



FM

TYPE GF-101-B

1000

WATT

FM BROADCAST TRANSMITTER



GEA-3484A



THE General Electric 1000-watt frequency-modulation transmitter, Type GF-101-B, is an important unit in the G-E broadcast-transmitter line. It consists of two sections—the Type GF-1-B exciter (250 watts) which is the basic unit of the line, and a 1000-watt radio-frequency power amplifier. Together, they are designated as Type GF-101-B. Each section is completely self-contained and can be easily moved if necessary. When used

together, a strip of molding provides the smooth, flowing lines of a single cabinet. Detailed information about Type GF-1-B, the exciter unit, is given in Bulletin GEA-3327C.

If greater coverage is desired, the standard G-E 10-kw amplifier can be added to Type GF-101-B to make the complete 10,000-watt transmitter, Type GF-110-B. Three-thousand-watt and fifty-thousand-watt transmitters are also available.

MAXIMUM ON-THE-AIR RELIABILITY

- Fewer parts, fewer tubes because of General Electric's simplified circuit design.
- Frequency stability is assured by instant-acting electronic frequency control.
- Conservative operation of all component parts.
- Hermetically sealed temperature-controlled crystal unit.
- Instruments are provided for checking tube and circuit performance.
- Automatic-reclosing overload protection.
- Complete accessibility without disassembly.

EXCELLENT PERFORMANCE GUARANTEES

CARRIER-POWER OUTPUT: 1000 watts.

CARRIER-FREQUENCY RANGE: 42 to 50 mc.

CARRIER-FREQUENCY STABILITY: Within ± 1000 cycles over normal room-temperature range (F.C.C. requirements, ± 2000 cycles).

FM CARRIER-NOISE LEVEL: 70 db below ± 75 -kc swing, unweighted.

AM CARRIER-NOISE LEVEL: 60 db below 100% amplitude modulation, unweighted.

R-F LOAD CHARACTERISTICS: R-f transmission line may be balanced or unbalanced, 60 to 200 ohms. The use of a single concentric r-f line is recommended.

MODULATION CAPABILITY: ± 75 -kc carrier swing corresponds to 100% modulation.

A-F INPUT LEVEL: Normal, 0 db* for 100% modulation; a variable balanced H-pad in the transmitter permits audio-frequency input levels of -7 db to $+8$ db in 0.5-db steps for 100% modulation; input impedance, 600 ohms.

* 0 db is 1 milliwatt of sine-wave power.

A-F RESPONSE: Within ± 1 db of F.C.C. pre-emphasis standard from 30 to 16,000 cycles; if desired, within ± 1 db of 1000-cycle response, 30 to 16,000 cycles.

A-F DISTORTION: Less than 1.5% rms, unweighted, for any single modulating frequency from 30 to 15,000 cycles and for carrier swing up to ± 75 kc; less than 2% distortion, 30 to 15,000 cycles, up to ± 100 kc swing.

INTERMODULATION DISTORTION: Less than 1% rms at ± 75 -kc swing, with equal audio-input combinations of 400 and 700 cycles, or 4000 and 7000 cycles.

POWER SUPPLY: **Exciter:** 115 volts $\pm 5\%$, 60 cycles, single-phase. **1-kw Amplifier:** 230 volts $\pm 5\%$, 60 cycles, single-phase.

POWER INPUT: **Exciter:** 1 kw at 90% power factor. **1-kw Amplifier:** 2.75 kw at 90% power factor.



Handles for the front doors are purposely placed on the inside to make it difficult to put the transmitter inadvertently off the air. All tuning controls are within easy reach through the front door panels.

TUBE ECONOMY

The careful designing that is characteristic of all General Electric FM transmitters has resulted in obtaining great reliability with very few tubes. This reduces maintenance expense and the possibility of tube failures. All tubes are operated well within their Continuous-Commercial-Service (C.C.S.) ratings.

Exciter		1-kw Amplifier	
1	2A3	1	902
2	5Z3	1	VR-105-30
1	6H6	3	GL-807
1	6J5	2	GL-810
1	6AB7/1853	4	GL-866A
3	6SJ7	5	GL-1614
		2	GL-833A
		2	GL-872A

MECHANICAL FEATURES

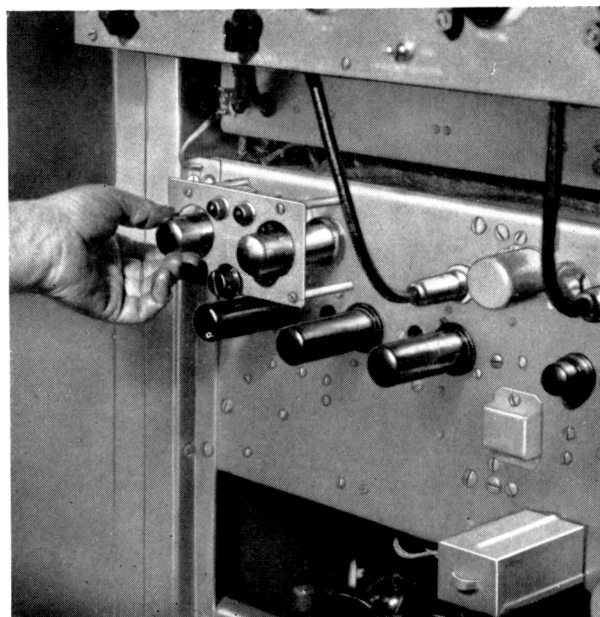
LITTLE FLOOR SPACE REQUIRED: Total width, 56 in. (each unit, 28 in. wide); depth, 24 in.; height, 78 in.

LIGHT IN WEIGHT: 250-watt exciter, 675 lb, net; 1000-watt amplifier, 860 lb, net.

NEAT CONSTRUCTION: Completely self-contained in two gray-ripple finish steel cabinets, generally placed side by side to give the appearance of a single unit.

NATURAL DRAFT VENTILATION—plus a small, quiet blower for cooling the power-amplifier tube seals.

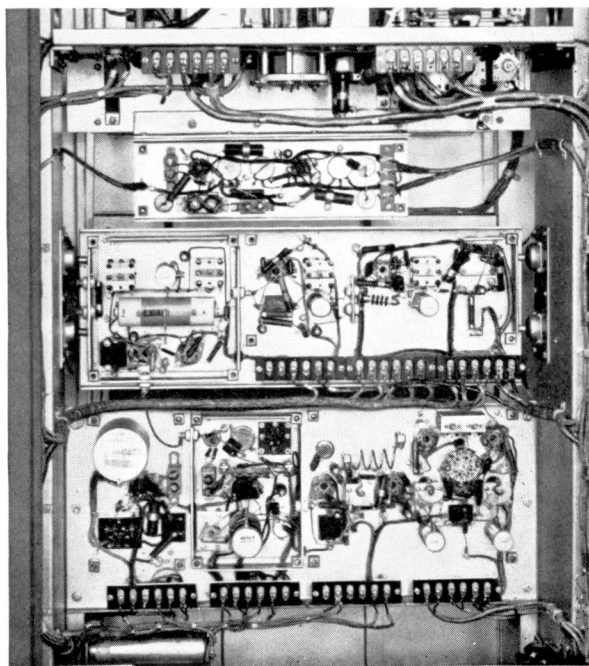
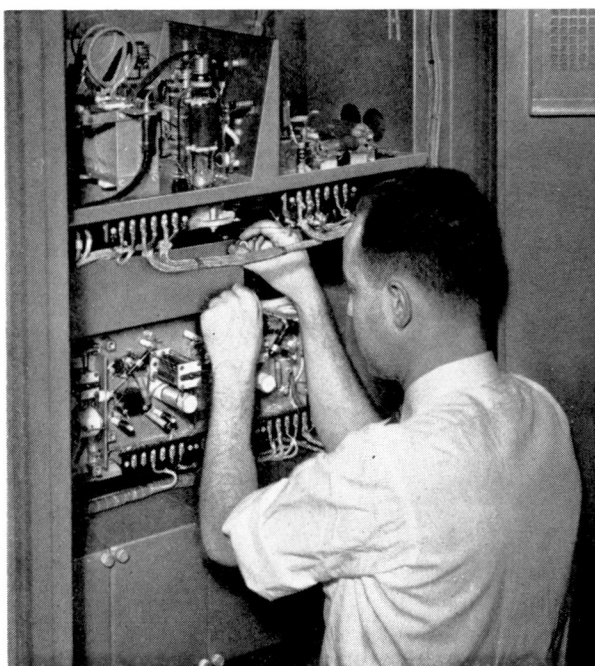
CONCEALED EXTERNAL CONNECTIONS Power and control wiring are concealed, due to the use of convenient entrances in the bottom of the cabinets. R-f input and output connections are made through knockouts provided in sides and top.



This is the hermetically sealed G-31 Thermocell crystal unit. It utilizes a new method of controlling crystal temperature which far surpasses older methods in the frequency stability obtained. Although only one Thermocell is used in General Electric's simplified circuit, provision is made for switching to a spare during operation.



“Vertical chassis construction” makes every tube and soldered joint completely accessible. Removal of the simple shielding is a matter of seconds. There is no need of removing entire units from the transmitter for detailed inspection.



RADIO-FREQUENCY CIRCUITS

The transmitter output of 1000 watts is obtained by conservative operation of two GL-833A vacuum tubes in a balanced push-pull circuit with capacity-bridge neutralization.

A short length of concentric r-f transmission line is furnished to connect the exciter output to the amplifier input in case the cabinets are located side

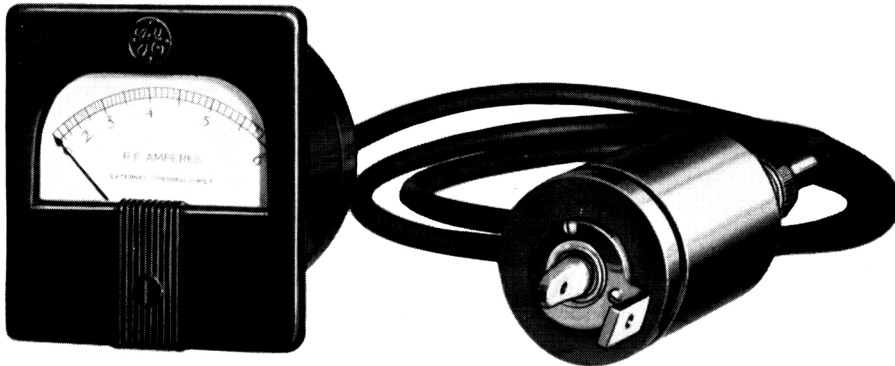
by side to form a single unit.

Controls are provided for grid tuning, plate tuning, neutralizing and output coupling. All controls may be safely operated with power applied.

The basic circuits of the Type GF-1-B exciter are described in Bulletin GEA-3327C.

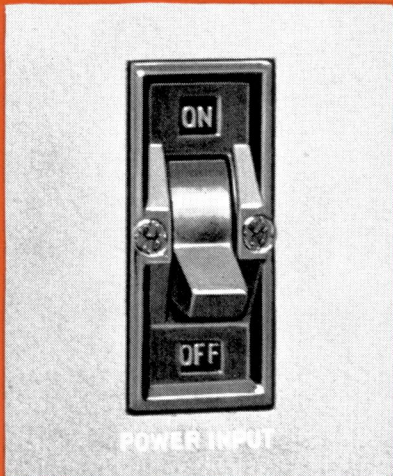
INSTRUMENTS

Instruments and associated controls are provided for checking the performance of the tubes in both the 250-watt exciter and the 1-kw amplifier. The power-amplifier unit contains one filament voltmeter, one plate voltmeter, one grid-current meter, one plate-current meter, and one r-f output ammeter. A switch is provided so that the individual plate current of either power-amplifier tube, or the sum of their currents can be measured.

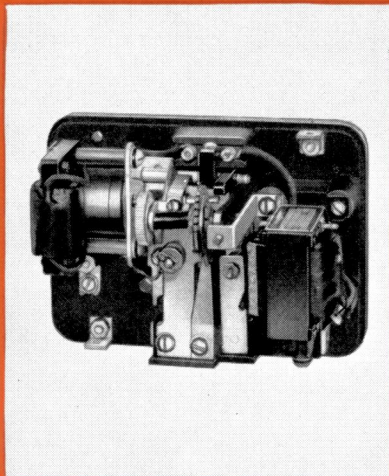


R-f Output Ammeter—a thermocouple-type instrument recently developed by General Electric for direct measurement of transmission-line current.

POWER AND CONTROL CIRCUITS



Power from the 60-cycle supply lines is fed to the exciter and amplifier through separate hand-operated circuit-breaker-type switches (shown above), which are controlled from the front panel. These switches provide full protection against short circuits and excessive overloads without the use of fuses. When tripped, they can be instantly reset from the front



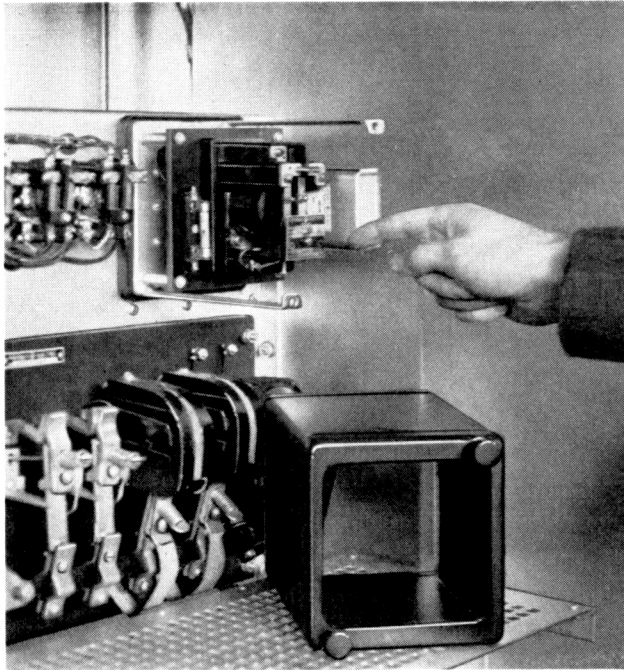
panel. When these switches are closed, power is applied to all filaments, control circuits, and the small tube-cooling air blower for the GL-833A tubes.

The control circuits, while unusually simple, assure complete protection to the transmitter. Separate Telechron motor time-delay relays (above, center) in the

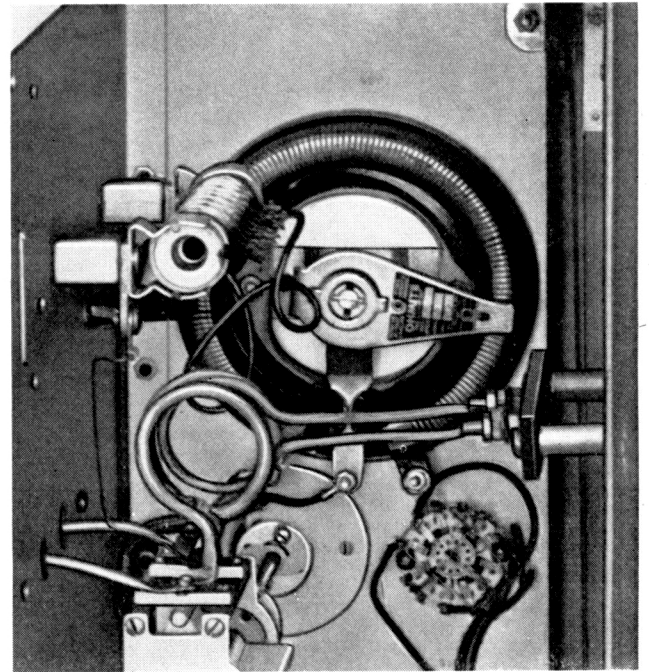


exciter and amplifier protect the rectifier tubes against premature application of plate voltage.

The red and green plate OFF-ON push buttons (above) are translucent, and contain 6-volt indicating lamps. This greatly enhances the appearance and operating convenience.

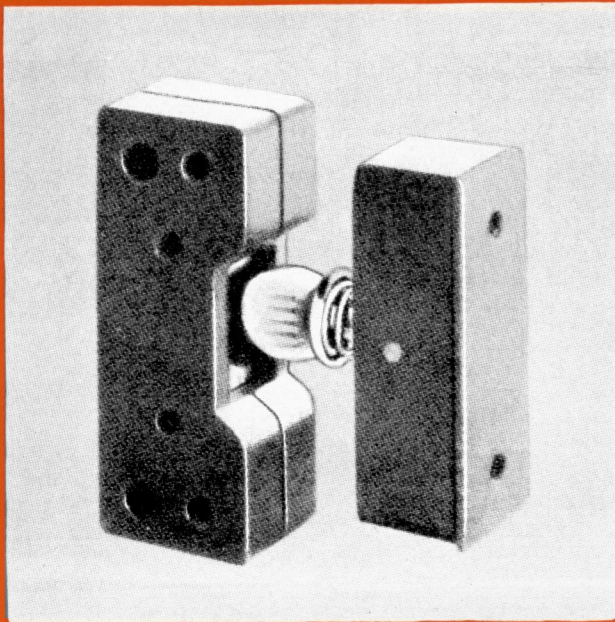


Overcurrent relays remove plate voltage in case of severe overload, and a recloser relay (above) automatically reapplies the plate voltage immediately. If a second interruption occurs within 15 seconds, plate power must be reapplied manually. After 15 seconds of normal operation, the recloser device resets itself in

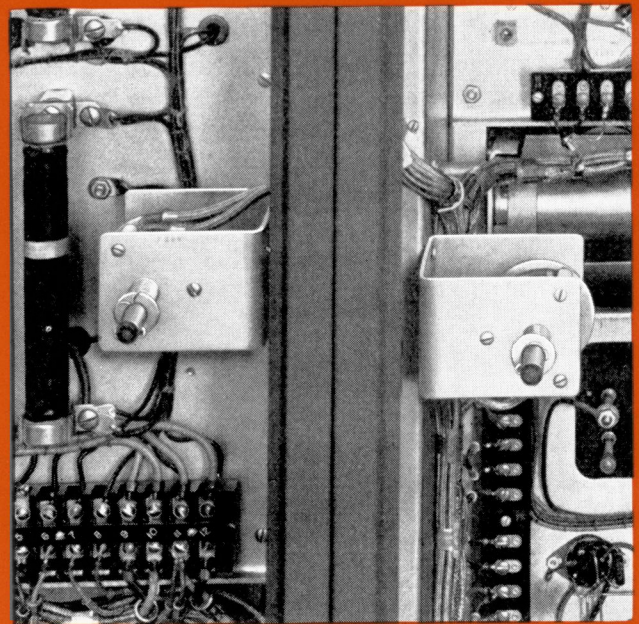


readiness for another automatic reclosing. The reclosing operation is effective on overloads in either the exciter or amplifier. Separate filament rheostats (above) are provided for the exciter and the power-amplifier units. These master filament rheostats control all the filament voltages in their respective units.

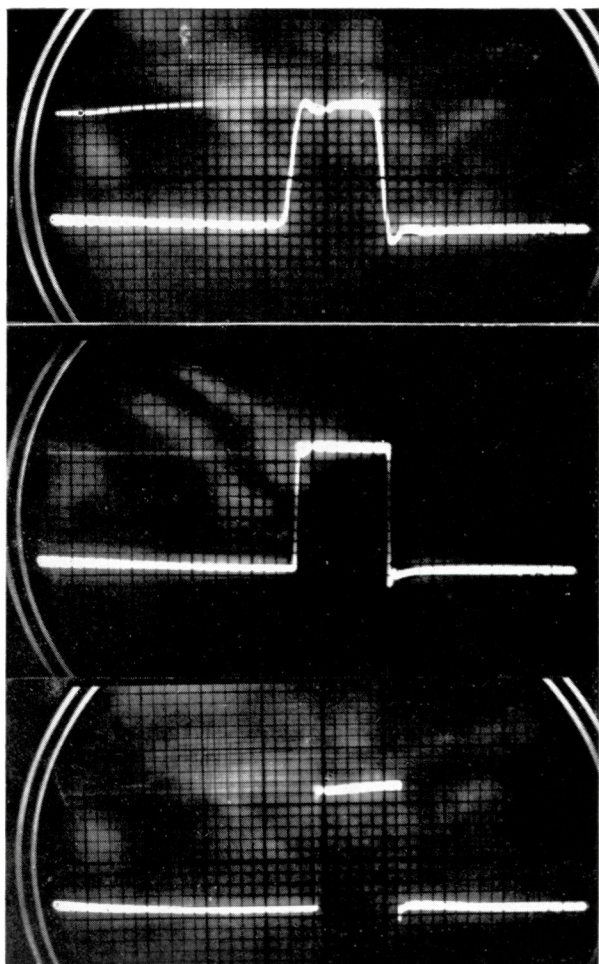
SAFETY FEATURES



Doors to the interior of the two grounded metal cabinets are equipped with safety interlocks (above, at left) that open the primary circuits of the plate transformers, and with safety grounding switches (above, at right) which ground both the



high-voltage and the low-voltage plate circuits when a door is opened. Safety interlocks on higher-power amplifier units can be conveniently connected to control the plate voltage in the exciter and 1-kw amplifier.



TESTING AND INSTALLATION

General Electric frequency-modulation transmitters are thoroughly tested and adjusted before they leave the factory. These tests assure the operating characteristics given under "Excellent Performance Guarantees," and include *thorough* square-wave measurements. Final tuning to operating frequency must, of course, be done after installation. Both the installation and the tuning of General Electric FM transmitters are simple.

STANDARD EQUIPMENT

Complete 1000-watt transmitter.

Two complete sets of G-E tubes.

One G-E Type G-31 Thermocell crystal unit, complete with a low-temperature-coefficient crystal ground to customer's operating frequency.

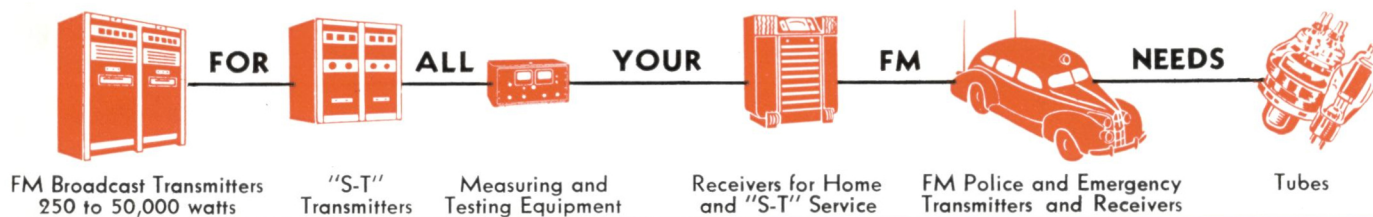
Installation and operating instructions.

TECHNICAL DATA ON FILE WITH F.C.C.

Complete technical data concerning the G-E 1-kw FM broadcast transmitter, Type GF-101-B, have been filed with the Federal Communications Commission. In applying for an FM construction permit, it is necessary only to specify "General Electric Type GF-101-B transmitter" in lieu of filing a complete description of the equipment.

ADDITIONAL EQUIPMENT AND SERVICE

General Electric also offers FM broadcast transmitters with the standard ratings of 250 watts, 3-, 10-, and 50-kw; broadcast-quality FM transmitters of the "S-T" class for carrying the program from studio to transmitter (50 watts, 156-168 mc and 25 watts, 260-350 mc); the new FM station monitor for checking center-frequency, percentage modulation, and fidelity; the G-E square-wave generator; and a complete line of transmitting tubes, crystals, and antennas.



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SCHENECTADY, N. Y.