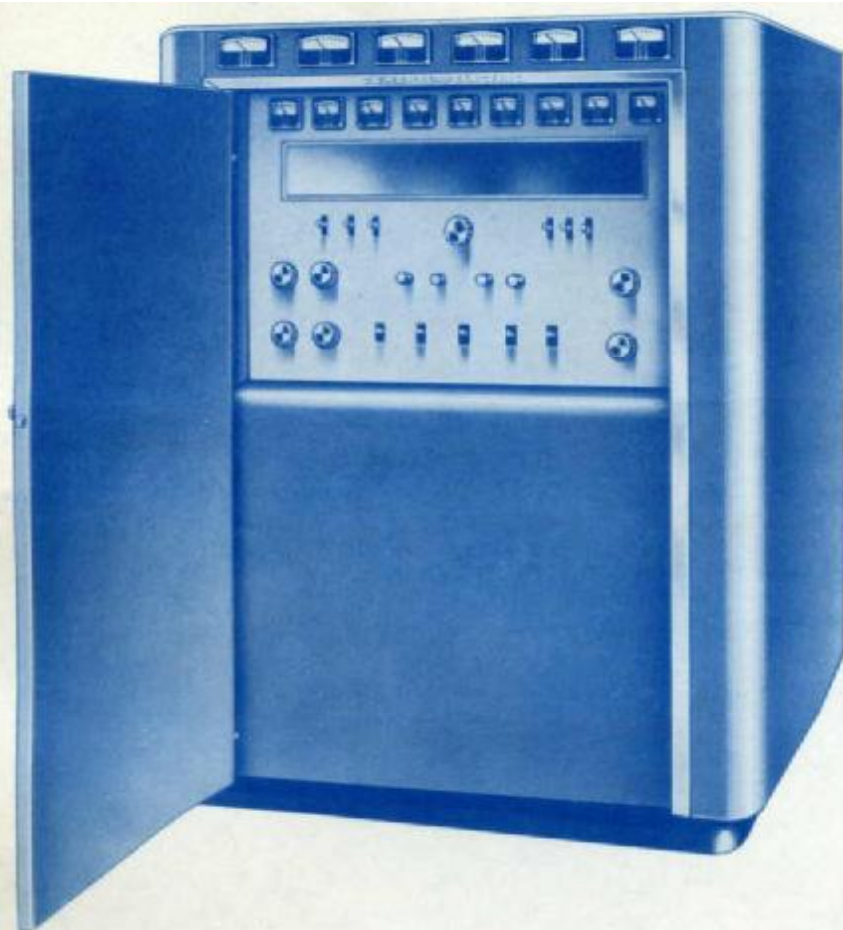




**1-KW AM
STANDARD BROADCAST
TRANSMITTER**

TYPE XT-1-A

GENERAL  ELECTRIC



1-KW A M

STANDARD BROADCAST TRANSMITTER

TYPE BT-21-A

Gives you...

- A New High in Efficiency
- Low Tube Costs
- Less Power Consumption
- High Quality Performance
- Modern, High Speed
Overload Relay Protection
- Double Safety Protection
- Improved Stability of
Crystal Oscillator Circuit

With these added features

- Smart, Modern Styling
- Maximum Accessibility
- Continuously Adjustable
Coupling to Load
- Duplicate Crystals—
Temperature-Controlled
- Harmonic Filter

Standard Broadcast Transmitter

TYPE XT-1-A

INTRODUCTION

The General Electric Type XT-1-A standard broadcast transmitter has been designed to provide the modern commercial broadcaster with an up-to-date 1000-watt equipment capable of the highest quality performance at the lowest possible annual operating cost, and with a minimum of maintenance and program interruptions.

The numerous 1000-watt broadcast stations in operation today are serving a large and important group of listeners. These people are fully as critical and deserving as those located within the service areas of the higher-powered transmitters. The General Electric Type XT-1-A transmitter has been designed to the same high standards and will meet the same rigid performance specifications which must be met by the best modern high-power equipments.

In the design of this equipment, the best features of contemporary transmitters have been carefully weighed. The opinions of many of the most experienced broadcasters have been thoughtfully considered. All of this, together with General Electric's many years of experience in building radio transmitters, has resulted in a design which we believe comes as close as possible to being the ideal broadcast transmitter in its power class.

In the process of design, every effort has been made to include only those features worth their cost to the station owner. All unnecessary "fads" and "gingerbread" have been eliminated. Yet nothing has been omitted when such omission would detract from reliability, performance and ease of operation. Circuits have been simplified. Numbers and types of tubes have been minimized. Annual tube and power costs are exceedingly low for a transmitter of this output rating.

Cabinet styling has not been overemphasized, but rather maintained in its proper balance with utility. The smart modern appearance of this

transmitter is an outward expression of its excellent internal performance. Its low operating cost will please the station owner; its reliability and ease of maintenance will delight the operator; and the high quality of its performance will win the acclaim of the most critical listeners.

GENERAL DESCRIPTION

The General Electric Type XT-1-A transmitter is a completely self-contained equipment mounted within an attractively styled steel cabinet. The approximate over-all dimensions are as follows:

Height	78 inches
Width	48 inches
Depth	34 inches
Depth (rear door open)	63 inches
Approximate net weight	3500 pounds

The standard cabinet is finished in blue lacquer with stainless steel trim and is constructed of heavy gage sheet steel with well-rounded corners and exceptionally sturdy nonsagging full-length doors. "Kick-coves" are provided at the front of the cabinet to permit close approach without danger of marring the cabinet finish.

Six meters, which include all instruments necessary for visual inspection of normal operating conditions, are located across the top front of the cabinet at approximately eye level. These meters include an r-f output or antenna current meter, power amplifier plate voltmeter and milliammeter, filament voltmeter, and two modulator plate milliammeters. To avoid confusion and to simplify normal routine operation, all meters which do not require frequent inspection, but are necessary for occasional circuit adjustments and metering of tubes, are located on the dead-front control panel.

The full-length rear door is electrically and mechanically interlocked so that high voltage is automatically removed and high-voltage circuits are grounded before the door can be opened. This furnishes complete safety to the operating personnel.

DESIGN

RADIO FREQUENCY CIRCUITS

The crystal oscillator unit is a carefully shielded assembly specially designed for good frequency stability. Duplicate crystal thermocells are provided. These are maintained at the operating temperature at all times, and either cell may be quickly switched into operation. The oscillator circuit employs a Type GL-807 tube and a General Electric Type G-30 crystal thermocell in an unusual circuit on which external conditions have negligible effect. A vernier adjustment of frequency is provided for each crystal.

The General Electric Type G-30 crystal thermocell is a complete plug-in temperature-controlled oven containing a low-temperature-coefficient quartz crystal. This unit resembles in appearance the familiar all-metal vacuum tube. It has been giving excellent performance at many broadcast stations for several years.

The output of the crystal oscillator is amplified by a Type GL-807 buffer amplifier which in turn feeds the driver stage. A frequency monitor may be coupled to the output of this buffer stage.

The r-f driver stage uses a Type GL-8005 tube and employs inductive or "coil" neutralization. It is capacity coupled to the power amplifier.

The power amplifier uses two Type GL-833A tubes in a single-ended inductively neutralized circuit. The tubes operate well below their maximum ratings, thus insuring long operating life. The type of circuit used makes it relatively easy to operate at half power if desired. Meters are provided to check the balance in cathode currents. Other meters indicate the total grid and plate current and the plate voltage.

The power amplifier output is capacitively coupled to the transmission line. This system discriminates against harmonic output and permits smooth load adjustment with but slight reaction on the power amplifier tank circuit. A matching network is included to properly match the transmitter output to the transmission line. This network also serves as a very effective filter of r-f harmonics. The r-f output circuit is designed to feed into coaxial or multiwire transmission lines now in common use.

A pick-up circuit, coupled to the power amplifier tank, is provided for feeding a modulation monitor.

An r-f ammeter is provided on the front panel. This may be connected in the transmission line or it may be removed to provide space for a remote r-f indicator.

AUDIO FREQUENCY CIRCUITS

The audio system consists of four, balanced, double-ended cascaded amplifier stages. Degenerative voltage feedback is used in this system to attain very low over-all distortion and excellent frequency response. The modulation equipment is designed to provide a flat frequency response between 30 and 10,000 cycles. For frequencies outside this range, a large attenuation factor minimizes adjacent channel interference.

The initial stage consists of a double-ended, Class A, resistance coupled amplifier employing a Type 6SN7/GT tube. Output of the first audio amplifier is capacitively coupled to the second stage.

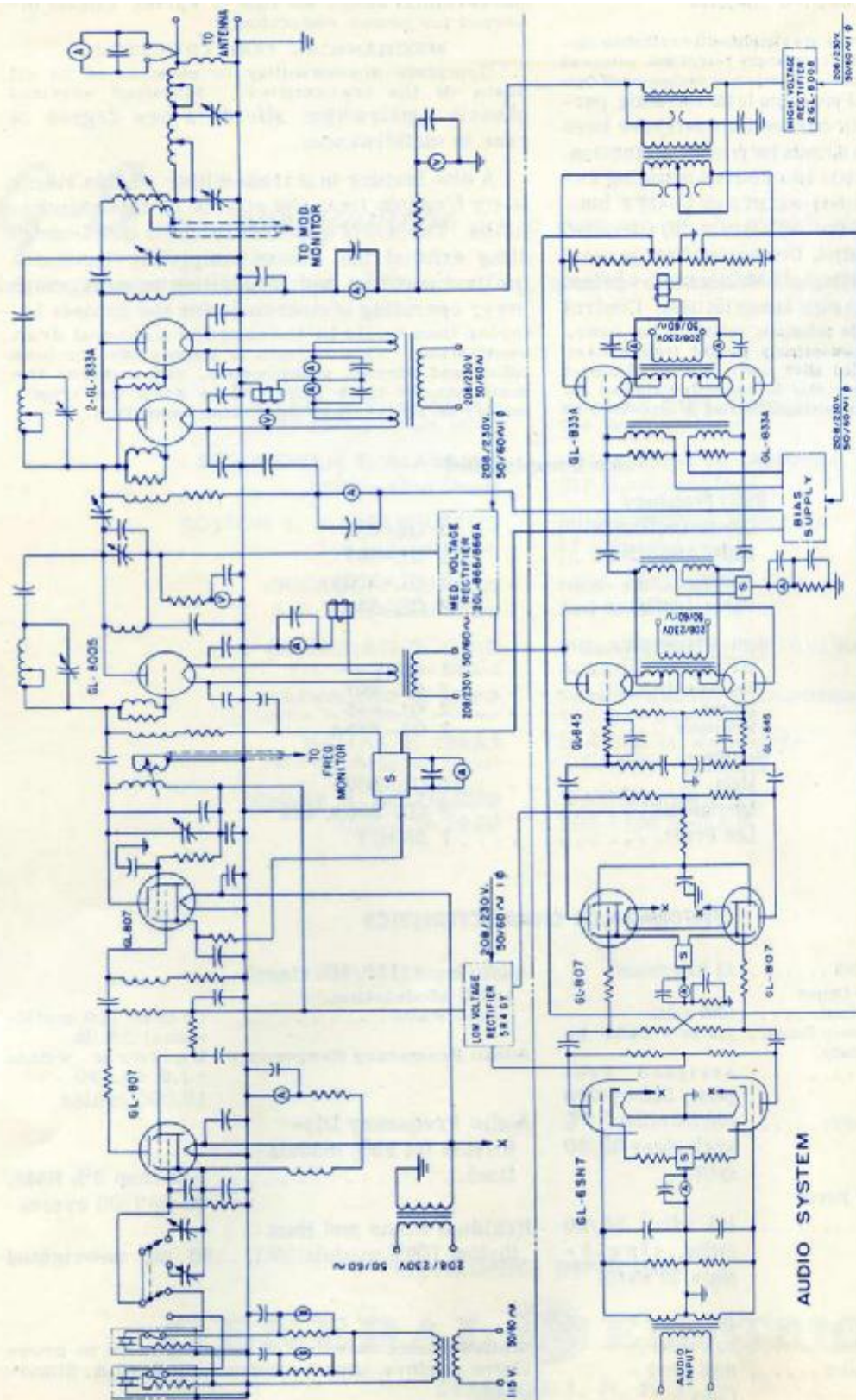
A pair of Type GL-807 tubes operating in a resistance coupled, double-ended, Class A amplifier circuit comprise the second audio amplifier. Output from this stage is capacitively coupled to the modulator driver.

For high quality audio performance, the modulator driver employs a cathode-follower amplifier with two Type GL-845 triodes operating as a Class A push-pull amplifier. This type of capacity coupled circuit eliminates a driver transformer which often introduces high values of distortion in the grid circuit of the modulator.

The modulator operates as a Class B amplifier using two Type GL-833A tubes, the same type as used in the r-f power amplifier. These tubes are conservatively operated and supply ample power to fully modulate the power amplifier. Individual bias controls permit accurate balancing of modulator plate currents. Overcurrent relays protect the modulator tubes from overloads.

RECTIFIERS

The main plate supply rectifier uses two Type GL-8008 Mercury Vapor Tubes in a conventional full-wave rectifier circuit. The intermediate rectifier uses two Type GL-866A/866 Mercury Vapor Tubes and the lower power rectifier uses one 5R4GY full-wave rectifier tube. A Selenium rectifier provides good regulation bias voltage for the Class B Modulator tubes as well as protective bias for the power amplifier and IPA stage.



(SIMPLIFIED)
 1 KW STANDARD BROADCAST TRANSM.
 Standard Broadcast Transmitter XT-1-A
 SIMPLIFIED SCHEMATIC DIAGRAM

CONTROL CIRCUITS

Control circuits are simplified for reliable operation, and yet all necessary relays and control devices have been used for proper sequence of operation and full protection to the operating personnel. Magnetic-trip circuit breakers have been used in branch circuits for primary protection. Time-delay relays insure correct operating sequence. Momentary-contact plate ON-OFF buttons are used so that they may be readily extended for external control. Overcurrent relays protect the power amplifier and modulator tubes against overloads which might damage the tubes. Control circuits provide automatic reclosure on overloads and instantaneously put the transmitter back into service after power failures of short duration. Power may be smoothly reduced by decreasing plate voltage. Wiring is extended to

the terminal board so that a variac can be inserted for power reduction.

MECHANICAL CONSTRUCTION

Complete accessibility is maintained in all parts of the transmitter. Modified vertical chassis construction affords a new degree of ease in maintenance.

A new feature in a transmitter of this rating is its freedom from the effects of dust accumulation. The use of dust filters and a quiet-operating exhaust fan almost completely eliminates the dust problem and in addition insures much lower operating temperature for the cabinet interior than would be the case for a natural draft ventilation. This results in longer life for both tubes and circuit components, and reduces the maintenance time required to keep the transmitter in first-class operating condition.

Tube Complement

Radio Frequency

Crystal Oscillator	1 GL-807
Buffer Amplifier	1 GL-807
Driver	1 GL-8005
Power Amplifier	2 GL-833A

Audio Frequency

1st Amplifier	1 6SN7
2nd Amplifier	2 GL-807
Driver	2 GL-845
Modulator	2 GL-833A

Rectifiers

Main	2 GL-8008
Intermediate	2 GL-866A/866
Low Power	1 5R4GY

PERFORMANCE CHARACTERISTICS

Type of Emission	A3 (telephone)
Carrier Power Output (40-250-ohm load)	1000 watts
Carrier Frequency Range ..	540 kc - 2400 kc
Carrier Frequency Stability	Assigned Frequency ± 10 cycles
Main Power Supply	208/230 volts $\pm 5\%$ single-phase 50/60 cycles
Crystal Heater Power Supply	115 volts, 50/60 cycles, single-phase, 25 watts
Power Input:	
Average Program Level ..	4300 watts
100% Modulation	5500 watts
Type of Modulation	High Level - Class B

Audio Input (150/600 ohms) 100% Modulation, sine wave	10 dbm (10 milliwatts) ± 2 db
Audio Frequency Response ..	Uniform within ± 1.5 db, 30 - 10,000 cycles
Audio Frequency Distortion (at 95% modulation)	less than 3% RMS, 50 to 7500 cycles
Residual Noise and Hum (below 100% modulation) ..	.60 db unweighted

Methods and conditions of measurement to prove above performance conform with R.M.A. Standards.

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