

30K-2 HIGH FREQUENCY TRANSMITTER

INSTRUCTION BOOK

INSTRUCTION BOOK

for

MODEL 30K-2 HIGH FREQUENCY TRANSMITTER

MANUFACTURED BY

COLLINS RADIO COMPANY, CEDAR RAPIDS, IOWA

520 9329 00

13509 w3upv 12/15



TABLE OF CONTENTS

Paragraph P.	age
SECTION 1 - GENERAL DESCRIPTION	
1.1. General. 1.2. Reference Data 1.2.1. Overall Dimensions and Weights 1.2.2. Frequency Range. 1.2.3. Number of Channels 1.2.4. Frequency Control. 1.2.5. Types of Emission. 1.2.6. Nominal Carrier Output 1.2.7. Audio Frequency Response 1.2.8. Audio Frequency Distortion 1.2.9. Input Impedance (Microphone) 1.2.10. Altitude for Rated Voltage 1.2.11. Power Requirements 1.2.12. Power Source 1.3. Vacuum Tube Complement 1.3.1. Type 30K-2 Transmitter 1.3.2. Type 177L-1 Remote Control Unit	1-2 1-2 1-2 1-2 1-2 1-2 1-3 1-3 1-3 1-3 1-3
SECTION 2 - INSTALLATION	
2.1.2. Preliminary	2-1
SECTION 3 - ADJUSTMENT AND OPERATION	
3.1. General. 3.1.1. Filament, On-off Switch. 3.1.2. Plate, On-off Switch. 3.1.3. Fil Voltage Adjustment. 3.1.4. Plate Voltage Control. 3.1.5. Phone CW Selector Switch. 3.1.6. Test Key. 3.1.7. Channel Switch. 3.1.8. Local-Remote Control Switch. 3.1.9. Osc Plate Tuning. 3.1.10. Mult Plate Tuning. 3.1.11. Ant Tuning & Loading. 3.1.12. PA Plate Tuning. 3.1.13. Audio Gain. 3.2. Energizing the Equipment for the First Time.	3-1 3-1 3-1 3-2 3-2 3-2 3-2 3-2 3-2
3.2.1. Precautions	

TABLE OF CONTENTS

Paragraph	<u>æ</u>
SECTION 3 - ADJUSTMENT AND OPERATION (CONT.)	
3.3. Adjustment Procedure	-2
4.1. General. 4.2. Primary Power Circuits 4.2.1, Rectifier Power System 4.3. Carrier Control Circuits 4.4. RF Circuits 4.4. Oscillator 4.4.2. Multiplier 4.4.3. RF Power Amplifier 4.4.4.4. RF Output Circuits 4.5. Audio Circuits	1-1-2-2-2-2-3-3-3
SECTION 5 - MAINTENANCE	
5.1. Routine Inspection Schedules 5.1.1. Cleaning 5.1.2. Vacuum Tubes 5.1.3. Relays 5.2. Trouble Shooting 5.2.1. General 5.2.2. Isolating the Trouble 5.2.3. Power Supply Troubles 5.2.4. Radio Frequency Trouble 5.2.5. Audio System Troubles 5.3. Replacement of Parts 5.4. Crystal Data 5.5.	1223334556

SECTION 6 - PARTS LIST

LIST OF ILLUSTRATIONS

Figure	<u>Title</u>
1-1	Type 30K-2 Transmitting Equipment
2-1	Type 30K-2 Transmitter Outline and Mounting Dimensions
2-2	Type 177L-1 Remote Control Unit Outline and Mounting Dimensions
2 3	Unit Placement Photograph
2-4	External Connections
2-5	Applicable Antenna Circuits
2-6	Suggested Ground System
2-7	Antenna Horn Gap
3 -1	Control Functions
4-1	Primary Power Circuit
4-2	Carrier Control Circuits
43	Audio Peak Clipper Circuit
4-4	Clipper Waveform Illustration
5 – 1	RF Output Network, Parts Arrangement - Top
5-2	RF Exciter, Amplifier and Output Network, Parts Arrangement - Front
5-3	RF Exciter, Amplifier and Output Network, Parts Arrangement - Rear
5 -4	RF Exciter, Amplifier and Output Network, Parts Arrangement-Bottom
5-5	Speech Amplifier and Modulator, Parts Arrangement - Top
5 6	Speech Amplifier and Modulator, Parts Arrangement - Bottom
5~7	Low Voltage and Bias Power Supply, Parts Arrangement - Top
5–8	Low Voltage and Bias Power Supply, Parts Arrangement - Bottom
5-9	High Voltage Rectifier and Filter, Parts Arrangement - Top
510	High Voltage Rectifier and Filter, Parts Arrangement - Bottom
5-11 5-30	Type 175V-1 Relay Unit, Parts Arrangement - Top
5-12	Type 175V-1 Relay Unit, Parts Arrangement - Bottom
5-13 5-14	Type 177L-1 Remote Control Unit, Parts Arrangement - Top Type 177L-1 Remote Control Unit, Parts Arrangement - Bottom
5-15	Type 30K-2 Transmitter, Complete Schematic
5-15	Type 30K-2 Transmitter Cabling Schematic
5 -17	Type 177L-1 Remote Control Unit Schematic
J -1 1	Type x112-x nomo se obitoror outro contentativo

GUARANTEE

This equipment is guaranteed against defects in material, workmanship or manufacture, for a period of one year from the date of delivery. Our obligation under this guarantee is limited to repairing or replacing any item which shall prove, by our examination, to be thus defective, provided the item is returned to the factory for inspection with all transportation charges paid. 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, detailed instructions as to how the equipment is to be returned will be issued. Do not return any material until instructed to do so by the company.

COLLINS RADIO COMPANY

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).
- Type number of unit from which part is removed.
- (G) Serial number of unit.
- (H) Serial number of the complete equipment.
- (I) Nature of failure.
- (J) Cause of failure.
- (K) Remarks.

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).
- Type number of unit. (D)
- (E) Serial number of unit.
- (F) Serial number of equipment.

NOTE: Blank Service Report form will be found in the appendix of this instruction book.







TYPE 177L-1 REMOTE CONTROL UNIT

TYPE 30K-2 TRANSMITTER

FIGURE 1-1 TYPE 30K-2 TRANSMITTING EQUIPMENT

SECTION 1

GENERAL DESCRIPTION

1.1. GENERAL.

- 1.1.1. This instruction book is intended to serve as a guide to the proper installation, adjustment, operation and maintenance of the Collins Type 30K-2 ground station transmitter.
- 1.1.2. The Type 30K-2 is a dual channel transmitter designed for general applications such as police service, aeronautical ground stations or general point to point communication, where service is intermittent. The adaptability of the transmitter is attested to by the wide frequency range and the flexible pi network output circuit arrangement, which permits the use of a variety of antenna types.

1.1.3. EQUIPMENT DESCRIPTION.

(a) The transmitter is completely self-contained except for microphone and key. It is housed in an attractive cabinet designed in accordance with the best principles of advance styling. It is built of heavy gauge steel employing a welded stiffener type of construction. The full length rear door provides access to all units. The component parts of each sub-unit are mounted on a removable chassis. All power and control wires between the sub-units are laced together in a neatly formed cable. Connections are made at screw type, barrier, terminal strips at the rear of each unit.

The various chassis may be removed from the rear of the transmitter cabinet by first taking off the control knobs, 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. 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 placed behind a glass covered opening in the interest of safety. The antenna current meters are located externally at the top rear edge of the transmitter cabinet. This feature allows shorter connecting leads, making possible more accurate current readings.

(b) ELECTRICAL - The stable oscillator circuit employs a type 6V6 tube. An 807 follows the oscillator and serves as a buffer, doubler and driver. An Eimac 4-125A high efficiency tetrode is used in the output stage. All r-f stages have dual tank circuits, one for each of the two pre-tuned frequencies. Relays connect the desired tuning elements into the circuit. Dual pi networks in the output stage are used for tuning the final amplifier and loading into the antenna. Only two controls, designated TUNING and LOADING are required for each network. Plug in coils for r-f stages provide maximum efficiency at all frequencies, with a saving of space and operating controls.

The audio frequency response of 150-4000 cps is especially suited for voice communication. An audio peak clipping circuit is incorporated to improve the intelligibility when the atmospheric static level is high or when frequencies are congested. The clipper permits an unusually high level of modulation. The peak power of vowel sounds is held at a low level; at the same time the consonant sounds, which provide intelligibility, are allowed to produce maximum power. The r-f carrier sideband power is greatly increased as compared to normal operation. The peak clipper also prevents overmodulation. A low pass audio filter follows the peak clipper thus attenuating audio frequencies above 4000 cps.

Remote operation can be provided by using the type 177L-1 control unit. When the length of cable from the operating position to the transmitter is 50 feet or less no additional equipment is required. However, for greater distances the type 177L-1 remote control unit provides filament and plate power controls, keying, microphone preamplifier and channel switching functions. The output of the remote line is fed to a standard telephone line. Two pairs plus ground return are required. A db meter is incorporated in the remote control unit so the operator can control the speech level. The loss in the telephone line cannot exceed 25 db or the resistance of any wire with the ground return should not exceed 200 ohms. This represents approximately 4-1/2 miles for #19 GA telephone cable, 2-1/2 miles for #22 GA and 1 mile for #26 GA.

1.2. REFERENCE DATA.

1.2.1. The units which constitute the complete equipment with the overall dimensions and weights are tabulated below:

Collins Type No.	Description	Overall <u>Dimensions</u>	<u>Weight</u>
30K-2	Transmitter	22" w, 16-1/2" d, 66-1/2" h	420 lbs.
1771-1	Remote Control Unit Telegraph Key Microphone and Microphone Cable	17-1/4" w, 7-7/16" d, 7" h	
520 9329 00	Instruction Book		

This list does not necessarily designate equipment supplied with this order.

- 1.2.2. FREQUENCY RANGE: 2.0 30.0 mc
- 1.2.3. NUMBER OF CHANNELS: two
- 1.2.4. FREQUENCY CONTROL: quartz crystals
- 1.2.5. TYPES OF EMISSION: Al and A3
- 1.2.6. NOMINAL CARRIER OUTPUT: 250 watts voice 300 watts cw from 2 mc to 15 mc 200 watts voice 250 watts cwfrom 15 mc to 30 mc

- 1.2.7. AUDIO FREQUENCY RESPONSE: within 3 db from 150 to 4000 cps.
- 1.2.8. AUDIO FREQUENCY DISTORTION: less than 10% at either 400 or 1000 cps at 100% modulation (with clipper and filter inoperative.)
- 1.2.9. INPUT IMPEDANCE (MICROPHONE) High impedance dynamic or crystal
- 1.2.10.ALTITUDE FOR RATED VOLTAGE: 6000 feet
- 1.2.11. POWER REQUIREMENTS: standby 160 watts on cw, 220 watts on phone operating 910 watts on cw, 1270 watts on phone
- 1.2.12.POWER SOURCE: 115 volts, 60 cps, single phase
- 1.3. VACUUM TUBE COMPLEMENT.
- 1.3.1. TYPE 30K-2 TRANSMITTER.

Symbol	Type	<u>Function</u>
V201	6V6GT	Oscillator
V202	8 07	Frequency multiplier
V203	4-125A	R-F Power amplifier
V301	6SJ7	Audio amplifier
V302	6SN7	Audio amplifier
V303	6 H6	Clipper
V304	6B4G	Modulator driver
V305	7 5 TH	Modulator
V306	75 TH	Modulator
V401	5R4GY	Bias rectifier
V402	5R4GY	LV rectifier
V501	866A	HV rectifier
V502	866A	HV rectifier

1.3.2. TYPE 177L-1 REMOTE CONTROL UNIT.



SECTION 2

INSTALLATION

2.1. INSTALLATION.

2.1.2. PRELIMINARY.

(a) UNPACKING - Refer to the table of equipment supplied in Section 1, paragraph 1.2.1. of this instruction book and the packing slip for a list of all units supplied. If the crates are marked with arrows to indicate the upright position, remove crate cover only. Use a nail puller to remove nails, a bar or hammer may damage the equipment within. Remove all of the packing material and lift each unit out carefully. Search all of the packing material for small packages. Inspect each unit for loose screws or bolts. Be certain all controls such as knobs, switches, etc., work properly. All claims for damage should be filed promptly with the transportation company. It is necessary to preserve the original packing box and the packing if claim is to be made.

2.1.3. INSTALLATION PROCEDURE.

- (a) PLACING THE CABINET The transmitter cabinet may now be set in place. It may be located for convenience of operation, but at the same time consideration should be given to power connections, control cables (if required) antenna and ground connections and maintenance accessibility. The required clearances and base dimensions are shown in figure 2-1. As all units are placed in the cabinet from the rear, 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 fully out of the way.
- (b) INSTALLATION OF UNITS Reference to the photographic illustrations will assist in the assembly of the transmitter. See figure 2-3. Any cords designed to hold the cable in place for shipment should be untied and removed. Place the heavy plate power transformer in position at 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 the cabling schematic diagram, figure 5-16 is also shown.

Unit Letter Designation	Description
A	Meter Panel
В	R-F Exciter, Amplifier and Antenna Network
C	Speech Amplifier and Modulator
D	Low Voltage and Bias Power Supply

Unit Letter Designation	<u>Description</u>
E	Control Panel
F	High Voltage Rectifier
G	High Voltage Power Transformer
Н	Type 175V-1 Relay Control Unit
J	Relay Voltage Supply and External
	Connection Strip

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

(c) INTERNAL CONNECTIONS - The connections between the units of the type 30K-2 transmitter 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 cabling schematic, figure 5-16 by means of the unit letter and terminal number to which each wire is 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 Cl2 and a similar arrow on 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. class A wire with solid red covering would be an A2 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 paragraph 5.2.2.(b) 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 type 30K-2 transmitter consist of the following: AC power line, microphone, radiation system, remote control lines if used.

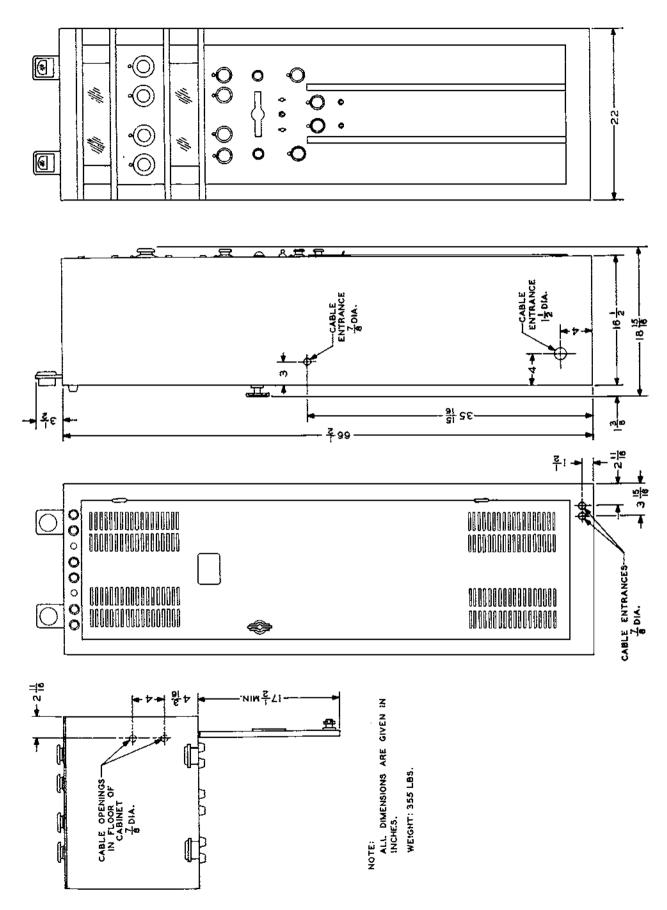
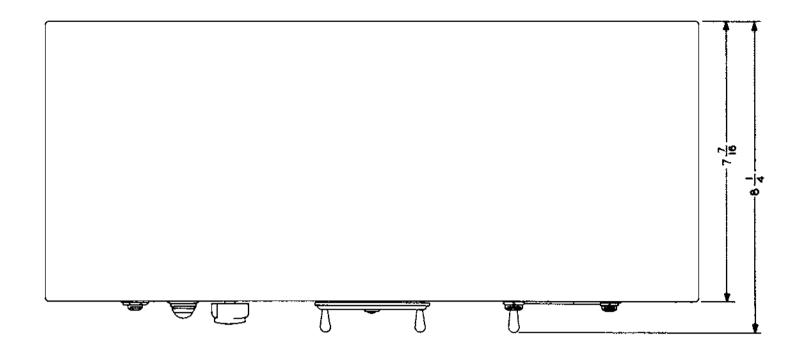


Figure 2-1 Type 30K-2 Transmitter Outline and Mounting Dimensions



NOTE: ALL DIMENSIONS ARE IN INCHES. WEIGHT:

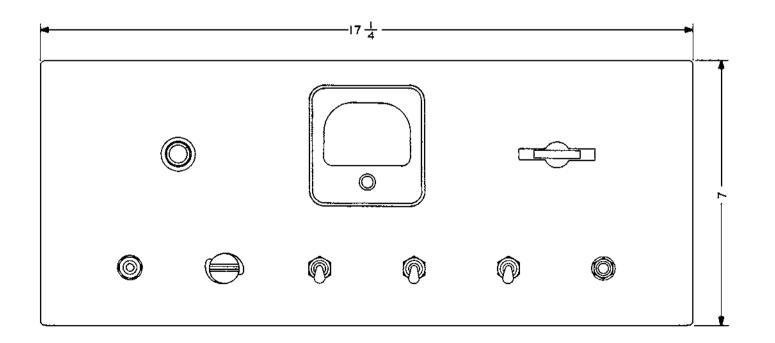


Figure 2-2 Type 177L-1 Remote Control Unit Outline and Mounting Dimensions

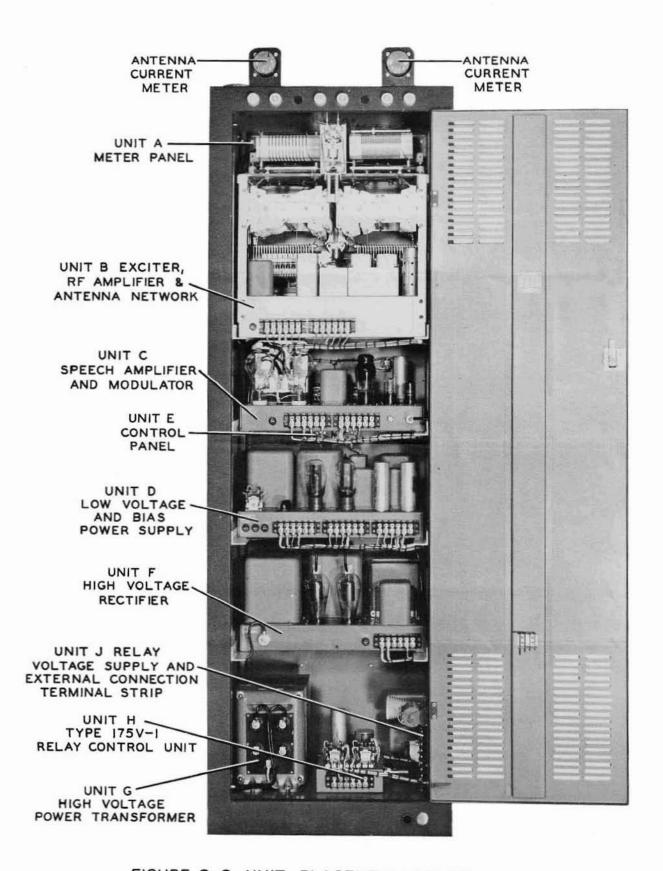


FIGURE 2-3 UNIT PLACEMENT DIAGRAM

(1) AC POWER LINE - The type 30K-2 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 maximum load used by this equipment is 1250 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 A.W.G. or larger, suitably insulated wire should be used. The "high" side of the line should be connected to terminal No. 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 the 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 stepdown autotransformer may be used.

Two holes 7/8" in diameter are available in the base of the cabinet for power leads, if conduit type of wiring is used; otherwise, the power leads may enter the cabinet through holes in 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" hole in the side of the cabinet at base level is also available for power lead entry.

- (2) MICROPHONE The microphone connection is made by means of Amphenol type MCIF, single connector plug. The receptacle is located at the rear of the chassis and the microphone cable may enter the side of the cabinet, a 7/8" hole is provided. The ring on the microphone plug should be securely tightened. For push-to-talk operation, connect the push-to-talk contacts across terminals 1 and 2 in the base of the cabinet and jumper terminal 4 to terminal 1 or close the telegraph key. During such operation, the LOCAL-REMOTE switch should be in the REMOTE position.
- (3) RADIATION SYSTEM The output networks will match an extremely wide range of antenna impedances with excellent efficiency. At lower frequencies, and for antenna less than a quarter wave in length, provision is made for load coils which will assist in matching the antenna impedance. Unbalanced antenna and single wire or concentric transmission lines can be matched directly. See fig. 2-5 for suggested antennas and circuits.

The details of the radiating system for any transmitter can best be determined at the time the installation is being made. Certain factors which will affect the operation of the equipment, however, should be considered before the installation is completed. With the 30K-2 transmitter a single antenna may be used for all frequencies provided space is available to install a suitable radiating system. When a single antenna is used for several operating frequencies, the antenna in general will not be resonant at all frequencies involved. For this type of operation it is recommended that a vertical radiating system be installed wherever possible. Such a vertical radiator would consist of either a self-supporting insulated tower or a guyed tower or mast supported on a base insulator. When several transmitters are being installed at the same location, it is sometimes desirable

to erect two tall masts to which a messenger cable may be attached. By connecting large diameter conductors to the messenger cable supported by the masts, several vertical radiating systems each having different properties may thus be installed This arrangement in general will result in a satisfactory radiating system for the 30K-2 Transmitter, if the conductor diameter is 3/4" to 2". When limitations are placed on the height to which the radiating system may extend, a single end fed antenna of at least 3/8 inch outside diameter may be used.

In any case serious attention should be given to the installation of a suitable ground system. In the case of a vertical radiator, 60 radials of 8 to 10 gauge bare copper wire spaced 6 degrees apart and terminated at a common heavy conductor as near the base of the radiator as possible, should be used. The length of these radials should be at least a quarter wavelength referred to the lowest operating frequency. The connections from this ground mat to the transmitter ground ter at the roof of the r-f bay should be made by means of a heavy copper conductor copper bus. See figure 2-6.

For a single wire end fed horizontal antenna, the ground system should have the following configuration. A system of radial wires of 8 to 10 gauge bare copper spaced six degrees apart covering approximately 225 degrees and extending for approximately a quarter wavelength (referred to the lowest operating frequency) should be installed with their center directly below the vertical or feed line portion of the antenna. The area covered by the radials should be the portion opposite the open end of the horizontal part of the antenna. Attached to and emanating from the common junction or center of the radial system should be a group of wires spaced 5 or 6 feet apart and laid parallel with the horizontal portion of the antenna and extending for at least an eighth wavelength (referred to the lowest operating frequency) beyond the open end of the antenna and approximately an eighth wavelength on each side of the horizontal portion of the antenna.

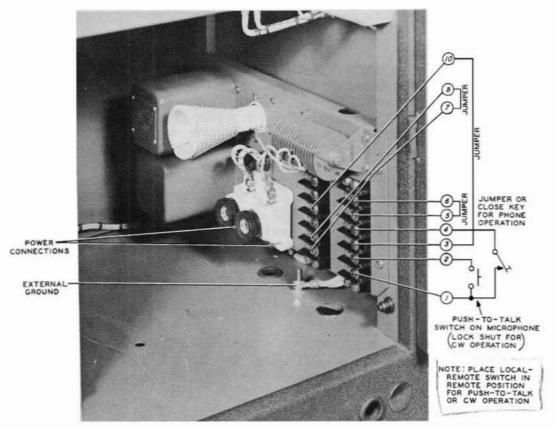
The use of a suitable ground system such as outlined above will improve the radiating efficiency of the installation and will reduce excessive radio frequency voltages appearing in the control circuits, particularly the telephone line control equipment.

The height of the vertical radiator should be determined for the lowest frequency and should be at least one-quarter wavelength at this frequency.

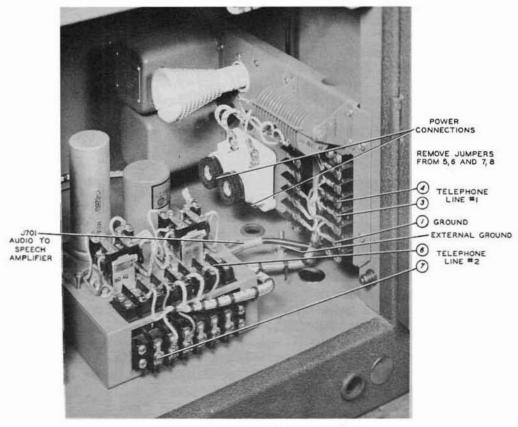
For an end fed horizontal antenna, the ratio of the length of the vertical portion to the horizontal portion should be as large as possible. Whenever possible the height of the antenna should be at least one-quarter wavelength at the lowest frequency. The total length of the antenna including the vertical portion or lead-in should be adjusted to avoid the immediate vicinity of a half wavelength at any of the operating frequencies. Whenever this condition exists, regardless of the choice of total length, the end fed antenna should not be used.

At the building entrance for each antenna, a horn gap should be installed to reduce the danger of damage to the equipment due to electrical storms or disturbances. Refer to figure 2-7 for recommended installation details.

2–4 14066



A. PANEL CONTROL, PUSH-TO-TALK AND/OR CW OPERATION



B. REMOTE CONTROL FROM TELEPHONE LINES

FIGURE 2-4 EXTERNAL CONNECTIONS

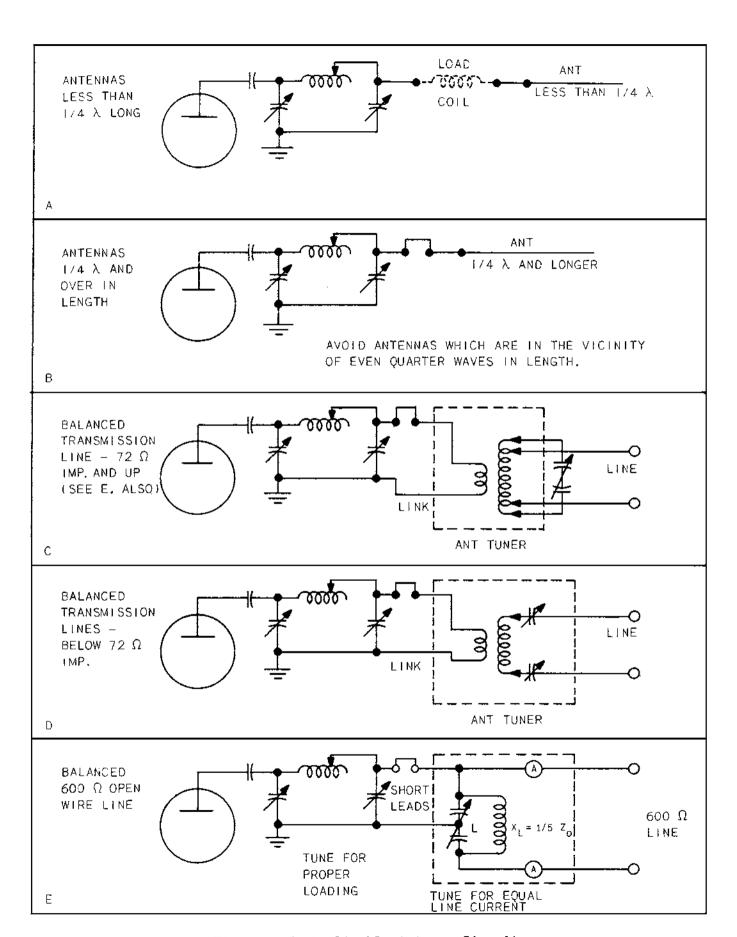


Figure 2-5 Applicable Antenna Circuits

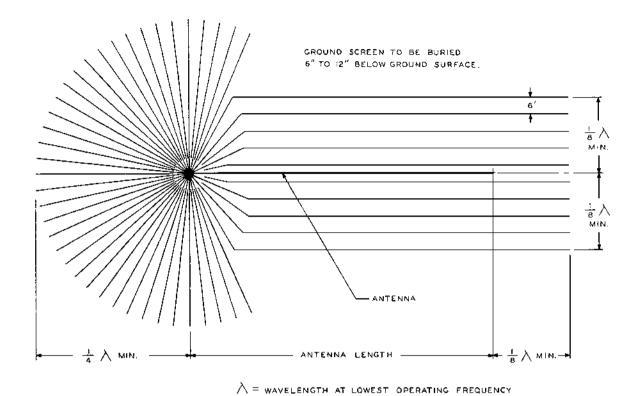


Figure 2-6 Suggested Ground System

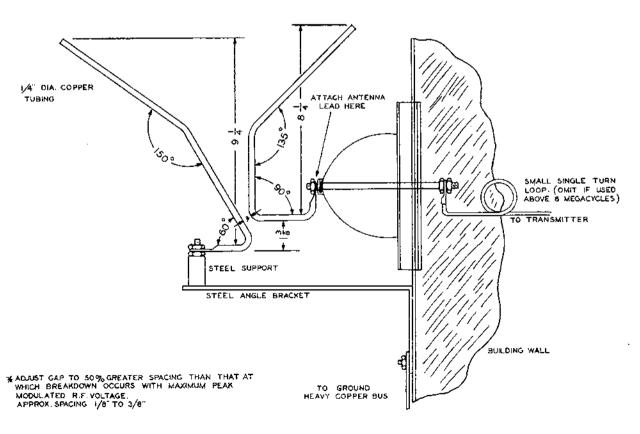


Figure 2-7 Antenna Horn Gap

The antenna connections are made to the terminals at the rear of the transmitter. The ground system should be connected to the terminal on the cabinet base.

(4) REMOTE CONTROL UNIT CONNECTIONS - A 7/8" diameter hole is provided at the cabinet base for entrance of remote control lines if used. Refer to figure 2-4.

In remote control operation using the 177L-1 Remote Control Unit, the distance from which the transmitter may be controlled is determined by the line loss. The loss in the line cannot exceed 25 db nor should the resistance of any wire plus ground return exceed 200 ohms. This represents 4-1/2 miles for #19 GA telephone cable, 2-1/2 miles for #22 GA and one mile for #26 GA. This distance from the transmitter can be extended considerably by using #12 open wire line which can be used up to 24 miles. For the longer distances using the smaller wire, the voltage adjustment tap on the relay supply transformer, TlO2, should be set on tap number 6. Also, low operating current telephone type relays can be installed in the 175V unit to operate the heavier relays therein.

The 177L Remote Control Unit is connected to the 30K-2 transmitter as shown in the following table:

177L-1 Terminal No.		175V-1 Terminal No.	30K-2 Terminal Nc. (On sidewall of Cabinet)
7	Connect to	7	
8	##	6	
9	14		3
10	7\$		4
ll (to ear GND)	th		15 (to earth GND)

NOTE

Be sure to remove the jumpers between J5 and 6 and J7 and 8 when using the 175V-1 Relay Unit.

Audio connection between the 175V-1 relay unit and the modulator unit is made by a short piece of microphone cable provided for this purpose. This cable is supplied with necessary connectors. Connection is made between J701 and J301.

Notice that terminals 10 and 11 on the 175V-1 Relay Unit connect to N.O. contacts on plate relay K702. These contacts may be used for operating auxilliary apparatus.

If CW operation is employed when using the 177L Remote Control Unit, jumper terminals 1 and 2 on the rear of the 177L or lock the push-to-talk switch closed.

(5) TELEGRAPH KEY - Connect between terminals 4 and 1 on the 30K-2 terminal strip. (On sidewall of cabinet).

	Freq. Freq. Y101 or Y102		Oscillator Plate		807 Plate		PA Plate		RF Choke	
· ·			L203 or L204		L207 or L208		L212 or L213		L210 or L211	
(MCS.) Mult	Mult.	lt. Crystal Freq.	Freq. Range	Part No.	Freq. Range	Part No.	Freq. Range	Part No.	Freq. Range	Part No.
2-2.6	1	2-2.6	None	Used	2.0-2.6	503 3828 003		503 3838 003	2-10	503 3821 002
2,6-3,4	1	2.6-3.4	None	Vsed .	2.6-3.4	503 3829 003	Ì	"		11
3.4-4.0	1	3.44.0	None	Used	3.4-4.5	503 3830 003		10] 	n
4.0-4.5	2	2.0-2.25	None	Used	3.4-4.5	503 3830 003		11		ŧŧ
4.5-6.0	2	2,25-3,0	None	Used	4.5-6.0	503 3831 003	[503 3839 003		11
6.0-6.8	4	1.5-1.7	2,6-3.4	503 3829 003	6.0-8.0	503 3832 003		18	6-18	503 3622 002
6,8-8,0	4	1.7-2.0	3.4-4.5	503 3830 003	6.0-8.0	503 3832 003		н		u
8.0-9.0	4	2.0-2.25	3.4-4.5	503 3830 003	8.0-10.5	503 3833 003]	503 3840 003		 1†
9.0-10.5	4	2,25-2,625	4.5-6.0	503 3831 003	8.0-10.5	503 3833 003	ļ	l H		**
10,5-12	4	2.625-3.0	4,5-6.0	503 3831 003	10,5-14	503 3834 003		u		(†
12-14	4	3.0-3.5	6.0-8.0	503 3832 003	10.5-14	503 3834 003		u,	10-30	503 3823 002
1418	6	2,33-3,0	4,5-6.0	503 3831 003	1418	503 3835 003		503 3841 003	 	tt
1824	6	3.0-4.0	6.0-8.0	503 3832 003	1824	503 3836 003		**		"
2430	6	4.0-5.0	8.0-10.5	503 3833 003	24-30	503 3837 003		503 3842 003	 	41

NOTE: On frequencies between 2 and 6 mc, a dummy can is plugged into L203 and L204 sockets to make the coil hold-down operative.

(f) CRYSTALS AND INDUCTORS - The transmitter is shipped with crystals and inductors for the two frequency channels specified at the time of purchase. However if a change in operating frequency is contemplated the proper tank circuit inductors may be selected from the table.

NOTE

Before operation of the transmitter is attempted, be sure the flexible plate lead to the 4-125A PA tube does not touch the glass envelope of the tube.

If push-to-talk operation is contemplated without the use of a remote control unit, it will be necessary to jumper terminal 3 in the cabinet base to terminal 10 in order to get panel selection of channels by use of S102. In event a remote control unit is used, the jumper should be removed and the remote control channel selector switch connected to terminals 3 and 1.

If CW operation is used from the 177L-1 remote unit, terminals 1 and 2 on the rear of the unit should be jumpered, or in lieu of this, the microphone push-to-talk switch can be locked in the ON position.

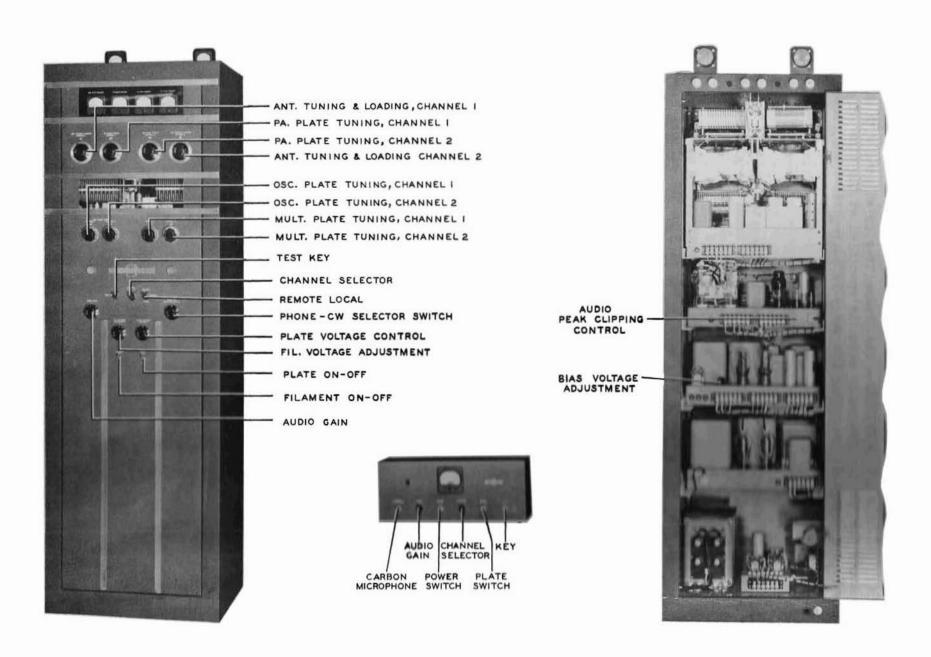


FIGURE 3-1 CONTROL FUNCTIONS

SECTION 3

ADJUSTMENT AND OPERATION

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARN DANGEROUS TO LIFE. OPERATING PERSONNEL SHOULD AT ALL TIMES OBSERVE ALL SAFETY PRECAUTIONS, DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH SUPPLY VOLTAGE ON, DO NOT DEPEND UPON DOOR INTERLOCK SWITCH FOR PROTECTION BUT ALWAYS OPEN THE MAIN SWITCH IN SUPPLY LINE TO EQUIPMENT.

- 3.1. GENERAL. After the installation wiring is complete and the tubes, fuses, crystals and inductors have been properly positioned in their respective sockets the equipment is ready for initial operational adjustment. All important operating controls are located on the front panel of the transmitter and each is clearly designated as to function. The following paragraphs list the control designations and circuit elements controlled by each. Refer to figure 3-1.
- 3.1.1. FILAMENT, ON-OFF switch. This switch, SlO5, energizes or de-energizes the primary windings of the following transformers: TlO2, T201, T303, T401, and T501.
- 3.1.2.PLATE, ON-OFF switch. This switch, S106, will apply power to the primary winding of T402. If the plate voltage control is in the TUNE or OPERATE position, the primary winding of T101 will be energized, also.
- 3.1.3. FIL VOLTAGE ADJUSTMENT. This switch, SlO4, selects taps on the primary winding of the power amplifier and modulator filament transformer; T3O3, thereby giving a small range in the voltage applied to the tube filament.
- 3.1.4. PLATE VOLTAGE CONTROL. This switch, S107, has three positions; LV, TUNE and OPERATE. When placed in the LV position no plate voltage is applied to the r-f amplifier or modulator tubes, allowing tuning adjustments to be made on the exciter section of the transmitter and grid of P.A. In the TUNE position a resistor, R101 is connected in series with the primary of the transformer T101 resulting in a reduced voltage on the r-f amplifier and modulator tubes. When rotated to the OPERATE position full plate power is applied to these tubes.
- 3,1.5. PHONE CW SELECTOR switch. When this switch S301 is placed in the CW position the filament supply voltage to the modulator tubes is removed and the secondary windings of the modulation transformer T302 is short circuited. In the PHONE position the circuits are returned to normal operations.
- 3.1.6. TEST KEY, The test key, S101, serves to close the carrier control circuit during the time tuning adjustments are being made. If the switch is operated in one direction the key will immediately return to the normal position when released; if operated in the opposite direction the key will lock to permit the making of tuning adjustments without the necessity of holding the telegraph key closed or the push to talk button on the microphone operated.

13467

- 3.1.7. CHANNEL switch. Either one of the two predetermined frequency channels may be selected by operation of this switch, SlO2. In the CHANNEL 1 position relays K2O4 and K2O5 are energized and relays K2O2 and K2O3 are not energized. When SlO2 is in the CHANNEL 2 position relays K2O4 and K2O5 are not energized and relays K2O2 and K2O3 are energized.
- 3.1.8. LOCAL-REMOTE CONTROL switch. Operating this switch, S103, to the REMOTE position, allows the transmitter to be operated by remote control. A type 177L-1 remote control unit is necessary if the distance from the operating position is greater than fifty feet.
- 3.1.9. OSC PLATE TUNING. The CHANNEL 1 control operates capacitor C206, while CHANNEL 2 control operates C207.
- 3.1.10.MULT PLATE TUNING. The CHANNEL 1 control operates C212 and the CHANNEL 2 control operates C213.
- 3.1.11.ANT TUNING & LOADING. The CHANNEL 1 control operates capacitor C218 and the CHANNEL 2 control operates capacitor C223.
- 3.1.12.PA PLATE TUNING. The CHANNEL 1 control operates capacitor C219 and the CHANNEL 2 control operates capacitor C222.
- 3.1.13.AUDIO GAIN. The AUDIO GAIN control operates the potentiometer R306. The control permits adjusting of the input to the audio amplifier tube V302. The speech amplifier gain increases as the control is rotated from 0 toward 10.

3.2. ENERGIZING THE EQUIPMENT FOR THE FIRST TIME.

3.2.1. PRECAUTIONS - Before applying any voltage to the transmitter a thorough inspection of all connections should be made for tightness and clearance to structuralparts which are at ground potential.

It is suggested the installation engineer read this complete section before beginning tuning adjustments. After this he will be able to make proper adjustments for the particular coil combinations which will be used.

3.3. ADJUSTMENT PROCEDURE.

3.3.1. RF ADJUSTMENTS.

- (a) Place the FILAMENT power switch in the ON position. Make certain the PLATE power switch is in the OFF position.
- (b) Adjust the filament voltage of the modulator and the r-f final amplifier tubes to exactly 5 volts as indicated on the FILAMENT VOLTAGE meter using the FIL VOLTAGE ADJUSTMENT knob located directly above the filament switch on the front panel.

NOTE

Permit the equipment to operate in this manner, with filament power only turned on, for a period of 15 minutes. This will allow the 866A rectifier tubes to attain proper operating conditions. Such a procedure is necessary only when new rectifier tubes are placed in service.

- (c) Operate the PHONE-CW switch to the CW position. Set the AUDIO GAIN at O.
- (d) Operate the REMOTE-LOCAL control switch to the LOCAL control position.
- (e) Operate CHANNEL selector switch to either channel 1 or channel 2. The channel selected will depend upon the position of the frequency determing components such as crystals and inductors.
 - (f) Place the PLATE VOLTAGE Control in the LV position.
 - (g) Operate the PLATE switch to the ON position.
 - (h) Operate the TEST switch.
- (i) Adjust the OSC PLATE TUNING control, if OSC coil is used, until maximum grid current is indicated on meter, M201. If OSC coil is not used, (on output frequencies below 6 mc) set the control at 100 on the dial. If, after tuning the MULT PLATE TUNING, (see below) the 4-125A grid current is greater than 15 ma turn the OSC PLATE TUNING control in the direction of decreasing dial numbers thereby increasing capacity in the circuit which will decrease the drive to the 807 multiplier tube and reduce the 4-125A excitation.
- (j) Adjust the MULT PLATE TUNING control, for the channel which is being used, until maximum grid current is indicated by the PA GRID CURRENT meter. A reading of 12 to 15 ma should be obtained. If the final grid drive is too great it may be adjusted by detuning the OSC PLATE TUNING control slightly in the direction of smaller numbers on the dial scale (when the output frequency is less than 6 mc only).

NOTE

12 to 15 ma grid current is best, but any grid current from 10 to 20 ma will give satisfactory operation. These grid current values should be obtained with plate power on and at full load since the grid current may drop slightly, when the PA is loaded in the higher frequencies.

(k) Set the ANTENNA TUNING & LOADING control at half capacity and with the PLATE VOLTAGE control in the TUNE position and the LOCAL-REMOTE control switch in the LOCAL position, apply PLATE power.

NOTE

Maximum capacity on all tuning dials is at "O" on the dial.

(1) Operate the TEST switch and immediately attempt to resonate the power amplifier plate tank circuit by operating the PA PLATE TUNING. Resonance will be indicated by a sharp dip in current on the PA PLATE CURRENT meter, MIOI. If resonance cannot be established, change the position of the inductor tap and make another attempt to resonate the circuit.

NOTE

If the tap on the inductor happens to fall in a position which leaves more than 50% of the turns unused the unused portion should be shorted out. This is easily done by soldering a short piece of heavy bus between the cold end of the coil and the coil rider right at the lugs on the connector pins.

- (m) Operate the TEST KEY and using the ANTENNA TUNING & LOADING control, load the power amplifier stage until the PA PLATE CURRENT meter indicates 80 ma. While increasing the loading with the ANTENNA TUNING & LOADING control, keep the tank circuit in resonance with the PA PLATE TUNING control.
- (n) Operate the PLATE VOLTAGE control to the OPERATE position and repeat step (m) until the PA PLATE CURRENT meter indicates 200 ma.
 - (o) Repeat the above tuning procedure for the other frequency channel.

NOTE

Do not operate the CHANNEL selector switch with the PLATE power ON.

3.3.2. VOICE OPERATION ADJUSTMENTS.

(a) TUNING ADJUSTMENTS - The tuning adjustments for type A3 emission are identical to those just outlined except that the r-f power amplifier should be loaded to 150 ma in step 3.3.1.(m). The PHONE-CW switch should be in the PHONE position.

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.

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

CAUTION

When applying plate power to the modulator tubes for the first time, immediately check the modulator static (resting) plate current. If over 45 ma, adjust before attempting further operation; otherwise, the modulators may become damaged.

(b) AUDIO ADJUSTMENTS.

- (1) REMOTE CONTROL ADJUSTMENTS This transmitter has been designed for remote operation from a type 177L-1 remote control unit. The distance from which the transmitter may be controlled is determined by the line loss. The loss in the line cannot exceed 25 db. The procedure outlined below should be followed in making preliminary adjustments.
- (a) Apply filament and plate to the tubes in the 177L-1 unit by operating the OFF-ON switch to the ON position.
- (b) When the tubes in the remote control unit have reached operating temperature, rotate the 177L-1 gain control in a clockwise direction until the AUDIO LEVEL meter, M801, indicates 0 db (zero level corresponds to 6 mw into 500 ohms) on peaks when talking in a normal tone into the microphone.
- (c) With the <u>transmitter</u> AUDIO GAIN control set at 1/3 ON position, adjust the audio control R7Ol in the 175V-1 Relay Unit for desired modulation. (When speaking into the remote microphone.)

(2) TRANSMITTER ADJUSTMENTS.

(a) SPEECH CLIPPER OUT - The percentage of modulation at which speech clipping occurs has been chosen at 100% and the modulation control locked at the factory. If speech clipping is not desired, merely adjust the AVDIO GAIN control on the front panel until approximately 125 ma MODULATOR PLATE current is obtainable on heavy modulation peaks.

In the event speech clipping is dispensed with entirely, the 6H6 clipper tube can be removed from its socket in the modulator unit. This is not recommended however, since the clipper does prevent overmodulation.

(b) SPEECH CLIPPER IN - The clipper level adjustment on the rear of the speech unit was set at the factory using the following procedure. The transmitter was loaded for normal power input and a 400 cycle sine wave audio tone fed into the microphone input. The clipper level adjustment was then set at approximately 1/5 turn back from the full clockwise position. The audio gain control was then advanced until approximately 75% modulation was observed on an oscilloscope screen, after which the audio input was increased just 12 db and the clipper level control adjusted so that 100% modulation was reached. This procedure is repeated if necessary so that 12 db increase in audio level raises modulation to just under 100%.

The amount 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 high modulation average. With the control set thus, however, a quiet operating position is desirable because of the higher overall audio gain with resulting higher room noise. Where the background noise is objectionable a noice-cancelling microphone is recommended.

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,

3.3. TYPICAL METER READINGS.

3.3.1. PHONE EMISSION

PA PLATE CURRENT - 150 ma

PA GRID CURRENT - 12-15 ma

MULTIPLIER GRID CURRENT - 0-4 ma

MODULATOR PLATE CURRENT - STATIC - 45

100% MOD (Sine wave) - 150 ma

FILAMENT VOLTAGE - 5 v

3.2.2. CW EMISSION
PA PLATE CURRENT - 200 ma
PA GRID CURRENT - 12-15 ma
FILAMENT VOLTAGE - 5 v
MULTIPLIER GRID CURRENT - 0-4 ma

SECTION 4

CIRCUIT DESCRIPTION

4.1. GENERAL.

The Collins Type 30K-2 has two r-f channels, each of which may be pretuned to any frequency between 2.0 and 30.0 mc. Switching from one to the other is accomplished instantaneously by means of relays. A stable crystal controlled oscillator is followed by a stage employing an 807 tube which serves as a buffer, doubler and driver. A single high efficiency tetrode is used in the output stage. The audio circuit is designed especially for voice communication.

4.2. PRIMARY POWER CIRCUITS.

Refer to figure 4-1. The filament transformers T201, T303, T403, and T501, bias supply transformer T401 and relay voltage transformer T102 are energized when the FILAMENT switch, S105, is closed. The FILAMENT switch disconnects all power to the transmitter and must be on for REMOTE as well IOCAL operation. Each of the above transformers is protected by a fuse. The filament voltage applied to the modulator and r-f power amplifier tubes may be adjusted by operation of S104. The low voltage transformer T402 and high voltage plate transformer T101 are energized by operation of plate relay K401 which is operated when the PLATE switch is closed. Since the relay coil energizing voltage is obtained from the bias supply, the possibility of applying plate power to modulator and r-f power amplifier with no fixed bias present is eliminated. A plate primary interlock switch, S108, is operated by the rear access door. When placed in the TUNE position the PLATE VOLTAGE CONTROL switch, S102, reduces the primary voltage on the high voltage plate transformer, T101, during the tuning procedure.

NOTE

The door interlock switch. S108. should not be made inoperative under any circumstances.

4.2.1. RECTIFIER POWER SYSTEM. - The type 30K-2 employes three separate d-c power circuits. These consist of a bias supply, a low voltage supply for the speech amplifier and low level r-f stages, and a high voltage supply for the modulator and r-f power amplifier stages. The bias supply employs a type 5R4GY tube, V401. The d-c output of the supply is approximately -145 volt. Provision is made for bias voltage adjustment on the modulator grids. The low voltage plate supply uses a 5R4GY tube, V402, in the rectifier circuit. The d-c output voltage is approximately 500 volts. The high voltage supply employs two type 866A tubes in a single phase full wave rectifier circuit. It supplies plate power to the r-f power amplifier and modulator tubes. The d-c output voltage of the high voltage supply is 2500 volts.

13472-1 4-1

4.3. CARRIER CONTROL CIRCUITS.

The carrier control circuits of the transmitter are outlined in figure 4-2. The CHANNEL switch, SlO2 will function only when the LOCAL-REMOTE switch, SlO3, is in the LCCAL position. When S103 is in the REMOTE position the desired channel may be selected from the remote control unit. When SlO3 is in the LOCAL position the key circuit is made operative and the auxiliary plate relay, K702, contacts are shorted allowing the transmitter plate switch, S106, to have control, the filament relay, K701 circuit is closed so the transmitter FILAMENT switch, S105, will remove all filament power. The keying relay, K201, interrunts the crystal oscillator cathode circuit. The plate voltage relay, K401, receives its energizing voltage from the bias supply and will not operate until bias voltage is being applied to the modulator and r-f power amplifier tubes. Two pairs of telephone lines and ground return are used to connect the type 177L-1 remote control unit and the transmitter. The resistance of any wire and ground return should not exceed 200 ohrs. If the operating controls (microphone, push to talk switch, key, relay control) are located at a distance no greater than 50 feet from the transmitter, a remote control unit will not be required.

4.4. RF CIRCUITS,

- 4.4.1. OSCILLATOR. A type 6V6GT tetrode, V201, is employed in a stable crystal controlled oscillator circuit. The proper crystal for operation on either channel one or channel two is selected by contacts on relay K202. Another group of contacts on this relay connect the desired osc plate tank components in the circuit. Screen voltage for the oscillator is supplied through the dropping resistor, R203. The transmitter is keyed in the oscillator cathode circuit.
- 4.4.2. MULTIPLIER. The multiplier stage uses a type 807 tube, V202. Grid currect is indicated by M201. A voltage divider composed of resistors R209 and R210 supplies screen voltage for the exciter tube.
- 4.4.3. RF POWER AMPLIFIER. The r-f amplifier uses a high efficiency tetrode. The proper grid circuit components are connected in the circuit by relay, K203. The desired output network is connected by relay, K204.
- 4.4.4. RF OUTPUT CIRCUIT. The output circuit employed in the 30K-2 transmitter consists of a pi section plate tank circuit. It is designed to operate ever the frequency ranges 2000 to 30,000 kc by means of plug in coils. It is designed to operate into an unbalanced transmission line or antenna.

4.5. AUDIO CIRCUITS.

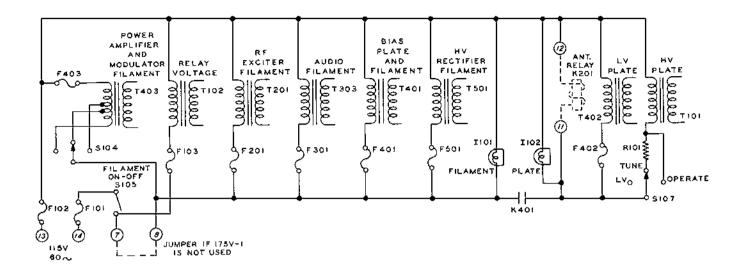


Figure 4-1 Primary Power Circuit

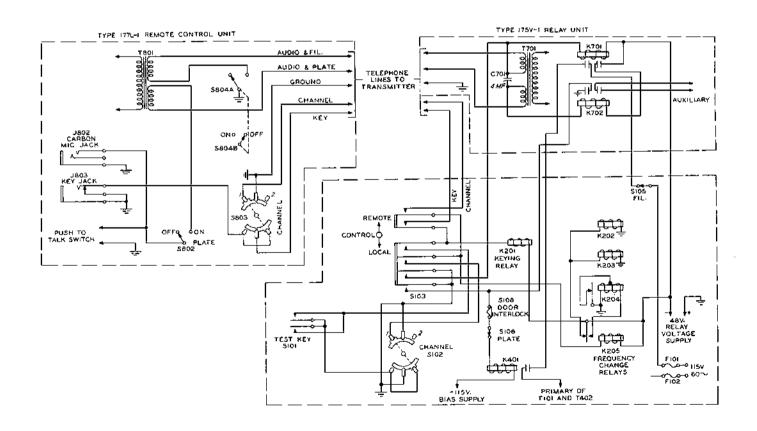


Figure 4-2 Carrier Control Circuits

- 4.5.1. GENERAL. A high gain preamplifier is followed by a two stage audio amplifier which is shunted by a peak clipper tube. The output of the amplifier is followed by the modulator driver stage, which in turn is followed by the class B modulator. Full 100% modulation is attained with the use of any high impedance microphone such as a crystal or high impedance dynamic. The peak clipper limits or 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 low-pass filter attenuates all speech frequencies over 4000 cps.
- 4.5.2. SPEECH AMPLIFIER CIRCUITS. A type 6SJ7 pentode, V301 is employed as a high gain voltage amplifier. Following the preamplifier is a type 6SN7 dual triode tube, the first section of which precedes the 6H6 clipper tube, Refer to figure 4-3. The type 6H6 clipper tube V303, is shunted across the audio input to the second section of the type 6SN7 audio amplifier tube. The cathode of one section of the type 6H6, pin number 4, is operated at a small fixed value of positive potential by virtue 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 limited or clipped 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 type 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 type 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 limited or clipped. 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 maximum modulation with the peak clipper control, R315, and to be assured that the percentage of modulation will not rise above the chosen amount.
- 4.5.3. MODULATOR DRIVER CIRCUITS. The output from the second section of the type 6SN7 dual triode tube is coupled to the grid of the driver tube, V3O4, through capacitor C31O and the clipper control R315. A type 6B4G power amplifier triode, drives the grids of the class B modulator tubes through transformer T3O1.
- 4.5.4. 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 obtained through the driver coupling 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

13474-1

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 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 potentiometer, R401, located at the rear of the low voltage power supply unit, is used for adjustment of the modulator bias.

4-4

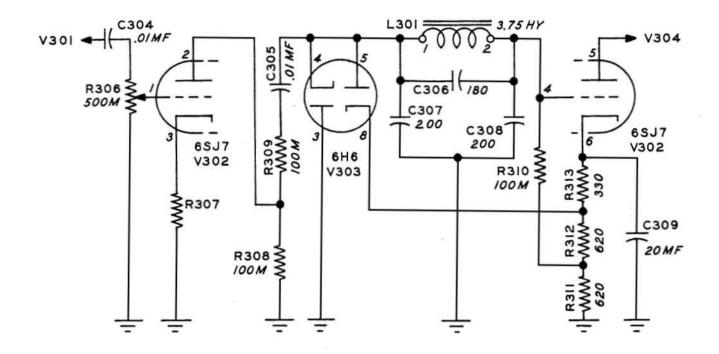


Figure 4-3 Audio Peak Clipper Circuit

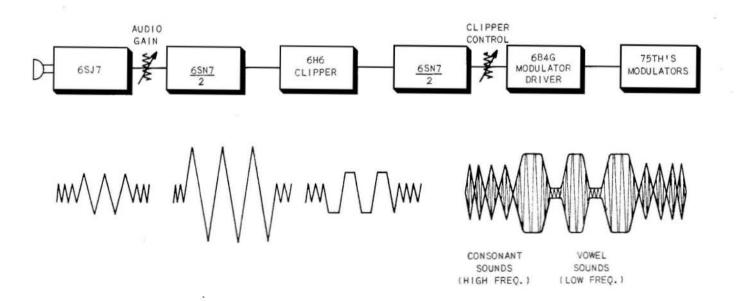


Figure 4-4 Clipper Waveform Illustration

SECTION 5

MAINTENANCE

This radio equipment is constructed of materials considered to be the best obtainable for the purpose, and has been carefully inspected and adjusted using accurate test equipment. No one but an authorized and competent service technician equipped with proper test facilities should be permitted to service the equipment.

5.1. ROUTINE INSPECTION SCHEDULES.

Routine inspection schedules should be set up for periodic checks of the equipment. This inspection should include examination of the mcchanical system for excessive wear or binding and of the electrical system for electrical defects. Make a check of the emission characteristics of all tubes. See that all tubes are replaced correctly and fully in their sockets, and that good electrical contact is made between the prongs of the tube and socket. Check all relays for proper operation and inspect relay contacts to make certain that the contact surfaces are clean and free from pits and projections. Make certain that contacts of all receptacles and plugs, such as microphone, key and cable connectors, are clean and make firm mechanical connections between one another. If the routine inspection of the equipment is carried out faithfully, the chances of improper operation of the equipment is greatly minimized. It is, therefore, important that this inspection be made at least once each month and it should be sufficiently thorough to include all major electrical circuits of the equipment.

5.1.1. 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 removed by means of a soft brush and dry, oilfree 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 of dust to prevent undue wear. Likewise, variable condenser plates should be kept free from dirt to avoid flashover on modulation peaks.

One of the predominant 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.

5.1.2. 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 socket. Use caution in removing and replacing grid or plate caps on tubes. Before a tube is discarded, make certain that the tube is at fault and the trouble is not a loose or broken connection within 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 manufacturer's 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.

- (a) PRECAUTIONS FOR SATISFACTORY TUBE LIFE.
- (1) Before any tube is removed from the equipment, make certain the primary power is disconnected from the equipment.
 - (2) Operate all tubes within ±5% of rated filament voltage.
- (3) Do not exceed the rated plate current of any tube during normal operation of the equipment.
 - (b) TUBE REPLACEMENT PRECAUTIONS.
 - (1) All tubes are removed by pulling straight up on them.
- (2) Remove plate cap connectors 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.
- (3) Before the tube is inserted, make certain that the type of tube is correct for the socket into which it is being placed.
- 5.1.3. 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. - If the section of the equipment in which the fault occurs can be isolated, the trouble may be located with a minimum of effort. Continuity checks and voltage measurements in circuits still operative may be helpful in isolating the trouble. For this purpose, an a-c, d-c voltmeter having an internal resistance of not less than 20,000 chms per volt and equipped with a battery for continuity and resistance measurements is necessary. An oscilloscope is very useful in tracing faults in r-f and a-f circuits.

The most frequent cause of trouble in equipment of this type is tube failure. If trouble occurs in the equipment, isolation of the circuit at fault is helpful in determining the location of the defective tube. Defective tubes which cause an overload in power circuits may usually be located by inspection. Low emission tubes may be the cause of erratic or poor performance of the equipment. If there is any doubt concerning the emission of any tube, it should be checked and immediately replaced if found defective. Tubes with electrical noises can cause excessive distortion or hum. This fault may be difficult to isolate to a particular tube. However, a tube suspected of faulty operation may be checked by replacing with a like tube known to be in good condition.

5.2.2. ISOLATING THE TROUBLE.

- (a) Check the position of all controls to ascertain whether they have not been accidentally moved from the normal operating position.
- (b) A check of all fuses should be made to determine the power circuit affected by the trouble. Fuse failure should be replaced only after the circuit in question has been carefully examined to make certain no permanent fault exists. Always replace a fuse with one having a rating specified in the following table.

FUSE TABLE

<u>Symbol</u>	Circuit <u>Location</u>	Type	Rating
Floi	Primary power source line	Screw base	15 amp
F102	Primary power source line	Screw base	15 amp
F103	Relay voltage supply transformer primary	Cartridge (3AG)	1/2 amp
F201	Exciter filament transformer primary	Cartridge (3AG)	1/2 amp
F 3 01	Speech amplifier filament trans- former primary	Cartridge (3AG)	1/2 amp

Symbol	Circuit <u>Location</u>	Type	Rating
F401	Bias supply transformer primary	Cartridge (3AG)	1/2 amp
F402	LV power supply transformer primary	Cartridge (3AG)	3 amp
F501	HV rectifier filament transformer primary	Cartridge (3AG)	l amp
F801	Type 177L-1 Remote Control Unit	Cartridge (3AG)	1/4 amp

- (c) Check the circuits in the sequence by which they are made operative in starting the transmitter.
- (d) Compare the transmitter meter readings with the typical readings given under operational data in Section 3.
- (e) Make a visual inspection of all tubes, resistors and chokes. Tubes may be sputtering indicating shorts or their plates may show color indicating a heavy current drain. Resistors and chokes may be discolored by passing large amounts of current.
- 5.2.3. POWER SUPPLY TROUBLES. The following chart lists troubles often encountered in power supply systems and causes and corrections of each:
 - (a) FAILURE OF FILAMENT SUPPLY VOLTAGE.

Symptoms	Possible Cause of Trouble	Remedy
1. No filament voltage applied to any one cer-	1. a. Associated fuse in primary circuit is open.	1. a. Replace fuse.
tain tube in the equipment.	b. Defective filament transformer.	b. Replace trans- former if found to be defective.
2. Filament pilot lamp does not light.	2. Filament pilot lamp defective.	2. Replace lamp.

(b) FAILURE OF PLATE VOLTAGE SUPPLY. - High voltage supply does not come on when PLATE supply switch is operated.

Symptoms	Possible Cause of Trouble	Remedy
1. Plate pilot lamp does not light and the meters indicate no plate current on modulators or power amplifiers.	1. a. Defective plate relay, K401. 2. Defective door switch. 3. Defective plate switch. 4. If 177L-1 used: Open telephone line or defective plate switch or push-to-talk button.	1. Replace component if found defective. 2. Same as above. 3. Same as above. 4. Same as above.

(c) LV OR BIAS VOLTAGE SUPPLY FAILURE.

Symptoms	Possible Cause of Trouble	Remedy
l. No indication of plate or screen voltages on oscillator, multiplier or audio amplifier tubes.	 1. a. Fuse, F402, is open. b. Defective rectifier tube, V402. c. Open filter choke L402. d. Shorted filter capacitors. 	l. In the event a defective compon- ent is isolated, it should be replaced with one known to be in good condition.
2. No bias voltage on modulators or r-f final amplifier tubes.	<pre>2, a. Fuse, F402, is open, b, Defective rectifier tube V401, c. Open filter choke L401, d. Shorted filter ca- pacitors.</pre>	2. In the event a defective component is isolated, it should be replaced with one known to be in good condition.

5.2,4, RADIO FREQUENCY TROUBLE.

Symptoms	Possible Cause of Trouble	<u>Remedy</u>
1. No drive to PA	l. a. Defective crystal.	l. a. Replace crys- tal.
	<pre>b. Defective tube, open r-f coil.</pre>	b. Replace de- fective component.
	c. Channel change relay contacts dirty.	e. Burnish con- tacts,
2. PA does not resonat	e. 2. a. Antenna or trans- mission line characteris- tics changed.	

5.2.5. AUDIO SYSTEM TROUBLES.

(a) DISTORTION. - Very little distortion, except when clipping, is likely to occur with this equipment. However, if distortion is at all noticeable, the following checks should help to locate and correct it:

Check the static plate current on the modulators. This current should be approximately 45 ma for best operation. This value can be obtained by adjusting the bias on the modulators.

Replace the audio amplifier tubes with tubes known to be good.

13480-1 5-5

Distortion may sometimes be difficult to locate. It may require a step by step method of testing with the oscilloscope until the point is reached where the distortion occurs.

5.3. REPLACEMENT OF PARTS.

The detailed tabular parts list which follows in the next section of this instruction book will aid in the choice of correct replacement parts.

5.4. CRYSTAL DATA.

a. Crystal frequency: In the range 1.5 mc to 5.0 mc as shown in the following table:

Channel Freq, in MC	Divide by	Crystal Free, in MC
2.0 to 4.0 4.0 to 6.0	1 2	2.0 to 4.0 2.0 to 3.0
6.0 to 8.0 8.0 to 14.0	~ 4 4	1.5 to 2.0 2.0 to 3.5
14.0 to 30.0	3	2.333 to 5.0

- b. Temperature Coefficient: not exceeding 2 PPM/oc over the total range, nor exceeding 4 PPM/oc over any 100 increment.
 - c. Calibration ±.005% at 25°c in correlated test oscillator.
 - d. Activity: .5 ma minimum rectified grid current,
 - e. Crystal Cut: AT
 - f. Crystal Blank Size: 1" square.
 - g. Electrodes: Air gap type preferably monel.

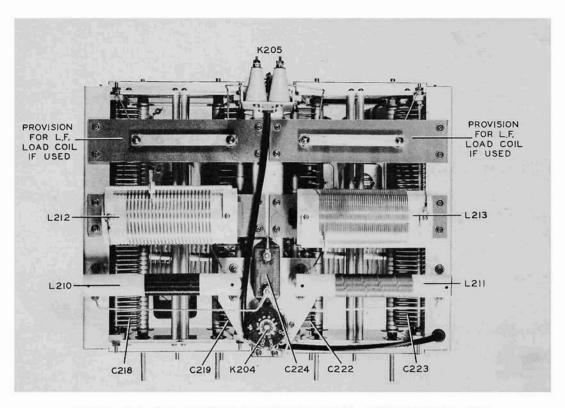


FIGURE 5-I R.F. OUTPUT NETWORK PARTS ARRANGEMENT-TOP

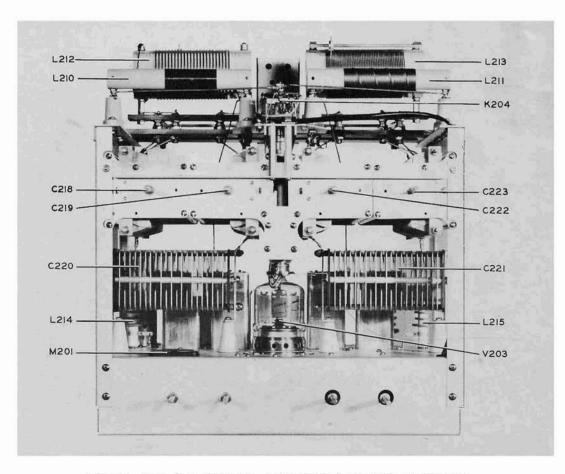


FIGURE 5-2 R.F. EXCITER, AMPLIFIER & OUTPUT NETWORK PARTS ARRANGEMENT-FRONT

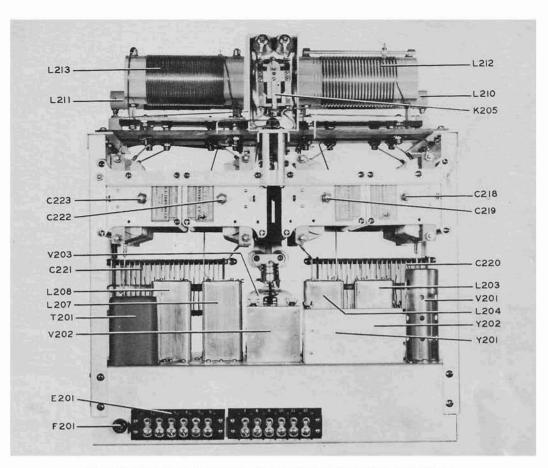


FIGURE 5-3 R.F. EXCITER, AMPLIFIER & OUTPUT NETWORK PARTS ARRANGEMENT-REAR

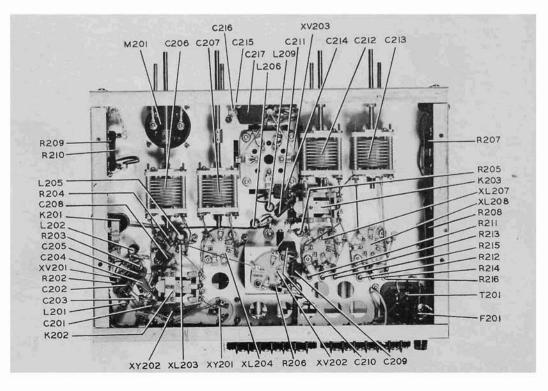
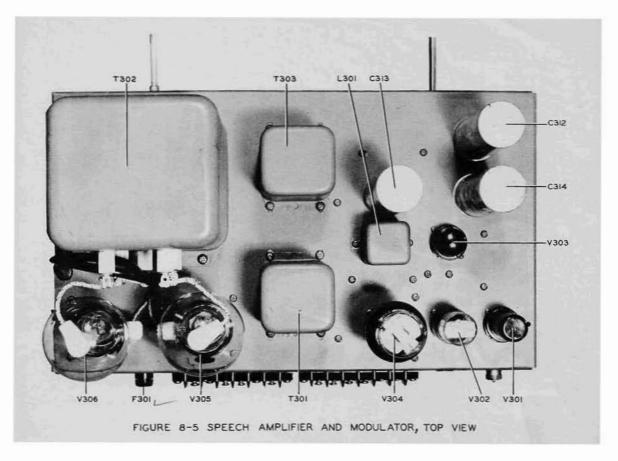
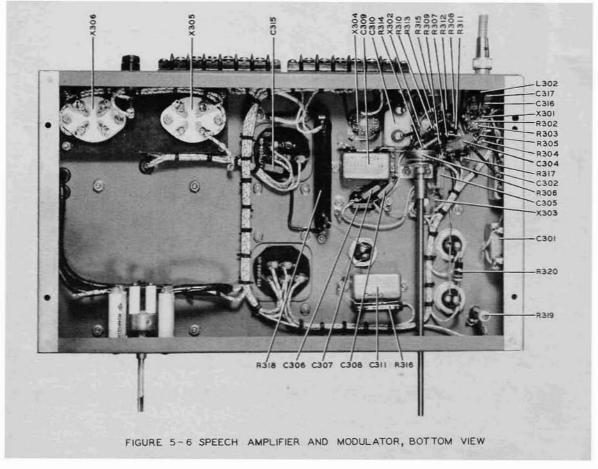
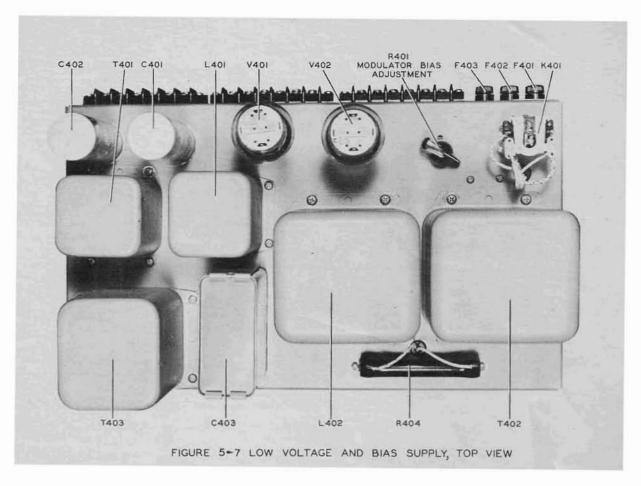
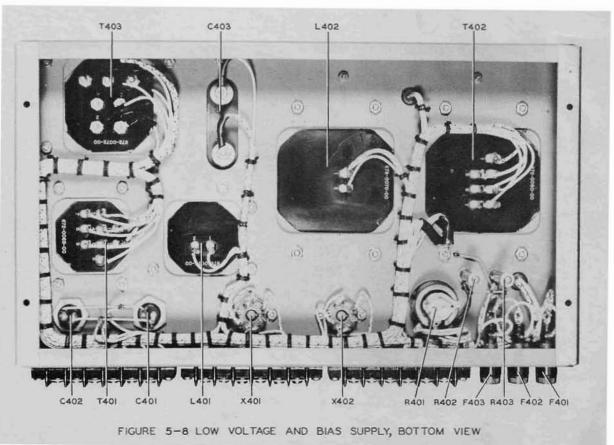


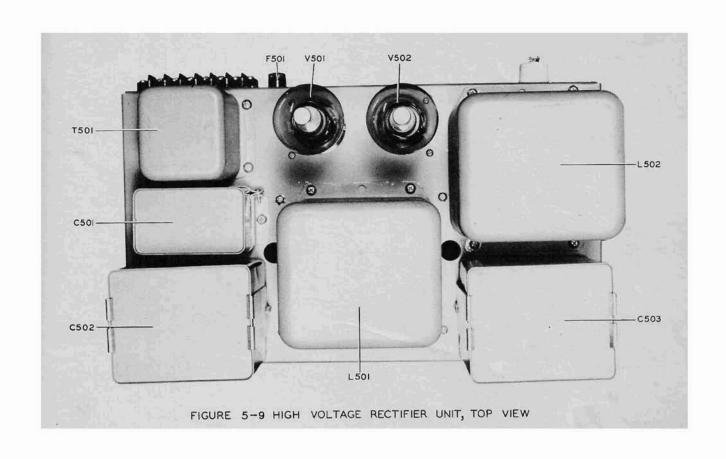
FIGURE 5-4 RF EXCITER & POWER AMPLIFIER PARTS ARRANGEMENT-BOTTOM

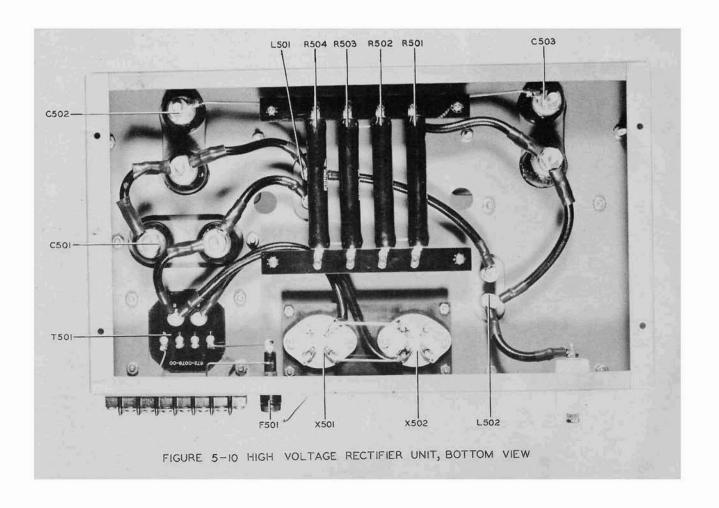


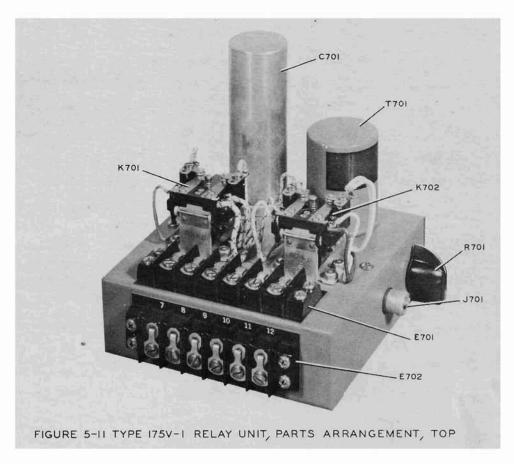


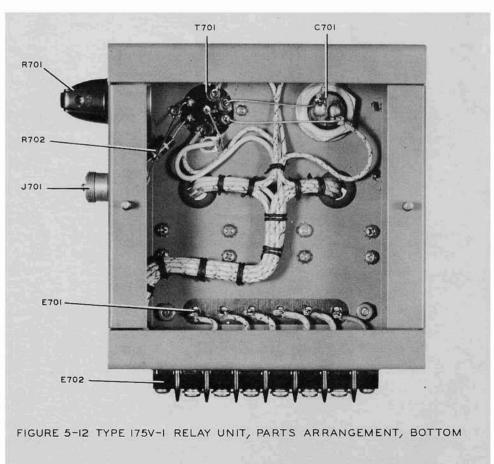


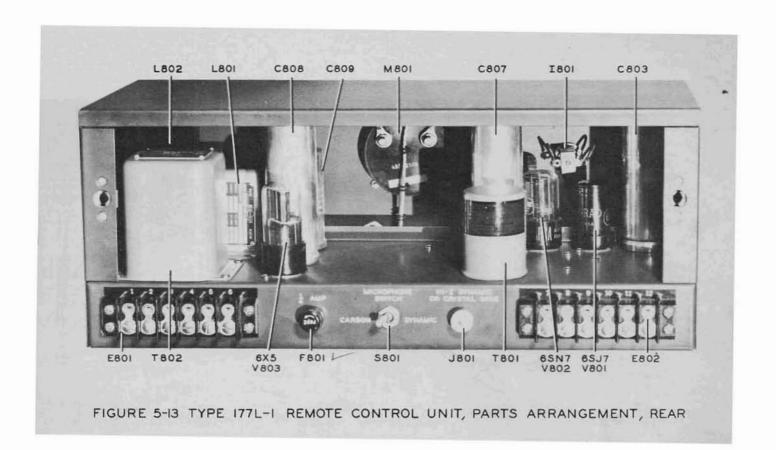


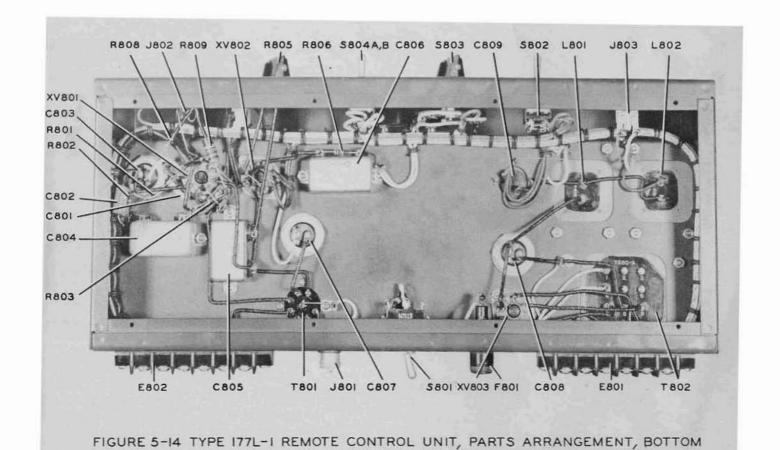












SECTION 6 PARTS LIST

4115354011H11(1)2 (e81	तात्तासुर्वात्रामाः।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।	सारक्षाप्रसाधकारकामाः व्यवस्थानसम्बद्धाः । ।	!!	_	
Maria	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	or CAT. NO.	COLLINS PART NUMBER
ClOl	Relay Supply Voltage Filter	CAPACITOR: 20 mf	1		184 6509 00
C102	Relay Supply Voltage Filter	CAPACITOR: 20 mf	5 b \$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		184 6509 00
C201	Oscillator, V201, Grid Circuit Capacitor	CAPACITOR: 15 mmf ±10%; 500 WV			935 0073 00
G202	Oscillator, V201, Grid-Cathode Capacitor	CAPACITOR: 47 mmf ±5%; 500 WV	2		935 0091 00
C203	Oscillator, V201, Cathode Capacitor		; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		935 0127 00
C204	Oscillator, V201, Screen Bypass Capacitor	CAPACITOR: 4700 mmf ±20%; 500 WV	1		935 2104 00
C2O5	R-F Coupling Capacitor	CAPACITOR: 1000 mmf +20%; 500 WV			935 4101 00
C206	Oscillator, V201, Plate Tank Capacitor	CAPACITOR: 100 mmf			920 1120 00
C207	Oscillator, V201, Plate Tank Capacitor	CAPACITOR: 100 mmf	1		920 1120 00
6208	R-F Coupling Capacitor	CAPACITOR: 1000 mmf ±20%; 500 WV			935 4101 00
0209	Multiplier, V202, Screen Bypass	CAPACITOR: 10,000 mmf +20%; 300 WV		3 1 3 1 1	935 2118 00
C210	Multiplier, V202, Cathode Bypass	CAPACITOR: 10,000 mmf +20%; 300 WV		1	935 2118 00
C211	R-F Coupling Capacitor	CAPACITOR: 1000 mmf +20%; 500 WV		; ; , , ,	935 4101 00
0212	Multiplier Plate Tank Capacitor	CAPACITOR: 100 mmf		4 2 2 1 1	920 1120 00
-	ŧ \$	į	;	;	

4: 27044141444444111 (+ + 111)		पुरस्तानसम्बद्धाः । । । । । । । । । । । । । । । । । । ।		F	LUMASEERI PHER PROPERTY OF THE SECOND COMMENTS OF THE SECOND COMMENT
HTEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER		COLLINS PART NUMBER
C213	Multiplier Plate Tank Capacitor	CAPACITOR: 100 mmf			920 1120 00
C214	R-F Coupling Capacitor	CAPACITOR: 1000 mmf ±20%; 500 WV			935 4101 00
C215	R-F Amplifier, V203, Filament Bypass Capacitor	CAPACITOR: 4700 mmf ±20%; 2500 WV			936 1105 00
C216	R-F Amplifier, V203, Filament Bypass Capacitor	CAPACITOR: 4700-mmf ±20%; 2500 WV	1		936 1105 00
C217	R-F Amplifier, V203, Screen Bypass	CAPACITOR: 4700 mmf ±20%; 2500 WV	1		936 1105 00
C218	Channel 1 Antenna Tuning and Load- ing Capacitor	CAPACITOR: dual sect; 670 mmf per sect	;		920 0018 00
0219	Channel 1 Plate Tuning Capacitor	CAPACITOR: dual sect; 75 mmf per sect	1		920 0016 00
C 220	R-F Coupling Capacitor	CAPACITOR: 193 mmf	1		924 1005 00
C221	R-F Coupling Capacitor	CAPACITOR: 193 mmf			924 1005 00
C222	Channel 2 Plate Tuning Capacitor	CAPACITOR: dual sect; 75 mmf per sect	, , , , , , , , , , , , , , , , , , ,		920 0016 00
0223	Channel 2 Antenna Tuning and Load- ing Capacitor	CAPACITOR: dual sect; 670 mmf per sect			920 0018 00
C224	R-F Coupling Capacitor	CAPACITOR: 1000 mmf ±5%			938 2066 00
0301	Audio Amplifier, V301, Cathode Bypass	CAPACITOR: 20 mf +100 -10%; 100 WV		:	183 3310 00
0302	, , , ,	CAPACITOR: 3 sect; 0,1 mf per sect +40 -15%; 600 WV		1	961 4059 00

******************		nadadaganandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandaga Taraasaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandagaanandaga	484443844543445	(1(1)11) ;;H((1)11(H445CQH4+H31);	циканияния пананыно
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE;		COLLINS PART NUMBER
H4409411040950	मन्त्रा:+क्ट-क्षामक्षमावाक्षककृतः वागवात्रामकृत्वा	्वतामन्त्रद्भवस्यक्रममस्याद्भावस्य । 	t tearitementementement f	шинумаандауыныши	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
C302A	Audio Amplifier, V301, Screen Bypass	Part of C302	1		
C302B	Audio Amplifier, V301, Plate Bypass	Part of C302	t : : : : : : : : : : : : : : : : : : :		
03020	Plate Decoupling	Part of C302			
0303		CAPACITOR: not used	1	! 	
C304	Audio Coupling Capacitor	CAPACITOR: 10,000 mmf ±20%; 300 WV			935 2118 00
C305	Audio Coupling Capacitor	CAPACITOR: 10,000 mmf ±20%; 300 WV	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		935 2118 00
c306	Filter Resonating Capacitor	CAPACITOR: 180 mmf ±5%; 500 WV			935 0116 00
C307	Audio Filter Capacitor	CAPACITOR: 200 mmf ±5%; 500 WV	; ; ; ;		935 0118 00
c308	Audio Filter Capacitor	CAPACITOR: 200 mmf ±5%; 500 WV	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		935 0118 00
C309	Audio Amplifier, V302, Cathode Bypass	CAPACITOR: 20 mf +100 -10%; 100 WV)		183 3310 00
0310	Audio Coupling Capacitor	CAPACITOR: 0,1 mf +40 -15%; 600 WV	1	:	961 5020 00
0311	Mod. Driver Grid Return Bypass	CAPACITOR: 20 mf +100 -10%; 100 WV			183 3310 00
C312	Audio Decoupling Capacitor	CAPACITOR: 4 mf +40 -15%; 600 WV			961 3005 00
0313	Modulator Driver Plate Decoupling Capacitor	CAPACITOR: 4 mf +40 -15%; 600 WV			961 3 005 00
C314	Audio Decoapling Capacitor	CAPACITOR: 4 mf +40 -15%; 600 WV			961 3005 00
 			1	: : :	

mennana hum ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	MFR, TYPE	COLLINS PART NUMBER
C315	Moàulator Grid Bypass Capacitor	CAPACITOR: 4700 mmf ±20%; 500 WV		490:Danahadaa(34):Dar	935 2104 00
c316	Audio Amplifier, V301, v-f bypass	CAPACITOR: 100 mmf ±20%; 500 WV	(935 0107 00
C317	Audio Amplifier, V301, Cathode Bypass	CAPACITOR: 1000 mmf ±20%; 500 WV			935 4101 00
C401	Bies Voltage Supply Filter	CAPACITOR: 4 mf +40 -15%; 600 WV	1		961 3005 00
C402	Bies Voltage Supply Filter	CAPACITOR: 4 mf +40 -15%; 600 WV	1		961 3005 00
C 403	L.V. Power Supply Filter	CAPACITOR: 10 mf ±10%; 1000 WV	1 1 1 1 1 1		930 0038 00
C501	H.V. Power Supply Filter	CAPACITOR: 0,1 mf ±10%; 5000 WV	; 1		930 0042 00
*C501		CAPACITOR: 0.15 mf ±10%; 500 WV	1		930 0035 00
C 502	H,V. Power Supply Filter	CAPACITOR: 2 mf ±10%; 4000 WV	;		930 0040 00
0503	H.V. Power Supply Filter	CAPACITOR: 2 mf ±10%; 4000 WV	; ; ; 1 1 1 2 3 4 5 5 7 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		930 0040 00
C701	Audio Bypass	CAPACITOR: 4 mf +40 -15%; 600 WV			961 3005 00
) CR101	Relay Voltage Supply Rectifier	RECTIFIER: Selenium; dry disc; single phase; full wave; input 72 v ac max; output 52 v dc max; .6 amp at 35°C; .4 amp at 45°C			353 0007 00
E101, E102, E201, E202, E301, E302, E401, E402, E403, E501	-	TERMINAL STRIP: black phenelic; barrier type w/ lugs for back connections; 6 term			367 0037 00

ITEM }	CIRCUIT FUNCTION	DESCRIPTION	NUMBER :	or CAT. NO.	
) 	; } }			415000000000000000000000000000000000000	FARI NUMBER
; 1 1 1 1 1 1 1) ; ; ; ; ; ; ; ;	INSULATOR: ceramic male bushing; .200" ID hole; 1-1/8" diam x 1-5/16" ho/a			190 0004 00
	,	INSULATOR: ceramic fe- male bushing; .200" ID hole; 1-1/8" diam x 3/4" h o/a	\$ 6 2 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		190 0008 00
, , , , , , , ,	1 4 2 3 4 8 8	JUMPER BAR: load coil; bar w/ banana plugs 4-3/8" c to c			502 3032 001
	1 1 6 7	CAP, TUBE PLATE: spring and connector assem for 4-125A tube cap			502 8808 002
) () () () ()	i 2 5 6 7 1 1 8	CAP, TUBE PLATE: ce- ramic; for 9/16" diam cap			301 1005 00
1 1 1 1 1 1	• • • • • • • • • • • • • • • • • • •	CAP, TUBE PLATE: ce- ramic; for 3/8" diam cap			301 1002 00
1	Plate Voltage Control Knob	KNOB: control; black phenolic w/ skirt; for 1/4" diam shaft; 1-3/4" diam x 7/8" h o/a; engraved OP T LV			502 9002 00
	Fil. Voltage Ad- justment Knob	KNOB: control; black phenolic w/ skirt; for 1/4" diam shaft; 1-3/4" diam x 7/8" h o/a; engraved 3 2 1			502 9003 00
	Phone-CW Selector Switch Knob	KNOB: control; black phenolic w/ skirt; for 1/4" diam shaft; 1-3/4" diam x 7/8" h o/a; engraved PH CW			502 9004 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE		COLLINS PART NUMBER
ZINGAGAGAGA	Audio Gain Gon- trol Knob	KNOB: control; black phenolic w/ skirt; for 1/4" diam shaft; 1-3/4" diam x 7/8" h o/a; engraved 10 to 0		<i>о</i>	502 9005 00
	Exciter Tuning Knobs	KNOB: tuning; black bakelite w/ skirt; for 1/4" diam shaft; 2" diam x 13/16" thk o/a; engraved 100 to 0			503 3041 002
1 1 1 1 5 1 2 2 2		KNOB: tuning; black phenclic w/ skirt; for 1/4" diam shaft; 2-3/4" diam x 7/8" h o/a; engraved 100 to 0			281 0039 00
		KNOB: pointer; black phenolic; for 1/4" diam shaft; 27/32" wd x 1-31/64" lg x 13/16" h; engraved indicator line			281 1080 00
	Channel Selector Knob	KNOB: black phenolic; for 1/4" diam shaft; 8-32 set screw; 3/4" diam x 1-1/4" h o/a	1 5 4 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		281 0002 00
	Supply Line Fuse Supply Line Fuse	FUSE: plug; 20 amp;			264 1200 00
F103	Relay Voltage Supply Fuse	FUSE: cartridge; 2 amp; 250 v			264 4070 00
	Exciter Filament Supply Fuse Mod. Driver Fila- ment Supply Fuse Bias Voltage Sup- ply Fuse	FUSE: slow blow; car- tridge; 1/2 amp; 250 v	: 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		264 4260 00
F402	L.V. Supply Fuse	FUSE: cartridge; 3 amp;			264 4080 00
F403	Modulator and R-F Amplifier Fila- ment Supply Fuse	FUSE: cartridge; 2 amp; 250 v	: ! ! ! !		264 4070 00
F501	H.V. Rectifier Filament Supply Fuse	FUSE: slow blow; car- tridge; 1 amp; 250 v			264 4280 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE;	MFR, TYPE	COLLINS PART NUMBER
400#HBBBBBBB) - 14/2868514846 214884 1731148 41	इ अध्यक्कातश्चभारम् 	hranemannanani 1		r ANT NOWIDEN
	Filament Power Indicator Plate Power Indi- cator	BULB: pilot light; 125 v; .040 amp; 6 w; candelabra base	2		262 3320 00
J301	Microphone or Audio Connector	CONNECTOR: wall mtg; pressure type cont for single cond shielded cable; 5/8" diam x 3/4" lg o/a; thd 5/8-27 for connecting ring			369 1008 00
K201	Keying Control Relay	RELAY: sensitive; 12-24 ma; 24-48 v			408 7000 00
K202	Exciter Channel Selector Relay	RELAY: RF circ control; DPDT; 48 v dc coil			407 1005 00
K203	Exciter Channel Selector Relay	RELAY: RF circ control; DPDT; 48 v dc coil	; ; ; ;		407 1005 00
K204	R-F Power Ampli- fier Channel Selector Relay	RELAY: rotary; 2 pos; 30° wafer switch driving 48 v dc coil			410 0026 00
·X 205	Output Network Channel Selector Relay	RELAY: RF circ control; DPDT cont w/ SPDT aux; 48 v dc coil	, , ,		407 1006 00
K206	Crystal Select Relay	RELAY: RF circ control; DPDT; 48 v dc coil	1		407 1005 00
K401	Plate Power Relay	RELAY: circ control; SPNO double break; 15 amp cont; 112 v dc coil			405 0021 00
L101	Relay Supply Voltage Filter	REACTOR: filter; 1 hy min at .050 amp, .25 hy min at .4 amp (at 25 v rms); 5 ohm max; 120 cps; 1000 TV rms; sealed case 2.850" x 3-1/2" x 4-1/4" h o/a; 2 solder post term			678 0154 00
L201	Oscillator Cath⊷ ode Choke	COIL: RF choke; 4 pi; duo-lateral wound; 2.5 mh; .125 amp; 50 ohm max; 1/2" diam x 1-15/16 h o/a; 6-32 thd mtg hole in base 3/8" d; cotter pin terms			240 5300 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER	MFR. TYPE or CAT. NO.	COLLINS PART NUMBER
L202	Oscillator Screen Supply Choke	COIL: RF choke; 4 pi; duo-lateral wound; 2.5 mh; .125 amp; 50 chm max; 1/2" diam x1-15/16" h c/a; 6-32 thd mtg hole in base 3/8" d; cotter pin terms			240 5300 00
*L203 and *L204	Tank Inductor	COIL: 34 turns #24 bus; 3.4-4.5 mc; shield can 2" sq x 4" h; med 7 pin base			50 3 3 8 3 0 003
	Tain Thudous	COIL: 21 turns #24 bus; 4.5-6.0 mc; shield can 2" sq x 4" h; med 7 pin base			503 3831 003
		COIL: 14 turns #24 bus; 6.0-8.0 mc; shield can 2" sq x 4" h; med 7 pin base			50 3 3 8 3 2 003
		COIL: 9-1/2 turns #24 bus; 8.0-10.5 mc; shield can 2" sq x 4" h; med 7 pin base		÷	50 3 3833 0 03
L205	V202, Multiplier, Grid Choke	COIL: RF choke; 4 pi; duo-lateral wound; 2.5 mh; .125 amp; 50 ohm max; 1/2" diam x 1-15/16" h o/a; 6-32 thd mtg hole in base 3/8" d; cotter pin terms			240 5300 00
L206	V2O2, Multiplier, Plate Supply Choke	_			240 5300 00
*L207 and *L208	Multiplier Plate Tank Inductor	COIL: 54 turns #24 DSC; 2.0-2.6 mc; shield can 2" sq x 4" h; med 7 pin base	, , , , , , , , , , , , , , , , , , ,		503 3828 00
* Choos	e coils for frequen	cy desired (See coil chart	in Insta	llation Sect	ion)

ITEM	CIRCUIT FUNCTION	OESCRIPTION	MFR. CODE NUMBER	MFR. TYPE or CAT. NO.	COLLINS
Meetings:	ताम् (४) इत्तरम् । इत्तरम् । इत्तरम् । इत्तरम् । इत्तरम् । इत्तरम् ।	COIL: 36 turns #24 DSC; 2.6-3.4 mc; shield can 2" sq x 4" h; med 7 pin	;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;		503 3829 003
		base COIL: 34 turns #24 bus; 3.4-4.5 mc; shield can 2" sq x 4" h; med 7 pin			503 3830 003
		base COIL: 21 turns #24 bus; 4.5-6.0 mc; shield can 2" sq x 4" h; med 7 pin			503 3831 003
		base COIL: 14 turns #24 bus; 6.0-8.0 mc; shield can 2" sq x 4" h; med 7 pin	1 1 1 1 1 1		503 3832 003
		base COIL: 9-1/2 turns #24 bus; 8.0-10.5 mc; shield can 2" sq x 4" h; med 7			503 3833 003
	,	pin base COIL: 8 turns #24 bus; 10.5-14.0 mc; shield can 2" sq x 4" h; med 7 pin	1		503 3834 003
		base COIL: 5 turns #24 bus; 14-18 mc; shield can 2" sq x 4" h; med 7 pin	1		503 3835 003
		base COIL: 5 turns #16 bus; 18-24 mc; shield can 2" sq x 4" h; med 7 pin	1		503 3836 003
		base COIL: 5 turns #16 bus; 24-30 mc; shield can; 2" sq x 4" h; med 7 pin base	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		503 3837 003
L209	V203, RF Power Amplifier Grid Choke	COIL: RF choke; 4 pi; duo-lateral wound; 2.5 mh; .125 amp; 50 ohm max; 1/2" diam x 1- 15/16" h o/a; 6-32 thd mtg hole in base 3/8" d; cotter pin terms			240 5300 00
, , , , ,					

411(#\$)]][[#4]]####(#*)) Printstrings inhtholinessymhetelsin <mark>(1926)1</mark> 495611	क्रमध्यक्रात्वक्षत्वक्रात्वक्रात्वक्रात्वक्रात्वक्रात्वक्रात्वक्षत्वक्रात्वक्षत्वक्रात्वक्षत्वक्रात्वक्षत्वक्रात्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्वक्षत्	imer. code!	MFR. TYPE	COLLINS
ITEM '	CIRCUIT FUNCTION	DESCRIPTION	NUMBER		PART NUMBER
*L210 and *L211	V203, RF Power Amplifier Plate Supply Choke	COIL: RF choke; 2 - 10,5 mc; 300 uh; #24 DSC double bank wound on cerramic form 1" diam x 7" lg. banana plugs 6-1/2"			503 3821 002
		c to c COIL: RF choke; 6 - 18 mc; 96 uh; #24 enam, single layer wound on ceramic form 1" diam x 7" lg; banana plugs 6-1/2" c to c	1		503 3822 002
		COIL: RF choke; 10 - 30 mc; 53 uh; #24 enam, single layer wound on ceramic form I" diam x 7" lg; banana plugs 6-1/2" c to c	1		503 3823 002
*L212 and *L213	RF Power Amplifier Output Tank In- ductor	COIL: tank; 46T #14 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 4 banana plugs on st line 1-1/4", 3-1/2", 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a			503 38 38 003
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;		COIL: tank; 24T #12 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 4 banana plugs on st line 1-1/4", 3-1/2", 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a			503 3839 003
1		COIL: tank; 12T #12 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 3 banana plugs on st line 3-1/2" and 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a			503 3840 003
* Choose coils for frequency desired. (See coil chart in Installation Section)					

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	 COLLINS PART NUMBER
		COIL: tank; 8T #10 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 2 banana plugs 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a COIL: tank; 6T 1/2" wd copper ribbon, wound 2" diam x 5-1/2" lg; shorting bar on T #4; mycalex mtg plate w/ 2 banana plugs 4-3/8" c to c; 6-1/2" lg x 2" wd x 4-1/4" h o/a		503 3841 003 503 3842 003
•	Static Drain Choke	COIL: RF Choke; 1 mh	1	240 2600 00
L215 **L216		COIL: load; 46T #14 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 2 banana plugs 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a	1	503 3843 003
**L217		COIL: load; 46T #14 bus on ceramic form 2-1/2" diam x 6" lg; sliding coil rider; mycalex mtg plate w/ 2 banana plugs 4-3/8" c to c; 6-1/2" lg x 3-1/4" wd x 5-1/4" h o/a	2	503 3843 003
L301	Audio Filter Reactor	REACTOR: audio; 3.75 hy; 1000 rms TV; 100-5000 cps; case 2-1/4" x 1- 1/2" x 2" h; 2 mtg holes 1.880" c to c; 2 solder post term	, , , , , , , , , , , , , , , , , , ,	678 0077 00
** For 1	ow frequency operat	ion.	t (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER	MFR. TYPE or CAT. NO.	COLLINS PART NUMBER
L302		COIL: RF choke; 2.7 uh; 300 ma; form 0.170" diam x 5/8" lg; axial leads		<u>шты</u>	240 0012 00
L401	Bias Supply Filter	REACTOR: filter; 12 hy; 75 ma; 2500 rms TV; 120 cps; 275 chms; case 2.850" x 3-1/2" x 3-3/4" h; mtg holes 2" x 3.12" c to c; lug term			678 0075 00
L402	L.V. Power Supply Filter	REACTOR: filter; 6 hy; 250 ma; 2500 rms TV; 120 cps; 62 ohms; case 5- 1/4" x 4-1/2" x 5.30" h; mtg holes 4-3/4" x 2- 1/2" c to c; lug term	; ;		678 0076 00
	H.V. Power Supply Filter	REACTOR: filter; 12 hy; 300 ma; 10,000 rms TV; resonates at 120 cps w/ .1 mf capacitor and 30 ma dc load; case 5.310" x 5.370" x 6.050" h; 2 screw term 1.250" h; mtg holes 5.370" x 3-1/2" c to c			678 0081 00
MlOl	Power Amplifier Plate Current Meter	METER: 0-300 ma dc; 30 scale div, 10 ma per div; case 2-3/8" sq x 2-11/64" d o/a; 1.875" x 1.875" mtg/c			450 0031 0 0
M102	Power Amplifier Grid Current Meter	METER: 0-25 ma dc; 2% accuracy; case 2-3/8" sq x 2-11/64" d o/a; 1,875" x 1,875" mtg/c	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		450 0029 00
M103	Filament Voltage Meter	METER: 0-10 v ac; 2% accuracy; case 2-3/8° sq x 2-5/32° d o/a; 1 875° x 1.875° mtg/c	1 2 3 5 6 6 4 1 2		452 0006 00
M104	Modulator Plate Current Meter	METER: 0-200 ma de; 40 scale div, 5 ma per div; case 2-3/8" sq x 2-11/64" d o/a; 1.875" x 1.875" mtg/c			450 0030 00
/ 10					

TEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	MFR. TYPE •r CAT. NO.	COLLINS PART NUMBER
M105	Antenna Current Meter	METER: 0-3 amp RF; 30 scale div, al amp per div; int thermocouple; case 2-3/8" sq x 2-19/64" d o/a; 1.875" x 1.875" mtg/c			451 0018 00
M106	Antenna Current Meter	METER: 0-3 amp RF; 30 scale div, 1 amp per div; int thermocouple; case 2-3/8" sq x 2-19/64" d o/a; 1.875" x 1.875" mtg/c			451 0018 00
M201	Multiplier Grid Current Meter	METER: 0-10 ma dc; 50 scale div, .2 ma per div; case 2-3/8" sq x 2-11/64" d o/a; 1.875" x 1.875" mtg/c			450 0049 00
P301	Microphone Con- nector	CONNECTOR: plug; for single cond shielded cable 1/4" OD max; 23/32" diam x 1-1/8" lg w/ cable spring 7/8" lg; locking ring			369 1006 00
RIOI	Plate Transformer Series Resistor for Tuning	RESISTOR: heater; 660 w; 115 v; conical form; med Edison base			711 0003 00
R102	Relay Voltage Sup- ply Bleeder Re- sistor	RESISTOR; 1000 ohm <u>+</u> 10%; 10 w			710 1142 00
R201	Oscillator, V201, Grid Resistor	RESISTOR: 47,000 ohm ±10%; 1 w			745 3156 00
R202	Oscillator, V201, Cathode Resistor	RESISTOR: 470 ohm ±10%; 2 w			745 5072 00
R203	Oscillator, V201, Screen Resistor	RESISTOR: 20,000 ohm +10%; 10 w			710 1204 20
R204	Multiplier, V202, Grid Resistor	RESISTOR: 47,000 ohm ±10%; 2 w			745 5156 00

#116121F19889 41# #1161	भगतित्यम्।तस्यातस्यक्षिक्षभगक्षाभगक्ष्यभगक्षित्रस्याक्ष्मभावस्य	१९४४)म् १९४८मा वस्त्रपञ्चन्त्रकात् स्थापा स्थापा १५०० व्यवस्था । १९४४ -			इ.स.च्यासम्बद्धाः इ.स.च्यासम्बद्धाः
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER	MFR. TYPE or CAT. NO.	COLLINS PART NUMBER
R205	Multiplier, V202, Cathode Resistor	RESISTOR: 500 ohm ±10%;			710 1500 20
R20 6	Multiplier, V202, Screen Dropping Resistor	RESISTOR: 47 ohm ±10%;	, 1 1 1 1 1 2 2 3 5 7		745 3030 00
R20 7	RF Power Amplifie V203, Grid Re- sistor	RESISTOR: 5000 ohm	!		710 3542 00
R208	RF Power Amplified V203, Screen DroppingResistor	<u>+</u> 10%; 50 w	6		710 4542 00
R20 9	Exciter Screen Voltage Divider Resistor	RESISTOR: 7500 ohm ±10%; 25 w	1		710 0069 00
R210	Exciter Screen Voltage Divider Resistor	RESISTOR: 2500 ohm +10%; 25 w	;		710 0066 00
R211, R212		RESISTOR: 1000 ohm +10%; 10 w	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		710 1142 00
R213, R214	PA Drive Control	RESISTOR: 500 ohm ±10%; 10 w	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		710 1500 20
R215, R216		RESISTOR: 1500 ohm ±10%; 10 w	, , , , , , , , , , , , , , , , , , ,		710 0027 00
R301		RESISTOR: not used			; ! !
R302	Audio Amplifier, V301, Grid Re- sistor	RESISTOR: 1.0 megohm ±10%; 1/2 w			745 1212 00
R303	Audio Amplifier V301, Cathode Resistor	RESISTOR: 1000 ohm ±10%; 1/2 w	1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		745 1086 00
R304	Audio Amplifier, V301,Screen Resistor	RESISTOR: ,47 megohm ±10%; 1/2 w			745 1198 00
R305	Audio Amplifier, V301, Plate Re- sistor	RESISTOR: .10 megohm ±10%; 1 w			745 3170 00
R306	Audio Gain Control	RESISTOR: .50 megohm; 1/2 w; 350 v max	1 ! 1		376 3027 00
R307	Audio Amplifier, V302, Cathode Resistor	RESISTOR: 1000 ohm +10%; 1 w			745 3086 00

श्वभवादत्त्वस्थात्	व्यक्षिताम् भवस्य स्थापन्य स्थापन्य । १	rate statistic succession in the contract of t	nomannamandumand	***************************************	(4400)1411410(B)14000034141424444*
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE;		COLLINS PART NUMBER
promonent Notice.	- 	; ;талиятативать, полиятья сукативноваещо ;		Therefores (reference) to 1	***************************************
R308	Audio Amplifier, V302, Plate Re- sistor	RESISTOR: 47,000 ohm +10%; 2 w			745 5156 00
R309	Audio Equalizing Resistor	RESISTOR: .10 megohm ±10%; 1/2 w	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		745 1170 00
R310	Audio Amplifier, V302, Grid Ro- sistor	RESISTOR: ,10 megohm ±10%; 1 w			745 3170 00
R311	Audio Amplifier, V302, Cathode Voltage Divider	RESISTOR: 620 ohm ±5%; l w			745 3077 00
R312	Audio Amplifier, V302, Cathode Voltage Dividor	RESISTOR: 620 ohm ±5%; 1 w			745 3077 00
R313	Audio Amplifier, V302, Cathode Voltage Divider	RESISTOR: 330 ohm <u>+</u> 10%; 1 w			745 3065 00
R314	Audio Amplifier; V302, Plate Re- sistor	RESISTOR: 47,000 ohm ±10%; 2 w			745 5156 00
R315	Peak Clipping Control	RESISTOR: 100,000 ohm potentiometer; 1/2 w	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	,	380 3100 40
R 31 6	Mod Driver, V304, Bias Resistor	RESISTOR: 750 ohm ±10%;	; ; ; ; ;		710 1750 20
R317	Audio Input Ampli- fier, V301, De- coupling Resistor	RESISTOR: 47,000 ohm ±10%; l w	1		745 3156 00
R318	Mod Driver De- coupling Resistor	RESISTOR: 4000 ohm ±10%; 50 w	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		710 4442 00
R319	Plate Decoupling Resistor	RESISTOR: 20,000 ohm ±10%; 10 w	; ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '		710 1204 20
R320	Plate Descupling Resistor	RESISTOR: 4700 ohm ±10%; 2 w			745 5114 00
: : !			1		i
i 1				: :	1

econson production	desints patti practi programa a mata da tarrera.		 		yandhiiii448888888488
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER	MFR. TYPE	COLLINS PART NUMBER
R401	Modulator Bias Control	RESISTOR: 750 ohm ±10%; 25 w			735 0002 00
R402	Bias Supply Volt- age Divider	RESISTOR: 500 ohm <u>+</u> 10%; 10 w	1 ! 2 ! 5 ! 1 ! 1 ! 1 ! 1 ! 1 ! 1 ! 1 ! 1 ! 1 ! 1		710 1500 20
R403	Bias Supply Volt- age Divider	RESISTOR: 1000 chm +10%; 10 w			710 1142 00
R404	L.V. Power Supply Bleeder	RESISTOR: 25,000 ohm ±10%; 50 w			710 4254 20
R501	H.V. Power Supply Bleeder Resistor	RESISTOR: 25,000 ohm ±10%; 50 w	; I ? ? ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !		710 4254 20
R502	H.V. Power Supply Bleeder Resistor	RESISTOR: 25,000 ohm ±10%; 50 w		;	710 4254 20
R503	H.V. Power Supply Bleeder Resistor	RESISTOR: 25,000 ohm +10%; 50 w			710 4254 20
R504	H.V. Power Supply Bleeder Resistor	RESISTOR: 25,000 ohm ±10%; 50 w			710 4254 20
S101	Test Key Switch	SWITCH: lever; contacts 1A 1A and 1A 1A; 110 v 60 cyc ac non-ind			375 0049 00
S102	Channel Selector Switch	SWITCH: tap; 2 circ; 2 pos	,		259 0239 00
S103	Local-Remote Con- trol Switch	SWITCH: lever; contacts 2A 2A and 2A 2A; 110 v 60 cyc ac non-ind			375 0031 00
S104	Filament Voltage Control Switch	SWITCH: tap; single circ; 30 pos	3		259 1180 00
S105	Filament Power ON-OFF Switch	SWITCH: toggle; SPST			266 30 05 0 0
S106	Plate Power ON- OFF Switch	SWITCH: toggle; SPST	:	• •	266 3005 00
S107	Plate Voltage Control Switch	SWITCH: tap; single circ; 3 pos			259 3180 00
; ; ;	1	; ; ;	: } }	4 1 i	

(#12113111111313344))**	प्रमानुन्यानुन्नान्यः।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।	merculoudioudomicane construction (special)	iconamontinos d	(4b1143)11(0)11(4b1)(4b1)(4b1)	(4471)))))
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE; NUMBER ;	MFR. TYPE or CAT. NO.	COLLINS PART NUMBER
nadolidien	patronespendintientillinintillinespilletebetidineses	व्यामासम्परस्थाः।१६वाक्षम्यस्यमासमावक्षाम्	timinannaaassassi tiinaannaaassassi	mannaman mannaman	
S108	Door Interlock Switch	SWITCH: push button; NO interlock; momentary			266 0003 00
S301	Phone-CW Selector Switch	DETENT ASSEMBLY: 2 pcs; 60° detent; 1/4" diam shaft w/ flat, 3-11/16" 1g o/a; 3/8-32 thd bush- ing; mtg holes 1,562"			269 1019 00
		c to c HUB: brass; 1/4" diam shaft hole; two 9/64" diam holes 5/8" c to c; 10-32 set screw hole;			502 8813 002
		l" diam x 9/16" thk STANDOFF: ceramic; 3/8" diam x 1" h; tapped	1	,	190 0012 00
		6-32 both ends 3/8" d CONTACT ARM: 2-1/4" lg arm w/ silver contact each end; mtg holes			502 8914 002
		5/8" c to c STANDOFF: ceramic; 1/2" diam x 2" h; tapped 8-32 both ends 3/8" d			190 0021 00
i i i		CONTACT STUD: hex head w/ silver contact; 8-32 screw 1/2" lg from head	1		305 0145 00
S301A		SWITCH: part of S301	\$ 1	·	•
S301B		SWITCH: part of \$301			; ; ;
TlOl		TRANSFORMER: plate; pri #1: 115 v; pri #2: 115 v; sec#1: 2365/2950 v; CT; sec #2: 2365/2950 v	:	·	662 0015 00
T102	Relay Voltage Sup- ply Transformer	TRANSFORMER: power; pri: 115 v; sec: 72/67/62 v; .58 amp			674 0153 00
T 201	Exciter Filament Transformer	TRANSFORMER: fil; pri: 115 v; sec: 6.3 v CT, 3 amp			672 0069 00
; ; ;			1		, ,
20100	:		1 1		\ 6_17

\$4161777JALESTEARTLATE	IIII ABSANTONINA INDANIA INDAN	aneachta thatteann teoleumann eann an a	uulektgaagenaatebbtiiibidt	 	njiboblagtyktysanggipitkyonnasiobkthiddob
ITE M	CIRCUIT FUNCTION	DESCRIPTION	MFR, CODE NUMBER	MFR. TYPE or CAT. NO.	COLLINS PART NUMBER
T301	Modulator Driver Transformer	TRANSFORMER: driver; pri: 2500 ohm; 60 ma bal; sec: 15,000 ohm CT; 100-5000 cps ±1-1/2 db			677 0 074 00
T302	Modulator Trans- former	TRANSFORMER: mod; pri: 32,000 ohm CT; 175 ma bal; sec #1: 16,700 ohm; 150 ma; sec #2: 248 v rms w/ 1770 v rms across sec #1; 50 ma unbal; 100-5000 cps			677 0073 00
T303	Mcdulator Driver Filament Trans- former	TRANSFORMER: fil; pri: 115 v; sec: 6.3 v CT, 3 amp			672 0069 00
T401	Bias Voltage Sup- ply Transformer	TRANSFORMER: LV; 50/60 cps; pri: 115 v; sec #1: 5 v; 2 amp; sec #2: 5 v; 2 amp; sec #3: 420 v CT; 1 amp			672 0068 00
T402	L.V. Power Supply Transformer	TRANSFORMER: LV; 50/60 cps; pri: 105/115/125 v; sec: 1320 v CT; .177 amp			672 0080 00
T403	Modulator and R-F Power Amplifier Filament Trans- former	TRANSFORMER: amp fil; 50/60 cps; pri: 105/110 /115 v; sec: 5 v CT; 20 amp			672 0072 00
T501	H.V. Rectifier Filament Trans- former	TRANSFORMER: rect fil; 50/60 cps; pri: 105/ 110/115 v; sec: 2,5 v; 10 amp			672 0079 00
V201	Oscillator	TUBE: 6V6GT/G; beam power amplifier	i		255 0031 00
V202	Multiplier	TUBE: 807; transmitting beam power amplifier			256 0033 00
V203	R-F Power Ampli- fier	TUBE: 4-125A; power tetrode			256 0068 00

\$31 6 (D29474177)) 				
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER		COLLINS PART NUMBER
V301	Audio Amplifier	TUBE: 6SJ7; triple-grid detector amplifier			255 0030 00
V302	Audio Amplifier	TUBE: 6SN7GT; twin- triode amplifier			255 0033 00
V303	Audio Peak Clipper	TUBE: 6H6; twin-diode	i 1 1 1 3		255 0117 00
V304	Modulator Driver	TUBE: 6B4G; power ampli- fier tricde	2 4 5 5 5 5 6 5 5 6 5 5 6 6 5 6 6 6 6 6 6	,	255 0124 00
V305	Modulator	TUBE: 75TH; medium-mu triode]		256 0071 00
V306	Modulator	TUBE: 75TH; medium-mu triode	P		256 0071 00
V401	Bias Supply Recti- fier	TUBE: 5R4GY; full-wave high-vacuum rectifier			257 0020 00
V402	L.V. Supply Recti- fier	TUBE: 5R4GY; full-wave high-vacuum rectifier	6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		257 0020 00
V501	H.V. Supply Recti- fier	TUBE: 866A; half-wave mercury-vapor rectifier			256 0049 00
V502	H.V. Supply Recti-	TUBE: 866A; half-wave mercury-vapor rectifier	; ; ; ;		256 0049 00
XF101, XF102		RECEPTACLE: fuse plug; 2 pole; 30 amp 125 v; porcelain body 2-1/2" wd x 2-15/16" lg x 1- 1/2" h; 2 mtg holes 1- 13/16" c to c; screw terms			265 1013 00
XF201, XF301, XF401, XF402, XF403,	Holder for F103 Holder for F201 Holder for F301 Holder for F401 Holder for F402 Holder for F403 Holder for F501	HOLDER: fuse cartridge; 1/2-24 thd mtg bushing; 11/16" diam x 2-7/16" 1g o/a; lug terms		3 2 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	265 1002 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	or CAT. NO.	COLLINS PART NUMBER
,	Socket for IlO1 Socket for IlO2	HOLDER: pilot light mtg; for candelabra base bulbs; frosted jewel 1" diam; 1"-27 thd bushing 1/2" lg; 1-5/16" diam x 2-3/4" lg o/a			262 0033 00
	Disc for IlOl Disc for IlO2	DISC: pilot light; green DISC: pilot light; red			262 2370 00 262 2360 00
XL204, XL207,		SOCKET: med 7 contact w/clips; ceramic; 1-49/64" mtg/c			220 57 3 0 00
XL209		SOCKET: not used	i 1 2		† † †
	Socket for L210 Socket for L211	JACK STANDOFF: 1-9/16" h ceramic standoff w/ banana jack; 1-5/16" mtg/c (reg 2 per coil)	, , , , , , , , , , , , , , , , , , ,		190 1132 00
	Socket for L212 Socket for L213	JACK ASSEMBLY: PLATE: 1/4" thk mycalex; 2" wd x 8-3/8" lg w/ 2 jack mtg holes 4-3/8" c to c			503 3046 002
		JACK: jumbo banana; 9/32" ID; 9/16" hex x 7/8" lg o/a; 3/8-24 thd	6 9 1 1 1		360 2030 00
XL214	Socket for LOAD COIL	JACK ASSEMBLY:			
XL215	Socket for LOAD COIL	PLATE: 1/4" thk mycalex; 2" wd x 8-3/8" lg w/ 4 jack mtg holes 1-1/4", 3-1/2", 4-3/8" c to c on st line			503 3047 002
2 : 1 1 1 1		JACK: jumbo banana; 9/32" ID; 9/16" hex x 7/8" 1g o/a; 3/8-24 thd			360 2030 00
XR101	Socket for R101	SCCKET: screw type; 660 v; 660 w; porcelain; 1-5/8" wd x 2-3/8" 1g x 1-5/8" h; mtg holes 1-13/16" c to c			265 1010 00

4zmminteletteltte	vincini (aasuure) niidendii (11) (11) (11) (11) (11) (11) (11) (1	illan, 1885, Pael 1861, Mron vanar i sach l Meshel Phirakanissigge Pi	randantielasmablide	PRIOCECTORMUNICALISMOS PROPRESSOR	janusanuurizhteilleseanuur
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER	MFR. TYPE	COLLINS PART NUMBER
XV201	Socket for V201	SCCKET: tube; std octal; bakelite w/ mtg plate; l.312" mtg/c	1		220 1005 00
XV202	Socket for V202	SOCKET: tube; 5 prong w/ clips; ceramic; 2 mtg holes 1-49/64" c to c			220 5520 00
XV203	Secket for V203	SOCKET: tube; 5 prong w/ clips; ceramic; 2- 1/4" x 2-1/4" mtg/c]		220 1016 00
XV302, XV303,	Socket for V301 Socket for V302 Socket for V303 Socket for V304	SOCKET: tube; std octal; bakelite w/ mtg plate; 1.312" mtg/c	1 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		220 1005 00
,	Socket for V305 Socket for V306	SOCKET: tube; 4 prong w/ clips; ceramic; 2 mtg holes 1-49/64" c to c			220 5450 00
	Socket for V401 Socket for V402	SOCKET: tube; std octal; bakelite w/ mtg plate; 1.312" mtg/c	1		220 1005 00
	Socket for V501 Socket for V502	SOCKET: tube; 4 prong w/ clips; ceramic; 2 mtg holes 1-49/64" c to c	1		220 5450 00
XY201, XY202	Socket for Y201 and Y202	SOCKET: crystal; dual 3 pin w/ clips; ceramic; l" x 4-1/8" mtg/c			220 8130 00
Y201, Y202	Frequency Control	CRYSTAL: frequency individually chosen within range 1.5 to 5 mc. See Maintenance Section 5.4			291 4149 00 thru 291 4648 00
,		! ! ! ! !			

1757-1	RELAY CONTROL UNIT	s grangaju: 5 dhe 20 (amerine) nee2hleane (amerine) ku	<u>9</u> 292841.************************************	ek518:711790407;pgp11{1 p2±2 +611k+1↓5	520	3438 00
ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE NUMBER		PART	LLINS NUMBER
C701	Remote line capacitor	CAPACITOR: 4 mf +40 -15%; 600 WV.			961	3005 00
E701, E702	Connector strip	TERMINAL STRIP: Black phenolic; barrier type with lugs for back connections; 6 term.			367 (0037 00
		KNOB: Pointer; black phenolic; for 1/4" diam shaft; 27/32" wd x1-1/2" lg x 3/4" h; engraved indicator line.			281]	00 0801
J 7 01	Audio connector	connector: Wall mtg; pressure type cont for single cond shielded cable; 5/8" diam x 3/4" lg o/a; thd 5/8-27 for locking ring,			369 1	1008 00
K701	Auxiliary filament power control	RELAY: Circ control; DPST; NO; 50 v coil.	; 1 1 1 1 5		407 1	1004 00
J702	Auxiliary plate power control	RELAY: Circ control;DPST; NO; 50 v coil.	1		407 1	.004 00
P701	Audio connector	CONNECTOR: Plug; for single cond shielded cable 1/4" OD max; 23/32" diam x 1-1/8" lg w/cable spring 7/8" lg; locking ring.			369 1	.006 00
R701	Audio input level adjustment	RESISTOR: 100 ohm poten- tiometer; .20 amp; 4 w.			377 0	036 00
R702	Audio pad	RESISTOR: 470 ohm \pm 10%; 1 w.	, , ,		745 3	072 00
T 7 01	Control lines transformer	TRANSFORMER: Audio; pri: 600 ohm CT; sec: 600 ohm 100-4000 cps ±1 db.			677 0	156 00
; ; ;			; 3 4 2 ; (1 1 4 ;	1 2 3 4		

177L-1 REMOTE UNIT

520 3439 00

CIRCUIT FUNCTION	DESCRIPTION	: .		PART NUMBER
Audio amplifier, V801, gridcapa- citor	CAPACITOR: 100 mmf ±20%; 500 W.	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		935 0107 00
Audio amplifier, V801, cathode bypass	CAPACITOR: 1000 mmf ±20%; 500 WV.			935 4101 00
Audio amplifier, V801, cathode bypass	CAPACITOR: 4 mf +40 -15%; 600 WV.			961 3005 00
Audio amplifier, V801, screen bypass	CAPACITOR: 500,000 mmf +40 -15%; 600 WV.	1		961 4077 00
Audio coupling	CAPACITOR: .1 mf +40 -15% 600 WV.			961 4020 00
Audio amplifier, V802, cathode bypass	CAPACITOR: 20 mf; 150WVDC	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		184 6509 00
Audio coupling	CAPACITOR: 4 mf +40 -15% 600 WV.	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		961 3005 00
Plate supply filter	CAPACITOR: 4 mf +40 -15% 600 WV.			961 3005 00
Plate supply filter	CAPACITOR: Dual sect; 4 mf per sect -15 +100%,			163 1009 00
Connector strip	TERMINAL STRIP: Black phenolic; barrier type w/lugs for back connections; 6 screw term,	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		367 0037 00
: t : !	KNOB: Black phenolic; for 1/4" diam shaft; 8-32 set screw; 3/4" diam x 1-1/4" h o/a.			2&1 0002 00
Fover line fuse	FUSE: Cartridge; 1/4 amp; 250 v; slow blow.			264 4240 00
Indicator lamp	BULB: Pilot light; 6,3 v;	; ; ;		262 3240 00
	Audio amplifier, V801, grid capacitor Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, V801, screen bypass Audio coupling Audio amplifier, V802, cathode bypass Audio coupling Plate supply filter Plate supply filter Connector strip Pover line fuse	Audio amplifier, V801, gridcapacitor Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, CAPACITOR: 1000 mmf ±20%; 500 WV. CAPACITOR: 1000 mmf ±20%; 500 WV. CAPACITOR: 4 mf +40 -15%; 600 WV. CAPACITOR: 500,000 mmf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 100 mmf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 20 mf; 150 WVDC. Audio amplifier, CAPACITOR: 20 mf; 150 WVDC. Audio amplifier, CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. CAPACITOR: 500,000 mmf +40 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Flate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Flate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Flate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Flate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Flate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 4 mf +40 -15%; 600 WV. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 500 WV. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 500 WV. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 500 wV. CAPACITOR: 500,000 mmf +400 -15%; 600 WV. CAPACITOR: 500 w	Audio amplifier, V801, grid capacitor Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, CAPACITOR: 1000 nmf ±20%; 500 WV. 8001, cathode bypass Audio amplifier, CAPACITOR: 4 mf +40 -15%; 600 WV. 8001, screen bypass Audio coupling CAPACITOR: 500,000 mmf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 1 nf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. CAPACITOR: 500 mr; 150 mr; 150 mr; 150 mr; 600 mr; 60	Audio amplifier, V801, gridcapacitor Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, V801, cathode bypass Audio amplifier, V801, screen bypass Audio amplifier, V801, screen bypass Audio coupling CAPACITOR: 500,000 mmf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 500,000 mmf +40 -15%; 600 WV. Audio amplifier, CAPACITOR: 20 mf; 150 WVDC. Audio amplifier, CAPACITOR: 20 mf; 150 WVDC. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 500,000 mmf +400 -15%; 600 WV. Audio coupling CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 500 mmf +400 -15%; 600 WV. Plate supply filter CAPACITOR: 500 mmf CAPACITOR: 20 mf; 150 WVDC. CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 500 mmf CAPACITOR: 20 mf; 150 WVDC. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Plate supply filter CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 20 mf; 150 WVDC. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 20 mf; 150 WVDC. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 500 wV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 500 wV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 500 wV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 500 wV. Audio coupling CAPACITOR: 4 mf +40 -15%; 600 WV. Audio coupling CAPACITOR: 500 wV. Audi

ITEM	CIRCUIT FUNCTION	DESCRIPTION	MFR. CODE	COLLINS PART NUMBER
J801	High impedance microphone connector	CONNECTOR: Wall mtg; pressure type cont for single cond shielded cable; 5/8" diam x 3/4" lg o/a; thd 5/8-27 for connecting ring.		369 1008 00
J802	Carbon microphone jack	JACK: Phone; 3 circ; midget; 15/16" diam x 1-9/32" lg o/a; 3/8-32 thd bushing 9/32" lg; lug tema.	1	358 1050 00
J803	Key jack	JACK: Phone; closed circ; 1/4" ID; 5/8" x 1" x 1-5/8" 1g o/a; 3/8-32 thd bushing 11/32" 1g.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	360 1060 00
L801	Plate supply filter	REACTOR: Filter; 15 hy; .02 amp; 120 cps.	t	678 1181 00
L802	Plate supply filter	REACTOR: Filter; 15 hy; .02 amp; 120 cps.	i 2 1 1 1	678 1181 00
м801	Audio level indicator	METER: Power level; -10 to +6 db; 5000 ohms int res at 0 db; 3" sq bake-lite case,	; ; ; ; ; ; ;	455 2500 00
P801		CONNECTOR: Plug; for single cond shielded cable 1/4" OD max;23/32" diam x 1-1/8" lg w/cable spring 7/8" lg; locking ring.		369 1006 00
P802	Carbon nicrophone connector plug	PLUG: Phone; 3 cond; 3/16 diam barrel 1.093" ig; 1/2" diam x 3-1/4" ig o/a.	† † † † † † † † † † † † † † † † † † †	361 0001 00
R801	Audio smplifier, V801, grid re- sister	RESISTOR: 1.0 megohm ±10岁; 1/2 w.	t	745 1212 00
R802	Audio amplifier, V801, cathode resistor	RESISTOR: 2200 ohm <u>+</u> 10%; 1/2 w,	; ; ; ; ; ; ;	745 1100 00

•41121114444449911444	Pangamanadingkatakonaaniiaaniisi - -	प्राच्चात्रकारम्यम्परभागात्रकारम्यम्परभागान-स्कृतस्वराधाः। स्वाच्चात्रकारम्यम्परभागात्रकारम्यम्	MFR. CODE	MFR. TYPE	COLLINS
ITEM	CIRCUIT FUNCTION	DESCRIPTION	NUMBER		PART NUMBER
R803	Audio emplifier, V801, screen resistor	RESISTOR: 2,2 megohm ±10%; 1/2 w.	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		745 1226 00
R804	Audio amplifier, V801, plate resistor	RESISTOR: .47 megohm +10%; 1/2 w.	} 1 1 1 1 1 1 1 1 1 1 1 1 1		745 1198 00
R805	Audio gain control	RESISTOR: .50 megohm; 1/2 w.	(376 3027 00
r806		RESISTOR: 470 ohm ±10%; 1/2 w.			745 1072 00
r207	Plate supply vol- tage divider bleeder resistor	RESISTOR: 2200 ohm ±10%;	1		745 1100 00
R808	Plate supply vol- tage divider bleeder resistor	RESISTOR: 4700 ohm ±10%; 1/2 w.)		745 1114 00
R809	Plate supply vol- tage divider bleeder resistor	RESISTOR: 33000 ohm ±10%; 2 w,	3		745 5149 00
\$801	Dynamic or carbon microphone switch	SWITCH: Toggle; DPDT,	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		260 0527 00
\$802	Plate power control switch	SWITCH: Toggle; DPDT.	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		260 0527 00
\$803	Channel selector switch	SWITCH: Tap; 2 circ; 2 pos	i i i i i i	·	259 0239 00
S804	On-off switch	SWITCH: Toggle; DPDT.			260 0527 00
S804A	 	SWITCH: Section of S804	1 4		
S804B		SWITCH: Section of S804			
T801	Audio output transformer	TRANSFORMER: Audio; pri: 600/15,000 ohm; sec: 600 ohm CT; 100-4000 cps ±1 db.			677 0159 00
	i i t	ī 	; ; ; ;		
13506-1 6-25					

sicongotticales	alipeppgp.sir.wizqriziq.ideadfindalibbaspaqris -	พระเลยสมารถสองสถายอาการของกระจะปกลอกหลายหลายคลุกระก เ	MFR, CODE	MFR. TYPE	COLLINS
ITEM	CIRCUIT FUNCTION	DESCRIPTION	NUMBER	or CAT. NO.	PART NUMBER
T802	Power transformer	TRANSFORMER: Plate and rect fil; 50/60 cps; pri: 105/110/115/120/125 v; sec #1: 400 v CT; .025 amp; sec #2: 6.30 v; 2 amp.			672 2550 00
v8ol	Audio amplifier	TUBE: 6SJ7; triple-grid detector amplifier.			255 0030 00
V802	Audio amplifier	TUBE: 6SN7GT; twin-triode amplifier.			255 0033 00
V803	Rectifier	TUBE: 6X5GT; full-wave high-vacuum rectifier,			255 0037 00
XF801	Holder for F801	HOLDER: Fuse cartridge; 1/2-24 thd mtg bushing; 11/16" diam x 2-7/16" 1g o/a; lug terms.			265 1002 00
XI8OT	Socket for I801	MTG: Pilot light; for min bayonet base bulbs; 15/16" diam x 1-3/8" lg; 11/16-27 thd bushing tapped 9/16-27; lug term			262 1260 00
	Jewel for 1801	JEWEL: Pilot light; green 9/16"-27 thd; 21/32" diam x 5/8" h o/a.		į	262 2180 00
XV802	Socket for V801 Socket for V802 Socket for V803	SOCKET: Tube; std octal; bakelite w/mtg plate; 1.312" mtg/c.			220 1005 00
:				1	
, , , ,	,		; ; ; ;		•
: ;)	;		;	!	

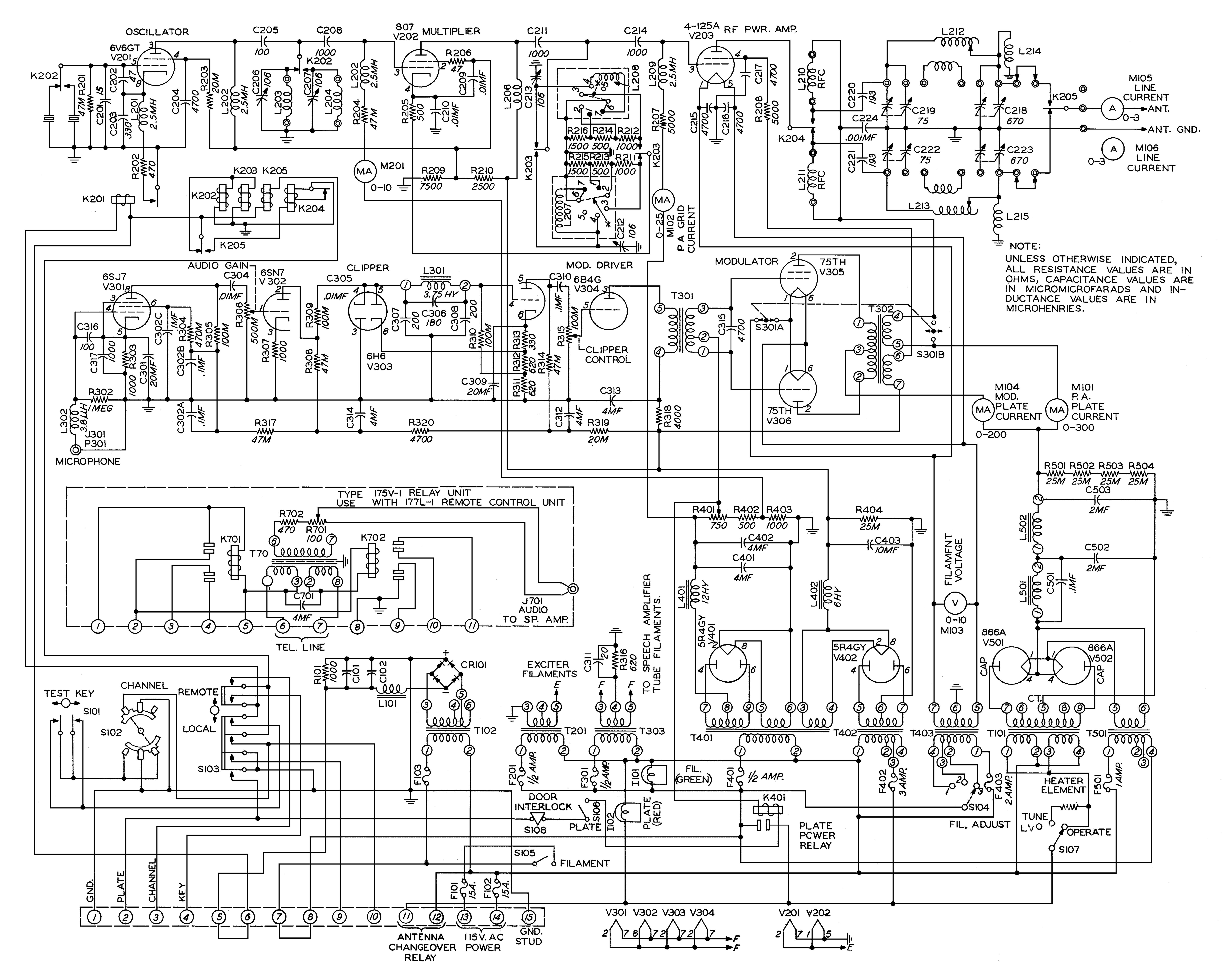


Figure 5-15 Type 30K-2 Transmitter, Complete Schematic

W3UPV 12/15




Figure 5-16 Type 30K-2 Transmitter Cabling Schematic

```
C801
       100 MMF MICA
                                                         R801
                                                                1 MEG 1/2 W.
C802
       1000 MMF MICA
                                                         R802
                                                                2200 N 1/2 W
C803
       4 MFD PAPER
                                                         R803
                                                                2.2 MEG 1/2 W
C804
       .5 MED PAPER
                                                         R804
                                                                470,000 Ω 1/2 W
C805
       . J MED PAPER
                                                         R805
                                                                500,000 N POT
¢806
       20 MFD ELECTROLYTIC
                                                         R806
                                                                470 D 1/2 W
C807
       4 MFD PAPER
                                                         R807
                                                                2200 Ω 1/2 W
C808
       4 MFD PAPER
                                                         R808
                                                                4700 A 1/2 W
6809
       40-40 MFD ELECTROLYTIC
                                                         R809
                                                                33000 Ω 2 W
```

