

Collins

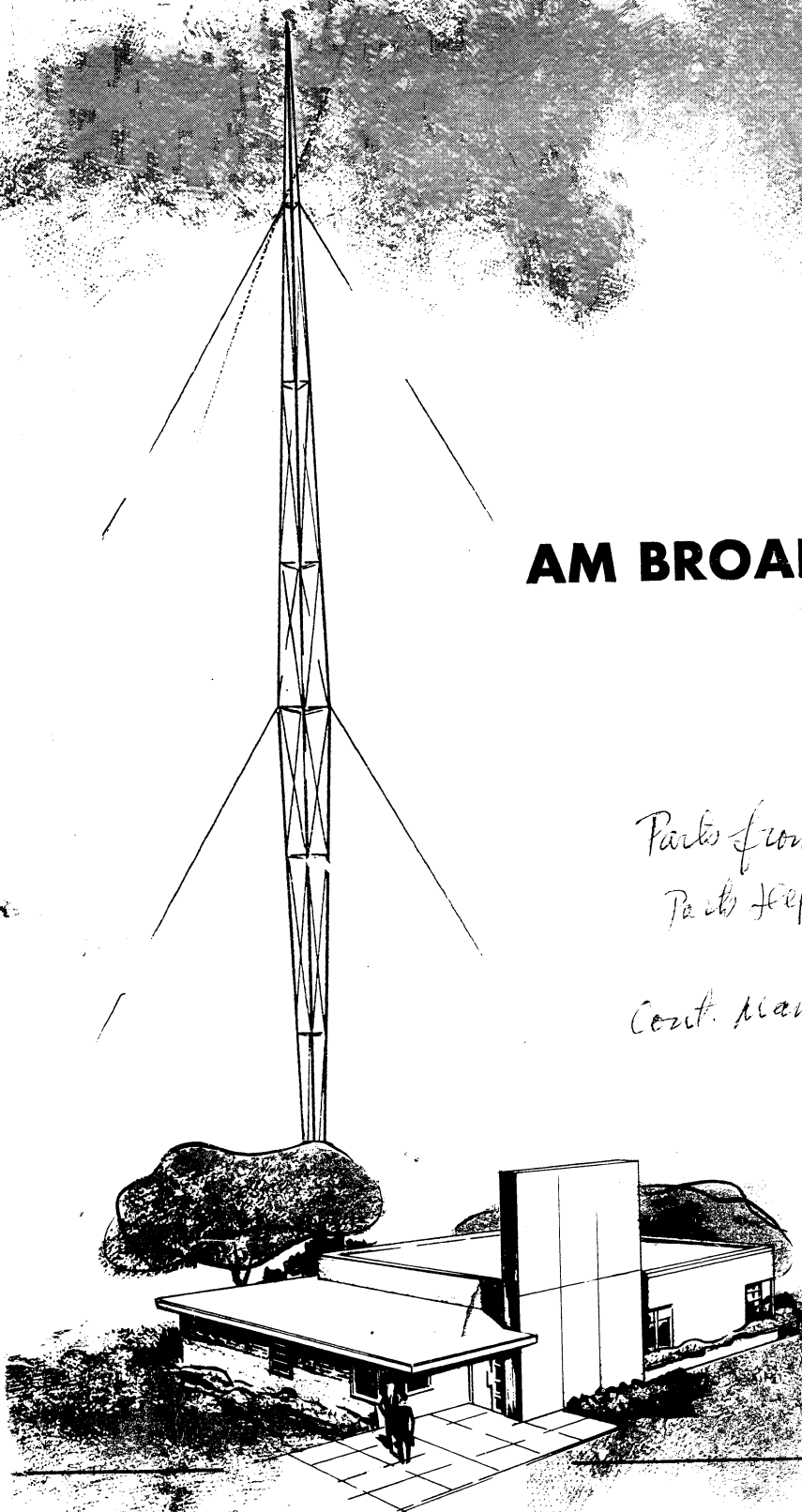
INSTRUCTION BOOK

AM BROADCAST TRANSMITTER

20V-2

Parts from Cont. Electronics
Part Dept. 1-214-327-4532

Cont. Main Number 1-214-381-7161
1-214-381-7161



COLLINS RADIO COMPANY —

GUARANTEE

The equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to design, workmanship or material, and which are returned to Collins at its factory, transportation prepaid, provided

- (a) Notice of the claimed defect is given Collins within one (1) year from date of delivery and goods are returned in accordance with Collins' instructions.
- (b) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins' designs are subject to only such adjustments as Collins may obtain from the supplier thereof.
- (c) No equipment or accessory shall be deemed to be defective if, due to exposure or excessive moisture in the atmosphere or otherwise after delivery, it shall fail to operate in a normal or proper manner.

Collins further guarantees that any radio transmitter described herein will deliver full radio frequency power output at the antenna lead when connected to a suitable load, but such guarantee shall not be construed as a guarantee of any definite coverage or range of said apparatus.

The guarantee of these paragraphs is void if equipment is altered or repaired by others than Collins or its authorized service center.

No other warranties, expressed or implied, shall be applicable to any equipment sold hereunder, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements in this paragraph contained. In no event shall Collins have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials, or from any other cause.

HOW TO RETURN MATERIAL OR EQUIPMENT. If, for any reason, you should wish to return material or equipment, whether under the guarantee or otherwise, you should notify us, giving full particulars including the details listed below, insofar as applicable. If the item is thought to be defective, such notice must give full information as to nature of defect and identification (including part number if possible) of part considered defective. (With respect to tubes we suggest that your adjustments can be speeded up if you give notice of defect directly to the tube manufacturer.) Upon receipt of such notice, Collins will promptly advise you respecting the return. Failure to secure our advice prior to the forwarding of the goods or failure to provide full particulars may cause unnecessary delay in handling of your returned merchandise.

ADDRESS:

Collins Radio Company
Sales Service Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

- (A) Type number, name, and serial number of equipment
- (B) Date of delivery of equipment
- (C) Date placed in service
- (D) Number of hours of service
- (E) Nature of trouble
- (F) Cause of trouble if known
- (G) Part number (9 or 10 digit number) and name of part thought to be causing trouble
- (H) Item or symbol number of same obtained from parts list or schematic
- (I) Collins' number (and name) of unit sub-assemblies involved in trouble
- (J) Remarks

HOW TO ORDER REPLACEMENT PARTS. When ordering replacement parts, you should direct your order as indicated below and furnish the following information insofar as applicable. To enable us to give you better replacement service, please be sure to give us complete information.

ADDRESS:

Collins Radio Company
Sales Service Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

- (A) Quantity required
- (B) Collins' part number (9 or 10 digit number) and description
- (C) Item or symbol number obtained from parts list or schematic
- (D) Collins' type number, name, and serial number of principal equipment
- (E) Unit sub-assembly number (where applicable)

*Transmitter on Air for Field Intensity Measurements
Sat. Sept. 8, 1962*

AM BROADCAST TRANSMITTER 20V-2

INSTRUCTION BOOK

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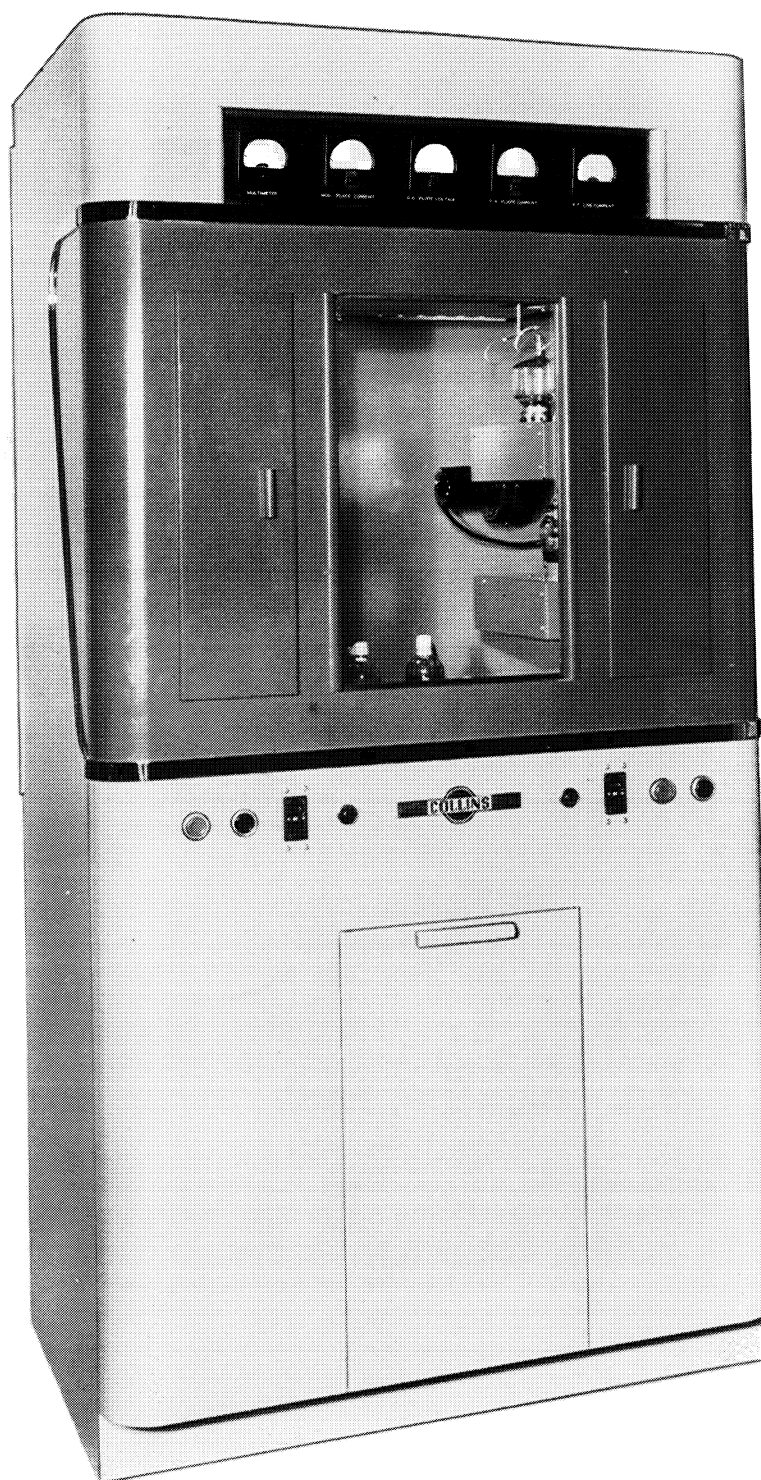


Figure 1-1. Collins 20V-2 1000/500/250 Watt AM Transmitter

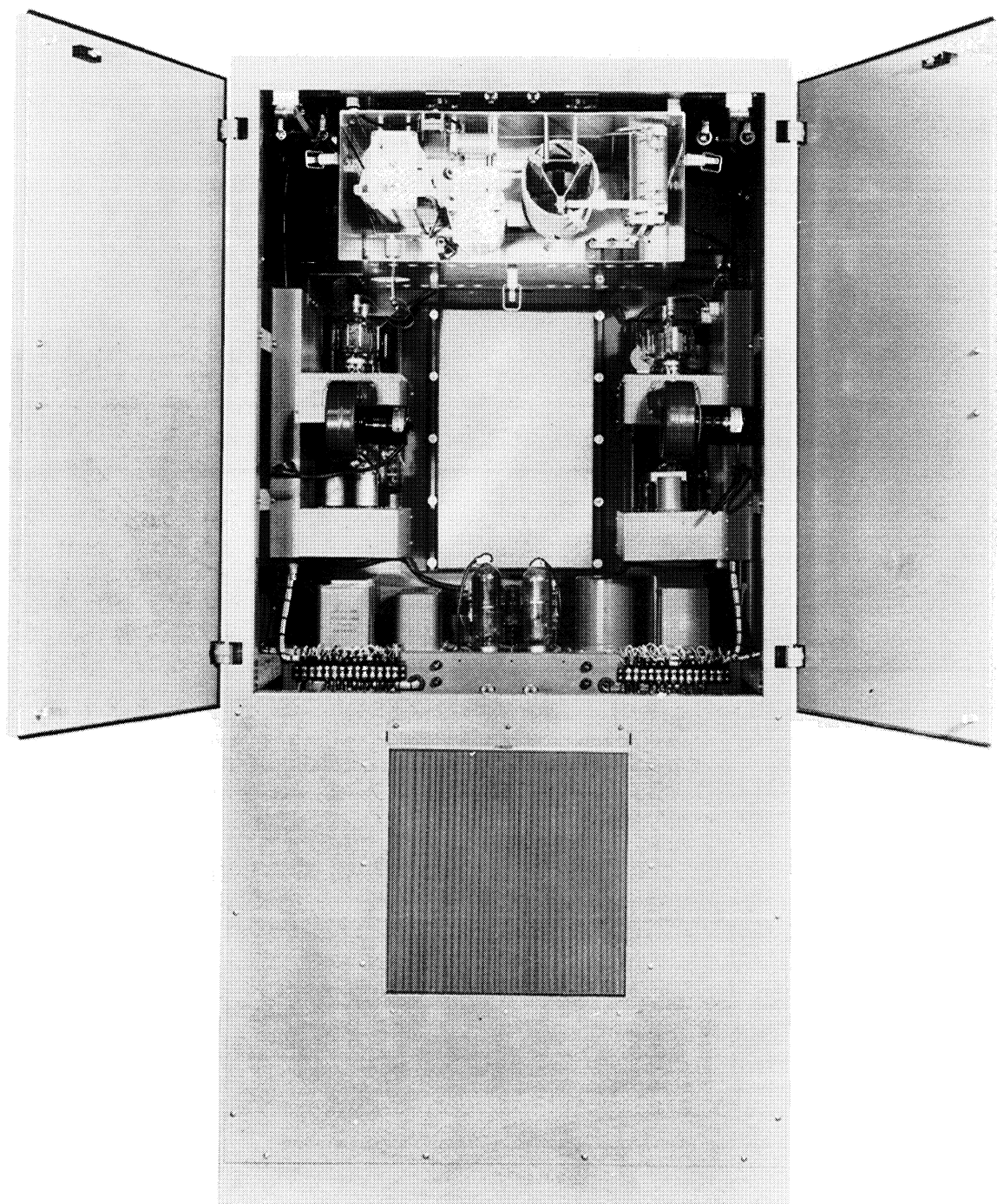


Figure 1-2. Collins 20V-2 Transmitter, Rear View

SECTION 1 GENERAL DESCRIPTION

1.1. GENERAL

The Collins type 20V-2 1000/500/250 watt AM transmitter has been designed for high-fidelity broadcast service. Advanced engineering techniques and new high-quality components have combined to produce a transmitter that provides outstanding features designed to meet today's demand for better service from modern broadcast equipment.

One neatly-styled heavy-gauge sheet metal cabinet houses the entire transmitter. The complete equipment occupies a space 27" deep by 38" wide by 76" high. Its weight is approximately 1150 pounds. Transformers and other heavy units are mounted on the cabinet floor. R-f and audio stages are housed in separate chassis that are designed for ease of servicing and maintenance. These two chassis are mounted on the right and left sides respectively, as viewed from the front of the cabinet. The power amplifier plate circuit and r-f output network are housed in a single shielded compartment that is suspended from the roof of the transmitter cabinet. The entire back panel of this r-f compartment is easily removable, providing ready access to the components within. A shelf extending the width of the cabinet holds the rectifier tubes and small transformers. All tubes are easily visible through the large window.

A small removable panel on the lower front of the transmitter allows access to power input terminals and control relays. The large doors at the rear of the cabinet allow access to the upper part of the transmitter for servicing and maintenance. The rear lower half of the transmitter is covered by a removable panel which contains the permanent-type air filter.

All meters are mounted on a single illuminated panel. Their location allows operation of tuning controls while observing meter indications. The four bolts which secure the meter panel fit into slotted holes that allow the panel to be tilted to the desired angle.

Operating controls are conveniently located on the front of the cabinet. Circuit breakers and filament and plate switches are mounted on the left and right sides of the cabinet below the front window. Other controls and switches are mounted behind small vertical access doors located on each side of the front window. As shown in figure 6-11, the right-hand door provides access to the crystal-selector switch, the crystal-frequency trimmers, the audio hum control, the PA drive control, the r-f driver tank trimmers, the first buffer tank trimmers, the power amplifier tuning control, and the power amplifier loading control. The latter two control position the tuning capacitor and loading capacitor by means of flexible drive shaft assemblies. Access to the multimeter switch, the power change switch, the modulator bias adjustments, and the other audio hum control is provided through the left-hand door.

Ventilating air is drawn through a cleanable bronze air filter by a low speed, high volume fan. The air cools the entire transmitter and is exhausted through a shielded opening in the roof of the cabinet. Individual blowers supply air directly to R-F Final and Modulator tubes.

The description and function of each part is included in the parts list in Section 5 of this book. section 3, Operation, lists the function of all controls.

1.2. GENERAL DESCRIPTION OF R-F SECTION

As a result of major advances in crystal stability and oscillator design, the crystal oven and its associated thermostats, relays and other controls have been eliminated. A highly-perfected oscillator design in conjunction with extremely stable, low-temperature-coefficient crystals has resulted in exceptionally good frequency stability. There are provisions for mounting two crystals on the r-f chassis, with one of the two always available in standby position. Crystals are easily selected by means of the crystal switch located behind the right-hand control panel.

All r-f circuits of the 20V-2 transmitter are straightforward and trouble free. A 6AU6 oscillator and 6SJ7 buffer are followed by an 807 which drives the parallel 4-400A tubes in the power amplifier. The oscillator, buffer and r-f driver plate circuits are contained within shielded plug-in units located behind the right front access door. For frequencies in the AM broadcast band, the oscillator employs a resistive load. As the 20V-2 transmitter is also available for high-frequency applications, provisions are included for replacing the resistor with a tuned tank circuit for frequency doubling. A frequency monitor connection is brought out from the grid circuit of the power amplifier. A resistor in the cathode circuit of the power amplifier acts as a low-impedance source for feeding an audio monitor speaker or amplifier.

The r-f output network consists of a pi section followed by an L-section and is designed to feed into impedances between 50 and 72* ohms. Harmonics are greatly attenuated in this network. There is a minimum of fundamental-frequency loss between the power amplifier and transmission line. Coil L-110 acts as a static drain and as a voltage source for feeding the modulation monitor. This coil is connected from the output end of the L-section to ground.

1.3. GENERAL DESCRIPTION OF AUDIO SECTION

The audio driver employs 6SJ7 pentodes in a push-pull amplifier circuit. The input to the audio system consists of a terminating pad that feeds the primary of the audio input transformer. An audio hum control is connected in the cathode circuit of the modulator. Type 4-400A tubes are used in the push-pull class AB₁ modulator. Approximately 12 db of feedback is provided from plates of the modulator tubes to grids of the first audio stage.

*Other impedances are available on special order.

1.4. GENERAL DESCRIPTION OF POWER SUPPLIES

There are separate power supplies for high voltage, low voltage, and bias. The high-voltage supply employs two type 575A half-wave mercury-vapor rectifiers in a full-wave circuit. It supplies d-c voltage for the plates of the modulators and the plates and screens of the power amplifier tubes. The low-voltage supply uses two type 866A half-wave mercury vapor rectifiers in a full-wave circuit to provide d-c voltage for plates and screens of the low power stages and screens of the modulator tubes. The bias supply employs a 5U4G high-vacuum rectifier in a full-wave circuit. It supplies bias to the r-f driver, modulator, and power amplifier tubes.

Overload protection is provided by magnetically-operated circuit breakers, by fuses in the primaries of the filament, low voltage, and bias transformers and by individual overload relays in the cathode circuits of the power amplifier and modulator. Instantaneous power change is accomplished by rotating the power-change switch inside the left-hand access door.

A thermal time delay is included in the control circuit to prevent application of plate voltage before the filaments reach operating temperature. A unique feature of this circuit is its ability to automatically select the proper time delay interval after short power interruptions. Instantaneous interruptions cause no delay in returning to the air.

Dual interlocks, both electrical and mechanical, are incorporated on each of the rear doors to provide double protection to personnel. Electrical interlocks of the split V-type open the primary circuits of the high and low voltage transformers whenever the rear doors are opened. The mechanical interlocks close, grounding the high-voltage circuits, after the electrical interlocks have opened the primary circuits.

Table 1-1. 20V-2 Transmitter Specifications

Power Output	250/500/1000 watts
R-F Output Impedance	50/72 ohms
Audio Input Impedance	600/150 ohms
Audio Input Level	+10 dbm $\pm$ 2 db, pad input
Audio Response	$\pm$ 2.0 db from 50 to 10,000 cps
Audio Distortion	Less than 3.0% from 50-7500 cps for 95% modulation including all harmonics up to 16 kc
Carrier Shift	Less than 3%
Residual Noise Level	60 db below 100% Modulation
Power Source	230/208 volts 50/60 cps single phase
Power Demand	Approximately 4.15 kw, 83% pf, at 100% modulation

Table 1-1. 20V-2 Transmitter Specifications (Cont.)

Temperature Range	+15°C (59°F) to 45°C (113°F)
Altitude Range	Sea level to 6000 feet
Weight	Approximately 1150 pounds
Dimensions	38" wide, 76" high, 27" deep

Table 1-2. Tube Complement

Item Number	Tube Type	Function
V-101	6AU6	Oscillator
V-102	✓ 6SJ7	Buffer Amplifier
V-103	✓ 807	R-F Driver
V-104	4-400A (8438)	Power Amplifier
V-105	4-400A	Power Amplifier
V-106	✓ 6SJ7	Audio Driver
V-107	✓ 6SJ7	Audio Driver
V-108	4-400A (8438)	Modulator
V-109	4-400A (8438)	Modulator
V-110	20V-2/5AV 5U4G (5U4G) ✓	Bias Rectifier
V-111	(1N 2637) S-575-A 575A ✓	HV Rectifier
V-112	(1N 2637) S-575-A 575A ✓	HV Rectifier
V-113	(1N 2637) 866A ✓	LV Rectifier
V-114	(1N 2637) 866A ✓	LV Rectifier