TECHNICAL MANUAL

for

SIDEBAND STRIP EXCITER
MODEL STEA-1A
TMC-6716
MF/HF SSB EXCITER

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, CANADA

TECHNICAL MANUAL

for

SIDEBAND STRIP EXCITER
MODEL STEA-1A
TMC-6716
MF/HF SSB EXCITER

THE TECHNICAL MATERIEL CORPORATION
MAMARONECK, N.Y. OTTAWA, CANADA

IN 10060 January 1, 1968

NOTICE

CHANGE NO. 1

STEA-1A

TECHNICAL MANUAL CHANGE NOTICE

DATE: Feb. 15/68

MANUAL AFFECTED: Sideband Strip Exciter Model STEA-1A: TMC-6716
MF/HF SSB Exciter

EN10060

Page 1-5, table 1-2

Delete CR919.

Page 2-3, paragraph 2-4d

Delete the third sentence beginning "If a high impedance microphone ....."

Page 4-1, paragraph 4-2a.

In the second paragraph, change "section B of S1517" to read section A of S1517, and vice versa.

Figure 4-1

Change the AC INPUT jack from J109 to J904.

Change FIGURE 4-3 to FIGURE 4-1 and add page number 4-3 in the bottom right corner.

Page 5-0, paragraph 5-2b(4)

Change "C1500 on the CW oscillator board" to read C1501 on the preamplifier board

Page 5-1, paragraph 5-2b(5)

Change "C1501" to read C1500 on the CW oscillator board.

Figure 7-1, sheet 1

Change FIGURE 7-3 to FIGURE 7-1 and add page number 7-3.

Figure 7-1, sheet 2

Change FIGURE 7-5 to FIGURE 7-1 and add page number 7-5.

Figure 7-2

Change FIGURE 7-7 to FIGURE 7-2 and add page number 7-7.

Figure 7-3

Change FIGURE 7-9 to FIGURE 7-3 and add page number 7-9.

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

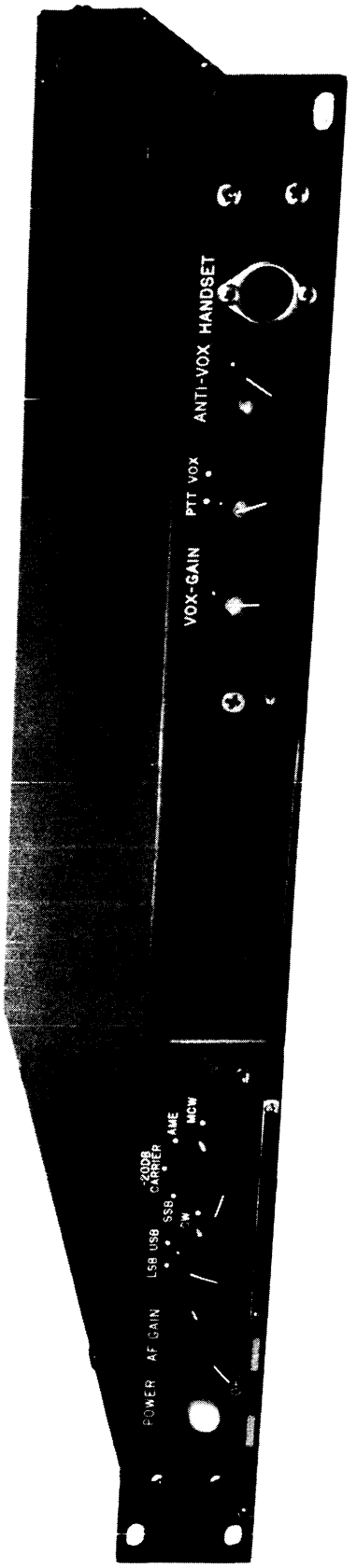


Figure 1-1. Sideband Strip Exciter, Model STEA-1A, Front View

SECTION 1

GENERAL INFORMATION

1-1. FUNCTIONAL DESCRIPTION.

The Sideband Strip Exciter Model STEA-1A (see figure 1-1) is a completely transistorized superheterodyne communications exciter that operates on any crystal-controlled frequency in the range of 2 to 32 MHz.

The STEA-1A provides up to 100 milliwatts excitation for amplitude modulation equivalent (AME), continuous wave (CW), facsimile (FAX), frequency shift keying (FSK), modulated continuous wave (MCW), and single sideband (SSB) operating modes.

NOTE

Additional equipment is required to provide FAX and FSK input signals.

Three models of the STEA-1A are available: STEA-1AU which transmits upper sideband only, STEA-1AL which transmits lower sideband only, and STEA-1AU/L which transmits either sideband depending on the position of the sideband selector switch.

The STEA-1A uses a fixed-tuned plug-in module (TTRT) for its r-f section. Five models of the TTRT module are available to cover the complete frequency range of the STEA-1A. Other features of the STEA-1A include:

a. Single conversion and a sharp cutoff bandpass filter.

b. Manual selection of either LSB or USB transmission, depending on the model.

c. Built-in power compensation circuit to prevent transmitter overload when mode of operation is changed.

d. Automatic compression circuit for higher average power output.

e. Selectable voice or push-to-talk operation of transmitters and receivers.

f. Low power consumption.

g. Compact, lightweight construction.

The STEA-1A is designed to accept a wide variety of audio inputs including a carbon microphone, high-impedance microphone, low-impedance microphone, and a 600-ohm balanced line. Provision is made for operation with a handset (also available from TMC). The STEA-1A contains an audio oscillator for CW and MCW transmission.

The performance specifications and other reference data for the STEA-1A are given in paragraph 1-3.

Table 1-1 lists the equipment supplied with the STEA-1A.

1-2. PHYSICAL DESCRIPTION

a. EXTERNAL.—The STEA-1A is designed for mounting in a standard 19-inch rack, and has a protective cover on top. Most of the operator's controls are located on the front panel, and are described in section 3. There is also a jack on the front panel for connecting a handset. A terminal board mounted to the rear panel is provided for most input and output connections. A BNC connector is provided on the rear panel for connecting the r-f output of the exciter to associated equipment with coaxial cable. In addition, the rear panel contains the power input connector, the line fuse, and a HANDSET/LINE switch.

TABLE 1-1. EQUIPMENT SUPPLIED

Name	Designation	Function	Qty.
Sideband Strip Exciter	STEA-1A	Communications exciter	1
Cable Assembly**	CA555-4	AC power cord	1
Fanning Strip	TM105-16AL	Aid for rear panel wiring	1
RF connector plug	UG88/U	Provides for coaxial cable connection to r-f output jack.	1
Service extension module	AX436	Aid in adjustment of TTRT	1

**This cable may be ordered with terminations other than the 115V polarized plug provided.

b. INTERNAL.–Most of the smaller components in the STEA-1A are soldered to printed circuit boards that are mounted to the chassis. There are five of these boards not including those in the TTRT modules. These are the transmitter i-f board, the transmitter a-f board, the power supply board, the preamplifier board and the CW oscillator board. The remainder of the components in the exciter are chassis mounted.

The semiconductor complement of the exciter is given in table 1-2.

1-3. TECHNICAL SPECIFICATIONS.

Frequency range	2 to 32 MHz divided into five bands using the following TTRT modules: Band 1: 2 to 4 MHz, TTRT-1. Band 2: 4 to 8 MHz, TTRT-2. Band 3: 8 to 16 MHz, TTRT-3. Band 4: 16 to 24 MHz, TTRT-4. Band 5: 24 to 32 MHz, TTRT-5.
Tuning system	The TTRT module is fixed tuned to a particular frequency within its band. Other prealigned TTRT modules must be used for other frequencies.

Frequency control	Crystal controlled oscillators are used throughout the exciter. For operating crystal frequency determination, see TTRT manual.
Types of signals transmitted	AME, CW, FAX, FSK, MCW and SSB (upper or lower).
Audio bandwidth	2.70 kHz ±2dB between 300 and 3000 Hz.
IF frequency	Single conversion to 1.75 MHz on all bands.
Signal-to-distortion ratio	Distortion products are down a minimum of 35 dB from full PEP output.
Unwanted sideband rejection	60 dB minimum at full PEP output.
Spurious signal level	Down a minimum of 50 dB at full PEP output.
Noise level	Down a minimum of 40 dB at full PEP output.
Carrier suppression	Automatically preset at -50dB, -20dB, or -6dB from sideband envelope power depending upon operating mode selected as follows: CW and SSB: - 50 dB. 20 dB: - 20 dB. AME and MCW: - 6 dB.
Output impedance	50 ohms (nominal) unbalanced.
Output power	100 milliwatts minimum PEP.
Primary power input	104, 115, 208, or 230V ±10%, 50/60 Hz, single phase, 8 watts. If a crystal oven is used in the TTRT module, an additional 6 watts is required.
Temperature range	0°C (32°F) to 50°C (122°F).
Dimensions	Depth: 15 inches Width: 19 inches Height: 1¾ inches
Weight, uncrated	10 pounds.

TABLE 1-2. SEMICONDUCTOR COMPLEMENT

Reference Designation	Type	Function
		POWER SUPPLY BOARD, A10545-6
CR910, 911, 913, 914, 916 917	1N547	Rectifiers
CR912, CR915	1N3022B	Voltage references
CR918	1N3030B	Voltage references
		MAIN CHASSIS
CR919	1N765	Voltage reference
Q900	2N350A	+12V series regulator
Q901	2N350A	-12V series regulator
Q902	2N350A	+28V series regulator
		PREAMPLIFIER BOARD, A10547
Q1501	2N1308	Preamplifier
		CW OSCILLATOR BOARD, A10546
Q1500	2N1308	CW Oscillator
		TRANSMITTER AF BOARD, A10540
CR1701, CR1702	1N34A	Anti-vox detector
CR1703, CR1704	1N34A	Vox detector
CR1705	1N34A	Relay suppressor
Q1701	2N1308	Anti-vox amplifier
Q1702	2N1370-4	Audio amplifier
Q1703	2N1370-4	Line amplifier
Q1704	2N1370-4	Emitter follower

TABLE 1-2. SEMICONDUCTOR COMPLEMENT (cont'd.)

Reference Designation	Type	Function
Q1705	2N1370-4	Vox amplifier
Q1706	2N1308	DC amplifier
Q1707	2N1370-4	DC amplifier
Q1708	2N2001	Relay driver
		TRANSMITTER IF BOARD, A10603
CR1801, 1802, 1803, 1804	1N34A	Balanced modulator
CR1805, 1806, 1807, 1808	1N34A	Balanced modulator
Q1801	2N3904	1st i-f amplifier
Q1802	2N3904	2nd i-f amplifier
Q1803	2N3904	ALDC amplifier
Q1804	MPF104	Buffer amplifier
Q1805, Q1806	MPF104	R-F switches
Q1807	MPF104	Carrier switch
Q1808	MPF104	Notch switch

SECTION 2

INSTALLATION

2-1. UNPACKING AND HANDLING.

The STEA-1A is shipped from the factory in a packing case to ensure maximum protection from damage in transit. The inside of the packing case contains additional packing material to protect the unit not only from breakage due to shock, but also from the elements. The equipment supplied with the STEA-1A (table 1-1) is packed in the box as loose items.

As soon as the exciter is unpacked, it should be visually inspected to make sure that it is not damaged. This examination should include the testing of each front panel control. The cover of the unit should be removed, and the inside of the unit checked carefully for damaged components and loose items.

With respect to damage to the equipment for which the carrier is liable TMC (Canada) Limited will assist in describing methods of repair and furnishing of replacement parts.

2-2. POWER REQUIREMENT.

The STEA-1A can operate with 104 volts, 115 volts, 208 volts or 230 volts ac power, and is normally shipped for operation with 115 vac ±10%. If the exciter is to operate from a power source other than 115 vac, the wiring of the power transformer T902 must be modified. Figure 2-1 illustrates the wiring of T902 for each of the four input power possibilities. It is recommended that a 0.25 ampere fuse be used with 104 or 115 volts and a 0.125 ampere fuse be used with 208 or 230 volts.

NOTE

The crystal oven (if used) in the TTRT module must be compatible with the primary line voltage.

2-3. MECHANICAL INSTALLATION.

Before installing the STEA-1A, consideration must be given to its location. The exciter should not be mounted directly adjacent to any unit that dissipates great amounts of heat. Since the STEA-1A is completely solid state, internally generated heat is not a problem, and several of the units may be mounted in a stack. The STEA-1A should be mounted so as to allow sufficient room to withdraw the TTRT plug-in module for frequency change purposes. If the audio compression feature is to be used intermittently, the LINE/HANDSET switch on the rear apron must be accessible to the operator.

Place the STEA-1A in the desired location in the rack, then fasten the front panel to the rack with four screws. The rear of the exciter must be suitably supported to prevent excessive strain on the front panel. If the STEA-1A is located in a vehicle or ship where it is subject to vibration, the rear of the unit should be rigidly supported to prevent possible damage due to vibration and vertical movement.

2-4. ELECTRICAL INSTALLATION.

a. POWER INPUT.–Connect the power cord between the AC power source receptacle and AC INPUT jack J904. (Refer to figure 2-2).

b. PUSH-TO-TALK.–Connect a push-to-talk switching device between ground and terminal 2 of J1515. If a remote switching device is to be used as well, connect the remote device between 48 volts DC and terminal 8 on TB1502.

c. AUDIO INPUT (600 OHM LINE).–Terminals 1 and 3 of terminal board TB1502 are provided for the connection of a 600 ohm input line. If the 600 ohm line is balanced, terminal 2 of TB1502 should be grounded.

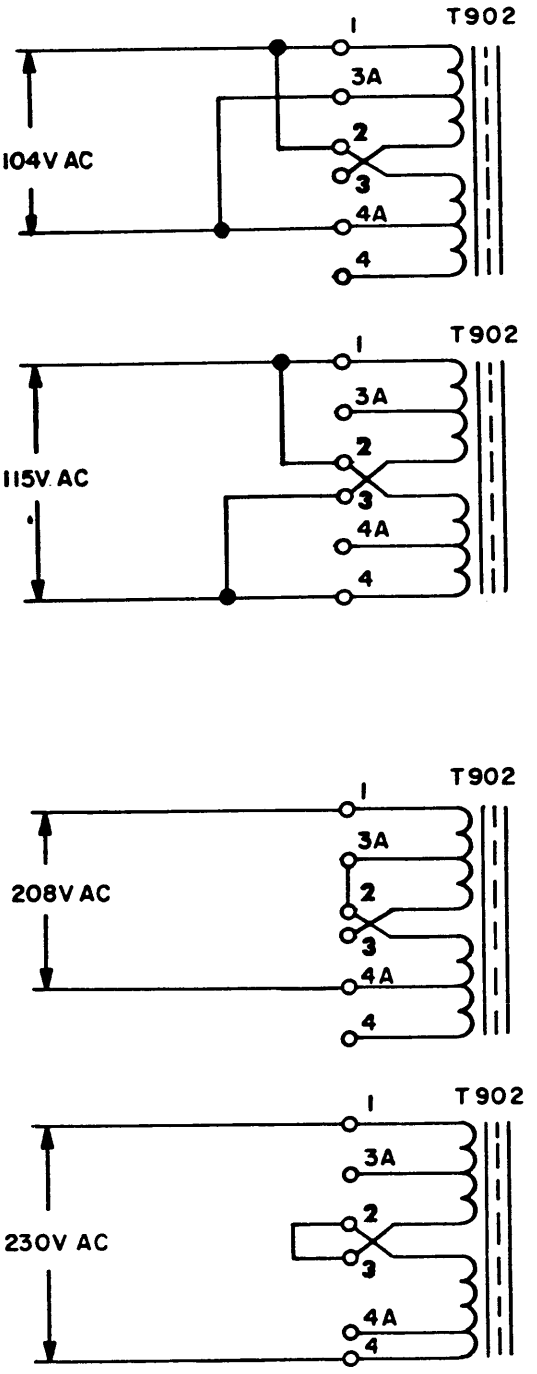


Figure 2-1. Power Transformer Wiring

d. MICROPHONE INPUTS.–Terminals 4, 5, 6 of terminal board TB1502 are provided for various types of microphone inputs. Connect the microphone between ground and the appropriate terminal as identified by rear panel markings (CAR, LOZ and HIZ). If a high impedance microphone is used, a jumper must be connected between terminals 14 and 15 of the CW oscillator printed circuit board (refer to figure 7-1). Carbon microphone, low impedance or high impedance microphone inputs may also be connected through pin 4, 5 or 6 respectively of handset jack J1504.

e. KEY LINE.–Terminals 9 and 10 of terminal board TB1502 are provided for the attachment of a keying device.

NOTE

An audio tone is used in the STEA-1A keying system. The key line should be made as short as possible, preferably under 50 feet.

f. RECEIVER AUDIO.–Connect the receiver audio output (unbalanced) to terminal 11 on TB1502. This audio signal is necessary for the operation of the anti-vox circuit. For earphone monitoring of the audio output, connect to terminal 12 of TB1502 or pin 3 of jack J1515.

g. RF OUTPUT.–Connect the RF OUT jack J1516 to the transmitter input.

NOTE

If the linear amplifier portion of the transmitter with which the STEA-1A is used does not have an r-f gain control, a variable r-f attenuator should be connected between the STEA-1A and the linear amplifier.

2-5. PERFORMANCE CHECK.

Immediately after the exciter has been installed it should be checked for proper operation as follows.–

NOTE

The r-f output cable should be disconnected during the performance check, and a dummy load used (47 ohm, ½ watt resistor).

a. Select the AME, 20DB, or SSB mode, and check the operation for all of the possible audio inputs. An oscilloscope connected across the dummy load can be used to indicate that the signal is present at the exciter output. Check the AF GAIN control for proper operation as indicated by a variation in the magnitude of the oscilloscope waveform.

b. Using any one of the audio inputs, repeat step a for each of the two modes not selected in step a.

c. Repeat step a for both upper and lower sideband operation, when applicable.

d. Repeat step a using an external key for both CW and MCW modes.

e. Check the VOX circuit as follows:

(1) Set the VOX/PTT switch at VOX.

(2) Turn the VOX GAIN control fully counterclockwise.

(3) Turn the ANTI-VOX control fully counterclockwise.

(4) Select the AME, 20DB, or SSB mode.

(5) Apply the normal audio input to the exciter: AF GAIN control must be adjusted for normal operation.

(6) Rotate the VOX GAIN control slowly clockwise. A point should be reached where a click will be heard, which is the transmit/receive relay energizing.

NOTE

Be sure to set the VOX GAIN and ANTI-VOX controls according to the applicable operating procedure given in section 3 before using the STEA-1A for transmitting.

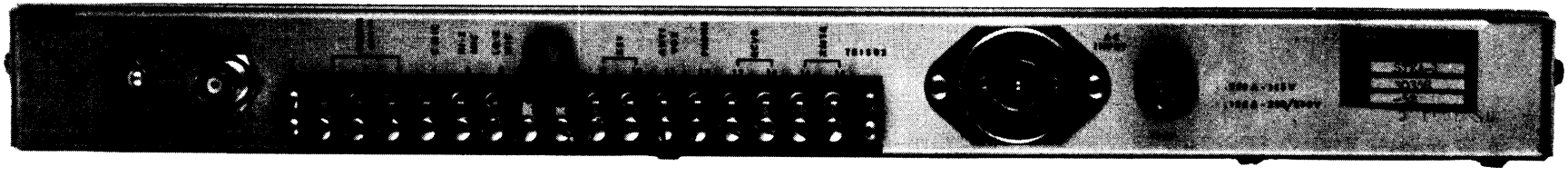


Figure 2-2. Sideband Strip Exciter, Model STEA-1A, Rear View

SECTION 3

OPERATOR'S SECTION

3-1. CONTROLS AND INDICATORS.

Before attempting to operate the STEA-1A, the operator should become familiar with the controls and indicators listed in table 3-1. The type and purpose of each control is described in the table. It is important to stress that these descriptions are not operating instructions; for specific operating instructions see paragraph 3-2. (Refer to figure 1-1.)

NOTE

The operating instructions for the TTRT modules are included in this section as part of the overall operating procedure for the exciter.

3-2. OPERATING PROCEDURES.

a. GENERAL.–A general operating procedure is given below to aid the operator in the correct use of the controls. The controls should be set in the sequence given. No specific operating procedure for the STEA-1A is given in this manual; the operator must determine the mode, sideband, signal level, and type of operation desired.

b. SETTING THE CONTROLS.

(1) Set the AF GAIN control at OFF.

NOTE

If the TTRT module cannot provide the desired carrier frequency, and a spare TTRT module must be used, refer to paragraph 3-3 for the module changing procedures.

(2) With the mode switch, select the desired mode of transmission: CW, SSB, 20DB, AME or MCW.

(3) With the LSB/USB switch, select the desired sideband.

(4) Set the VOX/PTT switch at PTT.

(5) Energize the exciter by rotating the AF GAIN control clockwise from OFF.

(6) Close the push-to-talk switch. If the microphone or other audio source does not have a push-to-talk switch, provide -48 volts DC to terminal 8 of TB1502.

(7) Adjust AF GAIN control for desired output level.

(8) If VOX operation is desired, set VOX/PTT switch at VOX, continue to supply audio signal, and rotate VOX GAIN control until the keying relay closes.

NOTE

If the microphone is located near the loudspeaker of the associated receiver, sound from the speaker may actuate the VOX circuit. If this is the case, rotate the ANTI-VOX control until the keying relay is deenergized without an audio signal being applied.

3-3. CHANGING TTRT MODULES.

a. Rotate the AF GAIN control fully counterclockwise.

b. Slide catches located on each end of module upward to release module.

c. Pull module out of exciter. A knob is provided in the center of the module for this purpose.

CAUTION

Before continuing, be sure that the voltage rating of the crystal oven (if used in the module to be inserted) is compatible with the ac line voltage that powers the exciter.

d. Insert the new module with its frequency identification plate facing the LSB/USB switch.

e. Slide catches located on each end of module downward, to lock module in place.

TABLE 3-1. OPERATOR'S CONTROLS AND INDICATORS

Designation	Function
POWER lamp (DS1501)	Lights when primary power is connected to the power supply.
AF GAIN/OFF rheostat switch (R1547, S1512)	Clockwise rotation connects the power supply to the primary power and increases the gain of the audio amplifier; full counter-clockwise rotation disconnects the primary power.
LSB/USB switch (S1502)	Selects either upper sideband or lower sideband operation.
CW/SSB/20DB/AME/MCW switch	Selects mode of operation: 1. CW (keyed carrier telegraphy). 2. SSB (single sideband, suppressed carrier). 3. 20DB (single sideband, reduced carrier). 4. AME (single sideband, full carrier). 5. MCW (keyed tone telegraphy).
VOX GAIN control (R1513)	Selects level of the audio input signal required to key the exciter when VOX/PTT switch is set at VOX.
VOX/PTT switch (S1501)	When set at VOX, enables the exciter to be keyed by input audio signals; when set at PTT, enables push-to-talk switch to key exciter.
ANTI-VOX control (R1517)	Selects level of receiver audio output signal required to cancel action of VOX circuit.
HANDSET jack (J1515)	Permits connection of handset to the exciter.
HANDSET/LINE switch (S1518, on rear of unit)	When set at HANDSET, enables compression circuit of audio amplifier; when set at LINE, disables compression circuit.

SECTION 4

PRINCIPLES OF OPERATION

4-1. GENERAL.

This section explains the principles of operation of the Sideband Strip Exciter STEA-1A only. The TTRT module is discussed only to the extent necessary to describe its operation in the STEA-1A.

4-2. THEORY. (See figures 4-1 and 7-1.)

a. INPUT CIRCUITS.–The audio signal for the STEA-1A may be provided from any one of the following sources: carbon microphone, low-impedance microphone, high-impedance microphone, 600-ohm line, or an internal CW oscillator. Any of the microphones can be wired to TB1502 or be incorporated in a handset plugged into J1515.

The carbon microphone and 600-ohm line inputs are connected to the audio stage. The low-impedance and high-impedance microphone inputs are connected to the preamplifier board (to Q1501) whose output feeds the audio stage through section B of S1517 in the SSB, 20DB, and AME modes. The audio tone for CW and MCW is supplied by Q1500 on the oscillator board (energized in the CW and MCW modes by +12V from section A of S1517). The output of the CW oscillator is supplied through an external key (connected to TB1502) and section B of S1517 in the CW and MCW modes to the audio stages.

b. AUDIO STAGE.–The 600-ohm line input is amplified by line amplifier Q1703 and supplied as an audio output to the transmitter i-f board and to VOX GAIN control R1513.

The carbon microphone input or audio signal from the preamplifier board provides the input to audio amplifier Q1702. The output from this amplifier is supplied to the transmitter IF board and VOX GAIN control.

The XMTR AF GAIN control R1547 controls the gain of both the line amplifier and the audio amplifier. HANDSET/LINE switch S1518 permits the insertion of a compression circuit, described below, that prevents abnormally high inputs from overmodulating the exciter. By flattening the sharp peaks of the input signal, the compression circuit permits an increase in the average sideband power generated. The output of the amplifier is supplied to the modulator and to the vox stages.

With S1518 set at LINE, +12V dc is supplied directly to the emitter resistors of both transistors Q1702 and Q1703. The emitter resistors establish an operating point for each transistor that is in the center of the transfer curve for each transistor. Thus, if the input signal does not overdrive the stage, the amplification of the stage is linear. With S1518 set at HANDSET, +12V dc is supplied through the CLIPPING ADJ control R1719 to the emitter resistors of both transistors. The additional resistance shifts each operating point down the transfer curve towards the cutoff region. The amount that the operating point is shifted is determined by the clipping adjustment. The operating point is selected so that abnormally high input amplitudes and voice peaks drive the transistors into the non-linear amplification region. As a result, these signals are compressed.

c. VOX AND ANTI-VOX STAGES.–The vox stages permit voice-controlled operation of the STEA-1A by energizing the exciter output stages only when an audio input is present. The anti-vox stages prevent a nearby receiver from keying the exciter if the output of the receiver is picked up by a microphone connected to the exciter.

The output of the audio stage is supplied to vox detector CR1704 through VOX GAIN control R1513, emitter follower Q1704, and vox

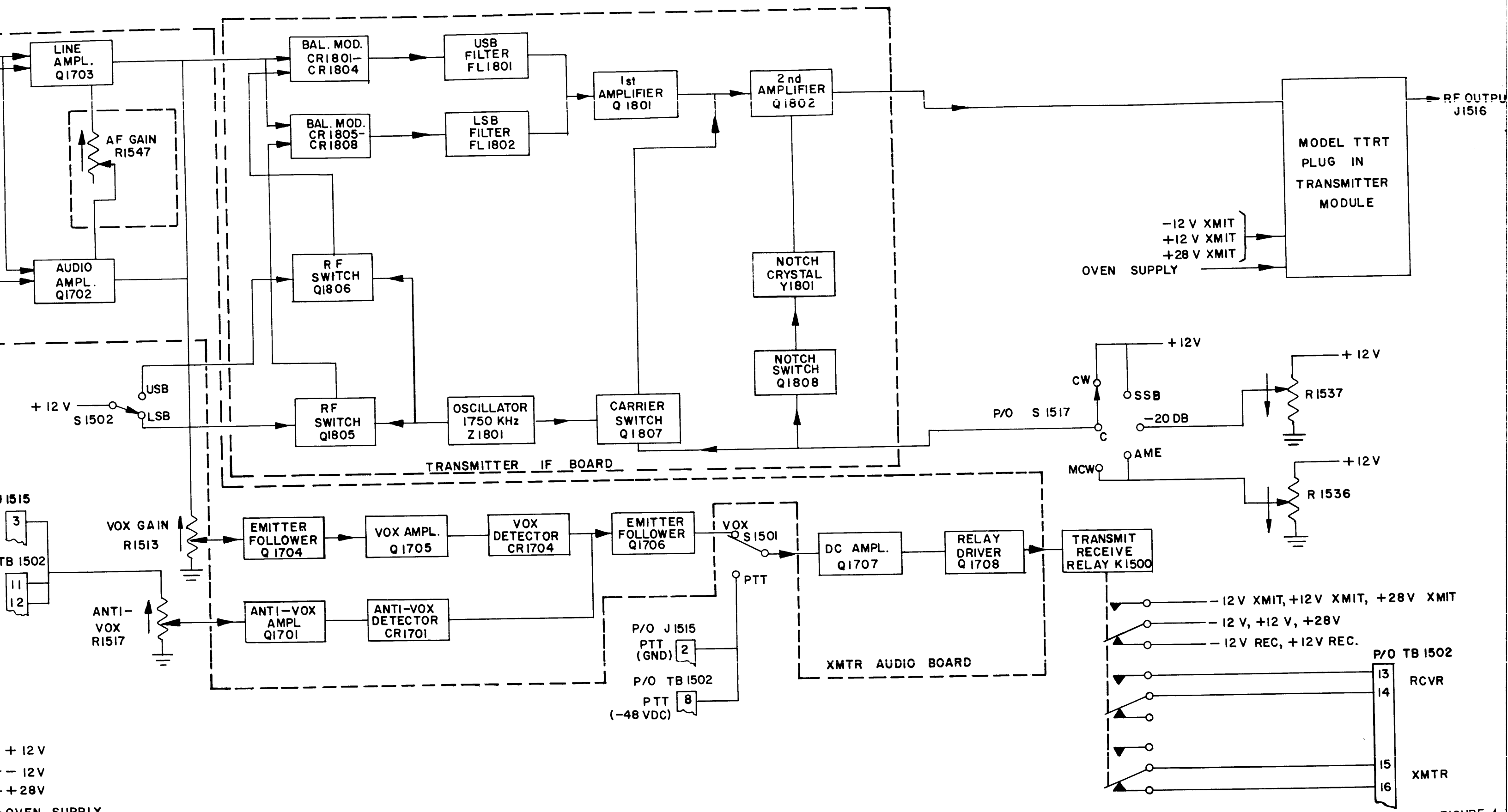
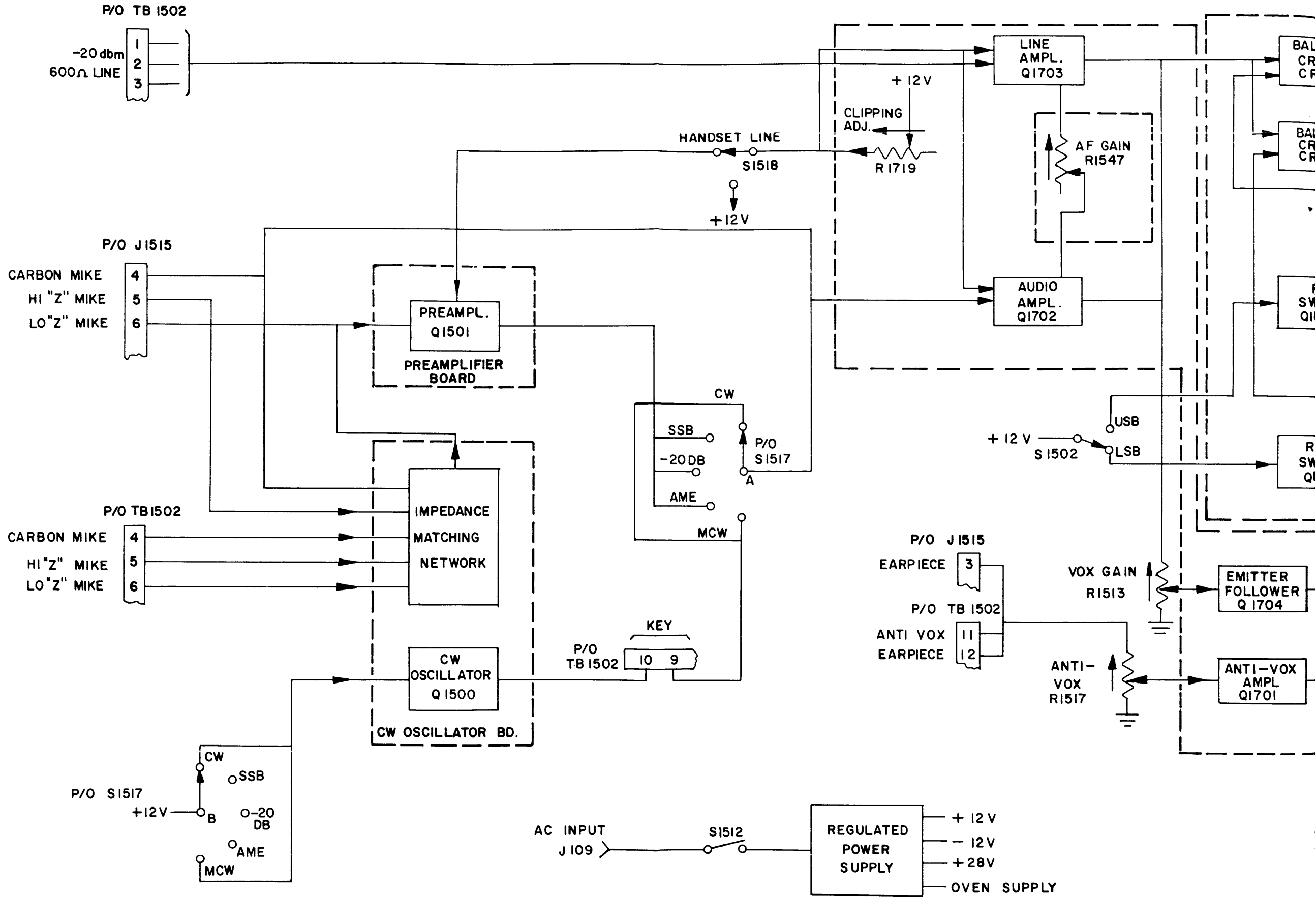


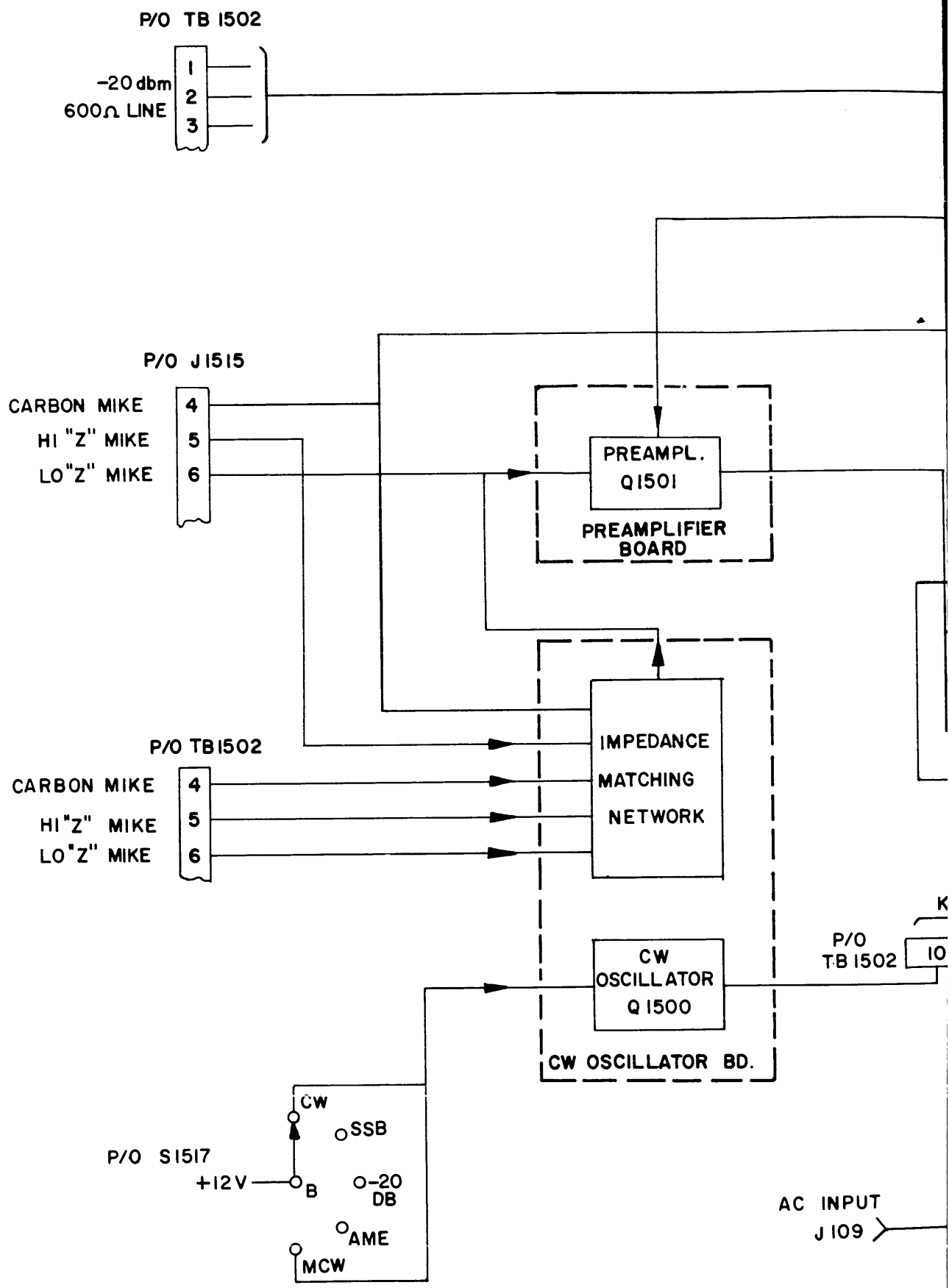
FIGURE 4-1, BLOCK DIAGRAM SIDEBAND STRIP EXCITER STEA-1A

FIGURE 4-



1016810060

FIGURE 4-1, BL


P/O TB 1502
-20 dbm
600Ω LINE
1
2
3
P/O J1515
CARBON MIKE
HI "Z" MIKE
LO "Z" MIKE
4
5
6
PREAMPL.
Q1501
PREAMPLIFIER
BOARD
P/O TB1502
CARBON MIKE
HI "Z" MIKE
LO "Z" MIKE
4
5
6
IMPEDANCE
MATCHING
NETWORK
CW
OSCILLATOR
Q 1500
CW OSCILLATOR BD.
P/O
TB 1502
10
P/O S1517
+12V
CW
SSB
B
-20
DB
AME
MCW
AC INPUT
J 109

1016810060

amplifier Q1705. The vox detector produces a positive dc voltage that is proportional to the magnitude of the audio signal. In the CW and MCW modes, the CW oscillator produces the audio signal. When a microphone is used, however, the dc voltage can be produced either by the signal intended for transmission or by the output of a nearby receiver that is unintentionally picked up by that microphone.

To prevent the output of a nearby receiver from keying the exciter, the output of the receiver is supplied to the STEA-1A as an anti-vox input. This signal is supplied to the anti-vox detector CR1701 through ANTI-VOX control R1517, and anti-vox amplifier Q1701; the receiver output signal can be monitored by phones connected to either J1515 or TB1502. The anti-vox detector produces a negative voltage that is proportional to the magnitude of the anti-vox signal.

The outputs of the vox and anti-vox detectors are added algebraically at the input of the emitter follower Q1706. When the vox detector produces an output (positive) with no anti-vox present, the output of the emitter follower is positive. When, however, the vox signal results from pick-up from an associated receiver, and a negative anti-vox voltage is present, the algebraic sum of the two results in a slightly negative output from the emitter follower. Thus, the anti-vox voltage cancels any vox voltage produced by pickup from a nearby receiver. With the VOX GAIN and ANTI-VOX controls properly set, the output of the emitter follower is positive when (and only when) an intentional vox signal is produced by speaking into the microphone.

When VOX/PTT switch S1501 is set at VOX, the output of the emitter follower is supplied through dc amplifier Q1707 to relay driver Q1708, which controls transmit/receive relay K1500. When the output of the emitter follower is negative, K1500 is de-energized, and the i-f and r-f stages of the exciter have no supply voltages. When the output of the emitter follower goes positive, K1500 is energized, and the -12 V dc XMIT, +12V dc XMIT, and +28V dc XMIT supply voltages are connected to the i-f and r-f stages of the exciter. Additional contacts of K1500 provide an indication to the associated transmitter and receiver that the STEA-1A is operating.

In operation, the VOX GAIN control is adjusted so that a normal voice into a microphone connected to the STEA-1A or the output of the CW oscillator is sufficient to energize the transmit/receive relay. The ANTI-VOX control is then adjusted to prevent the output of a nearby receiver from energizing the relay.

With S1501 set at PTT, the transmit/receive relay is controlled by the PTT (push-to-talk) input from either TB1502 or J1515. The relay is energized when the input at terminal 2 of J1515 is grounded or when -48 volts DC is provided to terminal 8 of TB1502. The relay is de-energized only if neither input is present.

d. MODULATOR STAGES.–The two balanced modulators on the transmitter i-f board (CR1801 – CR1804 and CR1805 – CR1808) receive the audio signal from the transmitter audio board. In addition, oscillator Z1801 provides a 1750 kHz signal to one of the modulators, as determined by switches Q1805 and Q1806. (The oscillator also provides a carrier output that can be inserted into 2nd amplifier Q1802.) The output from the modulators is an audio modulated i-f signal that contains both upper and lower sidebands. The output from modulator CR1801 – CR1804 is supplied to filter FL1801 which allows only the upper sideband of the signal to pass. The output from modulator CR1805 – CR1808 is supplied to filter FL1802 which allows only the lower sideband of the signal to pass. Filters FL1801 and FL1802 are highly selective filters, the bandpass for FL1801 is 1753.0 to 1753.0 kHz, and the bandpass for FL1802 is 1747.0 to 1749.7 kHz.

NOTE

The sideband generated by the i-f board is opposite to the sideband required for transmission as a reversal takes place in the TTRT module. Hence, for upper sideband operation, the i-f board generates a lower sideband signal, and vice versa.

The STEA-1AU is provided with filter FL1802 only (for USB operation), STEA-1AL with filter FL1801 only (for LSB operation) and STEA-1AU/L with both. The following discussion is for the STEA-1AU/L.

Switches Q1805 and Q1806 select the desired sideband by determining which balanced modulator will receive the oscillator signal. These switches are in turn controlled by XMTR switch S1502. When S1502 is in the LSB position, +12V dc is supplied to switch Q1805, cutting off the input to modulator CR1805 – CR1808. The input to switch Q1806, however, is open-circuit and the switch allows the oscillator signal to be applied to CR1801 – CR1804. Filter FL1801 passes only the upper sideband of the output from modulator CR1801 – CR1804. This upper sideband signal from the i-f board is reversed in the TTRT module, thus providing a lower sideband signal for transmission as required.

When S1502 is in the USB position +12V dc is supplied to switch Q1806, preventing the oscillator signal from being supplied to modulator CR1801 – CR1804. However, switch Q1805, being open-circuit, allows the oscillator signal to be applied to modulator CR1805 – CR1808. Filter FL1802 passes only the lower sideband of the output of this modulator, hence an upper sideband signal will be transmitted.

e. AMPLIFIER STAGES.–The USB or LSB i-f signal from filter FL1801 or FL1802 is amplified by Q1801 and Q1802 and the output is supplied to the selected TTRT module.

In the AME, MCW and 20DB modes, a carrier signal is inserted at the second amplifier Q1802. The insertion of the carrier is controlled by section C of switch S1517.

When S1517 is in the CW or SSB position the carrier control signal is +12V dc. When the +12V dc signal is applied to the carrier switch Q1807, the switch cuts off the carrier signal provided by oscillator Z1801 so that no carrier is inserted at amplifier Q1802.

When S1517 is in the AME or MCW position, the carrier control signal is 0 volts. When the 0 volt signal is applied to switch Q1807, the switch allows the carrier signal from Z1801 to be applied to Q1802.

When S1517 is in the 20DB position, the carrier control signal is set to such a voltage that the carrier inserted at Q1802 is 20 dB down from the i-f signal.

Crystal Y1801 is a notch device used to remove any undesirable carrier signal present at the output of amplifier Q1802. So that the carrier will not be removed by Y1801 when it is required at the output, notch switch Q1808 disables the notch device when the carrier control signal is 0 volts, and the carrier is applied to the output. When the carrier control signal is +12 volts, the notch switch is in the "off" condition and does not affect the operation of Y1801. This crystal is factory adjusted and non-repairable in the field.

f. TTRT PLUG-IN MODULE.–The i-f signal from the transmitter i-f board is supplied to the TTRT module. The TTRT module is fixed tuned to a pre-selected frequency, and contains a local oscillator, a balanced mixer, and three r-f amplifiers. Figure 4-2 shows the input and output of the TTRT module. In each case, the mixer injection signal in the module is tuned 1.75 MHz above the desired transmission frequency. Thus the frequency spectrum of the i-f signal is inverted as shown in the illustration. The bandpass of the r-f amplifiers in the TTRT module is sufficient to pass either the upper or lower sideband.

The output of the TTRT module is supplied to RF OUTPUT jack J1516.

g. POWER SUPPLY.–The power supply produces regulated +12V dc, -12V dc and +28V dc for the operation of the STEA-1A. The power supply is energized by power switch S1512, which is ganged to the AF GAIN control.

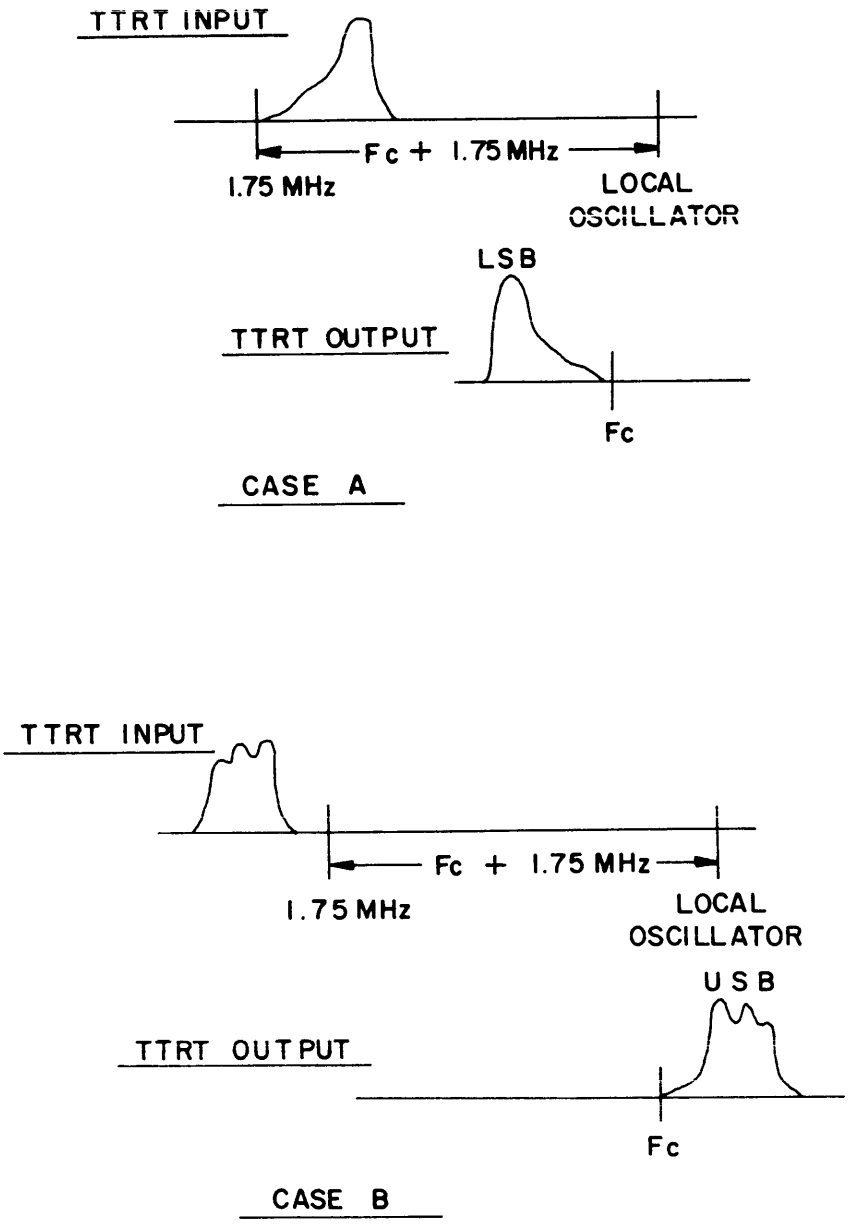


Figure 4-2. Frequency Inversion in SSB Reception

SECTION 5

MAINTENANCE

5-1. PREVENTIVE MAINTENANCE.

Preventive maintenance of the STEA-1A consists of routine inspection and cleaning. Cleaning is necessary because dust may accumulate on certain components and not only reduce efficiency of the exciter, but also increase component wear. Either a vacuum cleaner or a compressed air hose is the quickest and most effective method of cleaning the unit.

Visually checking the unit when it is opened for cleaning can prevent downtime due to component failure. Often a deteriorating component will look bad before it actually affects the operation of the unit. Some indicators of trouble are: discoloured components, leaking transformers and capacitors, dirty or pitted switch and relay contacts, warping printed circuit boards, and damaged wiring. Any components found in such condition should be replaced. In addition, all hardware should be checked for tightness.

5-2. TROUBLESHOOTING.

Troubleshooting procedures are described for model STEA-1AU/L. For models STEA-1AU and STEA-1AL, check operation for the appropriate sideband only.

Refer to figure 5-2 to locate components on the printed circuit boards or chassis of the STEA-1A.

a. QUICK TEST USING FRONT-PANEL CONTROLS.

(1) Sideband Test–Try to transmit with the USB/LSB switch set alternately in each of its positions. If transmission is not possible on one sideband the opposite sideband circuit on the transmitter IF board is defective.

(2) VOX/PTT Test–Set VOX/PTT switch to PTT. Close the push-to-talk switch on the microphone. The exciter should key as evidenced by a click as relay K1500 actuates. If the exciter does not key, the transmit/receive relay or relay driver is defective. Set the VOX/PTT switch to VOX; rotate the VOX GAIN control fully clockwise. Speak into the microphone. The exciter should key as the AF GAIN control is rotated clockwise. If the exciter does not key, the VOX amplifier or detector is defective.

(3) CW/Voice Test–Alternately try to operate the exciter in the CW and SSB modes. If the exciter operates in the CW mode only, the microphone pre-amplifier is probably defective. If the exciter operates in the SSB mode only, the CW oscillator is probably defective.

b. SYSTEMATIC TROUBLESHOOTING.

(1) Disconnect all external wiring from TB-1502.

(2) Connect a 47 ohm resistor across the RF output jack.

(3) Connect an audio signal generator to terminals 1 and 3 of TB1502. Adjust the generator to deliver 78 mV at 1 kHz. Measure the AF signal across pins 1 and 2 on the AF board. The level should be approximately 10 mV. If this signal is not obtained check audio amplifier Q1702/Q1703.

(4) Connect the audio generator between pin 1 and ground on the audio pre-amplifier board. Adjust the generator to deliver 8 mV at 1 kHz. Repeat the measurement as in step (3). If this signal is not obtained, check Q1500 on the CW oscillator board and Q1702/Q1703 on the audio board.

(5) Switch the mode selector switch to CW. Ensure that the jumper between terminals 9 and 10 of TB1502 is connected. Repeat the measurement as in step (3). If the required signal is not obtained, check Q1501.

(6) Jumper pin 8 of TB1502 to ground. Measure the RF output of Z1801 at the junction of R1829 and R1830. The level should be 0.9V RMS or better.

(7) Connect an oscilloscope to pin 13 of the IF board. With the mode switch in SSB and no audio input, check for the presence of 1.75 MHz carrier. There should be no carrier visible on the scope. Switch the mode switch to -20 dB carrier. There should be approximately 20 mV peak-to-peak carrier appear. Switch the mode switch to AME and then MCW. There should be approximately 200 mV peak-to-peak carrier appear. If any of the above voltages is not obtained check Q1801 and associated circuitry.

(8) Connect the audio generator and adjust the level as in step (3). With the mode switch in SSB and the LSB/USB switch in USB measure the IF level at pin 13 of the IF board. The level should be 400 mV peak-to-peak. (Adjust AUDIO GAIN as necessary). If this signal is not obtained, check CR1805 through CR1808, Q1805, Q1807 and Q1802.

(9) Repeat step (7) with the LSB/USB switch in LSB. If the required signal is not obtained, check CR1801 through CR1804, Q1806, Q1807 and Q1802.

5-3. REPAIR.

In most cases, the repair of the STEA-1A will consist of the replacement of an electrical component. Although no special instruction is required to accomplish this, the following points are provided to ensure that the repairs are completed properly.

a. Always replace a defective component with its exact duplicate.

b. Always place a new component in the same position as the one it replaces. In general, never change the existing chassis layout, whether in the routing of wiring or component placement.

c. Never use a soldering iron with a power rating of more than 100 watts. Use a pair of long-nose pliers as a heat sink to protect components while soldering.

d. Be extremely careful when replacing components of printed circuit boards. Excessive heat applied to a board might cause the printed wiring to lift off.

e. Always double check any solder joints made. Cold or loose solder connections can cause trouble at a later time.

5-4. ALIGNMENT.

Alignment procedures are described for model STEA-1AU/L. For models STEA-1AU and STEA-1AL, check operation for the appropriate sideband only.

Refer to figure 5-2 to locate components on the printed circuit boards or chassis of the STEA-1A.

a. Disconnect all external wiring from TB1502.

b. Connect one end of a jumper wire to terminal 8 of TB1502.

c. Connect an AF signal generator to terminals 1 and 3 of TB1502; adjust the generator output to deliver 78 mV at 1 kHz.

d. Set the POWER switch ON; set the mode switch at SSB.

e. Connect the jumper attached to pin 8 (step b) to ground. Ensure that the jumper is connected across pins 9 and 10 of TB1502.

f. Rotate the AF GAIN control fully clockwise. Connect an oscilloscope to pins 1 and 2 on the transmitter audio board and adjust R1718 to obtain 10 mV RMS between pins 1 and 2.

g. Set the mode switch to CW; adjust R1533 (on the CW oscillator board) to obtain 10 mV RMS between pins 1 and 2 on the audio board.

h. Set the LSB/USB switch to USB; rotate the AF GAIN control fully clockwise.

i. Adjust C1810 for maximum output.

j. Rotate the AF GAIN control fully counter-clockwise; set the mode switch to SSB; connect an oscilloscope to pin 13 of the transmitter IF board.

k. With the oscilloscope set at its most sensitive range, adjust C1811 for a minimum signal.

l. Disconnect the audio generator; set the mode switch to MCW.

m. Adjust R1814 and C1806 for maximum output and minimum distortion (see figure 5-1).

NOTE

"Distortion" or jitter along the edge of the waveform is caused by carrier through the improperly balanced bridge. Proper balance is obtained when R1814 is set approximately mid-range.

n. Set the LSB/USB switch to LSB and repeat step (m), adjusting R1813 and C1804. Repeat steps (m) and (n) until the waveform is stable for both USB and LSB.

o. Readjust C1810 for equal amplitude for USB and LSB.

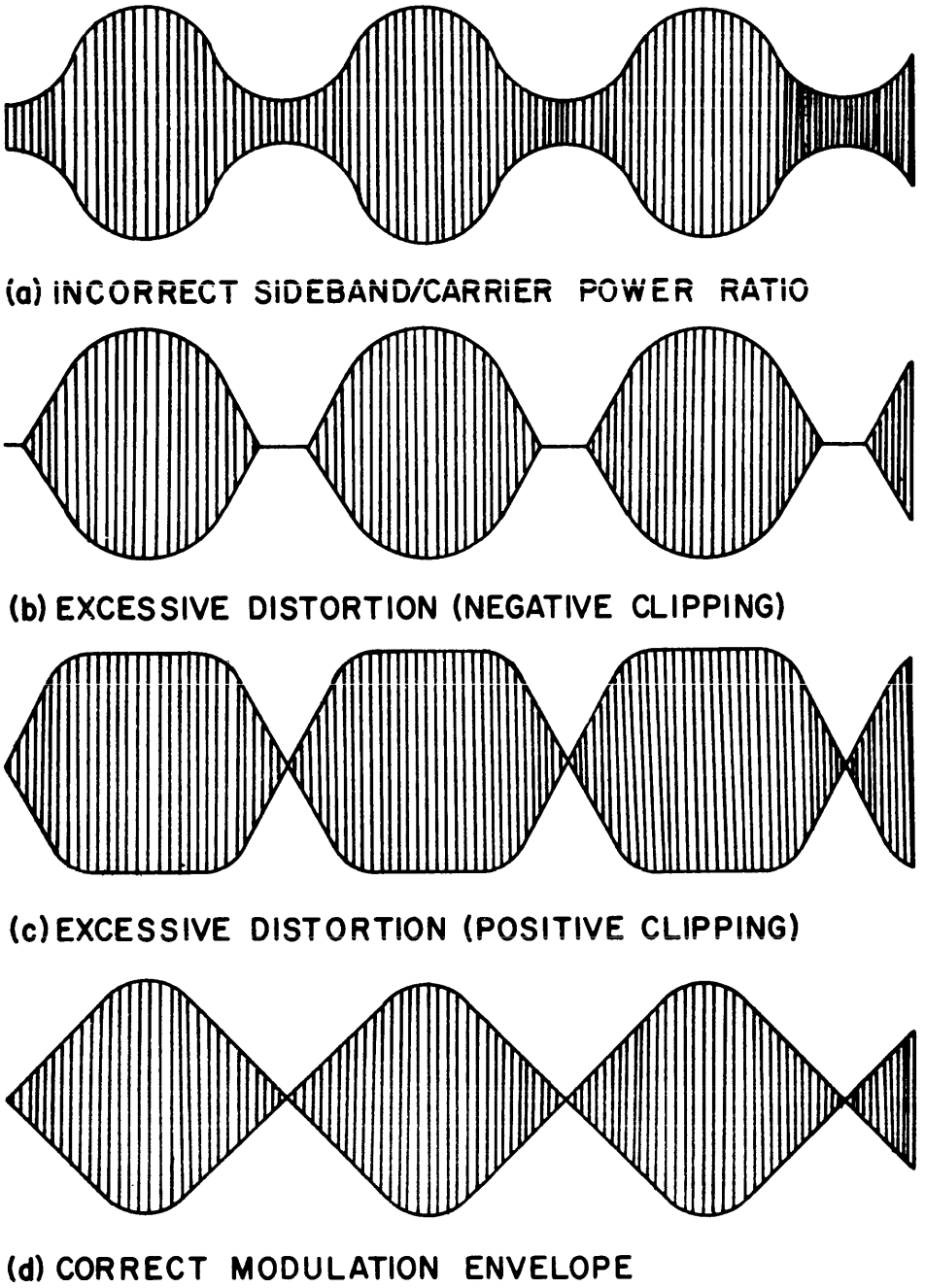


Figure 5-1. Modulation Envelopes

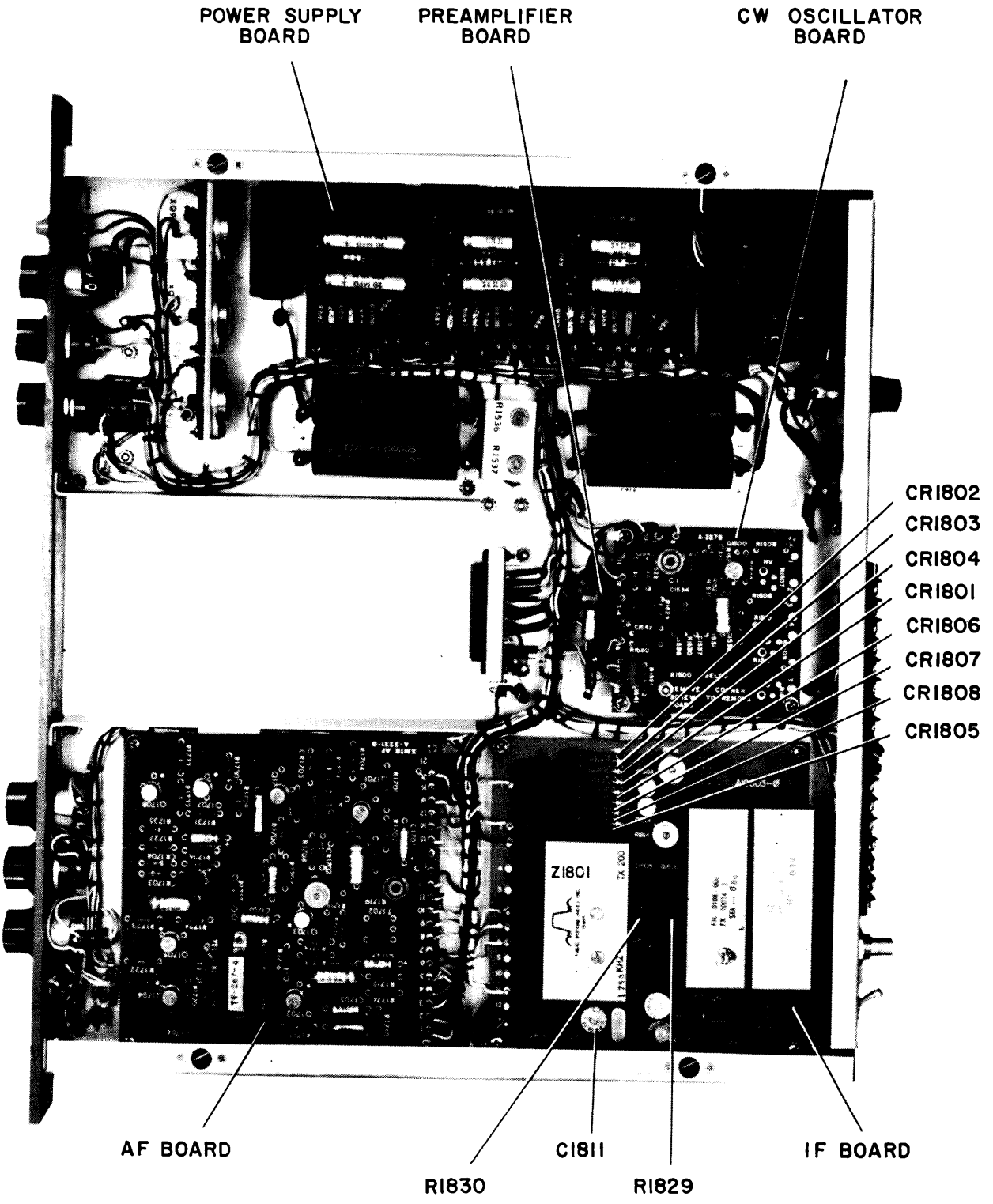


Figure 5-2. Top View with Cover Removed, Model STEA – 1A

SECTION 6

PARTS LIST

6-1. INTRODUCTION.

Reference designations have been assigned to identify all electrical parts of the equipment. These designations are used for marking the equipment (adjacent to the part they identify) and are included on drawings, diagrams and the parts list. The letters of a reference designation indicate the kind of part (generic group), such as resistor, capacitor, transistor, etc. The number differentiates between parts of the same generic group. Sockets associated with a particular plug-in device, such as transistor or fuse, are identified by a reference designation which includes the reference designation of the plug-in device. For example, the socket for fuse F907 is designated XF907. To expedite delivery, when ordering replacement parts, specify the TMC part number and the model number of the equipment.

MAIN CHASSIS
SYMBOL SERIES 900

Ref Symbol	Description	TMC Part Number
C900 thru C906	NOT USED	
C907	CAPACITOR, FIXED, ELECTROLYTIC: 2,000 uf, 25 WVDC; polarized.	CE116-5VN
C910	Same as C907	
C911	Same as C907	
F900 thru F906	NOT USED	
F907	FUSE, CARTRIDGE: 1/4 amp; slow blow. (For 115 VAC operation)	FU102-.250
F907	FUSE, CARTRIDGE: 1/8 amp; slow blow. (For 208/230 VAC operation)	FU102-.125
J900 thru J903	NOT USED	
J904	CONNECTOR, RECEPTACLE, ELECTRICAL: male; polarized.	JJ299
Q900	TRANSISTOR: germanium	2N350A
Q901	Same as Q900	
Q902	Same as Q900	
T900 and T901	NOT USED	
T902	TRANSFORMER, POWER, STEP-DOWN: primary; 104-115/208-230 VAC: secondary; 2 outputs of 24V, 300 mamps, C.T. and 1 output of 80V, 100 mamps, C.T.	TF298

POWER SUPPLY BOARD, A10545-7
SYMBOL SERIES 900

Ref Symbol	Description	TMC Part Number
C908	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10% + 15% at 120 Hz at 25°C; 25 WVDC; polarized.	CE105-100-25
C909	Same as C908	
C912	Same as C908	
C913	Same as C908	
C914	NOT USED	
C915	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% + 15% at 120 Hz at 25°C; 100 WVDC; polarized.	CE105-20-100
C916	Same as C915	
C917	Same as C915	
C918	CAPACITOR, FIXED, ELECTROLYTIC: 25 uf, -10% + 15% at 120 Hz at 25°C; 50 WVDC; polarized.	CE105-25-50
CR900 thru CR909	NOT USED	
CR910	SEMICONDUCTOR DEVICE, DIODE: silicon	1N547
CR911	Same as CR910	
CR912	SEMICONDUCTOR DEVICE, DIODE: silicon	1N3022B
CR913	Same as CR910	
CR914	Same as CR910	
CR915	Same as CR912	
CR916	Same as CR910	
CR917	Same as CR910	
CR918	SEMICONDUCTOR DEVICE, DIODE: Zener	1N3030B
L900	NOT USED	
L901	NOT USED	

POWER SUPPLY BOARD, A10545-7
SYMBOL SERIES 900

Ref Symbol	Description	TMC Part Number
L902	COIL, RADIO FREQUENCY: fixed; 1 uH	CL101-2
L903	Same as L902	
L904	Same as L902	
R900 thru R908	NOT USED	
R909	RESISTOR, FIXED, WIREWOUND: 10 ohms, ±5%; 3 watts	RW123-100J
R910	Same as R909	
R911	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±5%; 1 watt	RC32GF101J
R912	Same as R911	
R913	NOT USED	
R914	Same as R909	
R915	Same as R909	
R916	Same as R911	
R917	Same as R911	
R918	Same as R909	
R919	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1 watt	RC32GF102J
R920	Same as R919	
R921	Same as R919	

MAIN CHASSIS
SYMBOL SERIES 1500

Ref Symbol	Description	TMC Part Number
C1500	CAPACITOR, FIXED, ELECTROLYTIC: 2,000 uf, 25 WVDC; polarized	CE116-5VN
DS1500	NOT USED	
DS1501	LAMP, INCANDESCENT: single contact; 28 VAC/DC, 0.04 amp.	BI110-7
J1500 thru J1506	NOT USED	
J1507	CONNECTOR, RECEPTACLE, ELECTRICAL: printed circuit board type; 20 female contacts	JJ287-20
J1508 thru J1514	NOT USED	
J1515	CONNECTOR, RECEPTACLE, ELECTRICAL: 6 #20 female contacts; straight type.	JJ212
J1516	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 round female contact, straight type; series BNC to BNC.	JJ172
K1500	RELAY ARMATURE: 6 PDT	RL156-6
R1513	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms ±10%; 2 watts	RV4NAYSA-103AYY
R1514 thru R1516	NOT USED	
R1517	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, ±10%; 2 watts	RV4NAYSA-501AYY
R1523	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%, 1/2 watt	RC20GF103J
R1524	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%; 1/2 watt	RC20GF392J
R1525	Same as R1524	
R1526	Same as R1523	

MAIN CHASSIS
SYMBOL SERIES 1500

Ref. Symbol	Description	TMC Part Number
R1536	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms ±20%; 0.25 watt	RV106UX8B-503B
R1537	Same as R1536	
R1541	RESISTOR, FIXED, COMPOSITION: 330 ohms, ±5%; 1/2 watt	RC20GF331J
R1543 thru R1546	NOT USED	
R1547	RESISTOR, VARIABLE, COMPOSITION: 5,000 ohms, ±10%; 2 watts; includes switch S1512.	RV4NBYSA-502AYY
S1500	NOT USED	
S1501	SWITCH ROTARY: tap	SW336-1
S1502	Same as S1501	
S1503 thru S1511	NOT USED	
S1512	See symbol number R1547	
S1513 thru S1516	NOT USED	
S1517	SWITCH, ROTARY: tap	SW375-1
S1518	SWITCH, TOGGLE: SPDT	ST103-11-62
TB1500	NOT USED	
TB1501	NOT USED	
TB1502	TERMINAL BOARD, BARRIER: 16 terminals	TM100-16

CW OSCILLATOR BOARD, A10546
SYMBOL SERIES 1500

Ref Symbol	Description	TMC Part Number
C1501 thru C1533	NOT USED	
C1534	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 10,000 uuf, GMV; 500 WVDC	CC100-16
C1535	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80% -20%; 25 WVDC	CC100-33
C1536	Same as C1534	
C1537	Same as C1534	
C1538	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +150% at 120 Hz at 25°C; 15WVDC; polarized	CE105-50-15
C1539	NOT USED	
C1540	NOT USED	
C1541	CAPACITOR, FIXED, MICA DIELECTRIC: 39 uuf, ±5%; 500 WVDC: char. C.	CM15C390J03
C1542	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 5,000 uuf, GMV; 500 WVDC	CC100-15
C1543	Same as C1535	
Q1500	TRANSISTOR: germanium; NPN	2N1308
R1500 thru R1505	NOT USED	
R1506	RESISTOR, FIXED, COMPOSITION: 10 ohms, ±5%; 1 watt	RC32GF100J
R1507	RESISTOR, VARIABLE, COMPOSITION: 50,000 ohms, +10%; 0.25 watts at 70°C.	RV111U503A
R1508	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, ±5%; 1/2 watt	RC20GF273J
R1509	RESISTOR, VARIABLE, COMPOSITION: 250,000 ohms, +10%; 0.25 watt at 70°C	RV111U254A

CW OSCILLATOR BOARD, A10546
SYMBOL SERIES 1500

Ref Symbol	Description	TMC Part Number
R1510	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%; 1/2 watt	RC20GF102J
R1511	Same as R1509	
R1512	Same as R1510	
R1518	NOT USED	
R1519	NOT USED	
R1520	RESISTOR, FIXED, COMPOSITION: 68 ohms, ±5%; 1/2 watt	RC20GF680J
R1521	Same as R1520	
R1522	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%; 1/2 watt	RC20GF103J
R1527	RESISTOR, FIXED, COMPOSITION: 43,000 ohms, ±5%; 1/2 watt	RC20GF433J
R1528	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%; 1/2 watt	RC20GF472J
R1529 thru R1531	Same as R1528	
R1532	RESISTOR, FIXED, COMPOSITION: 1,800 ohms, ±5%; 1/2 watt	RC20GF182J
R1533	RESISTOR, VARIABLE, COMPOSITION: 10,000 ohms ±10%; nom. power rating 0.25 watt at 70°C	RV111B103A
R1534	NOT USED	
R1535	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±5%; 1/2 watt	RC20GF473J
R1538 thru R1540	NOT USED	
R1542	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±5%; 1/2 watt	RC20GF105J

CW OSCILLATOR BOARD, A10546
SYMBOL SERIES 1500

Ref Symbol	Description	TMC Part Number
R1552 thru R1555	NOT USED	
R1556	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 1/2 watt	RC20GF104J
T1500	NOT USED	
T1501	TRANSFORMER, AUDIO FREQUENCY	TF246-6X

PREAMPLIFIER BOARD, A10547
SYMBOL SERIES 1500

Ref Symbol	Description	TMC Part Number
C1544	CAPACITOR, FIXED, ELECTROLYTIC: 5 uf, -10% + 150% at 120 Hz at 25°C; 15 WVDC; polarized	CE105-5-15
Q1501	TRANSISTOR: germanium; NPN	2N1308
R1549	RESISTOR, FIXED, COMPOSITION: 22 ohms, ±5%; 1/2 watt	RC20GF220J
R1550	RESISTOR, FIXED, COMPOSITION: 1,800 ohms, ±5%; 1/2 watt	RC20GF182J
R1551	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±5%; 1/2 watt	RC20GF333J

TRANSMITTER AF BOARD, A10540
SYMBOL SERIES 1700

Ref Symbol	Description	TMC Part Number
C1701	CAPACITOR, FIXED, ELECTROLYTIC: 6 uf, -10% +150% at 120 Hz at 25°C; 15 WVDC; polarized.	CE105-6-15
C1702	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 200,000 uuf, +80%-20%; 25 WVDC	CC100-33
C1703	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10%+150% at 120 Hz at 25°C; 15 WVDC; polarized	CE105-50-15
C1704	Same as C1701	
C1705	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf, -10%+150% at 120 Hz at 25°C; 15 WVDC; polarized	CE105-10-15
C1706	Same as C1703	
C1707	Same as C1705	
C1708	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf, -10% + 150% at 120 Hz at 25°C; 15 WVDC, polarized	CE105-4-15
C1709	Same as C1701	
C1710	Same as C1703	
C1711	Same as C1702	
C1712	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf, -10% + 150% at 120 Hz at 25°C, 15 WVDC; polarized	CE105-20-15
C1729	Same as C1705	
C1761	Same as C1702	
C1764	Same as C1702	
CR1701	SEMICONDUCTOR DEVICE, DIODE: germanium	1N34A
CR1702 thru CR1705	Same as CR1701	
Q1701	TRANSISTOR: germanium; NPN	2N1308
Q1702	TRANSISTOR: germanium; PNP	2N1370-4

TRANSMITTER AF BOARD, A10540
SYMBOL SERIES 1700

Ref Symbol	Description	TMC Part Number
Q1703 thru Q1705	Same as Q1702	
Q1706	Same as Q1701	
Q1707	Same as Q1702	
Q1708	TRANSISTOR: germanium; PNP	2N2001
R1701	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, ±5%, 1/2 watt	RC20GF223J
R1702	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±5%, 1/2 watt	RC20GF103J
R1703	NOT USED	
R1704	RESISTOR, FIXED, COMPOSITION: 4,700 ohms, ±5%, 1/2 watt	RC20GF472J
R1705	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±5%, 1/2 watt	RC20GF222J
R1706	Same as R1702	
R1707	Same as R1705	
R1708	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±5%, 1/2 watt	RC20GF683J
R1709	Same as R1702	
R1710	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ±5%; 1/2 watt	RC20GF332J
R1711	Same as R1710	
R1712	RESISTOR, FIXED, COMPOSITION: 220 ohms, ±5%; 1/2 watt	RC20GF221J
R1713	Same as R1702	
R1714	Same as R1702	

TRANSMITTER AF BOARD, A10540
SYMBOL SERIES 1700

Ref Symbol	Description	TMC Part Number
R1715	RESISTOR, FIXED, COMPOSITION: 8,200 ohms, ±5%, 1/2 watt	RC20GF822J
R1716	RESISTOR, FIXED, COMPOSITION: 3,900 ohms, ±5%, 1/2 watt	RC20GF392J
R1717	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±5%, 1/2 watt	RC20GF102J
R1718	RESISTOR, VARIABLE, COMPOSITION: 500 ohms, ±10%; nom. power rating 0.25 watts at 70°C	RV111U501A
R1719	RESISTOR, VARIABLE, COMPOSITION: 250,000 ohms, ±10%; nom. power rating 0.25 watt at 70°C	RV111U254A
R1720	RESISTOR, FIXED, COMPOSITION: 1.5 megohms, ±5%; 1/2 watt	RC20GF155J
R1721	NOT USED	
R1722	Same as R1702	
R1723	RESISTOR, FIXED, COMPOSITION: 5,600 ohms, ±5%; 1/2 watt	RC20GF562J
R1724	Same as R1704	
R1725	Same as R1702	
R1726	Same as R1717	
R1727	Same as R1723	
R1728	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±5%; 1/2 watt	RC20GF104J
R1729	RESISTOR, FIXED, COMPOSITION: 150,000 ohms, ±5%; 1/2 watt	RC20GF154J
R1730	Same as R1704	
R1731	Same as R1705	
R1732	Same as R1715	
R1733	Same as R1729	

TRANSMITTER AF BOARD, A10540
SYMBOL SERIES 1700

Ref Symbol	Description	TMC Part Number
R1734	RESISTOR, FIXED, COMPOSITION: 33 ohms, ±5%; 1 watt	RC32GF330J
R1735	Same as R1729	
R1736	RESISTOR, FIXED, COMPOSITION: 56,000 ohms, ±5%, 1/2 watt	RC20GF563J
R1774	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±5%; 1/2 watt	RC20GF101J
T1701	TRANSFORMER, AUDIO FREQUENCY:	TF267-4
T1702	TRANSFORMER, AUDIO FREQUENCY:	TF246-17Z

TRANSMITTER IF BOARD, A10603
SYMBOL SERIES 1800

Ref Symbol	Description	TMC Part Number
C1801	CAPACITOR, FIXED, CERAMIC: .01 uf, 500 WVDC	CC100-16
C1802	Same as C1801	
C1803	CAPACITOR, FIXED, MICA: 22pf, ±5%, 500 WVDC	CM111C220J1S
C1804	CAPACITOR, VARIABLE, CERAMIC: 9-35 pf, 100 WVDC	CV112-2
C1805	Same as C1803	
C1806	Same as C1804	
C1807	CAPACITOR, FIXED, MICA: 1,000 pf, ±5%, 500 WVDC	CM111C102J1S
C1808	Same as C1807	
C1809	CAPACITOR, FIXED, MICA: 47 pf, ±5%, 500 WVDC	CM111C470J1S
C1810	CAPACITOR, VARIABLE, CERAMIC: 10-75 pf, 350 WVDC	CV109-8
C1811	Same as C1810	
C1812	CAPACITOR, FIXED, CERAMIC: .2 uf, + 80%-20%, 25 WVDC	CC100-33
C1813	Same as C1807	
C1814	Same as C1801	
C1815	Same as C1807	
C1816	Same as C1807	
C1817	Same as C1812	
C1818	Same as C1807	
C1819	CAPACITOR, FIXED, MICA: 100 pf, ±5%, 500 WVDC	CM111C101J1S
C1820	Same as C1801	
CR1801	DIODE	1N34A
CR1802 thru CR1808	Same as CR1801	

TRANSMITTER IF BOARD, A10603
SYMBOL SERIES 1800

Ref Symbol	Description	TMC Part Number
FL1801	FILTER: 1750.300 to 1753.000 kHz bandpass (for LSB transmission by STEA-1A)	FX10014-1
FL1802	FILTER: 1747.000 to 1749.000 kHz bandpass (for USB transmission by STEA-1A)	FX10014-2
L1801	COIL, RF, FIXED: 1,000 uh	CL275-102
L1802 thru L1805	Same as L1801	
Q1801	TRANSISTOR	2N3904
Q1802	Same as Q1801	
Q1803	Same as Q1801	
Q1804	TRANSISTOR	MPF104
Q1805 thru Q1808	Same as Q1804	
R1801	RESISTOR, FIXED, COMP: 1000 ohms, ±5%, 1/2 watt	RC20GF102J
R1802 thru R1812	Same as R1801	
R1813	RESISTOR, VARIABLE, COMP: 1000 ohms, ±10%	RV111U102A
R1814	Same as R1813	
R1815	RESISTOR, FIXED, COMP: 330 ohms, ±5%, 1/2 watt	RC20GF331J
R1816 thru R1818	Same as R1815	
R1819	RESISTOR, FIXED, COMP: 3300 ohms, ±5%, 1/2 watt	RC20GF332J
R1820	Same as R1819	
R1821	RESISTOR, FIXED, COMP: 470 k ohms, ±5%, 1/2 watt	RC20GF474J
R1822	RESISTOR, FIXED, COMP: 47 ohms, ±5%, 1/2 watt	RC20GF470J

TRANSMITTER IF BOARD, A10603
SYMBOL SERIES 1800

Ref Symbol	Description	TMC Part Number
C1801	CAPACITOR, FIXED, CERAMIC: .01 uf, 500 WVDC	CC100-16
C1802	Same as C1801	
C1803	CAPACITOR, FIXED, MICA: 22pf, ±5%, 500 WVDC	CM111C220J1S
C1804	CAPACITOR, VARIABLE, CERAMIC: 9-35 pf, 100 WVDC	CV112-2
C1805	Same as C1803	
C1806	Same as C1804	
C1807	CAPACITOR, FIXED, MICA: 1,000 pf, ±5%, 500 WVDC	CM111C102J1S
C1808	Same as C1807	
C1809	CAPACITOR, FIXED, MICA: 47 pf, ±5%, 500 WVDC	CM111C470J1S
C1810	CAPACITOR, VARIABLE, CERAMIC: 10-75 pf, 350 WVDC	CV109-8
C1811	Same as C1810	
C1812	CAPACITOR, FIXED, CERAMIC: .2 uf, + 80%-20%, 25 WVDC	CC100-33
C1813	Same as C1807	
C1814	Same as C1801	
C1815	Same as C1807	
C1816	Same as C1807	
C1817	Same as C1812	
C1818	Same as C1807	
C1819	CAPACITOR, FIXED, MICA: 100 pf, ±5%, 500 WVDC	CM111C101J1S
C1820	Same as C1801	
CR1801	DIODE	1N34A
CR1802 thru CR1808	Same as CR1801	

TRANSMITTER IF BOARD, A10603
SYMBOL SERIES 1800

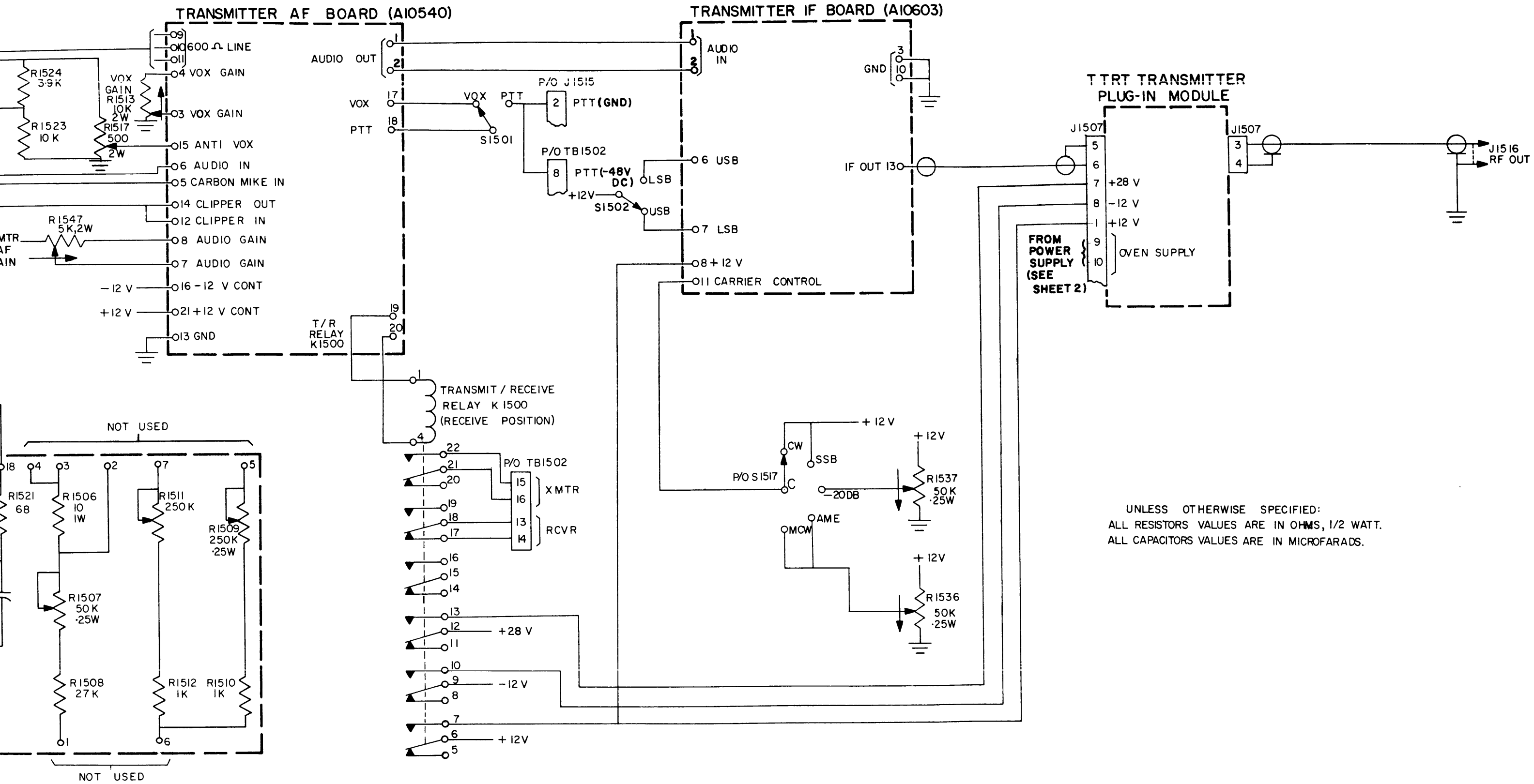
Ref Symbol	Description	TMC Part Number
FL1801	FILTER: 1750.300 to 1753.000 kHz bandpass (for LSB transmission by STEA-1A)	FX10014-1
FL1802	FILTER: 1747.000 to 1749.000 kHz bandpass (for USB transmission by STEA-1A)	FX10014-2
L1801	COIL, RF, FIXED: 1,000 uh	CL275-102
L1802 thru L1805	Same as L1801	
Q1801	TRANSISTOR	2N3904
Q1802	Same as Q1801	
Q1803	Same as Q1801	
Q1804	TRANSISTOR	MPF104
Q1805 thru Q1808	Same as Q1804	
R1801	RESISTOR, FIXED, COMP: 1000 ohms, ±5%, 1/2 watt	RC20GF102J
R1802 thru R1812	Same as R1801	
R1813	RESISTOR, VARIABLE, COMP: 1000 ohms, ±10%	RV111U102A
R1814	Same as R1813	
R1815	RESISTOR, FIXED, COMP: 330 ohms, ±5%, 1/2 watt	RC20GF331J
R1816 thru R1818	Same as R1815	
R1819	RESISTOR, FIXED, COMP: 3300 ohms, ±5%, 1/2 watt	RC20GF332J
R1820	Same as R1819	
R1821	RESISTOR, FIXED, COMP: 470 k ohms, ±5%, 1/2 watt	RC20GF474J
R1822	RESISTOR, FIXED, COMP: 47 ohms, ±5%, 1/2 watt	RC20GF470J

TRANSMITTER IF BOARD, A10603
SYMBOL SERIES 1800

Ref Symbol	Description	TMC Part Number
R1823	RESISTOR, FIXED, COMP: 100 k ohms, ±5%, 1/2 watt	RC20GF104J
R1824	RESISTOR, FIXED, COMP: 15 k ohms, ±5%, 1/2 watt	RC20GF153J
R1825	RESISTOR, FIXED, COMP: 10 k ohms, ±5%, 1/2 watt	RC20GF103J
R1826	Same as R1822	
R1827	RESISTOR, FIXED, COMP: 6.8 k ohms, ±5%, 1/2 watt	RC20GF682J
R1828	RESISTOR, FIXED, COMP: 10 ohms, ±5%, 1/2 watt	RC20GF100J
R1829	Same as R1801	
R1830	Same as R1819	
R1831	Same as R1824	
R1832	Same as R1815	
T1801	TRANSFORMER, RF	TZ10001
Y1801	QUARTZ, CRYSTAL: 1750 kHz	CR10008-1. 750000 MHz
Z1801	OSCILLATOR, OVEN, TEMPERATURE COMPENSATED: 0°C to 50°C; 12 Vdc regulated (max.); 10 m amps.	NF10002

SECTION 7

SCHEMATIC DIAGRAMS



UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS VALUES ARE IN OHMS, 1/2 WATT.
ALL CAPACITORS VALUES ARE IN MICROFARADS.

MATIC DIAGRAM SIDEBAND STRIP EXCITER STEA-IA

FIGURE 7-3, (sht. 1 of 2)

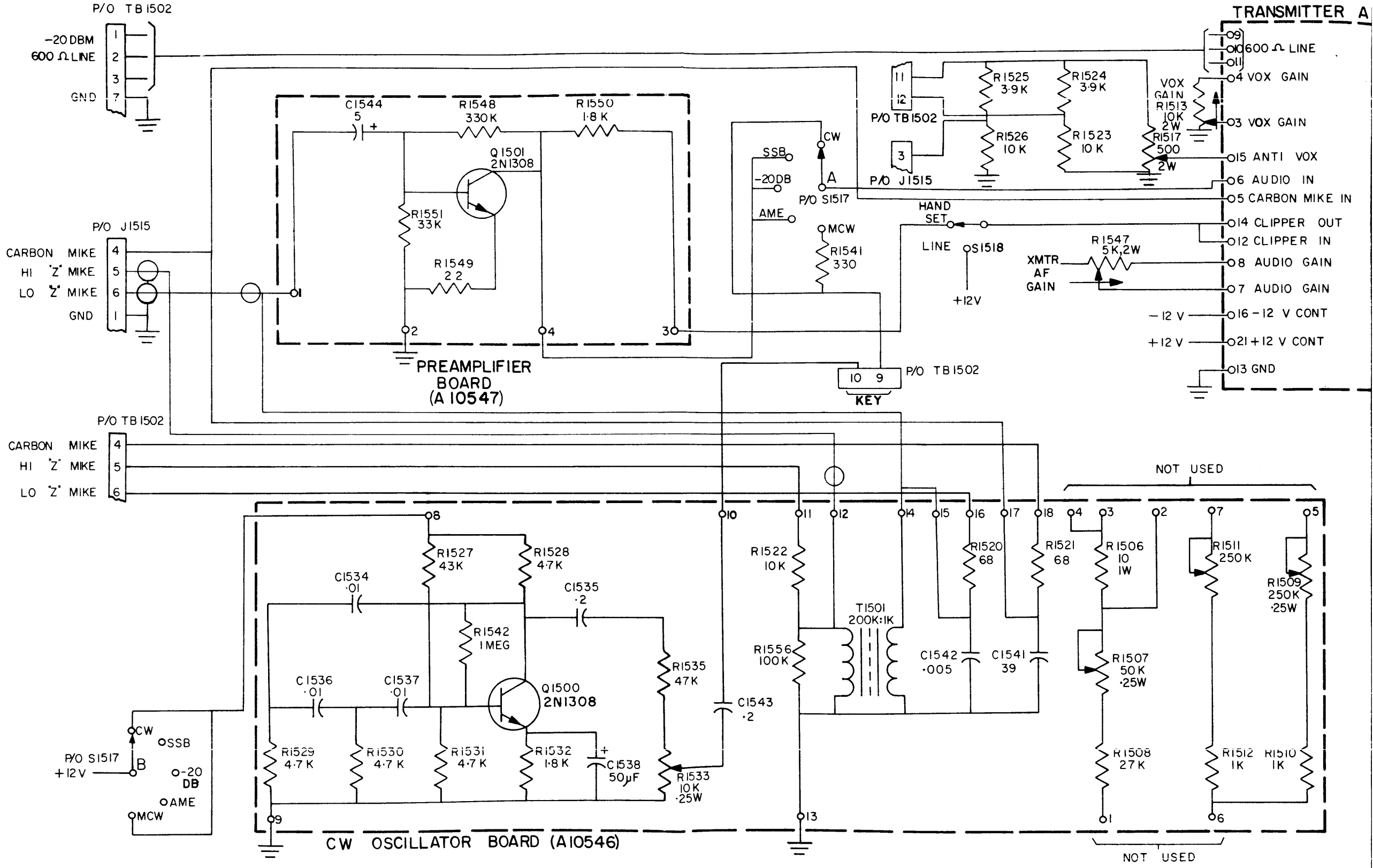
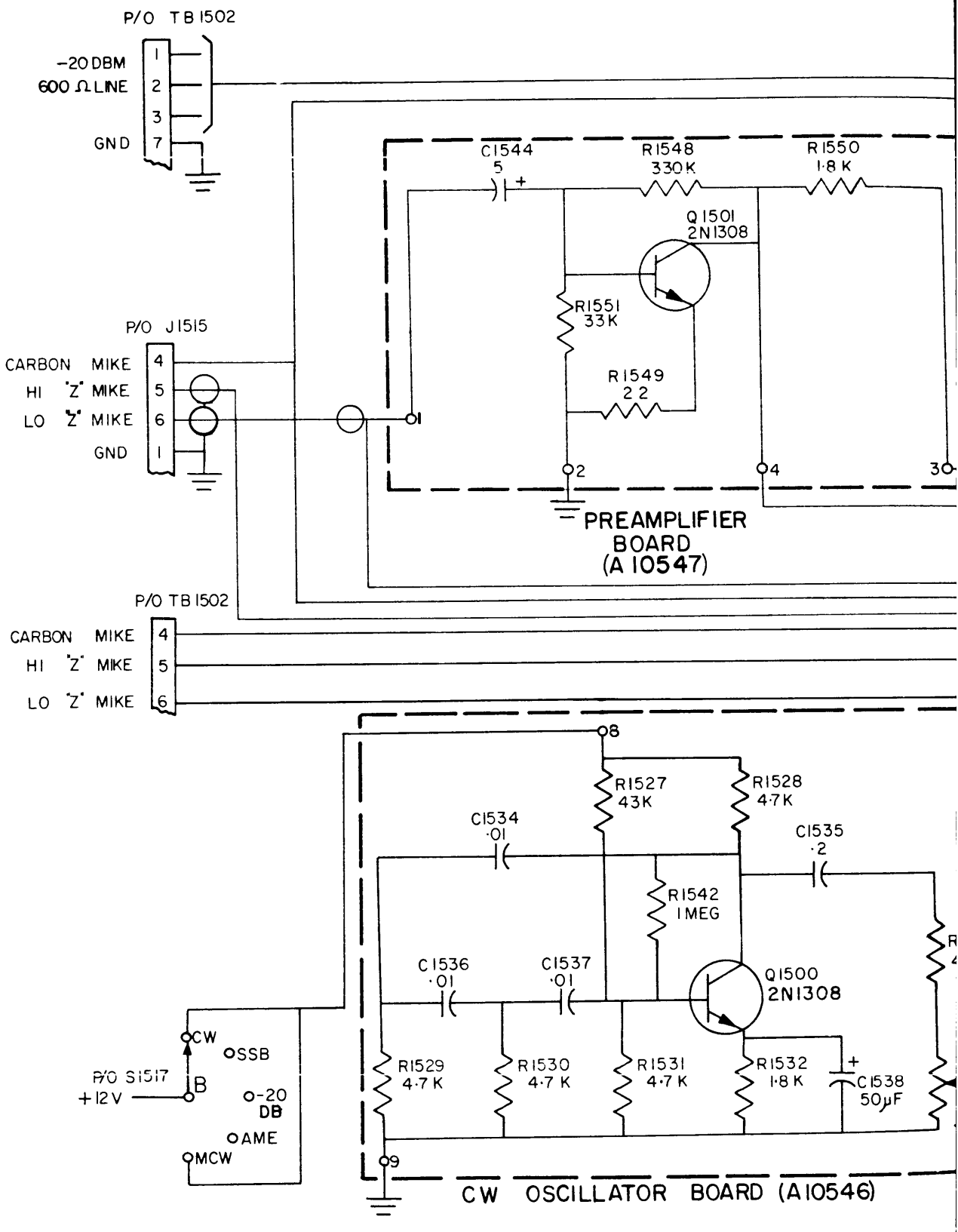
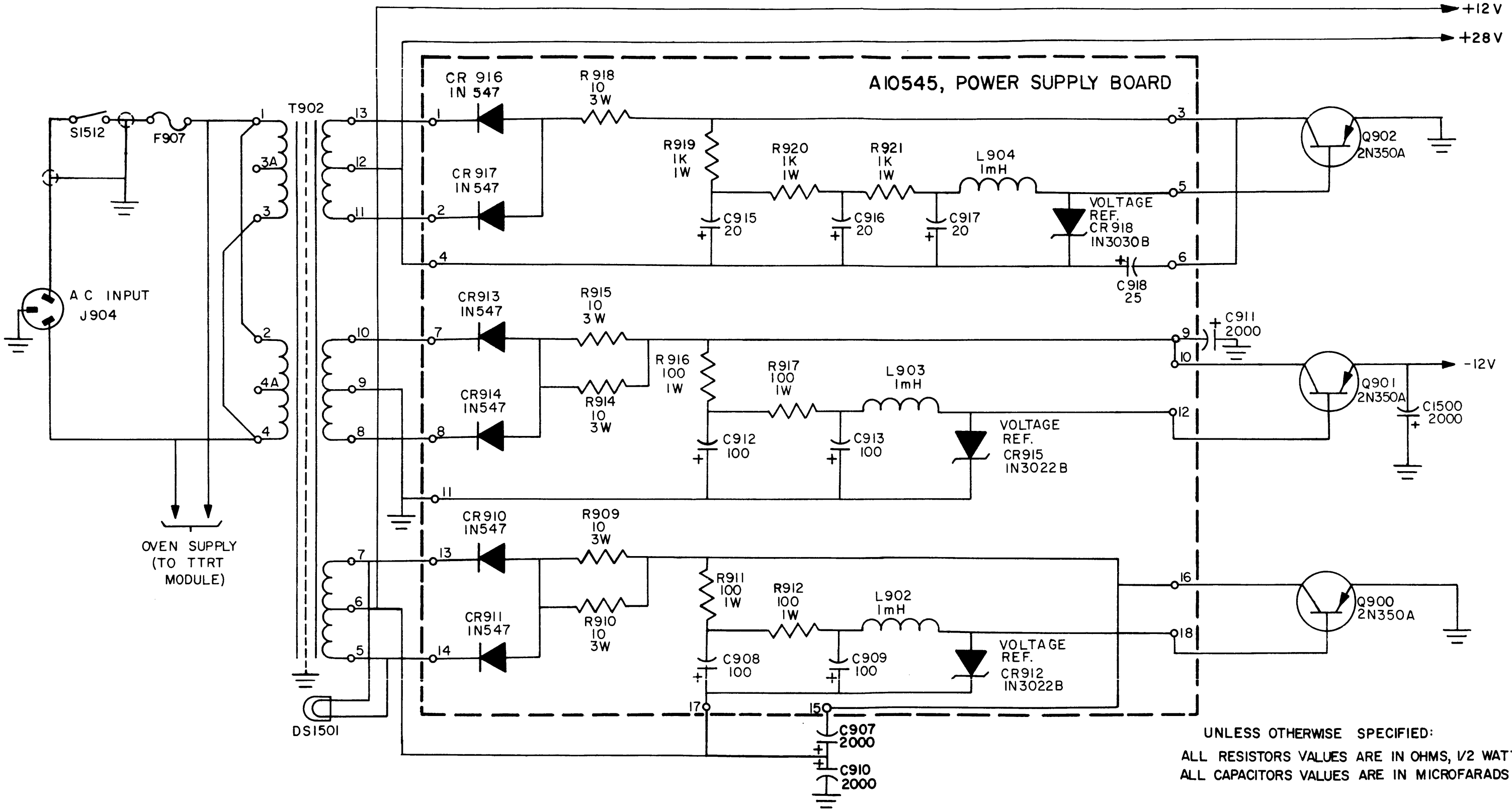


Figure 7-1,(sht.1of 2) SCHEMATIC DIAGRAM SIDEBA

1016810060


P/O TB 1502
-20 DBM
600 Ω LINE
GND
1
2
3
7
C1544
5
+
R1548
330K
R1550
1·8 K
Q1501
2N1308
R1551
33K
R1549
22
P/O J1515
CARBON MIKE
HI "Z" MIKE
LO "Z" MIKE
GND
4
5
6
1
1
2
4
3
PREAMPLIFIER
BOARD
(A 10547)
P/O TB 1502
CARBON MIKE
HI "Z" MIKE
LO "Z" MIKE
4
5
6
8
R1527
43K
R1528
4·7K
C1534
·01
C1535
·2
R1542
1 MEG
C1536
·01
C1537
·01
Q1500
2N1308
R1529
4·7 K
R1530
4·7 K
R1531
4·7 K
R1532
1·8 K
+
C1538
50μF
CW
SSB
P/O S1517
+12 V
B
-20
DB
AME
MCW
9
CW OSCILLATOR BOARD (A10546)

1016810060



1016810060

SCHEMATIC DIAGRAM, SIDEBAND STRIP EXCITER STEA-1A

FIGURE 7-5
SHEET 2 OF 2

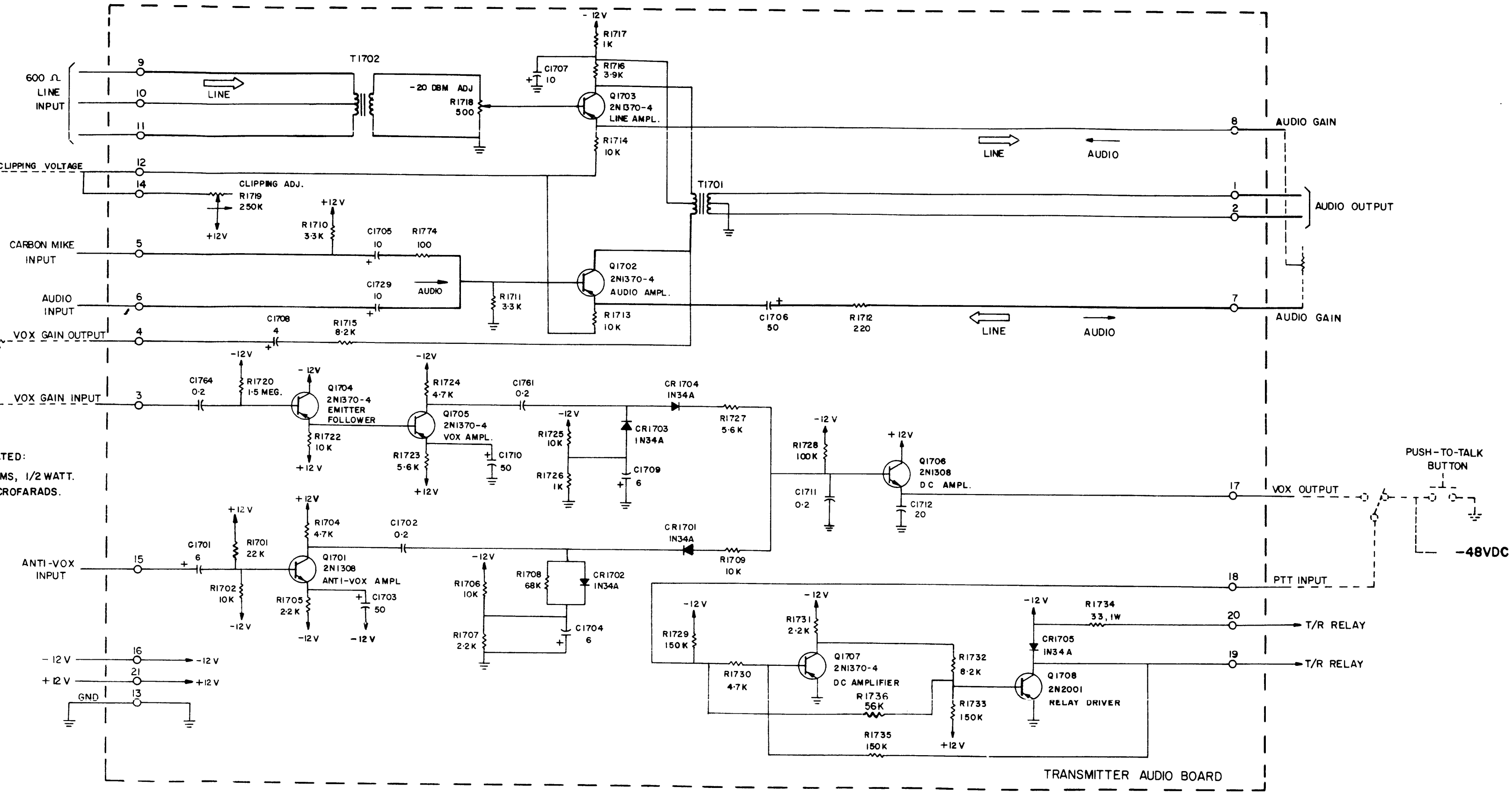
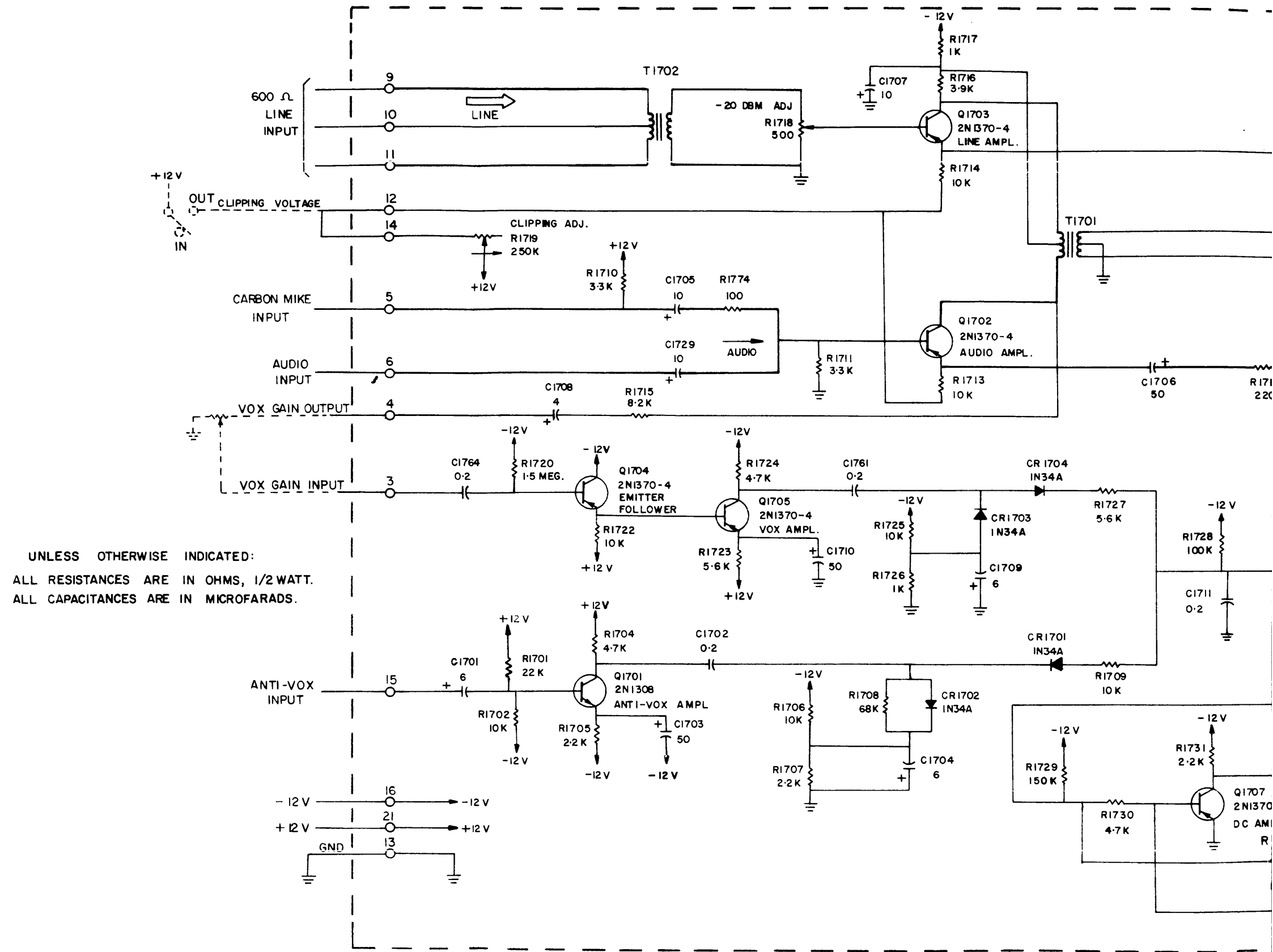


FIGURE 7-7. SCHEMATIC DIAGRAM, TRANSMITTER AF BOARD STEA-IA



UNLESS OTHERWISE INDICATED:

ALL RESISTANCES ARE IN OHMS, 1/2 WATT.

ALL CAPACITANCES ARE IN MICROFARADS.

1016810060

NOTES: 1. FL1801 IS FX10014-1 (1750.3 – 1753.0 kHz)
2. FL1802 IS FX10014-2 (1747.0 – 1749.7 kHz)
3. FL1801 REMOVED FOR "USB TRANSMISSION ONLY" APPLICATION
4. FL1802 REMOVED FOR "LSB TRANSMISSION ONLY" APPLICATION

CR1802 IN34A
R1804 1K
CR1803 IN34A
R1805 1K
R1811 1K
R1813 1K
C1803 22
C1804 9-35
R1815 330
R1816 330
IN FL1801 OUT
R1819 33K
R1821 470K
L1801 1mH
R1823 100K
C1810 10-75
C1809 47
T1801
13 IF OUT
R1827 6.8K
C1807 1000
Q1801 2N3904
C1808 1000
Q1802 2N3904
Y1801 1750 KHz
Q1803 2N3904
Q1804 MPF 104
12 ALDC (NOT USED)
R1824 15K
R1822 47
R1820 3.3K
R1825 10K
R1826 47
C1811 10-75
C1812 .2μF
R1828 10
C1813 1000
CR1806 IN34A
R1808 1K
CR1807 IN34A
R1809 1K
R1812 1K
R1814 1K
C1805 22
C1806 9-35
R1817 330
R1818 330
IN FL1802 OUT
R1832 330
8 +12 V
L1804 1mH
C1817 .2μF
Q1805 MPF 104
Q1806 MPF 104
L1802 1mH
L1803 1mH
C1818 1000
Q1807 MPF 104
Q1808 MPF 104
4
5
NOT USED
C1815 1000
C1816 1000
R1829 1K
R1830 3.3K
OUTPUT
+12VDC
Z1801 1750 KHz OSCILLATOR
TPVI
COMMON
L1805 1mH
C1819 100
C1820 .01μF
R1831 15K
3
10
GND

UNLESS OTHERWISE INDICATED
ALL CAPACITANCES IN pF
ALL RESISTANCES IN OHMS, 1/2 WATT

TRANSMITTER IF BOARD

FIGURE 7-3. SCHEMATIC DIAGRAM, TRANSMITTER IF BOARD, STEA-1A

FIGURE 7-9.

NOTES: 1. FL 1801 IS FX10014-1 (1750.3 – 1753.0 kHz)
2. FL 1802 IS FX10014-2 (1747.0 – 1749.7 kHz)
3. FL 1801 REMOVED FOR "USB TRANSMISSION
4. FL 1802 REMOVED FOR "LSB TRANSMISSION

AUDIO 2
C1801 ·01µF
C1802 ·01µF
R1801 1K
R1802 1K
R1803 1K
CR1801 IN34A
CR1802 IN34A
R1804 1K
R1805 1K
R1806 1K
CR1803 IN34A
CR1804 IN34A
R1807 1K
R1808 1K
CR1805 IN34A
CR1806 IN34A
R1809 1K
R1810 1K
CR1807 IN34A
CR1808 IN34A
R1811 1K
R1812 1K
R1813 1K
R1814 1K
C1803 22
C1804 9-35
C1805 22
C1806 9-35
R1815 330
R1816 330
R1817 330
R1818 330
FL 1801 IN OUT
FL 1802 IN OUT
R1819 33K
R1820 3.3K
R1821 470K
R1822 47
R1824 15K
R1825 10K
L1801 1mH
R1823 100K
C1810 10-75
C1807 1000
C1808 1000
Q1801 2N3904
Q1802 2N3904
L1804 1mH
C1817 ·2µF
Q1805 MPF 104
Q1806 MPF 104
Q1807 MPF 104
L1802 1mH
L1803 1mH
C1814 ·01µF
C1815 1000
C1816 1000
R1829 1K
R1830 3.3K
USB 6
LSB 7
OVEN SUPPLY (NOT USED) 9
CARR CONTROL 11
+12VDC
OUTPUT
TPVI
COMMON
Z1801 1750 KHz OSCILLATOR
L1805 1mH

TRANSMITTER IF BOARD

1016810060

FIGURE 7-3. SCHEMATIC DIAGRAM, TRANSMITTER IF BOARD, STE