

20 V 500/1000 WATT AM BROADCAST

TRANSMITTER

INSTRUCTION BOOK

INSTRUCTION BOOK
FOR
20V 500/1000 WATT AM BROADCAST
TRANSMITTER

MANUFACTURED BY
COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA

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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 in Cedar Rapids, Iowa, transportation prepaid, provided that the foregoing shall not be applicable to:

- (a) Equipment or accessories as to which notice of the claimed defect is not given Collins within one year from date of delivery;
- (b) Equipment and accessories manufactured by others than Collins, tubes and batteries, all of which are subject only to such adjustment as Collins may obtain from supplier thereof;
- (c) Equipment or accessories which shall fail to operate in a normal or proper manner due to exposure to excessive moisture in the atmosphere or otherwise after delivery, any such failure not being deemed a defect within the meaning of the foregoing provisions.

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.

Notice of any claimed defect must be given to Collins prior to return of any item. Such notice must give full information as to nature of defect and identification (including part number if possible) of part considered defective. Upon receipt of such notice, Collins will promptly advise respecting return of equipment. Failure to secure our advice prior to the forwarding of goods for return may cause unnecessary delay in the handling of such merchandise.

No other warranties, expressed or implied, shall be applicable to said equipment, 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 cause.

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:

Address: Collins Radio Company
Sales Service Department
Cedar Rapids, Iowa

Information Needed:

- (A) Quantity required
- (B) Part number of item
- (C) Item number (obtain from Parts List or Schematic Diagram)
- (D) Type number of unit
- (E) Serial number of unit
- (F) Serial number of equipment

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. 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) Date of delivery of equipment
- (B) Date placed in service
- (C) Number of hours in service
- (D) Part number of item
- (E) Item number (obtain from Parts List or Schematic Diagram)
- (F) Type number of unit from which part is removed
- (G) Serial number of unit
- (H) Serial number of the complete equipment
- (I) Nature of failure
- (J) Cause of failure
- (K) Remarks

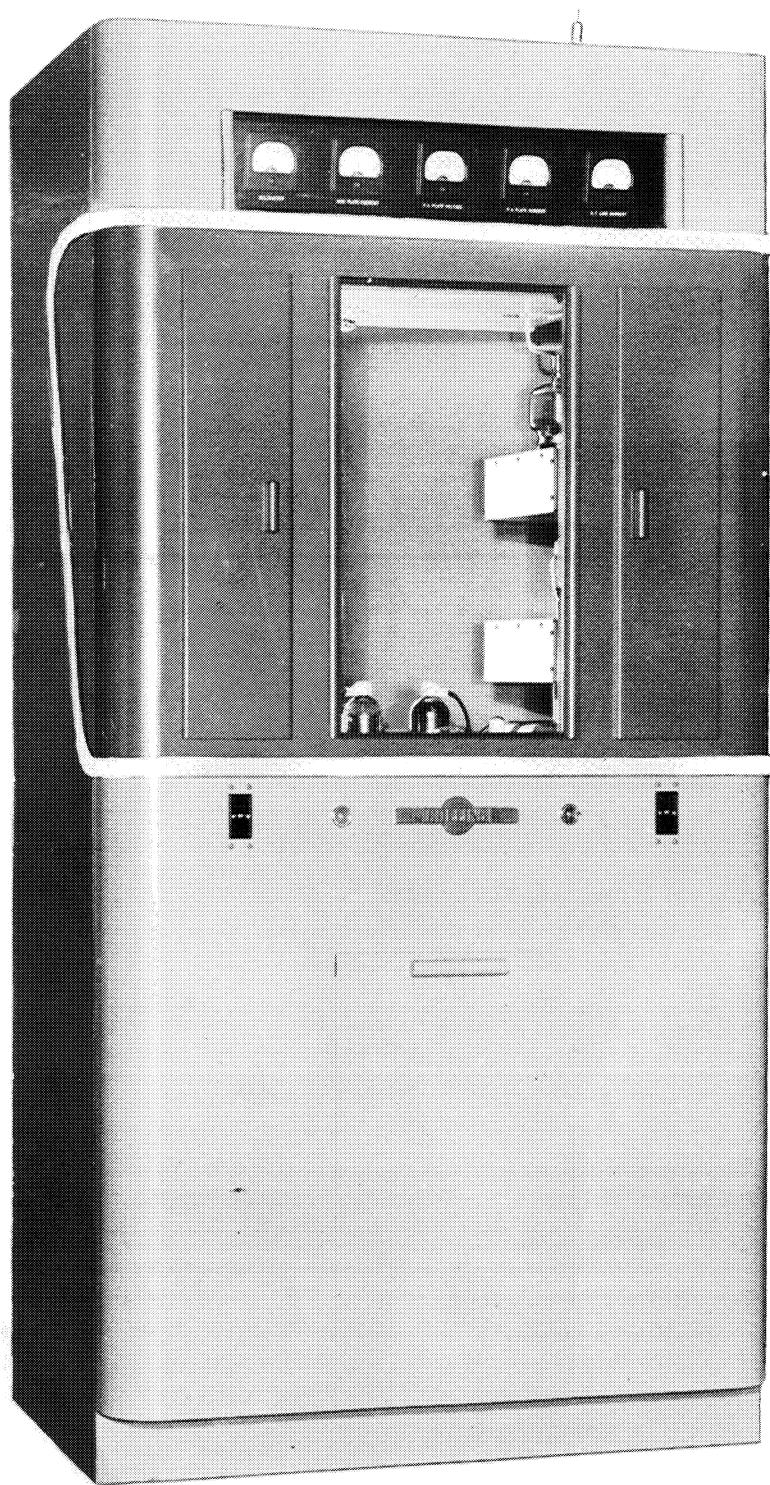


FIGURE I-1 COLLINS 20V 1000 WATT AM TRANSMITTER

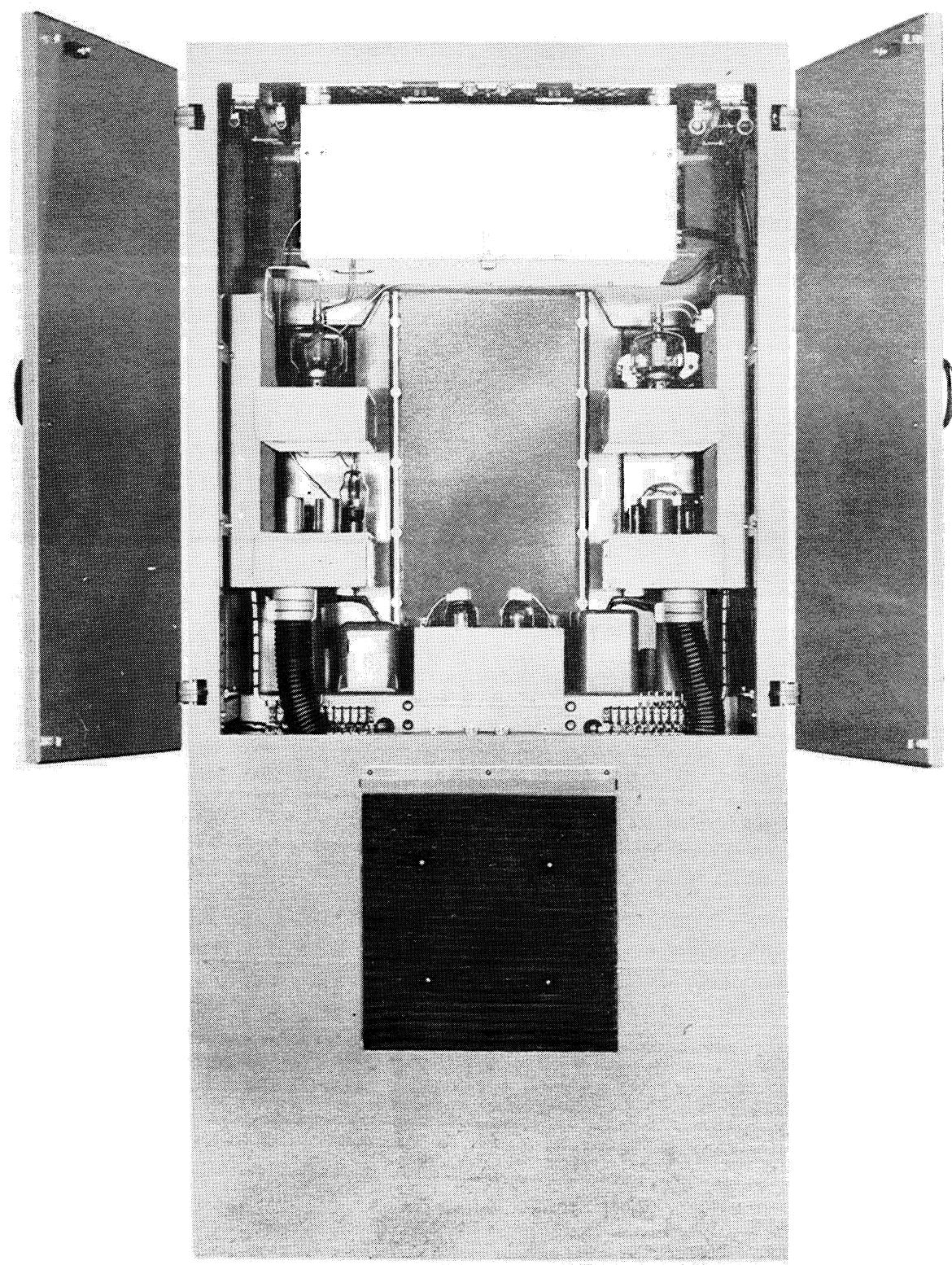


FIGURE 1-2 COLLINS 20V TRANSMITTER REAR VIEW

SECTION 1

GENERAL DESCRIPTION

1.1. GENERAL.

The Collins Type 20V 500/1000 Watt AM Transmitter, figure 1-1, has been designed particularly for high fidelity broadcast service. Advanced engineering techniques and new high quality components have combined to produce a transmitter which provides outstanding features designed to meet today's demand for better service from modern broadcast equipment.

1.2. MECHANICAL DESCRIPTION.

1.2.1. GENERAL. - The entire 20V transmitter is housed in one heavy gauge sheet metal cabinet neatly styled for impressive appearance. The complete equipment occupies a space 27" deep by 38" wide by 76" high. Its weight is approximately 1150 pounds. The heavier components, such as transformers, chokes and reactors are mounted on the floor of the transmitter cabinet. The audio and rf stages are housed in separate chassis which are designed for ease of servicing and maintenance. The two chassis are mounted on the right and left side respectively, as viewed from the rear of the cabinet. The amplifier plate circuit and the output network of the 20V are housed in a single shielded compartment which is suspended from the roof of the transmitter cabinet. The entire back panel of this rf compartment is easily removable providing access to the components within. The smaller transformers and the rectifier tubes are mounted on a power shelf which extends the width of the cabinet and which is located immediately behind the front panel of the transmitter. All tubes are easily visible through the large clear glass window on the front of the transmitter.

A removable panel on the lower front of the transmitter allows access to the power input terminals and the control relays. Two large rear doors, extending approximately 1/2 the length of the cabinet, allow access to the cabinet for servicing and maintenance. The lower half of the rear of the transmitter cabinet is covered by a removable panel which contains the permanent type air filter. Dual interlocks, both positive electrical and automatic mechanical in nature, are incorporated on both of the rear doors providing double protection to personnel. The electrical interlocks, which are 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 are designed to operate after the electrical interlocks have functioned. They ground the high voltage bus and discharge the high voltage filter capacitors.

All meters are mounted on a single illuminated panel which is located immediately above the window on the front of the cabinet. Their location enables operating personnel to operate the tuning controls while

observing the meter indications. The four bolts which secure the meter panel fit into slotted holes which allow the panel to be tilted at various angles.

1.2.2. CONTROL SYSTEM. - All operating controls for the 20V transmitter are conveniently located on the front of the cabinet. The FILAMENT ON-OFF and the PLATE ON-OFF switches are toggle type magnetically operated circuit breakers which are mounted on the left and right sides of the center of the cabinet, as viewed from the front, and immediately below the front window. The remainder of the controls and switches are mounted behind small vertical access doors which are located on either side of the front window. The right hand door provides access to the Crystal Selector Switch, the Crystal Frequency Trimmers, the Audio Hum Controls, the PA TUNING and the PA LOADING controls. The latter two controls position the variable tuning and loading capacitors by means of a flexible shaft drive assembly. The left hand door provides access to the MULTIMETER switch, the POWER CHANGE switch, the Modulator Bias Adjustments and the Audio Balance Control.

1.2.3. VENTILATION. - The necessary air for ventilating the 20V is drawn into the cabinet through a permanent type bronze air filter by means of a low speed, high volume blower. The entire cabinet is forced air cooled by means of the blower and in addition, the rf and audio chassis are pressurized by means of flexible air ducts leading directly from the blower. The air is exhausted through a shielded opening in the roof of the transmitter cabinet. The RF tank box acts as a dust baffle to prevent dust and dirt from settling into the cabinet during the periods the transmitter is not in operation.

1.3. ELECTRICAL DESCRIPTION.

1.3.1. GENERAL. - The 20V transmitter is provided with overload protection by means of the two magnetically operated circuit breakers associated with the FILAMENT ON-OFF switch and the PLATE ON-OFF switch. Further overload protection is afforded by means of fuses in the primary circuits of the filament, high voltage filament, low voltage, and bias supply transformers. A thermal time delay is provided in the filament circuits to preclude any possibility of energizing the low voltage and high voltage circuits before the filaments reach operating temperature.

Instantaneous power change is accomplished by simply rotating the POWER CHANGE switch inside the left hand access door on the front of the cabinet.

1.3.2. POWER SUPPLIES. - Excluding the filament supply, the 20V transmitter employs three power supplies: the high voltage, the low voltage, and the bias supply. The high voltage supply employs two type 872A half wave mercury rectifiers in a single phase full wave circuit. It furnishes the dc voltage for the plates of the Modulator and the plates and screens of the Power Amplifier tubes. The low voltage supply employs two type 866A half wave mercury rectifiers in a single phase full wave circuit. It furnishes the dc voltage for the plates and screens of the low power stages as well

as the dc voltage for the screens of the modulator tubes. The bias supply employs a single type 5U4G full wave high vacuum rectifier in a single phase full wave circuit. It furnishes bias to grids of the RF Driver, the Modulator and the Power Amplifier tubes.

1.3.3. AUDIO CIRCUITS. - The audio system in the 20V employs type 6SJ7 pentode tubes connected as push-pull triodes for the 1st Audio Amplifier and the Audio Driver stages. The Modulator stage employs two type 4-250A's operating in push-pull Class AB₁. A feedback loop to provide stability and noise reduction, is incorporated from the plates of the 4-250A's to the grids of the 6SJ7 1st Audio Amplifier.

1.3.4. R-F CIRCUITS. - The rf circuits of the 20V transmitter are straight-forward circuits employing a type 6AU6 tube as the Oscillator, a type 6SJ7 tube as the Buffer, a type 807 tube as the RF Driver and two 4-400's in parallel as the Power Amplifier. The output network, consisting of a pi-section followed by an L section, is designed to feed into impedances between 50 and 72* ohms, and to provide a high degree of harmonic attenuation with minimum loss between the Power Amplifier and the transmission line.

The Oscillator, Buffer, and RF Driver plate circuits are contained within shielded, plug-in type units. They are easily removed or plugged into their respective sockets which are located behind the right front access door.

As a result of major advances in crystal stability and oscillator design, the 20V transmitter has eliminated the use of a crystal oven and its associated thermostats, relays and other controls. The highly perfected oscillator design in conjunction with new extremely stable, low temperature coefficient crystals has resulted in exceptionally good frequency stability. The 20V has provisions for mounting two crystals, with one of the two always available in a stand-by condition. The crystals are easily switched by means of the Crystal Selector switch located behind the lower inset panel on the right hand control panel.

Provisions have been made for frequency and modulation monitoring connections as well as a direct monitor speaker connection to allow on-the-air monitoring. A monitor amplifier may also be fed from this system.

1.4. SPECIFICATIONS.

- (a) Power Output - 1000/500 watts.
- (b) Audio Input Impedance - 600/150 ohms.
- (c) R-F Output Impedance - 50/72 ohms.
- (d) Power Source - 208/230 volts single phase, 50/60 cps.
- (e) Power Demand - Approximately 4.15 kw at a power factor of 83% with 100% modulation.

* Other impedances are available.

- (f) Weight - Approximately 1150 pounds.
- (g) Dimensions - 38" wide, 76" high, and 27" deep.

SECTION 2

INSTALLATION

2.1. INSTALLATION.

2.1.1. PRELIMINARY.

(a) Unpacking. - Caution should be used when uncrating the transmitter and components to avoid damage to the equipment. All units should be inspected carefully. Inspect units for loose screws and bolts. Check all controls such as switches, etc., for proper operation as far as can be determined without the application of power. Inspect all cables and wiring and make sure all connections are tight and clear of each other and of the chassis. All claims for damage should be filed promptly with the transportation company.

(b) Location of the Transmitter. - It is recommended that the transmitter be placed in its permanent location before any of the units which were removed for shipping are replaced. The comparatively simple arrangement to accommodate the power and audio input, frequency monitoring, modulation monitoring and audio monitoring connections is illustrated in figure 2-1. The requirements of the illustration may be met by installing the necessary conduit in a concrete floor, or by installing a wiring trench of sufficient size. Another alternative would be to install a false floor under which the necessary wires and cables may be placed. The trench will have to accommodate a two wire power cable, a ground wire, two shielded twisted pairs, and two RG-8/U coaxial cables. It is also very desirable to have several ties from the transmitter cabinet to the building ground system.

Adequate clearance should be allowed in front of the transmitter for the operator to adjust the controls. There should be a clearance of 3-1/2 to 4 feet behind the unit to provide adequate ventilation and sufficient room to remove or install the units.

- (c) Replacement of Units Removed for Shipping.