
- When Ordering: State carrier frequency, remote meter ranges, type of sampling line or impedance and carrier power.



NOTE: As standard batteries are employed, it is recommended that batteries be procured locally as needed.

## FIELD INTENSITY METER

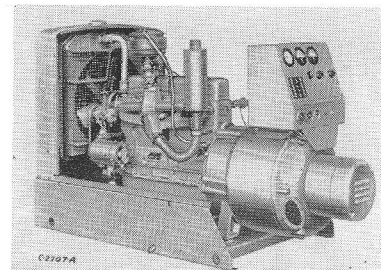
The Clarke 120D (formerly WX-2D) field meter is for measurement of radio signal intensity in the broadcast band between 540-1600 Kc. Sensitivity from 10 microvolts to 10 volts per meter, makes it equally effective for interference studies and close in measurements of high power directional arrays. — For measurements of any directional system or signal intensity, this test instrument is indispensable. — The 120D meter is battery operated, weighs only 12 1/2 lbs. and is direct reading.

### SPECIFICATIONS

- FREQUENCY RANGE:** 540-1600 Kc.
- FIELD INTENSITY RANGE:** 10 microvolts to 10 volts per meter.
- ACCURACY OF ATTENUATORS:** 2%.
- OUTPUT INDICATORS:** Panel meter, direct reading, with logarithmic scale graduated 1 to 10 and HAVING NO ZERO MARK (needle is OFF SCALE when meter is not energized). Provision for using recorder, and headphones.
- ANTENNA:** Shielded unbalanced loop.
- BATTERIES:** Five 1 1/2 volt A. Two 67 1/2 volt B.
- BATTERY LIFE:** Approximately 500 indications.
- TUBES:** (4) 1T4, (2) 1R5.
- SIZE:** 9" high, 13" wide, 5 1/4" deep (closed).
- WEIGHT:** 12 1/2 lbs.

Field Meter, less batteries ..... Model 120D

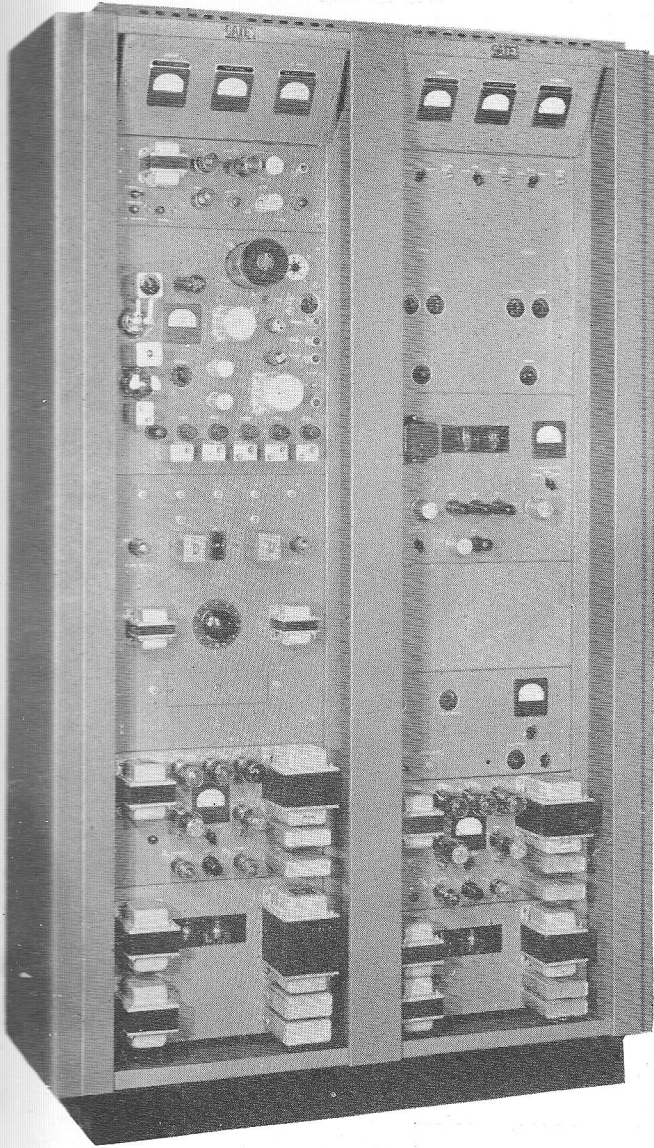
## ELECTRIC GENERATING PLANTS



Electric and diesel generating plants are available in all powers from 1 KW to 500 KW. Pictured above is the popular Onan 25,000 generating plant. Ideal for use in providing complete power for radio and TV stations. Full information, prices, supplied upon receipt of customer's requirements.

**GATES**

## BT100A 100 WATT TV TRANSMITTER



Low power television or satellite operation is becoming more and more popular. For VHF channels 2-13, the BT100A excellently fills this need in providing both picture sharpness and aural quality second to none. The BT100A transmitter is built in two standard rack cabinets. Use of vertical construction assures 100% access to all parts. — Top quality characteristics of Gates equipment is certainly amplified in the BT100A transmitter by fine workmanship and the use of the best components money can buy. A 50 watt model, identical to the BT100A in appearance, is also available with 50 watt video and 30 watt aural output.

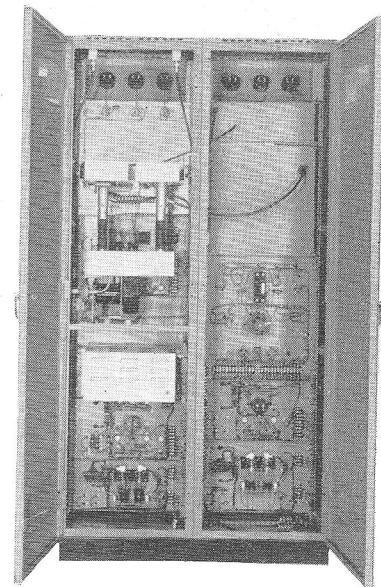
The Gates BT100A television transmitter is a complete aural-visual equipment ready to attach to aural and video input and antenna. Though the maximum power rating is 100/60 watts for visual-aural, the BT100A may be operated at lower powers, also. Ideal as a low power TV transmitter, it may also be employed as an exciter for higher powered transmitters and will find good acceptance for production line testing of TV receivers as well as laboratory use.

The aural section of the transmitter consists of an exciter, modulator and a power amplifier. Referring to the block diagram on the next page, the oscillator is crystal controlled with the output coupled to the shaping and modulating circuits. Audio voltage is applied in such a manner to cause a phase shift in the oscillator frequency of the audio rate. The oscillator frequency is then multiplied through a series of multipliers to the operating frequency. The output of the exciter modulator is at operating frequency and is used to drive the power amplifier. Conventional circuitry is used throughout.

Visual section design consists of an RF exciter, video modulator, and power amplifier. The exciter multiplies the crystal oscillator frequency to the operating frequency and at the proper power level to drive the power amplifier. The modulator is a video amplifier that amplifies a standard video input voltage to the power required to modulate the power amplifier. The power amplifier is grid-bias modulated. A diode is used to restore the DC component at the grid of the modulating stage. The modulating stage is DC coupled to the grid of the power amplifier.

A direct reading power output and VSWR indicator is standard equipment. Also provided is a video demodulator wave form and modulation monitor, indicating modulation percentage and wave shape. The monitor output may be attached to a wave form or picture monitor.

Vertical construction is employed for ease in servicing. Cabinets are finished in hand rubbed gloss gray and provided with full length rear doors.



Rear BT-100A view. Left cabinet contains visual and aural power amplifiers, visual exciter, modulator and power supplies. Right cabinet, demodulator, aural exciter, control and protective panel and power supplies.

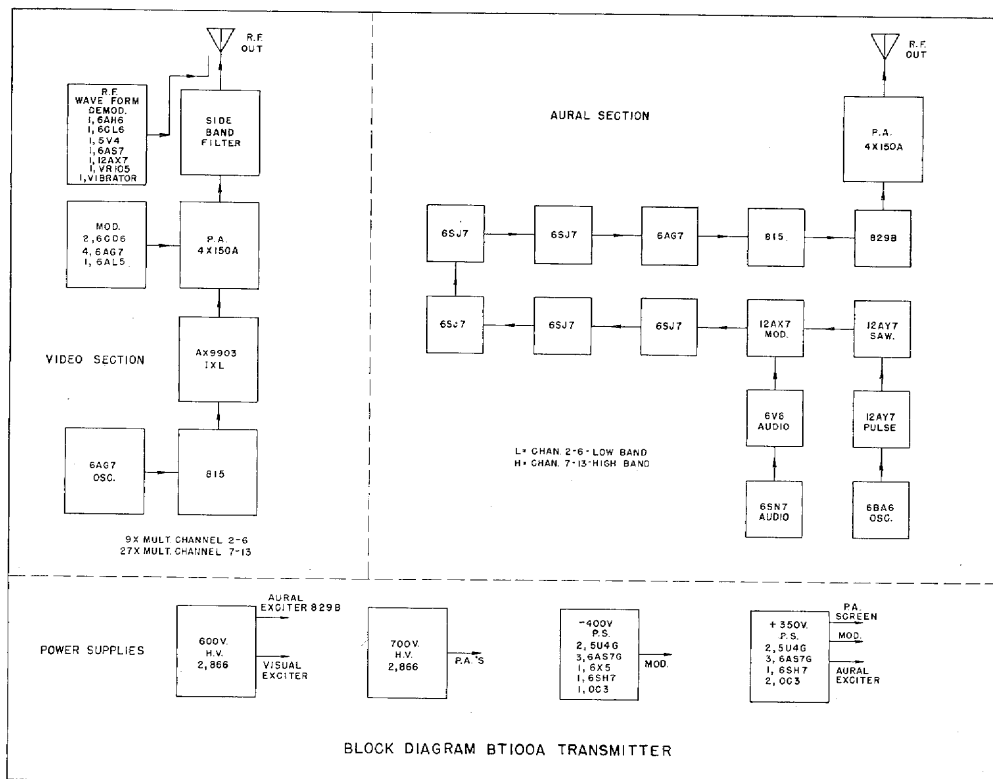


# BT100A SPECIFICATIONS

|                                    | <u>Visual Section</u>  | <u>Aural Section</u>                                     |
|------------------------------------|--|--|
| <b>TYPE OF EMISSION:</b>           | A5   | F3   |
| <b>FREQUENCY RANGE (channels):</b> | 2-13   | 2-13   |
| <b>POWER OUTPUT:</b>               | 100 watts  | 60 watts   |
| <b>RF OUTPUT IMPEDANCE:</b>        | 51 ohms  | 51 ohms  |
| <b>CARRIER STABILITY:</b>          | ±1000 cycles   | ±4000 cycles   |
| <b>MODULATION CAPABILITY:</b>      | 85 %   | ±40 Kc   |
| <b>METHOD OF MODULATION:</b>       | Amplitude grid modulation of PA stage.   | Phase, employing pulse timing                            |
| <b>FREQUENCY RESPONSE:</b>         | ±2 db at 500 Kc<br>±2 db at 1.5 Mc<br>±2 db at 2 Mc<br>±2 db at 3 Mc<br>±3 db at 4 Mc  | ±1 1/2 db 50 to 15,000 cycles                            |
| <b>INPUT IMPEDANCE:</b>            | 73 ohms  | 600 ohms   |
| <b>INPUT LEVEL:</b>                | 1.4 VPP  | +10 dbm  |
| <b>DISTORTION:</b>                 | .....  | 1 1/2 % or less 50 to 15,000 cycles                      |
| <b>NOISE:</b>                      | .....  | FM: 55 db below 100 % mod.<br>AM: 50 db below 100 % mod. |
| <b>POWER INPUT:</b>                | 117 volts, 50/60 cycles, 1700 watts  |  |
| <b>SIZE:</b>                       | 50" wide, 84" high, 21" deep.  |  |
| <b>OPERATION CYCLE:</b>            | Continuous duty.   |  |
| <b>WEIGHT:</b>                     | 1400 lbs. approximate.   |  |
| <b>CUBAGE:</b>                     | 68 cu. ft.   |  |
| <b>TUBES:</b>                      | One each, 6X5, 6BA6, 6V6, 6SN7, 829B, AX9903, 6AL5, 6AH6, 6CL6, 5V4, VR105; two each, 6SH7, 12AY7, 12AX7, 815, 4X150A; three each, OC3, 6AG7, 6SJ7, 6CD6; four each, 866A, 5U4G; seven each, 6AS7/G. |  |

## ORDERING INFORMATION

- Complete 100 watt TV transmitter for 100 watts video and 60 watts aural output, with one set of tubes, two crystals and ovens ..... **BT100A**
- 100% spare tube complement ..... **TK-212**
- Spare crystal and oven for visual section ..... **JKO9**
- Spare crystal and oven for aural section ..... **JKO7E**
- Complete 50 watt transmitter for 50 watt video and 30 watt aural output, one set of tubes, two crystals and ovens, identical to the BT100A except reduced to 50 watts ..... **BT50**





**GATES**

## **BT1A 500 WATT TELEVISION TRANSMITTER**



For either the experienced engineer or the engineer tackling TV for the first time, the straightforward, easy to service and completeness of the Gates BT1A, 500 watt transmitter will be appreciated. — Often an accessory, but built into the BT1A is a wave form and modulation monitor. Variable power-stats in both AC and plate voltage supplies assures absolute correct operating voltages whether input voltage is higher or lower than normal. Added to fine performance is conservative design and the feature standard in all Gates designs— instant accessibility to all components.

(continued next page)

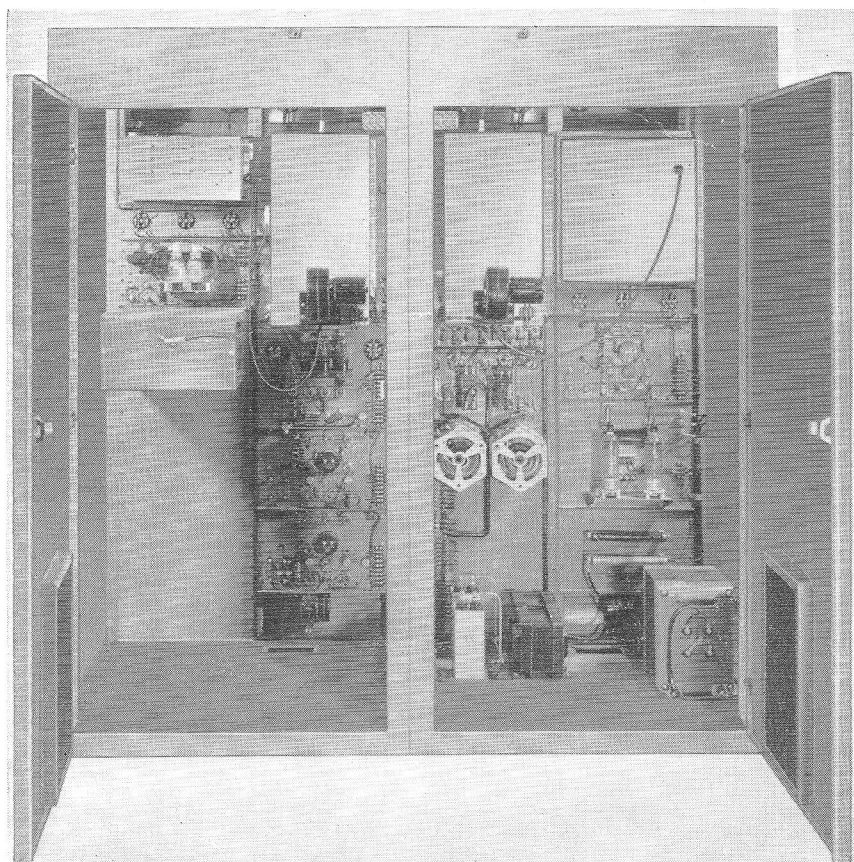
**GATES**

## BT1A 500 WATT TV TRANSMITTER

A wealth of background in VHF and UHF transmitters has aided materially in BT1A design. Essentially two transmitters, visual and aural are in two separate cubicles that join together at time of installation. — Visual transmitter consists of only four radio frequency stages. This provides unusual operating simplicity. The visual modulator is also less complicated, having only three stages including modulator tube. — Aural transmitter is phase modulated at the crystal frequency and multiplied as much as 1296 times for the top channel 13.

Reflectometers to indicate both VSWR and power output are provided for both aural and visual units. Five power supplies, three of the regulated type, add to transmitter stability. A generous supervisory relay and circuit breaker complement assure full protection of the valuable tubes and components. — Fifteen meters indicate every desirable current and voltage, even including sections of the regulated power supplies, important in picture quality. — Full length front doors protect tuning adjustments even though dead-front design is followed.

Roomy interior assures cool operation and ease of maintenance. Incoming air is filtered. Double back doors allow walk-in-to-service.





# BT1A SPECIFICATIONS

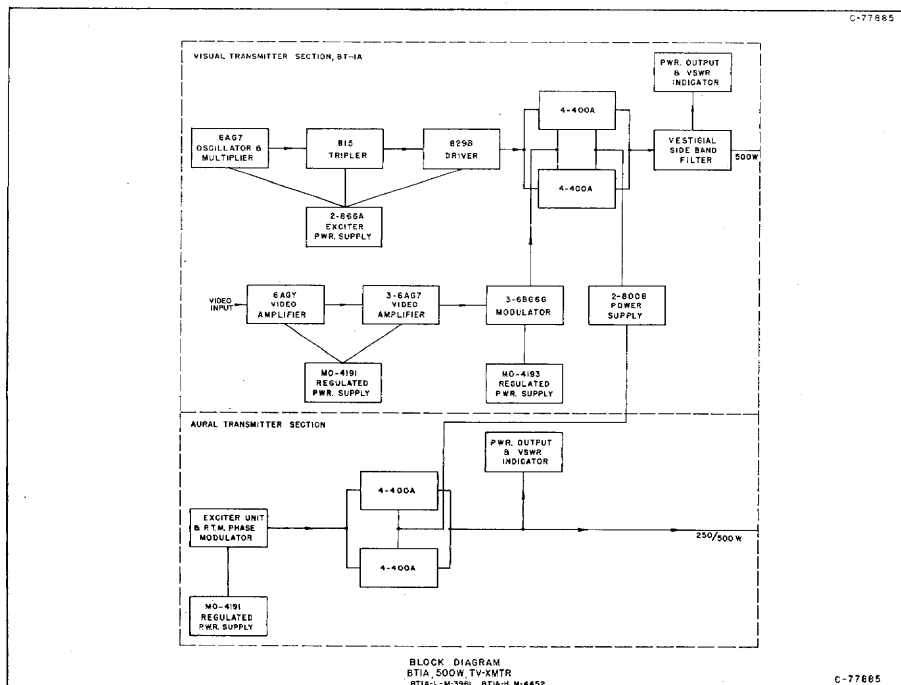
- FREQUENCY RANGE:** Model BT1A-L, channels 2-6.  
Model BT1A-H, channels 7-13.
- RATED POWER OUTPUT:** 500 watts visual, 250 watts aural.
- RF OUTPUT:** 51 ohms visual, 51 ohms aural.
- RF STABILITY:** Aural  $\pm 4$  Kc. Visual  $\pm 1$  Kc.
- INPUT:** Visual, 75 ohms at 1.4 volts peak to peak.  
Aural, 600 ohms at  $+10$  dbm  $\pm 2$  db.
- MODULATION CAPACITY:** Aural, 100% equals  $\pm 25$  Kc swing.  
Visual, 90%.
- AURAL RESPONSE:**  $\pm 1\frac{1}{2}$  db 50-15,000 cycles.
- VISUAL RESPONSE:**  $\pm 2$  db at 0.5 Mc.  
 $\pm 2$  db at 1.25 Mc.  
 $\pm 2$  db at 2 Mc.  
 $\pm 2$  db at 3 Mc.  
 $\pm 3$  db at 4 Mc.
- NOISE:** Aural, -60 db FM or -50 db AM.  
Visual, (amplitude variation over 1 frame) less than 5% of sync peak level.
- TYPE OF MODULATION:** Aural, phase shift.  
Visual, grid amplitude.
- BUILT-IN MONITOR:** Wave form and modulation monitor is built-in for visual section. — Direct power output and VSWR indicators built-in for both visual and aural sections.
- PRIMARY:** 230 volt, 60 cycle, single phase at approximately  $14\frac{1}{2}$  amperes load.

- SIZE:** 89" wide, 35" deep, 78" high. Door swing, 35".
- TUBES:** Following tubes used in both BT1A-L and BT1A-H:  
(9) 6AS7, (6) 5U4G, (5) 6AG7, VR105, 6SJ7, (4) 12AY7, (1) 6SH7, 6CD6, (2) 866A, 8008, (1) 6V6, 6SN7, 12AX7, 6BA6, 6X5, 5BP1A, 1X2, 6X4.  
—add to above for BT1A-L only: (4) 4-400A, (2) 815, 829 (1) 6AG7.  
—add to above for BT1A-H only: (4) 4X250B, (2) 5894, 576 (1) 815, 829B.
- METERING:** Eight 4" meters and seven 3" meters reading: RV Power, VSWR Visual, RF Power/VSWR Aural, PA Grid Aural, PA Filament Aural, PA Plate Aural. PA Plate Visual, PA Filament Visual, Plate Volts both Aural and Visual, PA Multi-Meter Aural Exciter, Screen Current PA Visual, Line Volts Aural. 3 Multi-Meters for the 3 regulated power supplies.
- POWER CONTROL:** Variable front panel control powerstats allow full 0-maximum control of both primary line voltage and DC high voltage to power amplifiers.
- SIDEBAND FILTER:** Mounted external to cabinet.
- SHIPPING WEIGHT:** 3300 lbs. Cubage 71.
- SUPPLIED AS STANDARD EQUIPMENT:** Transmitter, instruction manual, one set of tubes, one JKO9 crystal and oven for visual, one JKO7 crystal and oven for aural, installation hardware and electric jumpers.
- OPTIONAL EQUIPMENT:** Spare tube set, spare JKO9 crystal and oven, spare JKO7 crystal and oven.

## ORDERING INFORMATION

|   |        |
|---|--------|
| Transmitter for channels 2-6 as outlined in "standard equipment" above .....  | BT1A-L |
| Transmitter for channels 7-13 as outlined in "standard equipment" above ..... | BT1A-H |
| Spare crystal and oven for visual .....                                       | JKO9   |
| Spare crystal and oven for aural .....  | JKO7E  |
| Spare 100% tube complement for BT1A-L .....                                   | TK-160 |
| Spare 100% tube complement for BT1A-H .....                                   | TK-258 |

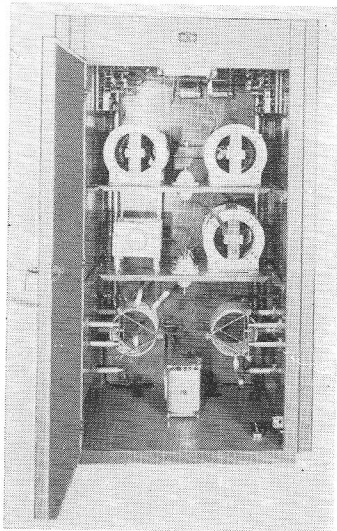
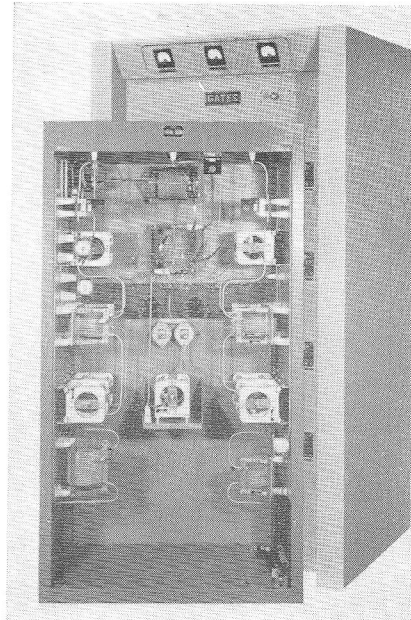
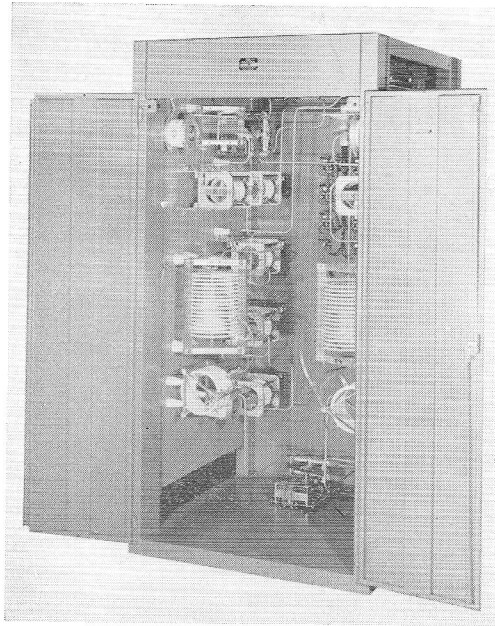
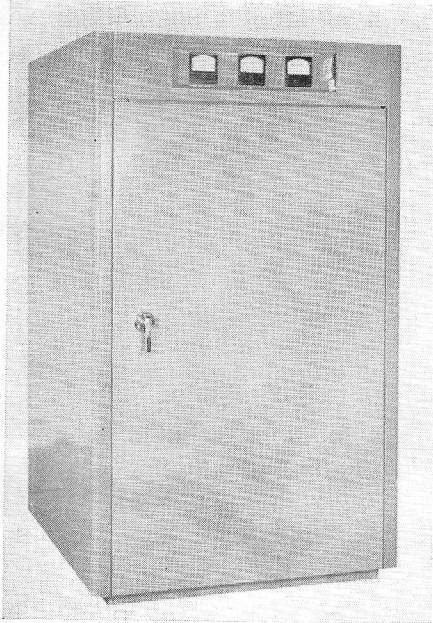
**WHEN ORDERING:** Be sure to state channel of operation. For other primary voltages, special primary voltage changing transformers are available.





**GATES**

## DIRECTIONAL PHASING EQUIPMENT

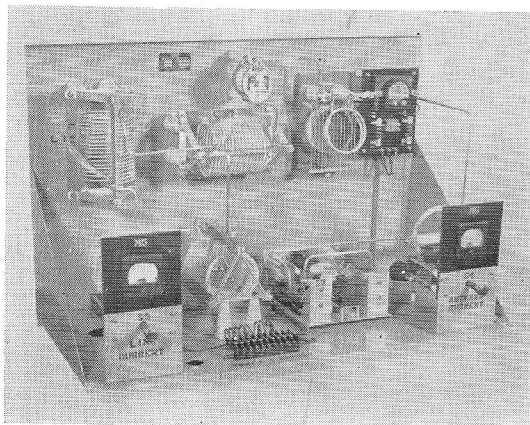
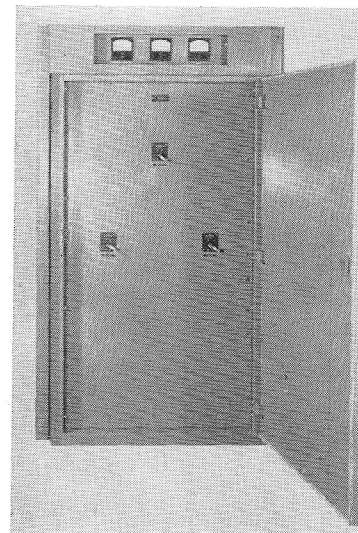


The total power of all Gates phasors manufactured in the past decade comes to well over half a million watts. This immense range of power signifies a combination of manufacturing experience and know-how that is unequalled in the broadcast industry.

Gates phasing equipment has for years been the choice of broadcasters and has held a fine reputation for meeting the exact specifications of consulting engineers. Stability of pattern and reliability of components, many of which are manufactured by Gates, are two reasons for the definite preference for Gates phasing equipment. Also, minimum tune-up time and minimum maintenance makes Gates phasors less expensive in the long run, though nothing is spared in the design cost. Gates manufactures directional phasing equipment up to 100 kilowatts in power and for any number of elements.

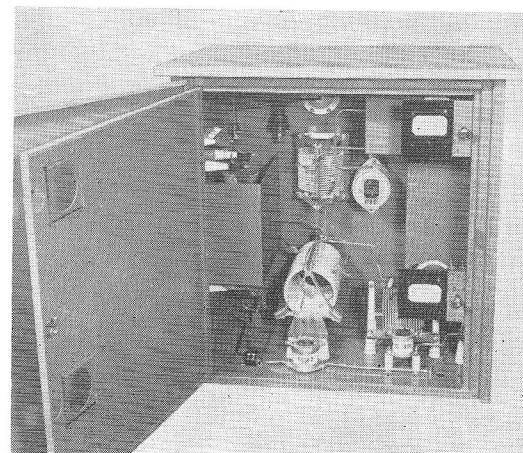
The directional phasing equipment illustrated on this page was manufactured to the specifications of the customer's consultant, and is typical of the hundreds of quality phasors designed and manufactured by Gates.

Prices noted in the accompanying price list are considered accurate estimates. Firm prices are quoted very promptly on receipt of your consulting engineer's specifications.



Indoor shelf-type antenna coupling units are often employed, mounted inside the so-called "doghouse" adjoining the antenna. There is no need for weather-proofing and all components are easily reached for adjustments.

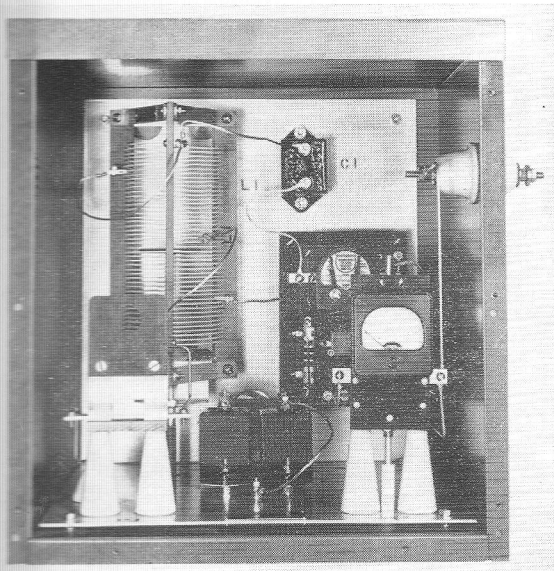
This weatherproof coupler does not require a doghouse and mounts adjacent to the tower either on posts or platform, and has double front door so that meters may be observed without opening inner door such as under storm conditions. Top of cabinet is sloped and this model is available in both ferrous and non-ferrous metals, depending upon engineering requirements.







# ANTENNA COUPLER — 1250 WATTS AND LOWER

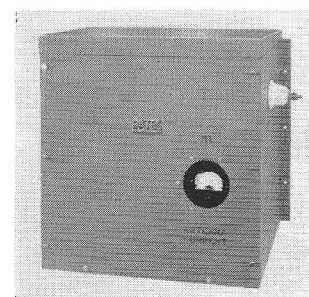


A fully weatherproof coupler for series feed antennas to handle 1250 watts or less and at 100% modulation. Plug-in meter supplied, which may be inserted in either line or antenna circuit. Meter shorting switch is provided in antenna circuit to eliminate damage to meter during electrical disturbances. Antenna meter may be observed through glass porthole. Coil is silver plated, edgewise wound mycalex insulated, having generous inductance for arrangement in a full Tee network along with the fixed mica capacitors supplied. Extra room is provided in the cabinet for either diode or thermocouple type remote metering kits.

## SPECIFICATIONS

- CARRIER POWER:** 1250 watts or less.
- INPUT IMPEDANCE:** 50 to 360 ohms, concentric or open line.
- ANTENNA RESISTANCE:** 10 to 1000 ohms.
- ANTENNA REACTANCE:** Plus J 600 to minus J 300 ohms from 540 to 1000 kc. Plus J 600 to minus J 500 ohms above 1000 Kc.
- CIRCUIT:** Tee network.

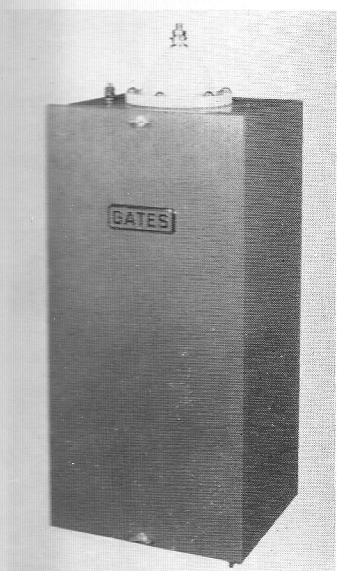
- LIGHTNING PROTECTION:** Meter shorting switch.
- METERING:** Plug-in 3" meter normally located as antenna meter but may be used as line meter for tune-up. Plug-in shorting bar provided for unused meter jack.
- REMOTE METERING:** Provision for either thermocouple or diode type as ordered.
- SHIPPING WEIGHT:** 98 lbs.
- SIZE:** 20" high, 20 1/4" wide, 18 3/4" deep.



## ORDERING INFORMATION

**IMPORTANT:** Kindly state transmission line impedance, frequency, tower height and tower measurements if known.  
**Antenna Coupler with antenna meter** ..... **Model 44**

## SERIES AND SHUNT FEED COUPLERS



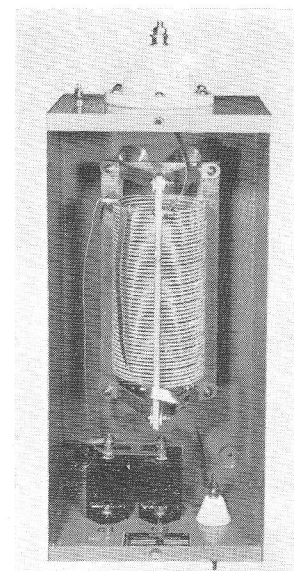
**Model M-5178:** Series feed, provides all coil and capacitance to provide full Tee network. Constructed in nonweatherproof steel cabinet, front removable. Size: 21" high, 10" wide, 9" deep. Matches RF input of 50 or 70 ohms. Output 10-600 ohms. In this model metering is external to the coupler, often desirable in unattended operation. For all powers 100% modulated up to 1250 watts carrier.

**Antenna Coupler** ..... **Model M-5178**

**Model M-5179:** Shunt feed coupler of coil and capacitor combination to tune out the reactance in shunt fed antenna coupling. Same size as M-5178 above. Rating up to 1250 watts carrier 100% modulated.

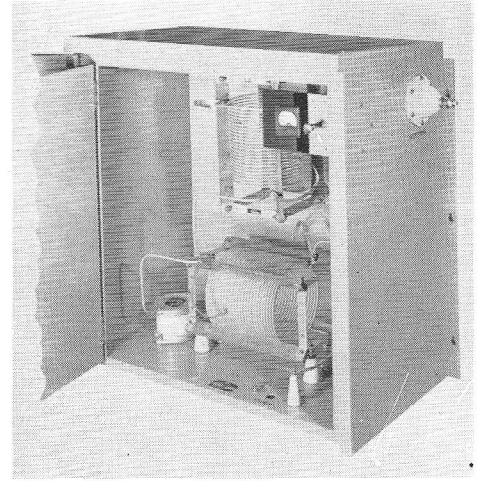
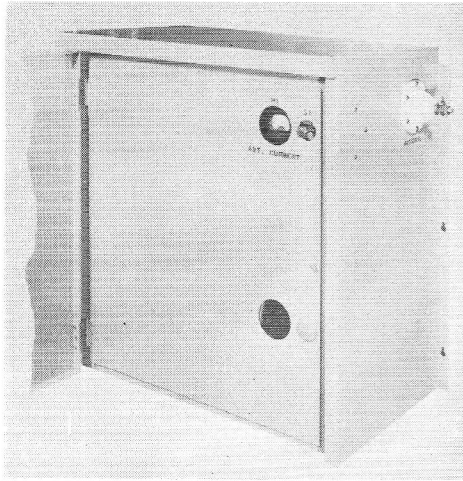
**Antenna Coupler** ..... **Model M-5179**

**IMPORTANT:** Please state frequency, tower height and tower measurements if known.





## 5-10 KW ANTENNA COUPLING UNITS



These two nearly identical models differ only in component size for 5 and 10KW power ratings. Housed in an aluminum cabinet with double front doors. Size: 38" high, 37" wide, and 21½" deep. Antenna meter may be observed and meter shorting switch operated with the inner door closed. Coils are silver plated and mica insulated. Capacitors have generous voltage and current safety factor. All ratings are 100% modulated.

Tuning unit may be mounted by metal flanges at each back side. Usually two wooden poles, set in the ground are used for mounting. A large lead in bowl is provided for antenna connection. The use of non-ferrous metal in the tuning house will prevent component heating under certain conditions.

### SPECIFICATIONS

- FREQUENCY RANGE:** 540-1700 Kc, as ordered.
- INPUT IMPEDANCE:** 45-360 ohms, as ordered.
- ANTENNA RESISTANCE:** 20-1000 ohms.
- REACTANCE:** +J500 to -J500.
- WEIGHT:** Packed, 315 lbs. (export); 200 lbs. (domestic).  
Unpacked, 136 lbs. Cubage, 24.

### ORDERING INFORMATION

**IMPORTANT:** When ordering, state carrier frequency, transmission line impedance, tower height and tower resistance measurements if known.

- Coupling Unit for 5KW** ..... M-5309A
- Coupling Unit for 10KW** ..... M-5309B

## HIGH POWER ANTENNA COUPLERS

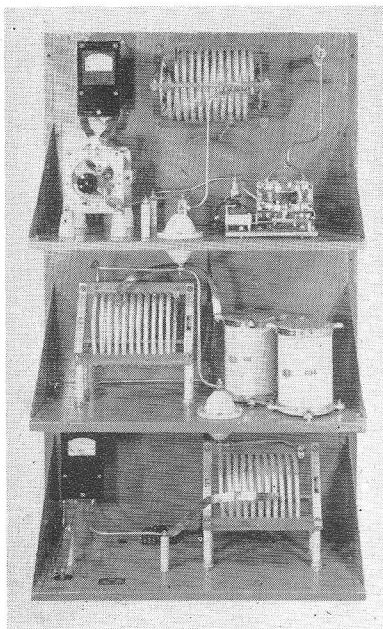
(50KW and 100KW)

Antenna couplers for powers in the 50,000 and 100,000 watt range are always of custom design but as the Gates inventory of components for these sizes is always substantial, the delay in custom design is held to the very minimum.

Illustrated is a typical shelf type unit employed in a North American 50,000 watt radio station. In this case, coil sizes were not excessive due to low currents involved. Couplers are also available in weatherproof cabinets, where desired.

When ordering, please supply all available information such as (1) power, (2) frequency, (3) tower height, (4) ground conductivity if known, (5) tower resistance measurements if known, (6) transmission line impedance such as 50 ohms, 75 ohms, 250 ohms, etc., and whether coupler will be mounted in an out-building or if weatherproof type is desired.

Price of coupler can be quickly quoted with the above data supplied.



**TOWER CHOKES — ISOLATION COILS — SAMPLING LOOP**

**Solenoid Tower Chokes**

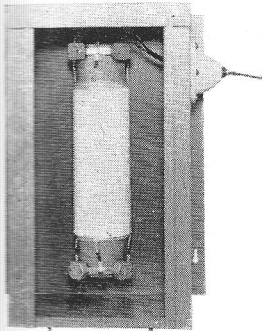


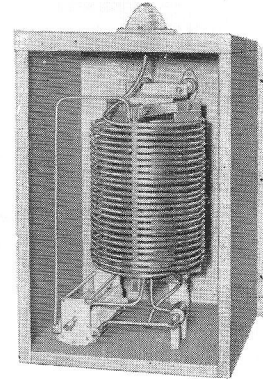
Fig. A

Most popular of all tower light isolation chokes. Available in 2 or 3 section and in open type, illustrated to right, or weatherproof type, illustrated to left. Wound on XX heavy bakelite tubing with mica by-pass condensers on each circuit end. Inductance 350 uh. 3" stand-off insulators are part of coil. Size: choke only, 18 1/2" long, 5" diameter, 7 1/2" from bottom of insulator to top of coil. Weatherproof type, 24" high, 17 3/4" wide, 10 1/4" deep. Illustration to left shows front cover of weatherproof unit removed for photographing.

M-3935A, 2-section, Fig. B      M-3937A, 2-section, Fig. A  
M-3936A, 3-section, Fig. B      M-3938A, 3-section, Fig. A



Fig. B

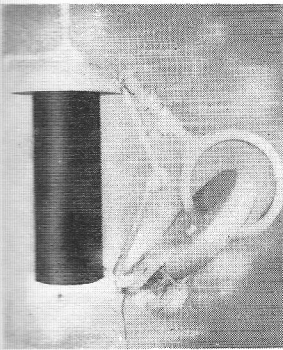


**Isolation Coil**

Used to isolate a phase sampling loop across base insulator of tower. Inductance 85 uh. Made of solid dielectric cable mounted on heavy bakelite bars. Available in weatherproof model illustrated above (front cover removed) or coil only for mounting in side tuning house. Size (weatherproof model): 20" wide, 32 1/2" high, 18" deep. State carrier frequency and power when ordering. Includes necessary elements to match purchaser's frequency.

Weatherproof isolation unit ..... M-303  
Coil only, less cabinet ..... M-456  
Weatherproof isolation unit with M-5573 coil (shown below) ..... M-5573

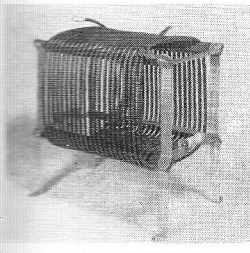
**Austin Ring Type Tower Choke**



Ring type tower choke is a transformer with clear air space between primary and secondary and resultant zero RF leakage. Independent of frequency. All models are for 115/230 volt primary and 115 volt secondary. Base insulator in photo for illustration purposes only.

| Type   | Capacity KVA | Mfg. Style   | Net Wt. Lbs. | Attachments |
|--------|--------------|--------------|--------------|-------------|
| A-2100 | 1—1.75       | Side Bracket | 81           | none        |
| A-2101 | 1—1.75       | Side Bracket | 85           | Lt. gap     |
| A-2102 | 1—1.75       | Pedestal     | 82           | none        |
| A-2103 | 1—1.75       | Pedestal     | 86           | Lt. gap     |
| A-1970 | 2—3          | Side Bracket | 188          | none        |
| A-1971 | 2—3          | Side Bracket | 201          | Lt. gap     |
| A-1972 | 2—3          | Pedestal     | 182          | none        |
| A-1973 | 2—3          | Pedestal     | 200          | Lt. gap     |

**M-5573 Isolation Coil**



Used in the same manner as the M-3073 and M-4561 shown above. The coil is wound of RG-11/U solid dielectric cable with an inductance of approximately 100 uh. Where the consulting engineer wishes to resonate the coil, a separate capacitor is required.

Coil only ..... M-5573

**Phase Sampling Loops**

**M-3283:** This model especially applicable where high current ratios are to be sampled. May be rotated so that phase monitor amplitude values are nearly equal. Electrostatically shielded and insulated from tower. May be used with or without isolation coil at base of tower. Coil is single loop of 7/8" coaxial cable, heavily insulated from base frame. Matches either 50 or 70 ohm line. Size: 45" wide, 60" high.

Sampling Loop ..... M-3283

**M-3389:** Very similar to M-3283 in size and rotating capabilities. Consists of a loop of RG/8U coaxial cable within a loop of 7/8" copper tubing. Provides unusually fine shielding and eliminates internal coupling in preventing the flow of undesirable current in tower outer conductor. Size: 63" high, 40" wide. For 50 ohm line or 70 ohm line.

Sampling Loop ..... M-3389

**M-3723:** A simple non-adjustable loop and not insulated from tower. Usually used in less complicated directional where currents in tower are nearly equal and high enough to cover stray effects. Matches 50 or 70 ohms and must be used with isolation coil. Made of aluminum angle. Provided with connector for RG/8U line. Size: 60" high, 40" wide.

Sampling Loop ..... M-3723

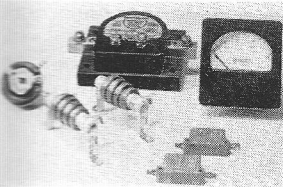


Fig. A

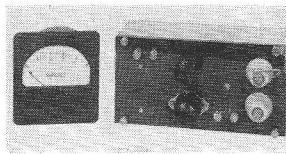


Fig. B

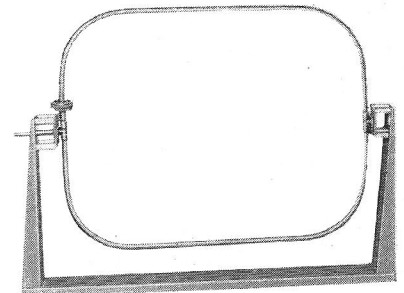
**Remote Meter Kits**

**Thermocouple Type:** Fig. A above. Includes 3" square case meter, thermocouple, adjusting rheostat, chokes and capacitors. May be used up to 1000 of 2C No. 18 or larger line for remote metering between tuning house and transmitter.

Complete (meter range 0-3 RFA) ..... M-3383  
Complete (meter range 0-5 RFA) ..... M-3133  
Complete (meter range 0-10 RFA) ..... M-3386

**Diode Type:** Fig. B above. Inductively connects to antenna lead for excellent protection against electrical disturbances. Uses 6H6 tube. Operates from 115 volt tower light circuit. May be used with 2C line up to 5000 feet. Available with or without meter. Standard 1 MA meter is employed. Ratings are 100% modulated.

1KW or less, 0-3 RF scale ..... M-3294  
1KW or less, 0-5 RF scale ..... M-3294B  
1KW or less, 0-10 RF scale ..... M-3294D  
5/10KW, 0-5 RF scale ..... M-5334  
5/10KW, 0-10 RF scale ..... M-5335  
Diode less meter, 1KW or less ..... M-3759  
Diode less meter, 5/10KW ..... M-2765B



M-3283 and M-3389 Loops

**Ordering Sampling Loops:** Unless for replacement purposes, it is always suggested that sampling loops be ordered on recommendation of the customer's consulting engineer. As the loop and its associated transmission line, and in some instances the isolation coil, are all part of the overall computations, the slight delay in checking with the consultant will often save time and expense.



**GATES**

# **NEW M-4990 BROADCAST FREQUENCY MONITOR**

(Fully FCC Approved)



An entirely new AM frequency monitor offers the progressive broadcaster added accuracy, greater reliability, smaller size, plus many new features which result in a monitor that once installed performs with laboratory precision and minimum maintenance.

Again the stability of printed wiring adds to the demanded stability of a frequency monitor. Each wire in the same place is why each production model has prototype performance. The absence of parts stacking and the absoluteness of soldering in the printed wiring process continues the quality emphasis in an instrument that demands quality all the way.

A new vacuum type crystal unit, precise to broadcast transmitter standards without temperature control, is mounted with its oscillator stage components within a carefully designed temperature controlled chamber to result in  $\frac{1}{2}$  part per million frequency accuracy. The adjustable air gap crystal holder is history. — The **new** is precision on frequency as received.

The M-4990 frequency monitor is fully FCC approved, carrying approval No. 3-102.



**GATES**

## M-4990 FREQUENCY MONITOR

Basic circuitry is shown in the block diagram on the next page. A precision oscillator operates 1000 cycles below the carrier frequency. The output from this oscillator is isolated and amplified and then mixed in a detector stage with the radio frequency signal from the transmitter. This signal may be direct connected or when used in remote control (unattended) operation, the M-5549 whip antenna kit may be purchased for direct air monitoring over distances of 20 miles or more, depending on the transmitter power. The beat note from the detector is amplified and then applied to a discriminator. The output is rectified and applied to a DC meter calibrated in 1-cycle steps from -30 to +30 cycles.

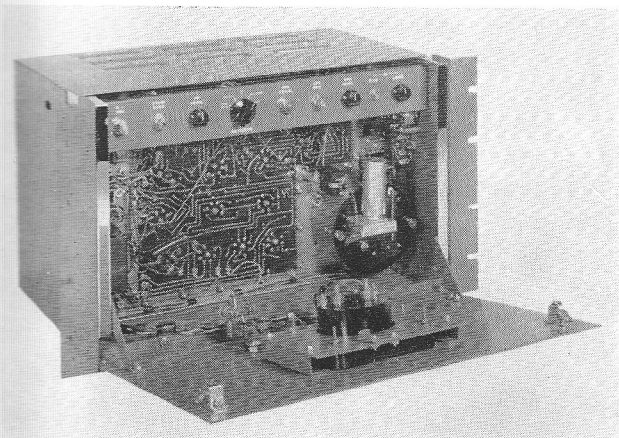
The meter may be switched to several circuits including carrier level, frequency deviation, oscillator current and local/remote functions. — Outstanding feature is the accuracy over a wide range of input voltages and modest fading conditions, when used with the antenna, will not affect operational stability.

Servicing of the M-4990 frequency monitor has the excellence of all Gates products. Front panel hinge down brings all adjustments to the operator's finger tips. Both

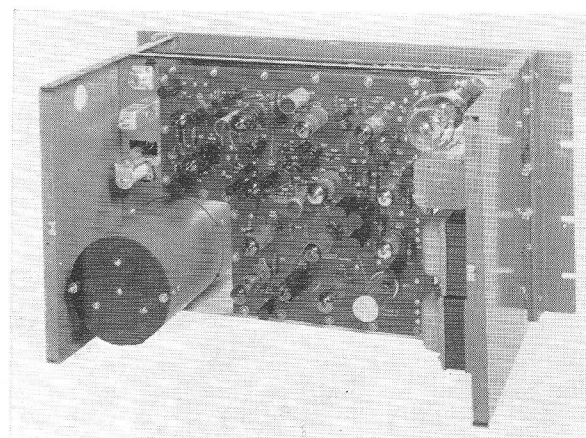
the filament and plate voltage supplies are fully regulated to add to accuracy under varying line voltage conditions. Connections are provided for a remote reading frequency meter which may be used with a line up to 2000 ohm resistance equivalent to 21 miles of telephone line.

Temperature control of the crystal chamber is through mercury thermostat operating with a relay. The thermostat employs a heater winding to minimize temperature fluctuations during each heating cycle. The heater itself is the blanket type for absolute even distribution. If the rarity of failure of the heater control circuit would occur a thermal fuse will meet and no damage to components will result to assure quick repairs.

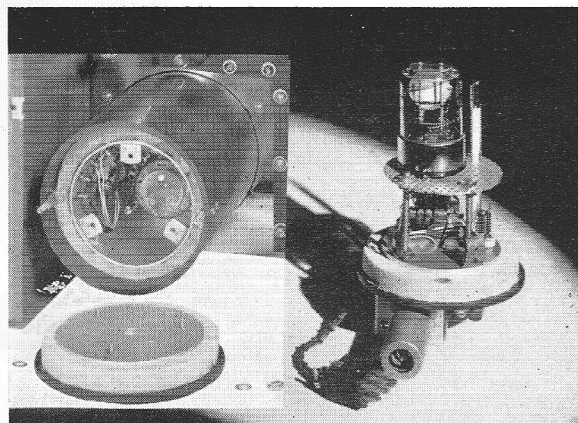
In designing the Gates M-4990 frequency monitor, Gates engineers have applied exacting standards. They have incorporated the basic requisite of a broadcast frequency monitor, accurate frequency measurement. Hundreds of Gates frequency monitors are in use today. The M-4990 takes the desirable features of these earlier models and adds advancements in tube, circuit and crystal designs to provide the most advanced monitor manufactured today.



Front panel hinges down to expose operating adjustments and the plug-in crystal unit. Here is exhibited the uniformity of printed wiring to produce uniformity in year-in and year-out service.



Rear of M-4990 frequency monitor with dust cover removed. Each resistor and capacitor is firmly secured to the printed wiring chassis. Parts stacking is obviously absent.



Left, the crystal oscillator unit, heart of the M-4990 frequency monitor. The open view illustrates the vacuum crystal, under which are the oscillator components. The oscillator tube, however, is external to the temperature chamber. The entire unit is plug-in and there are no variable air gaps for frequency adjustment at time of installation.

### SPECIFICATIONS

**OSCILLATOR:** Colprits electron coupled 1000 cycles below assigned frequency.

**FREQUENCY RANGE:** 540-1600 Kc as ordered.

**DEVIATION RANGE:** Meter reads -30/0/+30 cycles.

**INPUT VOLTAGE:** Supplied with external fixed pad to handle wide range of input voltages from 5 to 50 volts direct connected and down to 5 Mv with whip antenna.

**INPUT SIGNAL:** Modulated or unmodulated.

**INPUT IMPEDANCE:** 50/70 ohms.

**OVERALL STABILITY:** ±2 parts in one million.

**OSCILLATOR STABILITY:** ±0.5 parts in one million.

**LINE VOLTAGE:** 105-125 volts, 50/60 cycles at 85 watts

**TUBES:** 12BY7A oscillator, 6AU6 oscillator amplifier, 6AU6 input amplifier, 6C4 mixer, 6AU6 audio amplifier, 6AU6 limiter, 6AQ5 cathode follower, 12AT7 AVC, 6AL5 discriminator rectifier, 6AL5 VTVM rectifier, 6X4 high voltage rectifier, 6AQ5's Series regulators, 6AU6 voltage amplifier, OB2 voltage reference, 13-4 Ballast.

**SIZE:** 19" wide, 10½" high, 10⅝" deep.

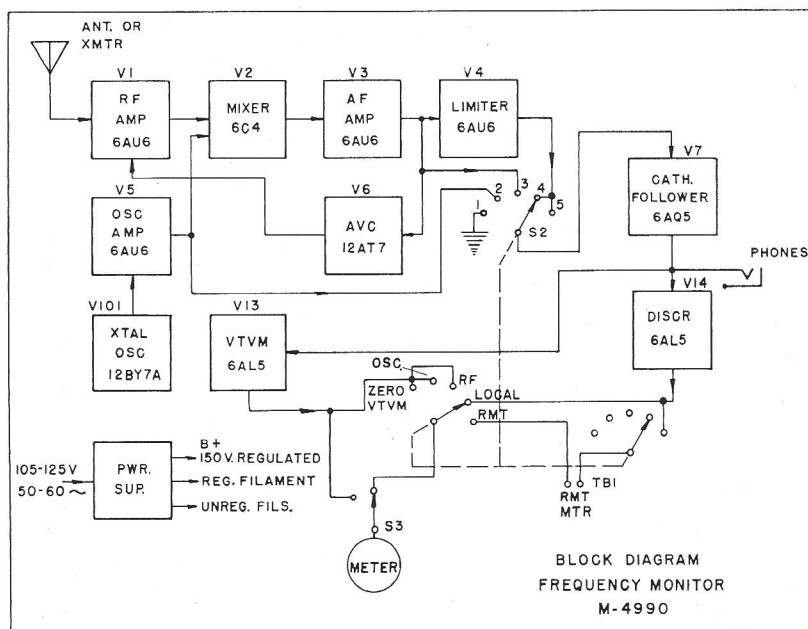
**FINISH:** Medium gloss gray.

**WEIGHT:** 32 lbs. net. 53 lbs. packed. Cubage 4.

**FCC APPROVAL:** No. 3-102.

### ORDERING INFORMATION

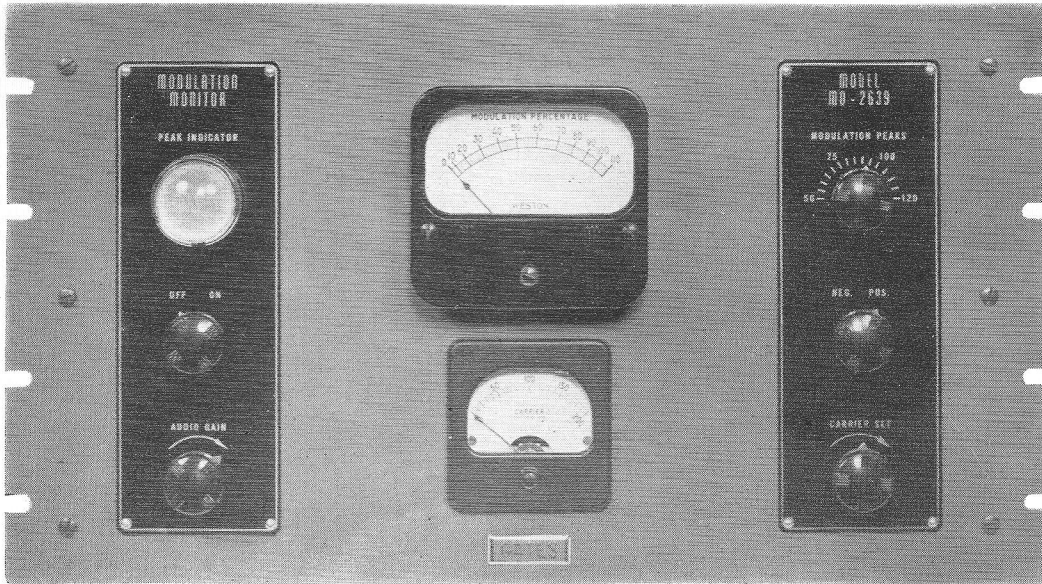
- Frequency monitor with tubes and crystal, state frequency when ordering ..... **M-4990**
- 100% spare tube complement ..... **TK-281**
- Remote frequency meter, reading -30 to +30 cycles, mounted on 5¼"x19" rack panel finished in gray ..... **M-5631**
- Whip antenna with coupler to match RG/59U cable and monitor ..... **M-5549**



A-C-30420

**GATES**

# BROADCAST MODULATION MONITOR



A fully FCC approved modulation monitor meeting all modern broadcast requirements, with a model available for both standard and high frequency service. Exclusive is the self-contained high level amplifier with sufficient power output to operate a loudspeaker for direct off-the-air monitoring.

The 4-inch modulation percentage meter is calibrated from -15 db to 0 db and 0-110% modulation. A neon lamp located behind a large bull's-eye on the front panel is adjustable to flash at any desired percentage of modulation.

The 3-inch carrier meter allows direct center scale reading for proper RF input. Panel controls include:

- (a) Carrier set adjustment.
- (b) Positive-negative peak control.
- (c) Peak indicator adjustment.
- (d) Audio amplifier gain control.
- (e) Off-On switch.

Each monitor is carefully manufactured and tested in accordance with specifications set forth under FCC standards and carries FCC approval No. 1556.

## SPECIFICATIONS

**FREQUENCY RANGE:** MO-2639, 200-2000 Kc.  
MO-2639A, 2-33 Mc.

**RF INPUT:** High impedance requiring less than 1/2 watt excitation.

**LOUDSPEAKER IMPEDANCE:** 4 to 8 ohms.

**MODULATION PERCENTAGE RANGE:** 0-110%.

**CARRIER LEVEL METER RANGE:** 0-200%.

**DECIBEL SCALE RANGE:** Calibrated to 15 db below 100% modulation.

**AUDIO AMPLIFIER:** Range exceeds best quality speaker capabilities.

**POWER:** 115 volts, 50/60 cycles at 65 VA.

**TUBES:** 3 each 6X5, 6C5; 1 each 6F6, 885, VR-150.

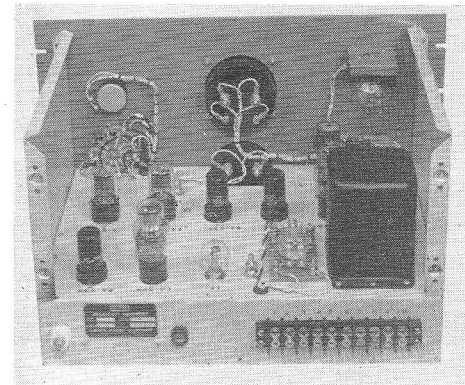
**WEIGHT:** Packed, 40 lbs. Net, 27 lbs. Cubage 4.

**DIMENSIONS:** 19" wide, 10 1/2" high, 13 1/2" deep.

**FINISH:** Medium hand rubbed gloss gray with escutcheons in black.

## ORDERING INFORMATION

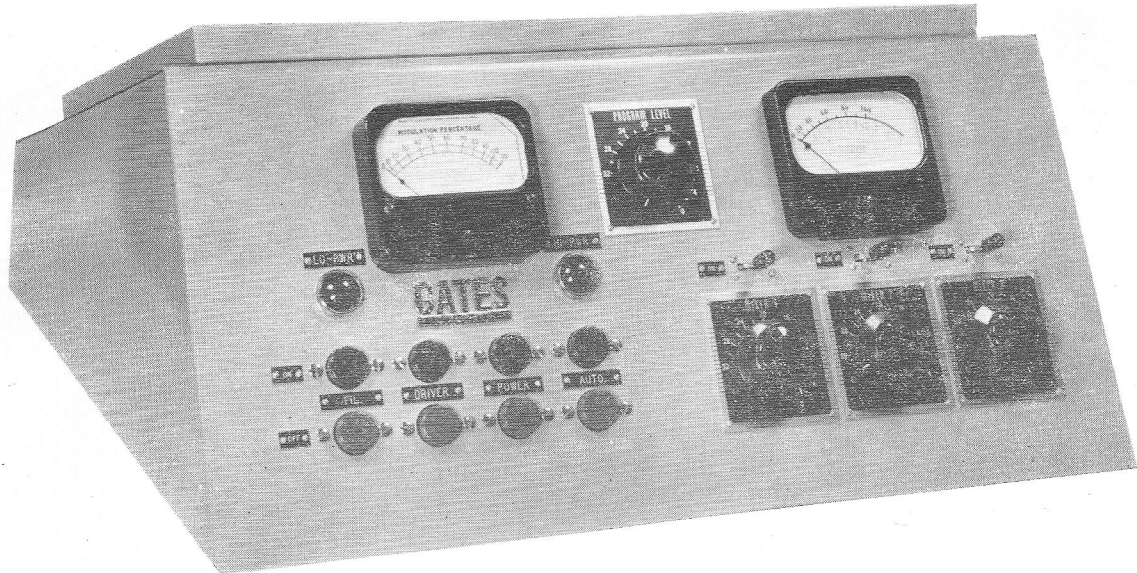
|  |          |
|--|----------|
| Modulation monitor complete with tubes ..... | MO-2639  |
| Modulation monitor complete with tubes ..... | MO-2639A |
| 100% set of spare tubes .....                | TK-113   |





**GATES**

# TRANSMITTER CONTROL CONSOLE



For use with any standard or short wave broadcast transmitter to provide several input circuits, extension audio indicating meters, remote start/stop functions and associated indicator lamps. Functional diagram at bottom of page outlines generous facilities available. Where desk is desired, see Index (Desks).

## SPECIFICATIONS

**INPUTS:** Three provided with line isolation transformer for each circuit, 50/150/600 ohms ladder type controls, 20 steps, 2 db each.

**OUTPUT:** 600 ohms.

**MASTER GAIN:** Balanced 30 step, 1.5 db per step.

**VU METER:** 4" square case with range control +4 to +40 VU in two VU steps for bridging 600 ohm line. Scale illuminated.

**MODULATION METER (CCD-2 only):** Gates A1363-2 as used in MO-2639 modulation monitor. Scale illuminated.

**PUSH BUTTONS:** Four pairs provided (black start-red stop) to cover all possible combinations including automatic reset as featured in many Gates models.

**PILOT LIGHTS:** Provided to indicate filament and plate on.

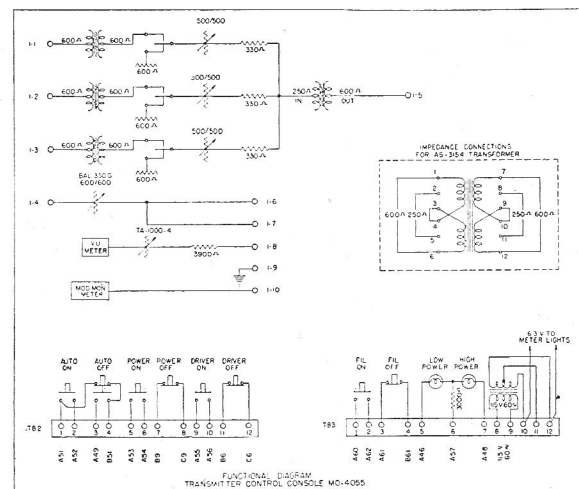
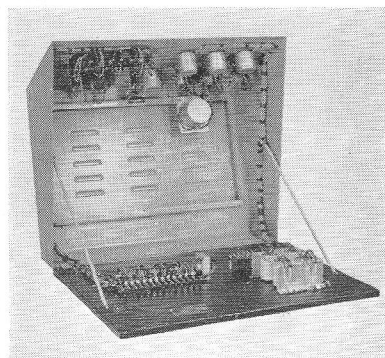
**FINISH:** Medium hand rubbed gloss gray with escutcheons in black.

**SIZE:** 24" wide, 10" high, 21 1/2" deep. Cabinet swings up from base for servicing. See illustration below.

**SHIPPING WEIGHT:** 60 lbs.

## ORDERING INFORMATION

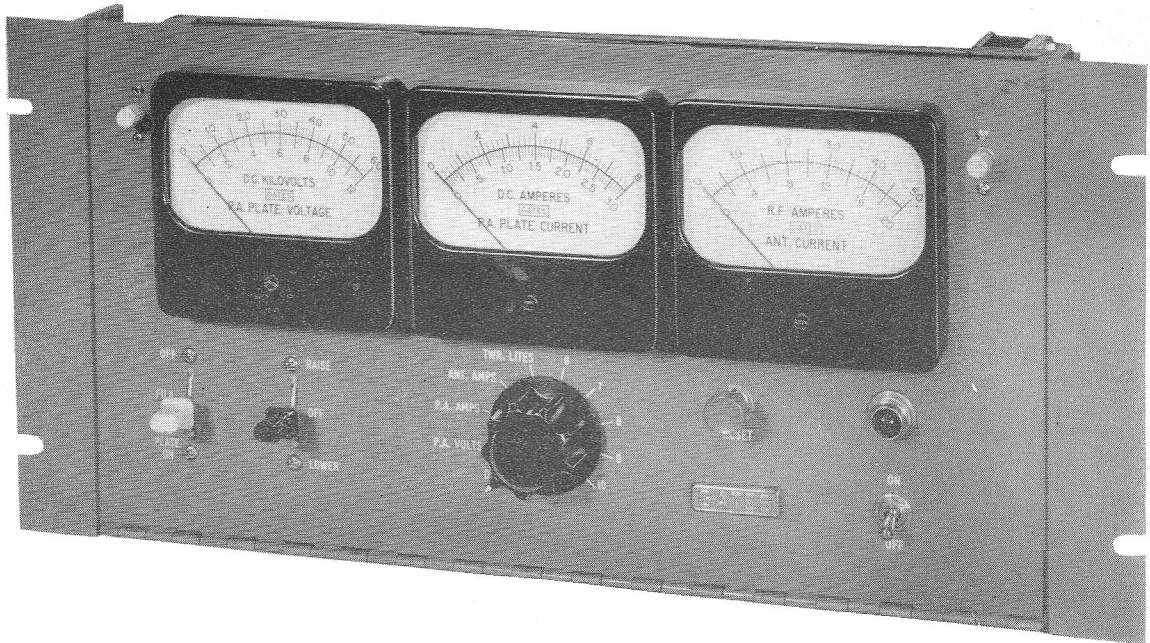
- Transmitter control console with extension modulation meter ..... **CCD-2**
- Same as above but modulation meter omitted and blank plate inserted ..... **CCD-2A**





**GATES**

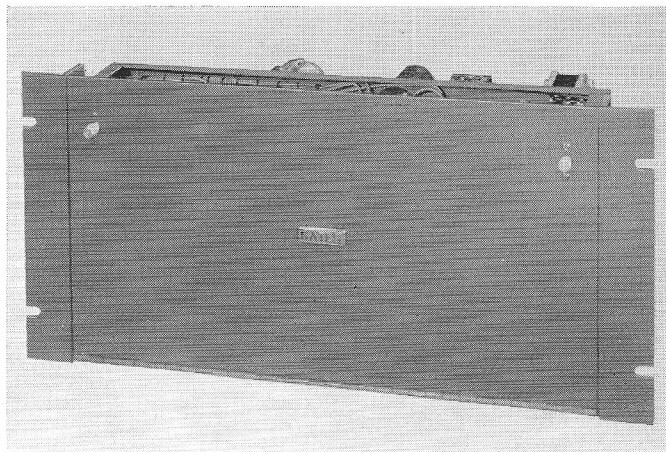
## RDC-10 REMOTE CONTROL SYSTEM



For top quality, modest cost handling of one or two transmitters, the Gates RDC-10 system for unattended operation supplies every needed facility, and is backed by the world's major supplier of radio broadcast equipment.

### Outstanding Features Are:

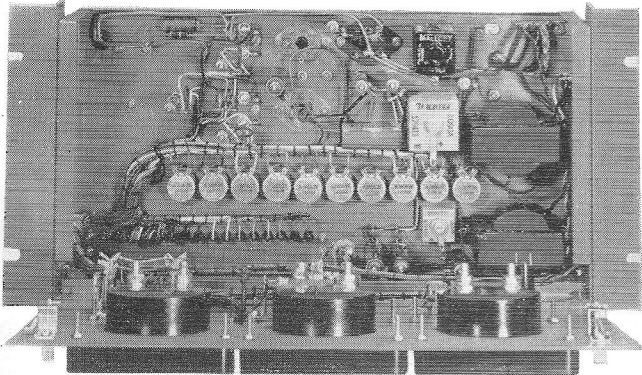
- 3 four-inch meters.
- 10 metering positions.
- 22 control functions possible.
- Positive action switch for meter selection—no dialing.
- Built-in relays for switching both filament and plate voltage.
- Constant voltage source provided for line checking.
- Abundantly meets FCC requirements.
- Drop down front panel to service.



The transmitter unit is absent of front panel controls, has drop down front panel to service and only requires 8 $\frac{3}{4}$ "x19" panel space. Small size even allows mounting in some transmitters, where room prevails.



# RDC-10 REMOTE CONTROL SYSTEM



Studio unit has drop-down front panel so all parts can be reached from front of rack. Panel size of 8 3/4"x19" often conserves badly needed rack panel space.

**THREE** four-inch meters calibrated directly in DC volts, DC amperes and RF amperes assures accurate, easy to read metering even from across a room. Seven of ten metering circuits are directly connected. Three balanced stepping relay positions, brought to extra terminals, may be used for metering, studio-transmitter order phone and emergency program line.

**CONTROL** relays are inbuilt for filament and plate switching on and off as well as for controlling plate voltage via the motor tuned rheostat supplied. Fail-safe protection is provided on the filament control circuit. Up to 18 more switching functions may be handled by adding inexpensive relays though full facilities are provided in the standard equipment for broadcast transmitter operation.

**WHAT IS SUPPLIED:** Both studio and transmitter units as illustrated, plus M-4703 motor control plate voltage rheostat, antenna diode unit M-3759 for reading antenna current, M-4720 plate current unit for reading plate current of transmitter, M-4719 plate voltage unit for reading plate voltage and the inbuilt light indicator with external current transformer.

**INSTALLATION** is speedily and easily made. Basic units (studio and transmitter) are each 8 3/4"x19" in panel size. Terminal boards assure quick attachment of interwiring.

**RECOMMENDED USAGE:** May be used with all Gates broadcast transmitters listed in this catalog. 250, 500 and 1000 watt models require no basic equipment additions for transmitter remote control. — 5000 to 10,000 watt models usually require added motor tuning unit for variable loading coil.

**REMOTE MONITORING:** Is accomplished through use of several accessories listed on following pages. Where modulation and/or frequency monitors are moved to studios, the model M-5144A RF amplifier is added.

**WHEN ORDERING:** State carrier power, make of transmitter, model number of transmitter, carrier frequency, and type of frequency and modulation monitors.

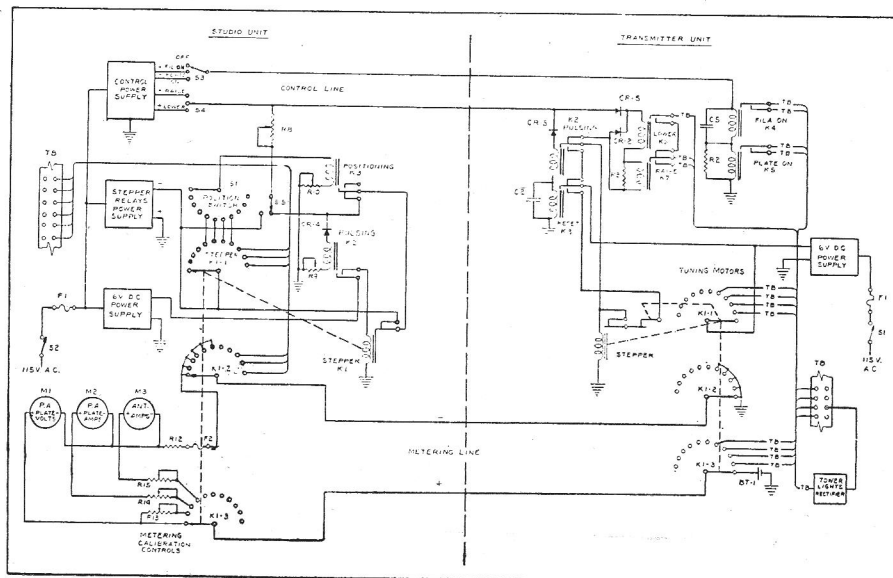
## ORDERING INFORMATION

Remote control system complete with motor tuned rheostat, antenna diode, plate and voltage metering kits and tower light indicator, for powers up to and including 1KW

RDC-10

Same as above but for powers up to and including 10KW

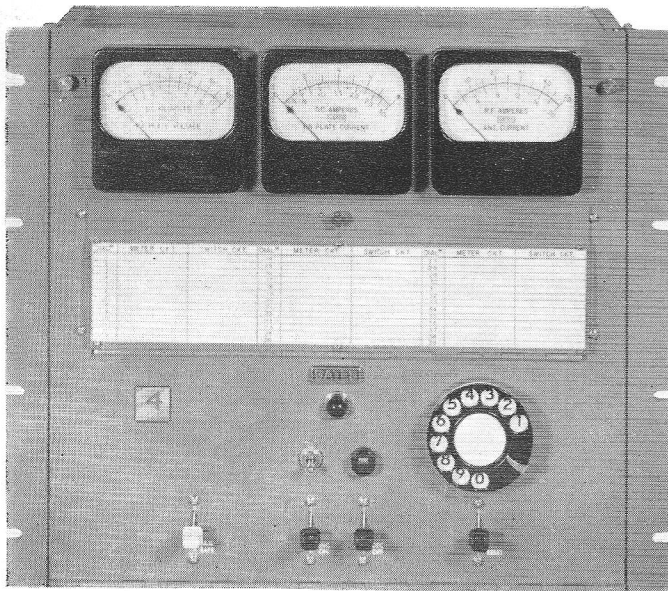
RDC-10A



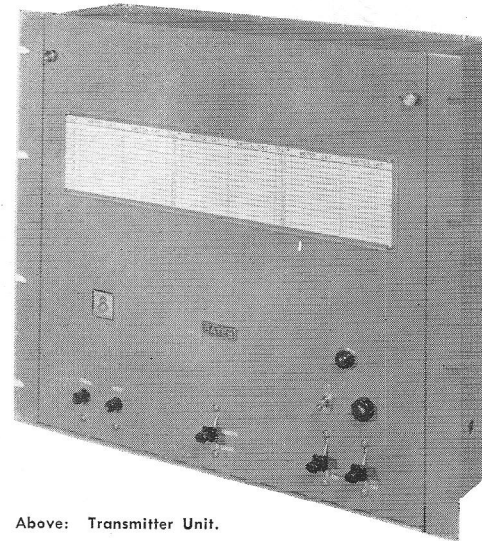
Functional line drawing of RDC-10 Remote Control System.

**GATES**

# RDC-200 DELUXE REMOTE CONTROL SYSTEM



Left: Studio Unit.



Above: Transmitter Unit.

Another 100% new Gates product for the expanding needs in remote control equipment. This system will handle the complicated directional system, several transmitters or the utmost in dependability for any transmitter power up to 50,000 watts.

Model RDC-200 is an advanced design of a DC operating system. Simplex, phantom or natural ground returns are eliminated in favor of a straight wire return. Two wire pairs are the maximum requirement for any requirement of one or several transmitters, directional operation, and tower light indication. With this system, wire lengths of as much as 60 miles provide no problem.

Highest current drain of any switching function is 3.125 MA, making the system almost impervious to line resistance change. These additional features will be of interest:

1. Provides 19 wired metering circuits, five of which are balanced pairs for monitors, phones, etc.
2. Only one-half of the 40-position stepper is wired to provide the 19 circuits (plus calibrate), leaving 20 added positions with spare terminal block provided, permitting 20 added meter circuits or 40 added switching circuits.
3. As wired, provides 38 switching circuits (which may be expanded to 78 positions, see Par. 2 above).
4. All DC control circuits. Operates through maximum loop resistance of 5000 ohms. Based on resistance of smallest underground cable, would equal 52 miles.
5. All necessary equipment for one transmitter is standard equipment. Includes: (a) plate current metering unit, (b) plate voltage metering unit, (c) plate voltage on and off relays, and (d) tower light indicator with current transformer.
6. Three 4" wide scale meters calibrated in plate volts, plate current and RF amperes. Pick the meter with the most appropriate scale for any other readings. 100 microampere meters used throughout.
7. 100% front panel accessibility via drop-down front panel. Panel size: 19"x15<sup>3</sup>/<sub>4</sub>".
8. Function dialed indicated by illuminated number on front panel. Chart on front panel permits instant number to function observation for checking.

## TRANSMITTER UNIT

9. Same light indication on transmitter unit, with chart as in Par. 8 above.
10. Through a combination of sensitive relays, polarizing diodes and biasing, positive control is insured at low current drain. Husky slave relays provide the necessary contact rating for external switching circuits.
11. Pulse, reset and all switching functions can be controlled from transmitter for local operation.
12. Complete front of rack accessibility through drop-down-to-service feature. Panel size: 19"x15<sup>3</sup>/<sub>4</sub>".

All of the standard demands of complete remote control equipment will be found in the Gates RDC-200 to exceed FCC requirements including fail safe. Transmitter and studio units have self-contained power supplies and are independent operating units.

## REMOTE CONTROL ACCESSORIES

With RDC-200 the only special applications would be with the type and amount of accessory equipment. Page 93 lists a wide range of accessories usually required in multiple transmitter and directional operation. These may all be used with the RDC-200 system. — Where an extra special application is required, Gates engineers will be happy to place into action, the manufacture of this special need in its model shop, known for speed.

### What Is Supplied!

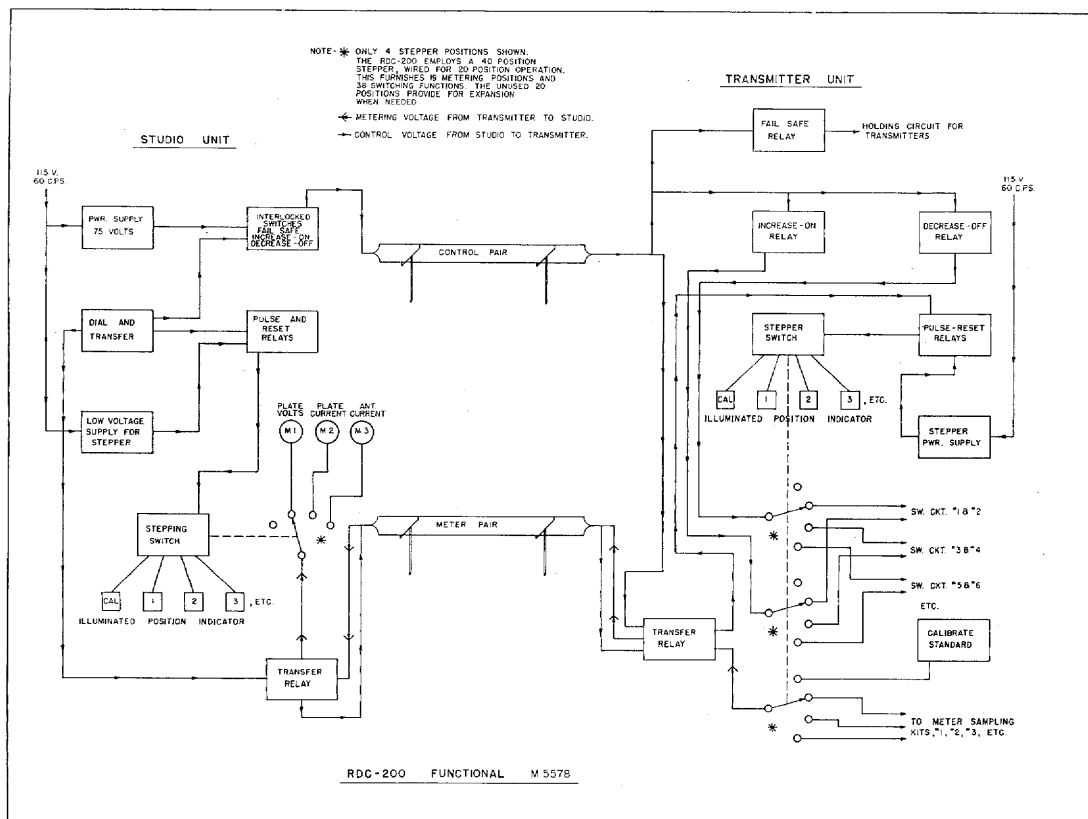
As standard equipment, the following is supplied:

- (a) Studio remote control unit.
- (b) Transmitter remote control unit.
- (c) M-4719 plate voltage metering unit.
- (d) M-4720 plate current metering unit.
- (e) Inbuilt plate start stop relays for one transmitter.
- (f) Tower light indicator.

**NOTE:** Motor tuned plate voltage rheostats are listed on Page 93 for powers up to 1 KW and motor tuning assemblies for load adjustments of higher power transmitters. There are optional accessories for your particular need and should be ordered for the complete system. Where more than one transmitter is to be remote controlled, the M-5249 momentary control or M-5248 latching (hold type) control is employed (see Page 93).

### ORDERING INFORMATION

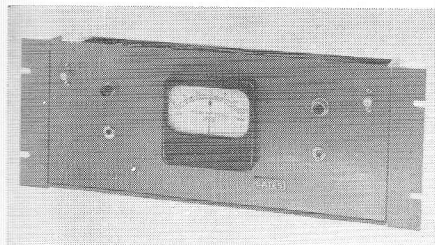
Complete deluxe remote control system ..... RDC-200  
 Extra tower light indicators (for multiple towers) ..... M-5145





# ACCESSORIES FOR REMOTE CONTROL

## Frequency Monitor Extension Meters



Used for extending Gates M-2890 monitors. Has 4" frequency indicating meter reading 30-0-30 cycles. Includes resistor pad for sampling voltage. Tubes: 6AW6, 6AQ5, 6AL5, 6X4 and OA2. For 115 volts, 50/60 cycles. Size: 7"x19"x7" deep.

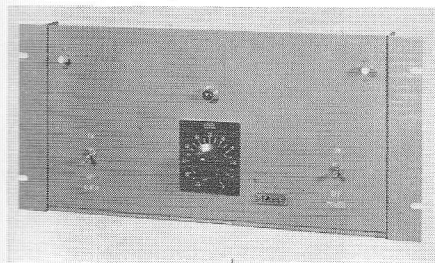
Frequency monitor extension unit ..... M-5270

### FOR M-4990 FREQUENCY MONITOR

Meter is exact duplicate of the M-4990 monitor (Page 84) for extending frequency indication to studios. On 5 1/4"x19" panel. Not illustrated.

Extension meter ..... M-5631

## RF Amplifier M-5144A



Preferred method is to have frequency and modulation monitors at the studios where the operator may view the operation at all times. This unit picks up the off air signal, furnishes both modulated and unmodulated signal to Gates, GR or RCA frequency and modulation monitors. Includes audio output and carrier failure relay to operate external alarm. Power supply is self-contained. Drop down front panel for servicing all inner components. Supplied with complete antenna kit.

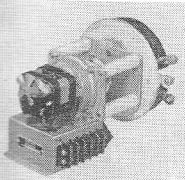
TUBES: (3) 6AU6, (2) 6BA6, (1) 1614, (1) 5V4G, (1) 6080, (1) OD3.

POWER: 115 volts, 50/60 cycles, 95 watts.

SIZE: 8 3/4"x19"x8" deep. Finish: Gray.

RF Amplifier with tubes ..... M-5144A

## Motor Operated Rheostat



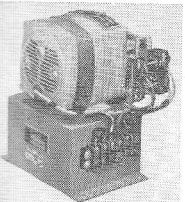
Recommended for regulating the plate voltage in transmitters of 1 KW and less. Available in three sizes for 250, 500 and 1000 watt transmitters. Motor is one RPM and operates from 115 volts, 60 cycles.

Motor Rheostat for 250 watts ..... M-4703A

Motor Rheostat for 500 watts ..... M-4703B

Motor Rheostat for 1 kw ..... M-4703C

## Tuning Motor



This unit for tuning variable inductor, capacitor or other controls, has inbuilt limit switches. Five wire reversible motor 1 RPM. 20 lb. inches torque. Requires M-5806 relay assembly for control. 115 volts, 50/60 cycles.

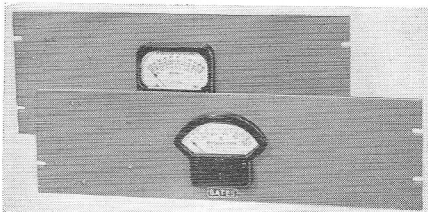
Tuning Motor ..... M-5066

## Tower Light Unit

This unit is used to provide a DC voltage for indication of proper tower light operation. Includes current transformer.

Tower Light Metering Kit ..... M-5145

## Monitor Extension Meters



Several types available as listed below for extending both frequency and modulation monitors. Meter is appropriate to type of monitor being used. Mounted on standard 19" rack panel 5 1/4" high.

Remote meter and panel for Gates M-4990 frequency monitor ..... M-5631

For extending Gates MO-2639 modulation monitor ..... M-5210

For GR1931A or RCA WM43A monitors ..... M-5206

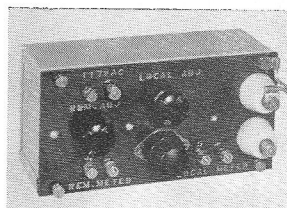
For GR1181A or RCA WF48A monitors ..... M-5208

For RCA 66 Series monitors ..... M-5207

For RCA 311A monitor ..... M-5209

## Antenna Diode Unit

The antenna diode unit is designed to provide remote metering of antenna current. A DC voltage proportional to the antenna current is returned to the studio unit via the metering line and measured on the directly calibrated antenna current meter. The unit pictured is the M-3759 for use with powers of 1 kw and under. A similar unit, the M-2765B is available for powers in excess of 1 kw. Tube: one type 6H6. Power requirements: 115 volts, 60 cycles.

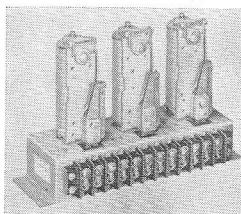


Diode 1 kw or less ..... M-3759

Diode 5 kw or more ..... M-2765B

## Relay Assembly

For controlling motors. Usually used where transmitters already incorporate tuning motors. Used with M-5066 tuning motor. As listed below, designed for control of one 3-wire motor or one 5-wire motor.

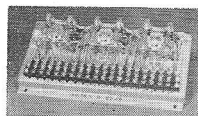


For 1 3-wire motor ..... M-4801

For 1 5-wire motor ..... M-4806

## Auxiliary Relay Assembly

Auxiliary relay assembly to provide one on-off holding switching facility. These relays provide two sets of double throw double contacts rated at 8 amperes.



Auxiliary relay assembly ..... M-5249

Same as above but latching (holding) type with 5 ampere contacts ..... M-5248

## Plate Voltage Unit

Supplied with all Gates Remote Control Systems and furnishes a sample of transmitter plate voltage for return via the metering line to the studio unit. One unit is used with voltages up to and including 6000 volts. For higher voltages, additional units may be connected in series. Also available as an accessory item for metering additional stages or transmitters.

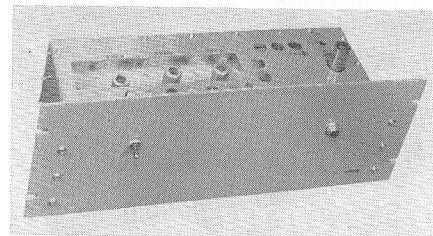
Plate Voltage Unit ..... M-4719

## Output Loading Control Kit

Complete kit to control output loading of Gates BC-5P 5 kw transmitter. It includes M-5066 and M-4806 relay and all necessary mounting hardware.

Output Loading Control Kit ..... M-4848A

## RF FM Amplifier M-4791



Operates with any approved FM frequency/modulation monitor where the signal is taken off the air and monitor is at studio. Amplifier supplied fixed tuned to your frequency. Power supply is not supplied. Requires 300 volts DC at 100 MA and 6.3 volts AC at 3 amperes. Use Gates PWR-3.

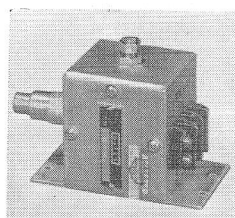
SIZE: 7"x19"x8" deep. Finish: medium gloss gray.

TUBES: 6AK5, 6BA6, 6AH6, 2E26, OA2.

RF FM Amplifier with tubes ..... M-4791

## FM Output Indicator

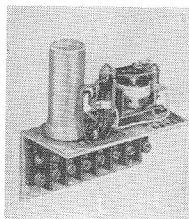
Designed to sample the 51.5 ohm transmission line of an FM transmitter for measuring transmitter output as required by FCC. Provides a DC voltage which is measured on the studio unit metering system.



FM Output Indicator ..... M-4845

## Overload Relay

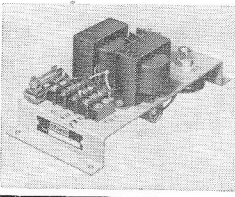
Replaces circuit breakers in current or older models as circuit breakers are usually undependable for remote control. Tripping current adjustable. Inserted in cathode circuit of RF power amplifier. Some engineers prefer an additional unit in modulator circuit.



Overload Relay ..... M-5129

## AC Rectifier

Rectifies the AC voltage, either line or filament, at the transmitter and feeds back DC to studio unit for measuring AC by remote control.



AC Voltage Unit ..... M-4825

## Plate Current Unit

Included with the Gates Remote Control System. Furnishes a sample of plate current which is returned to the studio unit and measured on the directly calibrated plate current meter. The unit is provided with a high voltage fuse for personnel and line protection, and can be used for current ranges of .8 ampere and 3 amperes. Also available as an accessory item to provide metering for additional transmitters, or can be used with unit furnished with equipment when extended range is necessary.

Plate Current Unit ..... M-4720

## Tuning Motor Assembly

For operating rheostat, variable condenser, or any variable control. Three wire reversible motor 1 RPM. Torque 15 lb. inches. 115 volts, 50/60 cycles.

Tuning Motor ..... M-4800

## Special Equipment for Remote Control

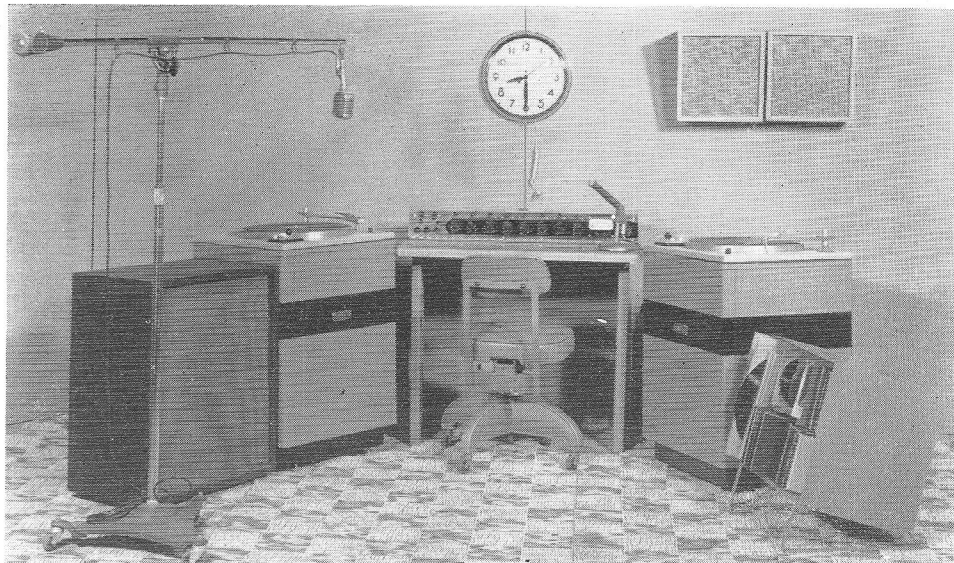
Gates has made every effort to provide a most complete line of equipment for unattended operation. It is recognized that unusual situations of multiple transmitters or directional requirements may demand special accessories. Gates engineers will happily work with our customers on any special application.

# PACKAGED AM RADIO STATIONS

## STUDIO PACKAGE

- 1—Yard 8-channel speech input console listed Page 104. Includes inbuilt cueing amplifier/speaker, self-contained power supply and 10 watt ultra linear monitoring amplifier.
- 1—Desk for Yard console as illustrated, Model M-5528.
- 2—CB-225A transcription turntables with dual diamond stylus for standard and microgroove, pre-amplifiers, equalizers, power supplies and ready to use. See Page 135.
- 1—Artility Model 255 adjustable, swivel and castored control room chair.
- 1—Argus Model DBR-2 bass reflex loudspeaker enclosure for control room monitoring.
- 2—Wall baffles for 12" speakers for studios and/or reception room, Model DWB-12.
- 3—Jensen P12T" dynamic loudspeakers.
- 1—M-5611 record/tape cabinet for discs and tape. Page 147.
- 1—Seth Thomas 15" studio clock, Page 131.
- 1—Atlas BS-36 microphone boom stand.
- 1—Atlas DS-7 microphone desk stand.
- 1—Electro-Voice 654 Slim-Trim dynamic microphone.
- 1—Shure 556-S cardioid mic.  
500' 2-wire shielded studio wire (not illustrated).
- 3—Cannon XL3-12 microphone connectors (not illustrated).
- 3—Cannon XL3-35 wall plate microphone receptacles (not illustrated).
- 1—Cabinet to hold studio portion of RDC-10 remote control unit (not illustrated).

**Complete studio package as listed above ..... M-5639**



This complete studio package includes all basic equipment for modern broadcasting and offers complete control facilities combined with attractive appearance.

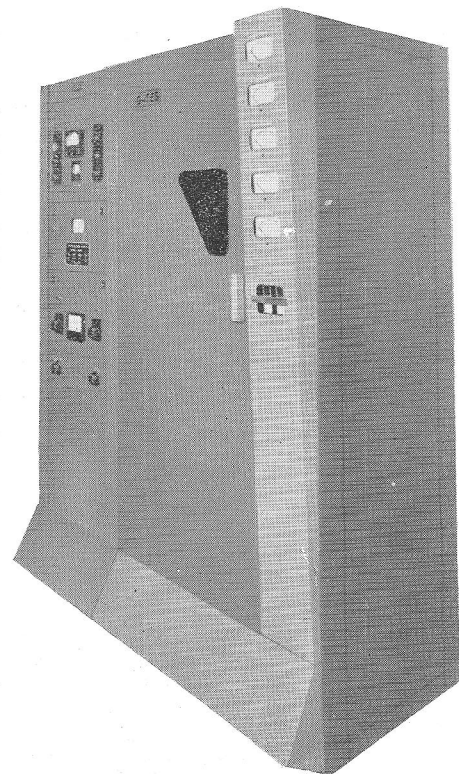
## TRANSMITTER PACKAGE

Choice of complete GY transmitter packages are listed on Page 58 for 250, 500 and 1000 watts, these include:

- 1—Transmitter with tubes, crystal and for either 25, 500 or 1000 watts as selected.
- 1—Extra crystal in vacuum holder.
- 1—FCC set of spare tubes.
- 1—Complete accessory cabinet with the following included and wired therein:
  - M-4990 FCC approved frequency monitor
  - MO-2639 FCC approved modulation monitor
  - SA-39B limiting amplifier
  - Switching panel
  - RDC-10 remote control system for unattended operation
- 1—Antenna coupler, Model 44, Page 81.
- 1—Tower choke M-3935, Page 83.

**Complete transmitter package as listed above ..... M-5643\***  
\* Transmitter supplied at power ordered.

Listed herein is all necessary basic equipment for the complete radio broadcasting station from microphone to antenna. Only optional equipment has been omitted such as transmission line and the minor accessories which vary with each installation. The combination of studio and transmitting equipment is considered substantially above average in quantity, quality and facilities offered.



Listed in greater detail on Page 58, the popular GY series complete transmitting plants are ready to attach to studio and transmission lines. When combined with the studio package above, a complete microphone to tower installation is ready to install.

## ORDERING INFORMATION

- Complete studio and transmitter package for 250 watts ..... M-5640**
- Same as above but for 500 watts ..... M-5641**
- Same as above but for 1000 watts ..... M-5642**

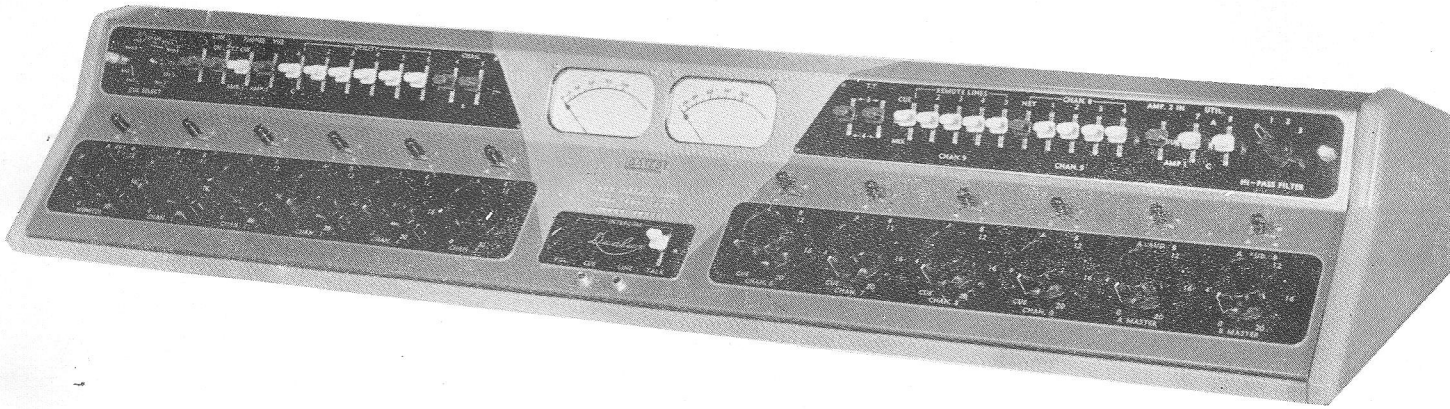
Includes all equipment listed on this page. Purchaser may substitute freely to suit his own requirements. Example: If Gatesway console preferred to Yard console, deduct price of Yard and Yard desk and add price of Gatesway (Page 100) and M-5371 desk (Page 147).



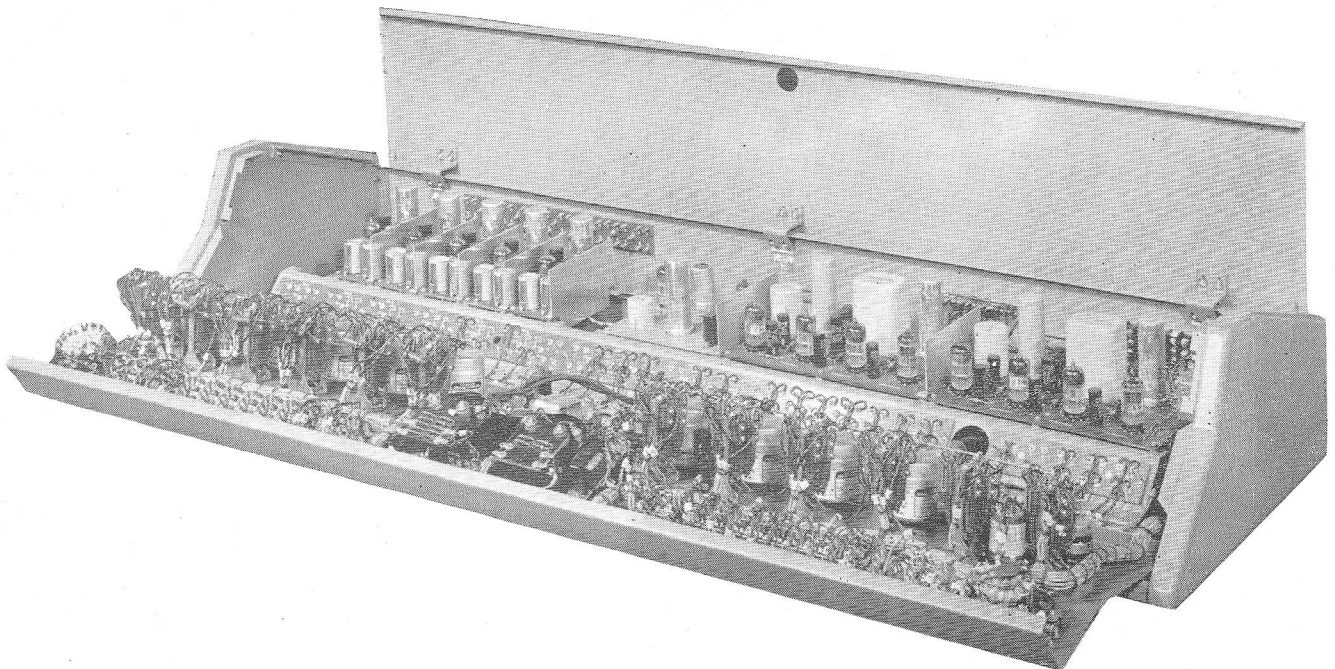


**GATES**

# DUALUX DUAL SPEECH INPUT EQUIPMENT



Dualux is one of the finest in the long line of illustrious speech input consoles manufactured by Gates. Study of the specifications and a glance at the block diagram makes self-evident the statement, "No standard speech input system on the market today will equal Dualux." One Dualux extra, the cue-intercom system, permits direct front panel loudspeaker listening on all major circuits plus talk-back to remotes and studios. The Dualux not only incorporates every feature the discriminating broadcaster could demand but many additional functional and manufacturing extras that place Dualux in a class by itself.







## DUALUX SPECIFICATIONS

**MIXING CHANNELS:** 9 keys selected to either program amplifier. Includes 5 microphone attenuators and 4 high-level attenuators with cue position used for turntables, tapes, networks.

**MICROPHONE INPUTS:** As wired, 7 microphones switchable to 5 preamplifiers. However, by use of auxiliary keys, as many as 22 microphones may be accommodated.

**TURNTABLE / TAPE / NETWORK INPUTS:** 4 turntables switchable into mixing channels 6 and 7. Network plus 4 tape or projector inputs selectable into either channels 8 or 9 by ingenious keying system to permit fading instead of dumping.

**MUTING:** All mixing channel keys provide switch contacts and are wired to operate 3 muting relays located on drop panel housing. Muting relays also accommodate warning light switching and intercom speaker muting. Room for two added relays is provided.

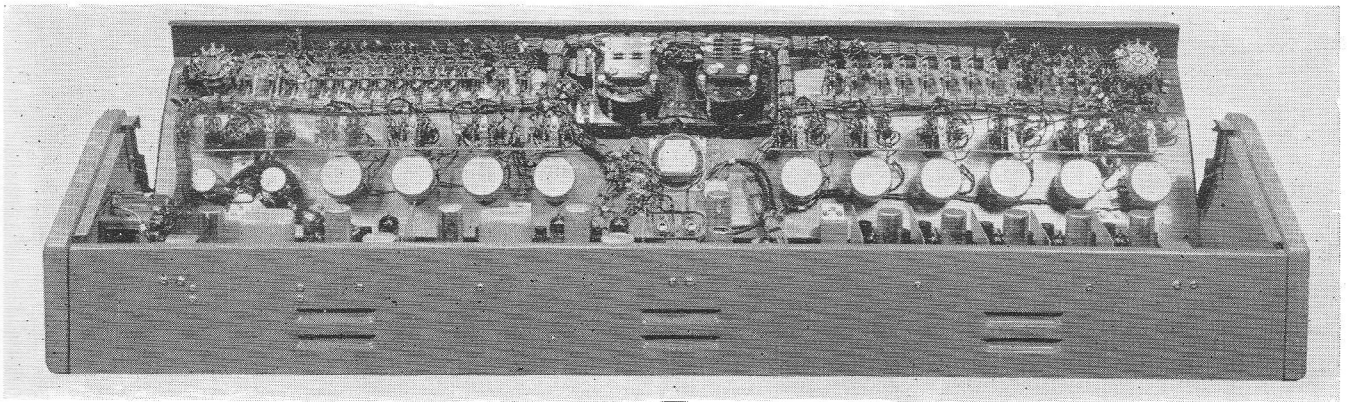
**PATCH PANEL:** All main circuits brought to terminal board and strapped together so that normalizing jacks, standard, and patch panels may be used where desired.

**POWER SUPPLY:** Gates heavy duty fully regulated. Relays are powered from main power supply and located inside of drop-panel housing.

**EQUALIZER (High-Pass Filter):** Direct front panel control for Program Channel A flat position and 3 selected response curves allows immediate elimination of hum, rumble or extraneous circuit noise at low frequencies. (See response curves).

**CUE-INTERCOM SYSTEM:** Loudspeaker and switching facilities directly in front center of Dualux console. May be used with M-5303 sub-station or any similar equipment for studio talk-back, providing following exclusive features:

- Interlocked and cannot interfere with programming.
- 8 external intercom circuits selected with front panel switch.
- 8 cueing circuits selected with front panel switch.
- Automatic gain cue-intercom amplifier takes care of level variations within 20 db.
- All inputs and outputs padded, plus isolation networks where necessary, to allow selection of any cir-



Rear view Dualux. Note no rear terminations, allowing Dualux to fit against wall where desired.

**REMOTE LINES:** 5 switched into channel 9, also into cueing system. Each remote key has off/talk-back/override positions. Duplicate line isolation transformers in channels 8 and 9 to handle any unbalanced condition.

**AMPLIFIERS:** 2 complete high-gain program amplifiers with individual front panel master gain controls are provided for entire dual operation. 5 preamplifiers with provisions for 2 additional preamplifiers for future expansion. Preamplifier, program amplifier, and monitoring amplifier have printed wiring throughout. Monitoring amplifier and regulated power supply mounted on drop down panel for rack mounting. Monitoring amplifier full 10 watt capacity.

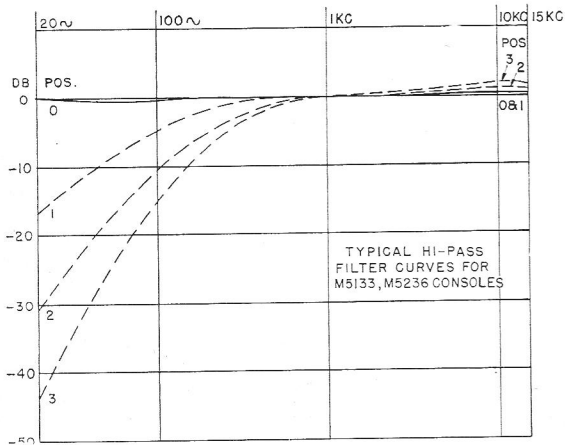
cuit without adjusting gain control where levels within 20 db of normal.

- Front panel phone jack will cut cue speaker when phone plug inserted.
- Intercom system will listen and talk back on following circuits:

|        |                |
|--------|----------------|
| RMT. 1 | Turntable Cue* |
| RMT. 2 | Studio A       |
| RMT. 3 | Studio B       |
| RMT. 4 | Studio C       |
| RMT. 5 | Mixer Bus A*   |
|        | Mixer Bus B*   |

\* Listen only.

## DUALUX SPECIFICATIONS



Graph showing four curves Dualux front panel control equalizer.

**IMPEDANCES:** Preamplifier input 30/50 and 150/250 ohms balanced or unbalanced. Remote, network, tape and projectors 600/150 ohms balanced or unbalanced. Output impedance 600/150 ohms balanced to both program amplifiers. Monitoring amplifier, 8 and 16 ohms. Intercom amplifier, 600 ohms.

**POWER:** 115 volts, 50/60 cycles.

**TUBES:** (18) 5879, (4) 12AX7, (2) 12AU7, EL84, (1) OA2, 6AK6, 6080, GZ34.

**PERFORMANCE DATA:** Gain overall, 104 db. From turntable, network, or remote input, 61 db.—All measurements  $\pm 2$  db.

**RESPONSE:** Overall or any segment of program circuit,  $\pm 1.5$  db, 30-15,000 cycles.

**MONITORING AMPLIFIER:**  $\pm 2$  db, 30 to 15,000 cycles.

**DISTORTION:** Any program circuit or segment thereof, 1% or less, 30-15,000 cycles at +8 dbm. 1.5% or less, 30-15,000 cycles at +18 dbm.

**NOISE:** Microphone input to program output 60 db or better below +8 dbm output, using -60 dbm input. Turntable, network and remote inputs 70 db or better below +8 dbm output.

**MONITORING CIRCUIT:** 60 db below +30 dbm output.

**CROSS-TALK:** All circuits or segments thereof below noise level with normal levels and control positions.

**METERING:** Two standard 4" illuminated VU meters recessed behind front panel for easy vision at correct level. One meter across program line at all times, second may be switched across either program line; both meters calibrated +8 dbm output (may be altered higher or lower levels on request).

**STYLING AND CONSTRUCTION:** Fingertip operation all controls. Dualux is only 7 1/2" high for easy over top vision. Front panel hinges down to service. Audio amplifier strip hinges up. Panel slope correct for eye upper line vision and control. Non-glaring finish which used in TV. Desk (designed exclusively for Dualux) optional. Rear inside has three wiring troughs to conduct wiring from console to floor. Top is formed linen form over seasoned 5-ply birch. Sides 16 gg. cold rolled stretcher level furniture steel. Finished in medium gloss gray. Leveling screws provided on all four corners. Size Height 29". Adjustable to 30". Top 30" front to back 47" wide.

**SIZE (Dualux):** 46 1/2" wide, 7 1/2" high, 15" deep.

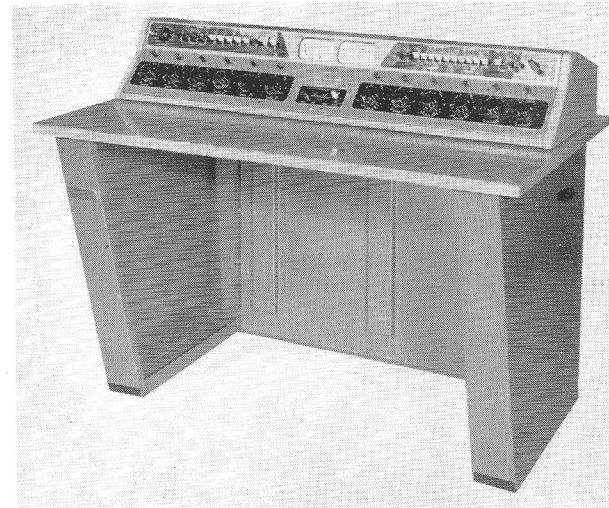
**TOTAL NET WEIGHT:** 101 lbs.

**PACKED WEIGHT:** 205 lbs.

**EXPORT WEIGHT:** 290 lbs.

**CUBAGE:** 9.

**FINISH:** Cabinet in medium gloss gray. Front panel metallic with escutcheons in etched black aluminum. Control knobs supplied with kit of color disc inserts for coding.

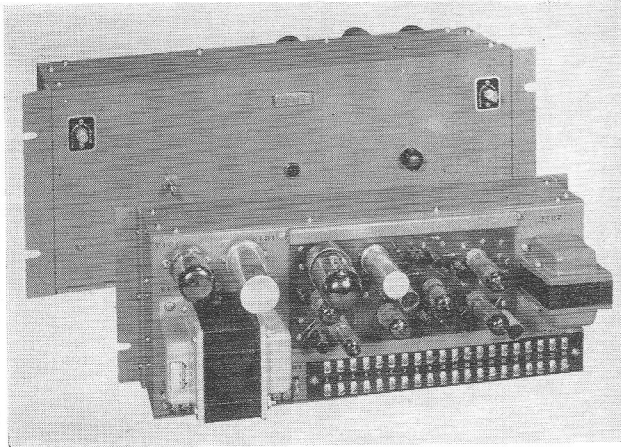


Console desk designed exclusively for Dualux.  
For other desks please refer to pages 132 and 147.

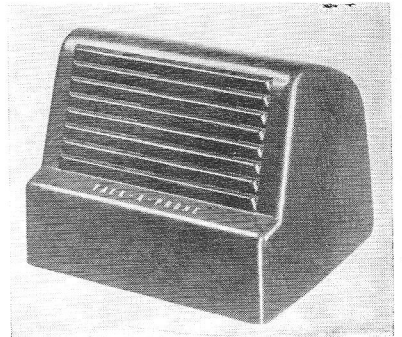


# DUALUX — ORDERING INFORMATION

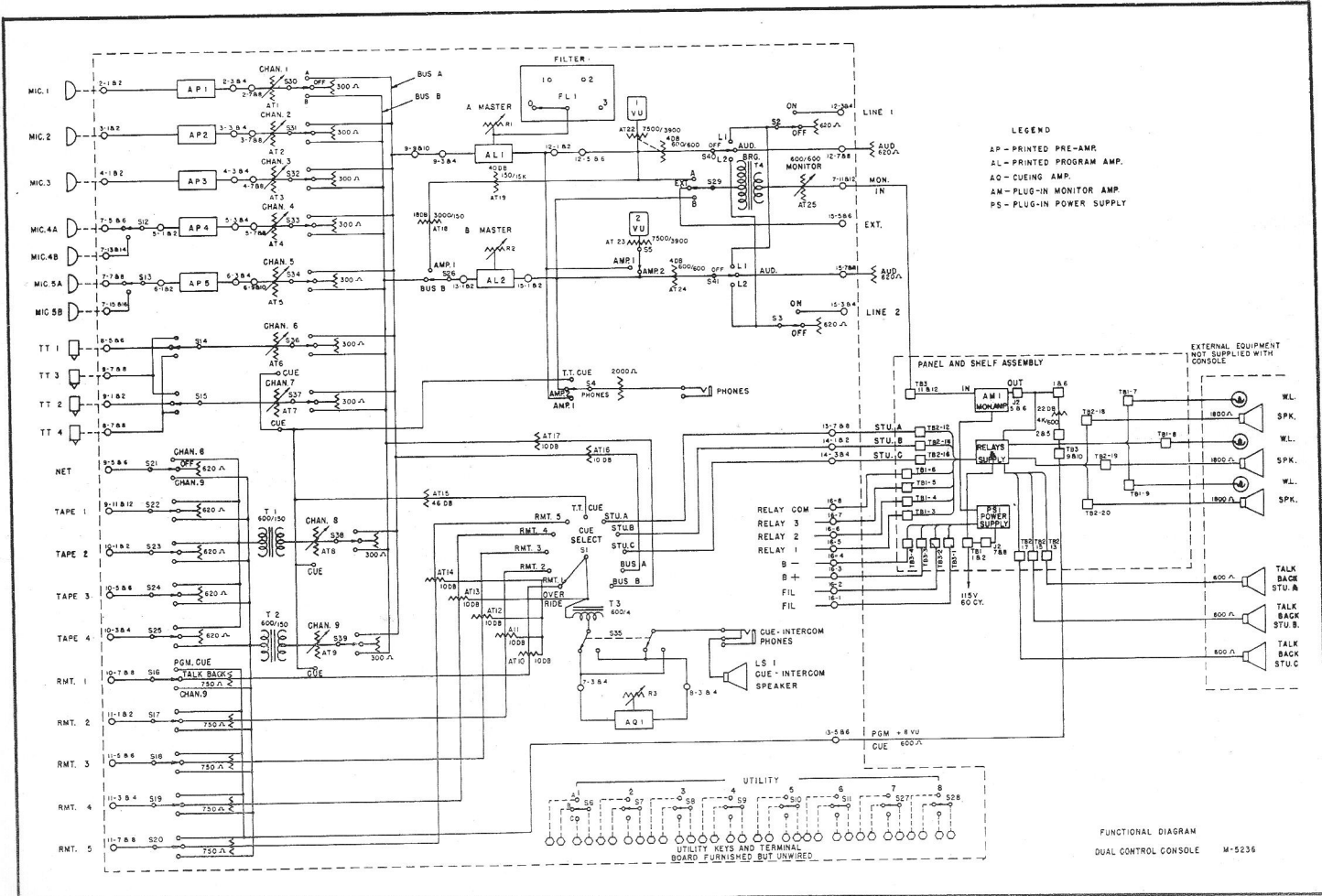
- Dualux dual channel speech input console complete with tubes, ready to use ..... **M-5236A**
- 100% spare tube complement for above ..... **TK-294**
- Intercom sub-station (optional) for studio use ..... **M-5303**
- Desk (optional) ..... **M-5372**
- Preamplifiers (room provided for two extra) ..... **M-5304**
- Extra relays for additional muting, etc. .... **AK-11939**



Fully regulated power supply. Relays are powered from main power supply and located inside of drop-panel housing.



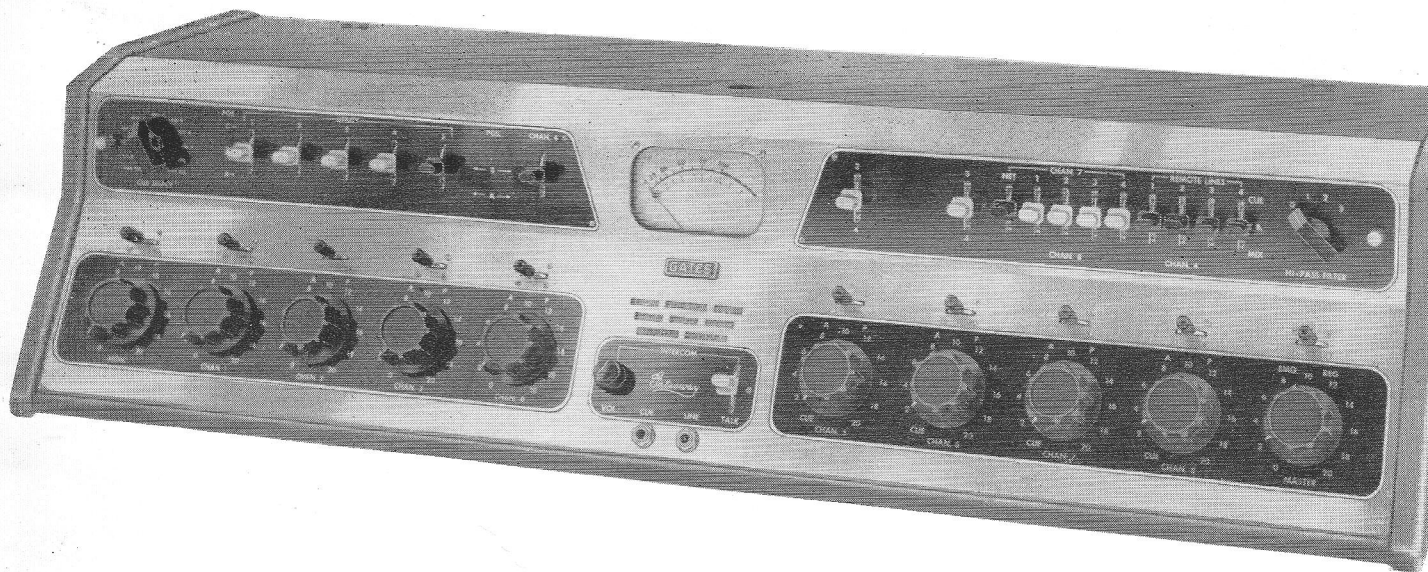
M-5303 sub-station for studio intercom to talk back to control board. Includes matching transformer.





**GATES**

## **GATESWAY SPEECH INPUT EQUIPMENT**



Years of extensive research in speech input systems are reflected in the Gatesway, a truly outstanding audio system. Modern for TV and modern for radio. Equally so for recording studios and university workshops. Each control seems to fall in the correct place — functional design at the finest. Printed wiring adds to reliability, easy serviceability, and best of all, more value at lower cost.

By observing the specifications and illustrations on the following pages, the engineer will quickly note that the Gatesway is quality speech equipment all the way.

