COLLINS

30K-1

AMATEUR TRANSMITTER

THIRD EDI

INSTRUCTION BOOK

INSTRUCTION BOOK

for

30K-1 AMATEUR TRANSMITTER

Manufactured By

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

520 9375 00

GUARANTEE

This radio equipment, which you have purchased, is licensed only for amateur use and shall carry the following guarantee provided notice of the purchase of the equipment with identifying serial numbers and date of purchase is given Collins promptly, and in any event within nine (9) months following delivery of the equipment to the dealer.

> "Guarantee. Radio transmitters are guaranteed to deliver their full rated radio frequency power output at the antenna lead (s) when connected to a suitable load, but such guarantee shall not be construed as a guarantee of any definite coverage or range. Collins Radio Company agrees to repair or replace, without charge, any equipment, accessories or parts manufactured by or for Collins Radio Company on its specifications which are defective as to design, workmanship or material, and which are returned to Collins Radio Company at its factory in Cedar Rapids, Iowa, transportation charges paid, within a period of ninety (90) days from the date of delivery by the Company or its authorized dealer."

Before returning any item believed to be of defective material, workmanship or manufacture, a detailed report must be submitted to the Company giving exact information as to the nature of the defect. The information shall include, in as much detail as possible, all subject material listed under instructions for replacement of parts. Upon receipt of the report by the Company, and if considered justified, a returned equipment tag will be forwarded to the shipper without delay. The returned equipment tag must accompany all shipments of defective parts. No action will be taken on any equipment returned to the Company unless the shipment includes the return tag.

REPLACEMENT OF PARTS

In case a replacement under the guarantee is desired, a full report must be submitted to the company. This report shall cover all details of the failure and must include the following information:

(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 complete equipment.
(I) Nature of failure.
(J) Cause of failure.
(K) Remarks.

When requisitioning replacement parts, the following information must be furnished:

(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.

LIST OF ILLUSTRATIONS

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION 1

GENERAL DESCRIPTION

1.1. GENERAL.

This instruction book has been prepared to assist in the proper installation, adjustment, operation, and maintenance of the Collins Type 30K Radio Transmitting Equipment.

The Type 30K Transmitting Equipment, figure 1-1, is a transmitter designed to fulfill the communication requirements of a modern amateur radio station. The unit embodies features which follow the trend of operating practices necessitated by increasingly strict governing regulations and well populated amateur band conditions. Among these features are: Complete coverage of the 80, 40, 20, 15, 11 and 10 meter bands (The 15 meter band is unauthorized at present.); quick band-change by means of switches; continuous frequency coverage within the amateur bands by means of a highly stabilized master oscillator; frequency calibration within one kc on 40 meters; a speech clipper to prevent overmodulation; and an audio response especially effective in speech communication.

Other features of the 30K Transmitter are: high efficiency; modern tubes and circuits; adequate metering; conservative ratings; safety door interlock switch; CW Sidetone oscillator, CW receiver muting and remote control from the operating position. The Collins Type 310A Exciter Unit, furnished with the equipment, is designed for mounting on the operating table near the operator. With the exception of the filament switch, all controls necessary for turning the equipment on and off are located on the exciter unit front panel.

The transmitter contains antenna tuning equipment which is capable of coupling the power amplifier plate circuit to an untuned transmission line of any impedance or to a tuned line of any multiple of a quarter wave in length. It will also function to couple the transmitter into an unbalanced antenna such as the Marconi, end fed Hertz or end fed Zepp. Antenna tuning and loading controls are located on the front panel. Three pairs of antenna terminals are provided and by connecting jumpers in the BAND switch the bands may be paired up as desired or all bands may be connected to one pair of antenna terminals.

An extra switch section is placed on the power amplifier grid band switch which can be used to operate antenna relays, etc., automatically when the band is changed.

1.2. MECHANICAL DESCRIPTION.

1.2.1. OVERALL DIMENSIONS.

(a) 30K Transmitter Unit. - 21-7/8" wide x 66-1/2" high x 18-15/16" deep including control knobs on front and door handle and antenna feedthrus on rear.

(b) 310A Exciter Unit. - 17-1/4" wide a 10-11/16" high x 13-7/16" deep including control knobs on front.

1.2.2. WEIGHT.

(a) 30K Transmitter Unit. - 355 lbs.

(b) 310A Exciter Unit. - 50 lbs.

1.2.3. FINISH. - Both the transmitter unit, figure 1-2, and the exciter unit, figure 1-3, are finished in St. James Gray wrinkle finish with polished stainless steel trim.

1.2.4. CONSTRUCTION. - The Cabinet of the 30K Transmitter Unit is constructed of heavy sheet steel plates formed and welded together. Access to all units is through a full length rear door. Access to the tubes in the Model 310A Exciter Unit is through a hinged top cover.

1.3. ELECTRICAL DESCRIPTION.

1.3.1. GENERAL. - High overall operating efficiency is attained by the use of tetrode and beam power tubes throughout the equipment, where applicable, and by the use of Class B, high level, amplitude modulation. A power input of 375 watts phone or 500 watts CW is possible on all bands. A speech clipper is incorporated in the audio section so that sideband power can be greatly increased without overmodulation. Frequency control is obtained by the use of a highly stabilized, accurately calibrated master oscillator.

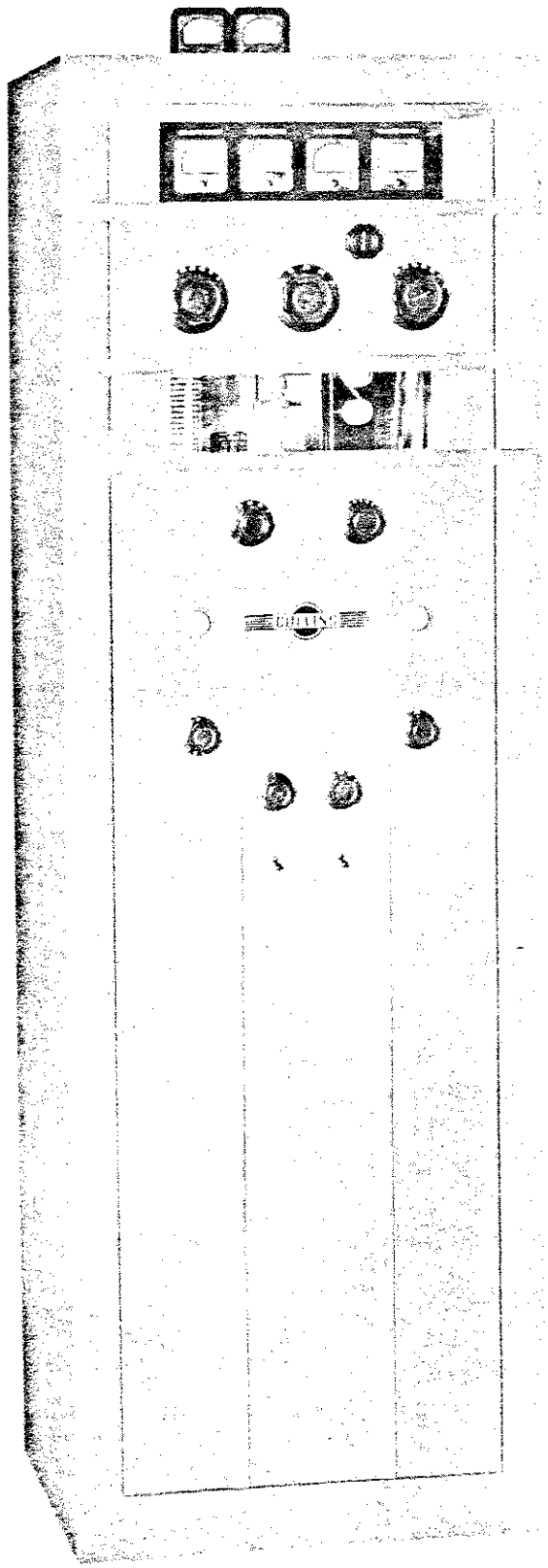
1.3.2. RADIO FREQUENCY SECTION.

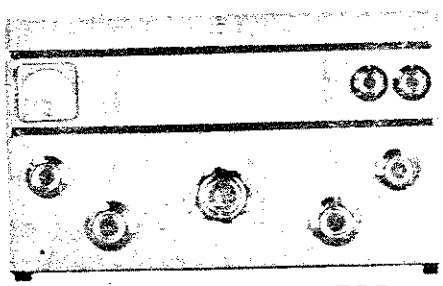
(a) Exciter Unit. - The master oscillator, which is heavily shielded and temperature compensated, employs a Type 6SJ7 radio tube. The grid circuit of the master oscillator tube is permeability tuned by a powdered iron slug. The master oscillator tuning control is ganged to the frequency multiplier tuning controls and is operated by the main tuning control which is calibrated to within .015 per cent. Following the master oscillator tube is a Type 6AG7 tube in an untuned stage which operates on the same frequency as the master oscillator and isolates the oscillator from the frequency multiplier stages.

Following the Type 6AG7 untuned stage is the first tuned doubler amplifier. This stage employs a Type 6AG7 tube also and is tuned to the 80 meter band or twice the frequency of the master oscillator by a variable capacitor ganged with the master oscillator tuning control.

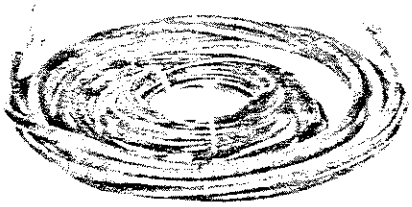
The frequency multiplier stage, a Type 807 beam amplifier tube, is tuned to 80, 40, 30, or 20 meters, as needed, by a variable capacitor and coils selected by a tap switch. The third r-f stage is always used as a doubler except when the final amplifier is operating in the 80 meter band, in which case, the third stage works straight through on 80 meters. The variable capacitors employed to tune the second and third r-f stages are ganged with the master

MODEL 30K TRANSMITTER





MODEL 310A EXCITER



CONNECTING CABLES

MICROPHONE 425 0018 00
RF CONNECTING..... 503 0907 002
POWER INTERCONNECTING....
... 503 6655 002

FIGURE 1-1 COMPLETE INSTALLATION

oscillator tuning control. Excitation of the grid of the power amplifier tube in the 30K unit is accomplished by pick-up coils coupled to the second multiplier plate coils and connected to a small coaxial transmission line which connects to the grid circuit of the power amplifier tube. The transmitter is keyed by blocking the grids of the isolation buffer stage and the first doubler stage. All subsequent stages including the power amplifier stage are biased to plate current cut off with no excitation. A keying sidetone oscillator is built into the 310A-3 unit.

(b) Transmitter Unit. - Excitation from the second multiplier stage in the exciter unit is carried through a coaxial transmission line and coupled to the power amplifier grid circuit which is tuned to the transmitting frequency. The amount of excitation is controllable from the front panel of the 310A-3 unit. Band switching by means of tap switches is employed in the grid and plate circuits of the power amplifier.

1.3.3. AUDIO SECTION.

(a) Transmitter Unit. - All audio circuits, which consists of voltage amplifier, speech clipper, high frequency filter, driver and modulator circuits, are located in the transmitter unit. Any high impedance microphone, such as crystal microphone or high impedance dynamic, may be used. The microphone cable connects directly into the rear of the speech amplifier unit in the transmitter.

A Type 6SJ7 and one section of a Type 6SN7 dual triode tube provide audio voltage amplification. A type 6H6 dual diode tube is employed in a clipper circuit to clip both positive and negative audio peaks at a predetermined level to provide greater sideband power without overmodulation. All high, less useful speech frequencies are attenuated by a cut-off filter designed for 4000 cps cut-off. A Type 6B4G tube is used to drive the grids of the Type 75TH modulator tubes. The modulators are capable of modulating the r-f carrier 100% with an audio response which is within 3 db from 100 to 4000 cps.

1.3.4. ANTENNA COUPLING. - Because of the great variety of antennas in use in amateur stations an extremely flexible antenna coupling circuit has been incorporated in the transmitter. To meet the complete frequency coverage requirements, it was found advisable to use plug-in units in the antenna tuning apparatus Any type of antenna or transmission line can be tuned with the two plug-in units supplied. Both the tuning and the loading are controllable from the front panel. Either series or parallel tuning can be had with any value of inductance. The ends of the antenna coil are connected to a pair of rotor contacts in the power amplifier plate band switch, the stator contacts of which can be connected to any one of three pairs of antenna terminals. These stator contacts can be jumpered to get any combination of antenna terminals desired, however, all are jumpered together and connected to the center pair of antenna terminals when shipped from the factory. An extra switch section is placed on the power amplifier grid band switch which can be used to operate antenna relays, etc., automatically when the band is changed.

1.4. ACCESSORIES.

The Model 30K amateur transmitter is supplied complete with tubes, fuses

and interconnecting cables. It will be necessary to have the following apparatus in order to complete the transmitting installation:

1.4.1. Any high impedance microphone such as a crystal or high impedance dynamic.

1.4.2. A telegraph key.

1.4.3. A suitable radiating system.

1.4.4. A 115 volt 60 cps power source capable of 1350 watts continuous load.

1.5. REFERENCE DATA.

1.5.1. LIST OF MAJOR UNITS.

MAJOR UNIT	SUB ASSEMBLY	DESCRIPTION
30K (520 3507 00)		TRANSMITTER UNIT
	520 3508 00	Power amplifier tank assembly
	520 2886 00	Power amplifier chassis assembly
	520 2887 00	Speech amplifier assembly
	520 2888 00	L-V Bias assembly
	520 2889 00	H-V Rectifier assembly
	520 3509 00	80 - 40 meter ant tank coil
	520 3510 00	20 - 15 - 10 meter ant tank coil
310A (520 4014 00)		EXCITER
503 6655 002		TRANSMITTER-EXCITER INTERCONNECTING CABLE
503 0907 002		COAXIAL RF CABLE (23.5 ft)
425 0018 00		MICROPHONE CABLE

1.5.2. FREQUENCY RANGE. - 10, 11, 15, 20, 40 and 80 meter amateur bands. (The 15 meter band is unauthorized at this time.)

1.5.3. FREQUENCY CONTROL. - Highly stabilized variable frequency oscillator.

1.5.4. TYPES OF EMISSION. - Amplitude modulated phone and CW. 100% modulation of carrier possible.

1.5.5. NOMINAL CARRIER OUTPUT. - 250 watts phone, 300 watts CW.

1.5.6. POWER REQUIREMENTS. - With a 115 volt 60 cps power source the following power is required: (Power amplifier loaded to 200 ma CW and 150 ma phone.)

CONDITIONS	CURRENT (AMPS)	POWER (WATTS)	V.A.	POWER FACTOR
Filaments ON, CW	1.75	140	202	70.0
Filaments ON, Phone	2.32	250	267	94.0
Carrier ON, CW	10.0	1000	1150	87.0
Carrier ON, Phone	10.2	1025	1175	87.5
Carrier ON, Phone 100% continuous modulation	10.5	1350	1555	87.0

1.5.7. INPUT IMPEDANCE (MICROPHONE). - High impedance dynamic or crystal.

1.5.8. OUTPUT IMPEDANCE (ANTENNA). - Any antenna impedance which has little reactance.

1.5.9. AMBIENT TEMPERATURE RANGE. - 0 degrees C (32°F) to 40 degrees C (104°F).

1.5.10. KEYING SPEED. - 75 WPM.

1.5.11. AUDIO CHARACTERISTICS.

(a) Response. - Within 3 db from 100 to 4000 cps. A cutoff filter is used to attenuate all frequencies above 4000 cps.

(b) Amplitude Distortion. - Less than 10% total RMS harmonic distortion (clipper tube removed) up to 100% modulation at 1000 cps.

1.6. VACUUM TUBE COMPLEMENT.

1.6.1. 310A EXCITER UNIT.

SYMBOL	TYPE	FUNCTION
V001	6SJ7	Master oscillator
V601	6AG7	Isolation buffer
V602	6AG7	Frequency doubler
V603	807	Frequency multiplier
V604	807	Frequency doubler
V605	VR105	Voltage regulator
V606	VR105	Voltage regulator
V607	6SL7	Sidetone oscillator
V608	VR150	Voltage regulator
V609	VR150	Voltage regulator

1.6.2. 30K TRANSMITTER UNIT.

SYMBOL	TYPE	FUNCTION
V201	4-125A	Power amplifier
V301	6SJ7	Audio amplifier
V302	6SN7	Dual audio amplifier

SYMBOL	TYPE	FUNCTION
V303	6H6	Speech clipper
V304	6B4G	Audio driver
V305	75TH	Modulator
V306	75TH	Modulator
V401	5R4GY	Bias rectifier
V402	5R4GY	LV rectifier
V501	866A	HV rectifier
V502	866A	HV rectifier

SECTION 2

THEORY OF OPERATION

2.1. MECHANICAL

2.1.1. GENERAL. - The complete 30K Transmitting Equipment consists of two units, the transmitter unitn nd the exciter unit. The transmitter unit is contained in a floor mounting cabinet while the exciter unit is constructed smaller for table mounting. Flexible interconnecting cables are employed between the two units.

The components of the transmitter unit are placed on removable chassis which are constructed of heavy gauge aluminum. All power and control wires between the various units are laced together in nicely formed cables. Connections to the units are made to terminal strips having insulating barriers between the individual screw terminals.

The exciter unit is constructed on an aluminum chassis contained within a steel cabinet which is suitable for table mounting.

The various chassis may be removed from the rear of the transmitter cabinet by removing the control knobs from units so equipped, removing the four bolts which secure the chassis to the mounting cleat, and disconnecting the cable from the terminal strip. (A set of Bristo wrenches is fastened to the rear door for loosening set screws in control knobs.) The transmitter cabinet is equipped with a full length rear door. A glass covered opening in the front panel allows a

continuous check on the color of the plate of the power amplifier tube. The meter panel is also behind a glass covered opening in the front panel thereby, in the interest of safety, making a completely dead panel. The antenna current meters are located externally at the top rear edge of the transmitter cabinet. This feature allows shorter connecting leads, making more accurate current readings possible.

2.2. ELECTRICAL.

2.2.1. GENERAL. - A master-oscillator-power amplifier circuit is employed in the 30K Transmitting Equipment to give 375 watts input to the final amplifier on phone and 500 watts input on CW. The final amplifier is high level amplitude modulated with Class "B" modulator tubes.

2.2.2. PRIMARY POWER CIRCUITS. - Refer to figure 2-1. The filament transformers T303, T403, T501 and T601 and the bias supply transformer T401 are energized when the FILAMENT switch S103 is closed. Each of the above transformers is protected by a fuse. The primary adjustment taps on filament transformer T403 are brought out to a tap switch S101 which is used to adjust the filament voltage to the PA and modulator tubes. High voltage plate transformer T101 is energized by the operation of plate power relay K401 which is operated when the PLATE switch is closed. Since operating voltage for the plate power relay coil is obtained from the bias power supply, the primary power cannot be applied to the high voltage transformer until the bias supply is operating thus preventing applying plate power to the power amplifier and modulator tubes when there is no fixed bias. A door switch, S105, operated by the rear access door also interlocks the high voltage power supply to prevent accidental shocks; however, since this unit operates with voltages which are extremely dangerous to life, interlock switches should not be depended upon when working on the unit, rather, completely disconnect the primary source of power by means of a conveniently located main power switch.

The TUNE-OPERATE switch S102 is provided with a large resistor in the TUNE position which reduces the primary power to the high voltage transformer during the tuning procedure. The PLATE power switch in the transmitter unit is interlocked with the POWER switch in the exciter unit in such a manner that the transmitter high voltage cannot be turned ON until the exciter plate power is turned ON.

The function of the exciter POWER switch is as follows:

POSITION NUMBER	POSITION NAME	FUNCTION
1	OFF	All transmitter plate and exciter plate and filament circuits inoperative. Receiver interlock circuit closed. (Does not remove transmitter filament power.)
2	CAL	Exciter plate and filaments operative. Receiver interlock circuit closed. Transmitter plate circuits inoperative.

POSITION NUMBER	POSITION NAME	FUNCTION
3	REC	All transmitter and exciter circuits inoperative. All filament circuits operative. Receiver interlock circuit closed.
4	SEND	All transmitter and exciter filament and plate circuits operative. Receiver interlock circuit open.

2.2.3. RADIO FREQUENCY SECTION.

(a) Exciter Unit. - A Type 6SJ7 tube is employed in a highly stabilized master oscillator circuit to generate the controlling radio frequency voltage. The oscillator circuit is compensated for temperature changes and is entirely enclosed in a heavy aluminum case. The oscillator grid operates in the 1.6875 to 2.0 mc frequency range. The oscillator plate output is in this same range. The oscillator grid circuit is permeability tuned with a powdered iron slug driven by a threaded shaft which is connected to the main tuning dial.

The output of the oscillator is coupled to the grid of a 6AG7 buffer stage. This stage is untuned and operates over the frequency range of the oscillator. The principal purpose of this stage is to isolate the master oscillator from the more powerful frequency multiplier stages which follow. Immediately following the isolation buffer stage is a tuned frequency-doubler employing a 6AG7 tube. This stage doubles the frequency of the oscillator in all cases.

The output of the 6AG7 doubler stage is coupled to an 807 frequency multiplier stage by capacitor C607. This stage doubles, triples, or quadruples the frequency as needed. It also operates straight-through when the transmitter output frequency is in the 80 meter band. To get to the 15 meter band, this stage triples the frequency from 80 meters to 30 meters from where the frequency is doubled to 15 meters by the following 807 frequency multiplier tube. The grid excitation to the 807 frequency doubler tube, which follows, is maintained at a nominal value by adding cathode bias to the 807 frequency multiplier tube by means of tap switch section, S601C-1, ganged to the band switch, which switches extra resistance in to the cathode circuit of the 807 frequency multiplier tube when a lesser amount of grid excitation to the 807 frequency doubler is needed. One section of the band switch selects the proper multiplier coil while another section of the band switch short circuits the unused coils.

Capacitor C115 couples the Type 807 frequency multiplier stage to the 807 frequency doubler stage. The 807 doubler stage is always used as a doubler except when the transmitter output is in the 80 meter band when it is used as an amplifier on the fundamental frequency. Two sections of the band switch are used in this stage, one to select the proper plate coil and one to short out the unused coils. Each output coil has a pick-up coil wound over it to pick-up the excitation power for the power amplifier grid. This pick-up coil is selected by a section of the band switch.

Both 807 tubes have some fixed bias provided by the bias power supply in the transmitter. Additional bias is obtained by the use of grid leak resistors in the

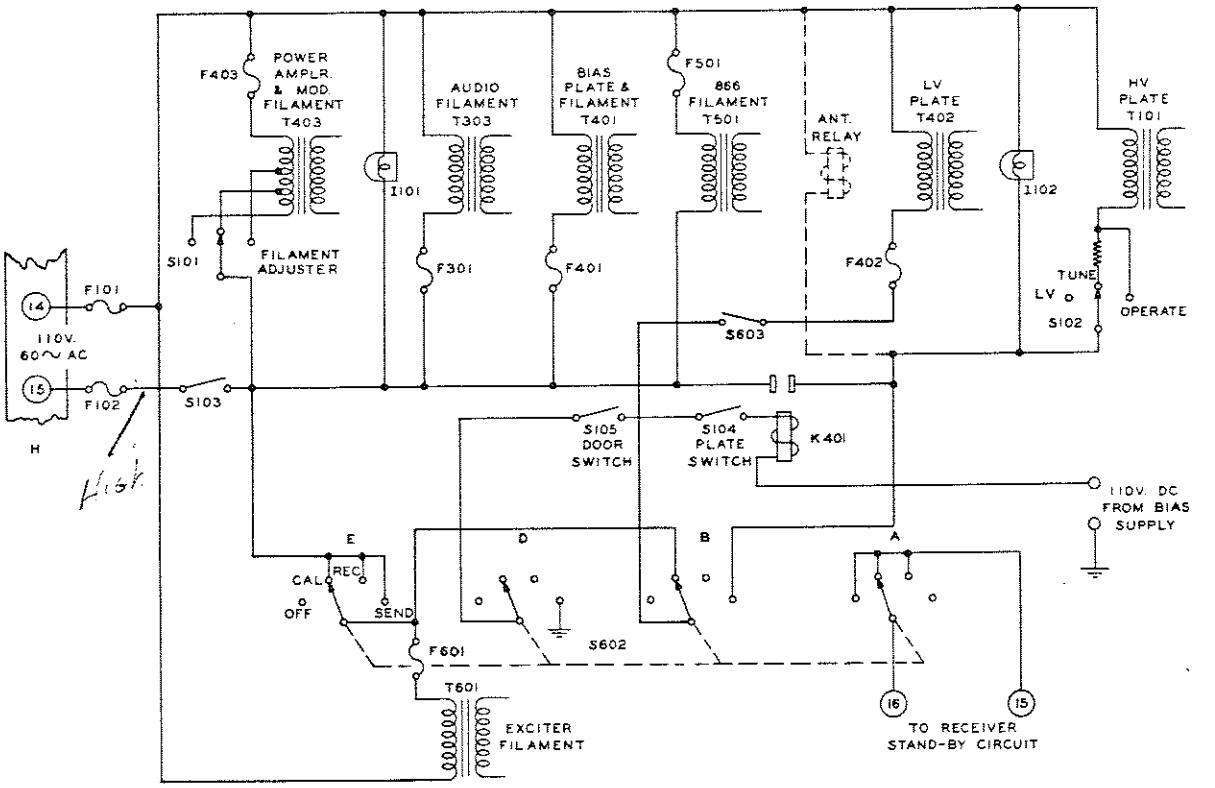


Figure 2-1 Primary Power Circuits

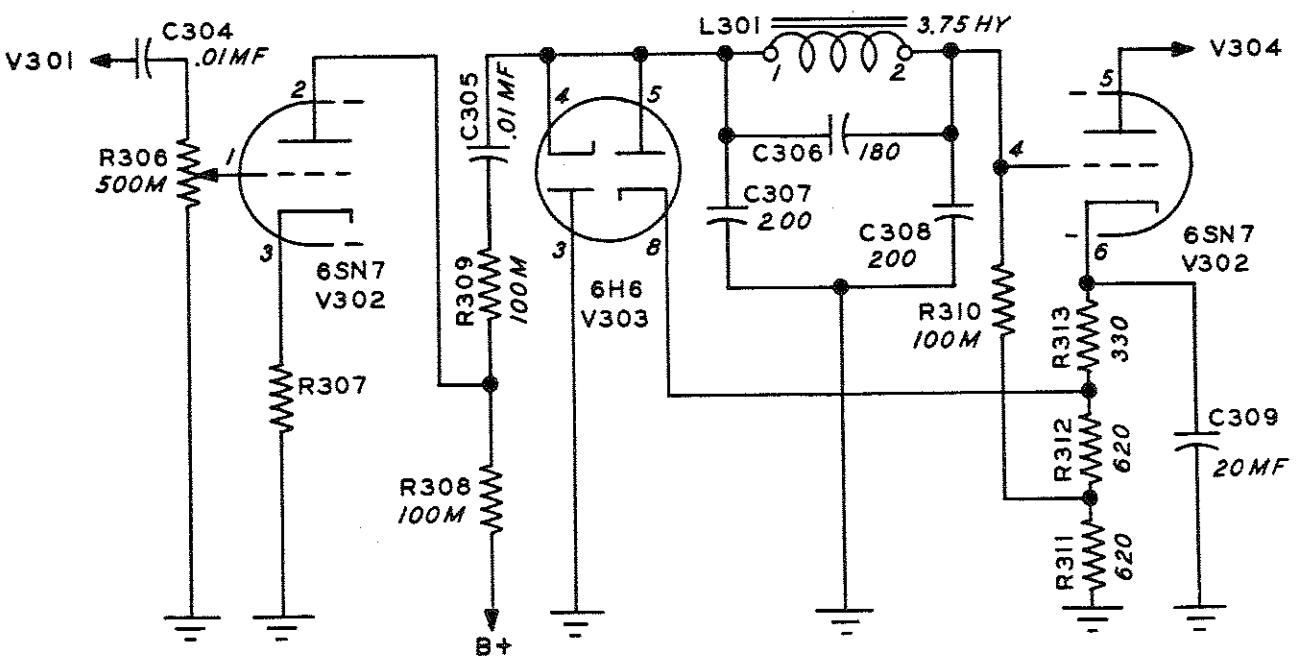


Figure 2-2 Speech Clipper Circuit

grid circuits of both tubes and by cathode resistors in the case of the multiplier tube. Excitation to the power amplifier is controlled by a potentiometer in the screen lead of the output 807.

Plate voltage to all stages in the exciter unit is furnished by a step-up transformer and a 5R4GY high vacuum rectifier. Filament power for all exciter tubes is obtained from a filament transformer T601. The primary circuit of T601 is fused for protection against short circuits. CW Sidetone is obtained through the use of a 6SL7 dual triode in an audio oscillator circuit. One section of the 6SL7 receives plate voltage from the low voltage supply while the other section gets its plate voltage from the voltage drop across the cathode resistor of the frequency multiplier stage which is keyed on CW.

Bias for muting a 75A receiver multiplier stage when the key is down is also obtained from the voltage drop across the frequency multipliers cathode resistor.

(b) Transmitter Unit. - The power amplifier for the Collins Model 30K Amateur Transmitter is located in the transmitter unit. Employing a Type 4-125A tetrode tube, the power amplifier requires a minimum of driving power and needs no neutralizing circuit. Band switching is used throughout the r-f circuits. The power amplifier is used straight-through on all bands. Grid excitation is received from the Model 310A Exciter unit via the link coupling. Both the grid and the plate circuits of the 4-125A tube are tuned to the output frequency. Special effort has been made to isolate the grid circuit from the plate circuit to prevent interaction. The band switch sections in both the grid and plate tuning circuits select the proper coils for the band in which operation is desired and, in most instances, short circuits the remaining unused coils.

The control grid of the power amplifier tube is biased to, or beyond, plate current cut-off by voltage from the bias supply. Additional bias is obtained from the voltage drop across grid leak R201. Screen voltage for the 4-125A tube is obtained from the low voltage power supply. Plate voltage for the power amplifier tube is obtained from the high voltage plate supply which employs a pair of 866A mercury vapor rectifier tubes in a full wave circuit.

One half of the plate circuit tuning variable capacitor C207 is employed during operation in the 10, 15, 20 and 40 meter bands while both halves of the capacitor are connected in parallel for 80 meter operation.

CIRCUIT FREQUENCIES vs OUTPUT FREQUENCY

OUTPUT FREQUENCY	CIRCUIT						
(AMATEUR BANDS)	V601 GRID	V602 PLATE	V603 PLATE	V604 PLATE	V605 PLATE	V201 GRID	V201 PLATE
3.5 mc	1.75 mc	1.75 mc	3.5 mc	3.5 mc	3.5 mc	3.5 mc	3.5 mc
7 mc	1.75 mc	1.75 mc	3.5 mc	3.5 mc	7 mc	7 mc	7 mc
14 mc	1.75 mc	1.75 mc	3.5 mc	7 mc	14 mc	14 mc	14 mc

OUTPUT FREQUENCY	CIRCUIT						
(AMATEUR BANDS)	V601 GRID	V602 PLATE	V603 PLATE	V604 PLATE	V605 PLATE	V201 GRID	V201 PLATE
21 mc	1.75 mc	1.75 mc	3.5 mc	10.5 mc	21 mc	21 mc	21 mc
28 mc	1.75 mc	1.75 mc	3.5 mc	14 mc	28 mc	28 mc	28 mc

2.2.4. AUDIO CIRCUITS.

(a) General. - The audio system of the transmitter is completely contained in the transmitter cabinet. A high gain microphone amplifier is followed by a two stage audio amplifier which is shunted by a speech clipper tube. The output of the audio amplifier is used to excite a driver stage which drives the grids of the Class B modulator tubes.

100% modulation is attained by the use of any high impedance microphone such as a crystal or high impedance dynamic. The speech clipper clips both the negative and the positive audio peaks, (if clipping is desired), thus preventing overmodulation while allowing a more powerful side band to be transmitted. A cut-off filter attenuates all speech frequencies above 4000 cps.

The plate and the screen of the power amplifier tube are modulated by dual windings on the modulation transformer when using phone emission. When CW emission is employed, the power amplifier plate winding is short circuited and the filaments of the modulator tubes are turned off.

(b) Speech Amplifier Circuits. - Refer to Figure 2-2. A 6SJ7 tube, pentode connected, is employed as a high gain voltage amplifier in the input stage of the speech amplifier. The 6SJ7 input tube is followed by a 6SN7 dual triode tube the first section of which precedes the 6H6 clipper tube. Refer to figure 2-2. The 6H6 clipper tube is shunted across the audio input to the second section of the 6SN7 audio amplifier tube. Notice that the cathode of one section of the 6H6 tube (pin number 4) is operating at a small fixed value of positive potential by virture of being connected through reactor L301, resistor R310 to a tap on the cathode resistors R311, R312, and R313. This positive cathode potential biases the corresponding diode plate and no current flows through this section of the tube. However, when the magnitude of the negative audio peaks applied to the diode cathode become large enough to overcome the fixed positive potential, current flows through this section of the diode and the negative audio peak is attenuated by the short circuiting action of the diode. Likewise, the cathode of the second section of the clipper tube is returned to a tap on the 6SN7 amplifier cathode resistor which is more positive than the tap where its corresponding plate is attached. Thus the plate of the second section of the 6H6 is more negative than the cathode and no current flows. When a positive audio peak of sufficient magnitude reaches this diode plate the fixed negative bias is overcome and current flows through the second section of the diode and the positive audio peak is attenuated. Because of the above action the audio output of the second section

of the audio amplifier tube cannot rise above the fixed level; therefore, it is possible to set the degree of modulation with the Clipper Control R315 and be assured that the percentage of modulation will not rise above the chosen amount.

The output from the second section of the t pe 6SN7 dual triode tube is coupled to the grid of the modulator driver tube, V304 through capacitor C310 and the Clipper Control R315. V304, a type 6B4G power amplifier tube, drives the grids of the Class "B" modulator tubes through coupling transformer T301.

(c) Modulator Circuit. - A pair of Type 75TH triode power amplifier tubes are employed as modulators operating in Class B service. Excitation for the modulator grids is received from the driver tube through the driver transformer T301. Both the screen and the plate of the r-f power amplifier tube are modulated by individual secondary windings on the modulation transformer T302. When switching to CW emission, the modulator filaments are turned off and the power amplifier plate winding in the modulation transformer is short circuited.

Plate voltage for the audio amplifier and the driver stages is obtained from the low voltage supply while plate voltage for the modulator tubes is obtained from the high voltage supply. Screen voltage for the power amplifier tube is also taken from the low voltage supply. Grid bias for all audio tubes except the modulators is obtained from cathode resistors. The modulators are biased by voltage from the bias supply. A variable resistor, R401, located at the rear of the low voltage power supply unit, is used for adjustment of the modulator bias.

2.2.5. Metering Circuits. - All important circuits are metered in the transmitter and exciter units. The power amplifier grid and plate currents, the modulator plate current, the modulator/power amplifier filament voltage, the exciter unit plate voltage, the frequency multiplier grid and plate current, and the frequency doubler (V604)grid and plate currents are metered. Two 3 ampere radio frequency meters to read r-f line current are mounted externally on the roof of the transmitter cabinet to be connected as desired.

2.2.6. Antenna Termination. - Refer to figure 3-3. The antenna tuning unit incorporated in the 30K transmitter is a condenser - coil combination which can be conveniently changed from a series to a parallel tuned circuit. The inductance of the coil and the place of antenna feeder attachment can be changed at will, with the result that practically any type of antenna or antenna feeders can be employed. In order to cover the entire frequency range of the transmitter, two sets of plug-in coils are used. One set covers the 10, 11, 15 and 20 meter bands while the other set is used on the 40 and 80 meter bands. The coil units plug into a jack strip mounted on top of the antenna tuning condenser. The antenna coils are split and a moveable link inserted between the sections. This link is actually a continuation of the power amplifier plate tank coil. The connection between the two sections of the antenna coil is actually a small jumper which, when opened, places the antenna tuning capacitor in series with the antenna coil thus making it possible to tune extremely low impedance antennas or transmission lines. When this jumper is closed, the tuning capacitor is in parallel with the coil and high impedance antennas and transmission lines can then be tuned.

In addition to the features already mentioned, it is possible to connect the feed lines to any turn on the antenna coils by means of small contactor arms with which each coil is provided. This allows for perfect transmission line impedance matching.

SECTION 3

INSTALLATION AND INITIAL ADJUSTMENT

3.1. INSTALLATION.

3.1.1. PRELIMINARY.

(a) Unpacking. - Refer to figure 1-1. The Model 30K transmitting equipment is packed in a number of wooden packing cases. Refer to the LIST OF MAJOR UNITS in Section 1 of this book and to the packing slip for a list of all the units supplied. Open packing crates with a nail puller rather than a bar or a hammer to prevent accidental damage to the units within. Remove the packing material and carefully lift the units out of the cases. Search all of the packing material for small packages. Inspect each unit for loose screws and bolts. Be certain all controls such as switches, dials, etc., work properly. All claims for damage should be filed promptly with the transportation company. If a claim for damage is to be filed, the original packing case and material must be preserved.

3.1.2. INSTALLATION PROCEDURE.

(a) Placing The Cabinets. - Each owner of the Collins Model 30K transmitting equipment will have his own individual placement problem and extensive thought and study should go into the proper placement of these units in order to get maximum efficiency from the equipment and also realize the operating advantages of the equipment. When choosing a location, consideration should be given to convenience of power, antenna, and ground connections, placement of remote cables and to maintenance.

As all the units are placed in the 30K cabinet from the rear, sufficient clearance should be allowed for a workman between the cabinet and any obstruction.

In addition, sufficient clearance should be provided to allow for the rear door to swing back full out of the way. Refer to figure 3-1 for outline dimensions and clearances.

The Model 310A Exciter unit should be located on the operating table which should be within convenient arms reach of the Model 30K transmitter unit if advantage is to be taken of the variable frequency feature of the equipment. See figure 3-2.

(b) Installation of Units. - Reference to the photographic illustrations will assist in the assembly of the transmitter. See figure 3-3. Any cords designed to hold the cable in place for shipment should be untied and removed. Place the heavy plate power transformer onto the bottom of the cabinet and make the connections indicated by the white tags tied to the cable lugs. After this, the power transformer may be placed over the mounting holes and bolted into place if desired. Proceed with the placement of units from the bottom to the top. The tabulation below lists the various units of the transmitter. For purposes of identification the unit letter designation which appears on schematic diagram is also shown.

Unit Letter Designation	Description
A	Meter Panel
B	RF Power Amp Tube and Tank Circuits
C	Speech Amp and Mod
D	Low Voltage and Bias Power Supply
E	High Voltage Rectifier
F	Control Panel
G	High Voltage Power Transformer
H	Terminal Bracket

Each unit should be placed with protruding control shafts properly centered to prevent binding and then bolted in place with bolts provided for the purpose. A set of Bristo wrenches is attached to the rear door to be used in tightening control knob set screws.

The meter panel should be in place and connections made before the coil mounting plate of unit "B" is bolted to the ceramic stand-offs.

(c) Internal Connections. - The connections between the units of the 30K are made by a pre-formed cable. The cable leads are formed and laced tightly so that they have a natural tendency to seek the proper terminal. Each wire is color

coded and otherwise identified on the schematic drawing by means of the unit letter and terminal number to which the wire should be terminated. Each cable connection in the transmitter is marked by a tag when the transmitter is dismantled for shipment. The cable connections can therefore be properly installed by following the markings on the tags.

The order of designation of inter-unit cabling is as follows: When a wire terminates on a single numbered terminal on a unit, the wire route is from the source to the terminal on the specified unit and is indicated by the unit letter designation followed by the terminal number. Thus, if a wire emanating from terminal number 2 on unit A is to be connected to terminal number 12 on Unit C, an arrow at terminal number 2 on unit A would indicate C12 and a similar arrow at terminal 12 on unit C would indicate A2.

Color coding of wires is used to facilitate connecting cables to terminal strips. The code is indicated by a letter such as A, B, etc., followed by a figure such as 1, 3, 5, etc. The letter designates the wire structure, size, amount and kind of insulation and rating. The figures refer to RMA color code for resistors etc. A Class A Wire with solid red covering would be an A2 wire while a Class A tracer wire with a red body and a white tracer would be designated A29.

(d) Fuses. - All fuses should be examined and their ratings checked. Refer to the MAINTENANCE section of this book for a table of fuses.

(e) External Connections. - Place all POWER switches in the OFF position before attempting to make any external connections. The external connections for the Model 30K transmitter consist of the following:

AC power line
Control and Audio
Exciter output
Radiation system
Utility

1. AC Power Line. - The 30K is designed to operate from a 115 volt, single phase, 60 cycle power source. The supply line voltage and frequency should be checked before connections are made. The maxmimum load taken by this equipment is 1350 watts. A power line of at least 2 k.v.a. capacity should be installed for each transmitter installation. Connect the power line directly to the bottom terminals of the line fuse block in the bottom of the cabinet. Number 10 or larger, suitably insulated wire, should be used. The "high" side of the line should be connected to terminal #15, if possible. The "high" side of the line may be found by checking with a small 110 volt bulb from each side of the line to an external ground. It is recommended that an external wall mounting, two pole, disconnect switch be installed between the transmitter and the main line connections. If line voltage is more than 5 volts too low or too high, the installation of an autotransformer is advisable. If 220 volts is available, a step down autotransformer may be used.

Twoholes 7/8" in diameter are available in the base of the cabinet for power leads, if a power conduit channel is used; otherwise the power leads may

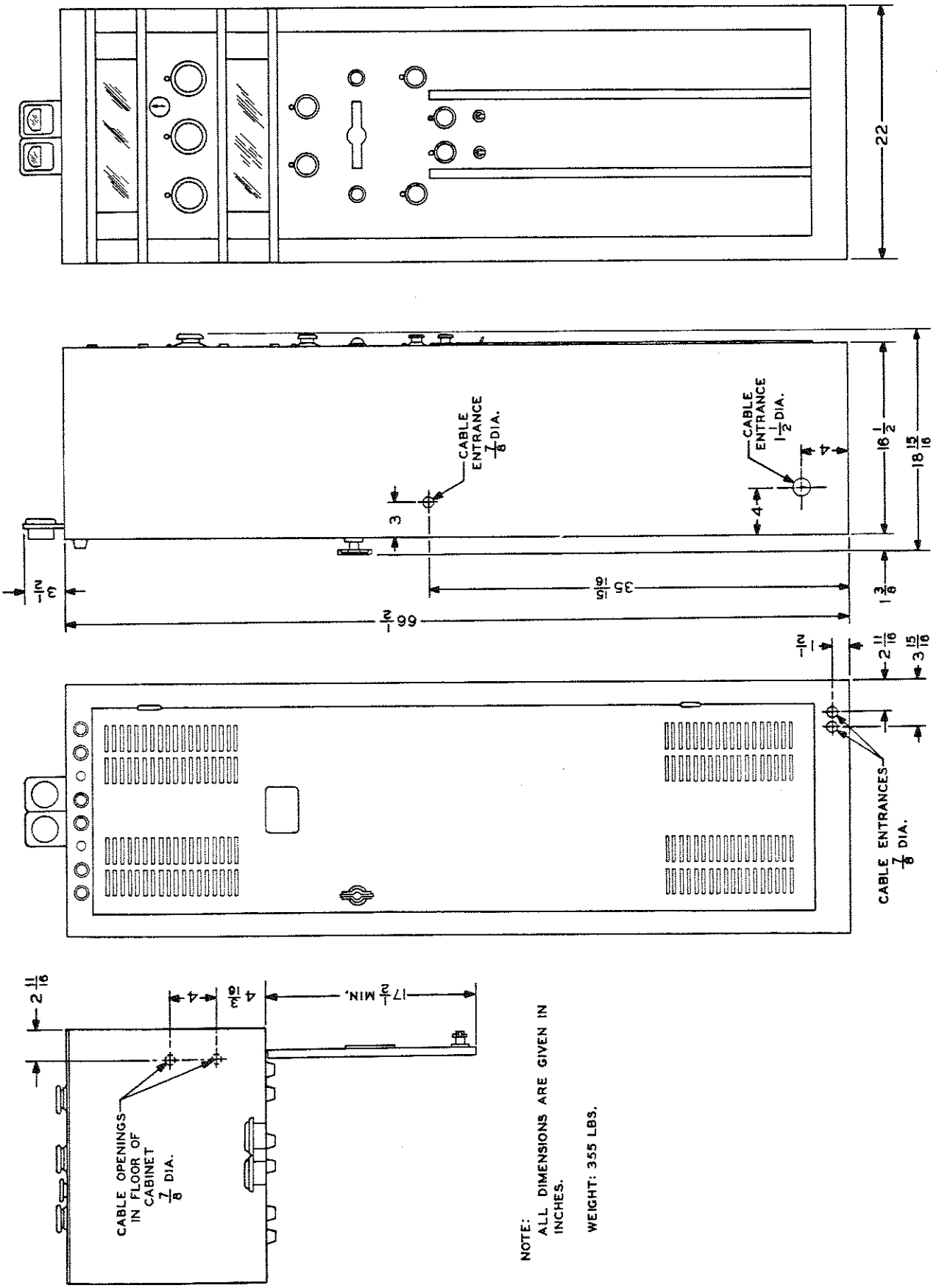


Figure 3-1 Transmitter Outline and Mounting Dimensions

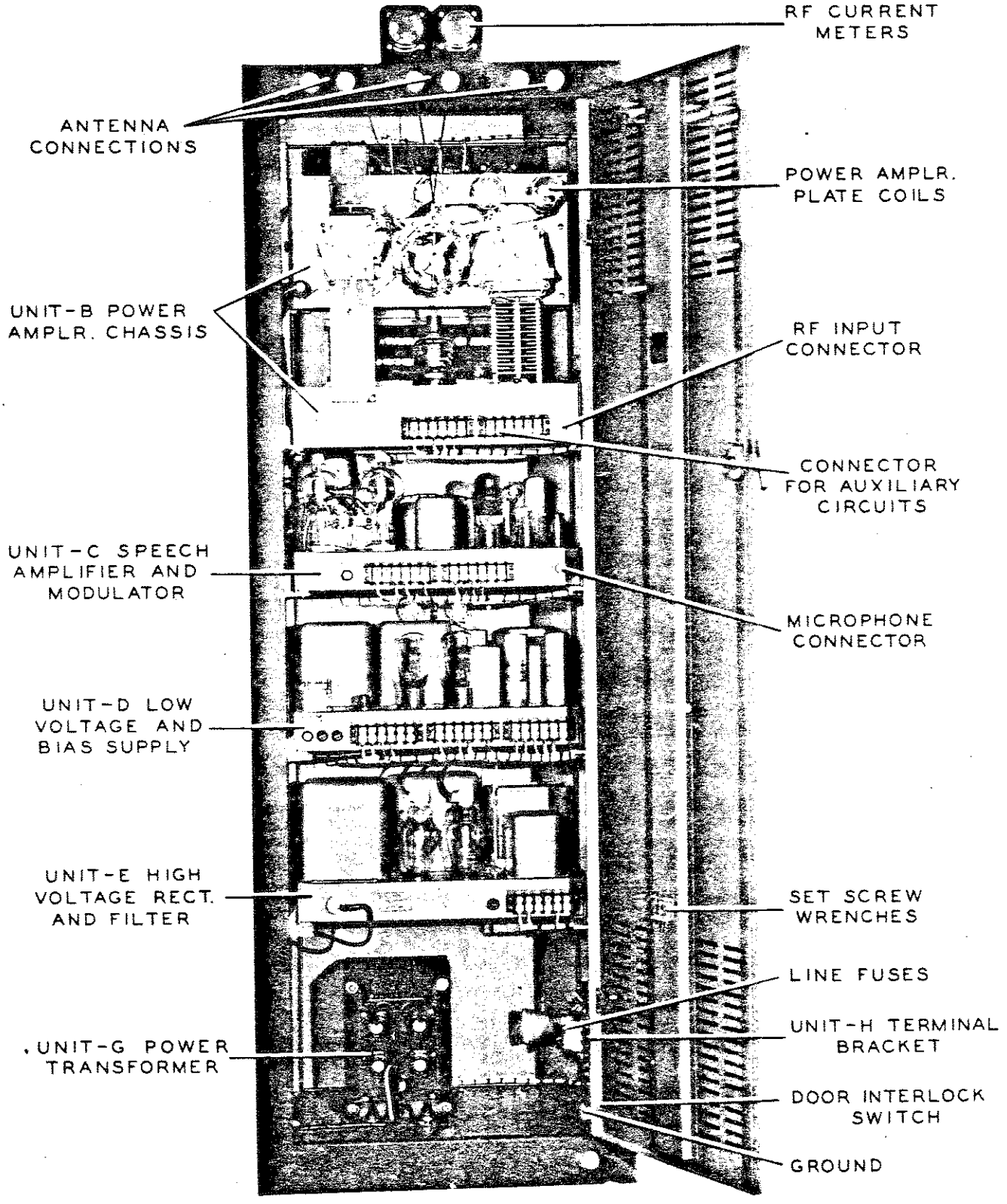


Figure 3-2 Transmitter, Rear Open

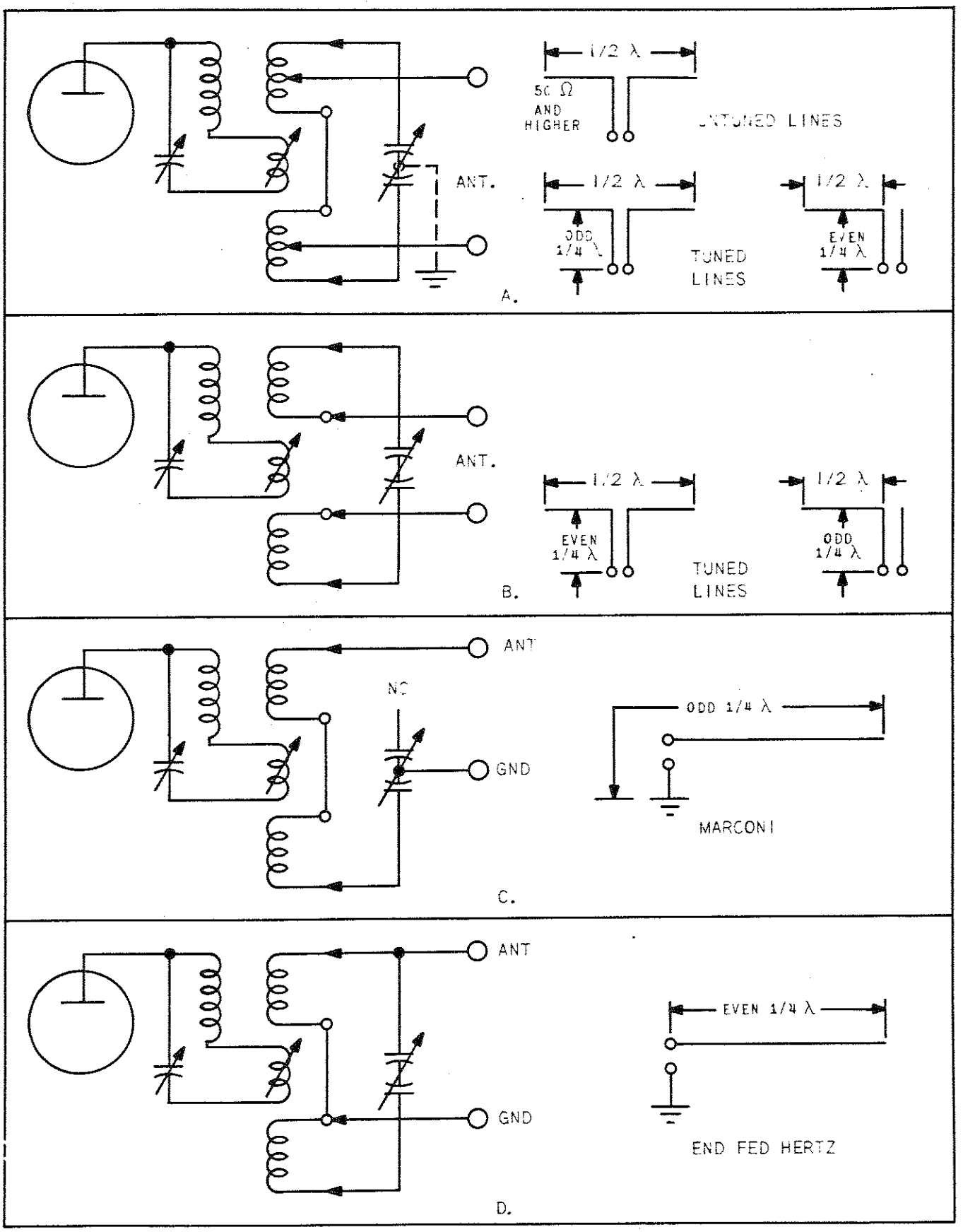


Figure 3-3 Applicable Antenna Tuning Circuits

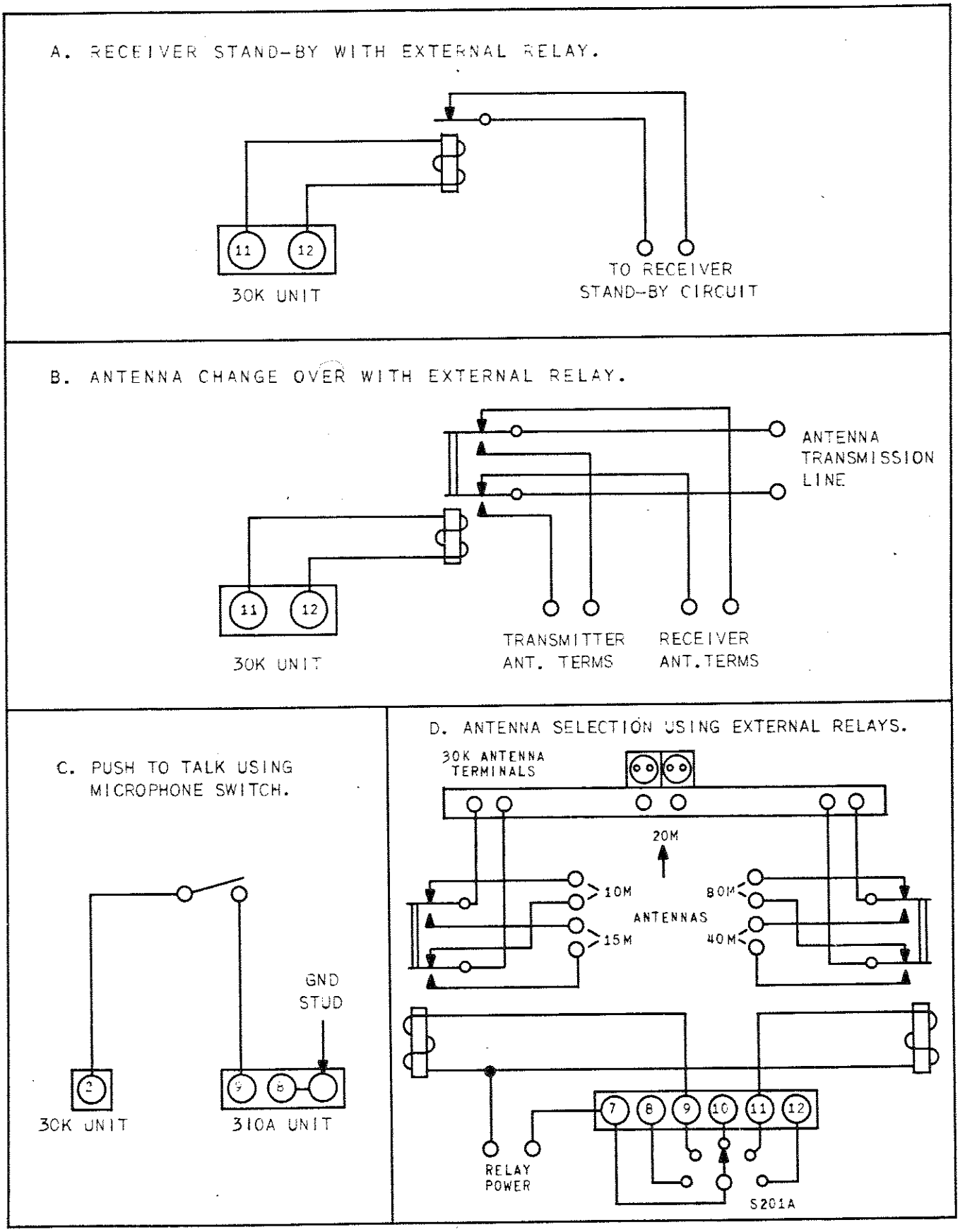


Figure 3-4 Possible Auxiliary Circuits

enter the cabinet through the holes in the rear of the base and thence through the above mentioned holes to the terminal board. Refer to figure 3-1 for location of the power entry holes. A 1-1/2 inch hole drilled in the side of the cabinet at base level is also available for power lead entry.

2. Control and Audio. - A 25 foot length of ten-conductor cable is provided for connection between the 310A Exciter unit and the 30K Transmitter Unit.

The two units are connected together as follows:

310A Terminal Number	To	*30K Terminal Number
1	Orange	H8
3	Black	H7
5	Green	H5
6	Blue	H6
8	~~Black-white~~	H2
9	White	H4
12	~~Red~~	H3
GND	Shield	H1

Control cable connections to the Exciter unit are made through a cut-out rear of the exciter cabinet. The control cable may enter the transmitter cabinet through the side of the transmitter cabinet.

The telegraph key may be plugged into a key jack in the front of the exciter unit or connected from terminal number 7 to gnd stud at the rear of the exciter unit; in which case, the key jack wire, connected to terminal 7, must be removed.

The microphone connection is made to the speech amplifier and modulator chassis by means of an amphenol single connector microphone receptacle. This receptacle is located at the rear of the chassis and the microphone cable may enter the cabinet at the same place as the control cable. It is very important, in avoiding feedback troubles, to tighten the ring on the microphone plug very securely. See figure 3-5 for a schematic on how to connect a microphone switch for push-to-talk operation. A 7/8" hole is drilled in the side of the cabinet near the audio input jack for microphone cable entry.

3. Sidetone. - The CW sidetone is terminated between terminal #13 and GND at the rear of the 310A unit. Speakers with impedance ratings of 500 to 1000 ohms or headphones with impedence ratings of 500 ohms or higher will be suitable for sidetone reproduction.

* The 30K terminals in the bottom of the cabinet are numbered similar to the terminals at the rear of the other units. The numbers, however, are behind the terminals strips.

4. Receiver Muting. - Terminals 14 at the rear of the 310A unit is provided for use with a Collins 75A receiver to provide CW break-in operation. This connector furnishes approximately 15 volts of positive voltage which cuts the receiver audio off when the key is pressed. Terminal number 14 should be connected to terminal B on the receiver. The receiver and exciter unit grounds should be connected together.

5. Exciter Output. - The exciter output is transmitted to the 30K Transmitter unit by means of a small concentric transmission line. Each end of the transmission line is equipped with a suitable connector. Use only the length of RF cable supplied. Do not cut it or use a longer cable as it may be difficult to secure proper drive on all bands.

The transmitter end of this transmission line is connected to a receptacle at the rear of Unit B while the exciter end is connected to a receptacle at the rear of the exciter unit. Be sure both connectors are clamped in their respective receptacles tightly.

6. Radiation System.

a. General. - This transmitter has antenna tuning facilities which will tune any kind of antenna or antenna transmission line. Two plug-in coil units are necessary for complete coverage. The coil unit with the single turn link is the proper unit for 10, 11, 15 and 20 meter operation while the other unit is intended for 40 and 80 meter use. Three sets of antenna terminals are mounted at the rear top edge of the cabinet to provide connections to several different antennas. The equipment is shipped with the various antenna selector contacts on the PA band switch connected together and then connected to the center pair of antenna terminals. If more than one antenna is available, the jumpers should be removed from the band switch and reconnected to provide for the extra antennas. The following instructions will enable one to connect the antenna tuner for operation with any of the popular antennas found at amateur stations.

b. Untuned High Impedance Transmission Line. - If the line has a characteristic impedance value of 50 ohms or over, parallel tuning of the antenna coil should be employed. For parallel tuning, the little jumper seen underneath the antenna coil should be closed. The tuning capacitor tap arms should be approximately as indicated in table 1 and the transmission line tap arms should be set on the same turn as the capacitor tap arms. The transmission line tap arms are those which are nearest the cabinet wall. In this type of operation, low values of capacitance and high values of inductance are best.

c. Untuned Low Impedance Transmission Lines. - Transmission lines having a characteristic impedance of less than 50 ohms require series tuning of the antenna coil. This is done by opening the small jumper underneath the coil and moving the transmission line tap arms to the inside coil turns. The capacitor coil tap arms should be set approximately as shown in table 1 to start. In this type of operation, high values of capacitance and low values of inductance are preferred.

d. Voltage Fed Tuned Transmission Lines. - Transmission lines which have a

current node at the transmitter should be connected exactly like the high impedance untuned transmission lines are connected. See paragraph b. above. It is highly recommended that tuned transmission lines be cut to multiples of a quarter wave in length.

e. Current Fed Tuned Transmission Lines. - Transmission lines which have voltage nodes at the transmitter should be connected exactly like the low impedance transmission lines are connected. See paragraph c. above. These lines should also be cut to multiples of a quarter wave in length for best results.

f. Quarter Wave Marconi. - Series tuning is indicated for the quarter wave Marconi antenna. In this type of operation the antenna tuning circuit should be connected so that the two sections of the antenna coil and one half of the antenna tuning capacitor are in series. To do this, place a grounding jumper to the rotor of the antenna tuning capacitor, connect the antenna to one end of the antenna coil, connect one stator section of the antenna tuning capacitor to the other end of the antenna coil and disconnect the other stator completely (slide contactor arm off wire). Refer to figure 3-4.

g. End Fed Half Wave. - End fed half wave (or even multiple of a half wave) antennas can be excited by employing parallel tuning. In this type of operation, the antenna is connected to one antenna terminal while the other antenna terminal is connected to transmitter ground. The little jumper under the tuning coil should be closed and the transmission line tap arm connected to the grounded antenna terminal should be moved to the inside coil turn. The corresponding tuning capacitor tap arm should be moved to the turn indicated in the table for untuned high impedance transmission lines. The other capacitor tap arm should also be set at the position indicated in the table for high impedance transmission lines and the transmission line tap to which the antenna is attached should be set on this same turn.

h. Ground. - A good ground should be connected to the large stud in unit H (bottom of the cabinet) to reduce possibilities of r-f feedback.

7. Utility Connections.

a. Antenna Relays. - An extra switch section is placed on the power amplifier grid band switch for automatically operating antenna relays or other control relays. The switch points are brought out to terminals marked 7, 8, 9, 10, 11 and 12 at the rear of unit B. Terminal #7 is the common terminal of the group.

Terminals 11 and 12 of unit H are connected to 115 volts a.c. for use in exciting the coil of an external relay. These terminals are in parallel with the HV transformer primary and are energized when the transmitter is emitting a signal. See figure 3-5 for possible uses of external relays connected to terminals #11 and 12 of unit H.

8. Receiver Std-By. - Terminals number 15 and 16 at the rear of the 310A exciter unit are connected to a switch section on the exciter POWER switch and may be used to turn the receiver on and off for stand-by purposes. As connected

at the factory, the receiver would be turned on in every position of the exciter POWER switch excepting the SEND position. If other means of receiver stand-by are employed, this switch could be used to turn a cw or phone monitor on or for some other useful purpose.

3.2. INITIAL ADJUSTMENTS.

3.2.1. GENERAL. - The initial adjustments consist of selecting the operating frequency, tuning the power amplifier to the operating frequency, loading the antenna, and adjusting the speech system. After all internal and external connections have been made and inspected and the tubes and fuses have been inserted in the proper sockets, the 115 volt 60 cps power may be applied. Be sure all power switches are in the OFF position.

3.2.2. FILAMENT VOLTAGE. - The correct value of filament voltage on the power amplifier and modulator tubes (5.0 volts a.c.) is rather important, therefore, a front panel manual adjustment is included on the 30K unit to compensate for varying power amplifier and modulator tube filament voltages.

The filaments in the exciter tubes may be turned on by operating the exciter POWER switch to the RECEIVE position providing the FILAMENT power switch on the 30K unit is in the ON position. The filaments in the 30K unit may be turned ON by operating the FILAMENT switch to the ON position. When turning the 30K filaments on for the first time, the filaments of the 866A rectifiers should be allowed to operate for 15 minutes before applying plate power to the rectifiers. Thereafter only 30 seconds will be required.

3.2.3. ADJUSTMENT PROCEDURE.

(a) Exciter Unit.

1. Place the FILAMENT power switch in the 30K unit in the ON position. Be sure the PLATE POWER switch is in the OFF position.

2. Rotate the EXCITER CONTROL switch to the REC position. (Allow 30 seconds for the tubes to heat.)

3. Choose the operating band with the BAND switch and close the telegraph key.

4. Rotate the TUNING Control to the desired frequency and check in a receiver to see if the channel is acceptable.

5. Operate the EXCITER CONTROL switch to the SEND position.

(b) 30K Transmitter Unit.

1. Be sure the PLATE power switch is in the OFF position and the AUDIO control is in the "0" position.

2. Insert the proper antenna tuning coil. Use the coil with the single turn link for 10, 11, 15 and 20 meters. Use the coil with the 6 turn link for 40 and 80 meters.

3. Operate the PHONE-CW switch to the CW position.

4. Operate the PA GRID and PA PLATE BAND switches to the band that includes the frequency selected under 4. above.

5. Place the LV-TUNE-OPERATE switch in the LV position.

6. Operate the ANTENNA COUPLING control to the counterclockwise position.

7. Operate the PLATE POWER switch to the ON position.

8. Tune the PA GRID Control for maximum PA GRID CURRENT. Manipulate the EXCITATION control until 12 to 15 ma grid current is obtained.

9. Operate the LV-TUNE-OPERATE switch to the TUNE position and tune the PA PLATE tuning control to PA PLATE CURRENT dip or minimum.

10. Place the TUNE-OPERATE switch in the OPERATE position.

11. Tune the antenna and load the transmitter as outlined in paragraph (c) below.

12. Re-check the PA PLATE TUNING control for exact resonance. (Normal color of PA tube plate is from dull to cherry.)

13. Check the FILAMENT VOLTAGE and adjust the FILAMENT ADJUSTMENT until 5 volts is obtained. Be sure to turn the PLATE power OFF while changing the FILAMENT ADJUSTMENT tap switch.

(c) Antenna Tuning and Loading. - Having completed steps 1. to 10, in paragraph 3.2.3.(b) above, the antenna can be tuned and the transmitter loaded by the following method. Refer to paragraph 3.1.2.(e) RADIATION SYSTEM for connections for various types of antennas and transmission lines.

1. Parallel Tuning. - (High impedance untuned lines and voltage fed tuned lines.) Be sure the small jumper under the antenna coil is closed and the feeder switch arms are on the same turns on which the capacitor tap arms are set. The capacitor switch arms should be set on the turns so designated in table 1 for the operating frequency.

a. Rotate the ANTENNA TUNING Control until antenna resonance is indicated by maximum antenna current.

b. Rotate the ANTENNA COUPLING Control clockwise until a reading of 200 ma is obtained on the PA PLATE meter. (If it is impossible to get 200 ma reading, turn the plate power off and rotate each transmission line tap arm on the antenna coil towards the center of the coil one turn at a time until this reading is possible. Use the turns which allow tightest coupling.)

NOTE

Fewer turns between antenna taps means increased loading.

NOTE

The tap arms on the antenna coils should be positioned on top of each turn rather than between two turns.

- - -

In this type of operation, large amounts of inductance and low values of capacitance in the antenna tuning circuit is desirable.

2. Series Tuning. - (Low impedance, i.e., below 50 ohms, untuned lines and current fed tuned lines.) The small jumper under the antenna coil should be open and the transmission line tap arms should be on the inside turns of the antenna coils while the tuning capacitor tap arms should be as indicated in table 1 for the operating frequency. (This is merely a good starting position only.)

a. With the COUPLING Control at the extreme counterclockwise position, turn the ANTENNA TUNING CONTROL until resonance is indicated by the antenna current meters.

b. If the ANTENNA TUNING Control is positioned with the capacitor plates nearly closed, turn the ANTENNA COUPLING Control clockwise until 200 ma is obtained on the PA PLATE Meter.

c. If it is impossible to load the power amplifier to 200 ma or the antenna tuning capacitor is in the low capacity portion of the dial, turn the plate power off and move the tuning capacitor tap arms toward the center of the antenna coils and repeat the tuning procedure.

NOTE

In this type of operation, large values of capacity and small mounts of inductance are desirable in the antenna tuning circuit.

3. Marconi Antenna. - In general, tuning instructions indicated for SERIES TUNING, paragraph 2. above, apply. Remember that large values of circulating current are possible so means should be taken to prevent damage to r-f meters.

4. End Fed Antennas. - Any antenna that is even multiples of a quarter wave long can be end fed with a parallel tuned circuit. The tuning instructions for this type of operation are the same as for PARALLEL TUNING, paragraph a. above. See paragraph 3.1.2.(e)4. Radiation System for antenna circuit connections.

5. Antenna Tuning Notes.

a. When using tuned transmission lines, better results can be obtained from lines which are very nearly a multiple of a quarter wave in length; otherwise high values of reactance might be present which will necessitate additional reactive elements of opposite sign placed across the transmission line before the line can be made to take proper loading.

b. The rotor of the antenna tuning capacitor can be grounded for harmonic suppression by placing a jumper across the bakelite rear support of the capacitor, providing a well balanced antenna is used.

(d) CW Operation. - For CW operation in the PHONE-CW switch should be in the CW position and the key plugged into the KEY jack on the front panel of the exciter unit. See paragraph 3.1.2.(e)2. in the INSTALLATION section of this book.

The AUDIO gain control should be in the "0" position; PA PLATE CURRENT should be 200 ma.

(e) Phone Operation.

1. Tuning Adjustments. - The tuning operations are identical to those outlined in paragraph 3.2.3.(b), except that the PA should be loaded to 150 ma in step 11.

The PHONE-CW switch should be in the PHONE position and the telegraph key shorted.

The modulator tubes static plate current (no modulation) should be adjusted to 45 ma by rotating the MODULATOR BIAS control at the rear of unit C with the transmitter fully operating. This will have to be done by steps since opening the rear door opens the interlock switch and turns the plate power off.

CAUTION

Do not operate the PHONE-CW switch while the plate power is ON. Always turn the PLATE POWER switch to the OFF position before operating the PHONE-CW switch.

2. Audio Adjustments.

a. Speech Clipper Out. - The percentage of modulation at which speech clipping occurs has been chosen as 100% and the modulation control locked at the factory. If speech clipping is not desired, merely adjust the AUDIO GAIN Control on the front panel until approximately 150 ma MODULATOR PLATE current is obtainable on heavy modulation peaks.

In event speech clipping is to be dispensed with entirely, the 6H6 Clipper tube can be removed from its socket in the modulator unit. No harm can result other than the possibility of overmodulation.

b. Speech Clipper In. - This adjustment should be made using an oscilloscope to observe percentage of modulation. The oscilloscope should be coupled to show PA r-f envelope after which the control at the rear of Unit C should be advanced to about the mid point. This control is used to set the percentage of modulation at which clipping occurs. Proceed to talk into the microphone and advance the AUDIO gain control on the transmitter panel until peak clipping is observed on the oscilloscope screen. The percentage of modulation can now be set with the control at the rear of Unit C.

Once the percentage of modulation has been set, the value of speech clipping can be adjusted by the AUDIO gain control. With the control in an advanced position, a greater amount of sideband power is obtained because of the higher modulation average. With the control set thus, however, a quiet operating position is desirable because of the higher audio gain with resultant higher room noise.

NOTE

Since clipping over 6 db results in less desirable quality, even though the intelligibility may be better for working through interference, the signal should be monitored and the audio gain adjusted to the point which produces a balance between more audio power and good quality.

f. Calibrate.

(1) General. - The CALIBRATE position on the Exciter Control Switch is provided to enable the operator to set the transmitter frequency on a clear channel within the amateur band. In the CAL position, the Exciter Control Switch turns on the plate power to all of the tubes in the exciter but disconnects the cathode resistors in the 807 stages. The signal thus produced is weak and can be tuned in on the communications receiver. If the signal is too weak, a small pick up antenna, connected to the receiver, can be placed near the Exciter Unit.

TABLE 1

ANTENNA TUNING CHART FOR 300 OHM RESISTIVE LOAD

Band	Antenna connection Tap	Antenna Tuning Capacitor Tap
10	*1-1/2 turns total	*3 turns total
15	2 turns each side of center	3 turns each side of center
20	2 turns each side of center	5 turns each side of center
40	5 turns each side of center	13 turns each side of center
80	5 turns each side of center	Entire coil

* Divided as equally each side of center as possible.

a. Parallel tuning should be used with this table.
b. Except where designated with the asterisk (*) count each wire as a full turn even though it actually is a part of a turn or a full turn and a fraction.
c. This table is for 300 ohm resistive load; for other loads the settings will differ somewhat. Higher impedance lines require more turns from center for antenna connection taps, likewise, lower impedance lines require fewer turns from center.
d. This table isn't suitable for lines below 50 ohms impedance which require series tuning of the antenna coil.

NOTE

The clipper level adjustment at the rear of the speech unit is set at the factory using the following procedure.

NOTE

The transmitter is loaded for normal power input and a 400 cycle sine wave audio tone fed into the microphone input. The clipper control should be set at approximately 1/5 turn back from the full clockwise position. Advance the audio gain control (front panel) until approximately 75% modulation is obtained on an oscilloscope observing the modulated wave form. Increase the audio input 12 db. Adjust the clipper control so that just 100% modulation is reached. Repeat if necessary so 12 db increase in audio level raises modulation to just under 100%.

SECTION 4

OPERATION

4.1. STARTING THE EQUIPMENT.

4.1.1. PROCEDURE. (Be sure PA PLATE POWER switch is in OFF position.)

(a) Operate FILAMENT switch to ON position. (Allow 30 seconds for filaments to heat.)

(b) Operate the EXCITER CONTROL SWITCH to REC. position.

(c) Select the type of emission with the PHONE-CW switch.

(d) Operate the transmitter PLATE switch to the ON position.

(e) Proceed to control the emission with the EXCITER CONTROL SWITCH and the key.

4.2. STOPPING THE EQUIPMENT.

4.2.1. PROCEDURE.

(a) Emergency.

1. Operate the FILAMENT switch to OFF.

2. Open station main power switch.

(b) Routine.

1. Operate the EXCITER CONTROL SWITCH to the RECEIVE position.

2. Operate the Transmitter PLATE power switch to the OFF position.

3. Operate the FILAMENT switch to the OFF position.

4.3. GENERAL.

4.3.1. FUNCTIONS OF THE EQUIPMENT.

(a) Types of Emission. - Voice or Continuous Wave.

(b) Frequency Range. - 3.5 to 4.0 mc.
7.0 to 7.3 mc.
14.0 to 14.4 mc.
*21.0 to 21.5 mc.
28.0 to 30.0 mc.

* This band is unauthorized at this date. (3-5-47)

(c) Power Input. - VOICE = 375 watts
CW = 500 watts

(d) Frequency Control. - Stabilized master oscillator.

(e) Power Source. - 115 volts 60 cps.

(f) Power Consumption (Max). - 1270 watts.

(g) Microphone. - Any high impedance microphone. (Crystal or high impedance dynamic.)

4.3.2. OPERATING PRECAUTIONS.

(a) Operate all tube filament within ±5 percent of published ratings.

(b) Allow 30 seconds for tubes to warm up upon turning transmitter on after any appreciable shut-down period.

(c) Do not operate power amplifier stage off resonance except in TUNE position.

(d) Always place the PLATE power switch in the OFF position when operating the PHONE-CW Control or the FILAMENT ADJUSTMENT.

4.4. ROUTINE OPERATION.

4.4.1. PANEL CONTROL.

(a) Starting the Equipment.

1. Operate the FILAMENT switch to the ON position. (Allow 30 seconds for tube filaments to warm up.)

2. Select type of emission with the PHONE-CW switch.

3. Operate the EXCITER CONTROL SWITCH to the RECEIVE position. (Allow 30 seconds for tubes to warm up.)

4. Operate the transmitter PLATE power switch to the ON position.

5. Operate the EXCITER CONTROL SWITCH to the SEND position and close telegraph key.

NOTE

Always place the TUNE-OPERATE switch in the TUNE position when tuning the power amplifier plate circuit to resonance. (Slight adjustments can be made in the OPERATE position. No harm will be done if the PA tube plate does not get too bright. Dull red to cherry red is proper in normal operation.)

(b) Stopping the Equipment.

1. Operate the transmitter PLATE switch to the OFF position.

2. Operate the EXCITER CONTROL SWITCH to the OFF position.

3. Operate the transmitter FILAMENT switch to the OFF position.

4.4.2. Remote Control.

(a) General. - It is intended that this equipment shall be normally controlled from the receiving position which may be at a position removed from the transmitter unit. The following procedure may be followed for operating the equipment at such a position. The transmitter must be tuned and in operating condition before the following operations are performed.

(b) Starting the Equipment.

1. Operate the transmitter FILAMENT switch to the ON position.

2. Select type of emission desired with the PHONE-CW switch.

3. Operate the PLATE power switch to the ON position.

4. Operate the EXCITER CONTROL SWITCH to the RECEIVE position. (Allow 30 seconds for the tube filaments to warm up.)

5. Operate the EXCITER CONTROL SWITCH to the SEND position to transmit and to the REC. position to receive.

(c) Stopping the Equipment.

1. Operate the EXCITER CONTROL SWITCH to the RECEIVE position.

2. Operate the PLATE power switch to the OFF position.

3. Operate the FILAMENT switch to the OFF position.

NOTE

Steps 1 and 2 are performed in the interests of safety only. Actually, the equipment can be turned off with step 3 only.

4.5. TUNING INSTRUCTIONS.

4.5.1. EXCITER UNIT.

(a) Place the EXCITER CONTROL SWITCH in the CALIBRATE position.

(b) Rotate the BAND switch to the band containing the desired operating frequency.

(c) Rotate the TUNING knob until the slide rule dial indicates the first two digits (if operating in the 7.0 mc band) or the first three digits (if operating in the 3.5, 14, 21 27 or 28 mc bands). See figure 4-2.

(d) Continue rotating the TUNING knob until the vernier tuning dial indicates the last digits of the desired frequency.

(e) Check the frequency with a receiver to see that there has been no error in tuning the exciter. (With the EXCITER CONTROL SWITCH in the CAL position, listen to the exciter output with a receiver.)

NOTE

On the slide rule dial, each division equals 100 kc on all bands excepting the 80 meter band where each division equals 10 kc.

4.5.2. TRANSMITTER UNIT. - If the Exciter unit is tuned to frequency, the transmitter may now be tuned and adjusted. (Be sure the transmitter PLATE switch is in the OFF position and the LV-TUNE-OPERATE switch is in the LV position.)

(a) Operate the PA GRID band switch and the PA PLATE band switch to the bands which contain the desired operating frequency.

(b) Select the type of emission with the PHONE-CW selector switch and rotate the AUDIO GAIN control to the OFF position.

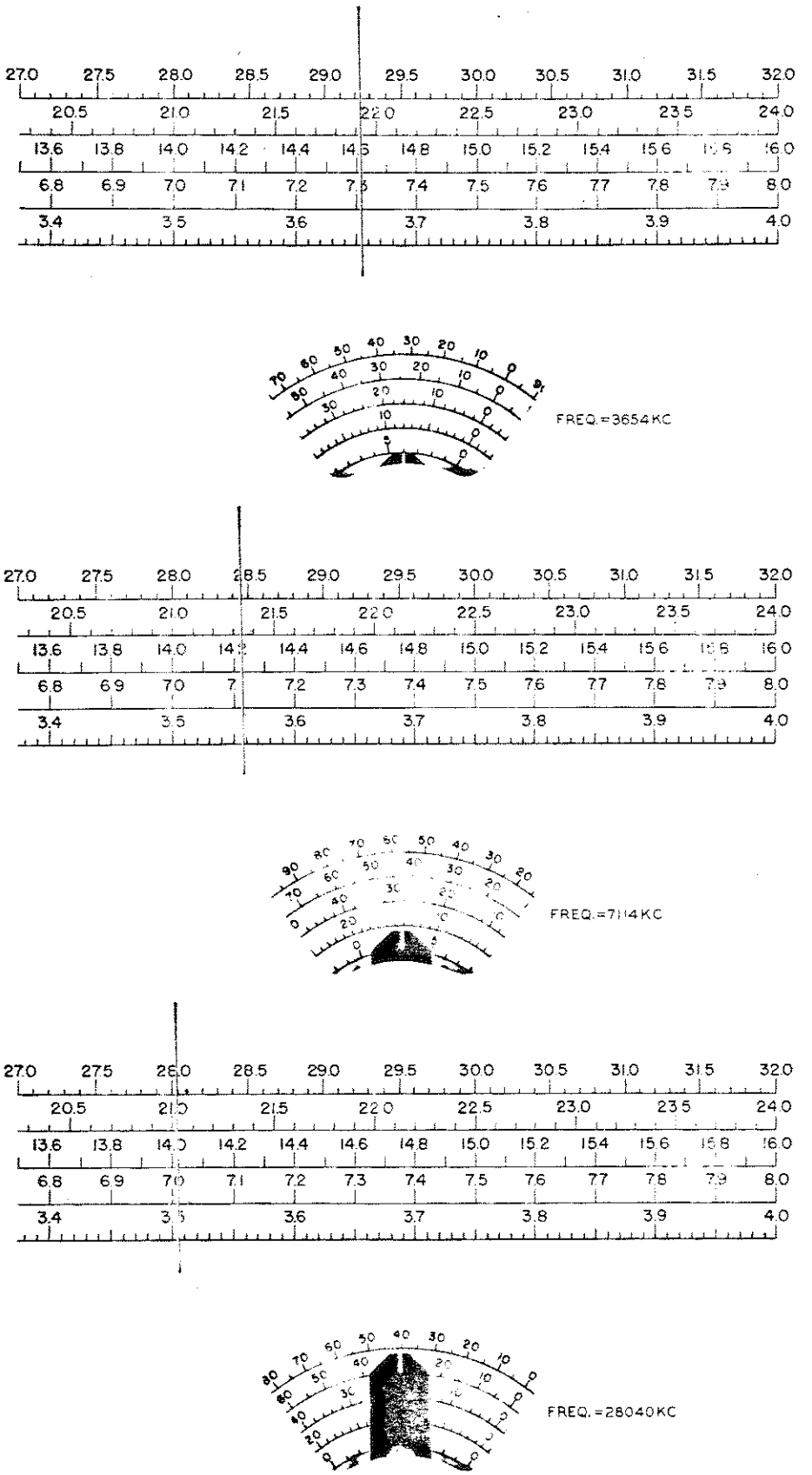


FIGURE 4-2 TYPICAL DIAL READINGS

(c) Reduce the ANTENNA COUPLING to counterclockwise position.

(d) Place the EXCITER CONTROL SWITCH in the SEND position.

(e) Operate the PLATE power switch to the ON position.

(f) Rotate the PA GRID tuning control to the point of maximum grid current as shown on the PA GRID CURRENT meter. The grid current should be 12 to 15 milliamperes.

(g) Place the TUNE-OPERATE switch in the TUNE position and tune the PA PLATE TUNING control to resonance as indicated by minimum PA plate current.

(h) Advance the ANTENNA COUPLING a few degrees and tune the antenna tank condenser to resonance.

(i) Rotate the TUNE-OPERATE switch to the OPERATE position and observe the PA PLATE CURRENT. If the plate current is more than 150 ma for phone operation or 200 ma for CW operation, reduce the antenna coupling with the ANTENNA COUPLING control. If the PA PLATE CURRENT is less than these values increase the coupling until the proper loading is obtained.

(j) After the tuning operations are completed, the audio gain control may be returned to the operating position.

4.6. SPEECH CLIPPER ADJUSTMENT.

4.6.1. SPEECH CLIPPER OUT.

(a) Reduce the AUDIO gain control until at normal speaking level, the MODULATOR PLATE current peaks should be less than 150 ma.

(b) If speech clipping is to be dispensed with entirely, remove the 6H6 Clipper tube. No harm will result other than the possibility of overmodulation.

4.6.2. SPEECH CLIPPER IN. - The point at which speech clipping occurs has been set at 100% modulation at the factory. The degree of speech clipping is raised by advancing the AUDIO GAIN Control clockwise.

NOTE

Advancing the AUDIO GAIN control will result in a greater amount of side-band power and higher background noise level, therefore a quiet operating position is desirable. Reducing the AUDIO GAIN will result in reduced side-band power and eventually a lower percentage of modulation. With the control set as furnished, any level of audio can be applied to the microphone without over modulating the transmitter.

4.7. CW OPERATION.

To operate the transmitter with continuous wave telegraphy emission, tune

the transmitter as outlined in paragraph 4.5.2. in this section excepting that the plate current to the power amplifier may be increased to 200 ma.

For CW operation the PHONE-CW switch should be placed in the CW position and a telegraph key plugged into the KEY jack on the exciter unit front panel. Any speed of keying possible with a manually operated straight key or semi-automatic key may be employed. The tone of the CW sidetone signal can be changed to suit the operator with the PITCH Control while the audio strength of the sidetone can be controlled by the VOLUME Control.

4.8. TYPICAL METER READINGS.

4.8.1. CW OPERATION.

(a) Filament - 5 v

(b) PA Grid Current - 15 ma

(c) PA Plate Current - 200 ma

(d) Exciter Plate Voltage - 480

(e) Freq. Mult. Grid Current - 1 - 3 ma

(f) Freq. Mult. Plate Current - 10 - 50 ma

(g) Freq. Doubler Grid Current - 4 - 5 ma

(h) Freq. Doubler Plate Current - 20 - 70 ma

4.8.2. PHONE OPERATION.

(a) Mod. Plate Current 45 ma (Static) 150 ma (100% no clipping)

(b) Filament - 5 v

(c) PA Grid Current - 15 ma

(d) PA Plate Current - 150 ma

NOTE

Exciter meter readings same as for CW operation.

SECTION 5

MAINTENANCE

5.1. INSPECTION.

5.1.1. GENERAL. - This radio equipment has been constructed of materials considered to be the best obtainable for the purpose and has been carefully inspected and adjusted at the factory to reduce maintenance to a minimum. However, a certain amount of checking and servicing will be necessary to maintain efficient and dependable operation. The following section has been written to aid in checking the equipment.

5.1.2. ROUTINE INSPECTION. - Routine inspection schedules should be set up for periodic checks of this equipment. This inspection should include examination of the mechanical system for excessive wear or binding and of the electrical system for electrical defects and deterioration of components.

If the routine inspection of the equipment is carried out faithfully, the chances of improper operation of the equipment are greatly minimized. It is, therefore, important that this inspection be made as frequently as possible and it should be sufficiently thorough to include all major electrical circuits of the equipment as well as the mechanical portion.

(a) Cleaning. - The greatest enemy to uninterrupted service in equipment of this type is corrosion and dirt. Corrosion itself is accelerated by the presence of dust and moisture on the component parts of the assembly. It is impossible to keep moisture out of the equipment in certain localities, but foreign particles and dust can be periodically removed by means of a soft brush and a dry, oil-free jet of air. Remove the dust as often as a perceptible quantity accumulates in any part of the equipment. It is very important that rotating equipment such as variable condensers and tap switches be kept free from dust to prevent undue wear. Likewise, variable condenser plates should be kept free from dirt to avoid flashover on modulation peaks.

One of the greatest sources of trouble in equipment located in a salt atmosphere is corrosion. Corrosion resulting from salt spray or salt laden atmosphere may cause failure of the equipment for no apparent reason. In general it will be found that contacts such as tap switches, tube prongs, cable plug connectors, and relay contacts are most affected by corrosion. When it is necessary to operate the equipment in localities subject to such corrosive atmosphere, inspection of wiping contacts, cable plugs, relays etc., should be made more frequently in order to keep the equipment in good condition.

(b) Vacuum Tubes. - Make a check of emission characteristics of all tubes. After the emission check, examine the prongs on all tubes to make sure that they are free from corrosion. See that all tubes are replaced correctly and fully in their sockets, and a good electrical contact is made between the prong of the tube and the socket. Use caution in removing and replacing grid or plate caps on tubes so equipped. Before a tube is discarded, make certain that the tube is at fault and the trouble is not a loose or broken connection with the

equipment. A complete set of tested tubes of the same type specified should be kept on hand at all times. If faulty operation of the transmitter is observed and tube failure suspected, each tube may be checked by replacing it with a tube known to be in good condition. Defective tubes causing an overload in power circuits may usually be located by inspection. It will be found that excessive heating or sputtering within the vacuum tubes is a good indication of a fault in the tube circuit.

If tubes have been in use for a period of time equal to or exceeding the manufacturers tube life rating, it is suggested that they be replaced. A marked improvement in the performance of the equipment is usually noticeable after the weak tubes have been replaced.

1. Precautions for Satisfactory Tube Life.

a. Before any tube is removed from the equipment, make certain the primary power is disconnected from the equipment.

b. Operate all tubes within ±5% of rated filament voltage.

c. Do not exceed the rated plate current of any tube during normal operation of the equipment.

2. Tube Replacement Precautions.

a. All tubes are removed by pulling straight up on them.

b. Remove plate cap connectors, from tubes so equipped, with great care to prevent breaking the seal around the plate cap. Grid and plate cap adaptors are used on the modulator tubes. To prevent glass breakage when changing tubes, lay the tube on its side on a table, grasp the adaptor with a pair of pliers, and loosen the set screws with a Bristo wrench. When tightening the set screws on the new tube be sure and hold the adaptor with the pliers.

c. Before a tube is inserted, make certain that the type of tube is correct for the socket into which it is being placed.

NOTE

Changing master oscillator tubes (V001 may cause a slight change in master oscillator calibration.

(c) Relays. - All relays should be inspected at regular intervals. Check the contacts for proper alignment, pitting and corrosion. Use a burnishing tool to clean contacts - never use sandpaper or emery cloth.

5.2. TROUBLE SHOOTING.

5.2.1. GENERAL. - The most general cause of improper operation of radio equipment is tube failure. Refer to paragraph 5.1.2.(b) in this section for comments concerning vacuum tube replacement. Defective tubes causing an overload in power

circuits may usually be located by inspection. High voltage arcs may be caused by bent condenser plates, corrosion or dust. Corrosion resulting from operating the equipment in a salt laden atmosphere may cause failure of the equipment for no apparent reason.

In general, trouble encountered in radio apparatus may be isolated by means of various tests and measurements, and the section of the transmitter determined in which the trouble is located. If this is done, the components in the associated circuit may be checked and the trouble located. Refer to the tables of meter readings in Section 4 of this book.

No one but an authorized and competent service man equipped with proper test facilities should be permitted to service this equipment.

5.2.2. FUSES.

(a) General. - This equipment is supplied with fuses of the correct rating in each position. Fuse failures should be replaced with spares only after the circuit in question has been carefully examined to make certain that no permanent fault exists. Always replace a fuse with the rating specified in the following table.

FUSE TABLE

SYMBOL	LOCATION	TYPE	RATING
F601	Exciter unit filament transformer primary.	Cartridge (3AG)	1/2 amp.
F301	Transmitter audio amplifier tubes filament transformer primary.	Cartridge (3AG)	1/2 amp.
F401	Transmitter bias supply primary.	Cartridge (3AG)	1/2 amp.
F402	Transmitter LV power supply primary.	Cartridge (3AG)	3 amp.
F403	Transmitter modulator and PA filament transformer primary.	Cartridge (3AG)	2 amp.
F501	Transmitter HV rectifier filament primary.	Cartridge (3AG)	1 amp.
F101	Transmitter power line.	Plug	15 amp.
F102	Transmitter power line.	Plug	15 amp.

5.3. ALIGNMENT.

5.3.1. GENERAL. - Should, for any reason, the Model 310A exciter unit get out of

alignment, it is recommended that the unit be realigned at once. Improper operation might result in damage to valuable equipment.

5.3.2. OSCILLATOR ALIGNMENT. - Should trouble develop in the high frequency master oscillator, the unit should be returned to the factory for servicing. However, the unit can be serviced and realigned by persons understanding such techniques providing accurate test equipment is at hand. A crystal controlled frequency standard with outputs at 1700 and 2000 kc with an accuracy of better than .015 percent must be used for setting the band edges.

(a) Procedure..

1. Apply power to the exciter unit and warm up the oscillator for approximately 30 minutes.

2. Couple a receiver to the output of the oscillator.

3. Set the vernier index to exact cent r of the dial window.

4. Tune receiver to output of 1700 kc frequency standard.

5. Rotate MO to vicinity of 3400 kc on the exciter dial and zero beat with the signal from the standard. Write dial re ding down for use as a reference.

6. Rotate the MO dial toward 4 mc exactly 12 turns.

7. Tune the receiver to the 2000 kc output of the standard.

8. The MO should zero beat with the 2000 kc output of the standard at exactly 12 turns of the MO dial.

9. If such is the case but the dial reading is incorrect, loosen the set screw in the oscillator coupler and turn the dial to the correct reading (4000 kc) after which, tighten the set screws again. If the MO does not zero beat with the standard at 4 mc, proceed as follows:

10. Read the kc difference (the difference of where the signal appeared from where it should have appeared after 12 turns) and multiply it by 5, add this figure to the actual beat note dial setting if the beat note was less than 12 turns or subtract it if the beat note occurred at more than 12 turns. Now set the dial to this new frequency, remove the trimmer plug from the top of the oscillator, and turn the adjustment until zero beat is again reached.

It will be found that the high and low ends are very nearly 12 turns apart. Repeat the above procedure until such is the case; remember that a new reference point will occur at the low end of the dial each time. Examples of above operations:

#1

Beat note at low end of dial = 3402 kc
Reading at which beat note should appear after 12 turns of dial = 4002 kc

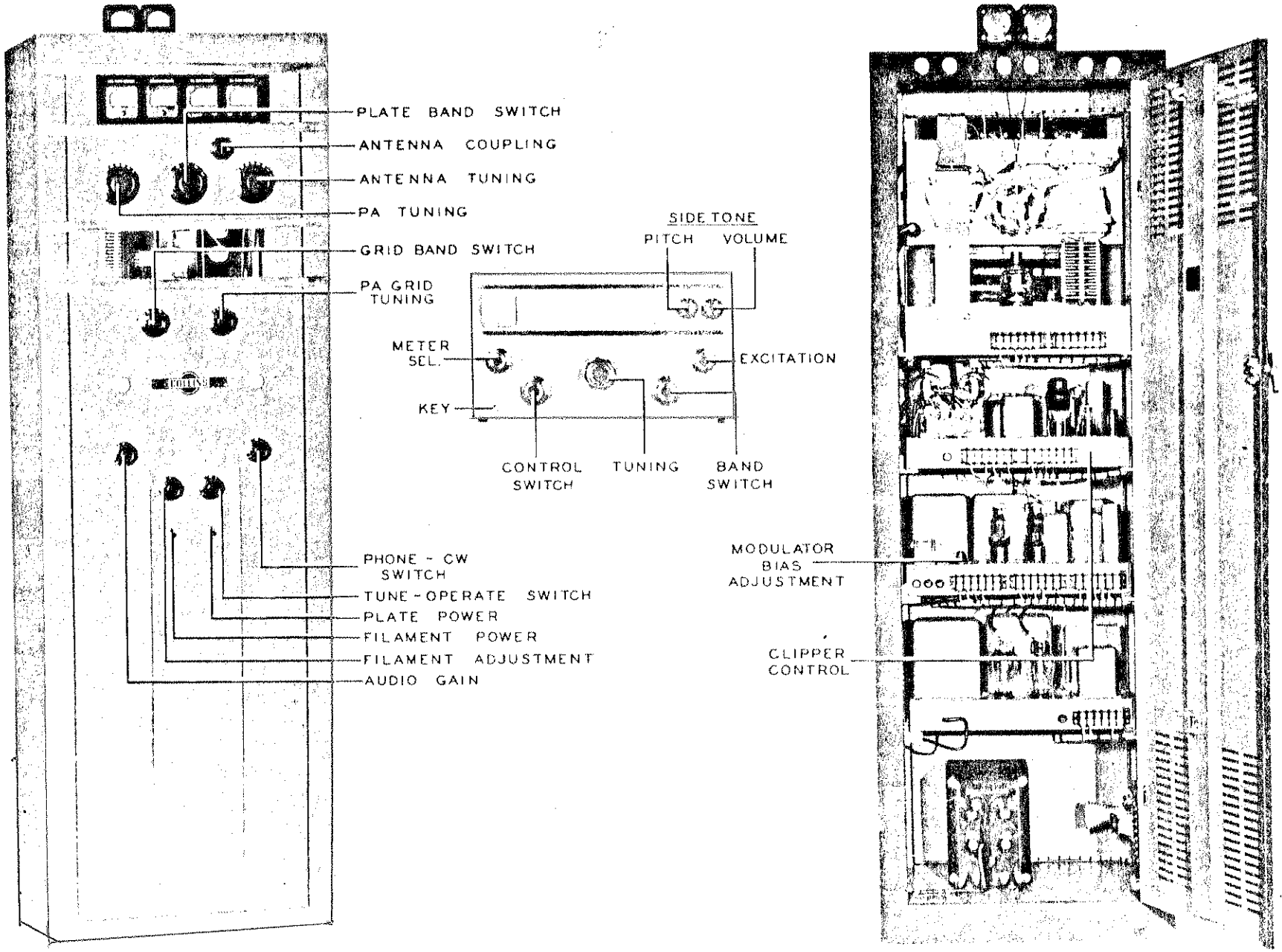


FIGURE 4-1 FUNCTIONS OF CONTROLS

Actual dial reading	= 4003 kc
Difference frequency (4003 - 4002)	= 1 kc
Multiplied by 5	= 5 kc
Subtracted from 4003 (since beat note occurred at more than 12 turns)	= 3998 kc

After setting dial to 3998 kc and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3398 kc.

#2

Beat note on low end of dial	= 3498 kc
Reading at which dial should appear after 12 turns	= 3998 kc
Actual dial reading	= 3996 kc
Difference frequency (3998 - 3996)	= 2 kc
Multiplied by 5	= 10 kc
Added to 3996 (since beat note occurred at less than 12 turns of the dial)	= 4006 kc

After setting the dial at 4006 and zero beating the MO to the standard with the trimmer adjustment, the low end beat note should appear at 3406 kc.

11. After the oscillator has been adjusted to cover the range 3400 to 4000 kc in exactly 12 turns, the coupler set screws can be loosened and the dial set on frequency.

NOTE

The above method of adjustment is that which is used at the factory. This is a short cut method and proves very reliable. Actually, the object is to get the 1700 kc and the 2000 kc outputs of the oscillator exactly 12 turns apart and it can be attained by using the slower method of moving the trimmer capacitor in one direction or the other and checking the results until the desired answer is obtained. Be sure to replace the trimmer cover plug after alignment.

5.3.3. EXCITER ALIGNMENT.

(a) Equipment Set-Up.

NOTE

If any of the main tuning capacitors have slipped with respect to each other or with respect to the dial, the following five steps must be performed before proceeding with the alignment. See steps 3, 4 and 5 for positions of capacitors and dial.

1. All power disconnected.

2. Loosen set screws in coupler connecting C613 shaft to dial drive.

3. Visually synchronize C606, C613, C618 (by turning capacitors to max. capacity position). Position crank arms on push rod to C606 at about 20° counter-clockwise from the plane of the straight edges of the rotor plates.

4. Visually align C606, C613, C618 at 90 rotation from max. capacity position.

5. Set Main Tuning Control at 3870 and tighten set screws on coupler connecting C613 to dial drive.

(b) Set Controls.

1. 30K-1 Fil SW on.

2. 30K-1 plate voltage control on LV.

3. 30K-1 plate SW on.

4. 310A-3 emission SW on SEND, key closed.

5. 310A-3 Excitation control on position 7.

(c) Trimmer Adjustments.

1. The following table lists the trimmer to be adjusted in each stage, on each band, in the order given, for maximum grid current in the following stage:

Set Band SW	Set Main Tuning	V602 Plate 2nd 6AG7	V603 Plate 1st 807	V604 Plate 2nd 807
80	4,000	C636	C637	C632
	3,400	L602	L604	L610
40	7,300	----	----	C633
	7,000	----	----	L611
20	14,400	----	C638	C634
	14,000	----	L605	L612
15	21,450	----	C639	C635
	21,000	----	L606	L613
10	29,700	----	C640	C619
	27,000	----	L607	L614

2. Start with inductive trimmers approximately centered in their adjustment range and coupling coils in place on the "cold" end (nearest chassis) of the plate coils of the V604 stage.

3. Alignment will be indicated on the meter as shown below:

Circuit	Meter Switch	Typical Meter Reading
Plate 2nd 6AG7	1st 807 grid	1-3 MA
Plate 1st 807	2nd 807 grid	4-5 MA
Plate 2nd 807	P.A. grid current	15 MA

4. Set Band Switch at 80.

5. Set Main Tuning at the higher frequency (4,000 kc).

6. Adjust C636, then C637, then C632, keeping the Grid Tuning control on the 30K-1 in resonance when adjusting C632. Alignment will be indicated as in paragraph c.3.

7. Set the Main Tuning Control at the lower frequency (3400 kc) and adjust L602, then L604, then L610, keeping the Grid Tuning Control on the 30K-1 in resonance when adjusting L610.

8. Repeat step 6 and 7 until tracking is obtained at each end of the band.

9. Alignment of the other bands is to be done in a similar manner, following the table in c.1 above.

10. NOTE: On the 40 meter band no adjustment of the V602 and V603 stages is made.

11. NOTE: On the 20, 15 and 10 meter bands no adjustment of the V602 stage is made.

12. Check second 807 grid current and PA grid current while tuning across each amateur band for abnormal variation or unstable operation. Variations should be gradual.

5.4. OSCILLATOR TUBE REMOVAL.

Replacing an oscillator tube requires the breaking of the seal around the shield and it will then become necessary to reseal the shield. If it becomes necessary to replace an oscillator tube, use a glyptal cement or a generous portion of Duco cement to reseal the shield.

5.5. DESICCANT CAPSULE.

A silica-gel tube is mounted on the top of the oscillator shield. The silica-gel absorbs moisture from within the oscillator and aids in retaining the oscillator calibration. Moisture causes the color the silica-gel to change from blue to pink. The silica-gel tube is screwed into a hole in the shield and should be replaced by a new tube of silica-gel when all of the material within the tube has changed from blue to pink. New tubes of silica-gel may be ordered from the Collins Radio Company.

NOTE

The seal around the oscillator tube shield and the silica-gel tube is more easily broken if the parts are warm. This can be done safely with a light bulb or infra-red lamp placed close to the oscillator.

310A-3 EXCITER UNIT

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
70E8-A	OSCILLATOR:	This unit has been dehydrated and hermetically sealed and should be returned to the Collins Radio Company if servicing is required	
C601	V601 Cathode bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C602	V602 Grid coupling	CAPACITOR: 2200 mmf ± 20%, 500 WV	935 4123 00
C603	V602 Screen bypass	CAPACITOR: 4700 mmf ±20%, 500 WV	935 2104 00
C604	V602 Cathode bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C605	V602 Plate bypass	CAPACITOR: 4700 mmf ±20%, 500 WV	935 2104 00
C606	V602 Plate tuning	CAPACITOR: 6 mmf min, 50 mmf max	922 0021 00
C607	V603 Grid coupling	CAPACITOR: 1000 mmf ±20%, 2500 WV	936 0250 00
C608	V603 Grid bypass	CAPACITOR: 2200 mmf ±20%, 500 WV	935 4123 00
C609	V603 Cathode bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C610	V603 Filament bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C611	V603 Screen bypass	CAPACITOR: 4700 mmf ±20%, 500 WV	935 2104 00
C612	V603 Plate blocking	CAPACITOR: 2200 mmf ±20%, 500 WV	935 4123 00
C613	V603 Plate tuning	CAPACITOR: 6 mmf min, 50 mmf max	922 0021 00
C614	V604 Grid coupling	CAPACITOR: .001 mf ±20%, 2500 WV	936 0250 00
C615	V604 Screen bypass	CAPACITOR: .1 mf +40 -15%, 600 WV	961 4020 00
C616	V604 Filament bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C617	V604 Plate Blocking	CAPACITOR: 2200 mmf ±20%, 500 WV	935 4123 00
C618	V604 Plate tuning	CAPACITOR: 35 mmf max, 5 mmf min	922 0022 00
C619	L614 Tuning	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C620	V607 Feedback	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C621	V607 Feedback	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C622	V607 Cathode bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C623	V604 Cathode bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C624	Side-tone pitch determining	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
C625	C625 A and B	CAPACITOR: 3 x 0.1 mf + 40 - 15%, 600 WV	961 4059 00
C625A	Sidetone plate bypass	CAPACITOR: Part of C625	
C625B	Sidetone plate bypass	CAPACITOR: Part of C625	
C625C	Sidetone plate bypass	CAPACITOR: Part of C625	
C626	Sidetone output coupling	CAPACITOR: 0.5 mf + 40 - 15%, 600WV	961 4077 00
C627	V601 Grid coupling	CAPACITOR: 100 mmf ±10%, 500 WV	916 4003 00
C628	Oscillator B+ r-f filter	CAPACITOR: 10,000 mmf ±20%, 350 WV	913 0106 00
C629	V601 Grid load	CAPACITOR: 10 mmf ±20%, 500 WV	935 0071 00
C630	V601 Grid bypass	CAPACITOR: 0.1 mf ±10%, 400 WV	931 3020 00
C631	V601 Screen bypass	CAPACITOR: 0.1 mf ±20%, 300 WV	935 2118 00
C632	L610 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C633	L611 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C634	L612 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C635	L613 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C636	L602 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C637	L604 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C638	L605 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C639	L606 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C640	L607 Trimming	CAPACITOR: 25.7 mmf max, 3.9 mmf min	922 0017 00
C641	V601 Plate bypass	CAPACITOR: .01 mf ±20%, 300 WV	935 2118 00
E601	V603 Grid suppressor	PARASITIC SUPPRESSOR: 47 ohm ±10%, 1 w resistor shunted by 8 turns #18 copper wire	571 1064 10
E602	V604 Grid suppressor	PARASITIC SUPPRESSOR: 47 ohm ±10%, 1 w resistor shunted by 8 turns #18 copper wire	571 1064 10

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
E603	V603 Plate suppressor	PARASITIC SUPPRESSOR: 47 ohm ± 10%, 1 w resistor shunted by 8 turns #18 copper wire	571 1064 00
E604	V604 Plate suppressor	PARASITIC SUPPRESSOR: 47 ohm ±10%, 1 w resistor shunted by 8 turns #18 copper wire	571 1064 00
	Power connector	STRIP: Terminal, phenolic, 8 post	367 0039 00
	Power connector	STRIP: Terminal, phenolic, 8 post	367 0039 00
F601	Fil. transformer fuse	FUSE: 1/2 amp, 250 v	264 4260 00
I101	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I102	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I103	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I104	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I105	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I106	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I107	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I108	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I109	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I110	Dial lamp	LAMP: 6 v, 0.2 amp, bulb T-1-3/4	262 0023 00
I111	Dial lamp	LAMP: Pilot, 6.3 v, 0.15 amp	262 3240 00
J601	Key jack	JACK: 2 conductor, closed circuit, for plug with 1/4" barrel	360 1060 00
J602	R-F Output	CONNECTOR: single conductor, pressure type contact	369 1007 00
	Interlock connector	CONNECTOR: 2 conductor convenience outlet	368 4500 00
	Filter connector	TERMINAL: Socket for banana plug (4)	304 0011 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
L601	V601 Plate	COIL: Choke, 2.5 mh, 0.125 amp	240 5300 00
L602	V602 Plate coil	COIL ASSEM: 37 turns #30 wire	503 6761 003
L603	V603 Plate choke	COIL: Choke, 2.5 mh, 0.125 amp	240 5300 00
L604	V603 Plate coil	COIL ASSEM: 80 meters, Mult	503 6762 003
L605	V603 Plate coil	COIL ASSEM: 40 meters, Mult	503 6763 003
L606	V603 Plate coil	COIL ASSEM: 30 meters, Mult	503 6764 003
L607	V603 Plate coil	COIL ASSEM: 20 meters, Mult	503 6765 003
L608	V604 Grid choke	COIL: Choke, 2.5 mh, 0.125 amp, 50 ohm	240 2100 00
L609	V604 Plate choke	COIL: Choke, 1 mh ±10%, 0.6 amp	240 2600 00
L610	V604 Plate coil	COIL ASSEM: 80 meters, Tank	503 6766 003
L611	V604 Plate coil	COIL ASSEM: 40 meters, Tank	503 6767 003
L612	V604 Plate coil	COIL ASSEM: 20 meters, Tank	503 6768 003
L613	V604 Plate coil	COIL ASSEM: 15 meters, Tank	503 6769 003
L614	V604 Plate coil	COIL ASSEM: 10 meters, Tank	503 6770 003
L615	Pick up coil for L610	COIL: Part of L610, four turns	
L616	Pickup coil for L611	COIL: Part of L611, three turns	
L617	Pickup coil for L612	COIL: Part of L612, two turns	
L618	Pickup coil for L613	COIL: Part of L613, one turn	
L619	Pickup coil for L614	COIL: Part of L614, one turn	
L620	Osc B+ r-f filter	COIL: Choke, 2.5 mh, 0.125 amp, 50 ohm	240 2100 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
M601	Grid and plate	METER: 0-5 ma DC movement, marked 0-1000, 0-100, 0-10	458 0165 00
	Output connector	CONNECTOR: plug for single conductor cable 1/4" max (2)	369 1006 00
	Interlock connector	CONNECTOR: 2 prong male plug	368 0028 00
R601	V601 grid	RESISTOR: 22,000 ohm ±10%, 1/2 w	745 1142 00
R602	V601 Cathode	RESISTOR: 1000 ohm ±10%, 1 w	745 3086 00
R603	V602 Grid	RESISTOR: 47,000 ohm ±10%, 1 w	745 3156 00
R604	V602 Cathode	RESISTOR: 470 ohm ±10%, 1 w	745 3072 00
R605	V602 Screen	RESISTOR: 33,000 ohm ±10%, 2 w	745 5149 00
R606	V603 Grid	RESISTOR: 22,000 ohm ±10%, 2 w	745 5142 00
R607	V603 Cathode	RESISTOR: 750 ohm ±10%, 10 w	710 1750 20
R608	V603 Cathode	RESISTOR: 4700 ohm ±10%, 2 w	745 5114 00
R609	V603 Cathode	RESISTOR: 3300 ohm ±10%, 2 w	745 5107 00
R610	V603 Cathode	RESISTOR: 3000 ohm ±10%, 25 w	710 3342 00
R611	V603 Screen	RESISTOR: 47 ohm ±10%, 1 w	745 3030 00
R612	V604 Grid	RESISTOR: 22,000 ohm ±10%, 2 w	745 5142 00
R613	V604 Screen suppressor	RESISTOR: 47 ohm ±10%, 1 w	745 3030 00
R614	Pitch control	RESISTOR: Variable; 250,000 ohm ±20%, 1/2 w	376 3026 00
R615	Sidetone volume control	RESISTOR: Variable; 1000 ohm, 63 ma	377 2200 00
R618	Regulator tube dropping	RESISTOR: 3000 ohm ±10%, 25w	710 3342 00
R619	Voltage divider	RESISTOR: 3000 ohm ±10%, 25 w	710 3342 00
R621	L604 Loading	RESISTOR: 47,000 ohm ±10%, 2 w	745 5156 00
R623	V604 Screen divider	RESISTOR: 22,000 ohm ±10%, 2 w	745 5142 00
R624	Output load	RESISTOR ASSEM: Nicrome wire wound on special form	503 4439 002
R624A	Part of R624	RESISTOR: Part of R624, 15	
R624B	Part of R624	RESISTOR: Part of R624, 15	

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R624C	Part of R624	RESISTOR: Part of R624, 8.5	
R625	V601, V602 Grid	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
R626	Keying load	RESISTOR: 220,000 ohm ±10%, 1/2 w	745 1184 00
R627	V607 Plate decoupling	RESISTOR: 10,000 ohm ±10%, 1/2 w	745 1128 00
R628	V607 Plate load	RESISTOR: 47,000 ohm ±10%, 1/2 w	745 1156 00
R629	V607 Plate load	RESISTOR: 47,000 ohm ±10%, 1/2 w	745 1156 00
R630	V607 Grid	RESISTOR: 10,000 ohm ±10%, 1/2 w	745 1128 00
R631	V607 Grid	RESISTOR: 4700 ohm ±10%, 1/2 w	745 1114 00
R632	Meter shunt	RESISTOR: 25 ohm ±5%, 1/2 w	701 0001 00
R633	Meter mult	RESISTOR: 100,000 ohm ±5%, 2 w	745 5169 00
R634	Meter mult	RESISTOR: 100,000 ohm ±5%, 2 w	745 5169 00
R635	Meter mult	RESISTOR: 100,000 ohm ±5%, 2 w	745 5169 00
R636	Meter mult	RESISTOR: 100,000 ohm ±5%, 2 w	745 5169 00
R637	Meter shunt	RESISTOR: 25 ohm ±5%, 1/2 w	701 0001 00
R638	Meter shunt	RESISTOR: 25 ohm ±5%, 1/2 w	701 0001 00
R639	Meter shunt	RESISTOR: 1.2 ohm ±5%, 1/2 w	707 0053 00
R640	Meter shunt	RESISTOR: 1.2 ohm ±5%, 1/2 w	707 0053 00
R641	Excitation control	RESISTOR: Variable; 25,000 ohm, 0.013amp	377 2280 00
R642	L605 Load	RESISTOR: 47,000 ohm ±10%, 2 w	745 5156 00
R643	L606 Load	RESISTOR: 47,000 ohm ±10%, 2 w	745 5156 00
R644	V607 Plate decoupling	RESISTOR: 47,000 ohm ±10%, 1/2 w	745 1156 00
R645	Regulator dropping	RESISTOR: 10,000 ohm ±10%, 25 w	710 3104 20
R647	V601 Screen	RESISTOR: 100,000 ohm ±10%, 1/2 w	745 1170 00
S601	Bond change	SWITCH: Band change, 7 circ, 5 pos, 6 deck	259 0030 00
S601A	V603 Plate coil shorting	SWITCH: Part of S601	

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
S601B	V603 Plate coil selecting	SWITCH: Part of S601	
S601C-1	V603 Cathode bias	SWITCH: Part of S601	
S601C-2	Dial light	SWITCH: Part of S601	
S601D	V604 Plate coil shorting	SWITCH: Part of S601	
S601E	V604 Plate coil selecting	SWITCH: Part of S601	
S601F	Output link selecting	SWITCH: Part of S601	
S602	Function switch	SWITCH: Band change, 5 circ, 4 pos, 3 deck	259 0031 00
S602A	Receiver disabling	SWITCH: Part of S602	
S602B	Plate switch	SWITCH: Part of S602	
S602C	V603, V604 Cathode opening	SWITCH: Part of S602	
S602D	HV Plate control	SWITCH: Part of S602	
S602E	Filament	SWITCH: Part of S602	
S603	Interlock	SWITCH: Snap, single pole, normally open	260 0708 00
S604	Meter circuit selector	SWITCH: Band change, 2 circ, 5 pos, non-shorting	259 0045 00
S604A	Part of S604	SWITCH: Part of S604	
S604B	Part of S604	SWITCH: Part of S604	
T601	Filament transformer	TRANSFORMER: Amp fil., Pri: 115 v, 2500 TV, 19 VA, Sec: 6.3 v CT, 3 amp rms, 2500 TV, 19 VA	672 0069 00
V601	Isolation buffer	TUBE: Type 6AG7, pentode power amp	255 0039 00
V602	Frequency doubler	TUBE: Type 6AG7, pentode power amp	255 0039 00
V603	Frequency multiplier	TUBE: Type 807, beam power amp	256 0033 00
V604	Frequency doubler	TUBE: Type 807, beam power amp	256 0033 00
V605	Voltage regulator	TUBE: Type VR150	257 0001 00
V606	Voltage regulator	TUBE: Type VR105	257 0002 00
V607	Sidetone oscillator	TUBE: Type 6SL7GT, twin triode	255 0040 00
V608	Voltage regulator	TUBE: Type VR150	257 0001 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
V609	Voltage regulator	TUBE: Type VR105	257 0002 00
XF601	Fuse holder	CLIP: Fuse, phosphor bronze	265 1002 00
XI111	Pilot light socket	SOCKET: Pilot light	262 1210 00
XV601, XV602	Tube socket	SOCKET: Octal	220 1005 00
XV603, XV604	Tube socket	SOCKET: 5 prong	220 5520 00
XV605, XV606, XV607, XV608, XV609	Tube Socket	SOCKET: Octal	220 1005 00
30K TRANSMITTER UNIT			
C201	PA grid tuning	CAPACITOR: 20 mmf to 67 mmf	920 0001 00
C202	PA grid blocking	CAPACITOR: .001 mf ±20%, 500 WV	935 4101 00
C203, C204	Filament bypass	CAPACITOR: .0047 mf ±20%	936 1105 00
C205	Screen bypass	CAPACITOR: .0047 mf ±20%	936 1105 00
C206	Plate blocking	CAPACITOR: 150 mmf	924 1004 00
C207	C207A and B PA plate tuning	CAPACITOR: Dual section; 13 mmf to 34.5 mmf and 20 mmf to 57 mmf	920 0002 00
C208	Antenna coil tuning	CAPACITOR: 19 mmf to 202 mmf; dual section	920 0023 00
C209	20M grid coupling	CAPACITOR: 200 mmf ±5%, 600 WVDC	913 0132 00
C210	20M grid coupling	CAPACITOR: 250 mmf ±5%, 600 WVDC	913 0133 00
C211	15M grid coupling	CAPACITOR: 300 mmf ±5%, 600 WVDC	913 0134 00
C212	10M grid coupling	CAPACITOR: 250 mmf ±5%, 600 WVDC	913 0133 00
C301	V301 cathode bypass	CAPACITOR: 20 mf +100% -10%, 100 WV	183 3310 00
C302	C302A, C302B, C302C	CAPACITOR: 3 x .1 mfd, +40 -15%, 600 WV	961 4059 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
C302A C302B C302C	V301 Screen bypass V301 Plate Decoupling	Part of C302 Part of C302	
C304, C305	Audio coupling capacitor	CAPACITOR: .01 mf ±20%, 200 WV	935 2118 00
C306	Filter tuning capacitor	CAPACITOR: 180 mmf ±5%, 500 WV	935 0116 00
C307, C308	Audio filter	CAPACITOR: 200 mmf ±5%, 500 WV	935 0118 00
C309	V302 Cathode bypass	CAPACITOR: 20 mf + 100% - 10%, 100 WV	183 3310 00
C310	Audio coupling	CAPACITOR: 0.1 mf + 40% - 15%, 600 WV	961 5020 00
C311	V304 Cathode bypass	CAPACITOR: 20mf +100% - 10%, 100 WV	183 3310 00
C312, C313, C314	Plate decoupling	CAPACITOR: 4 mf +40% - 15%, 600 WV	961 3005 00
C315	Mod grid bypass	CAPACITOR: 4700 mmf ±20%, 500 WV	935 2104 00
C316	V301 grid bypass	CAPACITOR: 100 mmf ±20%, 500 Wv	935 0107 00
C317	V301 Cathode bypass	CAPACITOR: .001 mf ±20%, 500 WV	935 4101 00
C401, C402	Filter	CAPACITOR: 4 mf + 40% - 15%, fixed, 600 WV	961 3005 00
C403	Filter	CAPACITOR: 10 mf ±10%, 1000 WV	930 0038 00
C501	Reactor tuning	CAPACITOR: 0.1 mf ±10%, 5000 WV	930 0042 00
*C501	Reactor tuning	CAPACITOR: .15 mf ±10%, 5000 WV	930 0035 00
C502, C503	Filter	CAPACITOR: 2 mf ±10%, 4,000 WV	930 0040 00
F101, F102	Line fuse	FUSE: 15 amp, 125 v	264 1150 00
F301	T303 Primary	FUSE: 1/2 amp, 250 v, 2 ohms	264 4250 00
F401	T401 Primary	FUSE: 1/2 amp, 250 v, 2 ohms	264 4260 00

* 50 cps equipments

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
F402	T402 Primary	FUSE: 3 amp, 250 v	264 4080 00
F403	T403 Primary	FUSE: 2 amp, 250 v	264 4070 00
F501	T501 Primary	FUSE: 1 amp, 250 v, 0.7 ohms	264 4280 00
I101	Filament pilot	LIGHT: Candelabra base; 125 v, 0.040 amps, 6 watts	262 3320 00
I102	Plate pilot	LIGHT: Candelabra base;125v;0.040amps;6 w	262 3320 00
J201	PA r-f input receptacle	CONNECTOR: Standard open circuit input; wall mounting; pressure type contact for single conductor shielded cables	369 1007 00
J301	Microphone connector receptacle	CONNECTOR: Standard open circuit input; wall mounting; pressure type contact for single conductor; shielded cables	369 1008 00
K401	Plate power control	RELAY: Single pole normally open double break; 15 amps, 112 v, 5000 ohms	405 0021 00
L201	V201 Grid	COIL: 80 meters; 48 turns #24 G.A. enam. wire	503 4441 002
L202	V201 Grid	COIL: 40 meters; 80 turns #24 G.A. magnet wire	503 4442 002
L203	V201 Grid	COIL: 20 meters; 10 turns #18 G.A. tinned copper wire	503 4443 002
L204	V201 Grid	COIL: 15 meters; 7 turns #18 G.A. tinned copper wire	503 4444 002
L205	V201 Grid	COIL: 10 meters; 5 turns #18 tinned copper wire	503 4445 002
L211	V201 Grid	CHOKE: 2.5 mh ±10%, 50 ohms	240 5300 00
L212	V201 Plate	CHOKE: 1.0 mh ±10%, 0.6 amp	240 2600 00
L213	V201 Plate	COIL: 40 & 80 meter plate tank, 24 turns #14 wire	503 3491 002
L214	V201 Plate	COIL: 15 & 20 meter plate tank, 8 turns #10 wire	503 3492 002
L215	V201 Plate	COIL: 10 meter, 4 turns #10 G.A. tinned copper wire	503 8832 002
L216 L217 L218	Link coil Antenna coil Antenna coil	COIL ASSEM: Plug-in; 80 - 40 meter	520 3509 00
L216 L217 L218	Link coil Antenna coil Antenna coil	COIL ASSEM: Plug in; 20-15-10 meter	520 3510 00
L219, L220	Static drain choke	CHOKE: 1 mh ±10%, 0.6 amp	240 2600 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
L301	Audio filter	CHOKE: Audio reactor, 3.75 hy ±0.25 henry, 100-5000 cps	678 0077 00
L302	V301 Grid	CHOKE: 3.8 microhy, 300 ma	240 0032 00
L401	Filter	CHOKE: 12 hy 75 ma filter reactor, 120 cps	678 0075 00
L402	Filter	CHOKE: 6 hy 250 ma filter reactor 120 cps	678 0076 00
L501, L502	HV Filter	CHOKE: 12 hy 300 ma, filter reactor 120 cps	678 0081 00
M101	PA Plate current	METER: 300 ma, 30 scale divisions, 10 ma per division, DC milliameter	450 0031 00
M102	PA Grid current	METER: 25 ma, DC milliameter	450 0029 00
M103	Filament voltage	METER: 10 v AC	452 0006 00
M104	Modulator plate current	METER: 200 ma, 40 scale divisions, 5 milliamps per division	450 0030 00
M105, M106	Antenna current	METER: 0-3 amp RF, 30 scale divisions	451 0018 00
P301	Microphone plug	CONNECTOR: Plug connector for single conductor shielded cables	369 1006 00
R101	Series resistor for tuning	RESISTOR: 660w, heater element conical, 115 v	711 0003 00
R201	PA Grid leak	RESISTOR: 5000 ohms ±10%, 25 watts	710 3542 00
R202	PA Screen dropping resistor	RESISTOR: 5000 ohms ±10%, 50 watts	710 4542 00
R302	V301 Grid	RESISTOR: 1.0 meg ±10%, 1/2 watt	745 1212 00
R303	V301 Cathode	RESISTOR: 1000 ohms ±10%, 1/2 watt	745 1086 00
R304	V301 Screen dropping	RESISTOR: .47 meg ±10%, 1/2 watt	745 1198 00
R305	V301 Plate	RESISTOR: 100,000 ohms ±10%, 1 watt	745 3170 00
R306	V302 Grid	RESISTOR: 500,000 ohms potentiometer	376 3027 00
R307	V302 Cathode	RESISTOR: 1000 ohms ±10%, 1 watt	745 3086 00
R308	V302 Plate	RESISTOR: 47,000 ohms ±10%, 2 watt	745 5156 00
R309	Audio dropping	RESISTOR: 100,000 ohms ±10%, 1/2 watt	745 1170 00
R310	V302 Grid	RESISTOR: 100,000 ohms ±10%, 1 watt	745 3170 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
R311, R312	Voltage divider and V302 cathode	RESISTOR: 620 ohms ±5%, 1 watt	745 3077 00
R313	Voltage divider and V302 Cathode	RESISTOR: 330 ohms ±10%, 1 watt	745 3065 00
R314	V302 Plate	RESISTOR: 47,000 ohms ±10%, 2 watt	745 5156 00
R315	Gain control	RESISTOR: 100,000 ohms potentiometer	380 3100 40
R316	V304 Bias	RESISTOR: 750 ohms ±10%, 10 watts	710 1750 20
R317	Plate decoupling	RESISTOR: 47,000 ohms ±10%, 1 watt	745 3156 00
R318	Plate decoupling	RESISTOR: 4000 ohms ±10%, 50 watts	710 4442 00
R319	Plate decoupling	RESISTOR: 20,000 ohms ±10% 10 watts	710 1204 20
R320	Plate decoupling	RESISTOR: 4,700 ohms ±10%, 2 watt	745 5114 00
R401	Modulator bias control	RESISTOR: 750 ohms ±10%, 25 watts	735 0002 00
R402	Bias voltage divider	RESISTOR: 500 ohms ±10%, 10 watts	710 1500 20
R403	Bias voltage divider	RESISTOR: 1000 ohms ±10%, 10 watts	710 1142 00
R404	Bleeder voltage divider	RESISTOR: 25,000 ohms ±10%, 50 watts	710 4254 20
R405	Relay voltage dropping	RESISTOR: 1250 ohm ±10%, 10 watts	710 0024 00
R501, R502, R503, R504	Bleeder	RESISTOR: 25,000 ohms ±10%, 50 watts	710 4254 20
S101	Filament adjusting	SWITCH: 3 position single circuit, 10 amp contacts in all positions	259 1180 00
S102	Tune-operate	SWITCH: 3 position single circuit, 10 amp contacts in all positions	259 1180 00
S103	Filament power	SWITCH: SPST toggle	266 3005 00
S104	Plate power	SWITCH: SPST toggle	266 3005 00
S105	Door interlock	SWITCH: Push button, 3 amps, 125 v	266 0003 00
S201	S201A, S201B, S201C, S201D	SWITCH: 4 circuits, 5 position, 4 decks; 3 decks are single circuit 5 position shorting, 1 deck shorts all except one contact together	259 0020 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
S201A	Relay selector	Section of S201	
S201B	Link selector	Section of S201	
S201C	Grid coil shorting	Section of S201	
S201D	Grid coil selector	Section of S201	
S202	S202A, B, C, D	SWITCH: 5 position tap switch, 4 deck	503 3540 004
S202A	Plate coil selector	Section of S202	
S202B	Plate coil shorting	Section of S202	
S202C	Antenna selector	Section of S202	
S202D	Antenna selector	Section of S202	
S301	S301A, B	SWITCH: includes	
		STANDOFF: (qty 2 req) ceramic, 1"x3/8"dia	190 0012 00
		STANDOFF: (qty 4 req) ceramic,2" x3/8"dia	190 0021 00
		CONTACT STUD: 8-32 hex	305 0145 00
S301A	Mod fil switch	Section of S301	
S301B	Mod transformer shorting	Section of S301	
T101	High voltage plate	TRANSFORMER: 50/60 cps; Pri: 115 v; Sec: 5700 v CT; 300 ma	662 0015 00
T301	Modulator input	TRANSFORMER: Driver; class "B"; Pri: 60 ma unbalanced; 2500 ohms; Sec: 15 ma balanced; 15,000 ohms, CT	677 0074 00
T302	Modulation	TRANSFORMER: Modulation; Pri: 175 ma bal; 32,000 ohms CT; Sec #1: 150 ma; 16,700 ohms; Sec #2: 50 ma unbalanced; 248 v rms w/1770 v across Sec #2	677 0073 00
T303	V304 Filament	TRANSFORMER: 50/60 cps; Pri: 115 v; Sec: 6.3 v; CT; 3.0 amps	672 0069 00
T401	Bias power	TRANSFORMER: 50/60 cps; Pri: 115 v; Sec: 5.0 v; 2.0 amps; 5.0 v, 2.0 amps; 420 v, CT; 0.100 amp	672 0068 00
T402	LV Power	TRANSFORMER: 50/60 cps; Pri: 105v, 115 v, 125 v; Sec: 1320 v; CT; .177 amps	672 0080 00
T403	V202, V305, V306 Filament	TRANSFORMER: 50/60 cps; Pri: 105v, 110 v 115 v; Sec: 5.0 v; CT; 20.0 amps	672 0072 00
T501	High voltage rectifier filament	TRANSFORMER: 50/60 cps; Pri: 105v, 110 v, 115 v; Sec: 2.5 v; 10 A	672 0079 00
V201	Power amplifier	TUBE: Type 4-125A; power tetrode	256 0068 00
V301	Audio input	TUBE: Type 6SJ7; triple grid detector amplifier	255 0030 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NUMBER
V302	Audio amplifier	TUBE: Type 6SN7-GT; twin triode amplifier	255 0033 00
V303	Clipper	TUBE: Type 6H6; twin diode	255 0117 00
V304	Audio driver	TUBE: Type 6B4G; power amplifier triode	255 0124 00
V305, V306	Modulator	TUBE: Type 75 TH; medium MU triode	256 0071 00
V401	Bias rectifier	TUBE: Type 5R4GY; full wave high-vacuum rectifier	257 0020 00
V402	Low voltage rectifier	TUBE: Type 5R4GY; full-wave high-vacuum rectifier	257 0020 00
V501, V502	High voltage rectifier	TUBE: Type 866A; half-wave mercury-vapor rectifier	256 0049 00
XF101, XF102	Sockets for F101, F102	MTG BLOCK: Fuse; 2 plug receptacle	265 1013 00
XF301, XF401, XF402, XF403, XF501	Holders for F301, F401, F402, F403, F501	HOLDER: Fuse; extractor post	265 1002 00
XI101, XI102	Sockets for I101, I102	SOCKET: Pilot light	262 0033 00
XR101	Socket for R101	SOCKET: Heater; std screw type	265 1010 00
XV201	Socket for V201	SOCKET: Tube socket for 5 prong tube	220 1016 00
XV301, XV302, XV303, XV304	Socket for V301, V302, V303, V304	SOCKET: Eight prong tube socket	220 1005 00
XV305, XV306	Socket for V305, V306	SOCKET: Four prong tube socket	220 5450 00
XV401, XV402	Socket for V401, V402	SOCKET: Eight prong tube socket	220 1005 00
XV501, XV502	Socket for V501, V502	SOCKET: Four prong tube socket, 9/16" x 1-11/16" x 1-49/64"	220 5450 00